

Feb. 6, 1968

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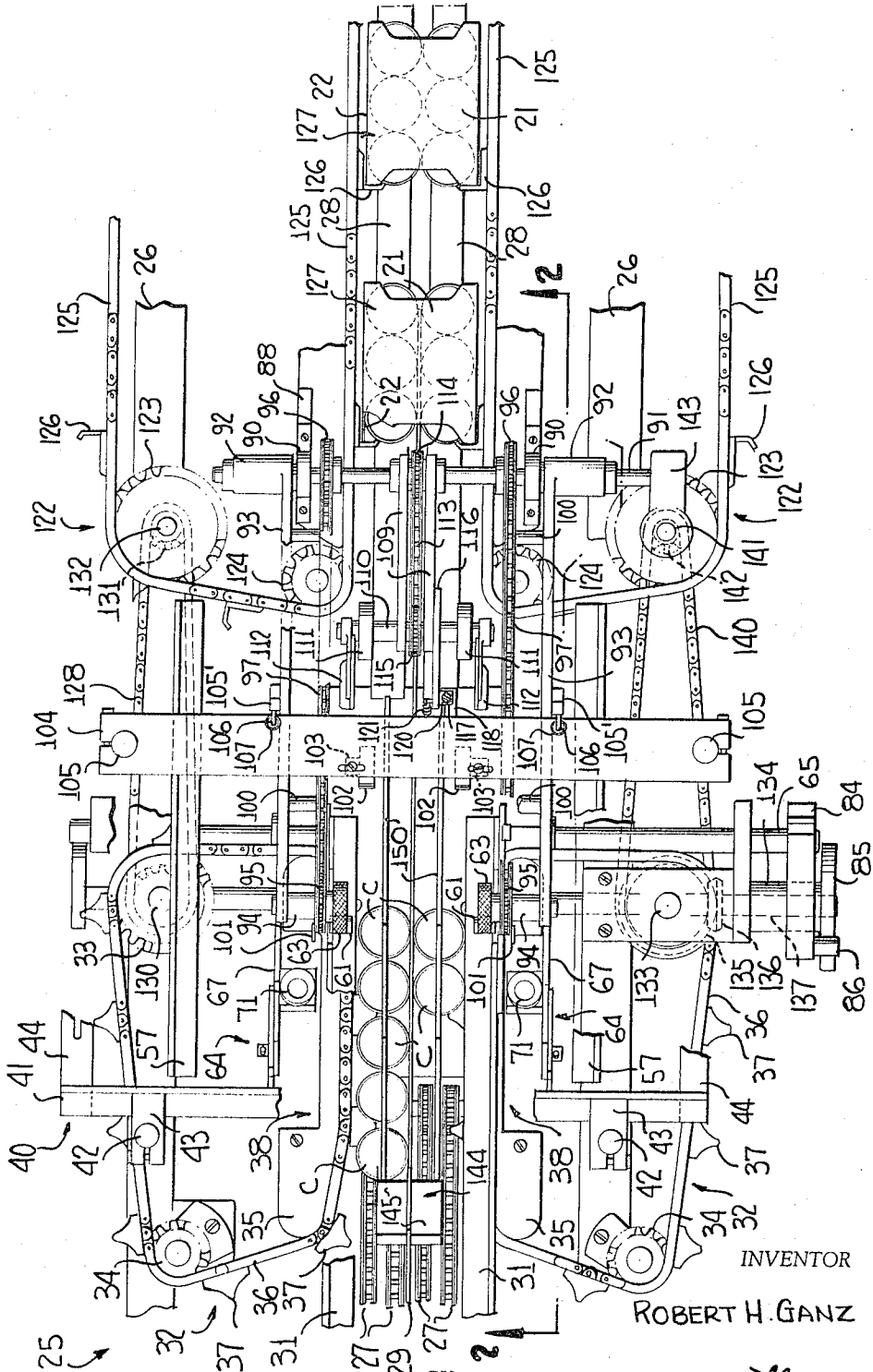
3,367,086

PACKAGE FORMING MACHINE

Filed May 28, 1964

7 Sheets-Sheet 1

FIG. 1



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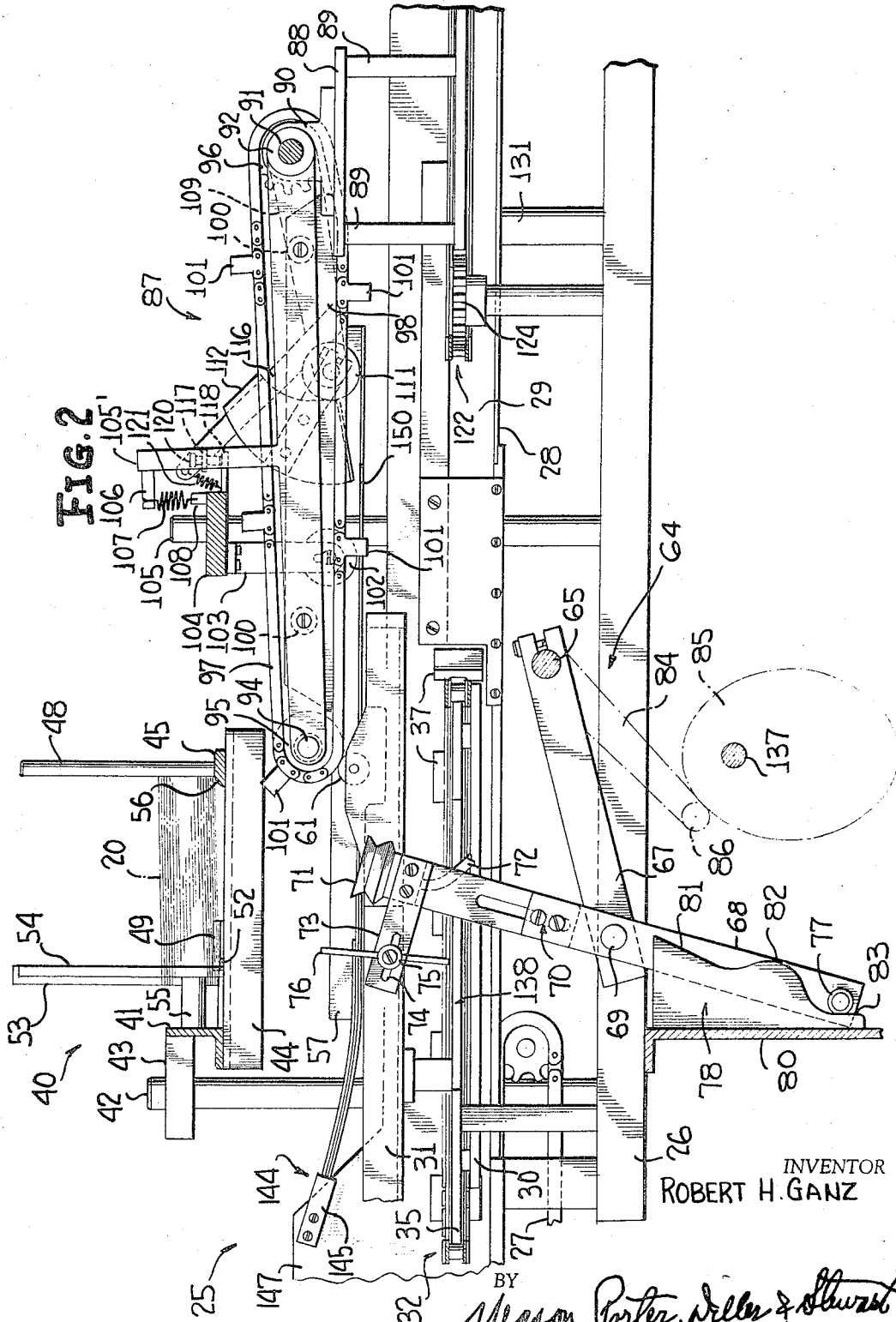
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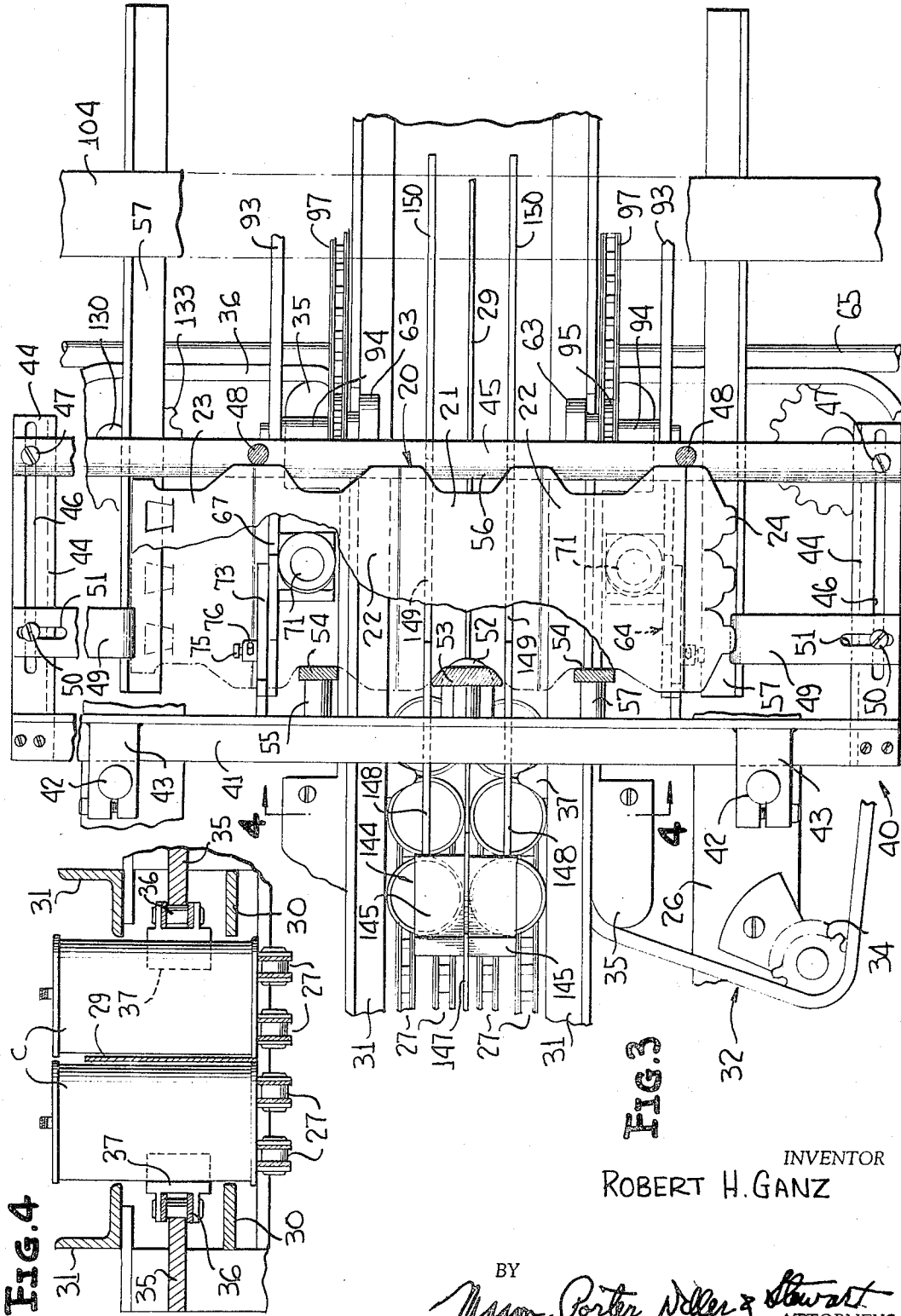


Fig. 4

Fig. 3

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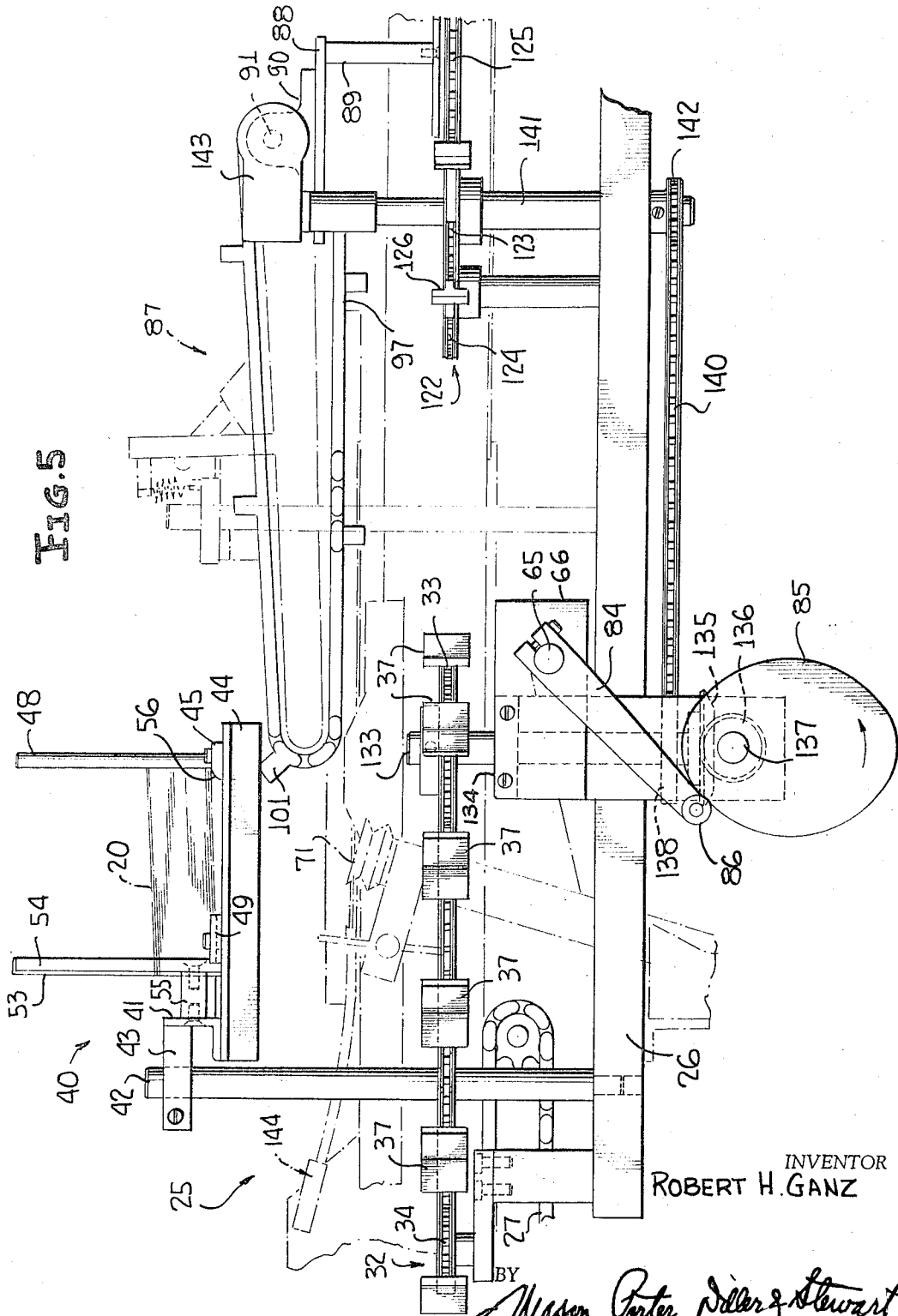
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FIG. 5



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PACKAGE FORMING MACHINE

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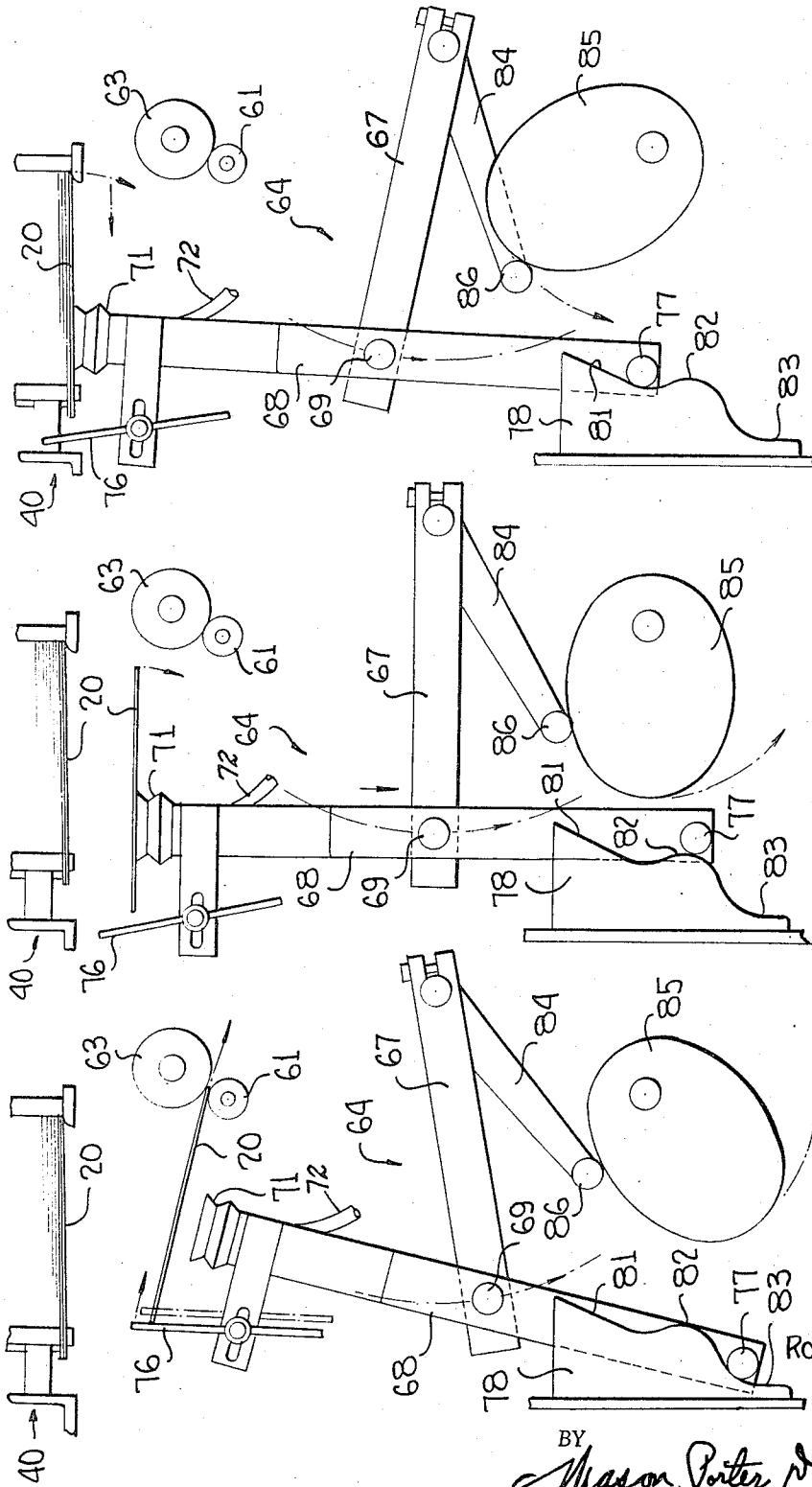


FIG. 6

FIG. 7

FIG. 8

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PACKAGE FORMING MACHINE

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FIG. 9

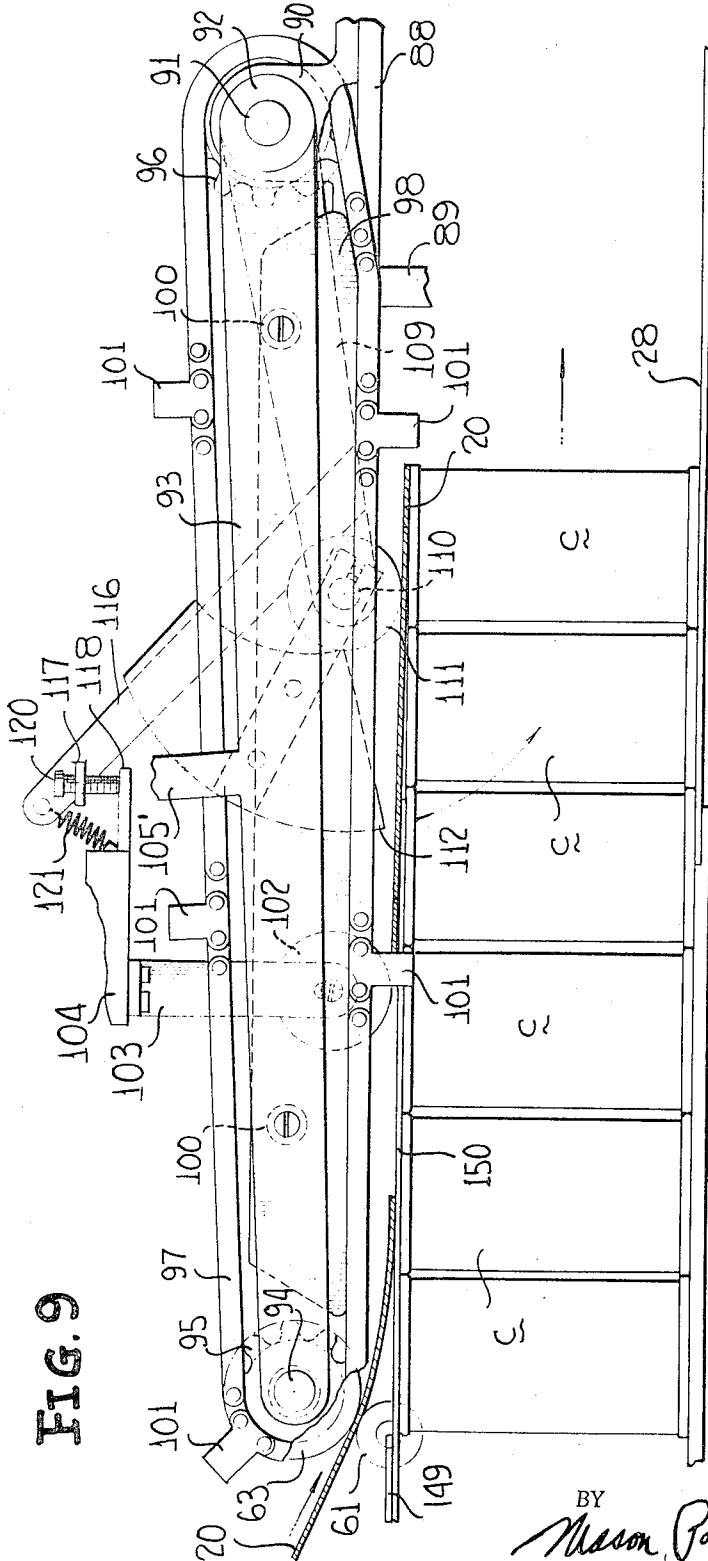
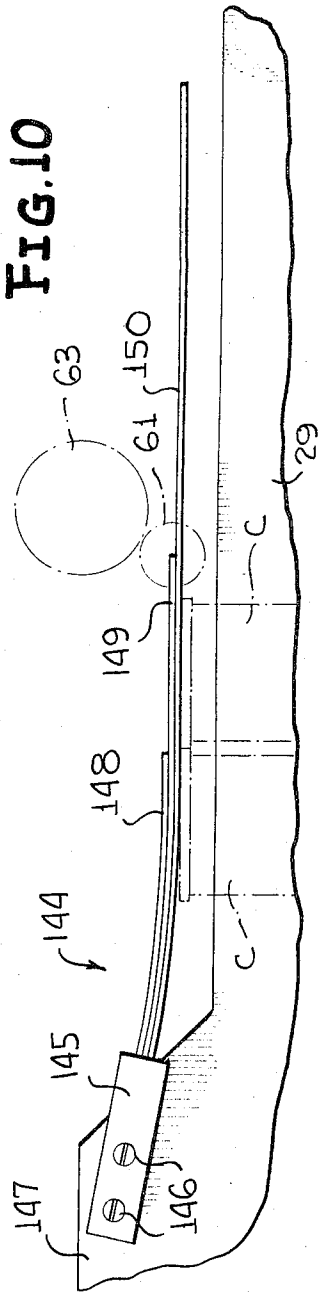


FIG. 10



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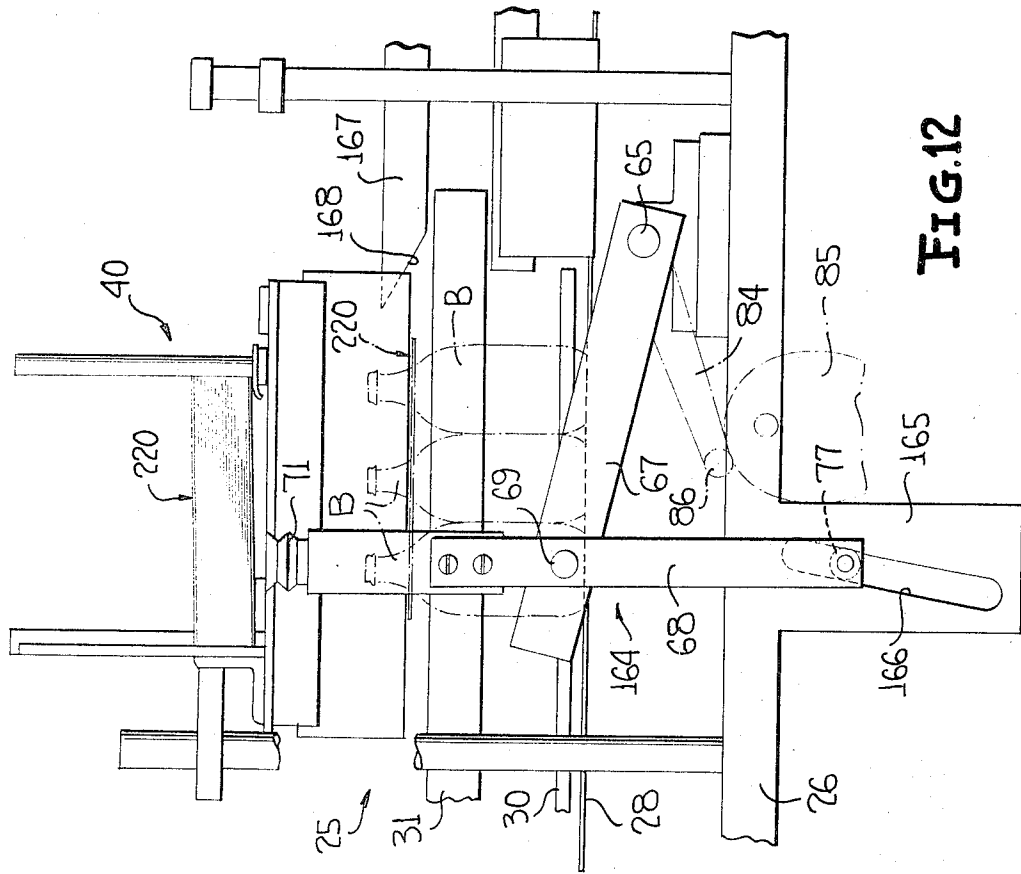


FIG. 12

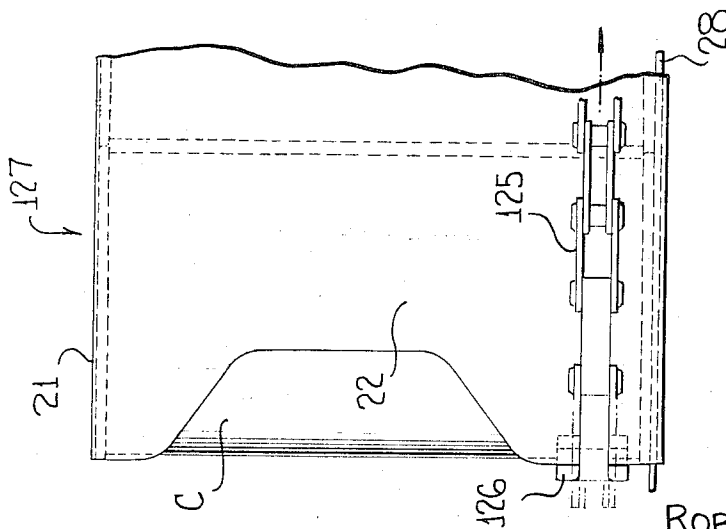


FIG. 11

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3,367,086  
**PACKAGE FORMING MACHINE**  
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 Filed May 28, 1964, Ser. No. 370,854  
 22 Claims. (Cl. 53—48)

**ABSTRACT OF THE DISCLOSURE**

A machine is provided which utilizes a suction gripper to remove a lowermost blank in a stack of blanks disposed within a hopper, the blank being moved rearwardly to a position free of a forward lip of the hopper, the blank then being moved forwardly and being placed between feed rolls, with the aid of a pusher. Specially designed cams provide the desired motion for the blank gripper. The blanks are then placed overtop groups of containers and are folded thereabout, by means mounted on a floating support. Containers being conveyed through the machine, prior to wrapping of blanks around the containers are retained in desired positions free of can chime-up by means of progressive strap-type leaf springs engageable with can ends.

This invention relates in general to new and useful improvements in package forming machines, and more particularly to a machine which is particularly adapted for wrapping a carton blank around a plurality of containers wherein the resultant carton and the containers form together a readily carriable package.

In the usual package forming machine of the type to which this invention relates, containers, primarily cans and bottles, are fed in two rows with the containers in transverse alignment. A blank is then fed into overlying relation with respect to a predetermined number of the containers, after which the blank is folded around the containers and secured together therebeneath with the containers being interlocked with the carton. Previous machines have several deficiencies. These include the problem of feeding carton blanks in unison with the movement of the containers to assure the proper alignment of the carton blanks with the containers. When the containers are in the form of cans, the double seams or chimes of longitudinally adjacent cans in the rows have a tendency to ride up upon one another so that the cans are not properly positioned for being received within the carton. It is the primary object of this invention to overcome these deficiencies.

In accordance with this invention, the riding up of the seams or chimes of cans one upon another in a longitudinal direction has been solved in a simple manner by merely providing spring type hold down members. These spring type hold down members are preferably curved by a center divider strip between the two rows of cans and are of a laminated construction whereby the thickness and stiffness of the hold down members gradually decrease as the cans are being brought back into proper alignment.

Another object of this invention is to provide suitable hold down members for preventing the riding up of seams or chimes of adjacent cans in rows, the hold down members being of a construction whereby they may be positioned between cans and mechanism for feeding carton blanks into overlying engagement with the cans so that the hold down members in no way interfere with the process of applying cartons to the cans.

In accordance with this invention, it has been proposed to solve the problem of feeding carton blanks to moving containers by providing an overhead hopper for the carton blanks from which the bottommost carton blank may be readily removed, a suitable mechanism for first withdrawing the carton blank from the hopper and then mov-

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ing the carton blank at the same rate as the rate of movement of associated containers and in timed relation thereto so that accurate and positive positioning of the carton blanks with respect to containers is assured.

Another object of this invention is to provide a novel carton blank feed mechanism which is suitable for removing carton blanks from a hopper, the feed mechanism including an upstanding support which is carried by a generally horizontal swing arm which is mounted for vertical oscillatory movement, the support being pivotally connected to the swing arm for swinging about a horizontal axis and having the lower end thereof associated with a suitable guide structure to effect the rocking of the support as it is swung by the swing arm, and the support carrying suitable carton blank gripping means at the upper end thereof.

A further object of this invention is to provide a novel carton feed and applying unit which includes a transverse rotating shaft, a frame pivotally mounted on the shaft in overlying relation to the path of containers, the frame having remote from the shaft a feed roll which cooperates with an idler feed roll, a drive mechanism driving the feed roll from the rotating shaft, the drive mechanism including an endless chain having carton blank pushers carried thereby to assure the uniform positioning and movement of carton blanks, the rotating shaft also supporting a carton blank hold down and folding mechanism to initiate the application of a carton blank to a plurality of containers and forming an interlock between the carton blank and the containers whereby the feeding of the carton blank also results in the feeding of the containers.

Yet another object of this invention is to provide a novel take away conveyor structure which is specifically configured for engaging both a carton and containers disposed therein and for exerting a pressure on the carton and containers to effect the movement thereof away from the package forming machine.

With the above and other objects in view that will hereinafter appear, the nature of the invention will be more clearly understood by reference to the following detailed description, the appended claims and the several views illustrated in the accompanying drawings:

In the drawings:

FIGURE 1 is a plan view of a package forming machine in accordance with this invention, only the specific details of those features of the machine which are parts of this invention being fully illustrated.

FIGURE 2 is an enlarged fragmentary longitudinal vertical sectional view taken along the line 2—2 of FIGURE 1 and shows more specifically the details of the carton blank feeding and applying mechanism.

FIGURE 3 is an enlarged fragmentary horizontal sectional view of the machine in the vicinity of the carton blank hopper and shows the specific details of construction of the hopper.

FIGURE 4 is an enlarged fragmentary transverse vertical sectional view taken along the line 4—4 of FIGURE 3 and shows the specific manner in which cans are fed along a predetermined path in two rows.

FIGURE 5 is a schematic longitudinal vertical view showing the drive mechanism for the various components of the machine which are believed to be novel.

FIGURES 6, 7 and 8 are schematic longitudinal elevational views showing steps in the sequence of removing a carton blank from a hopper and transferring the carton blank to feed rolls.

FIGURE 9 is an enlarged fragmentary longitudinal sectional view taken generally through the center of the machine and shows the specific manner in which carton blanks are delivered to a plurality of cans and the manner in which the spacing of the carton blanks is maintained.

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FIGURE 10 is an enlarged fragmentary longitudinal vertical sectional view showing the manner in which the spring hold down is carried by the central divider.

FIGURE 11 is an enlarged fragmentary side elevational view showing the manner in which the take away conveyor engages both the carton and a can of a completed package.

FIGURE 12 is an enlarged fragmentary side elevational view of a modified form of machine particularly adapted for forming packages wherein the containers are in the form of bottles.

In order to provide for a full understanding of the operation of the machine of this invention without going into details with respect to all of the necessary features for forming a package from a plurality of containers and a carton blank, the general function of the machine which is the subject of this invention is set forth here. The containers to be packaged are fed into the machine in two rows disposed in closely spaced, but definitely separated, relation. Transversely adjacent containers are then brought into alignment and fed in unison through the machine. With the containers being properly fed at a predetermined rate, a carton blank is provided and is positioned in overlying relation to the containers. When the containers are in the form of bottles, the carton blank is provided with openings for the necks of the bottles and the central part of the carton blank is merely slipped over the necks of the bottles. This solves the problem of alignment. When the containers are cans and the like, the central portion of the carton blank is seated in overlying relation with respect to the containers, after which the outer portions of the blank as folded down alongside the containers and at this time interlocks are formed between the containers and the partially formed carton. The containers and the carton now move in unison into a mechanism wherein the bottom panels of the carton are folded beneath the containers and are interlocked in a manner which is not a part of this invention. For a description of the apparatus for interlocking the bottom panels of a carton, reference is made to Patent No. 2,986,857, granted on June 6, 1961.

Reference is now made to FIGURE 3 in particular wherein there is illustrated a carton blank, generally referred to by the numeral 20 for which the machine of this invention is particularly adapted although the machine may be slightly modified to utilize other carton blanks. The carton blank 20 generally corresponds to the carton blank shown in Patent No. 2,986,857 and differs therefrom primarily in the scalloped edge configuration thereof. It is to be noted that the carton blank 20 includes a centrally located top panel 21, a pair of next adjacent side panels 22 and a pair of outer bottom forming panels 23 and 24. The bottom forming panels 23 and 24 are provided with interlocking means of the type broadly shown and described in Patent No. 2,988,857. Further description is believed to be unnecessary here in that this invention has nothing to do with the manner in which the bottom forming panels 23 and 24 are interlocked.

The package forming machine is generally referred to by the numeral 25 and includes a suitable frame structure 26. The machine 25, at the left end thereof, is provided with pairs of conveyor chains 27 which are disposed in generally side-by-side relation. The conveyor members 27 are arranged to support and feed from left to right two rows of containers, principally cans C. The cans C are delivered from the conveyor members 27 onto elongated strap like supports 28. During the movement of the cans C both on the conveyor members 27 and the supports 28, they are guided along two predetermined paths. The guiding of the cans C is accomplished by a central divider 29, which is vertically disposed, and outer guides. The outer guides, as is best shown in FIGURE 4, include a pair of lower guide bars 30 and a pair of upper guide members 31 which are angular in cross section.

It is desired that transversely adjacent cans be disposed

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in alignment and that the cans be properly spaced. To this end, on each side of the paths of can movement there is provided a feed conveyor, generally referred to by the numeral 32, there being one feed conveyor 32 for each row of cans. The feed conveyor 32 includes simply a drive sprocket 33 and an idler sprocket 34 which are spaced from the path of the cans. Adjacent the path of cans there is provided an elongated guide bar 35. An endless chain 36 passes around the sprockets 33 and 34 and over the guide surface of the guide bar 35 with that portion of the endless chain 36 passing along a central part of the guide bar 35 being disposed parallel to the path of movement of the cans. The conveyor chain 36 carries a plurality of can spacing and feeding dogs 37 for properly spacing the cans C on the supports 28 and moving the cans in this spaced relation along the supports 28. The guide bar 35 of each feed unit 32 is provided with an enlarged notch 38 to provide clearance for the purpose to be described in detail hereinafter.

A carton blank dispensing hopper, generally referred to by the numeral 40, overlies the path of the cans C in the vicinity of the feed units 32. The hopper 40 includes a main frame member 41 which extends transversely of the frame 26 and which is supported from the frame 26 by a pair of upstanding posts 42 and arms 43. It is to be noted that the arms 43 are adjustably clamped on the posts 42 to vary the height of the hopper 40.

A pair of arms extend longitudinally downstream of the machine from the frame member 41, the arms being referred to by the numeral 44. An adjustably mounted transverse carton blank support 45 extends between the ends of the arms 44 remote from the frame member 41. The support 45 is adjusted relative to the arms 44 by means of slots 46 in the arms 44 and releasable fasteners 47 passing through the slots 46. The support 45 has a pair of stop pins 48 for limiting the movement of carton blanks 20 to the right, as viewed in FIGURE 3. An adjustable arm 49 is carried by each of the arms 44 and is secured in place by a fastener 50 which extends both through the slot 46 and a transverse slot 51 in the associated arm 49. The arms 49 are adjusted to received upstream corners of the carton blank 20.

The frame member 41 has secured thereto a centrally located arm 52 which is slightly engaged beneath the trailing edge of the carton blank 20 at the center thereof. The arm 52 carries an upstanding guide member 53. Other guide members 54 are carried by the frame member 41 from support arms 55. In this manner, a stack of carton blanks 20 may be readily mounted within the hopper 40 in a manner wherein the lowermost carton blank may be readily withdrawn therefrom. With respect to the movement of carton blanks from the hopper 40, reference is made to the showing of the hopper in FIGURE 2 wherein the carton engaging portions of the hopper 40 have rounded edges, as at 56 to facilitate the removal of the lowermost carton blank.

The machine 25 includes a pair of outer carton blank combined guides and supports 57 which are best shown in FIGURE 3. After a carton blank 20 is removed from the bottom of the hopper 40, the extreme ends thereof are rested on the supports 57 and the carton blank 20 is driven therealong in a manner to be described hereinafter.

In order to facilitate the transfer of a carton blank 20 from the hopper 40 to the supports 57 and into overlying relation to a predetermined number of the cans C, there is provided a pair of feed roll units each generally referred to by the numeral 60. Each feed roll unit 60 includes a small diameter idler roll 61 which is disposed lowermost and which is carried by a suitable fitting 62 mounted on and partially within the associated one of the guides 31. A larger and upper feed roll 63 overlies the feed roll 61 and is pressure urged theretowards whereby the feed rolls 61 and 63 will feed a carton blank therebetween. The feed roll 63 is driven in a manner to be described hereinafter.

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Referring now to FIGURE 2 once again, it will be seen that there is illustrated the general details of a carton blank feeding mechanism which is generally referred to by the numeral 64. The mechanism 64 includes a transverse shaft 65 which is suitably journaled in bearing blocks 66 (FIGURE 5) carried by the frame 26. The shaft 65 has adjustably secured thereto a pair of swing arms 67 which are mounted for movement between a position above the horizontal to a position below the horizontal. Each swing arm 67 has secured thereto a support 68 by means of a pivot pin 69 so that the support 68 may rock relative to its respective swing arm 67. Each support 68 is of a two-piece construction having an intermediate adjusting feature 70 of a conventional type. At the upper end of each support 68 there is mounted an upwardly facing suction cup 71 for gripping engagement with a lowermost blank 20 disposed from the hopper 40. The suction cup 71 has a suction line 72 extending therefrom, which suction line 72 is connected to a suitable valve mechanism (not shown) which is operated in timed relation to the operation of the machine 25 in a conventional manner.

The upper end of each support 68 is also provided with an arm 73 having a slot 74 therein. A fitting 75 is adjustably mounted within the slot 74 and carries an upstanding pusher rod 76.

The lower end of each support 68 (FIGURE 2) is provided with a cam follower 77 which rides on a cam 78 which is supported by a transverse frame member 80 which is secured to the frame 26 in any conventional manner. It is to be noted that the cam 78 includes an upper straight portion 81, a lobe 82 and a lower straight portion 83 with the lobe 82 having curved connections with the straight portions 81 and 83. The cam follower 77 is normally retained in engagement with the cam 78 by the tendency of the support 68 and the element carried thereby to rotate the support 68 in a clockwise direction about the pivot pin 69. However, if desired, suitable spring means may be provided for biasing the cam follower 77 against the cam 78.

The transverse shaft 65 is provided with a crank arm 84 which is generally aligned with a rotating cam 85. The crank arm 84 carries a cam follower 86 which engages the cam 85. The manner in which the cam 85 is supported and driven will be described in detail hereinafter.

Reference is now made to FIGURES 6, 7 and 8 wherein the operation of the mechanism 64 is illustrated in detail. Referring first to FIGURE 6, it will be seen that the swing arm 67 is approaching its uppermost position and the suction cup 71 associated therewith has engaged the lowermost blank 20 within the hopper 40. As the cam 85 rotates, the swing arm 67 is moved upwardly a slightly further distance with the result that the associated suction cup 71 is partially collapsed and sealing contact of the suction cup with the lowermost carton blank 20 is assured. As the cam 85 continues to rotate, the swing arm 67 moves downwardly with the result that the associated support 68 is also moved downwardly. As the swing arm 67 moves downwardly, the pivot pin 69 is moved to the left. At the same time, the cam follower 77, which is riding on the lower part of the straight portion 81 of the cam 78 is moving to the left. As a result, the suction cup 71 moves both downwardly and to the left, as is shown by the arrows below the hopper 40. This results in the lowermost carton blank 20 being shifted to the left within the hopper 40 and the movement thereof off of the supporting ledges.

Referring now to FIGURE 7, it will be seen that continued downward movement of the swing arm 67 results in a further swinging of the suction cup 71 to the left while the suction cup 71 is being moved downwardly. At this time, the cam follower 77 is riding on the lobe 82 of the cam 78. The swing arm 67 has now reached a substantially horizontal position.

In FIGURE 8, it will be seen that when the swing

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arm 67 moves below its horizontal position of FIGURE 7, the pivot pin 69 now moves to the right. At the same time, the cam follower 77 is riding off of the lower portion of the cam lobe 82 and is moving to the left. As a result, the suction cup 71 is now rapidly moving to the right while it is still being moved downwardly at a relatively slow pace. The relationship of the suction cup 71 and the feed rolls 61 and 63 is such that the right hand edge of the carton blank 20 carried by the suction cups 71 is engaged between the feed rolls 61 and 63. The valving for controlling the drawing of a vacuum through the suction cup 71 is actuated at this time to cut off the vacuum so that the suction cup 71 releases the carton blank 20. However, while the carton blank 20 is released by the suction cup 71 carried by each of the supports 68, the pusher arm 76 adjacent each suction cup 71 engages the trailing edge of the associated carton blank 20 and assures the engagement thereof between the feed rolls 61 and 63.

The central part of the machine 25 is provided with a combined carton blank feed and folding mechanism which is generally referred to by the numeral 87. In order to facilitate the supporting of the unit 87, the frame 26 is provided with a transverse plate 88 which is supported from the main portion of the frame by standards 89. The plate carries a pair of transversely spaced bearing blocks 90 in which a shaft 91 is journaled for rotation. Each end portion of the shaft 91 has mounted thereon a bearing sleeve 92 which carries a floating arm 93. Each floating arm 93 is provided at its left end with a stub shaft 94 on which there is rotatably journaled a sprocket 95. The sprocket 95 has secured thereto in spaced relation and for rotation therewith one of the feed rolls 63, as is best shown in FIGURE 1. The shaft 91 carries a pair of sprockets 96 which are aligned with the sprockets 95. An endless chain 97 is entrained over each pair of sprockets 95 and 96 and is driven by the associated sprocket 96.

In order to insure that the path of the lower run of the endless chain 97 is parallel to the upper ends of the cans C, as is clearly shown in FIGURE 9, there is provided a guide bar 98 for each endless chain 97. Each guide bar 98 is carried by its associated floating arm 93 by means of a pair of short rods 100. It is also to be noted that each endless chain 97 is provided with a plurality of pusher lugs 101 which engage the trailing edges of the carton blanks 20 and move the carton blanks 20 at the same rate of movement as that of the cans C. It will be readily apparent from FIGURE 9 that each carton blank 20 is fed between the feed rolls 61 and 63 into overlying relation with respect to an associated group of cans C at a slightly accelerated rate until it passes between the feed rolls 61 and 63. At this time the trailing edge of the last fed carton blank 20 is in position for engagement by one of the feed lugs 101.

In order to assure the proper engagement of the carton blank 20 with the upper ends of the cans C, there are provided a pair of hold down rolls 102, there being one hold down roll 102 for each row of cans C. Each hold down roll 102 is carried by a bracket 103 which depends from a transverse plate 104. The ends of the plate 104 are adjustably supported on rods 105 (FIGURE 1) which extend upwardly from the frame 26.

At this time it is pointed out that the floating bars or frame members 93 are not only urged downwardly by gravitational forces, but are resiliently urged downwardly. This is accomplished by providing an upstanding arm 105' on each floating rail 93 with the upper part of the arm being provided with a projecting ear 106 to which an upper end of a tension spring 107 is connected. The lower end of each tension spring 107 is connected to an upwardly projecting ear 108 carried by the plate or bar 104.

The shaft 91 also supports a second set of floating rails 109. The rails 109 are rotatably journaled with

respect to the shaft 91 so that they are free to pivot about the axis of the shaft 91 while the shaft is rotating. The floating rails 109 carry a transverse shaft 110 which has mounted thereon adjacent the outer ends thereof presser rolls 111 which engage the outer edges of the top panel 21 to insure the proper engagement thereof with underlying cans. The extreme outer ends of the shaft 110 are provided with carton folding blades 112 which fold the outer portions of the carton blank 20 down around the sides of the cans. Due to the notched configuration of the carton blank 20, it will be seen that when it is folded down alongside the cans C, the carton blank becomes interlocked with the cans so that the cans and the associated carton blank now move as a unit with the feeding of the cans being through the carton blank by way of the feed lugs 101. The shaft 110 is driven from the shaft 91 by means of a chain 113 which is entrained over a sprocket 114 on the shaft 91 and a sprocket 115 on the shaft 110.

In order that the presser rolls 111 may positively engage the carton blank, one of the floating rails 109 is provided with an extension bar 116 which projects towards the plate 104. The extension bar 116 has an ear 117 thereon which is aligned with an ear 118 with the transverse plate 104. The ear 117 carries a set screw 120 which adjusts the height of the presser rolls 111. In addition, a tension spring 121 extends between the extension bar 116 and the plate 104 to resiliently hold the presser rolls 111 down in the desired position.

Referring once again to FIGURE 1 in particular, it will be seen that disposed along the opposite sides of the cans there are take-away conveyors which are generally referred to by the numeral 122. Each conveyor 122 is provided at the left end thereof, as viewed in FIGURE 1, with a drive sprocket 123 and an idler sprocket 124. Other sprockets (not shown) are mounted at the opposite end of the take-away conveyor 122. An endless conveyor chain 125 is entrained over all of the sprockets of the take-away conveyor 122 and has one run thereof extending parallel to the path of movement of associated cans. The endless conveyor chain 125 carries a plurality of lugs 126 which are particularly designed for simultaneously engaging both a side panel 22 of the carton and endmost can. It is to be noted that the rate of movement of the lugs 126 is such that the finished packages, which are generally referred to by the numeral 127, are rapidly moved away from the remainder of the mechanism 25.

It is pointed out at this time that immediately after the carton blank 20 is folded down around the opposite sides of the cans, the folding of the bottom panels 23 and 24 thereof begins and the bottom panels are interlocked together to form the completed carton. The means for folding and interlocking the bottom panels may be those which are disclosed in the aforementioned Patent No. 2,986,857. Since the bottom panel folding and interlocking means are not new and are in no way directly associated with those components of the machine 25 which are believed to be new, they have neither been specifically illustrated nor described here.

The manner in which the various components of the machine 25 are driven is clearly shown in FIGURES 1 and 5. Referring first to FIGURE 1, it will be seen that the conveyors 32 and 122 on the left-hand side of the machine looking downstream are interconnected by a drive chain 128. The drive chain 128 passes around a sprocket 129 which is secured to the drive shaft 130 for the sprocket 33. The drive chain 128 also passes around a sprocket 131 which is secured to the drive shaft 132 for the sprocket 123.

Referring now to FIGURE 5 in particular, it will be seen that the conveyor 32 on the right of the machine looking downstream has the drive sprocket 33 thereof carried by an upstanding drive shaft 133 which is suitably

journalled in a fitting 134 carried by the frame 26. The lower end of the drive shaft 133 is provided with a bevel gear 135 which is meshed with another bevel gear 136 carried by a horizontal shaft 137. The horizontal shaft 137 is also suitably journalled in the fitting 134 and carries the cam 85.

The lower portion of the drive shaft 133 above the bevel gear 135 is provided with a sprocket 138 over which there is entrained a drive chain 140 which corresponds to the drive chain 128. The conveyor 122 disposed at the right side of the machine looking downstream has a vertically disposed drive shaft 141 which corresponds to the drive shaft 132. The drive shaft 141 is suitably journalled for rotation and is provided at its lower end with a sprocket 142 over which the drive chain 140 is entrained. The drive sprocket 123 is carried by the drive shaft 141 substantially at mid-height. The upper end of the drive shaft 123 extends into a bevel gear box 143 of the right-angle drive. The right end of the drive shaft 91 also extends into the bevel gear box 143 so that the shafts 91 and 141 are drivingly connected together.

No specific coupling has been illustrated between the conveyors at the left-hand side of the machine and at the right-hand side of the machine. However, it is to be understood that all of these conveyors are to be driven in unison. The coupling can be through the drive shaft 91 with the drive shaft 132 being driven through the drive shaft 91 through a bevel gear box similar to the bevel gear box 143. On the other hand, the means for simultaneously driving the conveyor chains 125 of the two conveyors 122 may be interconnected. It will be readily apparent that as far as this invention is concerned, the manner in which the simultaneous driving of the conveyors at the opposite sides of the machine is accomplished, is immaterial.

It is now pointed out that as the cans are being fed, they have a tendency to longitudinally crowd one another with the result that the chimes or seams of adjacent cans ride up upon one another. As a result, the upper ends of the cans are not in a common plane, but are irregularly positioned. This is undesirable in a final package and the carton blanks 20 are so proportioned whereby they fit snugly around the cans when they are properly positioned with the upper ends thereof coplanar. It has been found that this longitudinal riding up of adjacent cans can be easily solved by means of a hold-down member disposed over each row of cans.

Reference is now made to FIGURE 10, where it will be seen that each row of cans is provided with a hold-down member generally referred to by the numeral 144. The hold-down members 144 include mounting blocks 145 which are secured by means of fasteners 146 to opposite sides of the center divider 29. It is to be noted that the center divider 29 has a left-hand portion, as viewed in FIGURE 10, which is of a greater height than the main part of the center divider. This left-hand portion is generally referred to by the numeral 147 and it is to this left-hand portion 147 that the fittings 145 are secured. It is also to be noted that the fittings 145 are so proportioned whereby the hold-down member 144 are substantially aligned with the rows of cans passing therebeneath.

Each hold-down member 144 is of the spring leaf type and the preferred form of hold-down member 144 includes three spring leaves 148, 149 and 150. The spring leaf 150 is much longer than the spring leaves 148 and 149 and is disposed lowermost. The spring leaf 149 terminates generally at the center of the feed roll 61. The spring leaf 148 is relatively short but provides for the necessary stiffness of the hold down member 144 at the upstream end thereof. It will be readily apparent that as cans pass beneath the hold-down member 144, due to their irregular movement they are slightly joggled and forced downwardly by the action of the hold-down

members 144 so that at the time the carton blank 20 is wrapped therearound, the riding up of adjacent cans which may have previously existed is eliminated. It is also to be noted that the downstream end of the spring leaf 150 is positioned over the cans at the time the carton blank is applied thereto. It will be readily apparent that due to the fact that the spring leaf 150 is very thin, it will in no way interfere with the application of the carton blank to the cans and the carton blank will move with the cans and slide off of the ends of the spring leaves 150.

Reference is now made to FIGURE 12 wherein a modification of the blank feeding mechanism is illustrated. The modified mechanism is generally referred to by the numeral 164 and differs from the mechanism 64 in that in lieu of the cam 78, the frame 26 is provided with a guide member 165 having a guide slot 166 therein which receives the cam follower 77. Also, the support 68 has omitted from the upper end thereof the arm 73 and the structure carried thereby.

Utilizing the mechanism 164, the machine 25 can be converted into making packages with bottles instead of cans. In such event, a carton blank 220 particularly adapted to receive bottles with the necks of the bottles extending through suitable openings in the top panel of the carton blank, is provided. It will be seen that when the swing arm 67 is swung upwardly a little further past its position of FIGURE 12, the suction cup 71 will engage the lowermost carton blank 220. Then as the swing arm 67 again moves downwardly, the suction cup 71 will move both downwardly and to the left.

It would appear that since the guide slot 166 slopes downwardly from right to left, the rocking of the suction cup 71 would be from left to right. However, during the initial downward movement of the swing arm 67, the pivot pin 69 is moved from right to left with the mean slope of the movement of the pivot pin 69 being generally equal to that of the guide slot 166. In view of this, during the initial downward movement of the supports 68, the suction cup 71 moves to the left so as to clear the carton blank 220 from the supporting elements of the hopper 40. Then, as the support 68 moves further downwardly, due to the movement of the lower end of the support 68 to the left and the movement of the pivot pin 69 to the right, the carton blank 220 is moved to the right. The rate of movement of the carton blank at the time it approaches the crown caps of the bottles B is substantially the same as that of the bottles. As a result, the carton blank 220 is readily seated over the necks of the bottles B.

In order to facilitate the seating of the top panel of the carton blank on the bottle necks, the machine will also be provided with a hold-down bar 167 having a downwardly sloping forward face 168 which is engaged by the top panel of the carton blank 220. It is to be understood that the carton blank 220 is folded and closed in the same general manner as that described above with respect to the carton blank 20. Further description of the carton blank applying means is believed to be unnecessary.

Although only preferred embodiments of the invention have been specifically illustrated and described herein, it is to be understood that other modifications may be made therein within the scope and spirit of the invention, as defined by the appended claims.

I claim:

1. In a machine for forming a package by the application of a carton to a plurality of moving containers, a blank feed mechanism comprising a hopper, blank gripping means, a support for said blank gripping means, a positioning arm mounted for oscillatory movement towards and away from said hopper, a pivotal connection between said support and said positioning arm with said support being carried by said positioning arm for oscillatory movement therewith, and cam means for engagement with said support for rocking said support about said

pivotal connection as said positioning arm is oscillated.

2. The machine of claim 1 wherein the containers are being moved at the time of carton blank feed, and the principal rocking movement of the blank gripping means is in the direction of container movement.

3. In a machine for forming a package by the application of a carton to a plurality of moving containers, a blank feed mechanism comprising an overhead hopper having a bottom discharge, a substantially upright support, blank gripping means carried by the upper end of said support, a generally horizontal swing arm, a pivotal connection between said support and said swing arm with said support being carried by said swing arm for oscillatory movement therewith, means for swinging said swing arm in timed relation to the movement of containers, and guide means for engagement with the lower end of said support for rocking said support as said support is vertically reciprocated by said swing arm.

4. The machine of claim 3 wherein said guide means includes a guide slot and a follower carried by said support engaged in said slot.

5. The machine of claim 3 wherein said guide means includes a multiple curve cam means for rocking said support in two directions during movement of said support in one vertical direction.

6. In a machine for forming a package by the application of a carton to a plurality of moving containers, a blank feed mechanism comprising an overhead hopper having a bottom discharge, a substantially upright support, blank gripping means carried by the upper end of said support, a generally horizontal swing arm, a pivotal connection between said support and said swing arm, means for swinging said swing arm in timed relation to the movement of containers, and guide means for engagement with the lower end of said support as said support is vertically reciprocated by said swing arm to effect a rocking movement of the upper end of said support which, at the commencement of its descent moves opposite to the direction of container movement to release a carton blank from said hopper and a subsequent rocking movement in the direction of container movement to apply the carton blank to containers.

7. In a machine for forming a package by the application of a carton to a plurality of moving containers, a blank feed mechanism comprising an overhead hopper having a bottom discharge, a substantially upright support, blank gripping means carried by the upper end of said support, a generally horizontal swing arm, a pivotal connection between said support and said swing arm, means for swinging said swing arm in timed relation to the movement of containers, and guide means for engagement with the lower end of said support as said support is vertical reciprocated by said swing arm to effect a rocking movement of the upper end of said support which, at the commencement of its descent moves opposite to the direction of container movement to release a carton blank from said hopper and a subsequent rocking movement in the direction of container movement to apply a carton blank to containers, said guide means including a straight line sloping guide slot and a follower carried by said support engaged in said slot, said swing arm having an upper position above the horizontal and the mean slope of initial downward movement of said pivotal connection being in the same direction as that of the guide slot.

8. In a machine for forming a package by the application of a carton to a plurality of moving containers, a blank feed mechanism comprising an overhead hopper having a bottom discharge, a substantially upright support, blank gripping means carried by the upper end of said support, a generally horizontal swing arm, a pivotal connection between said support and said swing arm, means for swinging said swing arm in timed relation to the movement of containers, and guide means for engagement with the lower end of said support as said support is vertically reciprocated by said swing arm to effect a

rocking movement of the upper end of said support which, at the commencement of its descent moves opposite to the direction of container movement to release a carton blank from said hopper and a subsequent rocking movement in the direction of container movement to apply the carton blank to containers, said guide means including a fixed cam and a follower carried by said support engaging said cam, said cam including a lobe extending first in the direction of container travel and then opposite thereto.

9. In a machine for forming a package by the application of a carton to a plurality of moving containers, a blank feed mechanism comprising a hopper, blank gripping means, a support for said blank gripping means, a positioning arm mounted for oscillatory movement towards and away from said hopper, a pivotal connection between said support and said positioning arm with said support being carried by said positioning arm for oscillatory movement therewith, and cam means for engagement with said support for rocking said support about said pivotal connection as said positioning arm is oscillated, and a pusher arm carried by said support for feeding a carton blank after the releasing thereof by said gripping means.

10. A blank feeding mechanism comprising a pair of feed rolls, a blank dispensing hopper disposed upstream of the direction of feed of said feed rolls and offset from said feed rolls, said hopper having a discharge end adjacent said feed rolls, blank gripping means opposing said hopper discharge end, and means for first moving said blank gripping means simultaneously away from said hopper discharge end and said feed rolls to release a blank from said hopper and then away from said hopper discharge end and towards said feed rolls to position an edge of a blank between said feed rolls.

11. A blank feeding mechanism comprising a pair of feed rolls, a blank dispensing hopper disposed upstream of the direction of feed of said feed rolls and offset from said feed rolls, said hopper having a discharge end adjacent said feed rolls, blank gripping means opposing said hopper discharge end, means for first moving said blank gripping means simultaneously away from said hopper discharge end and said feed rolls to release a blank from said hopper and then away from said hopper discharge end and towards said feed rolls to position an edge of a blank between said feed rolls, and a push arm mounted for movement with said blank gripping means for continued feeding of a blank after the release thereof by said blank gripping means.

12. A carton applying mechanism for forming a package by the application of a carton to a plurality of containers comprising means for advancing containers in at least one row along a predetermined path, a pair of feed rollers closely overlying the container path, a blank dispensing hopper overlying the container path and having a lower discharge end opposing the container path, said hopper being disposed upstream from said feed rolls and in vertically offset relation, blank gripping means opposing said hopper discharge end, and means for first moving said blank gripping means simultaneously away from said hopper discharge end and said feed rolls to release a blank from said hopper and then away from said hopper discharge end and towards said feed rolls to position an edge of a blank between said feed rolls.

13. A carton applying mechanism for forming a package by the application of a carton to a plurality of containers comprising means for advancing containers in at least one row along a predetermined path, a pair of feed rollers closely overlying the container path, a blank dispensing hopper overlying the container path and having a lower discharge end opposing the container path, said hopper being disposed upstream from said feed rolls and in vertically offset relation, blank gripping means opposing said hopper discharge end, means for first moving said blank gripping means away from said hopper

discharge end and said feed rolls simultaneously to release a blank from said hopper and then away from said hopper discharge end and towards said feed rolls to position an edge of a blank between said feed rolls, and other carton blank feed means cooperatively associated with said feed rolls.

14. The mechanism of claim 13 wherein an upper one of said feed rolls and said other carton blank and container feed means have a common drive.

15. The mechanism of claim 13 wherein an upper one of said feed rolls and said other carton blank and container feed means have a common mechanically floating support.

16. The mechanism of claim 13 wherein an upper one of said feed rolls and said other carton blank and container feed means have a common floating support, and said floating support carries carton blank folding means.

17. The mechanism of claim 13 wherein an upper one of said feed rolls and said other carton blank and container feed means have a common floating support, and said floating support carrier carton blank hold down means.

18. A carton applying mechanism for forming a package by the application of a carton to a plurality of containers comprising means for advancing containers in at least one row along a predetermined path, a pair of feed rollers closely overlying the container path, a blank dispensing hopper overlying the container path and having a lower discharge end opposing the container path, said hopper being disposed upstream from said feed rolls and in vertically offset relation, blank gripping means opposing said hopper discharge end, means for first moving said blank gripping means away from said hopper discharge end and said feed rolls simultaneously to release a blank from said hopper and then away from said hopper discharge end and towards said feed rolls to position an edge of a blank between said feed rolls, other carton blank feed means cooperatively associated with said feed rolls, and combined carton and container engaging take away means for receiving a completed package.

19. In a package forming machine, a carton blank feeding and applying unit comprising a rotating drive shaft, a frame floatingly and pivotally mounted on said drive shaft, a feed roll mounted on said frame, a continuous drive member driving said feed roll, blank feeding members carried by said continuous drive member, and means for applying a predetermined non-gravitational biasing force through said frame to carton blanks fed therebeneath.

20. A carton applying mechanism for forming a package by the application of a carton to a plurality of containers comprising means for advancing containers in at least one row along a predetermined path, a pair of feed rollers closely overlying the container path, a blank dispensing hopper overlying the container path and having a lower discharge end opposing the container path, said hopper being disposed upstream from said feed rolls and in vertically offset relation, blank gripping means opposing said hopper discharge end, and means for first moving said blank gripping means away from said hopper discharge end and said feed rolls simultaneously to release a blank from said hopper discharge end and then away from said hopper and towards said feed rolls to position an edge of a blank between said feed rolls, and a strap type spring container hold down overlying the container path beneath the path of carton blanks from said hopper to said feed rolls.

21. The machine of claim 12 wherein the containers are fed in two side-by-side rows, a fixed divider between said rows, and a strap type spring container hold down overlying the path of each row of containers beneath the path of carton blanks from said hopper to said feed rolls.

22. A machine for forming a package by the application of a carton to a plurality of containers movable

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along a path, comprising: feed roll means at a point along said path, a hopper having a discharge for blanks upstream of said feed roll means, a swing arm, means mounting said swing arm for oscillating movement toward and away from said hopper discharge, first cam means cooperating with said swing arm to effect said oscillatory movements, a support, blank gripping means carried by said support adjacent one end thereof, said swing arm being pivotally connected to said support intermediate the ends thereof, guide means cooperating with said support for pivoting said support about said pivotal connection as said support is oscillated by said swing arm, said guide means including second cam means and a follower on said support adjacent the other end thereof and movable along said cam means, said cam means co-acting with said follower during movement of said follower along said cam means first to move said blank gripping means away from said hopper and said feed roll means to remove a blank from said hopper dis-

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charge and then away from said hopper and towards said feed roll means to deliver a blank thereto.

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