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(54) **Flat top end closure for liquid containers.**

(57) There is disclosed herein a flat top end closure - (12) for a liquid carrying container, which includes two oppositely disposed, overlapped outer closure panels (40,42), one being longer than the other, and two oppositely disposed, three-segment fold-in panels (44,46), one (44) of which serves as the pour spout when opened. Each of the three-segment fold-in panels (44,46) includes a substantially triangular panel portion (76,82) defined by converging diagonal score lines (72, 74, 78, 80) extending from the upper edge of the tubular container body (14), and a pair of fold-back panels (84, 88, 96, 98) integrally connected to and folded between the substantially triangular panel portions (76, 82) and the respective adjacent outer closure panels. The shorter (40) of the outer closure panels includes a plurality of equally spaced triangular shaped tufts (70) formed on the free edge (60) thereof so as to be squeezed upon abutment of the shorter panel (40) against one (84) of one pair of fold-back panels (88, 84) in the closing process, to thereby fill any fluid leakage channels which may tend to remain therebetween after sealing.

EP 0 201 169 A2

FLAT TOP END CLOSURE FOR LIQUID CONTAINERS

Technical Field

This invention relates generally to thermoplastic coated paperboard containers for carrying liquids and blanks for constructing same and, more particularly, to an improved, easy openable flat top and closure therefor.

Background Art

Containers for beverages such as milk and juices are conventionally constructed from thermoplastic coated paperboard. One common type of these containers includes a top end closure with a folder gable roof having a vertically projecting sealed fin at the roof ridge for sealing the container. Such containers are shown by U.S. Pat. No. 3,270,940. The bottom end closure for same is conventionally of the infolded type, such as that shown by U.S. Patent No. 3,120,335.

Another type of container includes a slant top or a flat top end closure wherein what could otherwise be a vertically projecting sealed fin, or a slanted sealed fin, may be folded flat and releasably secured to the rest of the closure, U.S. Pat. Nos. 3,869,078 and 4,211,357 disclose such slant and/or flat top closures.

Various techniques have been employed to enhance the folding of a sealed fin in one particular direction to facilitate packing the containers in layers on top of each other to minimize storage and cargo space, without requiring any shipping tray between layers. For example, in U.S. Pat. No. 4,078,715 there is disclosed a top end closure with an inclined sealed fin that includes a "harder crease" on one side thereof than on the other for facilitating folding of the sealed fin from a vertical position to the inclined position.

U.S. Pat. Nos. 4,012,997 and 4,093,115 disclose a container folding method and the container made by the method, wherein one side of the gable panels of the top end closure is provided with double score lines extending parallel to each other. Folding of a sealed top fin of the end closure from a vertical position to a flat position requires the application of a downward force against the outside panel to bend the sealed fin downwardly.

In U.S. Pat. No. 4,206,867, a wide score line is formed on one side of the gable panels, in lieu of the above mentioned double score lines, with a conventional score line of the opposite side providing unequal foldback panels.

In the above-mentioned U.S. Pat. No. 4,211,357, unequal angles at the base of the infolded gable or gusset panels, with or without lower score lines on one side thereof than on the other, enhance folding in the direction of the larger base angles. In an alternative embodiment, a lowered and/or inclined wide score line provide the inclination to slant in one direction.

U.S. Pat. No. 4,422,570 is an example of an improved flat top end closure for a liquid carrying, paperboard container wherein the sealed fin previously used in conjunction with flat end closures is not required, but wherein a pitcher pour spout is included. An external lift tab is integrally formed on one outer closure panel for initial lifting of a portion of the pitcher pour spout, and an underlying lift tab is formed on one fold-back closure panel of another portion of the pitcher pour spout, in order to facilitate the opening process. An improved opening feature for this type of arrangement is shown and described in application Serial No. 665,880, filed on October 29, 1984.

In each of the above described arrangements, whether it be the gable top configuration or the non-sealed fin flat top configuration, there is a tendency in non-hermetically sealed containers for there to be a channel between abutting and/or adjacent end closure panels which may permit fluid products to escape or leak therethrough.

In the past, various techniques have been used to prevent such fluid leakage. One technique is popular for bottom end closures, as described in U.S. Pat. No. 3,120,335, wherein abutting panels have been made slightly oversize, i.e., each is slightly more than half a full side panel width wide, with the result that a "crowding" of material occurs at the abutting edges, effectively preventing the formation of a fluid escape channel therebetween. However, the crowding of the abutting edges tends to result in an overlapping of the edge portions, which would not be satisfactory for a sealed top end closure which must be openable with reasonable facility.

Another technique is shown and described in U.S. Pat. No. 3,471,076 as triangular shaped tufts formed on the free edges of inner rib panels of a gable top sealed fin, wherein the tufts assume a side-by-side relationship to extend into and between adjacent inner rib horizontal edges and overlying inherent channel outer rib or fin panels which are bent toward each other around the square inner edges.

Disclosure of the Invention

Accordingly, a general object of the invention is to provide a flat top end closure for a liquid carrying, paperboard container, including improved means for eliminating fluid leakage channels between abutting panel edges of the non-sealing fin type end closure disclosed in the above-mentioned Patent No. 4,422,570.

Another object of the invention is to provide an improved flat top end closure, wherein fluid leakage channels between abutting panel edges is eliminated by the formation of spaced protrusions on the one of the edges which is squeezed between the edges to block off any channel therebetween.

A further object of the invention is to provide an overlapped flat top end closure which is not formed from a sealed fin arrangement, and having spaced triangular tufts formed on one of abutting edges in the vicinity of the typical pitcher pour spout where anti-abhesive provisions are employed to provide a sealed, yet easily openable spout, for the purpose of blocking off a possible fluid leakage channel while the end closure is sealed.

These and other objects and advantages of the invention will be apparent when reference is made to the following description and accompanying drawings.

Brief Mode of Carrying Out the Invention

FIG. 1 is a fragmentary layout view of a blank from which the top end closure of the invention is formed, showing the outside surface thereof;

FIG. 2 is a fragmentary layout view of the outside surface of a blank after it is side seamed from the blank illustrated in FIG. 1;

FIGS. 3 and 4 are fragmentary perspective views illustrating sequentially various steps in forming the flat top end closure;

FIGS. 5, 6 and 7 are fragmentary perspective views illustrating sequentially various steps in opening the flat top end closure; and

FIG. 8 is a fragmentary perspective view similar to FIG. 4, showing the top closure in a reclosed condition after having been opened.

Best Mode of Carrying Out the Invention

Referring now to the drawings in greater detail, Figure 1 illustrates the outside surface of a blank 10 including a top closure portion 12 and a body portion 14, separated by a staggered horizontal score line 16. The latter includes a first side panel 18, a front panel 20, a second side panel 22, a back panel 24, and a narrow fifth panel or side seam 26. The panels 18, 20, 22, 24 and 26 are defined, respectively, by a first free cut edge 28, vertical score lines 30, 32, 34 and 36, and a second free cut edge 38.

A pair of outer top closure panels 40 and 42 are integrally connected to the first and second side panels 18 and 22, respectively, at the score line 16. A pair of fold-in top panels 44 and 46 are integrally connected to the back and front panels 20 and 24, respectively, at the score line 16. The top panels are integrally connected to each other by the above-mentioned vertical score lines. An end closure extension 48 of the side seam 26 is integrally connected to the latter at the score line 16 and to the fold-in panel 46 at the score line 36. The panel 44 will serve as a pour spout, as will be explained.

A lift tab 50 is formed on the upper edge portion of the top panel 42 so as to be integrally connected thereto by a score line 52 extension of the vertical score line 32, extending laterally and substantially parallel to a portion of the free cut edge 86 of the panel 44.

Opening-assist diagonal score lines 54 and 56 are formed on the outer top panels 40 and 42, respectively. The score line 54 extends substantially from the intersection of the vertical score line 30 and the horizontal score line 16 to a free cut edge 60, and divides the panel 62 into segments 62a and 62b. The score line 56 extends from the intersection of the score lines 32 and 16 to the free cut edge 66 of the panel 42, dividing the panel 42 into segments 42a and 42b, the lift tab 50 extending from the segment 42b.

A series of selectively shaped projections or tufts 70, say, three triangular in shape, are formed on the edge 60 substantially equally spaced intermediate the score line 30 and the point where the score line 54 contacts the edge 60, for a reason to be explained.

A pair of converging diagonal score lines 72 and 74 are formed on the fold-in top panel 44, forming a triangular pouring panel 76 with the horizontal score line 16. Likewise, a pair of converging diagonal score lines 78 and 80 are formed on the fold-in top panel 46, forming a triangular panel 82 with the horizontal score line 16. The diagonal

score lines 72, 74, 78 and 80 are preferably spaced at their lower ends slightly inward from the respective adjacent vertical score lines 30, 32, 34, and 36 along the horizontal score line 16, but may intersect the junctures of score lines 30 and 16, 34 and 16, 36 and 16, and 34 and 16, respectively, if desired.

There remains on the panel 44 a pair of fold-back panel portions consisting of a conventional panel portion 84 between the score lines 74 and 32 and a free cut edge 86 of the panel 44, and a longer panel portion 88 between the score lines 72 and 30 and a free cut edge 90 of the panel 44. An edge portion 92 extends between the adjacent ends of the free cut edges 86 and 90, with one end substantially aligned with the diagonal score line 74 and the other end arcuately connected to the free cut edge 90.

It is the area of the longer panel portion 88 which extends past a continuation of the line formed by the free cut edge 86 which is adapted to serve as a lift tab 94, as will be explained.

The fold-in panel 46, includes fold-back panel portions 96 and 98, each comparable to the conventional panel portion 84 of the fold-in panel 44. The panel portion 96 is defined by the score lines 78 and 34 and the free cut edge 100 of the panel 46. The panel portion 98 is defined by the score lines 80 and 36 and the free cut edge 100. A free cut edge 102 at the end of the side seam extension 48 aligns with the edge 100.

The container blank 10 illustrated in Figure 1 is formed into a side seamed blank, as illustrated in Figure 2, by rotating the body panel 24 and the side seam flap 26 as a unit about the vertical score line 34, and having the inside surfaces of the body panel 24 come into contact with the inside surface of the body panel 22, with the vertical score line 36 positioned next to the vertical score line 32, and with the inside surface of the side seam flap 26 in contact with the inside surface of the body panel 20 adjacent the vertical score line 32. The body panel 18 is then rotated about the vertical score line 30 to bring its inside surface into contact with the outside surface of the side seam flap 26, and the edge 28 is positioned parallel and substantially aligned with the vertical score line 36. The various members of the end closure 12 will make similar movements, and the container blank will appear as illustrated in Figure 2. The container blank 10 is then sealed where the inside areas of the body panel 18 and the closure panel 40 come into contact with the outside surface of the side seam flap 26 and its extension 48.

The next step in forming the side seam blank into a container is illustrated in Figure 3. The side seam blank is opened up into a squared or rectangular condition, after which the various parts of the end closure 12 are folded about the various score lines in the following manner. As may be noted from Figure 3, the triangular closure panels 76 and 82 are moved around the horizontal score line16 over the end of the container toward each other. At the same time, the outer panels 40 and 42 are also moved toward each other about the horizontal score line 16. This causes the fold-back panel portion 88 to bend around the vertical score line 30 such that the inside surfaces of the panel portion 88 and the outer panel 40 are approaching each other. Concurrently, the panel portion 84 is moved around the diagonal score line 74 such that the inside surfaces of the panel portion 84 and the panel segment 42b are approaching each other. The outside surfaces of the two fold-back panel portions 88 and 84 approach the outside of the triangular panel 76 such that the inside surfaces of the panel portion 88 and the panel segment 62b are approaching each other. The lift tab 94 extends beyond the free cut edge 60 of the panel segment 62b, beneath the series of tufts 70.

As may be noted in Figure 3, during this folding process, each of the edges 86 and 60 approach the centre line of the triangular panel 76 and each other. As they abut together, the tufts 70 on the edge 60 become squeezed between the edges and form barriers to fill any channel which tends to result between the edges 86 and 60, serving to minimize any leakage therethrough. This eliminates the need for any supplemental sealing material, such as wax or "hot melt" in this area, such as might be applied to the inside surface of the overlying panel segment 42b.

The fold-back panel portions 96 and 98 make the same movements as described for the panel portions 84 and 88, with respect to their adjacent panels 42 and 82 and 40 and 82 respectively.

The lift tab 50 (Figure 4) may be bent downwardly about the score line 52 and sealed against the front panel 20 to accommodate shipping and stacking.

Referring now to Figures 5-7, it may be noted that opening of the flat top closure is effectuated by first releasing the lift tab 50 from the front body panel 20 and then using the released tab to lift the outer roof panel segment 42b and the underlying panel portion 84 about the respective diagonal score lines 56 and 74, lifting the edge 86 away from the edge 60 and the distorted tufts 70. This exposes the underlying portions of the panels 84, such that one may grasp the lift tab 94 portion of

the panel 88, as defined by the free cut edges 90 and 92. The pour spout shown in Figure 7, enhanced by the presence of suitable "abhesive" or anti-sealant patterns on the inside surfaces thereof, is then opened as follows: the panel portions 76, 84 and 88 of the panel 44 are caused to assume a substantially planar attitude, as shown in Figure 6, whereupon pressure against the vertical edge score lines 30 and 32 tends to cause the triangular panel portions 76 to extend outwardly. The lift tab 94 may be used to lift up the panel 88 and, hence, the triangular panel portion 76 and the panel 84 from their planar attitude and beyond, into the usual pitcher pour spout (Figure 7) for dispensing the contents of the container. The pour spout may, of course, be generally reclosed after use. As shown in Figure 8, the lift tab 50 may be tucked inwardly, between the fold-back panel 84 and the triangular pouring panel 76 to effectuate a "locking" condition for the reclosed flat top structure.

Industrial Applicability

It should be apparent that the resultant flat top container is effectively sealed with improved provisions for minimizing leakage through any channels which may occur between abutting panel edges during the folding process in the vicinity of the pitcher pour spout where anti-sealant precautions have been taken for the easy opening thereof.

While but one embodiment of the invention has been shown and described, other modifications thereof are possible within the scope of the following claims.

Claims

1. In a flat top end closure for a liquid carrying, paperboard container having a tubular body and including two oppositely disposed infolded panels and two oppositely disposed outer closure panels, the infolded panels each including a set of a substantiall triangular centre panel portion defined by converging diagonal score lines and being integrally connected to the tubular body, and a pair of fold-back panels integrally connected at the diagonal score lines and folded between the substantially triangular panel portion and the respective adjacent outer closure panels, the two oppositely disposed outer closure panels including one shorter and one longer panel, with the edge portion of the longer panel overlapping the edge portion of the shorter panel and each having a diagonal opening-assist score line formed thereon and overlying the respective converging diagonal score lines, a first lift tab formed on a side edge of the longer panel for lifting the portion of the overlying longer panel adjacent its diagonal opening-assist score line and the integrally connected underlying fold-back panel, a second lift tab formed on one of one set of the fold-back panels for lifting the fold-back panel and the portion of the overlying shorter closure panel adjacent its diagonal opening-assist score line to enhance the opening of the underlying infolded panel into a pour spout, and a plurality of spaced projections formed on the free edge of the shorter outer closure panel adjacent the other of the said one set of fold-back panels so as to be squeezed therebetween to eliminate any fluid leakage channel therebetween.

2. A flat top end closure according to claim 1, wherein the plurality of projections consists of three equally spaced tufts formed on the free edge of the shorter outer closure panel between the adjacent one of one set of the fold-back panels and between the intersection of the diagonal opening-assist score line with the free edge of the shorter outer closure panel.

3. A flat top end closure according to claim 1, wherein the projections are triangular in shape.

4. A flat top end closure according to claim 1, wherein the spaced projections consist of three equally spaced tufts.

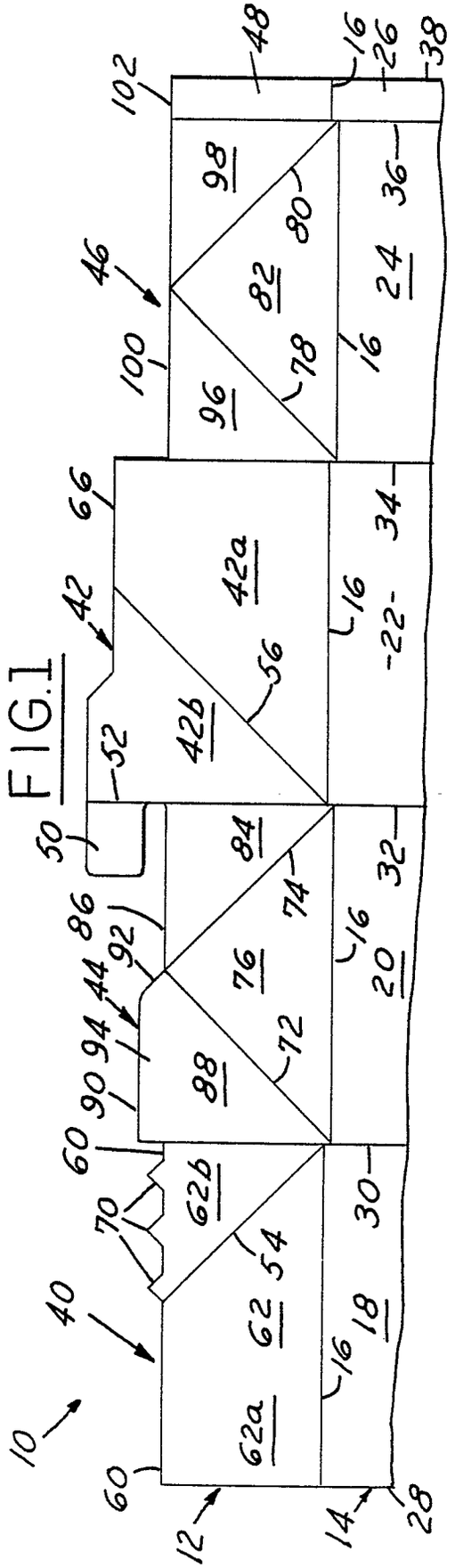

FIG.1

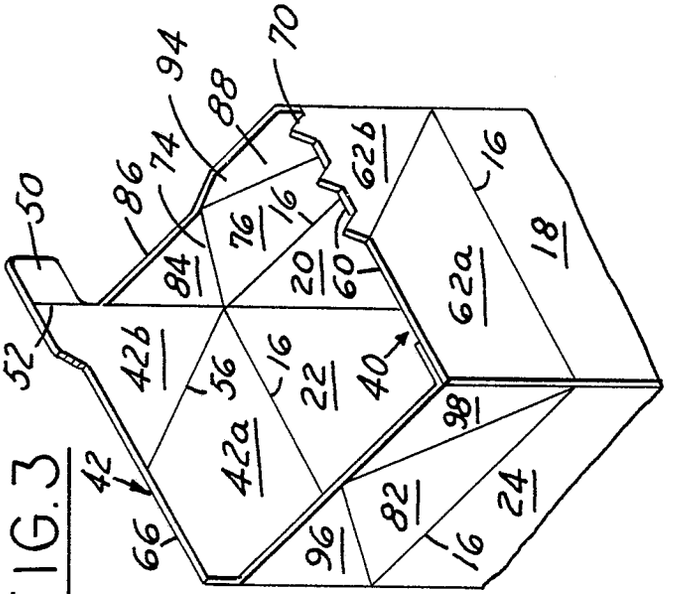

FIG.3

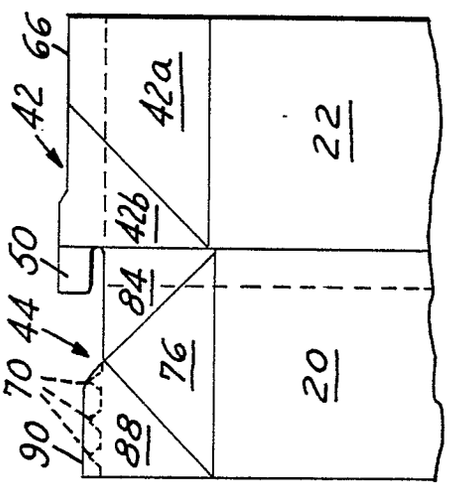

FIG.2

FIG.4

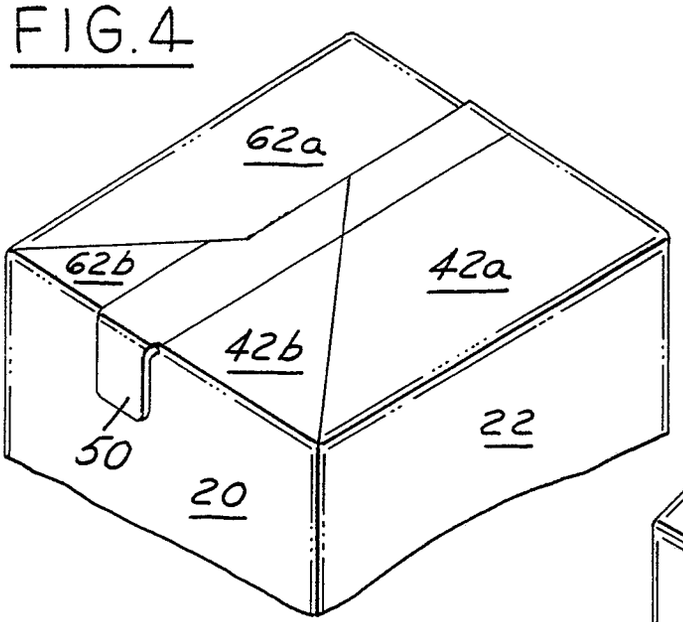

FIG.7

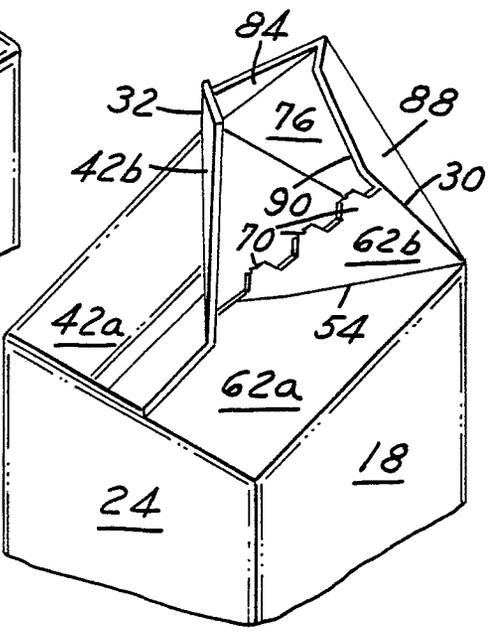

FIG.5

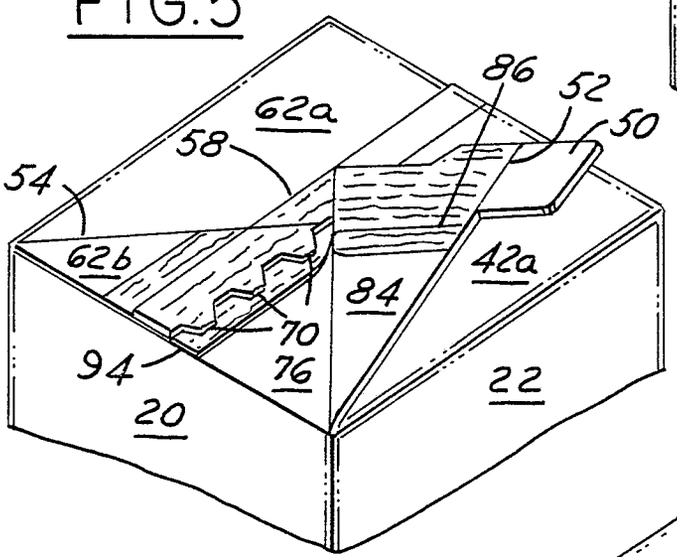

FIG.8

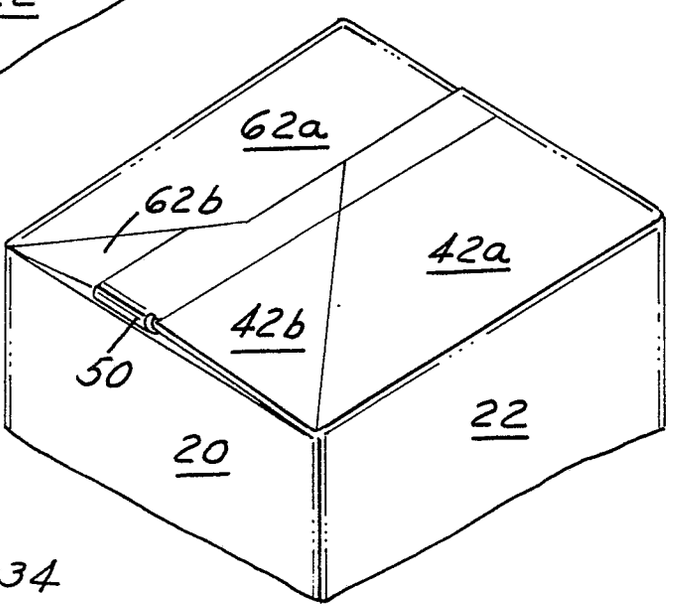

FIG.6