Nov. 23, 1965 R. M. HOLMES 3,219,255

LEAKPROOF CARTON

Filed March 7, 1963

FIG. 1

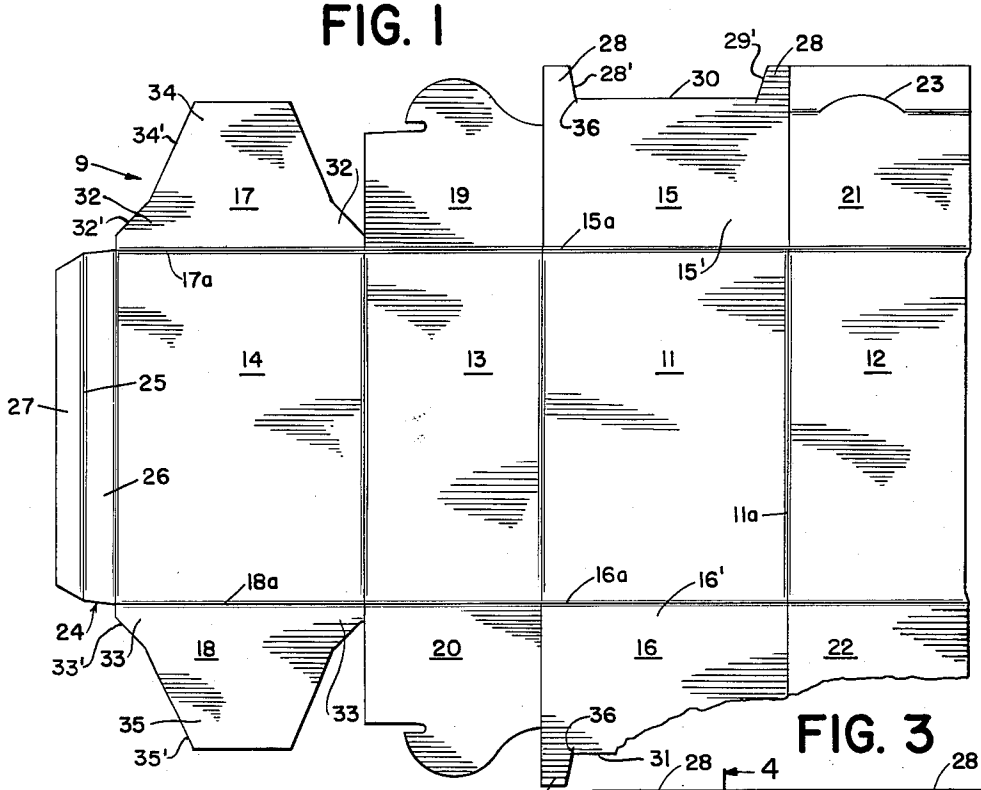


FIG. 2

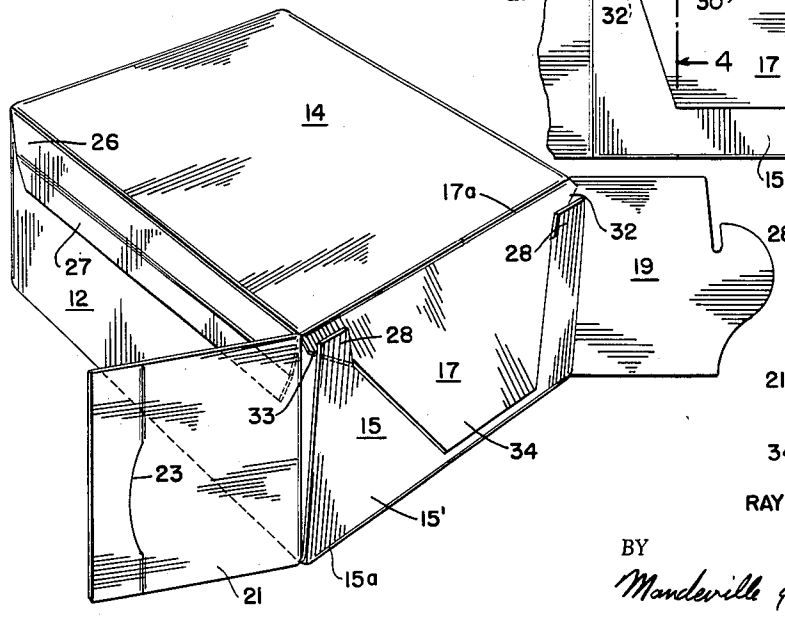


FIG. 3

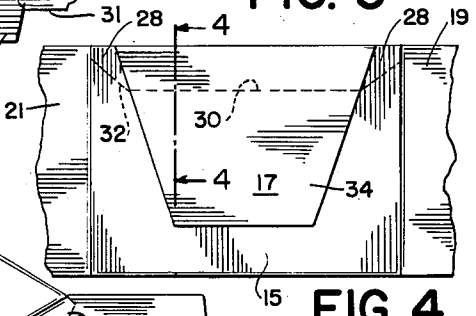
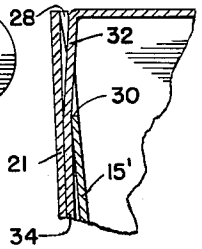


FIG. 4



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LEAKPROOF CARTON

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The present invention relates to leakproof fibrous cartons and more particularly to an improvement in the end construction thereof, which construction affords a simple, yet highly efficient, means for tightening the corners and controlling the leakage in such cartons.

Specifically, the present invention relates to a new and improved folding carton, especially adapted for packaging ice cream, which incorporates a novel "tongue and groove" end panel arrangement which cooperates to form and maintain a pair of tight corner seals, which seals prevent the leakage of melted ice cream therethrough. A further aspect of the invention is the provision of improved corner sealing means in combination with conventionally locking carton end flaps to form a new and improved end closure for an ice cream carton or the like.

Another important aspect of the invention resides in the improvement in the overall carton rigidity, as compared to conventional cartons of this type, contributed by the "tongue and groove" closure of the present invention.

To understand more completely the nature of the present invention, reference should be had to the following detailed description, taken in conjunction with the accompanying drawing in which:

FIG. 1 is a plan view of a one-piece blank cut, scored and ready for erection into a carton embodying the principles of the present invention;

FIG. 2 is a perspective view showing the carton erected and ready for leakproof end closure with the new and improved "tongue and groove" structure of the present invention;

FIG. 3 is an end view of the end closure structure of the carton; and

FIG. 4 is an enlarged, fragmentary cross-sectional view of the carton of FIG. 3 taken along line 4—4 thereof.

The invention is embodied in the present instance in a container made from a blank **9**, such as shown in FIG. 1, cut from paperboard stock or a like sheet material. Advantageously, the material is treated so as to be substantially impervious to moisture and liquid.

As shown in FIG. 1, the blank **9** is scored longitudinally and transversely to form bottom, front and back wall panels **11**, **12** and **13**, respectively, and a cover panel **14**, which in the present instance is rectangularly shaped so as to produce a straight-walled container when erected. The bottom panel **11** is provided at opposite ends thereof with inner end panels **15**, **16**, articulated along score lines **15***a*, **16***a*, while the cover panel **14** is provided at opposite ends thereof with outer end panels **17**, **18**.

Articulated to the opposite ends of the back wall panel **13** are back locking flaps **19**, **20**, while front locking flaps **21**, **22**, having locking slits **23**, are articulated to the opposite ends of the front wall **12**. The free end of the cover panel **14** has a glue flap **24** articulated thereto, which flap includes a transverse score line **25** defining an adhesive portion **26** and an opening portion **27**.

In accordance with the present invention, and as shown in FIG. 3, the bottom end panels **15**, **16** extend upwardly for the full depth of the carton at its corners only, to define sealing ears **28**, **29** at the upper carton corners. The sealing ears define therebetween recesses or "grooves" **30**, **31**. The cover outer end panels **17**, **18** are specially constructed to have corner sealing portions **32**, **33** of the full carton width only immediately adjacent the score lines **17***a*, **18***a*, while having the remainder of the panel cut away at convergent edges **34'**, **35'** to form tapered "tongue portions," **34**, **35** of widths not in excess of the widths of the grooves **30**, **31**. Advantageously, the sealing portions **32**, **33** and the sealing ears **28**, **29**, are, themselves, slightly tapered at convergent edges **32'**, **33'**, **28'**, **29'**, respectively, to facilitate erection of the carton from the glued blank **9**.

The carton contemplated by the present invention is of the "end-filling, top-opening" type, well known in the art. Accordingly, the blank **9** is initially folded upon itself to form a conventional flat carton tube, which is completed by gluing the flap **24** to the front wall **12**. The end closures may then be completed in the following manner: With the tube squared so as to have a rectangular profile, as shown clearly in FIGS. 2 and 3, the cover end panels **17**, **18** and the body end panels **15**, **16** are folded inwardly, so that the cover and body end panels interlock, with the tongue portions **34**, **35** overlying the lower portions **15'**, **16'** of the body end panels, and with the sealing ears **28**, **29** of the body panels overlying the sealing portions **32**, **33** of the cover panels **17**, **18**. The infolding and connection of the front flaps **21**, **22** and the rear flaps **19**, **20** completes the new and improved end structure.

The interlocking end panels create a truss-like effect adjacent the upper corners which significantly increases the rigidity of the carton and the tightness of the corners. Thus, a force normal to the end interlocked panels, which could cause conventional overlapping end panels to be collapsed, is easily resisted by the interlocked "tongue and groove" end panel construction of the invention. In this respect, the respective "tongue and groove" flaps advantageously are so proportioned that the sealing ears **28**, **29** are of sufficiently short length to retain substantial structural rigidity. By way of specific example, the sealing ears may have a free length of about ⅝ inch in a carton having a width of about 4¾ inches and a depth of about 3½ inches.

In order to accommodate the "cross-folding" of the respective tongue and groove flaps, without undesirably bending or distorting either flap, it is advantageous to form short slots or cuts **36** into the body of the groove flaps **15**, **16**, the slots **36** advantageously being about ⅛ inch in length in a carton of the dimensions mentioned above and being aligned substantially with the inner edges of the sealing ears **28**, **29**. The arrangement is such as to permit the free edges of the groove flaps **15**, **16**, which contact the tongue flaps **17**, **18** in the area of the crossover, to be deflected inward.

As shown in FIG. 4, the upper corners of the erected carton are sealed by a three-ply construction of cover panel sealing portions **32**, **33**, body panel sealing ears **28**, **29**, and body flaps **19–22**. Substantial improvement is realized over the sealing obtainable with conventional cover panel constructions, which is attributable in part to the unique construction in which the sealing elements at the corners are oppositely disposed from the panels from which they derive their support. Thus, the major portions of the cover end panels **17**, **18** overlie the body end panel lower portions **15'**, **16'**, while the sealing portions of the cover end panels underlie the sealing ears of the body end panels. Likewise, the major portions of the body end panels underlie the cover end panel "tongues" **34**, **35**, while the body panel sealing ears **28**, **29** overlie the cover end panel sealing portions **32**, **33**.

It should be understood that an inward normal force on the cover end panel, the body end panel, or both, causes the sealing ears to move against the sealing portion to increase the seal therewith due to the novel interlocking "tongue and groove" construction. A conven-

tional end structure would tend to cave in under such a force and thus decrease any existing seal. However, the truss-like effect of the new and improved carton resists such a collapse.

The carton of the present invention is intended particularly for use by dairies and the like in mass production ice cream filling applications, in which the filled containers are closed and then conveyed bottom up from the filling station to a freezing or hardening room. Particularly in the warm seasons, the newly filled cartons tend to leak at the corners, in the relatively short interim between filling and hardening. With the carton end construction of the invention, however, the "upper" corners of the carton are effectively sealed by a three-ply structure in which the sealing ears **28**, **29** are compressed at the upper corners between the sealing portions **32**, **33** and the folded-over and locked outer flaps **19–22**. Although it is still possible for leakage to occur with the new carton, it is confined to areas remote from the corners of the carton. Thus, such leakage as may occur remains underneath the outer flaps **19–22**. The advantageous new construction thus prevents the still soft ice cream from leaking out onto the printed outer surface of the carton, onto other, adjacent cartons, and onto the equipment, plant floor, etc., as has been the regular experience with conventional cartons.

Although the present invention has been described with reference to a specific, preferred embodiment, it should be understood that the disclosure has been made only by way of example and that certain changes in details of construction and arrangement of the elements may be made without departing from the spirit and scope of the invention as hereinafter claimed.

I claim:

1. A container for ice cream and the like comprising:

(a) contiguous, articulated cover, rear, bottom and front wall panels,

(b) said front and rear panels having side flaps articulated thereto,

(c) a pair of body end panels articulated to opposite ends of said bottom wall panel,

(d) said end panels being of full carton depth only along the end edge portion thereof and being of less than full carton depth along central body portions thereof,

(e) said full depth portions defining a pair of sealing ears adjacent two corners of each end of the container, and a recess therebetween of predetermined width, said recess being substantially adjacent an edge of the container,

(f) a pair of cover end panels articulated to opposite ends of said cover panel,

(g) said cover end panels having sealing portions of full carton width and having first convergent edges immediately adjacent said cover front panel,

(h) said sealing portions having a predetermined depth measured from the outer ends of said first convergent edges to said cover panel substantially equal to said depths of said recess,

(i) said cover end panels having second convergent edges providing predetermined tongue portions extending from said sealing portions and having a width at the intersection of said first and second convergent portions not greater than the width of said recesses,

(j) said corner sealing ears overlying said sealing portions at the upper corners of said carton and cooperating therewith to form corner seals having a predetermined efficiency, and said tongue portions extending through said recesses and overlying said central body portions, whereby inwardly directed forces applied to said tongue portions tend to increase the efficiency of said corner seals, and

(k) said side flaps overlying said cover body end panels.

2. A container in accordance with claim **1**, in which (a) said side flaps include non-adhesive locking means for mutually securing said cover and body end panels.

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