March 1, 1960 M. S. KENNEDY ET AL 2,926,830

LIQUID-TIGHT CARTON AND LINER

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Fig. 1.

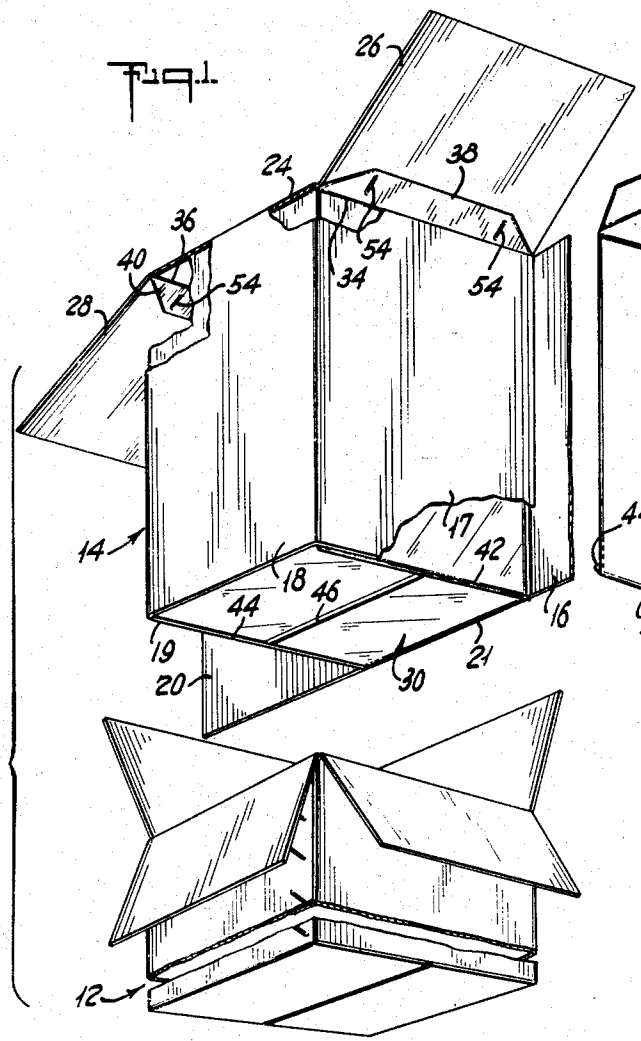


Fig. 3.

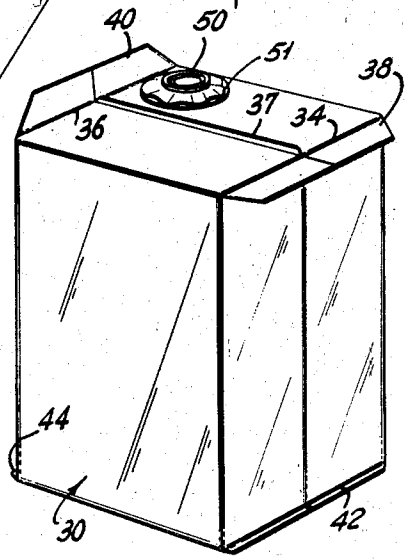


Fig. 4.

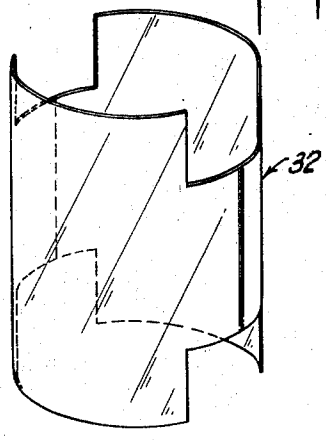


Fig. 2.

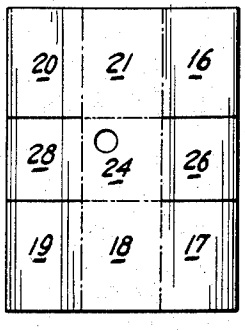
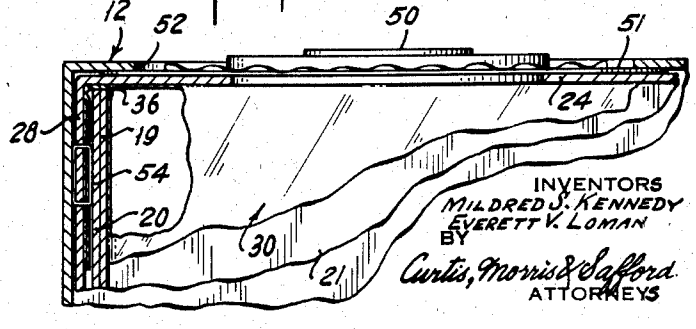


Fig. 5.



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LIQUID-TIGHT CARTON AND LINER

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3 Claims. (Cl. 229—14)

This invention relates to a liquid-tight plastic liner and carton assembly.

An object of the invention is to provide an improved cardboard box and liner construction which is able to withstand severe vibration and impact and yet remain liquid-tight.

Another object is to provide a simple and inexpensive way to fabricate a separate plastic liner for use inside a cardboard box.

These and other objects will in part be understood from and in part pointed out in the description given hereinafter.

In transporting certain kinds of liquids, such as soft-drink syrup, battery electrolyte and so forth, it is highly desirable to use individual containers which can be shipped from the factory filled and so delivered to the ultimate consumer, and then thrown away when empty. However, for the use of such containers to be economical they of course must have a low cost. They must also be strong enough, yet lightweight enough to be shipped without special handling. Otherwise even though a container has a low enough initial cost, the cost of shipping and handling becomes excessive.

One type of recently developed container which is being used more and more to replace glass bottles in many difficult applications is a steel drum having fitted within it a separate liquid-tight liner of a suitable plastic film, such as polyethylene. The advantages of such a container are that, for a given capacity, it weights appreciably less than a glass bottle and it is less vunerable to damage from sudden blows or dropping. Additionally, the initial cost of such a container is competitive with bottles and, depending on the type of plastic used for the liner, it can be used to carry very corrosive liquids or conversely those which must be kept absolutely free of contamination.

The success of the lined-drum type of container has created a growing demand for even better, less expensive containers. The goal sought is to be able to pack and ship all types of liquids in cardboard boxes in much the same way that great varieties of non-liquid goods are now handled. Cardboard boxes are commercially available in almost any size at very low cost and their weight to strength ratio is excellent. Also, because of the ease of working with paper rather than metal, paper boxes are often greatly preferred by the consumer. Furthermore, because of the mechanical and thermal insulation qualities of paper, corrugated boxes protect their contents against certain abuses, such as dropping or extremes of temperature better than a metal drum can.

In the past various arrangements for making a cardboard box liquid-tight have been tried. None, however, so far as is known has proved entirely satisfactory. One such arrangement consisted in simply coating the inner surface of the box with a liquid-impervious material. In the case of a wax coating, though this was relatively easy and inexpensive to apply, the sealed box

was extremely vunerable to sudden blows which caused the wax lining to crack and the box to leak. Another arrangement used an adherent plastic film instead of wax but with this it was very difficult to fabricate the box blank and then to completely seal it. This made the cost too high.

To avoid these difficulties with linings integral with the box walls, liners of thin plastic film have been fabricated separate from the boxes and then placed inside them. However, new difficulties arose. Now, because the liners were separate from the box walls, the two rubbed together and eventually wore through the thin soft liner. Sometimes, instead, the liner walls would flex in and out with the sloshing of the liquid back and forth inside and this quickly fatigued the liner and caused it to rupture. The present invention effectively overcomes these difficulties.

In accordance with the present invention there is provided a one piece liquid-tight liner having a cubical or rectangular shape. Formed integral with the liner are tabs or flaps by which it can be attached inside a cardboard box. The structure of this liner and the way it is fitted inside a box result in a container able to retain liquid without leaking even through subjected to strenuous vibration and sudden shocks, such as dropping. This container thus constitutes a nearly ideal liquid package because it has the desirable qualities of low cost, light weight and durability together with convenience and economy of handling.

A better understanding of the invention together with a fuller appreciation of its many advantages will best be gained from the following description given in connection with the accompanying drawings wherein:

Figure 1 is an exploded view from below in perspective of a cardboard box and liquid-tight liner embodying features of the invention;

Figure 2 is a plan view in reduced size of the blank from which the inner cover of the box is formed;

Figure 3 is a perspective view from above of the liner itself;

Figure 4 is a perspective view in reduced scale showing the pattern of the liner prior to folding and sealing; and

Figure 5 is an enlarged fragmentary cross-section view of the corner of a completed box with liner.

The box shown in Figure 1 comprises an outer cardboard cover **12** of standard construction and an inner cardboard cover **14** made in one piece and then folded into cubical form with an open bottom. A separate piece of cardboard (not shown) can be used to cover this open bottom. Inner cover **14**, which is folded from a flat one-piece blank seen in reduced size in Figure 2, includes six side panels **16**, **17**, **18**, **19**, **20** and **21**, panel **16** though shown broken away being the same size as the others. Panels **17** and **19** are joined to panel **18** along vertical edges of the cover and in like manner panels **16** and **20** are joined to panel **21**. Panels **18** and **21** are joined along their top edges to opposite sides, respectively, of the top panel **24** to which also are connected along the remaining pair of sides the flaps **26** and **28**. When inner cover **14** is folded to its final position, flap **26** folds down upon panel **16** which in turn is folded over upon panel **17**. Similarly, flap **28** is against panel **20** which in turn is folded over panel **19**.

During assembly, a liquid-tight liner **30** is placed inside inner cover **14** and secured to it so that when the completed container is filled with liquid, the liner will be protected from damage due to excessive flexing and abrasion. Figure 3 shows the liner by itself, the liner being made from a single short length of thin plastic tubing **32**, seen in reduced size in Figure 4, which is then folded

and sealed. The tubing is cut so that when folded as shown in Figure 3 it can be sealed along the opposite top edges **34** and **36** and transversely across the top at seam **37**. An excess of material is left adjacent edges **34** and **36** to form the narrow, double layer flaps **38** and **40**, respectively, the corners of these flaps being tapered inward as shown. In a similar way, but without edge flaps, the bottom of liner **30** as seen in Figure 1 is sealed along the opposite bottom edges **42** and **44** and across seam **46**. The sealing of the layers of tubing **32** is accomplished by heating and pressing or preferably by dielectric welding. The top of liner **30** is provided with a welded-on closure **50** through which it can be filled and emptied. This closure as seen in Figure 4 is positioned and clamped by the metal flange **51** in the center of opening **52** through the top of the box.

As seen in Figure 1, the flaps **38** and **40** along top edges **34** and **36** of the liner are attached to respective ones of flaps **26** and **28** of inner cover **14** by two or more of the staples **54**. Then, the cover flaps are folded down and this sub-assembly is placed inside outer cover **12** which is finally sealed. In the finally assembled carton, the liner flaps are folded down over the tops of panels **16** and **17** and panels **19** and **20** respectively and are supported along their length by the top edges of these flaps. Flaps **38** and **40** are the only portions of the liner, except for the top closure, adhering or fastened to the box. Thus a certain amount of freedom for the liner to conform to the box as it is being stressed or strained is permitted but destructive flexing or rubbing is prevented. The inner faces of inner cover **14** are advantageously wax coated to give low friction.

The relationship of a liner flap and the panels of the box when sealed is given in Figure 5 which shows the flap **40**, the opposite liner flap being positioned in a corresponding way. It will be seen that liner flap **40** extends over the top edges of box panels **19** and **20** and then down alongside cover flap **28** to which it is fastened by staples **54**. Thus, one top edge **36** as well as the opposite top edge **34** of the liner are supported along their length and held parallel with some degree of firmness. Accordingly, when the box is filled with liquid, destructive flexing or rubbing of the liner inside the box is prevented.

In an actual container built according to the invention, the shape of the liner and box was substantially the same as shown in the drawings and the dimensions of the liner were approximately 9½ inches square by 13½ inches high. Flaps **38** and **40** were each about 1 inch wide. The liner was made of 12 mil (0.012 inch) polyethylene dielectrically sealed and it had a capacity of 5 gallons. The inner and outer covers were corrugated paper board. This container, filled with water, was not damaged by a four foot drop onto a hard floor and the container thereafter survived a standard vibration test.

The above description of the invention is intended in illustration and not in limitation thereof. Various changes may occur to those skilled in the art and these may be made without departing from the spirit or scope of the invention as set forth.

We claim:

1. An improved liquid-tight carton comprising, an outer box cover, an inner cover having a top panel, two fold-down flaps and six side panels folded into box shape, a one-piece liner of polyethylene film of the order of 12 mils thick folded into box shape and sealed along two opposite top edges and a bi-secting top seam, and along two opposite bottom edges and a bi-secting bottom seam, said liner having narrow flaps along said sealed top edges, a plurality of fasteners pinning said flaps to the inner faces of said fold-down cover flaps, said liner flaps being folded down over the top edges of respective side panels, and a top closure sealed to said liner and centered within an opening in said covers.

2. An improved liquid-tight carton comprising: an outer box cover, an inner cover having a top panel, two fold-down flaps and six side panels folded into box shape, a one-piece liner of relatively thick gauge polyethylene-like film folded into box shape and sealed along two opposite top edges and a bisecting top seam, and along two opposite bottom edges and a bisecting bottom seam, said liner having narrow flaps along said sealed top edges, a plurality of fasteners pinning said flaps to the inner faces of said fold-down cover flaps, said liner flaps being folded down over the top edges of respective side panels, and a top closure sealed to said liner and centered within an opening in said covers.

3. In a liquid tight carton comprising an outer box cover, an inner cover having a top panel, two fold-down flaps and six side panels folded into box shape, an improved one-piece liner of relatively heavy heat-sealable plastic film, said liner comprising a short length tube folded into generally cubical shape and heat sealed along two opposite top edges and a top seam bisecting said edges and heat sealed along two opposite bottom edges and along a bottom seam bisecting said bottom edges, said liner having narrow flaps along said sealed top edges which are adapted to be fastened to the inner faces of said fold-down cover flaps to prevent destructive flexing and abrasion of said liner inside said inner cover, said liner having a top closure sealed to it and adapted to extend through an opening in said outer and inner covers.

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