Oct. 26, 1965 D. B. ANDREWS ETAL 3,214,079

CARTON WITH TEAR-OPEN END CLOSURE

Filed July 13, 1964 2 Sheets-Sheet 1

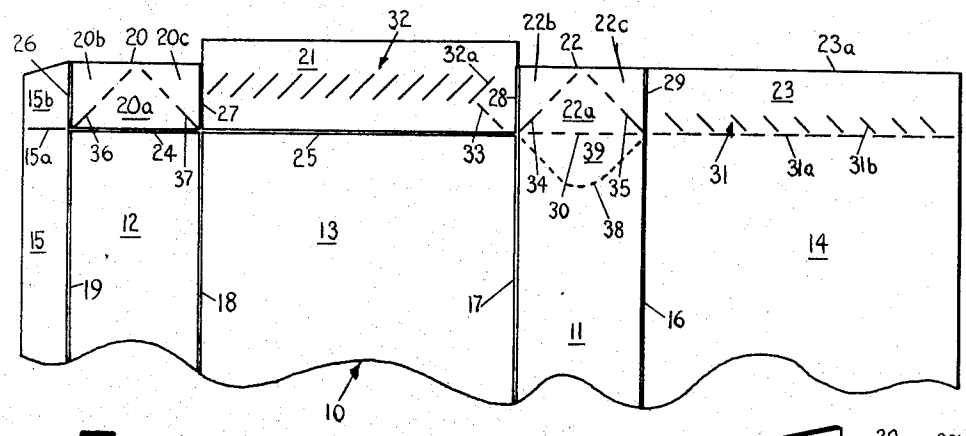


Fig. 1

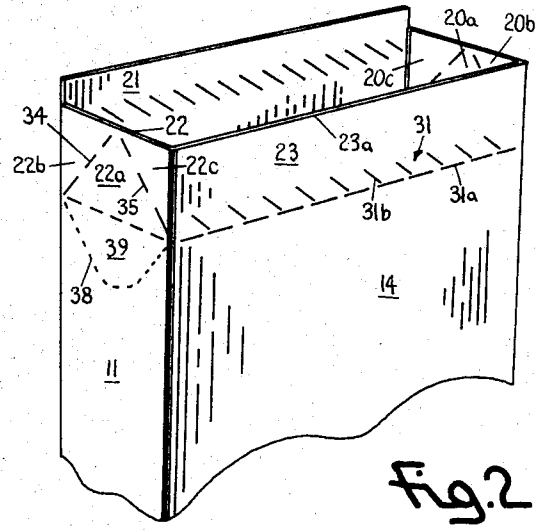
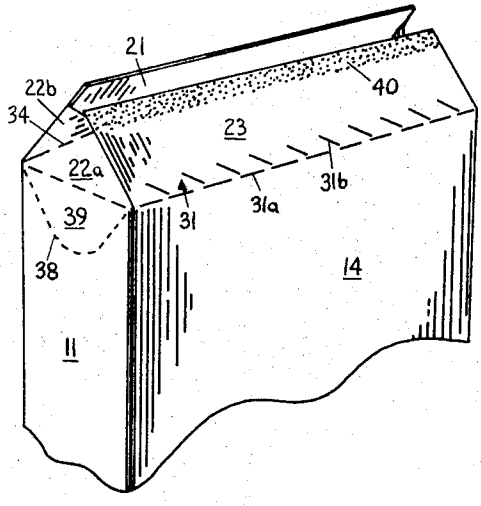


Fig. 2

Fig. 3



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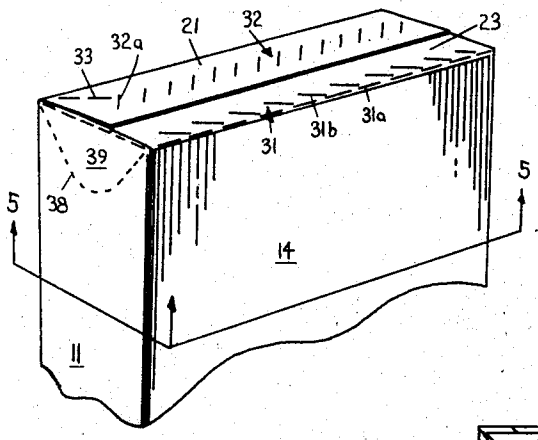


Fig.4

Fig.5

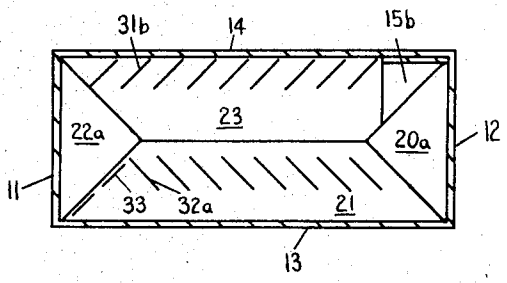
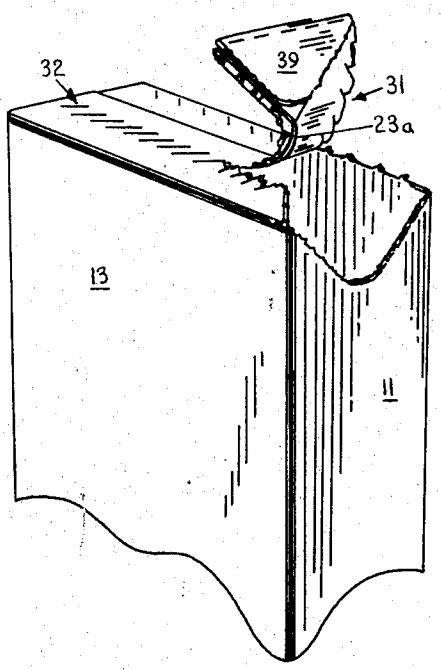


Fig.6



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CARTON WITH TEAR-OPEN END CLOSURE

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This invention relates to cartons and more particularly to cartons with a bellows-fold end closure construction incorporating an easy-open feature.

Paperboard cartons have gained wide acceptance in the food packaging industry for the merchandising of almost every type of food product. Since the industry uses cartons in vast quantities it is essential that the cartons be of a simple construction so that they can be produced, set up, filled, and sealed by high speed machinery. It is also essential that the cartons be tightly sealed and have sufficient strength to withstand stacking pressure during storage and the rigors of shipping and handling without being accidentally opened, crushed, mutilated, or misshapened in any way. The bellows-fold type end closure provides increased carton strength particularly at the critical areas, namely the corners, without increasing the amount of board used and without slowing down the packaging operations.

There is of course an important merchandising advantage in this highly competitive food packaging industry if the cartons can be provided with an opening feature which will facilitate the quick and easy opening of the carton by a housewife without the use of a knife or other opening instrument. Such an opening feature, however, must not substantially weaken the carton structure, slow down the packaging operations, nor materially increase the cost of the carton.

In view of the above considerations, an object of the present invention is to provide a new and improved carton construction having a tear-open, bellows-fold end closure.

Another object of the present invention is to provide a new and improved carton construction having integral end closure panels forming a tear-open, bellows-fold end closure which can be readily set up and effectively sealed with a single continuous strip of adhesive on high speed machinery.

Another object of the present invention is to provide a new and improved carton construction having a tear-open, bellows-fold end closure which materially reduces the cost of the cartons under the cost of presently known cartons having similar end opening features.

Other objects and advantages will be readily apparent from the following description, which taken in connection with the accompanying drawings, discloses the invention.

Referring to the drawings:

FIGURE 1 is a fragmentary plan view of a carton blank embodying the invention,

FIGURE 2 is an enlarged fragmentary perspective view of a carton in tubular shell form,

FIGURE 3 is an enlarged fragmentary perspective view of a partially closed carton,

FIGURE 4 is an enlarged fragmentary perspective view of a fully closed and sealed carton,

FIGURE 5 is a sectional view taken along line 5—5 of FIGURE 4, and

FIGURE 6 is an enlarged fragmentary perspective view of a partially torn open carton.

Referring now more specifically to the drawings, FIGURE 1 shows part of a unitary paperboard blank **10**, the main portion of which is divided into a front wall **11**, a rear wall **12**, a pair of side walls **13** and **14**, and a glue panel **15** by score lines **16**, **17**, **18**, and **19**.

The blank has integral end closure panels **20**, **21**, **22**, and **23** defined by score lines **24**, **25**, **26**, **27**, **28** and **29** and perforation lines **30** and **31***a*.

Glue panel **15** has a cut line **15***a* extending substantially across its width defining an upper portion **15***b*.

The end closure panel **21** has a substantially longitudinally disposed line of weakness, generally shown at **32**, comprising a series of relatively short, diagonally disposed, spaced, parallel cut lines, the foremost of which lines is shown at **32***a*. Panel **21** also has a diagonally disposed line of perforation **33** defining a lead-in tear path extending substantially from near the front end of score line **25** inwardly and rearwardly to the foremost cut line **32***a* of weakness line **32**.

Inner closure panel **22** has a pair of diagonally disposed fold lines or lines of perforation **34** and **35** setting off in panel **22** a triangular panel section **22***a* and a pair of adjacent triangular wing sections **22***b* and **22***c*. The lines of perforation **33** and **34** form equal angles with score line **25** and line of perforation **30**, respectively, so that when the carton is in closed condition as seen in FIGURES 4 and 5 the line of perforation **34** which defines the common edge of triangular panel section **22***a* and wing section **22***b* is juxtapositioned under line of perforation **33** to provide a supporting tear edge along the lead-in tear path.

End closure panel **23** is hingedly connected to side panel **14** and to inner end closure panel **22**. End closure panel **23** has a line of weakness, generally shown at **31**, comprising line of perforation **31***a* which consists of a series of short, longitudinally aligned cut lines extending substantially the length of the panel, and a series of short, substantially parallel, diagonally disposed cut lines **31***b* adjacent line of perforation **31***a*. The cut lines **31***b* nearly meet the longitudinally aligned cut lines **31***a* but are spaced a short distance thereform. Since there is a small portion of board between these lines, there are no loose protruding corners as in cartons where these lines actually meet each other.

End closure panel **20** has a pair of diagonally disposed fold lines or lines of perforation **36** and **37** setting off in panel **20** a triangular panel section **20***a* and a pair of adjacent triangular wing sections **20***b* and **20***c*.

Front wall **11** has a line of perforation **38** therein defining a potential push-in opening tab **39** at its upper end.

The blank is formed into a flattened shell by the carton manufacturer for shipment to the food packager. To so form the shell, the blank **10** is placed on a conventional straight line gluer with the surface shown in FIGURE 1 facing upwardly and glue is applied to the downwardly facing surface of glue panel **15** by a glue applicator wheel as the glue panel passes over the wheel. The rear wall **12** is then folded upwardly about score line **18** to overlie side wall **13**. Side wall **14** is folded upwardly about score line **16** and into contact with the adhesive on glue panel **15** to seal side panel **14** to glue panel **15** thus forming a flattened carton shell.

The carton is set up by first erecting the flattened shell into a rectangular tubular shell, the upper portion of which is shown in FIGURE 2. The bottom of the carton is then closed and sealed and the carton is filled from the top with a food product.

As best seen in FIGURE 3, the top end closure is then formed by folding inner end closure panels **20** and **22** inwardly about score line **24** and line of perforation **30**, respectively. The panels **20** and **22** are broken along diagonally disposed lines of perforation **36**, **37** and **34**, **35**, respectively, so that the triangular panel sections **20***a* and **22***a* are folded under their respective adjacent triangular wing sections. The outer end closure panels **21** and **23**, which are hinged to inner end closure panels

20 and 22, are plowed inwardly to a position substantially as shown in FIGURE 3. A continuous straight line strip of adhesive 40, depicted by the stippling in FIGURE 3, may then be applied to the outer surface of outer closure panel 23. It is understood, of course, that the strip of adhesive 40 may be applied to the inner surface of outer closure panel 21. It is further understood that the end closure can be sealed by a strip of pre-applied adhesive which is activated with heat just prior to folding of the end closure panels. The outer closure panels 21 and 23 are folded down to form the top end closure as shown in FIGURE 4 with panel 21 overlapping a portion of panel 23. Panel 23 is of such a width that its free edge 23*a* opposite weakness line 31 falls within panel 21 but short of weakness line 32 when panels 21 and 23 are folded over to form the end of the carton. The single continuous strip of adhesive 40 seals the top end closure across the entire length of the carton top and forms a tear strip in the top closure between lines of weakness 31 and 32.

The carton is opened by applying sufficient pressure with the thumb to the opening tab 39 to rupture the front wall 11 along line of perforation 38. Since opening tab 39 is hinged to inner closure panel 22 which in turn is hingedly connected along score lines 28 and 29 to the outer closure panels 21 and 23, respectively, the tab 39 is not free to fall down inside of the carton when it is pushed in and severed from the front wall. It is of considerable importance that this is accomplished without the application of adhesive to that portion of the carton to which the push-in opening tab is hinged as is necessary in the known carton construction. By eliminating an adhesive application step the carton may be set up at substantially higher speeds and the cost of the carton is materially reduced.

After severance along line 38, tab 39 is swung inwardly and held firmly against the triangular panel section 22 as shown in FIGURE 6. The top of the carton may then be torn open by tearing the tear strip backwardly and severing the end of the carton along the lead-in tear path defined by line of perforation 33 and along the tear paths defined by lines of weakness 31 and 32.

The common edge of the triangular panel section 22*a* and the triangular wing section 22*b* provides a supporting tear edge which is juxtapositioned under line of perforation 33 defining the lead-in tear path extending from near the front end of score line 25 inwardly and rearwardly to the foremost cut line 32*a* of weakness line 32.

It is recognized that in an alternative embodiment of the invention the outer closure panel 21 may be provided with a weakness line similar to 31 in outer closure flap 23 rather than with weakness line 32 and perforation line 33 as in the preferred embodiment shown in the drawings.

It is understood that the descriptions of the carton constructions given herein are merely illustrative of the essential features of the invention, and are not limited to the specific dimensions or contours which may be greatly varied or modified and which variations are intended to be included within the scope of the appended claims.

We claim:

1. A paperboard carton blank suitably cut and scored to provide a series of generally rectangular carton walls hingedly connected at their lateral edges by parallel score lines, said series including front and rear walls, a pair of side walls, and a glue panel hinged to a lateral edge of one of said walls; a first outer closure panel hingedly connected to one of said side walls; a second outer closure panel hingedly connected to the remaining side walls; said first and second outer closure panels each having a generally longitudinally disposed line of weakness extending substantially the length thereof and defining a potential tear path therein; said first and second outer

closure panels, when the blank is set up to form a carton, being foldable about said hinged connections into overlapped and adhered relationship in the area between said lines of weakness to form a tear strip whereof a substantial portion is of multi-ply thickness; a first and a second inner closure panel hinged to an edge of said front and back walls, respectively, and also each hingedly connected along score lines to each of said outer closure panels, each of said inner closure panels having a pair of diagonally disposed fold lines each extending from an end of the hinge line joining said inner closure panel with a wall to a convergence point on the edge of said inner closure panel opposite said last-mentioned hinge line to form in said inner closure panel a triangular panel section and a pair of adjacent triangular wing sections; said triangular wing sections being foldable inwardly along said diagonally disposed fold lines to be positioned between said triangular panel section and said outer closure panels; said front wall having a line of perforation therein extending between a point adjacent an end of the longitudinal weakness line of said first outer closure flap to a point adjacent the corresponding end of the longitudinal weakness line of said second outer closure flap and defining a push-in opening tab in said front wall, said tab being connected to said first inner closure panel along the hinge line forming the junction between said first inner closure panel and said front wall.

2. A carton having a body portion defined by conjoined front, back and a pair of opposed side walls and having a top closure construction comprising: a first outer closure panel hingedly connected along a score line to a first one of said side walls, said first outer closure panel having a substantially longitudinally extending line of weakness spaced from and substantially parallel to said score line and defining a tear path in said panel; said first outer closure panel having a lead-in tear path defined by a diagonally disposed line of perforation extending substantially from a point on said score line adjacent the junction between said first side wall and said front wall inwardly and rearwardly to said longitudinally disposed line of weakness in said first outer closure panel; a second outer closure panel hingedly connected along a line of weakness to the second of said pair of side walls, said line of weakness defining a tear path along the junction between said second side wall and said second closure panel; said first and second outer closure panels being overlapped and adhered together between their respective tear paths to form a tear strip, a first and a second inner closure panel hingedly connected to an edge of said front and back walls, respectively, and also hingedly connected along score lines to each of said outer closure panels, each of said inner closure panels having a pair of diagonally disposed fold lines each extending from an end of the hinge line joining said inner closure panel with a wall to a convergence point on the edge of said inner closure panel opposite said last mentioned hinge line to form in said closure panel a triangular panel section and a pair of adjacent triangular wing sections; said triangular wing sections being folded inwardly along said diagonally disposed fold lines to be positioned between said triangular panel section and said outer closure panels with one folded edge of one of said inner closure members underlying said lead-in tear path in the first outer closure panel; said front wall having a line of perforation therein extending between a point adjacent an end of the lead-in tear path in said first outer closure flap to a point adjacent an end of the longitudinal weakness line joining said second outer closure flap and said second side wall and defining a push-in opening tab in said front wall, said tab being connected to said first inner closure panel along the hinge line forming the junction between said first inner closure panel and said front wall.

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