United States Patent

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[54] CARTON HAVING GUSSETED SIDE FLAPS

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[52] **U.S. Cl.** ..... **229/51 SC**, 229/17 R

[51] **Int. Cl.** **B65d 5/54**

[58] **Field of Search** ..... 229/17 R, 51 SC, 51 D, 51 WB

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[57] **ABSTRACT**

A carton and the method of folding the closure flaps for adhesive application and closing the carton. Gusset side flaps are first folded out and the major flap to which the side flaps are connected is folded in. This forms a virtual coplanar surface to which adhesive is applied. Next the gusset side flaps are folded in and under the major flap to which they are attached. The second major flap is then folded down over the first major flap. Two cut-score lines which operate in conjunction with a grip tab integrally connected to one side flap provide an easy-open feature which makes a triangular opening.

4 Claims, 8 Drawing Figures

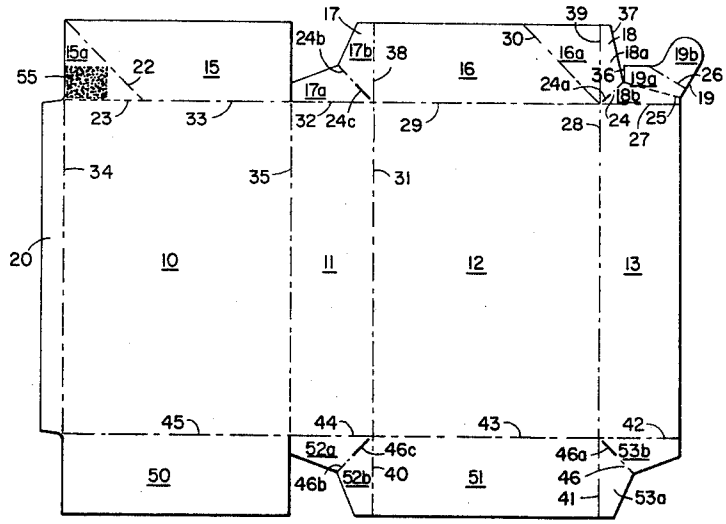
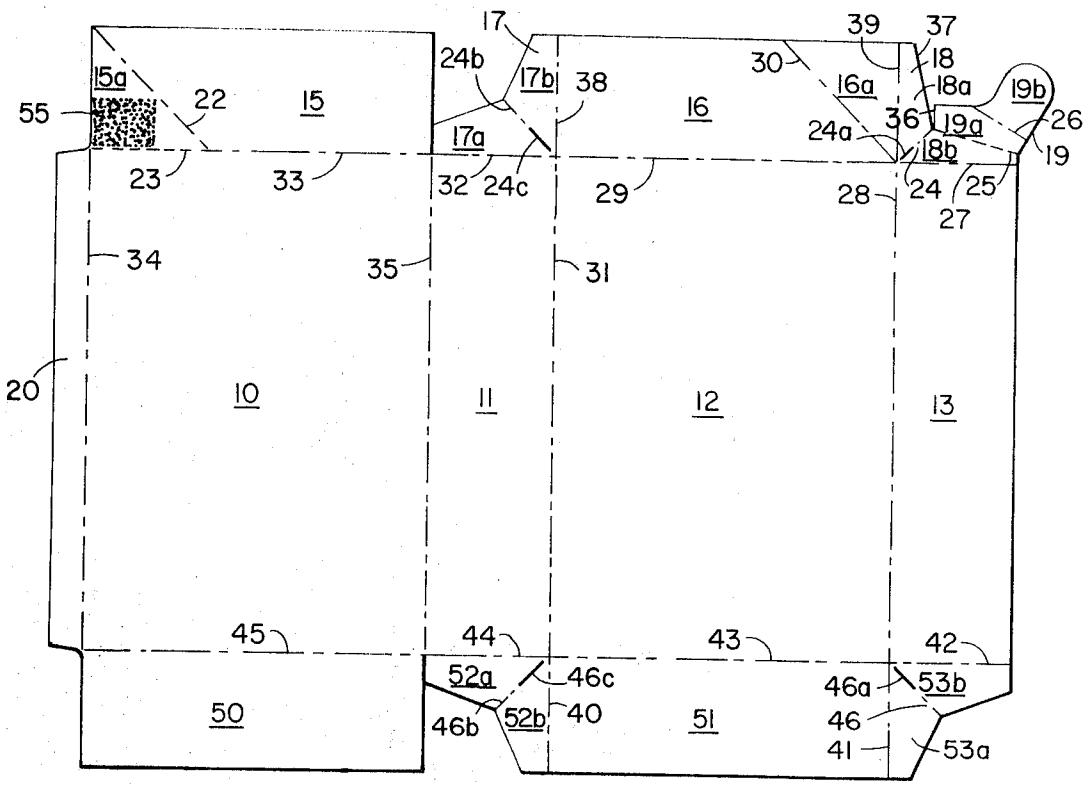


Fig. 1



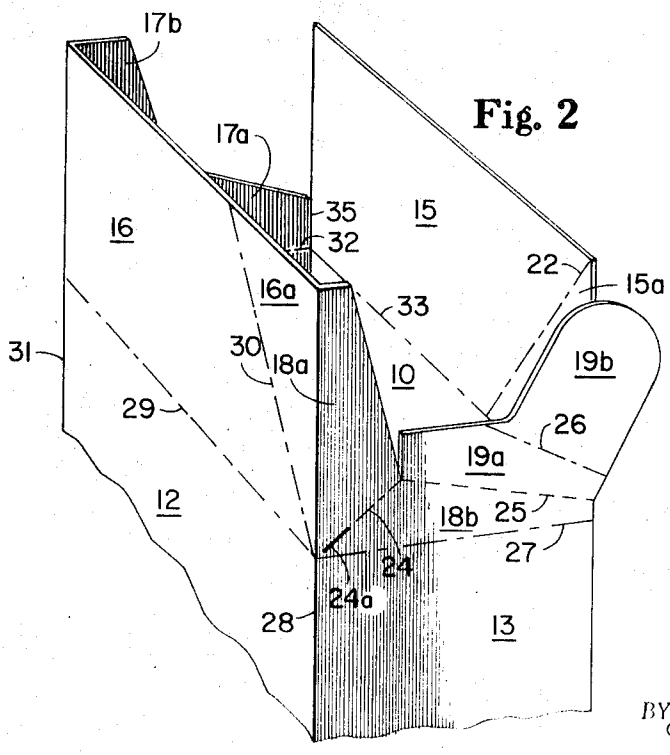


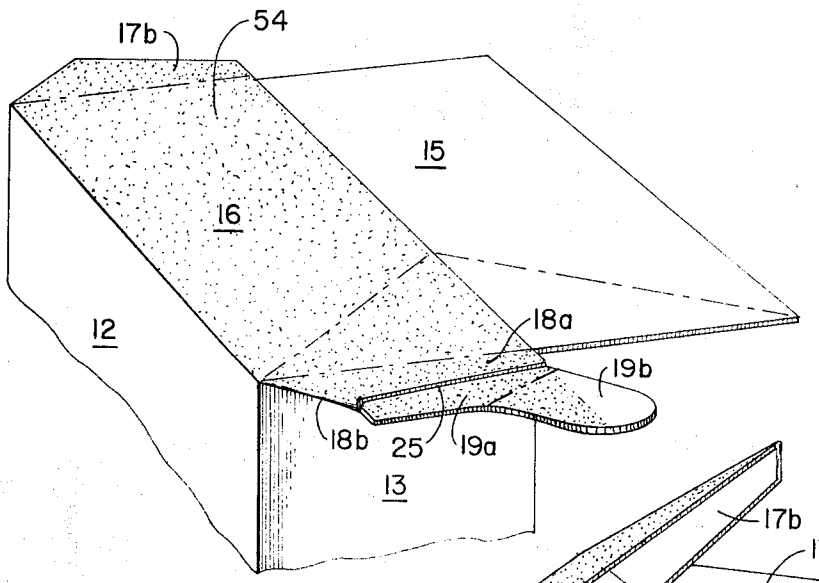
Fig. 2

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Fig. 3



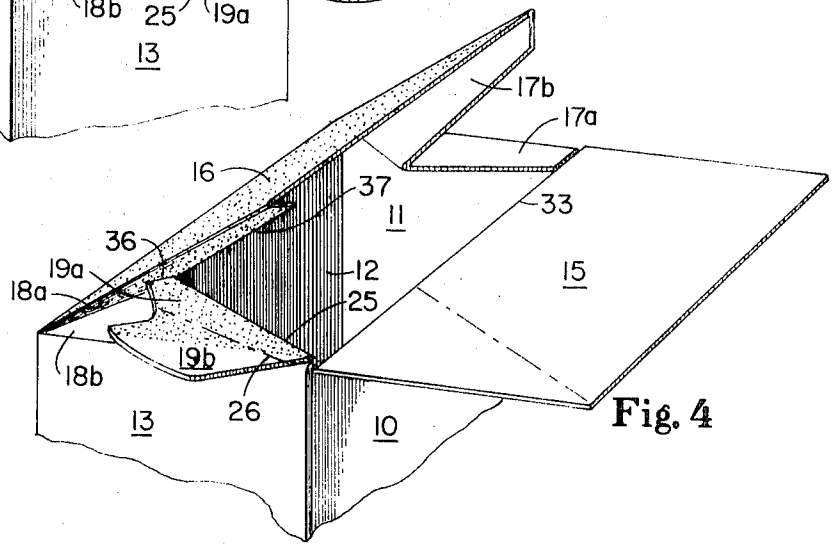


Fig. 4

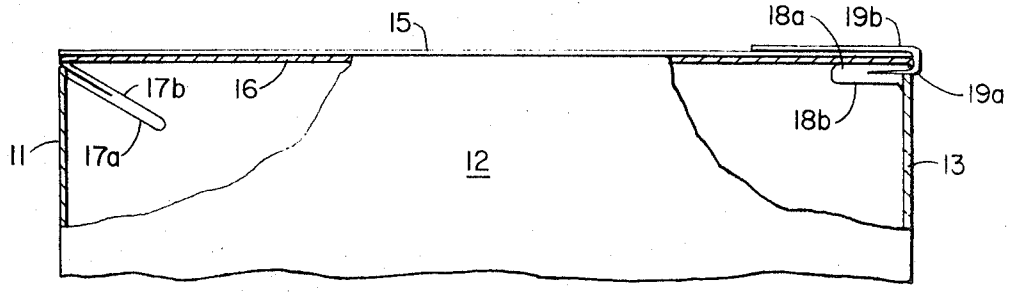


Fig. 5

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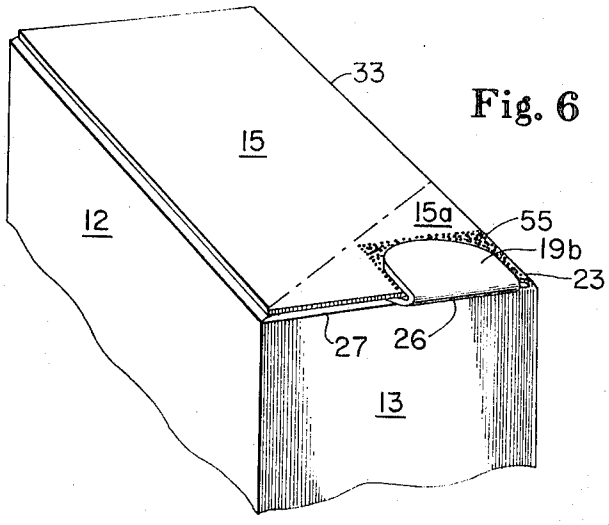


Fig. 6

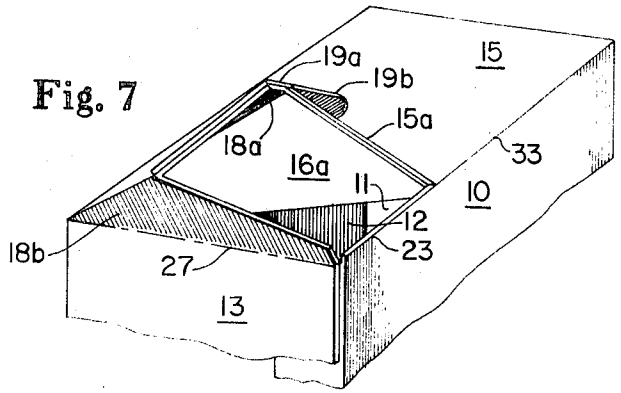


Fig. 7

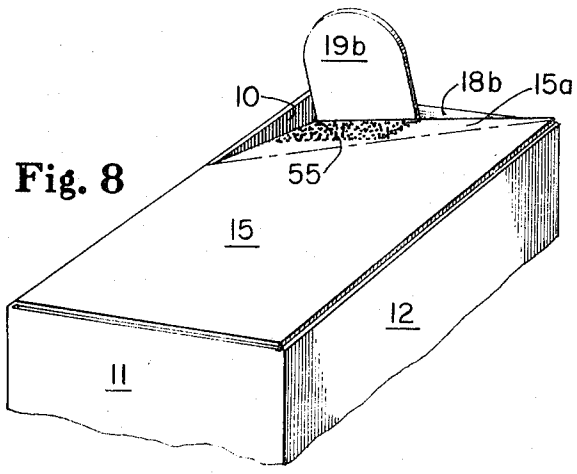


Fig. 8

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CARTON HAVING GUSSETED SIDE FLAPS

FIELD OF THE INVENTION

This invention relates to improvements in the art of packaging, more particularly to a carton and a method of closing the carton which is reliably performed at production speeds to make a siftproof carton having an easy-open feature. The carton of the present invention is particularly useful for packaging particulate, granular, or powdery products.

DESCRIPTION OF THE PRIOR ART

The prior art shows several techniques used to overcome sifting. One technique is to attach ears, commonly known as Van Buren ears, to the ends of one of the major flaps and bond these ears to the carton side panels. The ears close a potential sift line and hold the flap down tight.

Another technique is to use gusset-type side flaps to eliminate an opening through which product previously could sift to provide a tighter mechanical seal due to more bulk at the sealing line. The gusset side flaps have been folded to three positions: between the two major flaps, on top of both major flaps, and down the outer surface of the side panel. Folding the side flaps either on top of the major flaps or down the side panel is unsightly, and folding the flaps between the major flaps required a Van Buren ear to pull the overlying major flap down tightly on the side flaps. Folding the side flaps between the major flaps also required additional material on the distal edge of the underlying major flap. The additional material is bound between the side flaps and the overlying flap, otherwise the underlying major flap is forced downwardly by the side flaps and the mechanical seal between the underlying flap and the panel it abuts is destroyed. It is believed that the gusseted side flaps were folded to those three locations in the prior art because of lack of an acceptable adhesive-applying technique to bond the outside surfaces of the gusset portions to each other.

The above-mentioned techniques have resulted in complex folding and bonding operations. Bonding is accomplished either by applying an adhesive to the relevant areas before forming the carton and later activating that adhesive or by applying adhesive immediately before the surfaces to be joined are brought into contact. The latter method generally requires applying adhesive in more than one plane.

OBJECTS OF THE INVENTION

One object of this invention is to provide the carton blank and method of folding necessary to simplify the folding and adhesive application sequence for a rectangular cross section paperboard carton.

Another object of this invention is to provide a siftproof carton acceptable for packaging particulate, granular or powdery products.

A third object of this invention is to provide a carton which is strong enough to remain closed during shipping, is easy to open, and can be reclosed to prevent the product from spilling in the event the carton is inadvertently overturned after being opened.

BRIEF SUMMARY OF INVENTION

In accordance with one aspect of the present invention, a carton is equipped with gusset side flaps which underlie the two major closure flaps creating a neater looking, better sealed carton. Adhesive bonds are formed between the superposed gusset side flap parts and also between the two major closure flaps. If an easy-open pour spout feature is desired, this can be provided by the addition of two cut-score lines, one on a gusset side flap and one on a score line between the outer major closure flap and its adjacent panel.

In accordance with another aspect of the present invention there is provided a novel method of folding the closure flaps on the carton to allow adhesive to be applied in essentially a single, narrow plane. First the gusset side flaps are folded outwardly and the back flap folded inwardly, then adhesive is applied in a single narrow plane, and finally the gusset side flaps are folded inwardly under the back flap and the front flap is folded on top of the back flap.

BRIEF DESCRIPTION OF THE DRAWINGS

The novel features which are believed to be characteristic of this invention are set forth with particularity in the appended claims. The invention itself, however, both as to its organization and method of operation, may best be understood by reference to the following description taken in connection with the accompanying drawings in which:

FIG. **1** is a plan view of a one-piece blank from which the carton is constructed;

FIG. **2** is a partial perspective view of an end of the carton sleeve formed from the blank of FIG. **1**;

FIGS. **3**, **4** and **6** are partial perspective views showing successive steps in the closing of an end of the carton;

FIG. **5** is an enlarged, partial elevational view, partly cutaway to show the location of the gusset side flaps;

FIG. **7** is a fragmentary perspective view of the opening formed by the easy-open feature; and

FIG. **8** is a fragmentary perspective view showing the carton reclosed after being opened by the easy-open feature.

DETAILED DESCRIPTION OF THE INVENTION

Referring first to FIG. **1**, the carton is formed from a substantially rectangular blank, preferably of paperboard, suitably divided by cut and score lines into a conglomerate of connected panels, flaps and a tab. The paperboard used can be any of the types well known to those skilled in the art, e.g., white patent coated newsback or solid bleached sulfate with or without a coating. The thickness of the paperboard generally ranges from about 0.020 to about 0.040 inch with a preferred range of from about 0.024 to about 0.026 inch for a carton with outside dimensions of 6 × 8½ × 2¼ inches. Elements of the carton are alternate side panels **11** and **13**, front panel **10**, back panel **12** and glue panel **20** which are separated from each other by score lines **28**, **31**, **35** and **34**. The front flap **15**, back flap **16**, and gusset side flaps **17** and **18** are hinged to their respective panels along score lines **33**, **29**, **32** and **27**. Score line **33** is a cut-score line **23** for part of its length. Each side flap **17** and **18** is connected to the back flap **16** by score lines **38** and **39** and is divided into two parts, i.e., **17***a* and **17***b* and **18***a* and **18***b*, by hinge lines **24***b* and **24**, respectively.

Hinge lines **24** and **24***b* run diagonally at approximately 45° to the hinge lines on each side flap to allow the two parts comprising each side flap **17** and **18** to fold together. Cut lines **24***a* and **24***c* are made along the diagonal hinge lines **24**, **24***b* so that the parts **17***a* and **18***a* will lie flat against parts **17***b* and **18***b*, respectively, when the side flaps **17** and **18** are folded, thus eliminating a potential avenue through which the packaged product could sift. Without the cuts **24***a* and **24***c* the resiliency of the paperboard tends to hold the side flap parts **17***a*, **17***b* and **18***a*, **18***b* apart. Preferably, cuts **24***a* and **24***c* extend from a location adjacent, e.g., about one-sixteenth to one-eighth inch from the intersection of the lines of articulation of the respective side flaps, to a point spaced therefrom by a distance equal to about one-half the length of the diagonal hinge line **24** or **24***b*. The remainder of the hinge lines **24** and **24***b* are scored so that each comprises a cut and scored line.

Tab **19** is attached and hinged to a part of side flap **18**, i.e., **18***b*, by a cut-score line **25**. Portions **19***a* and **19***b* of the tab **19** are separated by score line **26**. A cut-score is a line of weakening comprising a score line which is provided with a cut partially through the material, approximately one-third to one-half the material thickness, and is adapted to rupture prior to the rupture of the surrounding material when a separating force is applied. Other types of weakening could be used, e.g., perforations; however, cut-scores are preferable since such

approach does not require complete penetration of the cartonboard.

The front flap **15** includes a corner portion **15***a* defined by score line **22** and cut-score line **23**. Back flap **16** includes a corner portion **16***a* defined by score line **30** and the edges of the back flap. In the closed position score lines **22** and **30** are superposed and in direct alignment, thus the front flap corner portion **15***a* and the back flap corner portion **16***a* are generally coextensive, superposed, congruent, triangular-shaped corner portions. As will be more fully understood from subsequent description, this arrangement allows portion **15***a* and the underlying elements to rotate about score lines **22** and **30** after the uncut material of cut-score lines **23** and **25** has been severed.

Additional elements of the carton which form the closure at the other end are front flap **50**, back flap **51**, and side flaps **52** and **53**. They are hinged to their respective panels along score lines **45**, **43**, **44** and **42**. Both side flaps **52** and **53** are hinged and divided in the same manner as is side flap **17** previously described, i.e., they comprise side flap parts **52***a*, **52***b*, **53***a* and **53***b*. The side flaps **52** and **53** are also articulated from back flap **51** by score lines **40** and **41**, respectively. The hinge lines **46***b* and **46** which traverse side flaps **52** and **53** are similar in construction and arrangement to hinge lines **24** and **24***b*, i.e., they have cuts along part of their length **46***c* and **46***a*, respectively.

The carton is formed by folding the blank shown in FIG. **1**. Elements **10** and **20** are folded about score line **35** so as to underlie panels **11** and **12**, and panel **13** is folded about score line **28** to underlie glue panel **20**. Panel **13** is then fastened to element **20** by any suitable means, preferably an adhesive. The packager receives the carton from the carton manufacturer in this collapsed tubular form. The packager will then set up, fill and seal the carton. FIG. **2** shows a perspective of the upper end of the carton after it has been formed by squaring the glued blank previously described.

Now referring to FIG. **3**, the first step in the method of closing this carton is the simultaneous outward folding of side flaps **17** and **18**, inward folding of back flap **16**, and, if desired, outward folding of front flap **15**. This simultaneous folding is preferable because all surfaces which are to receive adhesive **54** are aligned in virtually one plane during this step and front flap **15** is removed from the area of operation so an adhesive applying operation can be performed without interference. The top surface of back flap **16**, the top surface of side flap portions **17***b* and **18***a* and the surface of tab **19** which originally faced inwardly are all essentially coplanar, and adhesive application in a single plane is simpler than adhesive application in several planes. The adhesive **54** can be applied by any of several methods well known to those skilled in the art, for example, rolling, spraying or extruding. Glue can be applied in a defined pattern such that a continuous strip down the center of the back flap does not receive adhesive. This allows folding the flaps with fixed rails and moving tuckers without suffering an adhesive buildup on the folding mechanism.

Back flap **16** is then raised, tab **19** is folded out and down along cut-score line **25** until it is folded back on side flap part **18***b*. Side flap parts **17***a*, **17***b*, **18***a* and **18***b* are tucked inwardly before back flap **16** is again folded down to close the carton. In FIG. **4** tab **19** has been folded down, side flaps **17** and **18** have been deflected inwardly, and back flap **16** has been started downwardly.

FIG. **6** shows the closure completed wherein the adhesive-bearing surfaces of the side flaps **17** and **18** and the tab **19** adhere to the surfaces contacting them. The initially outward surfaces of side flap parts **17***a*, **17***b* are bonded together, and the initially outward surface of side flap part **18***a* is bonded to the inward surface of tab portion **19***a* and part of the outward surface of **18***b*. These bonds provide a siftproof seal along the top edges of panels **11** and **13**. In this connection, the hole which could exist at the intersection of edge **36** of the tab portion **19***a* and edge **37** of side flap part **18**a is sealed by the interaction of the elements during closure. Edge **36** wipes the adhesive-coated outside surface of side flap part **18***a* and accumulates adhesive along its length. This interaction can be visualized from FIG. **4**. The accumulated adhesive bonds the entire edge **36** between side flap parts **18***a* and **18***b* and also fills any potential hole at the intersection of edges **36** and **37**, thus preventing sifting.

With back flap **16** in its closed position, front flap **15** is rotated inwardly about score line **33** to its closed position, i.e., superposed on back flap **16**. A bond develops between the adhesive-coated top of back flap **16** and the bottom surface of front flap **15**.

The cutaways in FIG. **5** show the positions normally assumed by the inwardly folded side flaps **17** and **18**. Side flap parts **18***a*, **18***b* and the tab part **19***a* therebetween assume a position immediately beneath back flap **16**, while side flap parts **17***a*, **17***b* go to a position approximately equidistant back flap **16** and the side panel **11** so that it lies at an angle of about 45° with the horizontal. Such positions are not critical in any respect and although the reason for the difference in the attitudes of these parts is not fully understood, it is believed that each side flap takes the position it does because the lines of articulation on side flap **18** are of unequal strength while the lines of articulation for side flap **17** are of equal strength. When folded innermost, the gusset side flaps exert a springback force on the major flap to which they are attached, i.e., back flap **16**. This springback force ensures almost full contact between the adjacent surfaces of the overlying major flaps, i.e., back flap **16** and front flap **15**, thus enhancing the carton's sealability. The springback force also helps form excellent bonds between the gusset side flap parts. This design gives much protection against sifting, especially at high cartoning speeds.

Tab portion **19***b* is folded upwardly about score line **26** until it lies on top of front flap **15**, as shown in FIG. **6**. The inside surface of tab **19** is adhesive-bearing, therefore a bond develops between the inside surface of **19***b* and the outside surface of front flap **15**. Pressure should be applied to the folded elements of the closure until all adhesive has had time to set. An adhesive release ink **55**, as is well known to those skilled in the art, is printed on the portion of the front flap underlying the folded-over tab portion **19***b* to promote easy lifting of tab portion **19***b* when the consumer desires to open the package.

A mechanical seal is formed by the edges of back flap **16** and side flap parts **17***a*, **17***b*, **18***a* and **18***b* which come in contact with the inside of front panel **10**. For best results, these edges are forced in contact with the front panel **10**, by urging the front flap **15** as far toward the back panel **12** as is possible while the adhesive is setting up, as can be visualized from FIG. **4**. Thus with solid adhesive lines between side flap part **18***a* and tab portion **19***a*, side flap parts **17***a* and **17***b*, and back and front flaps **16** and **15**, and a bead of adhesive sealing any potential leak at the intersection of edges **36** and **37**, the only location whereat a leak can occur is at one of two corners. These corners are at the intersection of score line **27** with cut-score line **23** and the intersection of score line **32** with score line **33**. However, a tight mechanical seal exists at each of these two corners due to close carton design and the multiple paperboard thicknesses which can be bound tightly. Therefore the carton is virtually siftproof.

The adhering and sealing of the various elements of the carton construction may be achieved by using any suitable sealing or adhesive means. As used herein, "adhesive" is intended to convey the concept of any of the means well known to those skilled in the art used to bond two paperboard surfaces together, including hot melt adhesives, heat sealing coatings, adhesive tapes and the like. For economy, one of the preferred bonding agents is glue, especially water-base glues of which dextrin, polyvinyl acetate, and polyvinyl alcohol are generic examples. A commercial brand of a polyvinyl acetate which has been used successfully is available commercially from Findley Adhesives, Inc. of Milwaukee, Wis., under the code designation Findley Adhesive Number 4751-358.

The bottom closure is formed by using the same general folding and adhesive application sequence as was described above. Back flap **51**, side flaps **52** and **53**, and front flap **50** are simultaneously folded; back flap **51** inwardly, side flaps **52** and **53** outwardly, and front flap **50** outwardly. Adhesive is applied to the virtually coplanar surface formed by back flap **51** and side flap parts **53***a* and **52***b*. Then back flap **51** is raised, side flaps **52** and **53** are folded inwardly, back flap **51** is folded inwardly, and front flap **50** is folded inwardly. Thus side flap parts **52***a* and **52***b* are superposed as are side flap parts **53***a* and **53***b*. Side flap parts **52***a*, **52***b*, **53***a* and **53***b* lie inside back flap **51**, and front flap **50** lies outside back flap **51**. Three adhesive bonds are formed, i.e., between the superposed side flap parts **52***a* and **52***b*, between side flap parts **53***a* and **53***b*, and between the inward surface of front flap **50** and the outward surface of back flap **51**. This configuration offers reliably formed siftproof closure but no easy-open feature.

FIG. **7** shows the carton after being opened by using the easy-open feature, with the gusset side flap part **18***b* folded outwardly. The tab portion **19***b* is pried loose from the front flap **15** and pulled up and back in the direction of a line which would approximately bisect the angle formed by score line **27** and cut-score line **23**. The object of this pulling is to separate the corner portion **15***a* of the top flap **15** from the adjacent front panel **10** along cut-score line **23** and to separate tab portion **19***a* from side flap part **18***b* along the cut-score line **25**. This action rotates the assembly consisting of front flap corner portion **15***a* and the underlying elements about superposed score lines **22** and **30**, and results in the formation of a triangular-shaped pouring opening.

After each partial use of the product the carton can be reclosed, as shown in FIG. **8**. Reclosure is accomplished by folding gusset side flap part **18***b* inwardly and rotating the opened portion of the end closure, i.e., front flap corner portion **15***a* and the underlying components, downwardly about superposed score lines **22** and **30**. Then the periphery of front flap corner portion **15***a* must be fitted within the confines of the upper edges of side panel **13** and front panel **10** with side flap part **18***b* folded down inside side panel **13** and the thickness of side flap part **18***b* between side panel **13** and the adjacent edge of the front flap corner portion **15***a*. This reclosing is sufficiently tight to exclude foreign matter from the package and also to prevent wholesale loss of the product should the consumer have the misadventure of inadvertently tipping the carton. This opening and reclosing can normally be performed as often as required until the product is exhausted.

The same general end closure design and folding and adhesive application sequence can be used when the above-described easy-opening feature is not desired on the top closure. For example, in this case the top closure would be designed and closed as described in connection with the bottom end of the carton.

Although only certain modifications of preferred forms of this invention have been shown and described, it is clear that many others could also be made without departing from the spirit of the invention. The terms used in describing the invention are used in their descriptive sense and not as terms of limitation, it being intended that all equivalents thereof be included within the scope of the appended claims.

What is claimed is:

1. In a seal-end type carton having front and back panels and alternating side panels forming a tubular body of rectangular cross section and an adhesively sealed top closure formed by a front flap, a back flap, and two gusset side flaps, each of said flaps being joined to the correspondingly identified panel and articulated thereto, the gusset side flaps articulated also to said back flap and free of attachment to the front flap, one gusset side flap at each end thereof, each gusset side flap being traversed by a hinge line at about 45° to the side flap articulation lines and passing through their juncture, each gusset side flap thereby being divided into two parts, an improvement comprising:

each gusset side flap being folded inwardly and one said part being superposed over the other part, the adjacent faces of said parts being bonded together by adhesive means to establish a siftproof seal therebetween,

said back flap immediately overlying said inwardly folded side flaps, and

said front flap overlying said back flap and adhesively united thereto.

2. The carton of claim **1** having an easy-open reclosable feature which comprises:

a corner portion of said front flap, defined by a diagonal score line extending from a distal corner thereof to a point on the line of articulation separating the front flap from the front panel,

said last-mentioned line of articulation comprising a line of weakening along the portion thereof adjoining said corner portion,

a corner portion of said back flap being formed by a diagonal score line extending across said back flap, the diagonal score line on the back flap underlying and being in direct alignment with the diagonal score line on said front flap, whereby a pair of generally coextensive, superposed, congruent triangular-shaped corner portions of the back and front flap result,

a tab being attached to the gusset side flap directly underlying said corner portions along a tab articulation line at the distal edge of the gusset side flap part which is articulated from the side panel,

said tab articulation line comprising a line of weakening, and

said tab being folded along said tab articulation line so as to lie on the top of the gusset side flap part to which it is attached, whereby said tab lies between said parts of the gusset side flap and extends outwardly beyond the adjacent side panel to form a gripping tab,

so that a pull on the gripping tab will sever the corner portion of said front flap from the front panel along the line of weakening therebetween, sever the gripping tab from the gusset side flap along the line of weakening therebetween, and fold the superposed corner portions along their diagonal score lines to form an opening in the end of the carton.

3. The carton of claim **2** wherein each said hinge line comprises a cut which extends for about one-half the length of the hinge line, said cut originating at a location adjacent the intersection of the lines of articulation of the gusset side flap, said cut allowing the superposed parts of each gusset side flap to fold substantially flat against each other.

4. The carton of claim **1** wherein each said hinge line comprises a cut which extends for about one-half the length of the hinge line, said cut originating at a location adjacent the intersection of the lines of articulation of the gusset side flap, said cut allowing the superposed parts of each gusset side flap to fold substantially flat against each other.

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