# United States Patent

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[73] Assignee **Phillips Petroleum Company**
**a corporation of Delaware**


[54] **PUSHBUTTON OPENER FOR GABLE TOP CONTAINERS**
**7 Claims, 6 Drawing Figs.**


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[51] Int. Cl. ..... B65d 5/72, B65d 5/02, B65d 17/00
[50] Field of Search ..... 229/17, 37, 51



[56] **References Cited**
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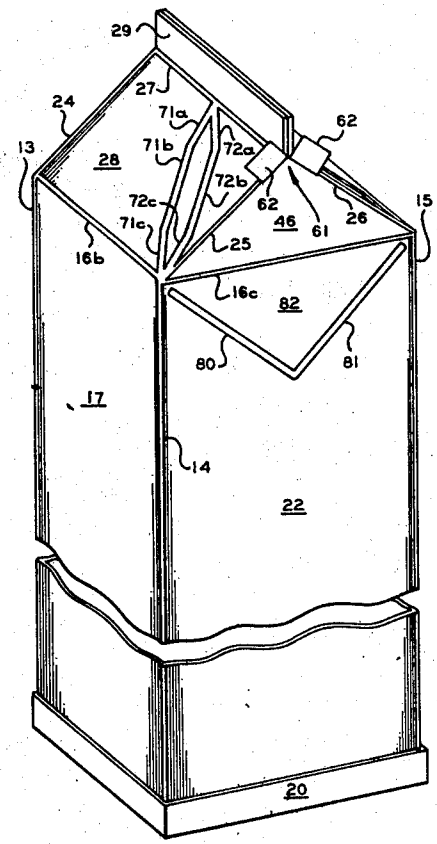
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**ABSTRACT:** Snap-action score lines in the side wall adjacent the first end closure panel of the container cause the first end closure panel to snap open when a portion of the side wall within said score lines is depressed.

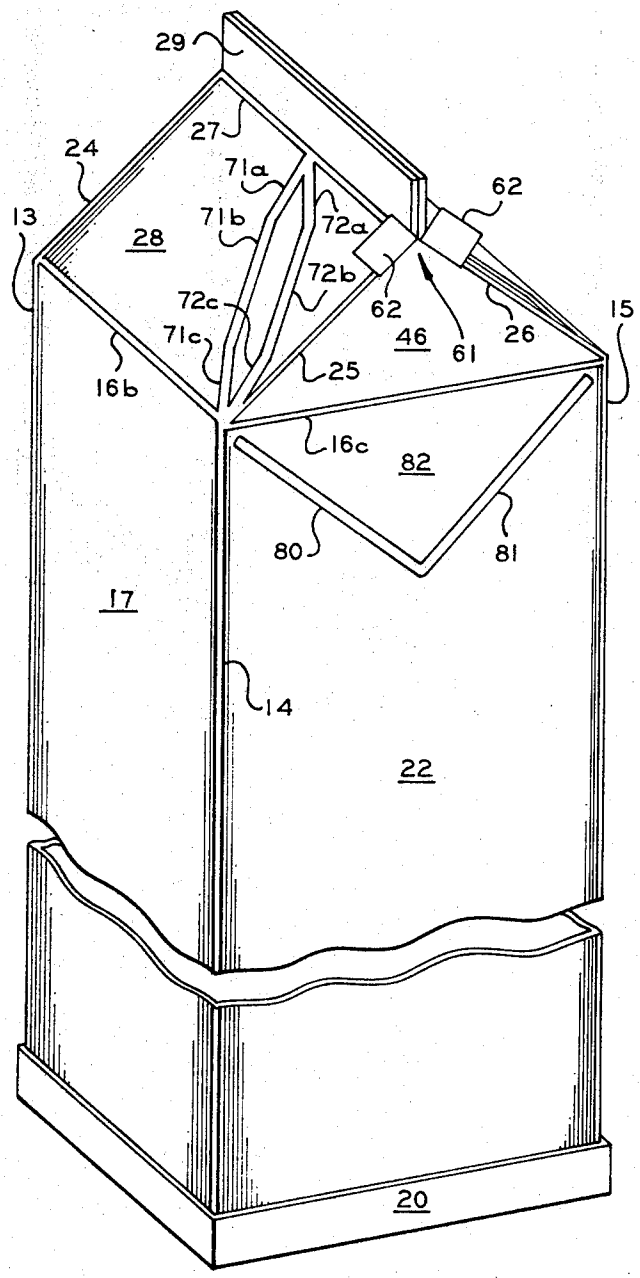



FIG. 1

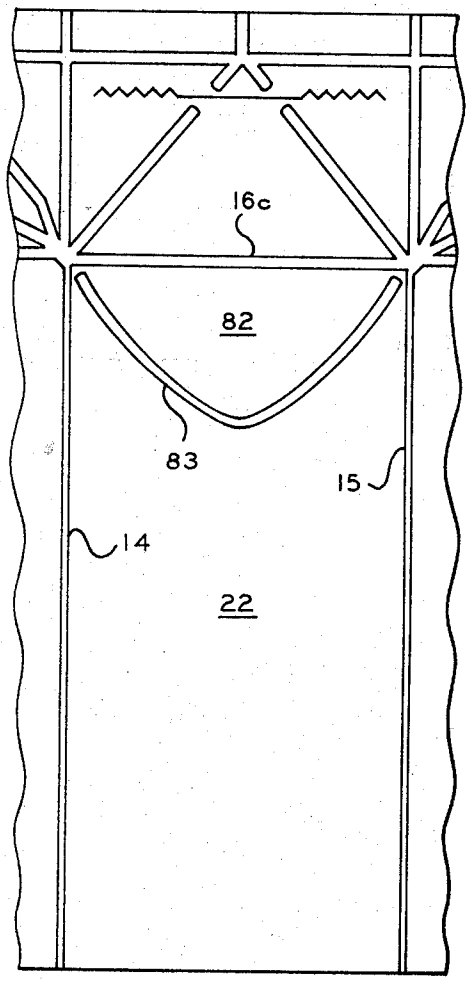



FIG. 6

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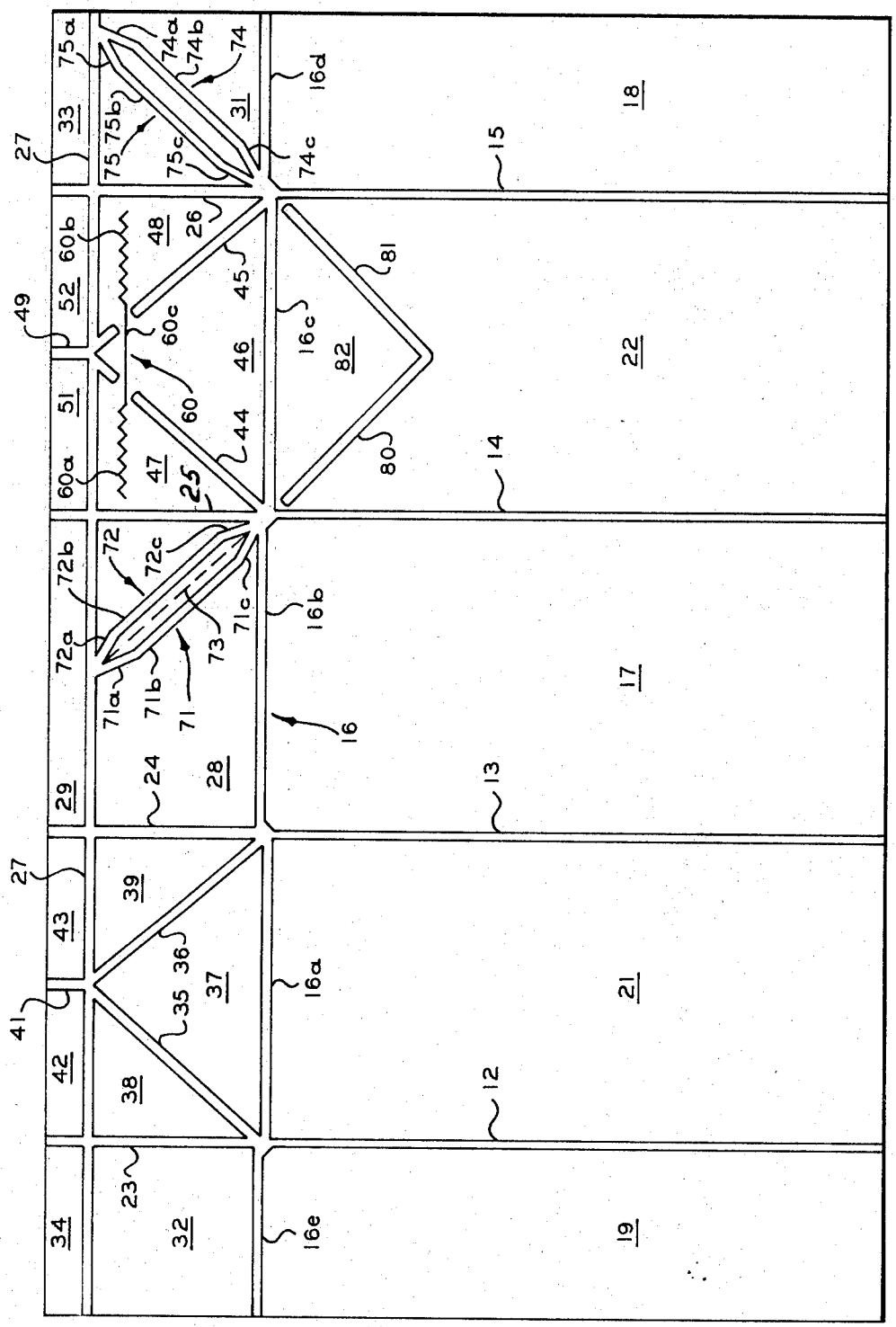



FIG. 2

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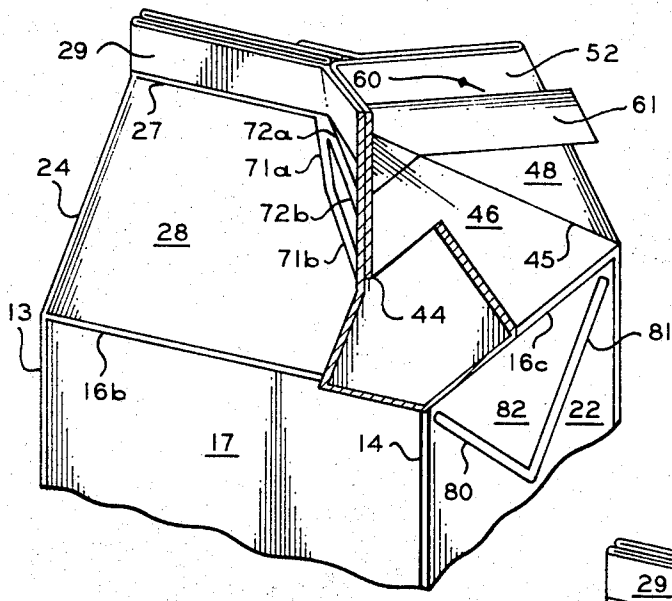



FIG. 3

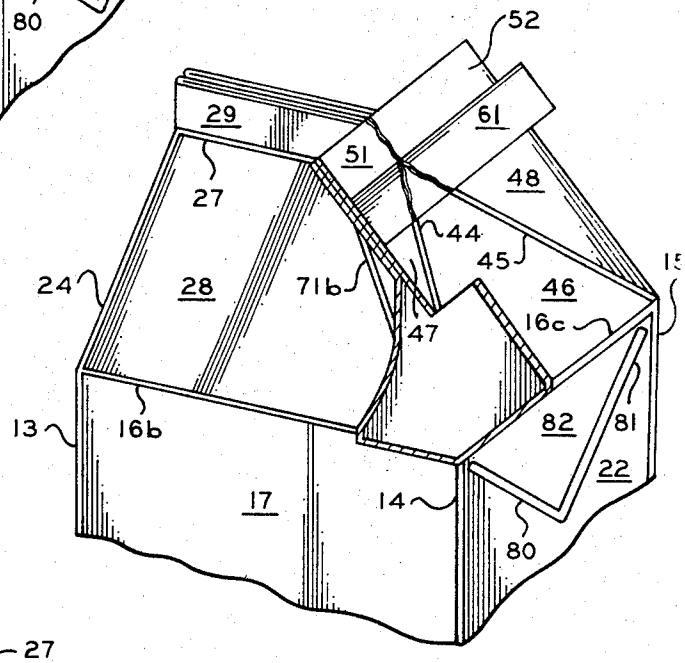



FIG. 4

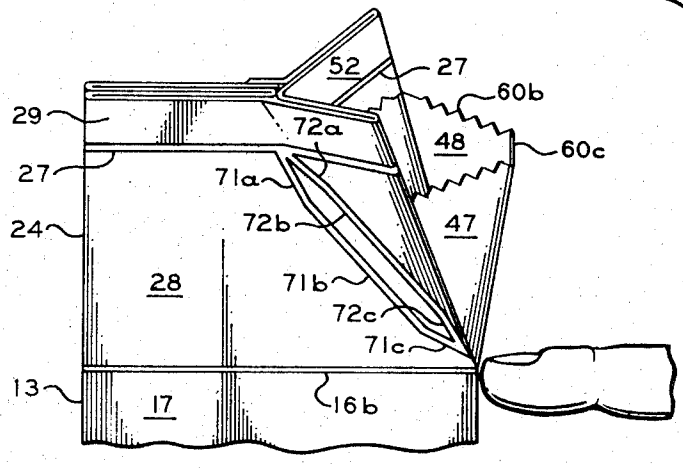



FIG. 5

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# PUSHBUTTON OPENER FOR GABLE TOP CONTAINERS

This invention relates to blanks for forming gable-top containers and the resulting containers. In another aspect, this invention relates to improved snap-action score lines for end-open gable-top containers. The invention is particularly applicable to gable-top containers of rectangular cross section formed from a paperboard blank coated on one or both sides with a thermoplastic material. These containers 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 rear roof panels. The fold-back panels, and the front and rear roof panels are formed with integral ridge panels which become disposed in vertical contacting relation and are joined together by some form of adhesive, usually by a bonding of the thermoplastic coating, to form the ridge of the gable top.

In the past, numerous configurations have been proposed for the paperboard gable-top containers. U.S. Pat. No. 3,348,755 is an example of an excellent snap-action container. We have discovered, however, that the container described in the above patent can be significantly improved by the addition of the score lines of this invention. This invention is equally applicable to end-open, snap-action containers of other configurations in order to provide containers which open with greater ease and efficiency.

Accordingly, it is an object of this invention to provide a new improved snap-action score line for gable-top containers. Another object of this invention is to provide a snap-action container which opens with greater ease and efficiency.

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:

FIG. 1 is a perspective view of a container embodying the invention;

FIG. 2 is a plan view of the paperboard blank from which the container of FIG. 1 is formed;

FIG. 3 is a perspective view of the gable-top structure in partial cross section in a partially open condition;

FIG. 4 is a perspective view of the gable-top structure in partial cross section in an advanced open condition;

FIG. 5 is a perspective view of the gable-top structure in the fully open condition after the tape has been removed; and

FIG. 6 is a plan view similar to FIG. 2 showing another embodiment of this invention.

Referring to FIG. 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 16 of horizontal extending score lines 16*a*, 16*b*, 16*c*, and 16*d*, and 16*e*. The score lines 13, 14, and 16*b* define a front side wall panel 17. Score lines 15 and 16*d*, and 12 and 16*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 16*a*, and 14, 15, and 16*c*, respectively. Horizontal score lines 16*a* and 16*c* are located lower on the container than other score lines 16*b*, 16*c*, and 16*e* to substantially reduce the thickness of the folds 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 forms smaller and more attractive folds in the resulting corners of the container. With the scoring arrangements shown in FIG. 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 16, as at 23, 24, 25, and 26, and terminate at the top edge of the blank. Horizontal score line 27 is located a short distance downward 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 20 is permanently sealed to the lower ends of the tubular formation. Score lines 24, 25, 16*b* and 27 define the front roof closure panel 28. Score lines 24, 25, and 27 define the rib panel 29, surmounting the front roof panel 28. Score lines 23, 26, 16*d*, 16*e*, and 27 define the rear roof closure panel comprised of sections 31 and 32. Score lines 26, 23, and 27 define the ridge panel, comprising sections 33 and 34, surmounting the rear roof panel. Score lines 25, 26, 16*c*, 27 define the first rectangular end closure panel. This first end closure panel is provided with converging score lines 44 and 45, which, at their upper ends intersect score line 27 medial of score lines 25 and 26, thus defining a first triangular end closure panel portion 46 and a pair of first fold-back panels 47 and 48. Score lines 23, 24, 16*a*, and 27 define a second rectangular end closure panel. This end closure panel is provided with converging score lines 35 and 36 which at their upper ends intersect the score line 27 medial of score lines 23 and 24, thus defining a second triangular end closure panel portion 37 and a pair of second triangular fold-back panel portions 38, and 39. Score lines 23, 24, 27, and 41 define rib panels 42 and 43, surmounting second fold-back panel portions 38 and 39, respectively. Score lines 25, 49, 26, and 27 define rib panels 51 and 52, surmounting the first fold-back panel portions 47 and 48, respectively. In the completed container, the pair of opposed roof panels 28 and 31, 32 are inclined toward each other and overlie the top of the tubular body formed by side walls 17, 21, 22, and 18, 19. The pair of second opposed end closure panels 37 and 46 are enfolded between roof panels 28 and 31, 32 from the opposite gable ends formed by the latter, and with their apexes located at the central area of the gable.

The fold lines 44, 45, 35, and 36 which join each pair of first and second triangular fold-back panels 47, 48, and 38, 39 to the opposite sides of first and second triangular end closure panels 46 and 37 are in proximity with the roof panels, the fold-back panels being folded against the underside of the roof panels. Ridge panels 51 and 52 surmounting the first fold-back panels 47 and 48 are hinged together at the apex of the first end closure panel 46 and are folded about the hinge joinder score line 49 in face-to-face relation, between the ridge panels 29 and 33 surmounting the roof panels. Similarly, ridge panels 42 and 43 surmounting fold-back panels 38 and 39 are hinged together at the apex of the second end closure panel 37 and are folded about the hinge joinder score line 41 in face-to-face relation, between ridge panels 29 and 34. The ridge panels are heated to form a bond between the contacting thermoplastic coating to form the ridge structure of the gable top.

Score lines 23, 24, 25, and 26 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 24 and 25 are of extended width in the direction of the center of the front roof panel 28, while score lines 23 and 26 are of extended width in a direction toward the center of the roof panel formed by panels 31 and 32.

When the blank of FIG. 2 is folded on 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 16 form a square, tubular cross section in a direction traversely of the container. When the top closure panels are folded inwardly, the greater width of the score lines 23, 24, 25, and 26 provides extra material for the end closure panels 46, 47, 48, and 37, 38, 39 and surmounting roof panels 51, 52, and 42, 43, whereby in the formed and sealed container, ridge panels 43 and 51 have a greater combined length than rib panel 29 surmounting the front roof panel 28. Similarly, ridge panels 52 and 42 have a greater combined length in the formed and sealed container than the ridge panel formed by panels 33, 34

surmounting the rear roof panels 31, 32. This, in turn, results in the hinge joint of score lines 41 and 49 abutting or slightly overlapping at the center of the laminar ridge structure formed by bonding the ridge panels together.

In the first end closure panel, which serves as the pour spout, converging score lines 44 and 45 intersect horizontal score line 27 midway between the score lines 25 and 26. Vertical score line 49 extends upwardly from the intersection of the score lines 44 and 45 to the top edge of the blank. The first weakened line of severance 60 is located in the upper part of panel portions 47, 46, and 48 preferably below horizontal score line 27. The first weakened line of severance 60 would intersect score lines 44 and 45 at points below the junction of said score lines except that score lines 44 and 45 are discontinuous, or interrupted, in the area of the weakened line of severance 60. Score lines 44 and 45 stop short of lines 60 to prevent leakage which would otherwise occur by capillary action through the slit and along the score lines. Eliminating all score line grooves in the vicinity of the line 60 provides a flat surface completely around the periphery of the slit, thus permitting a liquid-tight seal to be effected between the tape 61 and the container. The weakened line of severance sections 60*a* and 60*b* are preferably formed by a series of zig-zag incisions and the center section 60*c* being formed by a straight, horizontal incision. Center section 60*c* extends completely across panel 46 and preferably extends into panel 47, 48. The straight center section 60*c* provides for easy separation of the pouring spout section of the first end panel 46, 47, 48 from the upper portion thereof above severance lines 60. This is particularly important in view of the large amount of paperboard in the relatively small area of the triangle formed by lines 44, 46, and 60*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 61 is bonded to the first end closure panel in overlaying relation to the weakened line of severance 60. The tape 61 is applied over the weakened line of severance 60 and heat sealed to the entire marginal surface about the weakened line of severance. The tape 61 can be formed of thermoplastic material or it can be a nonthermoplastic material provided with a coating of thermoplastic material compatible and heat sealable to the thermoplastic coating on the container. It is presently preferred that the nonthermoplastic material have a heat reflective outer surface to prevent any weakening of the bond between tape 61 and the container during the time the top section of the container is being subjected to heat in preparation of sealing the ridge panels to form the central laminar ridge. The ends 62 of tape 61 extend beyond the ends of the second end closure panel to provide grasping tabs.

This strip of tape 61 can be eliminated in containers wherein there is no weakened line of severance 60, score lines 44 and 45 extend downwardly to the upper edge of the rectangular panel comprising panel portions 46, 47, and 48, and the pouring spout is opened by separation of panel portions 46, 47, and 48 from their respective restricting ridge panels 51, 52. abcabc

In order to provide a snap action for opening and closing the pouring spout, the front roof panel 28 is provided with score lines 71 and 72, extending upwardly from the intersection of the horizontal score line 16*b* and vertical score line 25 to a point on score line 27 midway between vertical score lines 24 and 25. Score line 71 is preferably formed in three sections 71*a*, 71*b*, and 71*c*. Score line 72 is preferably formed in three sections 72*a*, 72*b*, and 72*c*. Straight line sections 71*b* and 72*b* are substantially parallel to an imaginary line 73 between the point on score line 27 midway between score lines 24 and 25 and the intersection of score lines 16*b* and 25. Imaginary line 73 closely proximates the plane of the first triangular end closure panel 46 in the enfolded, sealed condition. If side walls 17 and 18, 19 were of greater width than c. 21 and 22, score line sections 71*a* and 72*a* would intersect score line 27 at or closely adjacent to the intersection of the imaginary line 73 and score line 27, or, in other words, at or closely adjacent to the intersection of score line 27 with the plane of panel 46 in the enfolded, sealed condition of the container. Score section 72*b* is positioned in roof panel 28 above the imaginary line 73, while score section 71*b* is positioned in roof panel 28 below imaginary line 73. Score sections 71*c* and 72*c* extend from the lower ends of score sections 71*b* and 72*b*, respectively, to converge together at the intersection of score line 16*b* and 25.

Score sections 71*a* and 72*a* extend from the upper ends of score section 71*b* and 72*b*, respectively, to the point on score line 27 midway between score lines 24 and 25. The rear roof panel 31, 32 is provided with score lines 74 and 75, corresponding to score lines 71 and 72, respectively, comprising score sections 74*a*, 74*b*, 74*c*, and 75*a*, 75*b*, 75*c*, respectively.

It has been discovered that a "pushbutton" snap action for opening the pouring spout can be constructed by providing the side wall 22 adjacent the first end closure panel 46 with first and second score lines 80 and 81. In one embodiment of the invention, these score lines 80, 81 originate at a common point spaced from the sides of the side wall 22 and below the upper edge of said side wall a distance at least three-eighths of the width of the side wall, preferably in the range of three-eighths to five-eighths of the width of said side wall. It is also preferred that these first and second score lines 80, 81 each extend from the common point of origin upwardly and outwardly toward their respective upper corner of said side wall and terminate adjacent the score lines intersecting at said respective corner. It is also preferred that the triangular shaped panel portion 82 circumscribed by score lines 80, 81 and 16*c* is substantially the same size as the first triangular shaped end closure panel 46 with the common point of origin equally spaced from the sides of the side wall 22. The score lines 80, 81 of this invention can also be positioned with their respective points of origin spaced from one another. In this embodiment a third score line will be formed which connects the point of origin of the first score line 80 with the point of origin of the second score line 81. In cartons wherein the first rectangular end closure panel formed by the first triangular panels 46, 47, 48 form a square, the common point of origin of score lines 80, 81 should be spaced equal distances from the upper edge and either side of the side wall 22. These score lines 80, 81 slightly weaken a portion of the side wall 22. Pressure exerted on triangular panel 82 when the fold-back panels 47, 48 are folded backwardly toward the container, causes said triangular panel 82 to depress inwardly. Depressing the upper portion of the side wall 22 inwardly causes the upper corners of side wall 22 to move slightly toward the center of said side wall, exert a force against the incision 60, and cause the incision to separate and triangular panel 46 to move outwardly. Upon release of pressure on triangular panel 82, separated triangular panel 46 will move further outwardly relative to the container. The "pushbutton" discovery of this invention thereby significantly improves the snap-open action of gable-top containers.

The container of FIG. 1 can be opened by applying outward pressure against the fold-back panels 47 and 48 to cause a separation of the bond between the adjacent outer faces of ridge panels 51 and 52. The container at this stage is illustrated in FIG. 3. Roof panels 28 and 31, 32 have broken along score lines 71 and 74, respectively. Pressure can then be applied against panels 47, 51, and 48, 52 to move these panels toward the container as shown in FIG. 4. This movement causes roof panels 28 and 31, 32 to break along score lines 72 and 75. Tape 61 is removed from the container to permit the lower portions of 46, 47, and 48 to be separated from the upper portion thereof along the weakened line of severance 60. Pressure can then be applied to triangular panel 82 to sever triangular end closure panels 46, 47, and 48 along the weakened line of severance 60 and cause triangular panels, 46, 47, and 48 to snap partially open. Release of said pressure causes the triangular end closure panels 46, 47, and 48 to open further. FIG. 5 illustrates the container in the stable open position. The container can be closed by applying pressure against panel 46 to move it inwardly. At a point during such

inward movement, panel 46 will experience a snap action and be returned to its stable closed position, similar to position illustrated in FIG. 3, except for the absence of tape 61. Another embodiment of score lines 80 and 81 is a curved score line 83 illustrated in FIG. 6. It is a continuously curved score line in side wall 22 extending from adjacent the intersection of score line 16c and score line 14 to adjacent the intersection of score line 16c and score line 15 having its apex about midway between score lines 14 and 15 and three-eighths to five-eighths of the width of side wall 22 downwardly from score line 16c.

While the invention has been illustrated with the presently preferred container employing weakened line of severance 60, it is applicable to other side-open containers which do not utilize a weakened line of severance or which provide the weakened line of severance in a different location.

Reasonable variations and modifications are possible within the scope of the foregoing disclosure, the drawings, 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, a pair of opposed roof panels inclining toward each other and overlying the top of said body, first and second opposed triangular enclosure panels enfolded between said roof panels from the opposite gable ends formed by the latter, first and second pairs of triangular fold-back panels, each pair of triangular fold-back panels being joined to the opposite sides of a 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, the first triangular end closure panel and its associated pair of triangular fold-back panels forming a first rectangular end closure panel having a weakened line of severance lying solely within the upper portion thereof below the respective surmounting ridge panels and extending traversely of said rectangular end closure panel and terminating at its ends in spaced relation to the side edges of said rectangular end closure panel, wherein the improvement comprises:

First and second score lines located in the side wall adjacent the first end closure panel;

each first and second score line originating from a point spaced from the sides of the side wall below the upper edge of the side wall a distance at least three-eighths of the width of said side wall; and

each first and second score line extending from its point of origin upwardly and outwardly toward a respective upper corner of said side wall and terminating adjacent the score lines intersecting at said respective corner.

2. A container, as set forth in claim 1, wherein said first and second score lines are curved lines.

3. A container, as set forth in claim 1, wherein the first and second score lines originate from a common point of origin, spaced an equal distance from each side of the side wall and the upper edge of the side wall.

4. 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 traversely of the blank in downward-spaced relation to the upper edge thereof, said latter score line, in conjunction with said vertically extending score line, defining opposed front and rear side wall panels and opposed end wall panels, a second traversely extending score line arranged intermediate the upper edge of said blank, and said first traversely extending score line and defining, in conjunction therewith, and with said vertically extending score lines, a front roof panel surmounting said front side wall panel, a rear roof panel surmounting said rear side wall panel, and an area surmounting each of said end wall panels, each of said areas being provided with converging score lines inclining upwardly from said first traverse score line to said second traverse score line and defining in each of said areas a first and second triangular enclosure panel and a pair of triangular fold-back panels hinged to the triangular end closure panel, said second traversely 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, the first triangular end closure panel and its associated pair of triangular fold-back panels forming a rectangular end closure panel having a weakened line of severance lying solely within the upper portion thereof and extending traversely of said rectangular end closure panel and terminating at its ends in spaced relation to the side edges of said rectangular end closure panel, wherein the improvement comprises:

First and second score lines located in the side wall adjacent the first end closure panel;

each first and second score line originating from a point spaced from the sides of the side wall below the upper edge of the side wall a distance in the range of three-eighths to five-eighths of the width of said side wall; and

each first and second score line extending from its point of origin upwardly and outwardly toward a respective upper corner of said side wall and terminating adjacent the score lines intersecting at said respective corner when folded and sealed to form a gabled top container.

5. A blank, as set forth in claim 4, wherein the points of origin of the first and second score lines are laterally spaced and are connected by a third score line.

6. A blank, as set forth in claim 4, wherein the first and second score lines originate from a common point of origin spaced and equidistant from each side of the side wall and the upper edge of the side wall.

7. A blank, as set forth in claim 4, wherein said first and second score lines are curved lines.