Oct. 31, 1961 E. P. HERRMANN 3,006,525

CONTAINER

Filed Oct. 11, 1957 2 Sheets-Sheet 1

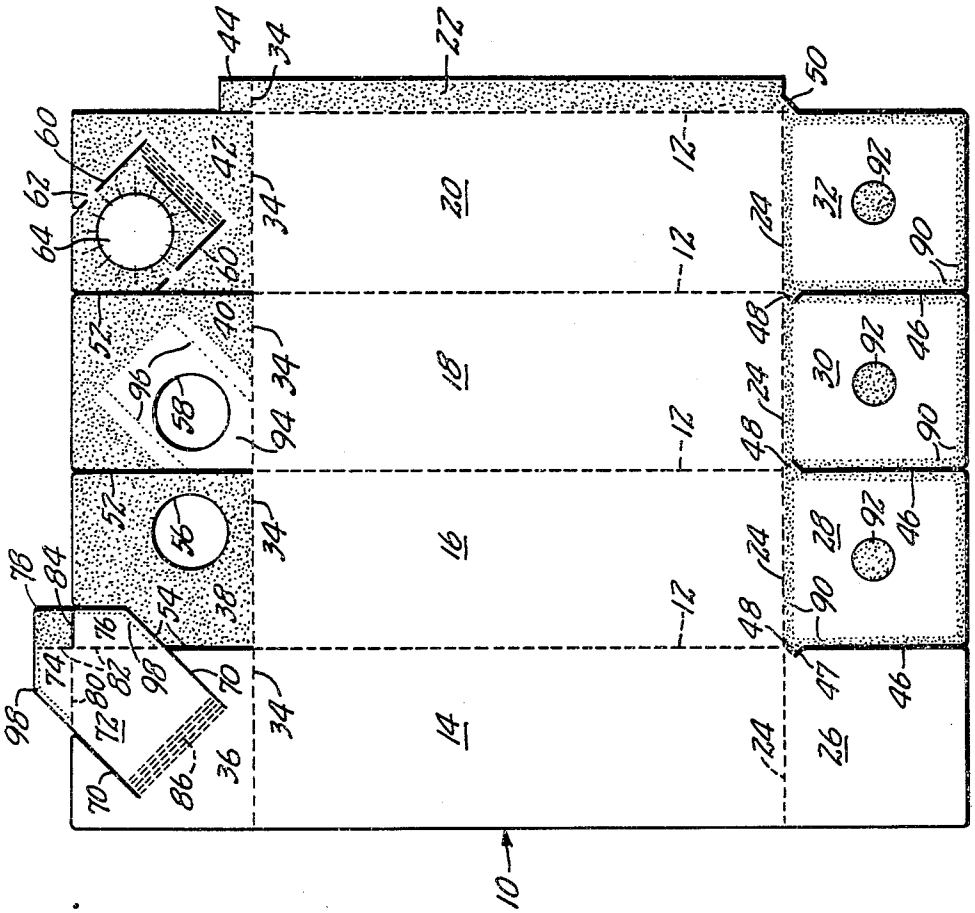


FIG. 1.

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FIG. 2.

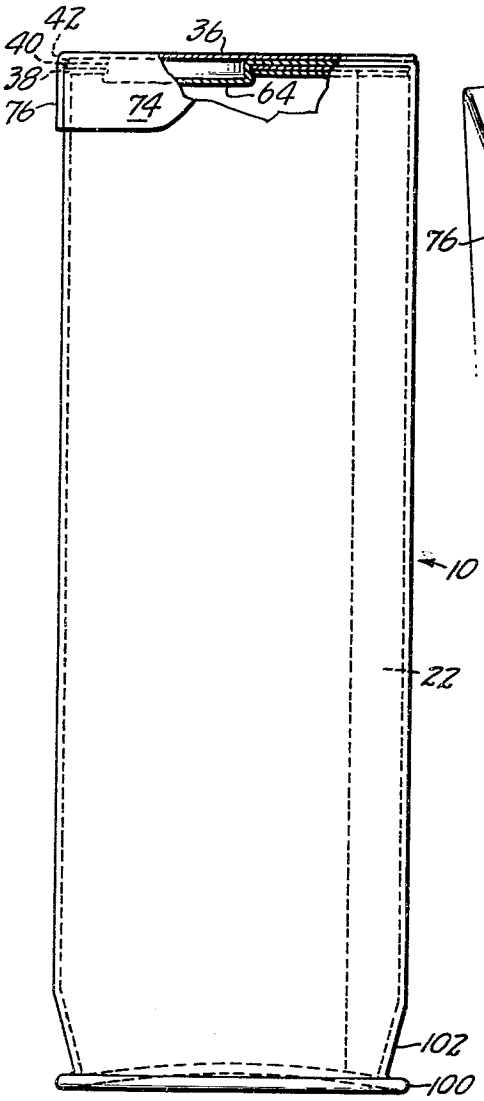


FIG. 3

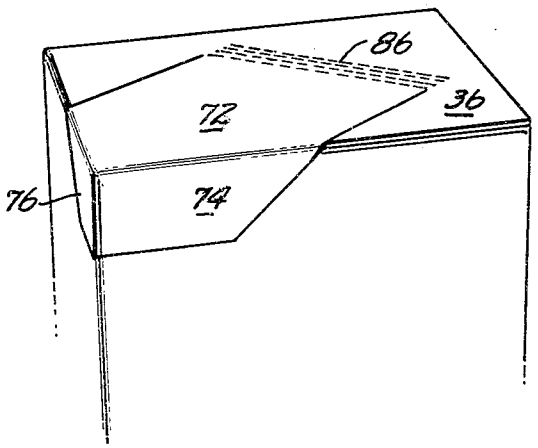
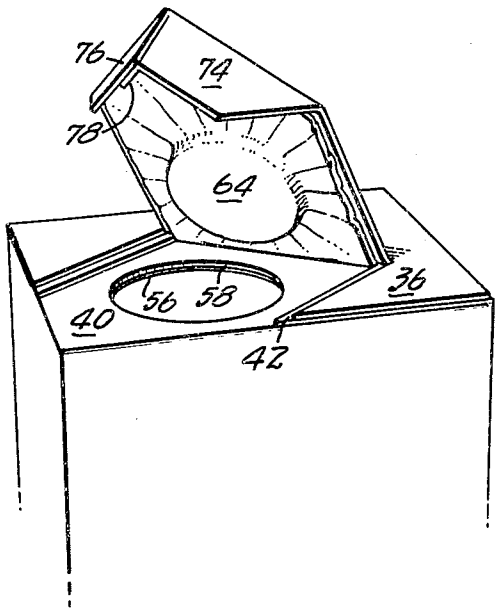


FIG. 4.



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CONTAINER

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8 Claims. (Cl. 229—17)

This invention relates to liquid tight paperboard containers, and more particularly to containers made entirely from a single paperboard blank; such containers being suitable for the packaging, storing, shipping and selling of liquids such as milk.

Prior to the present invention liquid tight containers of the paperboard type (or as they are sometimes called the fibre type) have generally been made of many separate component pieces. Heretofore, several assembly and/or sub-assembly operations were required to produce the completed container. While these multi-component containers have been satisfactory from a utility standpoint they have been more expensive to manufacture than a container made primarily from a single blank.

Containers of this general single blank type have been suggested previously, but all have suffered from various shortcomings. Some of the suggested containers have had gabled or wedge-shaped tops, and were not capable of being stacked upright one upon another, for example, in a storage refrigerator.

Other prior one piece containers have required the use of prominent and projecting flanges or ledges at the upper edges, and they are particularly susceptible to damage. Also, the upper portion of such a container must necessarily be tapered in order to permit the forming of the flanges and still not have them extend beyond the cross-sectional area of the container body. Because of this tapering the container must be either taller or of greater cross-sectional area at the base than would be the case if it had a uniform cross-section, and consequently it must occupy greater shipping and storage space.

Some multi-component containers, such as that used for packaging milk, have uniform cross-sectional areas, and a top pouring opening fitted with a hinged, single-ply plug piece attached by a wire staple. This plug portion has a pocket or recess which becomes filled with contaminated water or dirt during handling or storage. If there is even the slightest perforation in the bottom of the plug wall the water or dirt will seep into the container and contaminate the contents.

It is an object of this invention to provide an inexpensive paperboard container, capable of being economically manufactured from a one piece blank with a minimum of operations.

It is another object to provide a multi-ply top which is strong and substantially free of pockets or recesses. It is a further object to provide a container with a multi-ply bottom which does not tend to bulge and round on the bottom when filled.

It is still another object to provide a container which may be sealed at the top, and then filled through the bottom in an upside-down position before the bottom is sealed.

In the accompanying drawings, a preferred embodiment of the present invention is shown and the same is described in the specification. However, it is to be understood that the drawings and description are not intended to be either exhaustive or limiting of the invention, but, on the contrary, are for the purpose of illustrating and describing the invention in order that others skilled in the art may fully understand the invention, its principles and the application thereof, and that they may embody it and

adapt it in numerous forms, each as may be best suited to the requirements of the particular usage.

In the drawings:

FIGURE 1 is a plan view on a reduced scale of a blank from which a complete container may be made;

FIGURE 2 is a side elevation of an assembled container;

FIGURE 3 is an enlarged fragmentary perspective view of the top of an assembled container with the top closed and sealed; and

FIGURE 4 is an enlarged fragmentary perspective view of the top of an assembled container with the top tear strip and the underlying plug portion pulled away.

In FIGURE 1 of the drawings, a blank **10** is shown which is capable of being formed into a complete liquid tight container **11** illustrated in FIGURE 2. The blank **10** is divided primarily into panels and flaps by score lines. Score lines **12** divide the body of the blank into four side panels, **14**, **16**, **18** and **20**, and a connecting side flap **22**. Other score lines **24** define bottom end flaps **26**, **28**, **30** and **32** extending from panels **14**, **16**, **18** and **20** respectively; and score lines **34** define the top end flaps **36**, **38**, **40** and **42**, extending from panels **14**, **16**, **18** and **20**, respectively. Score line **34** also divides a tab portion **44** extending from the end of the connecting flap **22**.

The bottom end flaps are separated from adjacent end flaps by cut lines **46**. The cut lines **46** have angle extensions **47** adjacent score lines **24**, which define web portions **48** adjacent the points where the cut lines **46** would normally meet the score lines **24**, if the cut line extended in a straight line. A similar web portion **50** is provided joining flaps **22** and **32**. These web portions reinforce the bottom corners when the blank has been formed into a container. The top end flaps **38**, **40** and **42** are separated from each other by cut lines **52**, and flap **36** is separated from flap **38** by a jogged cut line **54**.

A round aperture **56** is provided in flap **38**, and a similar but, slightly smaller aperture **58** is provided in flap **40**. These apertures are eccentrically located with respect to the centers of their respective flaps, each between the center and a corner of its flap. In forming the blank **10** into a container **11**, the apertures are brought into concentric registration with flap **40** overlying flap **38**, so that they form a reinforced pouring opening positioned adjacent one corner of the container top.

In the illustrative embodiment of the invention, flap **42** is divided by partially cut or weakened lines **60** to define a tear strip portion or area **62** the center of which is formed into a plug portion **64** (see FIGURE 2) during the assembly or container-forming operation. The plug portion **64** fits into the registered apertures **56** and **58** in the completed container, with flap **42** overlying flap **40**. A group of scored or weakened lines **66** and a cut line **68** at the end of the strip **62** serve as hinge means for the plug portion **64** when it is extracted from the apertures.

As indicated above, aperture **56** in flap **38** is slightly larger in diameter than aperture **58** in flap **40**. The greater sized aperture **56** provides an inwardly flaring double wall opening with the pouring edge being of single wall thickness. This arrangement also facilitates manufacture of the container because it provides a margin in registration of the apertures. Flap **36** is also divided by a pair of cut or weakened lines or perforation lines **70** to provide a tear strip **72**. The tear strip **72** has integral lift tabs **74** and **76** and a connecting tab **78** which are defined by score lines **80** and **82** and a cut line **84**. A group of weakened lines **86** serve as hinge means for tear strip **72** when it is lifted away from flap **36**.

In order to join the various portions of the blank **10** together to form the completed container **11** shown in FIGURE 2, the blank **10** is selectively coated, illustra-

tively as indicated by shading in FIGURE 1, over areas and lines with a suitable thermoplastic adhesive. Connecting flap **22**, end flap **38**, tab portion **44**, web **50** and connecting tab **78** are coated with the adhesive substantially throughout their entire top surfaces. Bottom flaps **28**, **30** and **32** are coated at their peripheries along strips **90** and also on their center areas **92**. Top flap **40** is adhesively coated except for a substantial area **94** about aperture **58**. Flap **42** is also coated except in an area at the edges of the tear strip or area **62**. Adhesive lines **96** are provided in the area **94** to provide tacking means for holding the plug area **62** in position when plug **64** is inserted into apertures **56** and **58**. Lift tabs **74** and **76** have adhesive lines **98** on their under sides and the upper surface of tab **78** is completely coated all for securing the tabs in folded position in the formed container as shown in FIGURES 2 and 3.

The first step in making a container of the illustrated type is to cut and score the blank **10**. This is carried out on a press which may also be adapted to print the labeling on the container. The blank is then coated with a suitable plastic coating to seal the edges and cut portions, making the blank substantial liquid proof and sealed against "wicking." The blank is next coated or printed throughout the shaded areas of FIGURE 1, as discussed above, with a suitable adhesive which is compatible with the previously applied plastic coating. In this prepared and flat condition, the blank may be shipped to the packaging place—such as a dairy—where it is formed into a container, filled and sealed. If it is not economical for the packer to form the blanks into containers, they may be worked further at the blank manufacturing site, and shipped in partially or fully assembled condition in dustproof bags or cartons.

In the forming or assembling step the prepared blank is fed into a forming machine of the box-making type. The blank **10** is wrapped about a mandrel by folding the side panels **14**, **16**, **18** and **20** and the connecting flap **22** along the score lines **12**. Panel **14** is wrapped over flap **22** and adhesively joined thereto by activating the adhesive on the flap by means of a heated strip located in that portion of the mandrel adjacent the flap. The heated strip is heated only sufficiently to flow the thermoplastic adhesive on flap **22**.

With the body of the container formed, the top end flaps **36**, **38**, **40**, **42** are next set in flace. Flap **38** is folded along score line **34** and positioned against the head of the wrapping mandrel. Tab **44** is folded next and then flap **40** is placed against the mandrel and the apertures **56** and **58** set in registered position, and they are positioned adjacent a recess or female opening in the mandrel. Then flap **42** folded over so that the plug area **62** overlies the registered apertures **56** and **58**. The female die opening in the mandrel conforms to the shape of the desired plug, and a mating male punch die with an expandable head is projected against the plug area **62**. The punch die projects the plug material through the apertures **56** and **58** and the end of the punch die expands and extrudes the plug portion into the female die opening. Hence, the plug **64** is formed in place, and then the punch die is retracted. Flap **36** then is folded and the lift tabs **74** and **76** set in place against panels **18** and **16**. The assembled top is then sealed by heating the previously applied thermoplastic adhesive to a flow condition and pressing the several flaps into liquid tight relationship.

If the container has been assembled at the packing or filling place, it may be then filled immediately and the end flaps sealed over. However, if the container is only assembled and not filled at the blank manufacturing site the end flaps **26**, **28**, **30** and **32** may be folded over and tacked in holding contact to prevent contamination of the interior of the container during shipment. This may be accomplished by applying a thin overcoating of a compatible thermoplastic adhesive to the adhesive area

92 of flap **30**. This overcoating preferably has a lower flow temperature than the permanent adhesive. Flap **30** is provided with the extra coating as it is folded the next to the last in forming the bottom and will hold the underlying flaps **32** and **28** and the overlying flap **26** in place.

If it is desired to coat the container with a coating of paraffin wax instead of plastic, the container need not be coated until after the top has been sealed. It is then immersed completely in a bath of molten paraffin, removed, drained and cooled rapidly by refrigeration. The flow temperature of the parffin wax is lower than that of the adhesive so that it flows before the adhesive thus providing good adhesive contact.

When the container is to be filled, the contents are placed into it through the open bottom. By bottom filling the container, the tightly sealed top need not be disturbed until the container reaches the final user. After the container has been filled it is ready to have the bottom sealed liquid tight.

The bottom is sealed by slightly indenting the bottoms of the side walls of the container with horizontal slide members or any other suitable clamping and crimping means. The slide members form a bottom flange or ledge **100** and an obtusely angled bottom panel area **102** in each side panel as shown in FIGURE 2. After the panel area **102** has been formed and the bottom flaps folded in the sequential order of **32**, **28**, **30** and **26**, a heated platen is pressed against the upside-down bottom.

The slide members are preferably kept in engagement with the container during the application of the platen. By so doing, the platen has a suitable bearing surface to press against and the adhesive strips **90** are caused to flow sufficiently to seal the flaps together at their peripheries and center to form a liquid-tight bottom.

In forming the bottom, the end flaps may be forced into a concave condition as shown in FIGURE 2. The concave bottom has the advantage of resisting "rounding out." Single-ply bottom containers often round out after filling and the slightest protrudence on the surface beneath the single ply bottom may cause a leak. The container in the illustrated embodiment in FIGURE 2 does not have that fault.

After the container has been filled and the bottom sealed, it may be sprayed with another plastic coat if desired as a further seal. However, such a coating is not normally required. If any leaks were to develop they would normally occur at the corner points where the bottom flaps are joined to the side panels. This danger is reduced by the use of the web portions **48** and **50**.

In FIGURES 2 and 3, the closed flat container top is shown free of outstanding ledges or flanges which might be easily damaged in handling. In FIGURE 4 the top is shown in an open position. To open the container the tear strip **72** is raised upwardly about tthe hinge lines **86**. The lift tabs **74** and **76** provide convenient access means for lifting the strip **72**. Since the tear strip or plug area **62** is adhesively secured to the tear strip **72**, the plug **64** is also lifted out of the apertures **56** and **58** forming the pouring opening when the tear strip is pulled upwardly.

The hinged plug **64** may be easily reinserted into the pouring opening after each use.

It may be desirable to use a separate plug member in place of forming the plug portion **64** in the plug area **62**. In such a case the plug area **62** must be provided with an opening sufficient to accommodate the separate plug. If a separate plug is used it should be provided with a flange sufficiently large enough to permit it to be secured to the tear strip **72**.

The above described embodiment and the method of manufacture are merely illustrative of the present invention and are set forth to provide a full understanding of this invention and its many benefits and advantages. To those gifted in the art, modifications will occur which

will come within the scope and spirit of the present invention as defined in the following claims:

I claim:

1. A tubular paperboard container for liquid comprising a body portion formed of integrally joined side panels in angular relation, a bottom portion integrally joined in watertight relation with the lower end of said body portion, a top portion including four top flaps extending from said side panels, the first and second lower-most of said top flaps each having an aperture therein and being positioned whereby said apertures are in registry, the third of said folded top flaps having a plug portion formed from said flap integral therewith and fitting securely into said registered apertures, and an uppermost flat top flap having a tear strip overlying and secured to said plug portion whereby the plug portion is removed from the apertures when the tear strip is torn and lifted upwardly.

2. A tubular paperboard container as defined in claim 1, wherein each of said side panels and its respective integral top flap are foldably joined in angular relation, each fold line being substantially along a peripheral line of said uppermost flat top flap.

3. A tubular paperboard container as defined in claim 1 wherein said uppermost flat top flap has an integral lift tab extending from said tear strip portion thereof, said lift tab being folded and detachably secured to one of said side panels and constituting means for lifting said tear strip.

4. A tubular paperboard container as defined in claim 1 wherein said bottom portion comprises bottom flaps extending from said side panels said flaps being folded, closed together and sealed, said bottom being watertight.

5. A tubular paperboard container as defined in claim 1 wherein said bottom comprises bottom flaps extending from said side panels, said flaps being folded and sealed together to form a concave bottom.

6. A tubular paperboard container as defined in claim 1 wherein the area of the aperture in said first folded top flap is greater than the area of the aperture in said second folded top flap and the side of the plug is flared outwardly along the sloping line formed by the walls of the aperture whereby the apertures and the plug are interlocked.

7. A tubular paperboard container as defined in claim 6, wherein each of said top flaps is secured in substantially right angular relationship with its respective integral side panel.

8. A tubular paperboard container for liquid comprising a body portion formed of integrally joined side panels in angular relation, a bottom portion comprising bottom flaps extending from said side panels, side flaps being folded and sealed together to form a concave liquid tight bottom, a top portion including top flaps extending from said side panels, first and second of said top flaps each having an aperture therein and being folded whereby said apertures are in registered position, an intermediate folded top flap having a severable plug portion integral therewith and fitting securely into said registered apertures, and an uppermost flat top flap having a tear strip overlying and secured to said plug portion whereby the plug portion is removed from the apertures when the tear strip is lifted upwardly, said final top flap having at least one lift tab being folded and detachably secured to one of said side panels whereby means is provided for lifting said tear strip and the accompanying plug portion upwardly.

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