United States Patent [19]

Lattke

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[45] **June 19, 1973**

[54] **METHOD AND APPARATUS FOR PACKAGING ARTICLES**

[75] Inventor: **Horst G. Lattke,** Middletown, Conn.

[73] Assignee: **Emhart Corporation,** Bloomfield, Conn.

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[52] **U.S. Cl.** **53/29,** 53/32, 53/192, 53/230

[51] **Int. Cl.** **B65b 5/02,** B65b 11/26

[58] **Field of Search** 53/29, 32, 191–195, 53/223, 230

[56] **References Cited**

UNITED STATES PATENTS

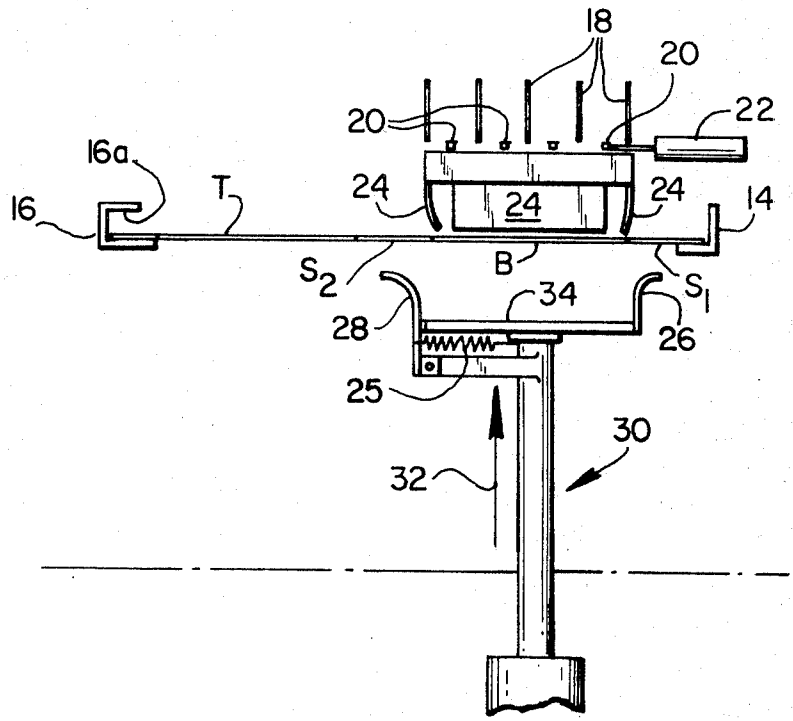
3,146,565	9/1964	Otto	53/192
3,306,002	2/1967	Vogt	53/29

Primary Examiner—Granville Y. Custer, Jr.
Assistant Examiner—Neil Abrams
Attorney—McCormick, Paulding & Huber

[57] **ABSTRACT**

An automatic machine is disclosed for packaging an array, or slug, of articles, such as cans, in a paperboard carton, wherein the carton is first provided in a flat blank form, is then preliminarily formed into a U-shaped configuration, and then final wrapped around the array of articles, to be subsequently glued up and sealed so as to form a very compact paperboard carton for the articles. The machine includes a frame having a vertically movable elevator structure which is equipped with laterally opposed plows for engaging side panels of the paperboard blank, and for folding the side panels upwardly into a U-shaped configuration around the funnel portion of a packer in which the articles are held prior to being dropped onto the bottom panel of the blank. After the articles are positioned thereon, the elevator structure lowers the U-shaped blank, together with the articles, onto a pocket chain conveyor where the carton is fed laterally off the elevator to fold the top panel, and to fold the end panels associated with the side panels, as well as those associated with the top and bottom panels, into place. A conventional vertical compression unit is also used, and the manufacturer' s tab or flap is glued and folded in this portion of the machine.

10 Claims, 8 Drawing Figures



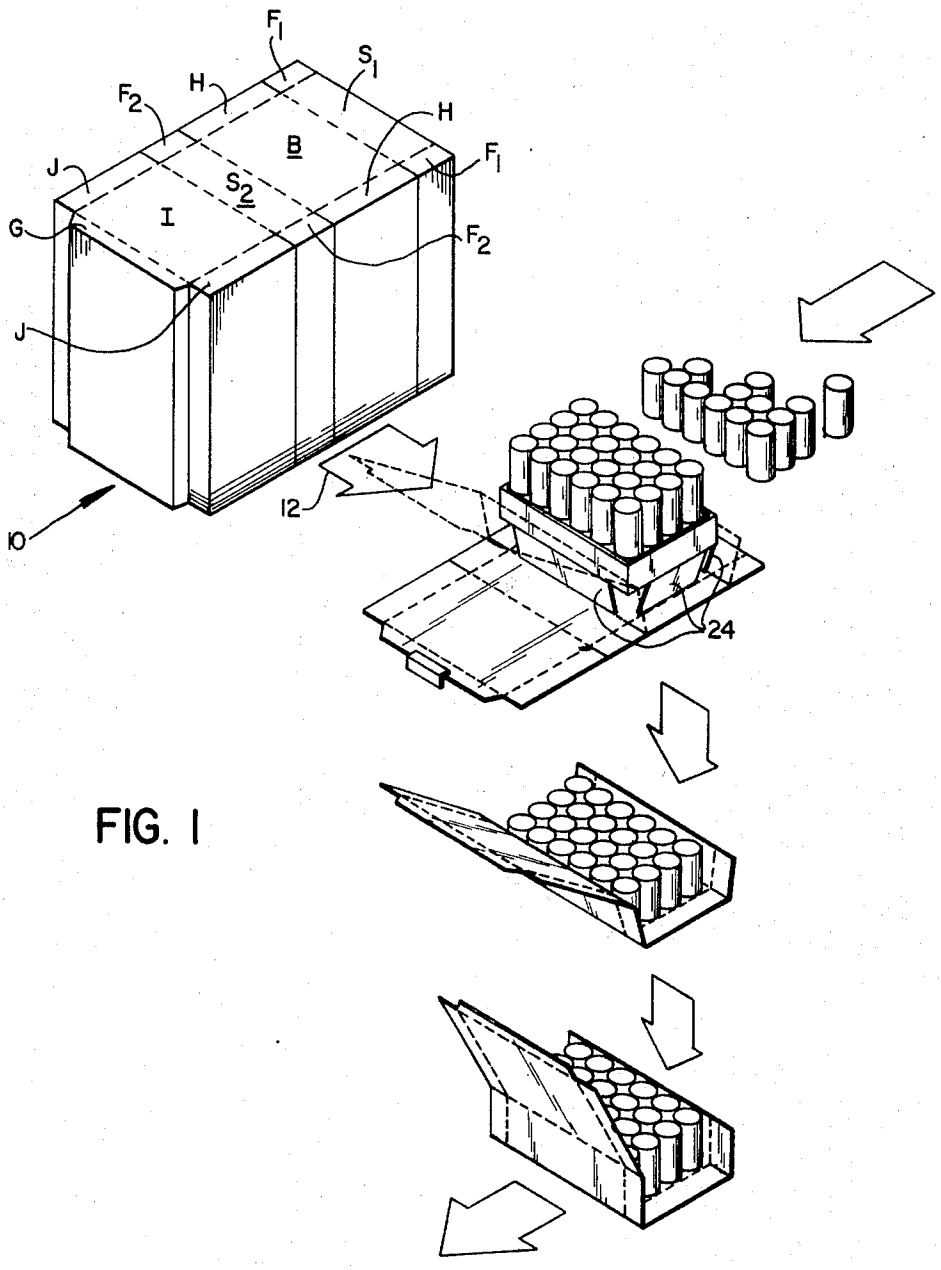


FIG. 1

INVENTOR.
HORST G. LATTKE
BY
McCormick, Paulding & Huber
ATTORNEYS

FIG. 2

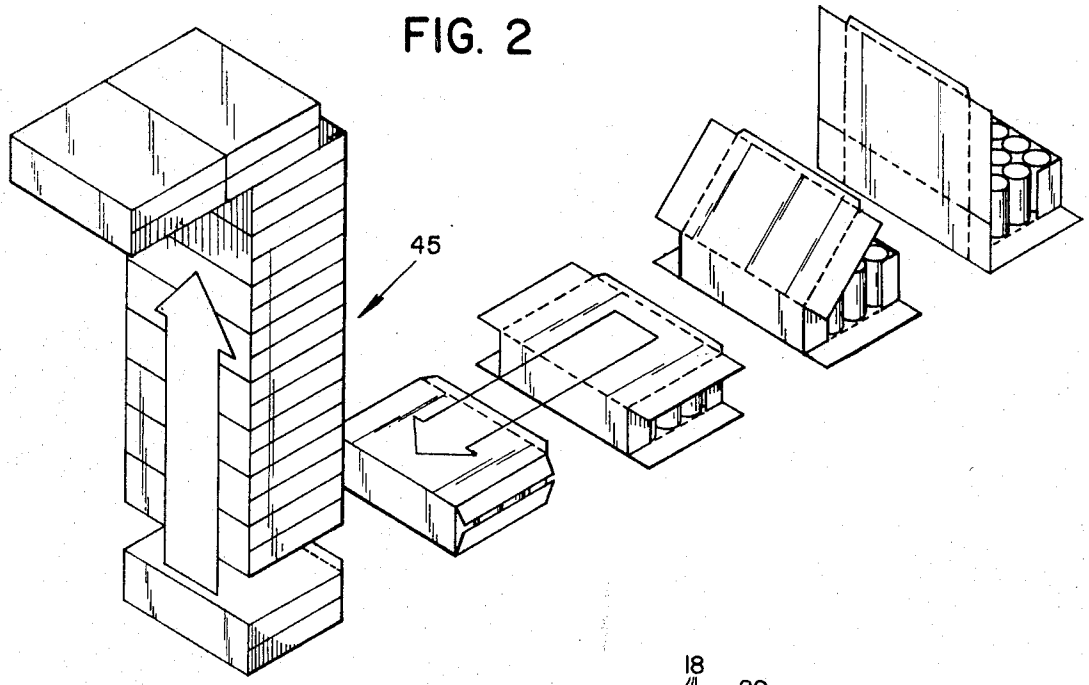


FIG. 3

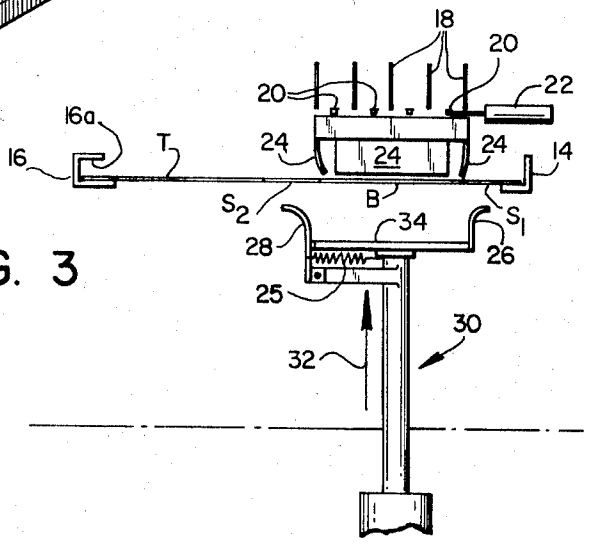


FIG. 4

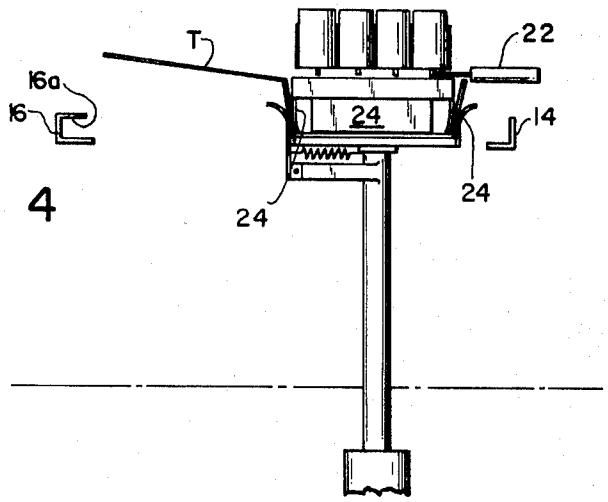


FIG. 5

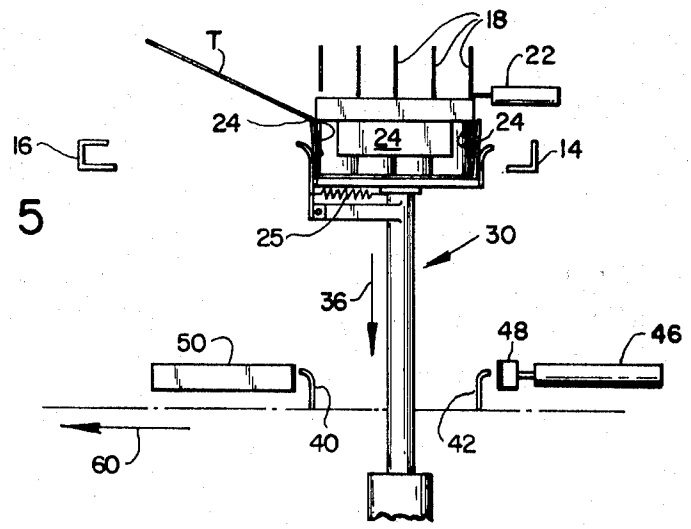


FIG. 6

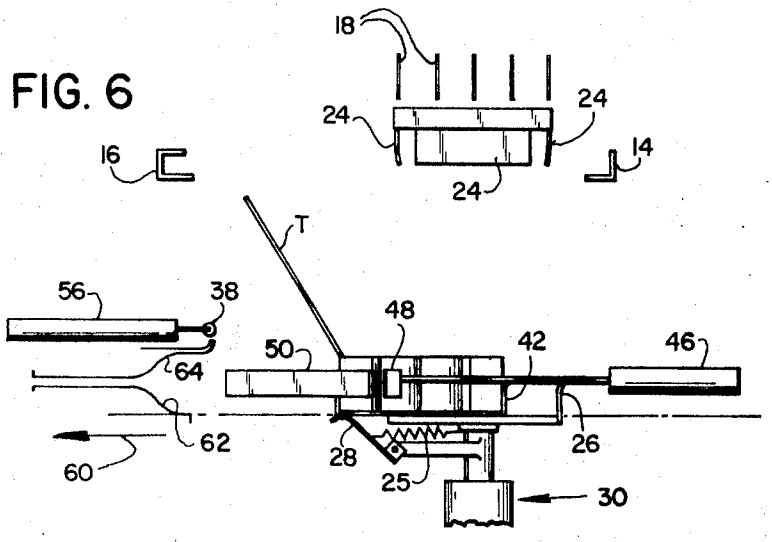


FIG. 7

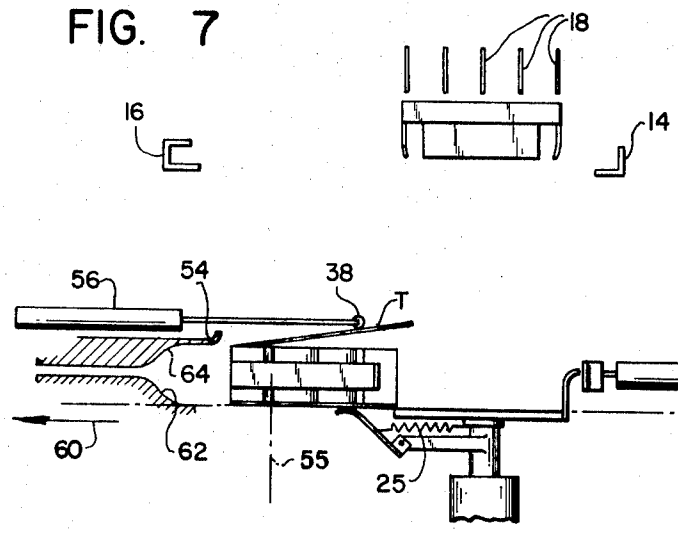
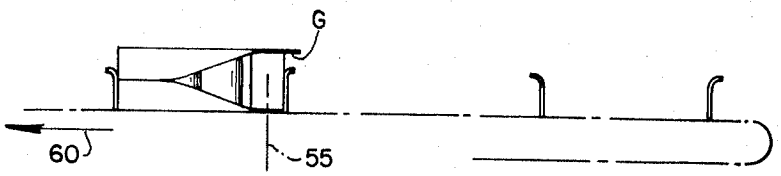


FIG. 8



METHOD AND APPARATUS FOR PACKAGING ARTICLES

BACKGROUND OF THE INVENTION

This invention relates to packaging machines, and deals more particularly with a machine for automatically wrapping a blank of corrugated paperboard material, first around the funnel portion of a packer in which a slug of array of articles is performed, and for then placing the array of articles onto the blank and sequentially folding and sealing the remaining panels and flaps to form a very compact container.

Prior art machines of this general type have been proposed heretofore, and U.S. Pat. No. 3,530,640, issued to Hoffman Sept. 29, 1970, shows one such machine for forming a package after the array of articles has been placed upon the initially flat blank, but the construction shown in this patent requires that a forming mandrel of the reciprocal type be utilized in conjunction with a fixed die for achieving the initial U-shaped configuration of the blank.

One of the objects of the present invention is to provide means for preforming the blank into a U-shaped configuration without utilizing a reciprocable mandrel, and more particularly by utilizing the funnel portion of a conventional drop packer as a mandrel prior to loading the articles onto the bottom panel of the blank. As a result of the construction adopted in this disclosure, the articles and the blank are positively controlled throughout the machine without the need for providing a reciprocable mandrel, and without the need for relying upon gravity to hold the array of articles on the paperboard blank during the preliminary folding step.

In this connection, U.S. Pat. No. 3,482,372, issued to Hottendorf, Dec. 9, 1969, shows a machine for utilizing the articles to be packaged as the mandrel in the forming of the blank around the articles. However, in the Hottendorf machine, the blank is relatively unsupported, as are the articles, especially during the preliminary forming stages where the U-shaped configuration is achieved. The weight or mass of the slug of articles being packaged must be relied upon in the Hottendorf machine in order to properly position the blank as it is gravity fed through a fixed die, or box forming means, of the machine.

Another object of the present invention is to provide a machine which permits the blank to be folded to a preliminary U-shaped configuration, not only without the need for a reciprocating mandrel, but also without the need for relying upon the gravity of the articles being packaged to hold the blank in position while this preliminary U-shaped configuration is achieved.

SUMMARY OF THE INVENTION

In practicing the method of the present invention, and in adapting the method of the present invention to the machine described herein, a paperboard flat box blank is prescored so as to define a bottom panel, a pair of side panels connected to opposite sides of the bottom panel, a pair of end flaps connected to opposite ends of each of said side panels, and a top panel connected to one of said side panels. The top and bottom panels also have end panels connected to their opposite ends to provide a blank of conventional configuration well adapted to be used in a packaging machine, either of the type shown in the foregoing patents, or in a machine in accordance with the present disclosure, to provide a very compact and tight package for shipping an array or slug such as cans. The blanks are sequentially fed from a magazine to an infeed station of the machine where each of them can be engaged from below by a vertically reciprocable elevator structure characterized by a pair of upstanding plows located in laterally spaced relationship thereupon. These plows engage the underside of the box blank to fold the side panels upwardly around the depending funnel portion of a drop packer. Thus, the blank is folded into a generally U-shaped configuration around the funnel portion of the packer prior to dropping the array of articles onto the bottom panel of the blank. Once the articles have been dropped onto the bottom panel, the elevator structure lowers the articles, and U-shaped blank, downwardly to deliver this unit to a transverse, or laterally extending, intermittently driven, conveyor where the unit may be fed past a top folding device, and past apparatus for folding the various end panels of the blank. It is an important feature of the present invention that the array of articles to be packaged is only dropped onto the bottom panel of the box blank after the blank has been folded into a preliminary U-shaped configuration around the funnel portion of the drop packer. As a result of this sequence of events, the articles are restrained by the box blank so that they remain in position while the U-shaped box blank and array of articles are lowered to the pocket chain conveyor for further forming. One pair of end flaps associated with one side panel are folded by reciprocable plows while the partially formed box is held at the lower station of the elevator structure. The other pair of end flaps associated with the other side panel are folded into position as the package is moved by the pocket chain conveyor, and the top panel is similarly folded. Fixed plows then fold the end panels associated with the top and bottom panels but only after the end panels referred to above have been preglued. The manufacturer's tab is glued and sealed in a compression unit of the vertical type provided at the downstream end of the pocket chain conveyor.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view, and shows in schematic fashion a first portion of the machine wherein the box blank is fed from the magazine to an infeed station, where it is adapted to have its side panels folded upwardly around the funnel portion of the packer so that the resulting U-shaped package and its contents can be dropped vertically for further processing.

FIG. 2 is a schematic view showing in perspective the remaining portion of the machine, wherein the partially formed box blank is fed horizontally toward the lower end of a vertical compression unit.

FIGS. 3 through 8 inclusively show the successive mode of operation of the elevator structure used in forming the box blank and in moving the blank and articles downwardly so as to be transferred by the pocket chain conveyor to the lower station of the compression unit.

DETAILED DESCRIPTION

Turning now to the drawings in greater detail, FIG. 1 shows in schematic fashion a vertical stack **10** of box blanks, which stack is held in a conventional magazine (not shown), and which magazine further includes means for stripping the lowermost blank from the stack

and for feeding the blank horizontally in the direction of the arrow **12** toward an infeed station. The blank is supported at the infeed station by suitable means such as the blank guides **14** and **16** best shown in FIG. **3.**

The box blanks are of conventional constructions, and each includes a bottom panel B, a pair of side panels S_1 and S_2 connected to opposite sides of the bottom panel B, and two pairs of end flaps F1, F1 and F2, F2 connected to opposite ends of each of said side panels respectively to provide four such end flaps as shown. The box blank further includes a top panel T connected to one of the side panels S2, and the top panel T also has a manufacuter's tab or side flap G provided on an opposite side edge from that associated with the side panel S2. Finally, the box blank is further characterized by end flaps H,H and J,J associated, respectively, with the bottom and top panels B and T.

Still with reference to FIG. **1,** means is provided for advancing slugs or arrays of articles in uniform lanes to a drop packer spaced vertically above the box blank at the infeed station, and as suggested in FIG. **3.** One possible construction for this packer, or array forming apparatus is shown in U.S. Pat. No. 2,219,824 issued to Kimball et al., Oct. 29, 1940. As described in this patent, and as indicated schematically in FIGS. **3, 4** and **5,** the apparatus for feeding the array of articles to the position indicated in FIGS. **1** and **4** includes a drop packer having a shifting grid structure which defines a plurality of lanes for receiving the array of articles in columns, and this shifting grid structure further includes a shifting bottom bar associated with each lane divider. Means is provided for moving these bars, all of which are connected to one another for simultaneous movement, to align them with the lane fividers of the grid structure and thereby to permit the articles to drop from the position shown in FIG. **4** to that shown in FIG. **5.** A four sided funnel structure of rectangular shape is provided in conjunction with the drop packer apparatus just described so as to guide the articles during their free fall and to also serve a further function to be discussed hereinbelow in conjunction with practicing the present invention.

FIG. **4** shows in schematic fashion the fixed lane defining portion of the grid structure **18, 18** which will be fixed in a particular installation, and also shows each of the bars **20, 20** which are connected to one another and to an actuator **22** for movement from the position shown in FIG. **4** to that shown in FIG. **5** for dropping the articles as described above. The four resilient sheet steel panels defining the four boundaries of the funnel structure are indicated generally at **24** in the drawings. Two of these will serve a further purpose to be described.

Still with reference to FIG. **1,** an elevator structure is provided for engaging the box blank and more particularly, for engaging the side panels S1 and S2 so as to form the box blank into a generally U-shaped configuration as depicted in FIGS. **1** and **4** prior to dropping the articles onto the bottom panel of the blank. Referring now particularly to FIG. **3,** the elevator structure **30** is adapted to move initially upwardly in the direction of the arrow **32** so that left and right-hand plows **26** and **28** respectively engage these side panels, S1 and S2 respectively, to fold them about the fold lines defining the side edges of the bottom panel B, once this bottom panel B moves up slightly to engage the lower edges of the funnel structure **24, 24.** From FIG. **3** it will be apparent that these fold lines are the first broken on the initially flat box blank, and that further upward movement of the elevator structure will cause the top panel T to fold in the wrong direction about its associated fold line, that is about the fold line between the top panel T and the side panel S2 so as to move counterclockwise as suggested in FIG. **3** and FIG. **4.** The guide structure **16** for the initially flat box blank is provided with an upper edge **16*a*** for achieving this initial reverse fold of the top panel T.

The elevator structure **30** comprises a vertically reciprocable air motor having a movable portion which carries the plows **26** and **28,** as well as a generally flat platten **34,** across which the U-shaped blank and its associated articles will be slid by the pocket chain conveyor to be described. The air motor is initially in the intermediate position shown in FIG. **3** and will move initially upwardly in the direction of the arrow **32** so as to form the box blank into a U-shaped configuration as shown in FIGS. **4** and **5,** and thence downwardly in a manner to be described.

As suggested in FIG. **5,** the articles in the grid structure, defined by the lane dividers **18, 18,** are dropped downwardly as a result of actuation of air motor **22** with the result that all of the articles are provided in the U-shaped carton which has been preformed about the funnel portion **24** of the drop packer. The elevator structure then moves downwardly as indicated by the arrow **36** from the position shown in FIG. **5** to the lower position shown in FIG. **6.** The elevator structure is air operated in both directions, and it is an important feature of the present invention that this elevator structure is programmed for upward preliminary movement, followed by subsequent downward movement of the packing case blank.

As the U-shaped box blank, together with the slug of articles, is lowered to the position shown in FIG. **6,** that is into a pocket of the pocket chain conveyor defined by the pocket defining elements **40** and **42,** the end flaps F1, F1, associated with the side panel S1, are folded by a movable plow **48** which is operated by an air motor **46** prior to transverse movement of the blank and articles, as shown in FIG. **6.** The stroke of this air cylinder **46** is preferably such that its associated plow **48** moves downstream into closely spaced transverse relationship to a fixed guide **50** so that when the carton and its articles are conveyed horizontally to the left, as suggested in FIG. **6** by the direction of arrow **60.** The end flaps F2 and F2 associated with the leading side panel S2 will also be folded into position and will be held in position by the fixed guide **50.** This fixed guide **50** also serves to hold the end flaps F1 and F1 associated with the trailing side panel S1 in position during this transverse motion of the package.

As mentioned above, the elevator structure has a flat upper surface, or platen **34,** which permits the package to be slid horizontally off the elevator in response to the horizontal motion of the intermittently operated pocket chain conveyor, and it is an important feature of the present invention that the plow **28** is movably mounted to the elevator so as to be moved downwardly out of the way of the package as it is so conveyed. FIG. **6** shows this plow **28** in its inactive position, that is, after it is urged out of the path of travel of the package in response to transverse movement of the package under the influence of the pocket chain conveyor. A tension spring **25** holds the plow **28** in its active posi-

tion but with a force which can be overcome by the pocket chain conveyor. As the package is moved downstream by the pocket chain conveyor, the top panel T is folded upwardly in a clockwise direction by a movable bar **38** associated with an air motor or cylinder **56.** This motion is shown in FIGS. **6** and **7,** and a fixed plate **54** is provided below the air cylinder **56** to hold the top panel T in position abutting the upper ends of the articles in the array. The air motor **46** retracts when motor **56** extends, and bot motors may be so moved in response to the closing of a normal open switch (not shown) on the elevator itself which switch is actuated by the package as it leaves the elevator.

The pocket chain conveyor indicated schematically in FIGS. **5** through **8** inclusively is intermittently driven in the direction indicated by the arrow **60,** and this conveyor includes a series of pockets defined by elements such as those described above with reference to numerals **40** and **42,** which elements serve to hold the side panels of the box blank in the desired 90° position with respect to the bottom panel even after the side panels S1 and S2 have been folded as a result of the apparatus described above. The pocket chain conveyor, and more particularly, the pocket defining elements thereof, can be seen to move the package through fixed plows **62** and **64** which plows fold the end flaps associated with the bottom and top panels respectively but only after the end flaps F1, F1 and F2, F2 have been preglued at a gluing station immediately upstream of these plows. The location of this station is indicated schematically in FIGS. **7** and **8** by the line **55.**

The pocket chain conveyor then moves the package and its contents to the lower end of a vertical compression unit **45** of conventional construction to set the adhesive applied at the above-mentioned station. The manufacturer's tab G is of course not folded in this compression unit **45** until the tab has been glued by suitable means (not shown). When so glued, a fixed plow (also not shown) folds this final flap G in place.

I claim:

1. Apparatus for forming a carton for an array of articles, said apparatus comprising a drop packer for releasably supporting the array of articles and including at least two fixed parallel funnel sides for guiding the articles when they are released, means for feeding a flat carton blank to an infeed position wherein a bottom panel of the blank is below said drop packer and so that side panels of the blank have prescored fold lines adjacent the sides of the bottom panel located in spaced relation below said fixed funnel sides, an elevator structure below the blank infeed position and including a first plow at one side for engaging one of said blank side panels during upward movement of said elevator structure to fold it upwardly against one of said fixed funnel sides, a second plow at the opposite side of said elevator structure for engaging the other side panel to fold it upwardly along side the other fixed funnel side, means for reciprocating said elevator structure to move it upwardly from an initial position to a raised position as aforesaid to form said initially flat blank into a generally U-shaped configuration and with the blank side panels folded against said fixed funnel sides, said drop packer including means for releasing the array of articles so that they drop downwardly onto the bottom panel between said fixed funnel sides, and said means for reciprocating said elevator structure then lowering said array of articles and said U-shaped blank downwardly to a position below said initial position.

2. The apparatus of claim **1** further characterized by conveyor means for moving the U-shaped blank off said elevator structure after said elevator structure reaches said position below said initial one.

3. The apparatus of claim **2** wherein said second plow is hingedly connected to said elevator structure so that said U-shaped blank and its associated array of articles can be moved by said conveyor means in a direction suitable for folding a top panel of the blank, which top panel is carried by said other side panel, and plow means for so folding said top panel as the U-shaped blank is so moved.

4. The apparatus of claim **3** further characterized by biasing means for urging said second plow toward an active position for folding said other blank side panel as aforesaid, and wherein said conveyor means overcomes the biasing force of said biasing means when moving the U-shaped blank transversely off said elevator structure.

5. The apparatus of claim **4** further characterized by blank supporting means at said infeed station, said last mentioned means including structure for restraining the top panel and bending it back as the other side panel is folded up by said second plow whereby the top panel is more readily folded over by said plow means during transverse movement of the U-shaped blank off the elevator structure as aforesaid.

6. a method for forming a carton from an initially flat carton blank having a bottom panel, two side panels connected thereto, and end flaps associated with these bottom and side panels for an array of articles held in a drop packer, said method comprising the steps of

a. feeding a blank from a stack to a generally horizontal initial position below the fixed funnel of a drop packer.

b. lifting the blank upwardly so that the bottom panel engages the fixed funnel and so that the side panels are folded upwardly to abut the sides of the fixed funnel to provide a U-shaped blank configuration,

c. dropping an array of articles on the bottom panel while the blank is in said U-shaped configuration, and

d. lowering said array of articles and said U-shaped blank downwardly to a position below said initial position.

7. The method of claim **6** further characterized by the additional step of moving said U-shaped blank and the articles therein in a generally horizontal direction away from said lowered position, and folding a top panel, which is carried by one of said side panels of said blank, over the upper ends of the articles as they are so moved.

8. The method of claim **6** further characterized by the step of folding the end flaps associated with the other of said side panels while said U-shaped blank is in said lowered position.

9. The method of claim **8** further characterized by the additional step of moving said U-shaped blank and the articles therein in a generally horizontal direction away from said lowered position, and folding a top panel, which is carried by one of said side panels of said blank, over the upper ends of the articles as they are so moved.

10. The method of claim **9** further characterized by the step of folding the end flaps associated with said one side panel as the U-shaped blank is moved horizontally to so fold said top panel.

* * * * *