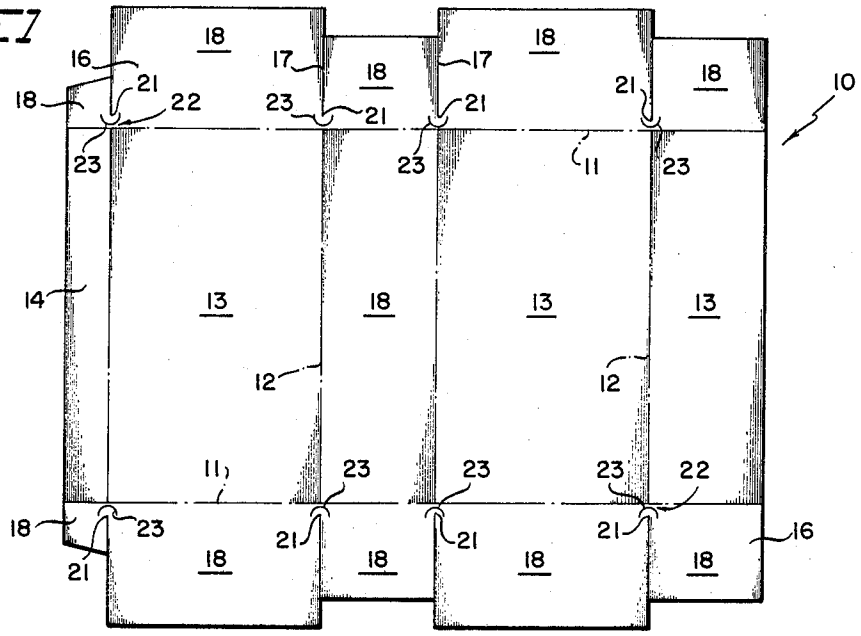
Dec. 2, 1969 R. E. JACKE 3,481,527

SIFT-PROOF OR LIQUID-TIGHT CARTON CONSTRUCTION

Filed Feb. 2, 1968

Fig. 1



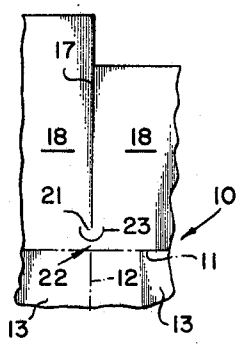


Fig. 2

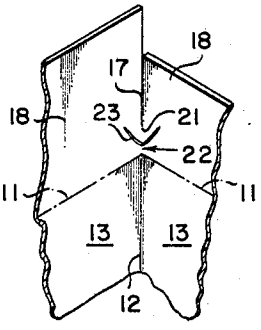


Fig. 3

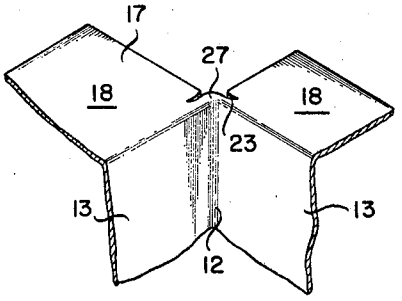


Fig. 4

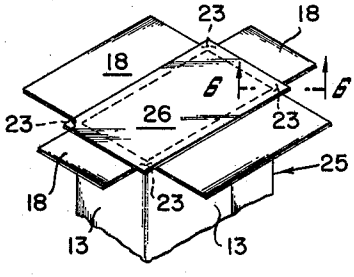


Fig. 5

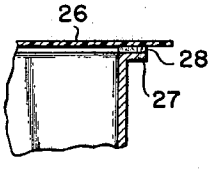
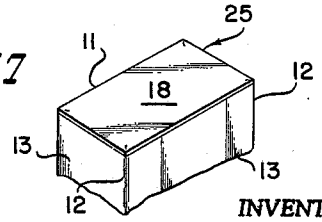


Fig. 6

Fig. 7



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SIFT-PROOF OR LIQUID-TIGHT CARTON CONSTRUCTION

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Int. Cl. B65d 5/02, 5/56
U.S. Cl. 229—37 8 Claims

ABSTRACT OF THE DISCLOSURE

A sift-proof or liquid-tight carton construction utilizing drumhead end closure members wherein the improvement comprises increasing the compression strength of the corners so that the drumhead will not delaminate. This is accomplished by controlling the tear propagation of slits or cut outs used to define the end flaps. The end panel defining slits or cut outs are foreshortened and an arcuate or U-shaped slit is placed between the termination of each end panel defining slit and each crease defining the main carton panels thereby directing the tear propagation away from each corner.

The present invention relates generally to an end closure construction for cartons, and more particularly to an end closure for cartons which includes a thin membrane or drumhead to make the carton sift-proof and capable of holding liquid or semi-liquid contents.

Heretofore, sift-proof cartons have been devised which use thin membranes or drumheads to close the top and bottom of the carton. Representative examples of these include Benzon-Petersen 2,886,231 and Cheeley 3,236,436. The cartons made in accordance with these and others in the prior art have suffered from weakened corner conditions which make it difficult to prevent buckling at the corners when loaded in compression. Such a loading frequently occurs in normal usage in that the cartons are frequently stacked one atop another. Buckling at the corner frequently results in partial delamination of the thin membrane or drumhead thereby resulting in sifting or leaking of the contents.

The weakened corner condition exists primarily because of the presence of slits or cut out portions used to define the end flaps for the carton. When the slit or cut out elongates, i.e. propagates, under stress, such as occurs in stacking or rough handling, the corner buckles and frequently causes some delamination of the membrane.

In accordance with the present invention, the weakened corner condition is effectively overcome by utilizing two construction features which, in combination, greatly strengthen the corner construction and notably improve its ability to withstand loading in compression. In this manner, the thin membrane or drumhead remains intact and sifting or leaking is prevented.

The first constructional feature of the cartons made in accordance with the present invention is to terminate the slits or cut outs which define the end flaps of the carton short of the transverse crease or fold lines which define the tops and bottoms of the main panels of the carton.

The second constructional feature is to provide means to prevent propagation of the slits or cut outs which define the end panels to the point that it intersects the transverse crease or score lines.

In the preferred form of the invention, the manner of controlling the propagation of the end panel defining slits or cut outs comprises an arcuate or V-shaped slit extending transversely between the termination of the end panel defining slits or cut outs and the transverse crease or fold lines with the ends of the arcuate or V-shaped slits extending away from the transverse crease or fold lines. In this manner a natural bridge is provided at each corner of the carton which provides a much more rigid corner construction.

The inherent advantages and improvements of the present invention will become more readily apparent upon considering the following detailed description of the invention and by reference to the drawings in which:

FIG. 1 is a plan view of a carton blank embodying the invention;

FIG. 2 is an enlarged view taken at a juncture between body and end panels of the blank;

FIG. 3 is a perspective view of that portion of the blank shown in FIG. 2 with adjacent body and end panels bent at a right angle to each other;

FIG. 4 is a perspective view of that portion shown in FIG. 3 but with the end panels bent outwardly;

FIG. 5 is a perspective view of a carton end to which a drumhead has been applied;

FIG. 6 is a fragmentary vertical cross sectional view, drawn to an enlarged scale, taken along line 6—6 of FIG. 5; and,

FIG. 7 is a perspective view of the carton end when closed.

Referring now to FIG. 1 of the drawings, a carton blank indicated generally at **10** is provided with transverse crease and fold lines **11** and longitudinal crease and fold lines **12** between which body side wall panels **13**, and a side wall corner sealing panel **14** are defined, leaving beyond the crease lines **12** lateral margins **16** in which longitudinal slits **17** set off end panels or flaps **18**. The slits **17** extend inwardly from the top and bottom edges of the blank **10** along projected longitudinal fold lines **12** and terminate short of the transverse crease and fold lines **11** at points designated **21**.

Between each point **21** and its adjacent transverse crease line **11** an uncut area indicated generally at **22** extends between contiguous end panels. In this uncut area a transverse slit **23** is cut, the slit extending laterally into both contiguous end panels. The slit is preferably U-shaped or arcuate and is spaced a short distance from its adjacent transverse crease line **11** from which the ends of the slit diverge. Each transverse slit **23** is also preferably spaced from the terminations **21** of each end panel defining slits **17**.

The transverse slits **23** thus function to divert the line of weakness along end panel defining slits **17** away from the transverse crease and fold lines **11** and thereby away from the corners of the erected carton. The space in uncut area **22** between the transverse crease and fold lines **11** and each transverse slit **23** provides a bridging area which greatly increases the compression strength of the erected carton and guards against delamination of a drumhead adhesively secured to the end flaps in a manner to be described.

In erecting the carton indicated generally at **25** from the blank **10**, the corner structure shown flat in FIG. 2 is first folded along a longitudinal crease and fold line **12** as shown in FIG. 3. Subsequently, preliminary to the application of a membrane or drumhead **26** (FIG. 5) to the carton, the end flaps **18** are bent outwardly along the transverse crease **11** and into a common plane as shown in FIG. 4.

In accordance with the present invention, the worst that will occur either during the process of adhesively securing the drumhead **26** to the end flaps **18** or subsequently during normal handling of the carton is that the line of weakness along slit **17** will propagate and extend to slit **23** as illustrated in FIG. 4. The line of tear is then diverted by slit **23** away from the corner, i.e. the juncture

of crease lines **11** and **12**, and thereby preserves a portion of the uncut area **22** to serve as a ledge or bridge **27** extending outwardly and providing a continuous surface between the flaps **18** at the corner.

The opposite sides of the slit **23**, open slightly at this time, but the ends of the slit, diverging from the crease line **11** prevent any possible tearing back from the ends of the slits to the fold line **11**. In the preferred form of the invention, each transverse slit **23** is substantially symmetrical with the extension of its associated longitudinal crease line **12** and slit **17**.

When the membrane or drumhead **26** is applied to the open end of the carton (FIG. 5), a peripheral margin of the membrane **26** is secured by any suitable adhesive **28** to a continuous outwardly projecting area of flaps **18** and ledges **27**, thus assuring a tight seal at the critical corner areas as well as along the end flaps **18** when the latter are folded inwardly to closed position as shown in FIG. 7.

As an alternative to the use of an adhesive at **28**, the membrane or drumhead **26** may be of the heat sealing type. Thus membrane or drumhead **26** may either have a thermoplastic coating thereon or it may be composed of a welding type film to provide a heat sealing surface. In all instances, the membrane or drumhead **26** must have good adhesive compatibility with the inner surface of the container.

Thus it will be seen that the cartons made in accordance with this invention by virtue of their corner bridging structure provide greater margin or sealing area for the leak-proof attachment of a membrane to the carton ends. The invention effectively achieves the elimination of leakers from the package closing operation caused by the inherent weakness of the corners.

While presently preferred embodiments of the invention have been illustrated and described, it will be recognized that the invention may be otherwise variously embodied and practiced.

What is claimed is:

1. A carton blank for a sift-proof or liquid-tight carton comprising:

(a) a pair of parallel transverse crease lines;

(b) a plurality of parallel longitudinal crease lines normal to and extending between said transverse crease lines;

(c) said tranverse and longitudinal crease lines defining between them a plurality of body side wall panels and leaving marginal areas beyond said transverse crease lines;

(d) a plurality of longitudinal cuts in said marginal areas, each of said cuts being substantially in line with said longitudinal crease lines and terminating at a point spaced from the end of one of said longitudinal crease lines at its juncture with said transverse crease lines;

(e) said longitudinal cuts dividing said marginal areas into a plurality of end panels and leaving an uncut area between contiguous end panels;

(f) said plurality of longitudinal cuts in said marginal areas constituting lines of weakness directed toward said parallel transverse crease lines;

(g) and carton weakening means positioned between the ends of said plurality of cuts in said marginal areas and an adjacent parallel transverse crease line;

(h) each carton weakening means straddling an extension of a corresponding longitudinal cut and directing the tear propagation from said plurality of longitudinal cuts away from said parallel transverse crease lines.

2. A carton blank for a sift-proof or liquid-tight carton as defined in claim **1** wherein said carton weakening means comprises a slit associated with each longitudinal cut with each slit being spaced from the termination of one of said longitudinal cuts and one of said parallel transverse crease lines.

3. A carton blank for a sift-proof or liquid-tight carton comprising:

(a) a pair of parallel transverse crease lines;

(b) a plurality of parallel longitudinal crease lines normal to and extending between said transverse crease lines;

(c) said transverse and longitudinal crease lines defining between them a plurality of body side wall panels and leaving marginal areas beyond said transverse crease lines;

(d) a plurality of longitudinal cuts in said marginal areas, each of said cuts being substantially in line with said longitudinal crease lines and terminating at a point spaced from the end of one of said longitudinal crease lines at its juncture with said transverse crease lines;

(e) said longitudinal cuts dividing said marginal areas into a plurality of end panels and leaving an uncut area between contiguous end panels;

(f) said plurality of longitudinal cuts in said marginal areas constituting lines of weakness directed toward said parallel transverse crease lines;

(g) and means to direct the tear propagation from said plurality of longitudinal cuts away from said parallel transverse crease lines;

(h) said means to direct the tear propagation from said plurality of longitudinal cuts away from said parallel transverse crease lines comprises a slit associated with each longitudinal cut with each slit being spaced from the termination of one of said longitudinal cuts and one of said parallel transverse crease lines, and wherein each slit is arcuate in shape with its ends extending away from its associated transverse crease line.

4. A carton blank for a sift-proof or liquid-tight carton as defined in claim **3** wherein each arcuate slit is substantially symmetrical to an extension of its respective longitudinal cut.

5. A corner construction for a sift-proof or liquid-tight carton comprising:

(a) a pair of body panels hingedly connected to a longitudinal crease line to form a corner of a carton;

(b) a transverse crease line defining an end for each of said body panels;

(c) an end panel hingedly attached to each of said body panels at said transverse crease line;

(d) each end panel having a side contiguous with the other end panel prior to its erection to a carton defined by a cut substantially in line with said longitudinal crease line;

(e) said cut terminating short of said transverse crease line thereby leaving a bridging structure joining said end panels between the termination of said cut and said transverse crease line;

(f) said cut constituting a first line of weakness directed toward said corner of said carton;

(g) and carton weakening means positioned between the end of said cut line and said transverse crease line,

(h) said carton weakening means straddling an extension of said cut line and being located within said bridging structure for directing tear propagation from said first line of weakness away from said corner.

6. A corner construction for a sift-proof or liquid-tight carton as defined in claim **5** wherein said carton weakening means positioned between the end of said cut line and said transverse crease line and located within said bridging structure constitutes a second line of weakness for directing tear propagation from said first line of weakness away from said corner.

7. A corner construction for a sift-proof or liquid-tight carton as defined in claim **5** including a flexible membrane adhesively secured peripherally to a continuous marginal area of said end panels.

8. A corner construction for a sift-proof or liquid-tight carton comprising:

(a) a pair of body panels hingedly connected to a longitudinal crease line to form a corner of a carton;

(b) a transverse crease line defining an end for each of said body panels;

(c) an end panel hingedly attached to each of said body panels at said transverse crease line;

(d) each end panel having a side contiguous with the other end panel prior to its erection to a carton defined by a cut substantially in line with said longitudinal crease line;

(e) said cut terminating short of said transverse crease line thereby leaving a bridging structure joining said end panels between the termination of said cut and said transverse crease line;

(f) said cut constituting a first line of weakness directed toward said corner of said carton;

(g) and means located within said bridging structure for directing tear propagation from said first line of weakness away from said corner;

(h) said means located within said bridging structure

consists of a slit the ends of which extend away from said transverse crease line.

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