United States Patent

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[54] **SELF-LOCKING BOX**
5 Claims, 11 Drawing Figs.

[52] **U.S. Cl.** **229/36**
[51] **Int. Cl.** **B65d 5/22**
[50] **Field of Search** 229/35, 36, 31, 33

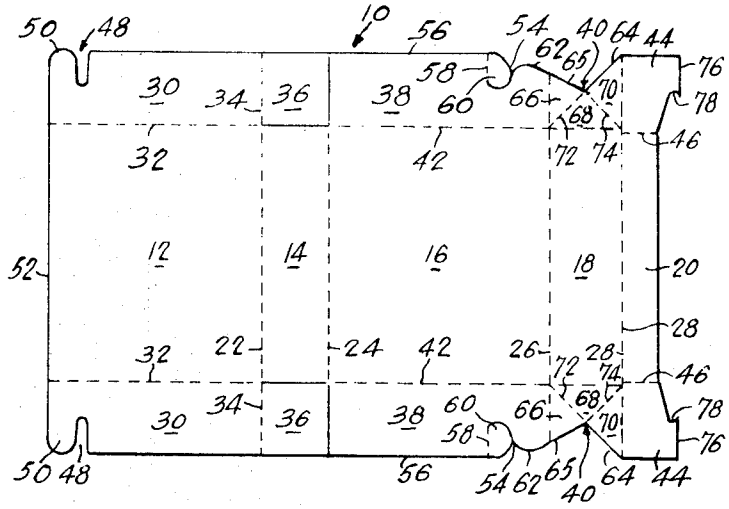
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ABSTRACT: A tray comprising, integrally connected, a bottom panel having bottom side panels and a front panel having front side panels, each front side panel being foldably connected at one edge to a bottom side panel and at its opposite edge to a locking panel, a locking flap formed in each of the bottom side panels and fold lines in said front side panels permitting the front panel and bottom side panels to be moved into erected position perpendicular to the bottom panel and the locking flaps to cooperate with the locking panels to secure the panels in erected position.



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SHEET 1 OF 2

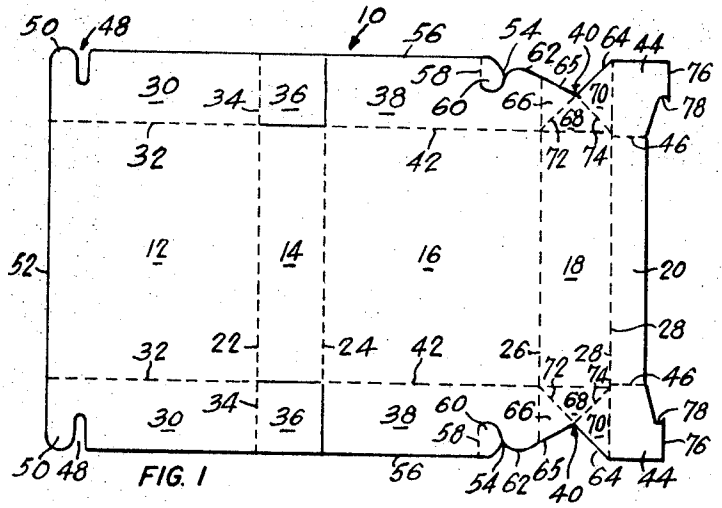


FIG. 1

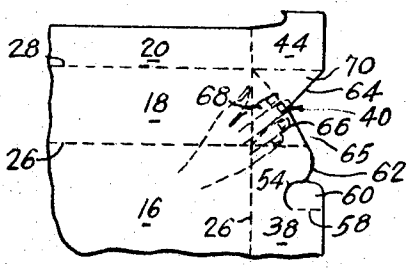


FIG. 2

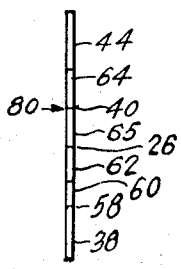


FIG. 3

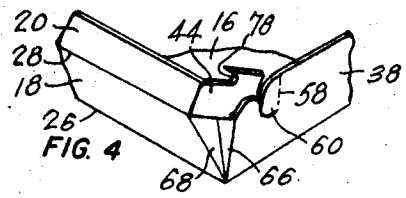


FIG. 4

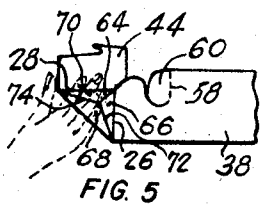


FIG. 5

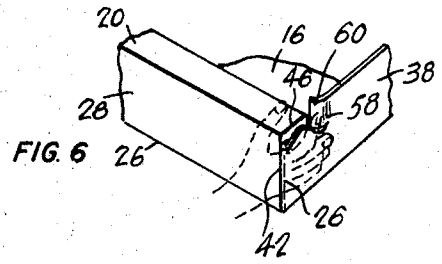


FIG. 6

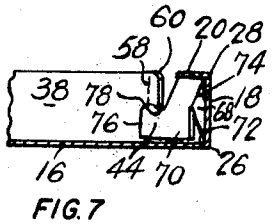


FIG. 7

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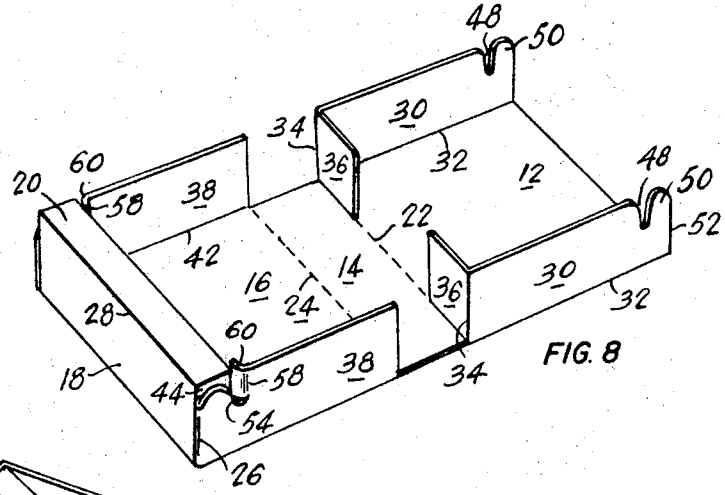


FIG. 8

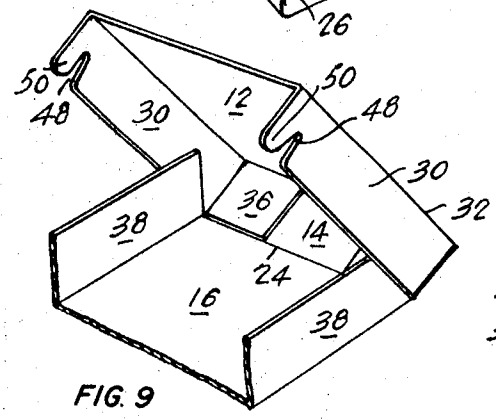


FIG. 9

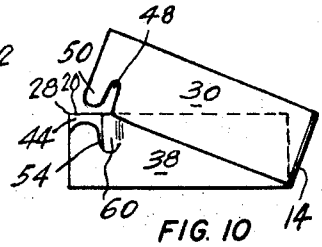


FIG. 10

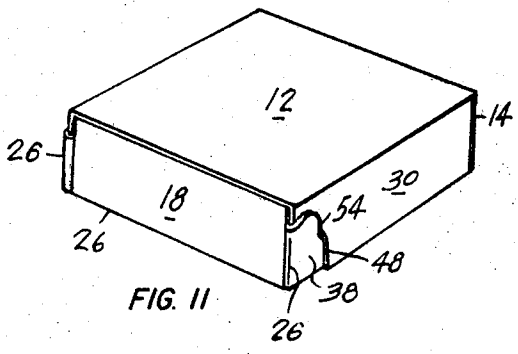


FIG. 11

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SELF-LOCKING BOX

The present invention relates to cartons, more particularly to cartons that may be easily set up without the use of adhesives, and having a top that may be locked in closed position.

Self-locking boxes are well known, either for manual or machine setting up operation. Generally, for manual setting up, the boxes are either partially preglued, which requires extra operations at the factory, or require that a plurality of different manipulations be performed, and thus are difficult to set up. The present invention provides a carton that requires no preliminary gluing or partial setting up by the manufacturer, but is easily set up with a simple twist of the wrists thereby to form an erected tray.

It is thus the main object of the present invention to provide a new form of self-locking box structure that does not require adhesives.

Broadly, the present invention comprises a bottom and a front panel, bottom side panels connected one to each side of said bottom panel, and front side panels connected one to each side of said front panel, said bottom side and said front side panels being foldably connected together along one end edge, a pair of fold lines extending from each corner of each of said front sidewall panels adjacent the juncture of this panel with the front panel to meet at the juncture of the center line of each said front side panel with the free edge of same, and a locking panel connected to the end of each said front side panel remote from said bottom side panel, a pair of locking flaps each formed by a slit in one of said bottom side panels and a hook formed on each said locking panel, said locking flaps and said hooks cooperating to hold said bottom and front panels in erected position.

Further features, objects and advantages will be evident from the following detailed description taken in conjunction with the accompanying drawings in which:

FIG. 1 is a plan view of a blank formed in accordance with the present invention.

FIG. 2 is a partial plan view illustrating the first step in setting up of the carton.

FIG. 3 is an end view of FIG. 2.

FIG. 4 is a partial isometric view illustrating the next step in setting up the tray section of the carton.

FIG. 5 is an end view of the carton illustrated in FIG. 4.

FIG. 6 is a partial isometric view of one corner of the tray structure in the final stages of erection.

FIG. 7 is a view looking in the direction of arrow *a* in FIG. 6.

FIG. 8 is an isometric view of the partially setup carton illustrating the next folding operations for closing of the carton.

FIG. 9 is a partial isometric view illustrating the next stage in the closing operation.

FIG. 10 is an end view of an almost closed carton.

FIG. 11 is an isometric view of a closed carton.

The blank **10** of FIG. 1 comprises a top wall panel **12**, a rear wall panel **14**, a bottom wall panel **16**, a front wall panel **18**, and a ledge forming panel **20**, interconnected by fold lines **22**, **24**, **26** and **28**. A pair of top outside side panels **30** are connected one to each side of top panel **12** by a fold line **32**, and connected to each panel **30** by a fold line **34** which extends substantially perpendicular to the fold line **32**, but spaced from the fold line **22** in a direction away from panel **14** by a distance substantially equal to the thickness of the board, is a rear inside flap **36**. No flaps or panels are connected to the rear wall panel **14**. A pair of bottom inside side panels **38**, and a pair of front side panels **40**, are connected one to each opposite side of the panels **16** and **18** respectively by a pair of fold lines **42**. Each of the panels **38** is hingedly connected to its adjacent panel **40** by an extension of fold line **22**. A pair of lock forming panels **44** are connected one to each end of the panel **20** by fold lines **46**, and to their adjacent panel **40** by an extension of the fold line **28**.

A locking slot **48** is cut into each of the top side panels **30** to form a locking tab **50** between slot **48** and the free end edge **52** of each panel **30**. The slot **48** and tabs **50** cooperate with other parts of the carton to hold the box closed in a manner to be described more fully hereinbelow.

Each panel **38** has a substantially C-shaped slit **54** which, in the illustrated embodiment, begins at the free edge **56** of the panel **38** and terminates at or adjacent a fold line **58**. The fold line **58** extends between the free edge **56** and the slit **54** to define with the slit **54** a locking flap **60** foldable relative to the panel **38** on fold line **58**. The dimensions of this C-saped slit **54**, the location of the slit **54** and of the fold line **58**, the width of the locking panel **44**, and the width of tab **50**, are correlated for intercooperation to lock the tray in erected position and to hold the top of the box closed as will be more apparent as the description proceeds. The free edge **62** of the remainder of the panel **38** curves from the slit **54** to the fold line **26**.

Each panel **40**, in the illustrated embodiment, has a V-shaped free edge **64** with the leg of the V extending toward the fold line **26** being shortest. The specific shape of this free edge is important only to ensure that during erection the locking panel **44** is able to pass over the shorter leg of the V and into the box structure. Stated differently, it is important that the junction of the free edge **64** with the extension of fold line **26** be located at a point where it will not interfere with the movement of the panel **44** into the carton. Each of the panels **40** has a pair of fold lines **72** and **74** extending at an angle from the corners of the panel **40** adjacent the fold lines **26**, **28** and **42** and meeting at a point on the free edge **64**, which point is on the center line of the panels **18** and **40**. These fold lines **72** and **74** divide the panels in the illustrated embodiment into three triangular areas indicated at **66**, **68** and **70**.

The locking panels **44** are each provided on their free end edge remote from the fold line **28** with a hooklike projection **76** formed with an inwardly facing concave curved edge **78** adapted to receive an engage the bottom edge of the locking flap **60** and thereby lock the panels **18** and **20** in erected position as will be explained in detail hereinbelow.

To set up the carton, the blank is taken with both hands and pressure is applied to the triangular areas **68** of the panels **40** in the direction of the arrow **80** (preferably by means of the center fingers of each hand), as shown in FIGS. 2 and 3 thereby to fold the panels **38**, **40** and **44** perpendicular to their respective panels **16**, **18** and **20** on fold lines **42** and **46**. The area **68** is moved past the perpendicular position to approach the inside surface of the panel **18** by continued pressure in the direction of the arrow **80** and by simultaneously bending (by thumb pressure) the panel **20** relative to panel **18** on fold line **28**. Also simultaneously with the folding of the panels **40** and **20**, the panel **18** may be folded relative to the panel **16** along the line **26** by twisting the wrists so that the end of the carton is shaped as shown in FIGS. 4 and 5 and finally to the position shown in FIGS. 6 and 7. As seen in FIGS. 4 and 5, the panel **44** slides over the top edge **65** of the panel **40** so that in the erected carton the panel **44** is positioned inside the panel **38** and the fold line **28** between the panels **40** and **44** is inside the fold line **26** between the panels **38** and **40**. When the panels **18**, **20**, **38** and **40** have been folded to their final position with the panel **18** substantially perpendicular to the panels **16**, **20** and **38** as shown in FIGS. 6, 7 and 8, the flaps **60** are folded on their fold lines **58** (preferably by means of the first finger of each hand) into the carton so that the bottom edge of each flap **60** overlies and engages the concave curved edge **78** of the projection **78** on the adjacent panel **44** thereby to lock the panels **18**, **20**, **38** and **40** in erected position.

In closing the box the panels **30** are folded perpendicular to the panel **12** along fold lines **32** and the flaps **36** are folded perpendicular to the panels **30** along fold lines **34** so that the carton is substantially as shown in FIG. 8. Next the panels **12** and **14** are folded along lines **22** and **24** relative to the panel **16** to the position shown in FIGS. 9, 10 and finally 11. As the box is closed, the panels **30** remain outside of the panels **38** and the tabs **50** are inserted inside of the panels **38** in the area between the fold lines **26** and **58**. The slot **48** combines with the slit **54** so that the tab **50** may be located on one side of the panel **38**, while the remainder of the panels **30** are outside of this panel. The tab **50** is snugly received between the inside surface of the panel **38** and the outside surface of the panel **44** to lock the top in closed position substantially as shown in FIG. 11.

Thus applicant has disclosed a new folding carton that may be easily set up and closed without the use of adhesive. Modifications may be made without departing from the spirit of the invention as defined in the appended claims. For example, the tabs **50** could be turned to face in the opposite direction and the panels **30** folded to lie inside of the panels **38** with the tabs **50** on the outside. Also the panel **20** could be omitted, however, setting up then becomes more difficult.

I claim:

1. A carton comprising a bottom panel and a front panel interconnected by a first fold line, a pair of bottom side panels foldably connected one to each side of said bottom panel, locking flaps formed by a slit in each of said bottom side panels and connected to said bottom side panels by fold lines, a ledge forming panel foldably connected to said front panel by a fold line substantially parallel to said first fold line, a pair of locking panels, means foldably connecting said ledge forming panel to each of said locking panels whereby said locking panels may be folded substantially perpendicular to said ledge forming panel, a locking hook projecting from a side edge of each said locking panel remote from said front panel, each said locking flap being foldable out of the plane of its respective bottom side panel on its said fold line connecting same to its respective bottom side panel into a position overlying said locking hook on its adjacent said locking panel.

2. A carton as defined in claim **1** further comprising a rear panel foldably connected to said bottom panel and a top panel foldably connected to said rear panel by fold lines substantially parallel to said first fold line.

3. A carton as defined in claim **2** further comprising top side panels foldably connected one at each side of said top panel, a locking slot extending in from the free side edge of each said top side panel adjacent the free end edge thereof and forming a locking tab between said slot and said free end edge, said slit and said slot cooperating to permit each said top side panel to be positioned on one side of its adjacent said bottom side panel with each said locking tab being positioned on the other side of said adjacent bottom side panel thereby to lock said top panel in closed position.

4. A carton as defined in claim **3** wherein said one side is the outside of the carton.

5. A carton as defined in claim **4** further comprising a pair of top rear flaps foldably connected one to the side of each said top side panel remote from said free edge.