United States Patent [19]

Reeves

[11] **3,729,887**

[45] **May 1, 1973**

[54] **APPARATUS FOR FORMING CONTAINERS**

[75] Inventor: **Robert E. Reeves,** Indianapolis, Ind.

[73] Assignee: **Inland Container Corporation,** Indianapolis, Ind.

[22] Filed: **Nov. 17, 1970**

[21] Appl. No.: **90,273**

[52] **U.S. Cl.** .....**53/194,** 53/387, 53/391, 93/59 R

[51] **Int. Cl.** **B65b 43/26**

[58] **Field of Search** .....53/124 A, 124 B, 53/124 C, 124 CC, 391, 194, 387; 93/58 P, 59 R

[56] **References Cited**

UNITED STATES PATENTS

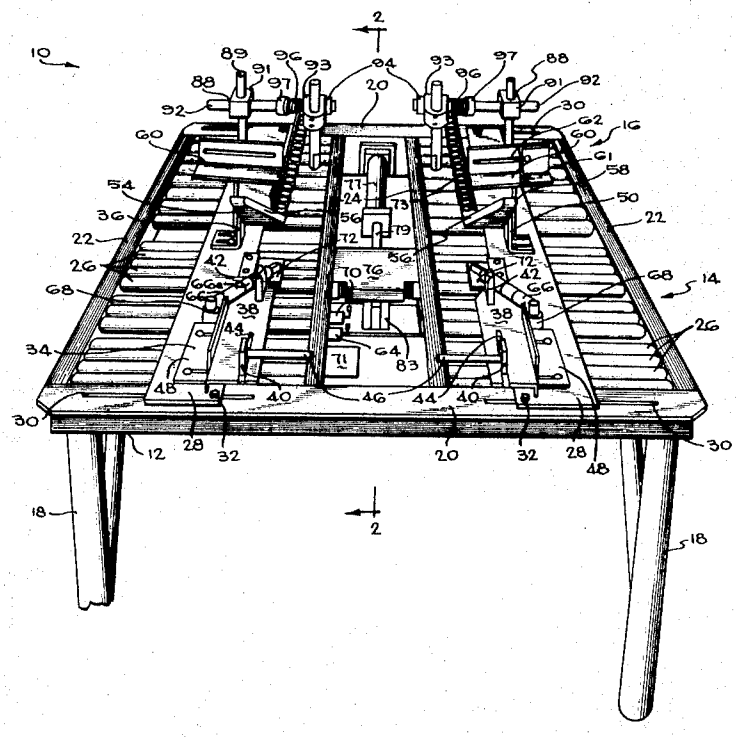
3,490,198	1/1970	Beckman	53/124 A
3,383,825	5/1968	Titchenal	53/124 C
3,530,640	9/1970	Hoffmann	53/124 C
2,781,622	2/1957	Shoffner	53/391 X
2,920,429	1/1960	Rejsa	53/391 X
2,932,927	4/1960	Segerstrom	53/64
R26,075	9/1966	Canno	93/58 P
2,627,153	2/1953	Stencil	53/124 A
2,962,848	12/1960	Wilson	53/124 CC
3,091,066	5/1963	Laurenzi	53/391 X
3,301,144	1/1967	Reeves	93/36 R

Primary Examiner—Travis S. McGehee
Attorney—Anderson, Luedeka, Fitch, Even & Tabin

[57] **ABSTRACT**

Apparatus for forming a container from a flat blank includes a forming station having a plurality of camming elements for folding the panels and flaps of the blank into an upwardly open container. The operator manually fills the container in the forming station, and the filled container is slid horizontally therefrom past a pair of adhesive applicators. The horizontal movement folds closed the remaining flaps of the end closures as the container is pushed into a compression station where the adhesive sets.

1 Claim, 10 Drawing Figures



Patented May 1, 1973 3,729,887

3 Sheets-Sheet 1

FIG. 1

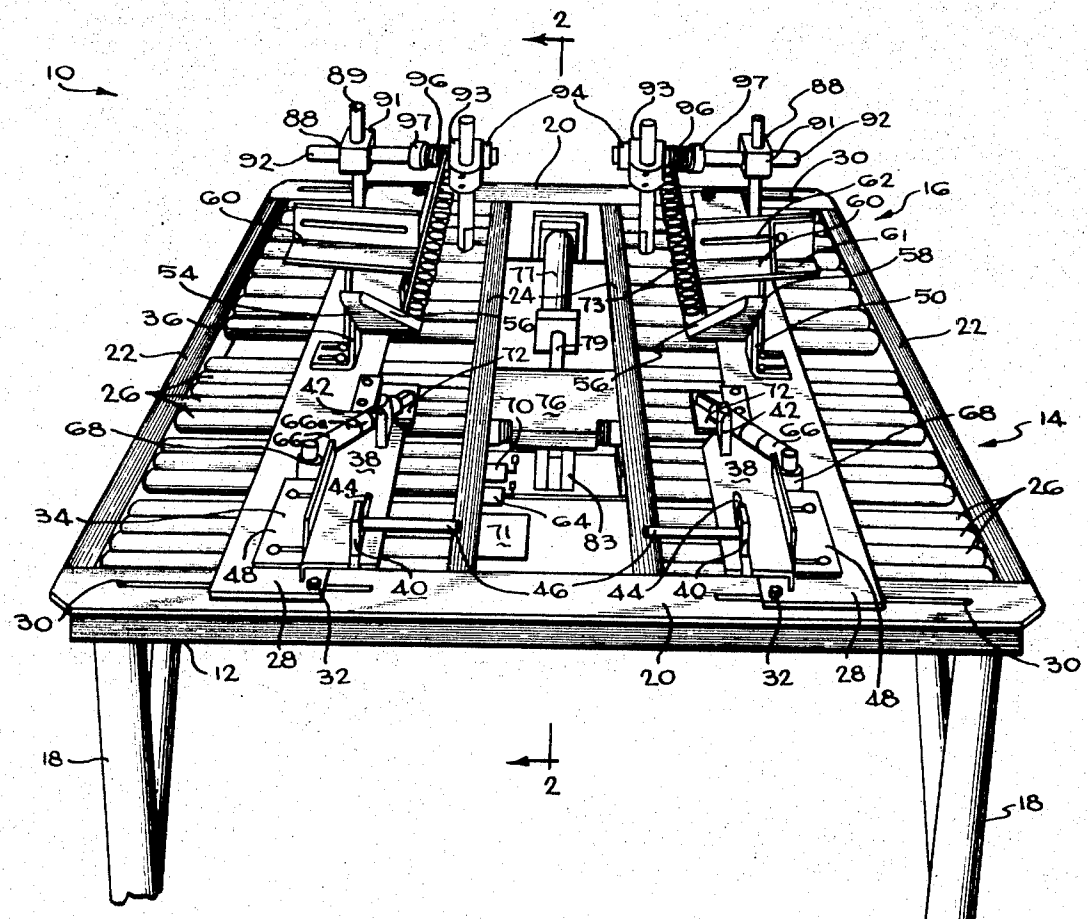
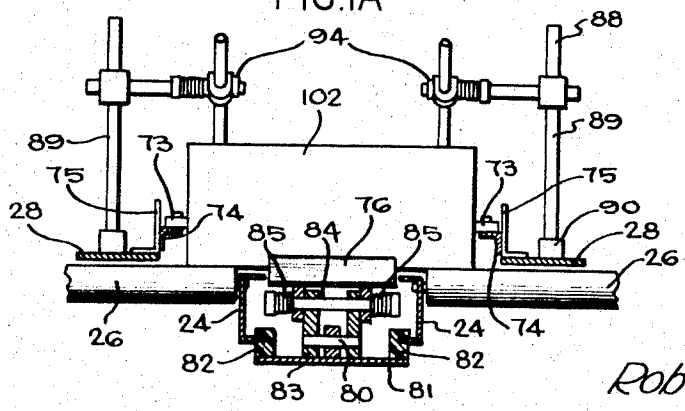


FIG. 1A



INVENTOR.
Robert E. Reeves

Anderson, Luedeka, Fitch, Even & Tabin
ATTYS.

3 Sheets-Sheet 2

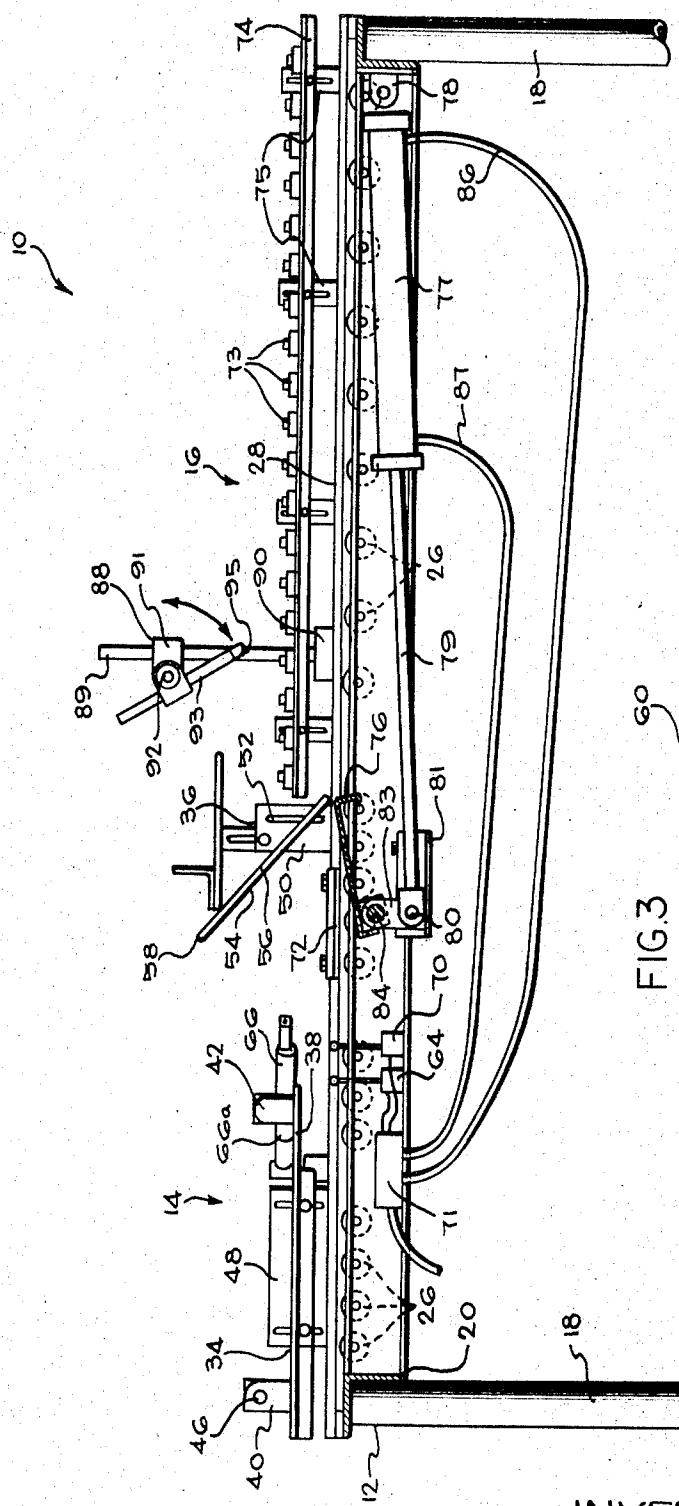


FIG.2

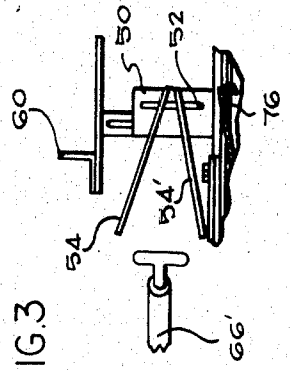


FIG.3

INVENTOR
Robert E. Reeves

Anderson, Luedeka, Fitch, Even, & Tabin
ATTYS.

FIG.4

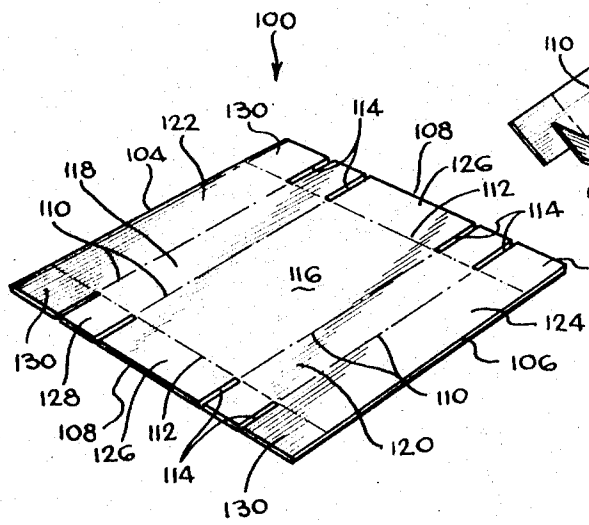


FIG.5

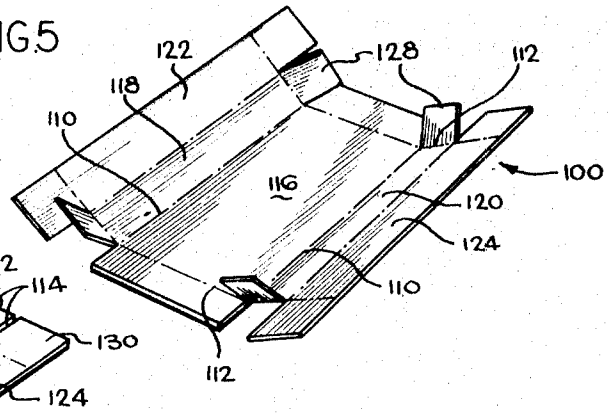


FIG.6

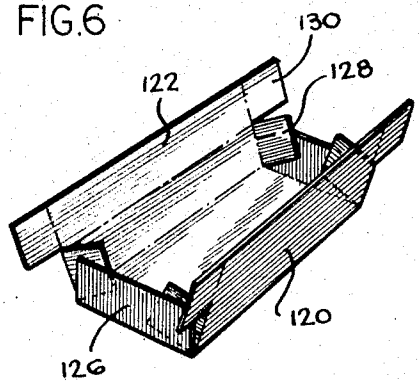


FIG.7

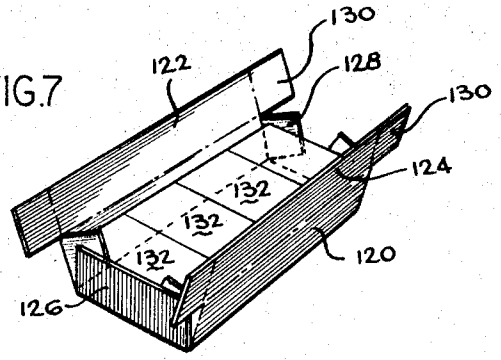


FIG.8

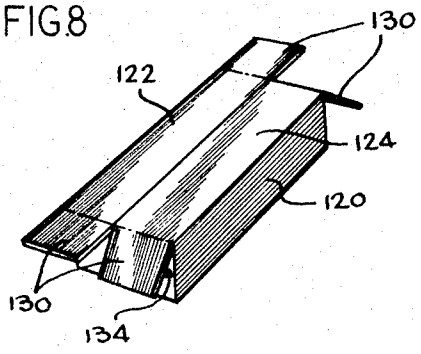
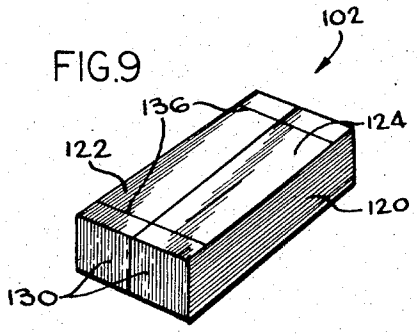


FIG.9



INVENTOR
Robert E. Reeves

Anderson, Luedeka, Fitch, Even, & Tabin
ATTYS.

APPARATUS FOR FORMING CONTAINERS

The present invention relates to container-making and more particularly to apparatus for forming a container and sealing it after it is filled with items being packaged.

Container closing and sealing machines are well known in the packaging industry, and such machines are particularly useful in packing small packages into larger containers and then sealing the containers. However, even semi-automatic machines of this type have been large, complicated and fairly expensive, and thus such machines have not been economically feasible for use in many operations which presently utilize hand loading and sealing of containers. Typically, these devices for the forming containers include a plurality of pressure-movable platens that sequentially engage the panels and flaps of a container blank to fold them into a complete container. These devices may frequently need repairs and often create improperly formed containers, and many of them require manual handling of the blank and/or container at several stages during fabrication. Moreover, these machines are generally considered unsuited for packaging items such as processed meat and cheese and fragile items like cookies.

Accordingly, an object of the present invention is to provide improved apparatus for fabrication of a container from a flat blank by the user.

Another object of the invention is to provide apparatus for forming a container from a blank in a location suitable for filling the container with packages and for the semi-automatic sealing of the filled containers.

A further object is to provide semi-automatic apparatus for the efficient forming, filling and sealing of containers which requires little effort on the part of the operator.

Still another object of the invention is to provide apparatus for forming containers which is small in size, simple in operation, efficient in sealing and inexpensive to purchase, so that it may serve as a ready replacement for manual forming and sealing of containers.

These and other objects of the invention will become apparent with reference to the following description and accompanying drawings in which:

FIG. 1 is a perspective view of representative apparatus for forming, filling and sealing a container from a flat blank;

FIG. 1A is a front, fragmentary sectional view of the apparatus illustrated in FIG. 1 shown with a sealed container located therein;

FIG. 2 is a side sectional view of the apparatus shown in FIG. 1 taken generally along the line 2—2 of FIG. 1;

FIG. 3 is a fragmentary section view showing a modified version of the apparatus illustrated in FIG. 2;

FIG. 4 is a perspective view of a carton blank typical of a type which the apparatus is designed to form into a container; and

FIGS. 5 to 9 are sequential perspective views of the blank shown in FIG. 4 during its formation into a container on the apparatus shown in FIG. 1.

In FIG. 1, there is shown apparatus **10** particularly useful for forming a flat blank **100** (FIG. 4) into a container **102** (FIG. 9). The apparatus **10** generally includes a supporting structure **12** on the upper surface of which there is provided a forming station **14** at the front thereof, wherein the container **102** is initially formed from the blank **100**, and a compression station **16** at the rear thereof, wherein sealing of the filled container **102** is completed. Desirably, the entire apparatus **10** is fabricated of a material, such as stainless steel, that may be readily cleaned. It is noted that the terms "front" and "rear" are used only to describe the orientation of the apparatus **10** relative to the operator who stands adjacent the forming station **14** and views the apparatus as it is shown in FIG. 1.

As shown in FIG. 4, the container blank **100** used in forming the container **102** is of the five-panel-folder type. Such a blank **100** is rectangular in shape, and the illustrated blank is defined by a front edge **104**, a rear edge **106** and a pair of side edges **108**. Typically, the container blank **100** is fabricated of corrugated fiberboard with the corrugations paralleling the front edge **104**. A plurality of score lines **110** run transversely of the blank **100** between the side edges **108**. Additional score lines **112** are located perpendicular to the score lines **110** and extend between the front and rear edges **104** and **106**. Cuts **114** are formed in the blank **100** at both ends of the respective score lines **110**, extending between each side edge **108** and the adjacent longitudinal score line **112**.

The cuts and score lines divide the blank **100** into a number of panels, flaps and extensions. The illustrated five-panel-folder blank has a bottom panel **116** and front and rear vertical panels **118** and **120** which are hinged thereto at the score lines **110**. Front and rear partial cover panels **122** and **124** are hinged to the front and rear panels **118** and **120**, respectively, along the upper edges thereof at the score lines **110**. End flaps **126** are hinged to the side edges of the bottom panel **116** at the longitudinal score lines **112**, and end flaps **128** are hinged to each side edge of the front and rear panels **118** and **120** at the score lines **112**. Finally, the rear and front partial cover panels **122** and **124** carry end extensions **130** hinged thereto at the score lines **112**. These panels, flaps and extensions are folded from flat blanks **100** to form the container **102** by an operator using the apparatus **10**.

The supporting structure **12** of the illustrated embodiment of the apparatus **10** resembles a table having four legs **18** which are interconnected in pairs by front and rear transverse structural members **20**, which are suitably affixed thereto, as by welding. Extending between and suitably affixed to the front and rear structural members **20**, are two outer channels **22** which constitute the side edges of the supporting structure **12** and two channels **24** disposed respectively inward thereof. These four channel members provide the longitudinal structural strength for the apparatus **10**. The inner channels **24** are disposed facing each other and provide a central longitudinal track along which the blank is moved in its progression into the filled, sealed container shown in FIG. 9. A plurality of rollers **26** are mounted on horizontal axes extending respectively between the channels **22** and **24** on each side of the track. As seen in FIG. 2, the rollers **26** extend slightly above the upper flanges of the inner channels **24** which constitute the track and thus facilitate the movement of the packed containers therealong.

The mechanism constituting the forming station **14** and the compression station **16** is mounted on a pair of

longitudinally extending mounting plates **28** which are individually of a length substantially equal to that of the supporting structure **12**. The mounting plates **28** are slidably supported on the upper surfaces of the transverse structural members **20**, which in the illustrated embodiment are made of angle iron and the upper surfaces of which lie slightly above the tops of the rollers. To facilitate adjustment of the spacing between the parallel mounting plates **28** to accommodate containers of different sizes, elongated slots **30** are provided in the upper flanges of both the front and rear transverse structural members **20**. The mounting plates **28** are appropriately clamped to the upper surface of the transverse members **20** in the desired lateral positions relative to the central track, using nuts and bolts **32** or the like which extend through the elongated slots **30**.

The forming station **14**, which is located at the front of the apparatus **10**, includes front camming fixtures **34** and back camming-plow fixtures **36**. Each front fixture **34** includes a cam plate **38** which carries forward and rearward upstanding abutments **40**, **42** respectively that are rounded at the corners which come in contact with the blank being formed. Each rear abutment **42** is mounted by screws extending upward through holes in the plates **38**, and more than one set of holes may be provided in each plate to facilitate relocation. The forward abutments **40** can be positioned longitudinally as desired by the provision of slots **44** in the plate through which screws extend into the underside of the abutments. The forward abutments **40** carry camming rods **46** which extend toward each other to a location generally above the track. The cam plate **38** is suitably supported on the longitudinal mounting plates **28** by brackets **48** which themselves are slotted to allow both vertical and lateral adjustment of the cam plates **38** relative to the longitudinal mounting plates.

Each back fixture **36** contains an upstanding bracket **50** suitably bolted to the longitudinal mounting plate **28** through elongated holes. Each bracket **50**, as best seen in FIG. **2**, contains a vertical slot **52** which is used to mount one of a pair of facing plows **54**. The plows **54** are formed from plate material, and each has the general shape of a right triangle. A suitable mounting screw extends through the elongated vertical slot **52** in the mounting bracket into a threaded hole in one of the perpendicular edges of the plow **54** and is employed to clamp the plow **54** to the mounting bracket **50** at the desired vertical level and with the desired orientation relative to the track. The long edge or hypotenuse **56** of the plow serves to fold the cover extensions **130** closed as shown in FIG. **8**, and as described more fully hereinafter. The upper edges **58** of the plows **54** provide short, rounded surfaces which are employed to engage the blank **100** at an appropriate location to cause breaking of the blank at the fold line **110** between the bottom panel **116** and the rear panel **120**, as hereinafter described in more detail.

Also supported on the vertical brackets **50** are a pair of guides **60**, which in the illustrated embodiment are pieces of angle iron. The guides **60** aid the operator in precisely locating the rear edge **106** of the blank above the forming station **14** as the initial step of the forming operation. In the illustrated embodiment, the right hand guide **60** carries a corner locator **61** which is appropriately positioned on the guide via an elongated slot **62** in its upstanding vertical flange. The corner locator **61** may be a piece of flat metal formed to provide three mutually perpendicular surfaces, and it serves as a guide for the operator to precisely locate the right hand edge of the blank above the forming station. It will be understood that the illustrated embodiment is adapted for the operator to feed the blanks **100** from a stack appropriately located to the left of the apparatus **10**, and thus it would be more convenient to dispose the corner locator **61** on the left hand guide **60** should it be desired to position the stack of flat blanks **100** on the right hand side of the apparatus.

The operator appropriately locates the blank **100** above the forming station **14** and then presses it downward, exerting force with his fingers against the bottom panel **116**. The upper rounded edges **58** of the plows **54** engage the undersurface of the blank **100** in the vicinity of the cover extensions **130** and, due in part to the fact that the corrugations in the blank **100** run transversely, (i.e., parallel to the score lines **110**), cause the breaking of the blank at the score line **110** between the bottom panel **116** and the rear panel **120**. Generally simultaneously with the breaking of this score line, the front cover panel **122** and its extensions **130** engage the pair of forward abutments **40** and the camming rods **46** which they carry. The effect on the blank **100** is similar in that breaking occurs at the score line **110** at which the front edge of the bottom panel **116** is hinged to the front panel **118** of the container.

Continued downward movement of the blank causes the camming of the end flaps **128**, which are hinged to the front and rear panels, as a result of their engagement by the four upstanding abutments **40** and **42**, and the blank takes the form shown in FIG. **5**. As can be seen, this arrangement has the effect of folding the end flaps **128** attached to the front and rear panels **118**, **120** inward of the larger end flaps **126** which are hinged to the bottom panel **116**. Still further downward movement of the blank **100** causes the interior edges of the cam plates **38** to engage undersides of the end flaps **126**. This engagement causes the breading of the score lines **112** along the side edges of the bottom panel **116**, upwardly camming the end flaps **126** to the position shown in FIG. **6**, which depicts the carton blank at the time that the bottom panel **118** is in engagement with the rollers **26** adjacent the track edges. As can be seen, neither the end flaps **126** nor the front or rear panels **118**,**120** are disposed vertically, but the container is open slightly in all directions to facilitate loading.

In this position, the operator packs the container with the desired number of packages **132** (see FIG. **7**). The operator then manually closes the front and rear cover panels **122** and **124** and begins to slide the packed container rearward on the track. The leading edge of the bottom of the packed container engages and closes a first switch **64** which has a roller arm at the end thereof. The first switch **64** is located so that at about the time it is closed the outer surface of the upstanding end flaps **126** are just short of engaging the heads of adhesive applicators **66** mounted adjacent each side of the track. The illustrated adhesive applicators **66** are extrusion type devices which are pneumatically powered. The applicators **66** are mounted by pivotal supports **68** which are suitably attached to the

mounting plates **28**. The adhesive applicators **66** include a resilient central section **66***a*, made of rubber or other suitable material, which permits the applicators to be set so that they bear firmly against and follow the contour of the outer surface of the end flaps **126** to which the adhesive is to be applied.

Continued forward sliding movement of the packed container causes the leading edge of the bottom thereof to engage and close a second switch **70** which also includes a roller arm. The second switch **70** and the first switch **64** are connected to a control mechanism **71** having a section that regulates the adhesive applicators. Actuation of the second switch **70** activates the control mechanism **71** which causes adhesive to be extruded from the heads of both adhesive applicators **66** onto the outer surface of the sliding container. As can be seen from FIG. **8**, the line of adhesive **134** applied to the container begins a short distance behind the leading edge and can be adjusted by adjusting the location of the second switch in the track. Continuing travel of the container also causes the diagonal plowing edges of the plows **54** to engage the cover extensions **130** and fold them down against the outer surface of the end flaps **126** upon which the adhesive has been applied. A pair of guide plates **72** are provided along the inner edges of the two longitudinal mounting plates **28**. The inner facing edges of these guide plates **72** provide guide surfaces at a location just slightly above the rollers **26** which serve to maintain the straight alignment of the packed container as it travels from the forming station **14** to the compression station **16**.

Sufficient movement of the container rearward on the track causes the first switch **64** to open, upon which occurrence the control mechanism **71** terminates the flow of adhesive to the head of the applicator **66**. This causes the line of adhesive **134** to be terminated slightly short of the trailing edge of the end flap **126**, and thus allows the head to be wiped clean of adhesive to avoid any weeping or dripping that might occur while the next container is being packed.

Movement of the packed container by the operator terminates after it passes through the discharge opening between the plows **54** and enters the compression station **16** of the apparatus. The operator shoves the container **102** far enough so that it clears the plows **54**.

The compression station **16** includes two parallel lines of resilient rollers **73** which flank the track and are spaced apart a distance just slightly less than the length of the packed container **102**. The individual rollers **73** are made of a suitable resilient material, such as synthetic rubber, and individually supported for rotation on vertical axes at spaced locations along a pair of angle iron supports **74**. Each angle iron support **74** is mounted by four brackets **75** to the main longitudinal mounting plates **28** by screws which are threaded into tapped holes in the vertical flange of each angle iron support **74**. The screws pass through vertical slots in the brackets **75** which allow for adjustment of the height of the resilient rollers **73** above the track. Desirably, the rollers **73** are located at or slightly above the line of adhesive **134** which was applied to the end flaps.

The resilient rollers **73** are preferred and exert desired pressure against the end closures at both ends of the filled container **102** while the adhesive sets; however, other suitable means, such as leaf springs or tensioned belts might also be employed. As can be seen in FIG. **2**, the spacing between the forwardmost roller **73** and the rear end of the plow **54** is less than the corresponding dimension of the cover extension **130** so as to assure that folded extension remains in contact with the end flap **126**. Depending upon the type of adhesive used and the time it takes the average operator to pack a container, the compression station **16** is made suitably long so that the container will remain under the compression station for sufficient time for the adhesive to set and complete the sealing of the packed container.

To avoid potential fatigue which might affect an operator who, at arms length, must move a line of packed containers through the compression station **16** each time he plows shut the cover extensions **130** on the container just packed, a power-operated pusher **76** can be optionally provided. It should be understood that a suitable conveyor or the like (not shown) would be disposed adjacent the rear end of the compression station **16** to accept the packed, sealed containers **102** as they are ejected from the rear end thereof. The power-operated pusher **76** is located between the two facing channels **24** which form the track, and it includes a double-acting air cylinder **77** which is pivotally connected to a lug **78** that is welded to the rear transverse structural member **20**.

The piston rod **79** from the cylinder **77** is attached at its free end via a pivotal connection to a transverse pin **80** that is affixed to a movable carriage **81**. The carriage **81**, as best seen in FIG. **1A**, is slidably mounted on and extends between the lower flanges of the interior longitudinal support channels **24**. The carriage **81** is provided with suitable bearing surfaces, for example, slotted blocks **82** of polytetrafluroethylene, which assure that the carriage can be slid smoothly fore and aft in the track. The carriage **81** includes a pair of upstanding lugs **83** which support a shaft **84** on which the pusher **76** is mounted. The pusher **76** has a cap portion which may be bent from a piece of suitable sheet material and is suitably pivotally mounted on the shaft **84** and biased by a pair of springs **85** to the upper position shown in FIG. **2**. The trailing end of the pusher **76** is bent downward to provide a depending flange that engages the lugs **83** to limit upward pivotal movement of the pusher **76** to the position shown in FIG. **2**.

In its upper position, the leading edge of the pusher **76** is disposed sufficiently above the vertical level of the rollers **26** so that it will engage the front panel **118** of the packed container **102** (as shown in FIG. **1A**). The control mechanism **71** also contains another section which operates the double-acting air cylinder **77** as a result of signals received from the first switch **64**. Ordinarily the piston rod **79** is maintained in its retracted position during its dwell time so as to protect it against rust and the like during periods between shifts or at other times when the apparatus **10** is not being used. Closing of the first switch **64**, as the operator begins to slide a packed container down the track, causes air to be applied through a hose **86** to the rear end of the cylinder **77** to drive the piston rod **79** to the extended position shown in FIG. **2**. During its travel, the pusher **76** will pivot beneath the bottom panel **116** of the container which the operator is sliding rearward. As soon

as the pusher **76** clears the container, the springs **85** cause it to pivot to the upper position shown in FIG. **2**.

The control mechanism **71** contains a variable time delay which can be set for a desired number of seconds, depending upon the anticipated length of the manual packing operation. At the end of this time delay, air is automatically fed to the front end of the cylinder **77** through the line **87**, causing the piston rod **79** to be retracted and driving all of the containers **102** in the compression station **16** a distance equal to the stroke of the pneumatic cylinder. Assuming the compression station **16** is filled, the power stroke of the pusher **76** ejects the rearwardmost container, upon which the adhesive will now have set, from the end of the compression station and onto a suitable conveyor (not shown).

The provision of the time delay lengthens the period which each container spends in the compression station **16** while the adhesive sets and thus effects efficient use of the compression station.

Also illustrated in the drawings is a cover scarifying mechanism **88** which may optionally be provided in order to provide lines of weakness along the cover that will facilitate the easy opening of the container **102** at its final destination. Supported on the longitudinal mounting plates **28** are a pair of vertical rods **89** which are mounted in suitable bases **90** screwed to the upper surface thereof. Slidably mounted on each of the rods **89** is a bracket **91** that supports a horizontal shaft **92** which extends inward toward the track a desired distance past the resilient rollers **73** of the compression station. Setscrews in the brackets **91** provide for adjustment of the vertical height at which the shafts **92** are located above the track.

Pivotally mounted near the ends of the horizontal shafts **92** are knife holders **93** which are maintained at the desired location on the shafts by keepers **94** which are affixed thereto by setscrews. At its lower end, each of the knife holders **93** supports a knife **95**, which may be a razor blade that is suitably clamped therein. The exposure of the blade edge below the bottom of the holder **93** determines the depth of the cut which will be made. The knife holders are biased clockwise, as viewed in FIG. **2**, to a position about 30° from the vertical. The biasing is accomplished by suitable springs **96** which are disposed about the shafts **92** and each of which is attached at one end to the knife holder **93** and at its other end to a sleeve **97** which s fixedly positioned on the shaft via a setscrew or the like. A suitable stop (not shown) is provided to incline each knife holder **93** at the desired orientation.

As a packed container is moved through the compression station **16**, the knife holders **93** are initially pivoted in a counterclockwise direction (as viewed in FIG. **2**) until the knife blades **95** at the lower ends thereof engage the rear cover panels **124** of the container. The knives **95** are set so the depth of cut is sufficient to pass through the top liner and the major portion of the corrugating medium of the corrugated fiberboard from which the blank **100** is constructed, the corrugations preferably running in a direction transverse to the line of weakness **136** which the knife creates. The pressure of the spring-biased knives against the cover panels **122** and **124** assures clean slitting for the entire width of the container along two parallel lines **136**. As can be seen from FIG. **2**, the majority of the distance of travel of the container **102** in contact with the knives occurs while it is being moved by the power-operated pusher **76**.

In summary, the flat blank **100** is first located above the forming station **14** using the guides **60** and corner locator **61**, and the operator then pushes the blank downward into the forming station, applying pressure generally in the region of the bottom panel **116**. The score lines **110** between the bottom panel **116** and the front and rear panels **118** and **120** are broken by contact of the blank with the upper rounded edges **58** of the plows **54** and with the front abutments **40** and camming rods **46**, respectively. Further downward movement bends the four end flaps **128** upward as a result of contact with the four camming abutments **40** and **42**. Next, the end flaps **126** which are hinged to the bottom panel **116** are bent upward when these flaps contact the inner edges of the camming plates **38**.

With the partially formed blank in the disposition shown in FIG. **6**, the operator proceeds to fill it with the desired number of packages **132** and then manually closes the cover panels **122** and **124**. Although in the illustrated five-panel-folder the front and rear cover panels are of equal dimension, they could be of unequal dimension, if desired, or could even be shorter than the full width of the container, should a gap in the cover be desired for some purpose. Furthermore, it is possible to employ a blank in which a full cover panel is attached to the rear panel **120** and a narrow flap is hinged to the front panel, which arrangement would serve to form a manufacturers joint at the corner. In such a case, it may be desirable to provide an adhesive coater adjacent the apparatus for applying a line of adhesive for gluing such a joint and to also provide additional means at the compression station **16** for applying downward pressure on the cover of the container in addition to the endwise pressure that is provided by the illustrated resilient rollers **73**.

The operator applies a rearward thrust to slide the container along the track through the discharge opening between the pair of plows. As the packed container horizontally escapes from the forming station, the switches **64** and **70** activate the adhesive applicators **66** and also cause the pneumatic cylinder **77** tO extend the piston rod. Horizontal lines of adhesive **134** are applied along the outer surface of the end flaps **126**, and the cover extensions **130** are folded downward thereagainst by the plows **54**. The flow of adhesive is automatically halted when the first switch **64** opens as the result of the disengagement of its roller arm from the bottom panel of the sliding container.

The operator releases the closed container after it has passed completely through the discharge opening between the plows **54** and resides in the front end of the compression station **16**, and he turns to remove the top blank **100** from the stack of blanks and repeat the packing process. After a time delay of a predetermined number of seconds, which is shorter than the time it will take the operator to pack the next container, the control mechanism **71** applies air to the forward end of the pneumatic cylinder **77**, thus driving the piston rod **79** to its retracted position and pushing the container **102** rearward in the compression station **16**. This movement causes the rearwardmost container to be ejected from the end of the compression station **16** onto a suitable transfer conveyor (not shown).

Illustrated in FIG. 3 is a modification of the apparatus 10 which may be emploYed for the closing of container blanks having end closures of the type usually found on regular slotted containers, where the outermost end flaps are of equal dimension and do not overlap as in the illustrated embodiment but meet along a central line where their edges substantially abut. In the modified embodiment, a lower plow 54' is provided below each of the plows 54 heretofore described. The lower plow 54' Is supported in the same manner, by screws which pass through the elongated vertical slots 52 in the supporting brackets 50. Thus, the plows 54, 54' are positioned with their oblique plowing edges disposed in converging relationship.

In such a modified apparatus, a wider line of adhesive is applied to each end closure in order to seal both the upper and lower end flaps, and accordingly a adhesive applicator 66' is provided having a T-shaped head which may extrude an adhesive pattern 3 to 4 inches wide. Preferably, for a container of this type, the bottom, front and rear panels all have the same dimension so that the cross section of the container is square. Under such circumstances, the end flaps 128 hinged to the front and rear panels will each extend halfway across the container closure, and their edges will substantially abut. Continuous lines of adhesive may accordingly be applied to the outer surfaces of the abutting end flaps 128. Should the container dimensions be such that the end flaps 128 would be shorter, two additional switches may be provided in the track to turn the adhesive applicators 66' off and on and thus interrupt the line of adhesive 134 at the gap between the flaps.

Furthermore, when forming such a container construction, the cam plate 38 of the front camming fixture 34 would likely be adjusted a sufficient distance upward so that the end flaps 126 attached to the bottom panels, once the defining score lines are broken, would spring outward past the inner edge and reside under the plate. In this manner, the end flaps will pass under the T-shaped heads of the adhesive applicators 66' when the operator slides the filled container through the discharge opening between the pairs of converging plows. The converging plows 54, 54' simultaneously fold the end flaps attached to the bottom panel and the cover panels closed against the lines of adhesive. Resilient rollers 73 of somewhat thicker construction may be employed and located at the vertical center of the container where pressure will simultaneously be applied to both the upper and lower end flaps. Alternatively, an additional row of resilient rollers 73 could instead be employed adjacent each side of the compression station 16.

The present invention provides improved apparatus for the semi-automatic forming, filling and sealing of containers from flat blanks. The apparatus 10 allows flat blanks to be formed and filled simply and efficiently, and it is easily adapted to accommodate blanks for containers of various sizes and configurations. The apparatus is simple, compact, relatively inexpensive and requires a minimum of maintenance, and it accordingly provides many advantages for packing operations which have heretofore been performed completely by hand because the expense of automatic equipment could not be economically justified.

While a specific embodiment of the invention has been primarily shown and described, it should be apparent that various additional modifications may be made to the apparatus without departing from the scope of the invention. For example, other types of adhesive dispensers, such as rollers or spray devices or the like, may be employed instead of the extrusion applicators illustrated. Tape dispensers or staplers might also be substituted for the adhesive applicators. Moreover, additional mechanisms, such as printers which imprint a desired legend on the outer surfaces of the sealed end flaps, might be incorporated into the compression station of the apparatus. Furthermore, a suction assist device might be provided at the forming station to move the blank downward therein and, if desired, hold it in this position while it is being packed. As already indicated, compression devices of various types might be employed instead of the resilient rollers illustrated.

Various of the features of the invention are set forth in the following claims.

I claim:

1. Apparatus for forming a container from a blank by initially moving the empty blank downward, which blank has a bottom panel, front and rear panels, end flaps, and cover means including flap extensions, which apparatus comprises a supporting structure having a forming station, front camming means at said forming station for bending the front panel upwardly from said blank as the bottom panel of said blank is moved downward into said station, a pair of plow means located at the rear of said forming station and spaced apart a distance greater than the length of the bottom panel to provide a discharge opening therebetween, the upper portions of each of said pair of plow means being disposed to bend the rear panel upwardly from said blank as the bottom panel of said blank is moved downward into said station, end camming means disposed at both sides of said forming station for bending the end flaps of said container upwardly from said blank as a part of the same downward movement that bends the front and rear panels upward, track means on said supporting structure extending rearward from said forming station, a compression station longitudinally spaced along said track means from said forming station, adhesive dispensing means located between said forming and compression stations for applying adhesive to the exterior surfaces of the end flaps, switch means actuated by the movement of the packed container from said forming station including first and second switches spaced longitudinally along said track means which actuate said adheslve dispensing means to cause adhesive to be dispensed only when both of said switches are activated so that a line of adhesive applied to the end flaps is terminated short of the front and the rear edges of the container, said compression station including means for applying compressive force against the cover extension flaps and end flaps while the adhesive sets, said compression station being sufficiently long to accommodate a plurality of packed containers, power-operated means being provided in said track means for automatically moving a plurality of packed containers one in contact with another in said compression station a predetermined distance to discharge the rearmost container from the end thereof as the operator is packing another container, said power-operated

means including a fluid-operated cylinder and means connected thereto for engaging the front panel of a packed container that has been moved through said discharge opening, and control means for said fluid cylinder connected to said switch means and including time-delay means which activates said fluid cylinder a predetermined time after movement of the packed container occurs to drive said engaging means toward the discharge end of said compression station.

* * * * *