United States Patent [19]

Sanders et al.

[11] **3,870,185**

[45] **Mar. 11, 1975**

[54] **COLLAPSIBLE CONTAINER**

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[73] Assignee: **Pinckney Molded Plastics, Inc.,** Pinckney, Mich.

[22] Filed: **Oct. 29, 1973**

[21] Appl. No.: **410,374**

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 259,844, June 5, 1972, Pat. No. 3,796,342.

[52] **U.S. Cl.** **220/6,** 220/1.5

[51] **Int. Cl.** **B65d 7/24**

[58] **Field of Search** 220/6, 7, 1.5

[56] **References Cited**

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3,796,342 3/1974 Sanders et al. 220/6

Primary Examiner—William I. Price

Assistant Examiner—Steven M. Pollard

Attorney, Agent, or Firm—Whittemore, Hulbert & Belknap

[57] **ABSTRACT**

A collapsible container having a base or bottom wall and having an open border frame defining the top. Foldable side walls are hinged to the base and to the border frame, and end walls are hinged to the border frame only. When the container is collapsed, the side walls fold inwardly and the end walls swing up and inward into the plane of the border frame.

8 Claims, 13 Drawing Figures

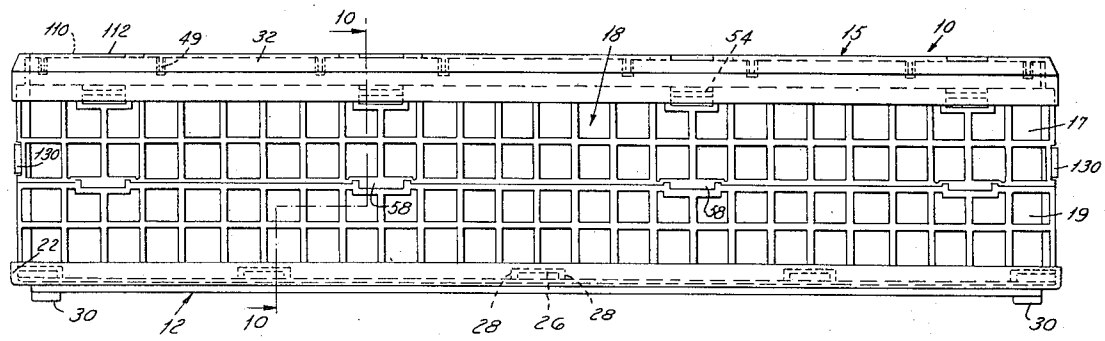


FIG. 1

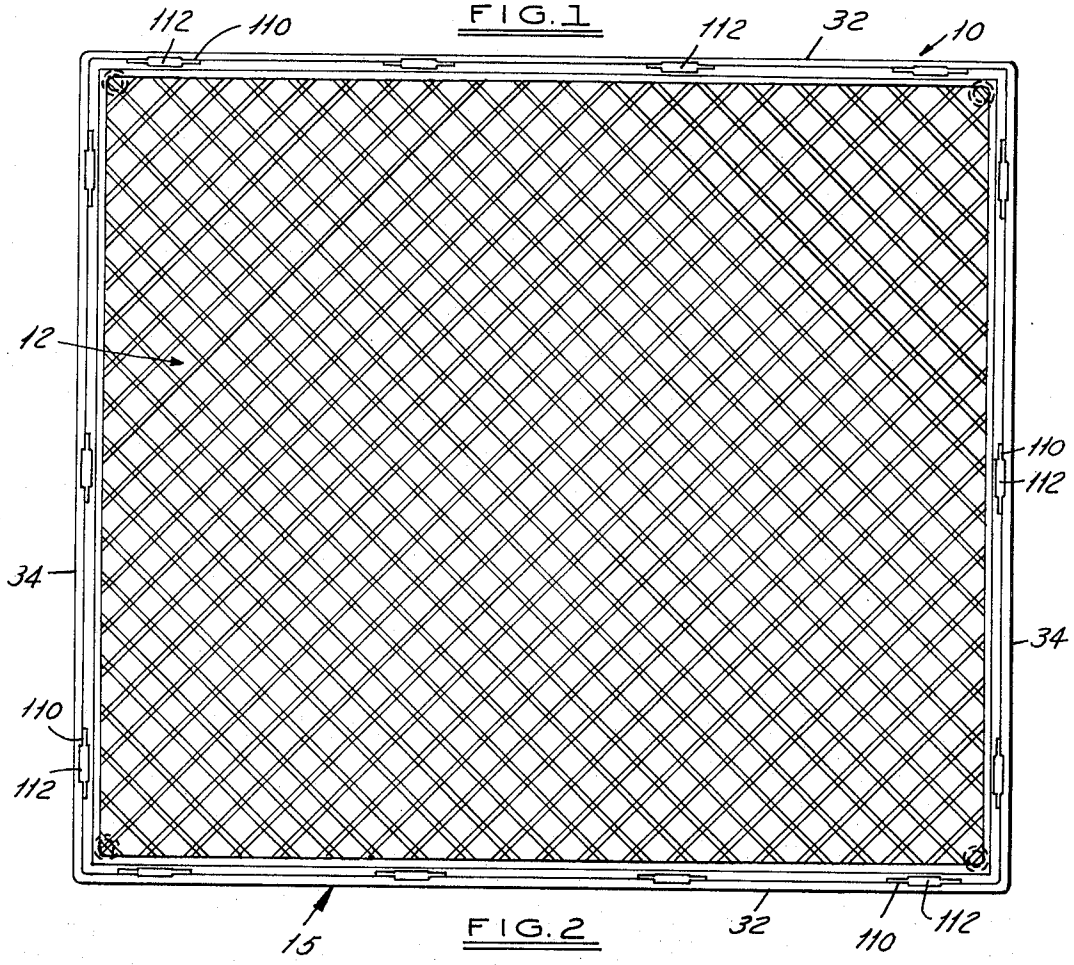
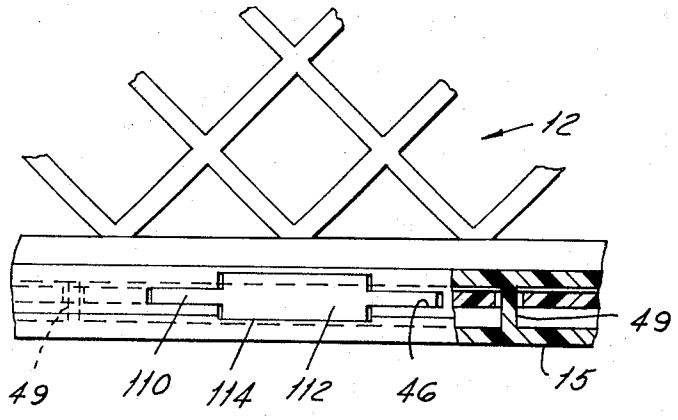

112
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FIG. 2


12
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114
112
46
15

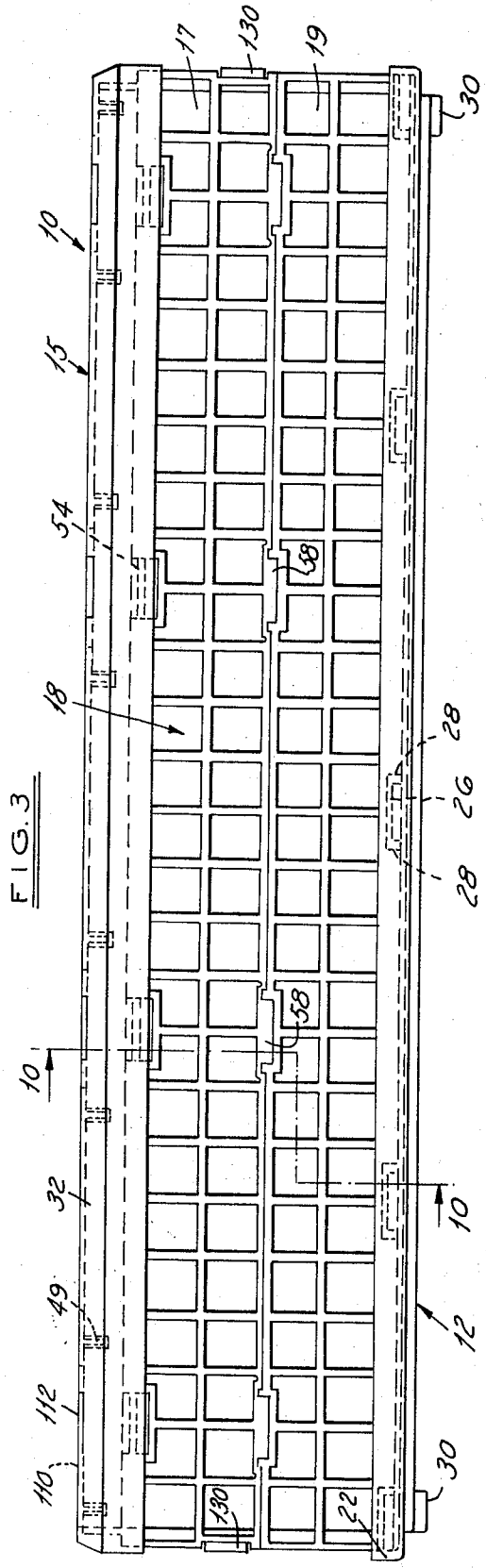


FIG. 3

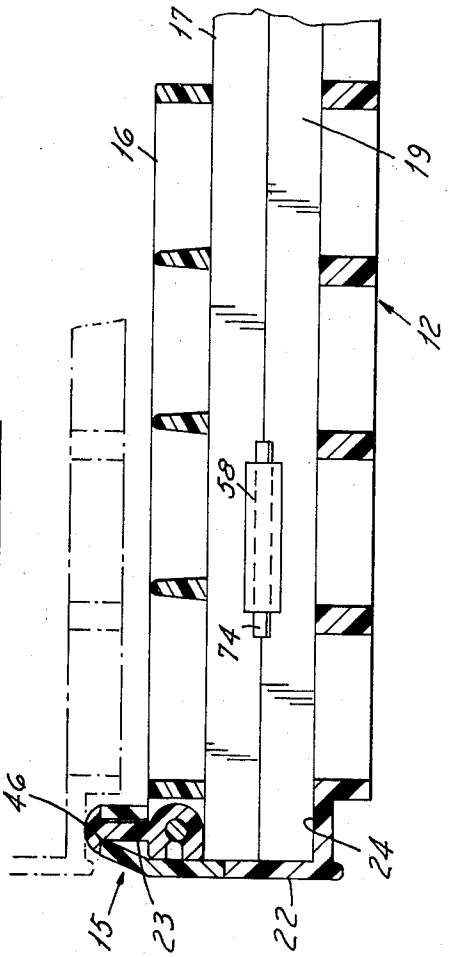


FIG. 5

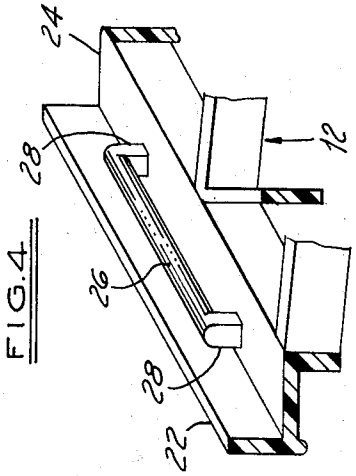


FIG. 4

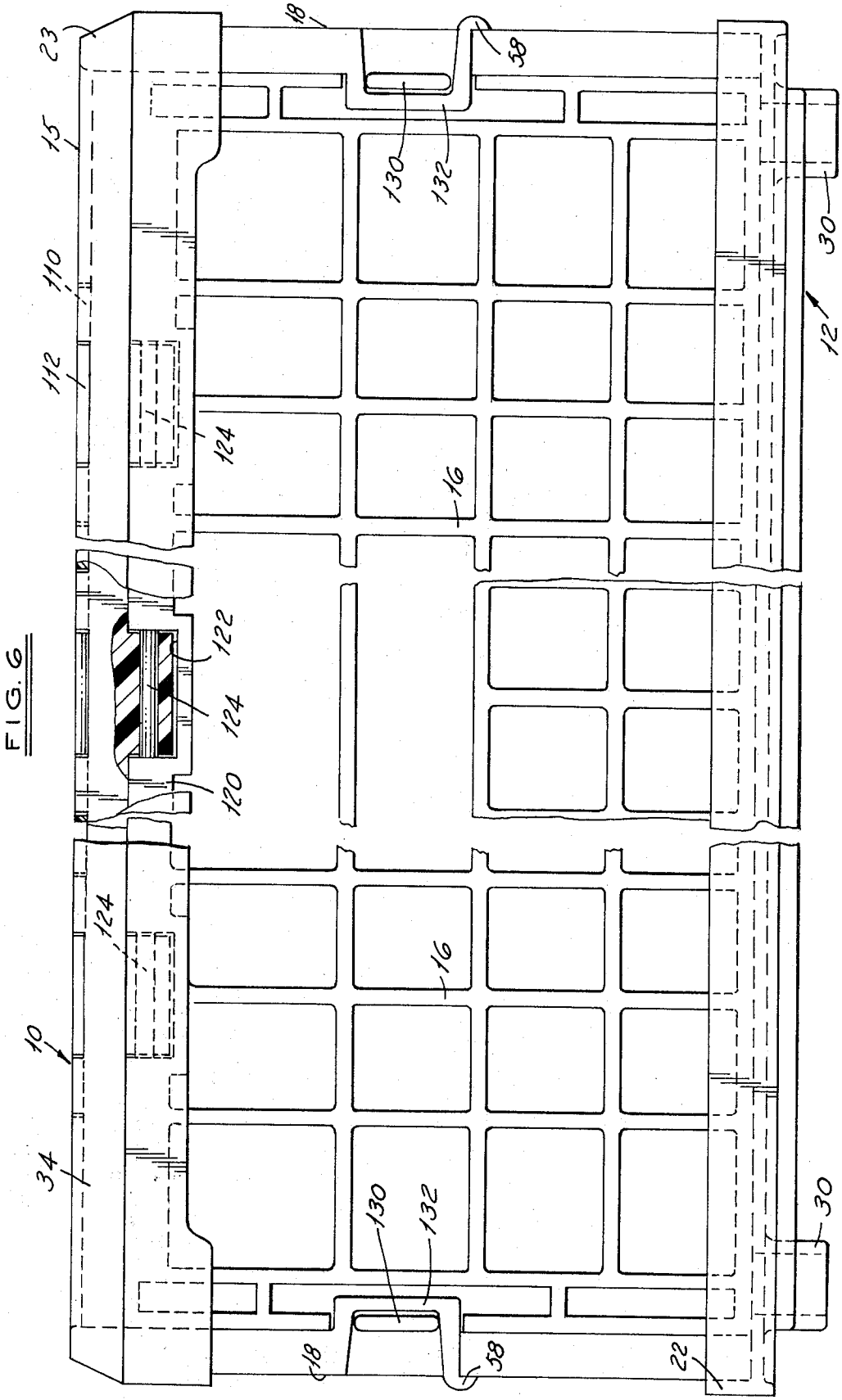

23
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58
15
130
132
30
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122
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120
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16
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34
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132
30
18
58
22

FIG. 6

FIG. 7

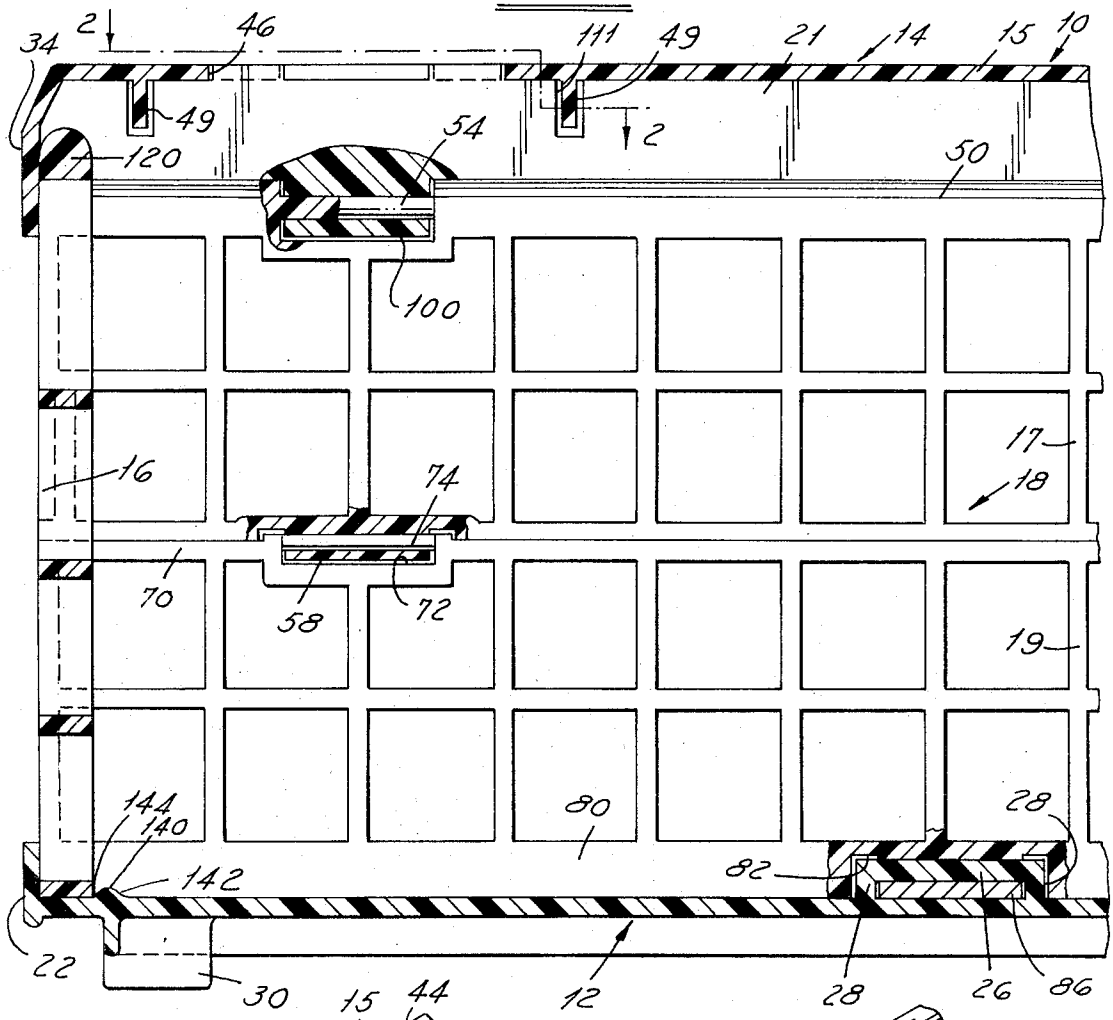


FIG. 8

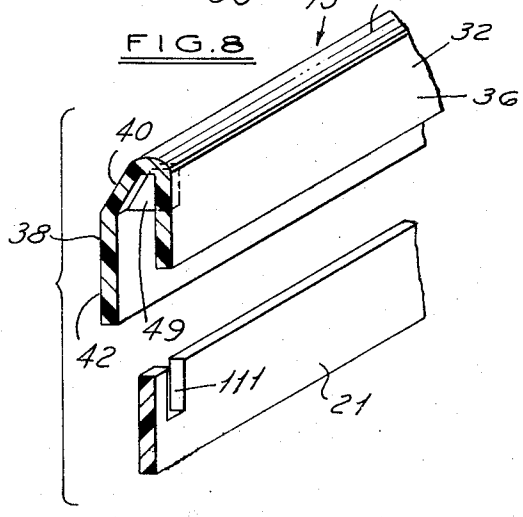


FIG. 9

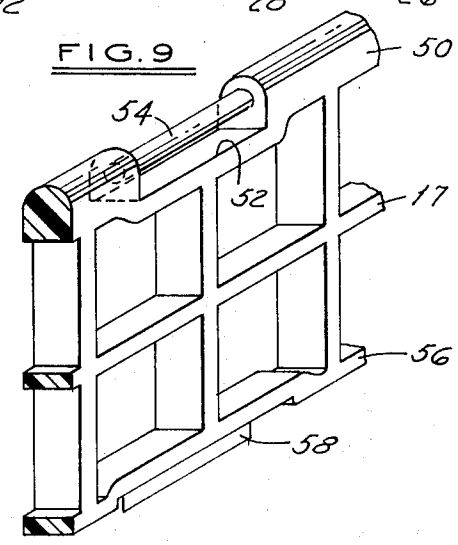


FIG. 11

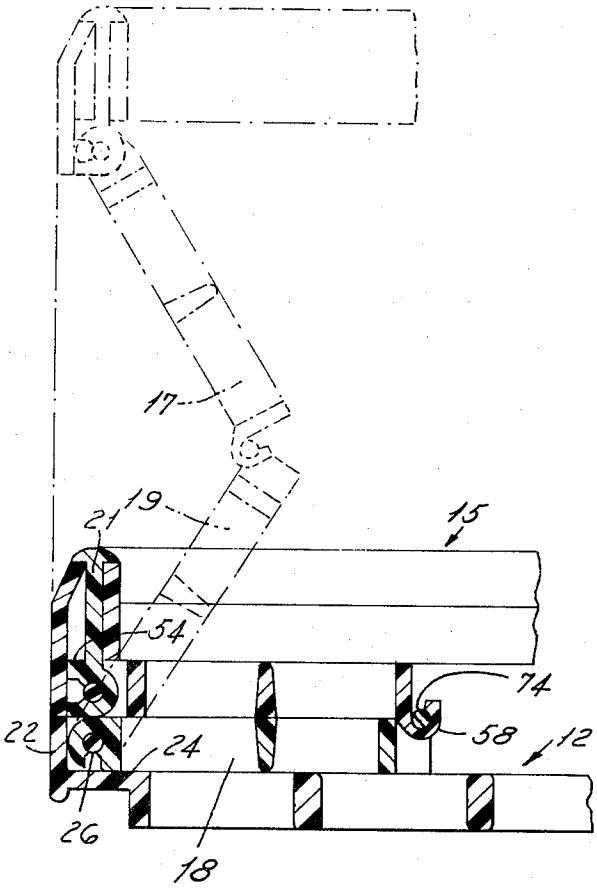


FIG. 10

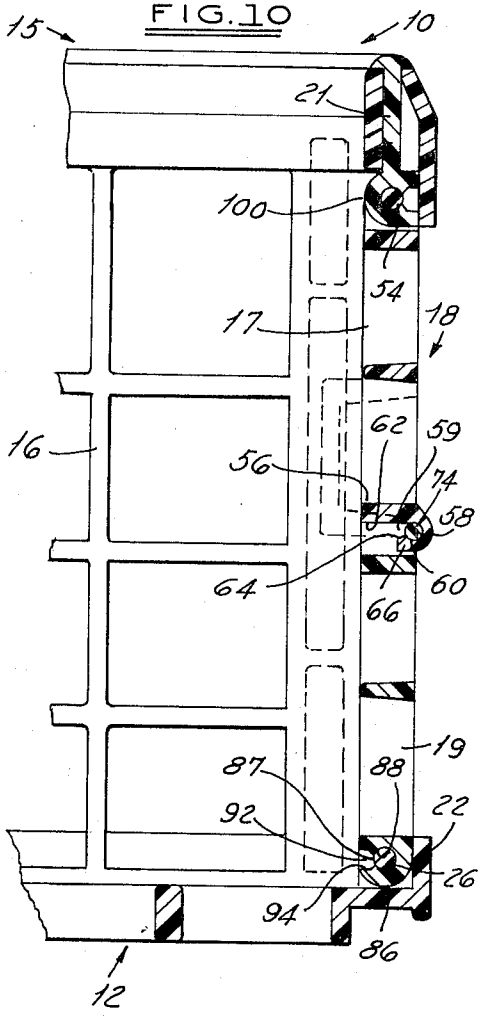


FIG. 12

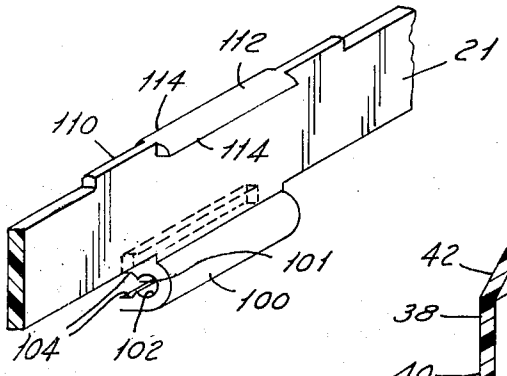
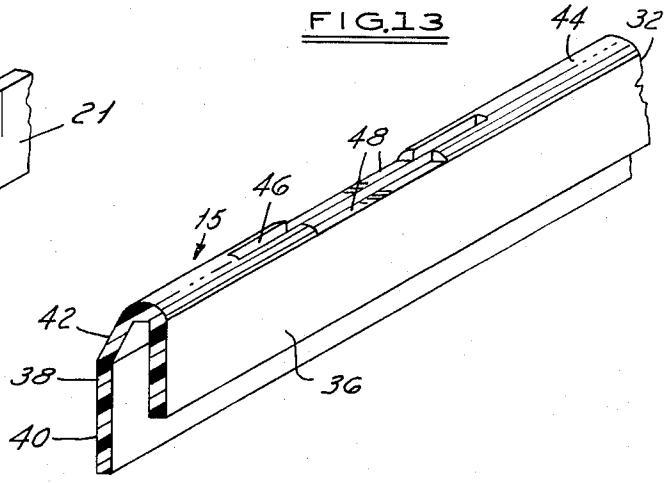


FIG. 13



COLLAPSIBLE CONTAINER

REFERENCE TO RELATED APPLICATIONS

This application is a continuation-in-part of our copending application Ser. No. 259,844 filed June 5, 1972, now U.S. Pat. No. 3,796,342. A similar although specifically different container was disclosed in the application of Ellsworth E. Sanders, Ser. No. 422,931, filed Jan. 4, 1965, and now abandoned.

SUMMARY OF THE INVENTION

The container of this invention may be made of any suitable material, preferably plastic. When upright, the walls of the container are vertical and provide a maximum of interior space for packing. When collapsed, the container is reduced to a fraction of its normal height so that it takes up very little space. The container also has the advantage when collapsed of stacking with other collapsed containers.

The container is molded in separate parts, one part consisting of the base or bottom wall. The side walls each consists of two separately molded parts. The top border frame of the container comprises another part to which the side walls are connected by locking bars which comprise additional parts of the assembly. Each end wall is a separately molded part. The various separately molded parts of the container readily snap together in a permanent assembly. The novel snap connections joining the parts constitute important features of the invention.

Other objects and features of the invention will become apparent as the description proceeds, especially when taken in conjunction with the accompanying drawings illustrating a preferred embodiment of the invention wherein:

FIG. 1 is a top plan view of a container embodying our invention.

FIG. 2 is an enlarged fragmentary view with parts in section of a portion of FIG. 1 taken on the line 2—2 in FIG. 7.

FIG. 3 is a side elevational view of the container shown in FIG. 1.

FIG. 4 is a fragmentary perspective view with parts in section of a portion of the base.

FIG. 5 is a fragmentary sectional view of the container in collapsed position, the phantom lines illustrating a second container in stacked relation thereon.

FIG. 6 is an end elevational view of the container with parks in section and parts broken away.

FIG. 7 is an enlarged side elevational view of one end portion of the container with parts in section.

FIG. 8 is an exploded view in perspective with parts in section showing a portion of a side rail of the border frame and a portion of one of the locking bars.

FIG. 9 is a fragmentary perspective view partly in section showing an upper portion of one of the side wall parts.

FIG. 10 is a fragmentary sectional view taken on the line 10—10 in FIG. 3.

FIG. 11 is similar to FIG. 10 but shows the container collapsed, and in phantom lines shows the container partially collapsed.

FIG. 12 is a fragmentary detail view of a portion of a locking bar.

FIG. 13 is a fragmentary detail view of a portion of a side rail of the border frame.

Referring now more particularly to the drawings, the container is shown as being an open top container, although it may be provided with a top or lid, if desired. The container is generally designated **10** and, as indicated above, may be collapsed from its normal position of use shown in FIGS. **3, 6, 7** and **10** to a flat compact position shown in FIGS. **5** and **11.** FIG. **11** illustrates the container in an intermediate stage between fully erect and collapsed positions in phantom lines. The container when erect or upright may be used to carry any desired material although it is particularly designed as a container for egg cartons. The container may be made of any suitable material preferably plastic, such for example as molded polyethylene or polypropylene. Such materials are strong yet sufficiently flexible to permit the snap connections described hereinafter. The container consists of separately molded or formed parts which are readily joined together by snap connections but which when put together provide a virtually permanent assembly. It is not intended that the container should be taken apart once assembled. The container can of course be disassembled although with some difficulty and usually with the aid of a tool suitable for the purpose.

The container parts include a base or bottom wall **12,** a top open border frame **15,** two separately molded end walls **16,** two side walls **18** each composed of separately molded sections or parts **17** and **19,** and separately molded side and end locking bars **21** and **23** for connecting the side and end walls to the border frame **15.** These separately formed parts are secured together by snap connections hereinafter more fully described to form a permanent assembly which should never need to be disassembled and which in fact can be disassembled only with considerable effort.

The base or bottom wall **12** as stated is preferably separately formed of molded plastic and in the preferred embodiment is made rectangular in form having the upturned generally vertical peripheral wall **22.** Substantially the entire surface of the base within the peripheral wall, with the exception of a peripheral horizontal ledge **24** joined to the peripheral wall, is preferably of an open grid construction to facilitate cleaning and generally for sanitary purposes as well as to reduce weight. A plurality of longitudinally spaced horizontal hinge pins **26** which extend lengthwise of the container are mounted on the ledge **24** of the base **12** along each side of the container in aligned relation to each other, being mounted on the ledge **24** by the legs **28.** Such pins **26** and legs **28** are integrally molded with the base. These hinge pins **26** are parts of the snap connections employed to join the side walls to the base as will become apparent from the following description. The base has integrally molded legs **30** extending downward from the four corners of the open grid portion of the base to support the container.

The top open border frame **15** of the container is a separately molded part as previously stated. It is rectangular in form and is composed of the side rails **32** and end rails **34** integrally connected end to end.

The side rails of the top border frame **15** are of the cross section or configuration shown in FIG. **13.** They are generally of inverted U-shape having the vertical inner flange **36,** the outer flange **38** consisting of the vertical lower portion **40** and the upwardly and inwardly inclined upper portion **42** which is joined to the upper edge of the inner flange **36** by the horizontal top

or web portion **44.** This top or web portion has a plurality of longitudinally spaced elongated rectangular slots **46** which extend lengthwise of the side rails. Such top or web portions **44** are also relieved or cut down where indicated at **48** across each such slot **46** between the ends thereof. An integral rib **49** extends across the rail from flange **36** to flange portion **42** to strengthen the structure.

The end rails **34** of the top open border frame **15** are of the same cross section or configuration as the side rails except for the fact that the vertical portions **40** of the outer flanges are of somewhat less vertical height. Accordingly, the corresponding parts of the end and side rails have been given the same numbers. The end rails will also be seen having a plurality of longitudinally spaced elongated rectangular slots **46** in the top or web portion **44** extending lengthwise of the rails and of identical configuration with the slots **46** in the side rails. Such top or web portions **44** of the end rails are also relieved or cut down where indicated at **48** across the slots between the ends thereof in the same manner as the side rails.

The separately molded upper parts or sections **17** of the side walls are of identical construction. Each is preferably rectangular and of open grid form as illustrated. The upper side wall parts **17** each has a horizontal frame bar **50** along its upper edge cut out where indicated at **52** at spaced points along its length to accommodate a horizontal hinge pin **54** in each such cut-out portion. Such hinge pins **54** are molded integrally with the upper side parts **17** and are aligned with one another.

Each side wall part **17** also has a horizontal bottom rail **56** to which are integrally molded a plurality of aligned horizontally disposed hinge knuckles **58.** As seen in FIGS. **7, 10** and **11** each hinge knuckle **58** is an open-ended tubular member of generally cylindrical form but longitudinally slotted at **59** from end to end. The cylindrical inner surface wall **60** of the hinge knuckle from one edge of the slot to the other is slightly greater than **180°** in extent. This circular inner surface **60** receives a hinge pin on the lower part of the lower side wall part **19** whose diameter is the same as that of inner surface **60** but greater than the width of slot **59** as more fully described hereinafter. The bottom surface **62** of the rail **56** and the opposed upper surface **64** of the lip **66** of the hinge knuckle **58** diverge to provide a flaring entrance to pilot the hinge pin when pressed into the hinge knuckle. This entrance or pilot is wider than pin **54** at its outer end and narrower than pin **54** at its inner end where it merges into the slot **59.** The plastic material of which the hinge knuckle is molded is sufficiently flexible to permit the hinge pin to enter when forced with sufficient pressure.

The bottom parts **19** of the side wall **18** are identical and like the upper parts are of generally rectangular form. Each has an upper rail **70** which is recessed where indicated at **72** at spaced points along its length to accommodate aligned horizontal hinge pins **74.** Each such hinge pin is integrally molded and registers with a hinge knuckle **58** of the upper molded side part **17.** Such hinge pins **74** have a diameter the same as the inner surface **60** of the hinge knuckles but greater than the width of slots **59** and are snapped into hinged relationship therewith as seen in FIGS. **7, 10,** and **11** by a lateral movement through the slots.

The lower rail **80** of the bottom part **19** of each side wall is formed with a recess **82** to receive or clear one of the hinge pins **26** along a side of the base, and in such recessed portions **82** the lower side wall **19** has integrally molded aligned horizontal hinge knuckles **86** each of which is an open-ended tubular member of generally cylindrical form but longitudinally slotted at **87** from end to end. The cylindrical inner surface **88** of the hinge knuckle from one edge of the slot to the other is slightly greater than **180°** in extent. As shown in FIG. **10,** leading into the slotted side is a flaring entry way defined by the walls **92** and **94** which is wider at its outer end but narrower at its inner end where it merges with slot **87** than hinge pins **26** to permit the hinge pins **26** to be forced laterally through slots **87** into the hinge knuckles under pressure in the relationship shown in FIGS. **7, 10** and **11.** The plastic flexes enough to permit this. Such hinge pins **26** have a diameter the same as the inner surface **88** of the knuckles but greater than the width of slots **87.**

Each side locking bar **21** comprises an elongated molded flat strip which has at spaced points along its length a plurality of aligned horizontal hinge knuckles **100** as seen in FIGS. **7, 10, 11** and **12.** Such knuckles **100** are like knuckles **86,** being an open-ended tubular member of generally cylindrical form but longitudinally slotted at **101** from end to end. The cylindrical inner surface **102** is of the same diameter as the hinge pins **54** along the tops of the upper side wall parts **17** but the hinge pin diameter is greater than the width of the slots **101.** Such inner surfaces **102** are of slightly greater than 180° in extent and the flaring surfaces **104** leading into the slotted side provide a guide or pilot for the entry of the hinge pins **54** when forced laterally under pressure through the slots into the hinge knuckles.

Each locking bar also has on its upper edge a plurality of spaced integrally molded elongated ribs **110** which are of the same length and width and spaced apart the same distance as the slots **46** in the side rails **21** of the open top border frame **15.** Each rib **110** has molded intermediate its length a T-shaped head portion **112** formed with laterally outwardly projecting extensions **114.** The head portion **112** is of the same length as the recessed portions **48** extending across the slots **46** in the side rails. To assemble the locking bars with the side rails, they are forced up between the side flanges of the side rails so that the ribs **110** enter the slots **46** and the extensions **114** of head portion **112** overlie the recessed portions **48.** There is sufficient flexibility in the flanges of the side walls to allow them to spread and clear the head as it is forced up into position, after which the flanges snap back to their unstressed condition to lock the parts together. The locking bars **21** also are notched as at **111** to clear the ribs **49** of the side rails.

The end locking bars **23** are of the same form and construction as the side locking bars having the ribs **110,** head portions **112** and hinge knuckles **100** as shown in FIG. **12.** They are, of course, shorter than the side locking bars. End locking bars **23** snap into the end rails **34** of the top border frame **15** in the same manner as the side locking bars **21** snap into the side rails.

Each end wall **16** has a top rail **120** provided with longitudinally spaced recessed portions **122** in which are disposed integrally molded horizontal, aligned hinge pins **124.** The hinge pins **124** are positioned to register with the hinge knuckles **100** on the end locking

bars and are of the same diameter as the inside of the hinge knuckles, such diameter being greater however than the width of the slots leading to the knuckles. The pins are snapped laterally through the slots into the knuckles in the same manner as the hinge pins on the top side wall parts **17** are snapped into the hinge knuckles of the side locking bars.

The end walls have intermediate their height along each side vertical edge a rearwardly projecting part or fin **130**. The lower portion of each upper side wall part **17** has along each side edge an inwardly extending loop formation **132**. Such fins or projections **130** on the end walls are adapted to extend into the loops **132** of the side walls in the upright position of the container. The end walls when upright rest against peripheral wall **22** of base **12** and engage the inner surfaces of the upright side walls along the side edges of the latter to prevent the side walls from collapsing.

The end ledges **24** on the base **12** may have molded detents **140** to retain the end walls in the upright position. Such detents are inclined as indicated at **142** to permit the bottoms of the end walls to cam over the detents when swung to upright position.

In order to collapse the container, an upward and inward manual pressure is applied to the end walls **16** to lift them over the substantially vertical retaining parts **144** of the detents and swing them to a horizontal position about their upper hinges into the plane of the top border frame **15**. The side walls **18** are now released so that they may readily fold inwardly to collapse the container to the position of FIGS. **5** and **11**. FIG. **5** shows in phantom lines a second collapsed container in stacked relationship with the one shown in section indicating that a plurality of containers **10** when collapsed may be readily stacked one upon another.

In the foregoing description and the appended claims, reference is made to "side" walls and "end" walls of the container. The use of the words "side" and "end" is solely for the purpose of distinguishing one set of opposite walls from the other and should not be taken as implying that one set of walls is necessarily longer or shorter than the other.

What we claim as our invention is:

1. A plastic collapsible container comprising a rectangular bottom wall, two opposed vertical side walls, two opposed vertical end walls, a top rectangular border frame defining the top of the container, said side walls each having upper and lower wall sections, said border frame, upper and lower side wall sections, said end walls and said bottom wall being separately formed, means providing snap hinge connections between the adjacent edges of said upper and lower wall sections, means providing snap hinge connections between the upper edges of said upper wall sections and said border frame and means providing snap hinge connections between the lower edges of said lower wall sections and said bottom wall to permit inward folding of said side walls when said container is collapsed, and means providing snap hinge connections between the upper edges of said end walls and said border frame to permit inward swinging of said end walls to a substantially horizontal position when said container is collapsed.

2. The container defined in claim **1**, wherein each hinge connection comprises a hinge knuckle in the form of an elongated open ended tubular member of generally cylindrical form but longitudinally slotted from end to end, the inner surface of said tubular member being cylindrical and more than **180°** in arcuate extent from one edge of the slot to the other, and a hinge pin of a diameter greater than the width of said slot received in said hinge knuckle and being insertable laterally therein through said slot, said tubular member being formed of a sufficiently flexible plastic to yield when said pin is inserted therein as aforesaid.

3. A plastic collapsible container comprising a rectangular bottom wall, two opposed vertical side walls, two opposed vertical end walls, a top rectangular border frame defining the top of the container, said side walls each having upper and lower wall sections, said border frame, said upper and lower side wall sections, said end walls and said bottom wall being separately formed, means providing hinge connections between the adjacent edges of said upper and lower wall sections, means providing hinge connections between the upper edges of said upper wall sections and said border frame and means providing hinge connections between the lower edges of said lower wall sections and said bottom wall to permit inward folding of said side walls when said container is collapsed, and means providing hinge connections between the upper edges of said end walls and said border frame to permit inward swinging of said end walls to a substantially horizontal position when said container is collapsed, said border frame being of inverted U shape in cross section having inner and outer flanges connected at the top by a web, said means providing said hinge connections between said border frame and each end wall and between said border frame and said upper edge of each upper side wall section comprising an elongated locking bar, an elongated slot in the web of said border frame, said locking bar having along its upper edge a locking part of generally T-shape consisting of an upstanding rib of no greater length than said slot and a head at the top of greater width than said slot, the rib of said locking part projecting into said slot with said head overlying said slot to prevent withdrawal of said locking bar, said locking part being insertable into said slot by being pressed upwardly between the flanges of said border frame, said border frame being of sufficiently flexible plastic material to admit said locking part into said slot during assembly and to snap into locked relationship therewith after assembly.

4. The container defined in claim **3**, wherein said rib and slot are of greater length than said head so that said slot may have sufficient flexibility to clear said head during insertion of said locking part as aforesaid.

5. The container defined in claim **3**, wherein each hinge connection comprises a hinge knuckle in the form of an elongated open ended tubular member of generally cylindrical form but longitudinally slotted from end to end, the inner surface of said tubular member being more than **180°** in arcuate extent from one edge of the slot to the other, and a hinge pin of a diameter greater than the width of said slot received in said hinge knuckle and being insertable laterally therein through said slot, said tubular member being formed of a sufficiently flexible plastic to yield when said pin is inserted therein as aforesaid.

6. The container defined in claim **5**, including pilot means for guiding said pin through said slot during insertion thereof into said hinge knuckle.

7. A plastic collapsible container comprising a rectangular bottom wall, two opposed vertical side walls,

two opposed vertical end walls, a top rectangular border frame defining the top of the container, said side walls each having upper and lower wall sections, means providing hinge connections between the adjacent edges of said upper and lower wall sections, means providing hinge connections between the upper edges of said upper wall sections and said border frame and means providing hinge connections between the lower edges of said lower wall sections and said bottom wall to permit inward folding of said side walls when said container is collapsed, and means providing hinge connections between the upper edges of said end walls and said border frame to permit inward swinging of said end walls to a substantially horizontal position when said container is collapsed, one of said hinge connections comprising a hinge knuckle in the form of an elongated open ended tubular member of generally cylindrical form but longitudinally slotted from end to end, the inner surface of said tubular member being cylindrical and more than **180°** in arcuate extent from one edge of the slot to the other, and a hinge pin of a diameter greater than the width of said slot received in said hinge knuckle and being insertable laterally therein through said slot, said tubular member being formed of a sufficiently flexible plastic to yield when said pin is inserted therein as aforesaid.

8. A plastic collapsible container comprising a rectangular bottom wall, two opposed vertical side walls, two opposed vertical end walls, a top rectangular border frame defining the top of the container, said side walls each having upper and lower wall sections, means providing hinge connections between the adjacent edges of said upper and lower wall sections, means providing hinge connections between the upper edges of said upper wall sections and said border frame and means providing hinge connections between the lower edges of said lower wall sections and said bottom wall to permit inward folding of said side walls when said container is collapsed, and means providing hinge connections between the upper edges of said end walls and said border frame to permit inward swinging of said end walls to a substantially horizontal position when said container is collapsed, said border frame being of inverted U shape in cross section having inner and outer flanges connected at the top by a web, said means providing said hinge connection between said border frame and at least one of said end walls and upper side wall sections comprising an elongated locking bar, an elongated slot in the web of said border frame, said locking bar having along its upper edge a locking part of generally T shape consisting of an upstanding rib of no greater length than said slot and a head at the top of greater width than said slot, the rib of said locking part projecting into said slot with said head overlying said slot to prevent withdrawal of said locking bar, said locking part being insertable into said slot by being pressed upwardly between the flanges of said border frame, said border frame being of sufficiently flexible plastic material to admit said locking part into said slot during assembly and to snap into locked relationship therewith after assembly.

* * * * *