Nov. 28, 1967 I. L. WILCOX 3,355,083

CONTAINER

Filed May 9, 1966 4 Sheets-Sheet 1

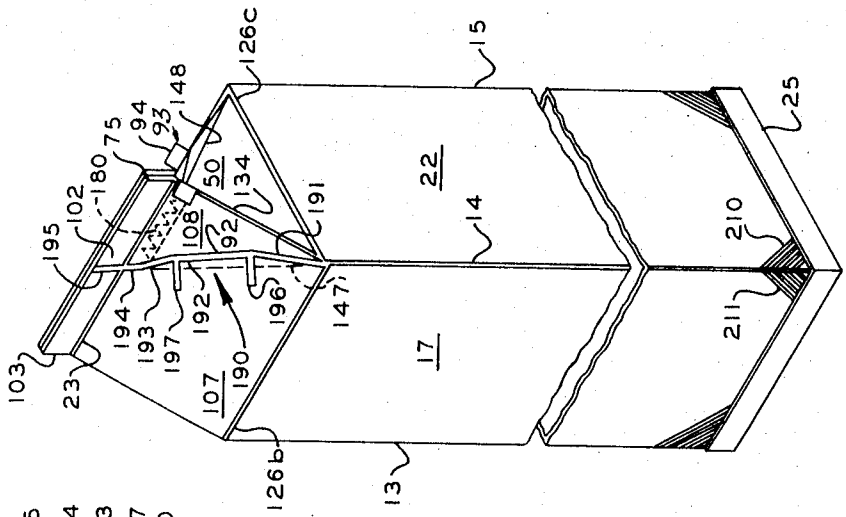


FIG. 1

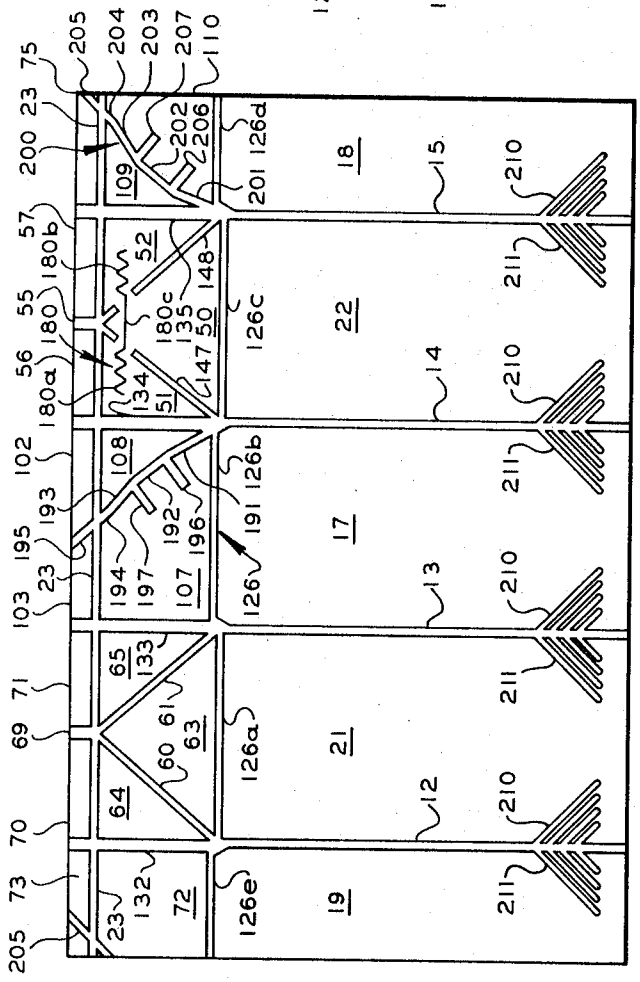


FIG. 2

INVENTOR
I. L. WILCOX

BY Young & Quigg
ATTORNEYS

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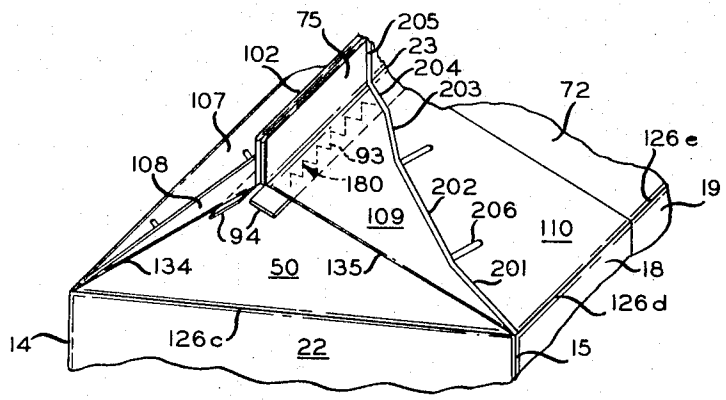


FIG. 5

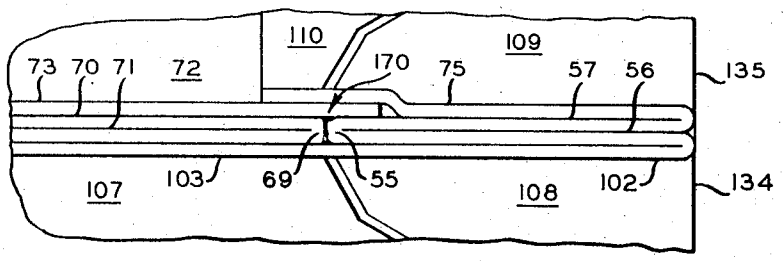


FIG. 4

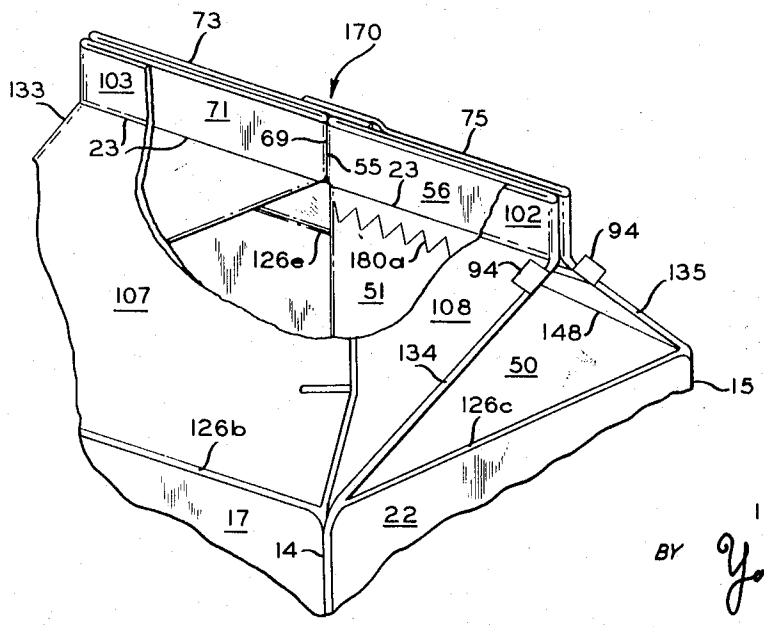


FIG. 3

INVENTOR
I. L. WILCOX
BY Young & Quigg
ATTORNEYS

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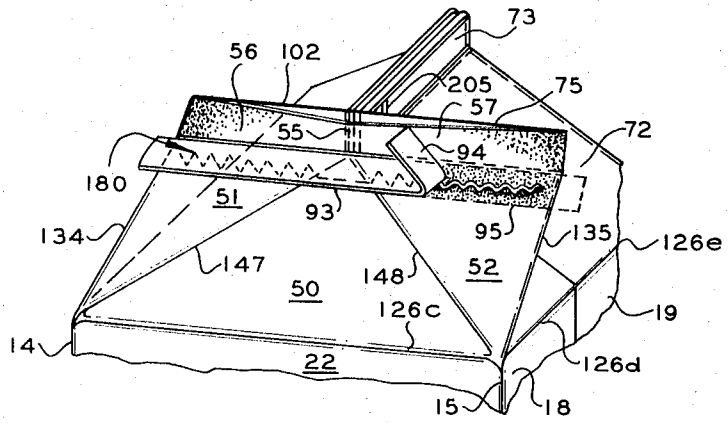


FIG. 6

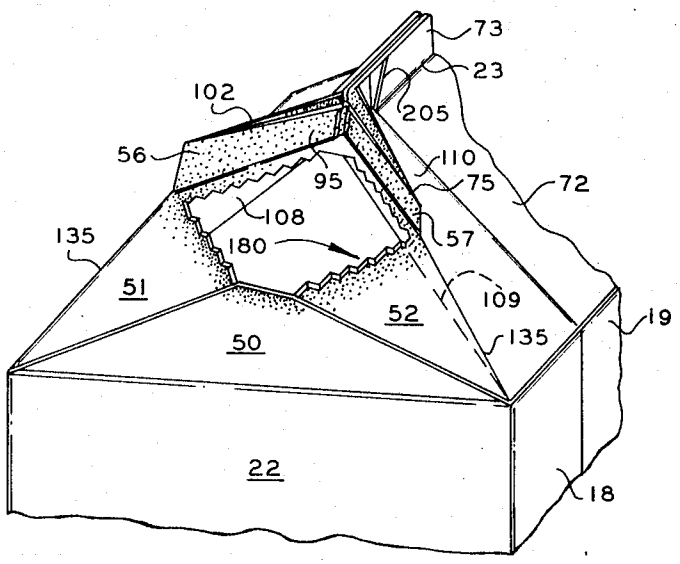


FIG. 7

INVENTOR
I. L. WILCOX

BY Young & Quigg
ATTORNEYS

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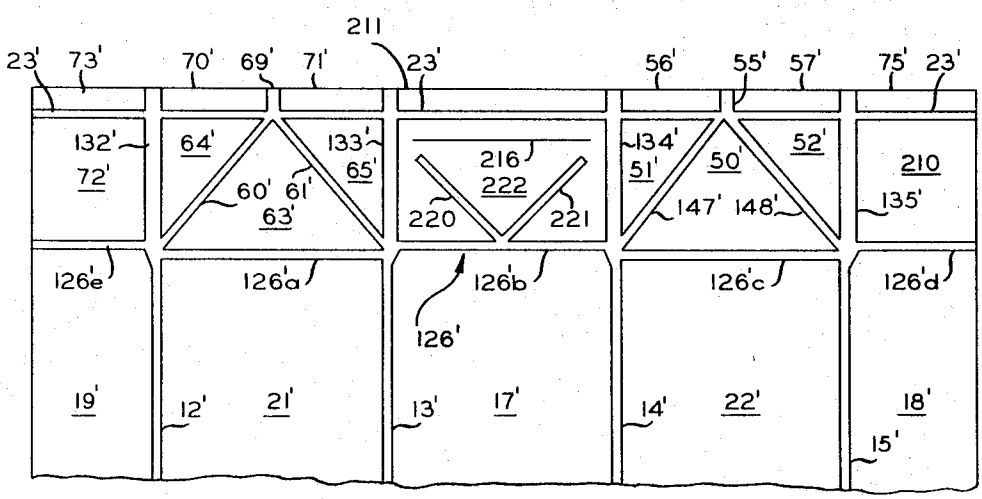


FIG. 9

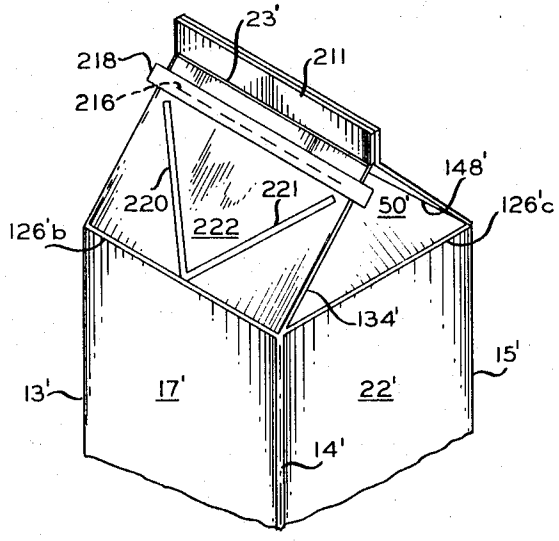


FIG. 8

INVENTOR.
I. L. WILCOX

BY Young & Quigg

ATTORNEYS

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3,355,083

CONTAINER

Isaac L. Wilcox, Fulton, N.Y., assignor to Phillips Petroleum Company, a corporation of Delaware

Filed May 9, 1966, Ser. No. 548,472
10 Claims. (Cl. 229—17)

This is a continuation-in-part of my copending application Ser. No. 482,993, filed August 9, 1965, now U.S. 3,295,739 which in turn is a continuation-in-part of the copending application Ser. No. 369,830, filed May 25, 1964, and now abandoned.

This invention has to do, in general, with containers formed of paper-board and used for the packaging of liquid products. The invention is particularly applicable to gable top containers of rectangular cross section formed from a paperboard blank coated on both sides with a thermoplastic material. These containers, provided with suitable top and bottom structures, are commonly used in the dairy industry for packaging milk, orange juice, lemonade and the like. The gable top closure structure consists generally of opposed front and rear roof panels inclined to make the gable formation, and a pair of triangular-shaped end closure panels inclined upwardly between the front and rear roof panels. These end closure panels have integral fold-back panels that assume a position lying against the underside of the front and rear roof panels. The fold-back panels, and the front and rear roof panels, are formed with integral ridge panels, which get to be disposed in vertical contacting relation and are joined together, usually, by some form of adhesive to form the ridge of the gable top.

Although numerous configurations have been proposed for the top structure of such gable top containers, very few have enjoyed any significant commercial success. Many of the proposed designs have proven to be difficult to open or to provide a tight reclosure. It has been proposed, as in British Patent 583,755, that a slit be provided in the roof panel to permit a greater ease in opening the container. However, some difficulties of leakage have been encountered when a score line intersects such a slit.

In one aspect this invention has as an object the provision of an improved configuration of a slit opening in a gable top container. It is an object of the invention to prevent or at least minimize leakage from gable top containers. It is a further object of the invention to provide a gable top container having an improved spout.

Other objects, aspects and advantages of the invention will be apparent from a study of the specification, the drawing and the appended claims to the invention.

In the drawing, FIGURE 1 is a perspective view of a container embodying the invention, FIGURE 2 is a plan view of the paperboard blank from which the container of FIGURE 1 is formed, FIGURE 3 is a perspective view of the gable top structure with a portion of the front roof panel and the contiguous portion of the ridge panel surmounting the same being removed, FIGURE 4 is a top plan view of the sealed ridge structure, FIGURE 5 is a perspective view of the top portion of the container of FIGURE 1 in the sealed condition, FIGURE 6 is a perspective view of the top portion of the container of FIGURE 1 in partially opened condition, FIGURE 7 is a perspective view of the top portion of the container of FIGURE 1 in fully opened condition, FIGURE 8 is a perspective view of a container in accordance with a second embodiment of the invention, and FIGURE 9 is a plan view of the paperboard blank from which the container of FIGURE 8 is formed.

Referring to FIGURE 2, the rectangular blank is provided with vertical score lines **12**, **13**, **14** and **15**, extending upwardly from the lower edge of the blank to a series **126** of horizontally extending score lines **126***a*, **126***b*, **126***c*, **126***d* and **126***e*. The score lines **13**, **14** and **126***b* define a front side wall panel **17**. Score lines **15** and **126***d*, and **12** and **126***e* define panels **18** and **19**, the free edges of which, in the formed container, are overlapped and joined by a permanent adhesive bond to form a rear side wall panel which is located opposite front side panel **17**. End wall panels **21** and **22** are defined by score lines **12**, **13** and **126***a* and **14**, **15** and **126***c*, respectively. Horizontal score lines **126***a* and **126***c* are located lower on the container than score lines **126***b*, **126***d* and **126***e* to substantially reduce the thickness of the folds at adjacent lower corners of the closure panels. In other words, the spacing apart in the vertical plane of the bend of each roof panel into its vertical container wall from the bend of each end closure panel into its vertical container wall permits smaller and more attractive folds in the resulting corners of the container. With the scoring arrangement shown in FIGURE 2, the panels **17**, **21**, **22** and the rear wall panel formed by panels **18** and **19** are all of equal width.

The vertical score lines **12**, **13**, **14** and **15**, which are located at the vertical corners of the completed container, extend upwardly past score lines **126** as at **132**, **133**, **134** and **135**, and terminate at the top edge of the blank. Horizontal score line **23** is located a short distance downwardly from the top edge of the blank.

When the blank has been folded to tubular form and overlapping edges of the panels **18** and **19** have been joined together, a bottom closure **25** (FIGURE 1) is permanently sealed to the lower end of the tubular formation. Score lines **133**, **134**, **126***b* and **23** define the front roof closure panel composed of sections **107** and **108**. Score lines **133**, **134** and **23** define the ridge panel comprising sections **102** and **103**, surmounting the front roof panel. Score lines **132**, **135**, **126***d*, **126***e* and **23** define the rear roof closure panel composed of sections **109**, **110** and **72**. Score lines **135**, **132** and **23** define the ridge panel, comprising sections **73** and **75**, surmounting the rear roof panel. Score lines **132**, **133**, **126***a* and **23** define a rectangular end closure panel. This end closure panel is provided with converging score lines **60** and **61** which at their upper ends intersect the score line **23** medial of score lines **132** and **133**, thus defining a triangular end panel portion **63** and a pair of triangular fold-back panel portions **64** and **65**. Score lines **132**, **133**, **23** and **69** define ridge panels **70** and **71**, surmounting fold-back panel portions **64** and **65**, respectively. Score lines **134**, **135**, **126***c* and **23** define a second rectangular end closure panel. This second end closure panel is provided with converging score lines **147** and **148**, which, at their upper ends, intersect score line **23** medial of score lines **134** and **135**, thus defiining a triangular end panel portion **50** and a pair of triangular fold-back panels **51** and **52**. Score lines **134**, **55**, **135** and **23** define ridge panels **56** and **57**, surmounting fold-back panel portions **51** and **52**, respectively. In the completed container, the two end closure panels are infolded between and beneath the two roof closure panels, with the adjacent ridge panels being heat sealed to each other.

Score lines **132**, **133**, **134** and **135** are of extended width, with respect to the remainder of score lines **12**, **13**, **14** and **15**, with the extension being in a direction toward the center of the respective roof panel. Thus score lines **133** and **134** are of extended width in the direction of the center of the front roof panel formed by panels **107** and **108**, while score lines **132** and **135** are of extended width in a direction toward the center of the rear roof panel formed by panels **72**, **109** and **110**.

When the blank of FIGURE 2 is folded in the score lines **12**, **13**, **14** and **15** about the square mandrel of the container erecting machine, the closure panels above the

series of score lines **126** form a square tubular cross section in a direction transversely of the container. When the top closure panels are folded inwardly, the greater width of score lines **132, 133, 134** and **135** provides extra material for the end closure panels **50, 51, 52** and **63, 64, 65** and surmounting ridge panels **56, 57** and **70, 71**, whereby in the formed and sealed container ridge panels **56** and **71**, have a greater combined length than ridge panels **102, 103** surmounting the front roof panel. Similarly ridge panels **57** and **70** have a greater combined length in the formed and sealed container than the ridge panel formed by panels **73, 75** surmounting the rear roof panel. This, in turn, results in the hinge joints on score lines **55** and **69** abutting or slightly overlapping at the center of the laminar ridge structure formed by bonding the ridge panels together as at **170** in **FIGURES 3 and 4.**

In containers of this type employing conventional scoring with the vertical score lines **12–15** being of uniform width throughout their length, the ridge panels surmounting the front and rear roof panels, and surmounting the end panels are all of equal length. In manipulating these panels to folded, closed position, the hinge joint between the ridge panel sections, surmounting the fold-back panels, fail to meet or abut at the center of the ridge structure and, accordingly, there is a space between the inner folded ends of the inner ridge panels surmounting the fold-back panels. This spacing has a dimension transversely of the ridge structure equivalent to double the thickness of the blank due to the folded inner ridge panels, whereby there is, accordingly, a small aperture for the escape of liquid contents from the container.

However, with the arrangement above described, wherein the folded ends of the inner ridge panels abut or overlap, such a leak passage is entirely avoided.

It will be apparent that this improvement is obtained simply by the modification of the vertical scoring in the areas **132–135**, which obviously results in no increase in the cost of producing the blank, and also no change or modification in the container erecting equipment. It also results in maintaining the square form of the container body, thus avoiding any changes in the equipment for handling and casing the filled containers.

In the second end closure panel, which serves as the pouring spout, converging score lines **147** and **148** intersect horizontal score line **23** midway between score lines **134** and **135**. Vertical score line **55** extends upwardly from the intersection of score lines **147** and **148** to the top edge of the blank. The weakened line of severance **180** is located in the upper part of panel portions **50, 51** and **52** below horizontal score line **23**. The weakened line of severance **180** would intersect score lines **147** and **148** at points below the junction of score lines **147** and **148** except that score lines **147** and **148** are discontinuous, or interrupted, in the area of the weakened line of severance **180**. Score lines **147** and **148** stop short of line **180** to prevent leakage which could otherwise occur by capillary action through the slit and along the score lines. Eliminating all score line grooves in the vicinity of the line **180** provides a flat surface completely around the periphery of the slit, thus permitting a liquid tight seal to be effected between the tape **93** and the container. The weakened line of severance is preferably formed in three sections, each end section **180*a*** and **180*b*** being formed by a series of zig-zag incisions and the center section **180*c*** being formed by a straight, horizontal incision. Center section **180*c*** extends completely across panel **50** and preferably extends into panels **51** and **52**. The straight center section **180*c*** provides for easier separation of the pouring spout section of end panel **50** from the upper portion thereof above severance line **180**. This is particularly important in view of the large amount of paperboard in the relatively small area of the triangle formed by lines **147, 148** and **180*c*** as well as the fold lines formed in this area by the fabrication of the central laminar ridge and subsequent opening and closing of the pouring spout.

A strip of tape **93** (FIGURE 1) is bonded to the second end closure panel in overlying relation to the weakened line of severance **180**. The tape **93** is applied over the weakened line of severance **180** and heat sealed to the entire marginal surface about the weakened line of severance. The tape **93** can be formed of thermoplastic material or it can be a non-thermoplastic material provided with a coating of thermoplastic material compatible and heat-sealable to the thermoplastic coating on the container. It is presently preferable that the non-thermoplastic material have a heat-reflective outer surface to prevent any weakening of the bond between tape **93** and the container during the time the top section of the container is being subjected to heat in preparation for sealing the ridge panels to form the central laminar ridge. The ends **94** of tape **93** extend beyond the ends of the second end closure panel to provide grasping tabs.

In order to provide a snap action for opening and closing the pouring spout, the front roof panel is provided with a score line **190** extending upwardly from the intersection of horizontal score line **126*b*** and vertical score line **134**, to the point on score line **23** midway between vertical scores lines **133** and **134**. Score line **190** is preferably formed in four sections **191, 192, 193** and **194**. Section **194** extends downwardly from the point on score line **23** midway between score lines **133** and **134** on substantially a direct line toward the intersection of score lines **126*b*** and **134**. Section **192** is positioned approximately midway between the lower end of section **194** and the intersection of score lines **126*b*** and **134**, approximately parallel to said direct line but spaced therefrom toward the upper corner of the front roof panel formed by the intersection of score lines **23** and **134**. Score line **191** extends from the intersection of score lines **126*b*** and **134** to the lower end of section **192** while section **193** extends from the upper end of section **192** of the lower end of section **194**. The angle of inclination of score line **191** within the front roof panel with respect to the horizontal reference is thus greater than the angle of inclination of score line **147** on the same reference basis. The portion of panel **107** which is the area between score lines **191, 192** and **193** and the imaginary line having the same angle of inclination as score line **147** in the formed container thus serves as a fulcrum for snapping the pouring spout between the two stable positions of opened and closed. Score lines **196** and **197** are approximately perpendicular to and intersect section **192** at the junctions therewith of sections **191** and **193**, respectively. Score lines **196** and **197** are located on the side of section **192** opposite the intersection of score lines **23** and **134** to act as braces to strength score line **190**. Score lines **196** and **197** cause the roof panel to bend along score line **190** instead of merely following a natural bend on the direct line between the intersection of score lines **126*b*** and **134** and section **194**. The rear roof panel **109, 110** is provided with score line **200**, corresponding to score line **190**, having sections **201, 202, 203** and **204** corresponding to sections **191, 192, 193** and **194**, respectively, and score lines **206** and **207** corresponding to score lines **196** and **197**, respectively. Score lines **195** and **205** can be provided as an extension of sections **194** and **204** through the surmounting ridge panels.

A first plurality of parallel score lines **210** extend downwardly and to the right from each of vertical score lines **12, 13, 14** and **15** while a second plurality of parallel score lines **211** extend downwardly and to the left from each of vertical score lines **12, 13, 14** and **15**. Corresponding ones of score lines **210** and **211** can have a common intersection with the vertical score line to form a plurality of chevrons or V-shaped score lines having upwardly directed apexes. In a presently preferred embodiment, the lower ends of score lines **210** and **211** are located at approximately the upper edge of the vertical seal panels of bottom closure **25**. However score lines **210** and **211** can be spaced some distance above bottom closure **25**, but still within the lower half of the container. The score lines **210**

and **211** are directed downwardly at an angle of inclination from the vertical in the range of 15° to 75°. It has been found that score lines **210** and **211** having an angle of inclination in the stated range provide a greater degree of protection against rupture of the container side walls than would be provided by horizontal score lines of similar size, length and location. A more preferred range for the angle of inclination from the vertical of score lines **210** and **211** is from 30° to 60°, with the value of approximately 45° being very satisfactory. The chevron score lines on a given vertical corner can be spaced from each other by any desired amount, but the spacing will generally be in the range of ⅛ inch to ¾ inch. The length of each arm of a chevron score line can be any desired value, but will generally be in the range of ¼ inch to 2 inches.

While the weakened score line has been illustrated in FIGURES 1 through 7 as being in one of the end closure panels, it is apparent that it can be located in one of the roof panels, as for example is shown in British Patent 583,755. A modification of the container of FIGURES 1 through 7 to incorporate the weakened score line in one of the roof panels in the manner of British Patent 583,755 instead of in one of the end closure panels is illustrated in FIGURE 8, with the corresponding blank being illustrated in FIGURE 9. For purposes of simplicity, the elements of the container and blank of FIGURES 8 and 9 which are common to the container and blank of FIGURES 1 and 2 are indicated by corresponding primed numbers. In the embodiment of FIGURES 8 and 9, ridge panels **102** and **103** are replaced by a single ridge panel **211** due to the omission of score line **195**; score lines **147'** and **148'** are continuous in view of the omission of the weakened line of severance **180** from the end panel; and the snap action score lines **190** and **200** are omitted from the roof panels. The rear roof panel is composed of sections **72'** and **210**, while the front roof panel is a single panel **222**. In accordance with the disclosure of British Patent 583,755, the front roof panel **222** is provided with a weakened line of severance **216** substantially parallel to score line **23'** and extending horizontally across panel **222** to stop short of vertical score lines **133'** and **134'**. Score lines **220** and **221** extend from a point in score line **126'***b* approximately midway between vertical score lines **133'** and **134'** toward the respective ends of the weakened line of severance **216**. While the corresponding score lines of British Patent 583,755 intersect the weakened line of severance, score lines **220** and **221** are interrupted in the area of the weakened line of severance **216** so that score lines **220** and **221** do not intersect line **216**. Tape **218** is bonded to roof panel **22** in overlying relation to weakened line of severance **216** by being heat sealed to the entire marginal surface around line **216**. While FIGURES 8 and 9 illustrate the roof panel scoring arrangement of British Patent 583,755, it is obvious that other score arrangements could be utilized so long as the score lines which would otherwise intersect the weakened line of severance are interrupted in the area of the weakened line of severance.

Reasonable variations and modifications are possible within the scope of the foregoing disclosure, the drawing and the appended claims to the invention.

I claim:

1. A gable top container of sheet material comprising a tubular body having four side walls; a bottom closure fixed to said body; first and second upper panels constituting a pair of opposed roof panels inclining toward each other and overlying the top of the body; third and fourth upper panels constituting a pair of opposed rectangular end closure panels, each comprising a triangular end closure panel and a pair of triangular fold-back panels, the opposed triangular end closure panels being infolded between said roof panels from the opposite gable ends formed by the latter, and with their apexes located at the central area of the gable, each pair of triangular fold-back panels being joined to the opposite sides of the respective one of said triangular end closure panels along fold lines which are in proximity with said roof panels, said fold-back panels being folded against the underside of said roof panels; a ridge panel surmounting each of said roof panels; a ridge panel surmounting each of said fold-back panels; each pair of ridge panels surmounting a pair of fold-back panels being hinged together at the apex of the contiguous end closure panel and being folded about such hinge joinder in face-to-face relation between the ridge panels surmounting said roof panels; a first one of said upper panels being provided with a weakened line of severance lying solely within the upper portion thereof below the respective surmounting ridge panel and extending transversely of said first one panel and terminating at its ends in spaced relation to the side edges of said first one panel, said first one panel having a coating of thermosplastic material permanently bonded on the exterior side thereof; a tape overlying the exterior side of said weakened line of severance, at least the surface of said tape confronting said first one panel being formed of thermoplastic material heat-sealable to said thermoplastic coating on said first one panel, said tape being bonded to the entire marginal area of said first one panel about said weakened line of severance by the heat sealing of said thermoplastic materials; all score lines which would otherwise intersect said weakened line of severance being interrupted in the area of said weakened line of severance.

2. A container in accordance with claim **1** wherein said weakened line of severance comprises a series of zig-zag incisions.

3. A container in accordance with claim **1** wherein said weakened line of severance comprises first and second end sections and a center section, each of said first and second end sections comprising a series of zig-zag incisions, and said center section being a straight line incision.

4. A container in accordance with claim **1** wherein the outer surface of said tape is a heat reflective material.

5. A container in accordance with claim **1** wherein said first one panel is one of said rectangular end closure panels.

6. A paperboard blank for forming a container of rectangular formation and having a gable top, said blank being formed with laterally spaced-apart score lines extending vertically from the lower to the upper edge of the blank; a score line extending transversely of the blank in downward spaced relation to the upper edge thereof; said latter score line, in conjunction with said vertically extending score lines, defining opposed front and rear side wall panels and first and second opposed end wall panels; a second transversely extending score line arranged intermediate the upper edge of said blank and said first transversely extending score line and defining, in conjunction therewith, and with said vertically extending score lines, a first upper panel constituting a front roof panel surmounting said front side wall panel, a second upper panel constituting a rear roof panel surmounting said rear side wall panel, a third upper panel constituting a rectangular end closure panel surmounting said first end wall panel, and a fourth upper panel constituting a rectangular end closure panel surmounting said second end wall panel; each of said rectangular end closure panels being provided with converging score lines inclining upwardly from said first transverse score line to said second transverse score line, and defining in each of said rectangular end closure panels, a triangular end closure panel and a pair of triangular fold-back panels hinged to the triangular end closure panel; said second transversely extending score line, in conjunction with said vertically extending score lines, defining ridge panels surmounting said front and rear roof panels, and each pair of said fold-back panels; a first one of said upper panels being provided with a weakened line of severance lying solely within the upper portion thereof below the respec-

tive surmounting ridge panel and extending transversely of said first one panel and terminating at its ends in spaced relation to the side edges of said first one panel, said first one panel having a coating of thermoplastic material permanently bonded on the exterior side thereof; all score lines which would otherwise intersect said weakened line of severance being interrupted in the area of said weakened line of severance.

7. A blank in accordance with claim 6 further comprising a tape overlying the exterior side of said weakened line of severance, at least the surface of said tape confronting said first one panel being formed of thermoplastic material heat-sealable to said thermoplastic coating on said first one panel, said tape being bonded to the entire marginal area of said first one panel about said weakened line of severance by the heat sealing of said thermoplastic materials.

8. A blank in accordance with claim 6 wherein said first one panel is one of said rectangular end closure panels.

9. A blank in accordance with claim 6 wherein said weakened line of severance comprises a series of zig-zag incisions.

10. A blank in accordance with claim 6 wherein said weakened line of severance comprises first and second end sections and a center section, each of said first and second end sections comprising a series of zig-zag incisions, and said center section being a straight line incision.

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JOSEPH R. LECLAIR, *Primary Examiner.*

DAVID M. BOCKENEK, *Examiner.*