United States Patent [19]

Hoiles

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[54] **END WALL CONSTRUCTION FOR A CARTON**

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[73] Assignee: **American Can Company,** Greenwich, Conn.

[22] Filed: **Jan. 22, 1973**

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[52] **U.S. Cl.**..... **229/37 R,** 229/48 SB, 229/48 T, 229/51 TS

[51] **Int. Cl.**..... **B65d 5/02,** B65d 17/12

[58] **Field of Search**..... 229/3.1, 48 SA, 48 SB, 229/48 SC, 48 T, 51 TS, 37 R

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Assistant Examiner—Bruce H. Bernstein
Attorney, Agent, or Firm—Robert P. Auber; Frank S. Charlton; Harries A. Mumma, Jr.

[57] **ABSTRACT**

An end wall construction for a carton including an anti-seepage or leakage barrier formed partially of embossments bridging the gap between overlapped end panels and partially of a line of water-resistant adhesive adhering the overlapped panels together.

6 Claims, 11 Drawing Figures

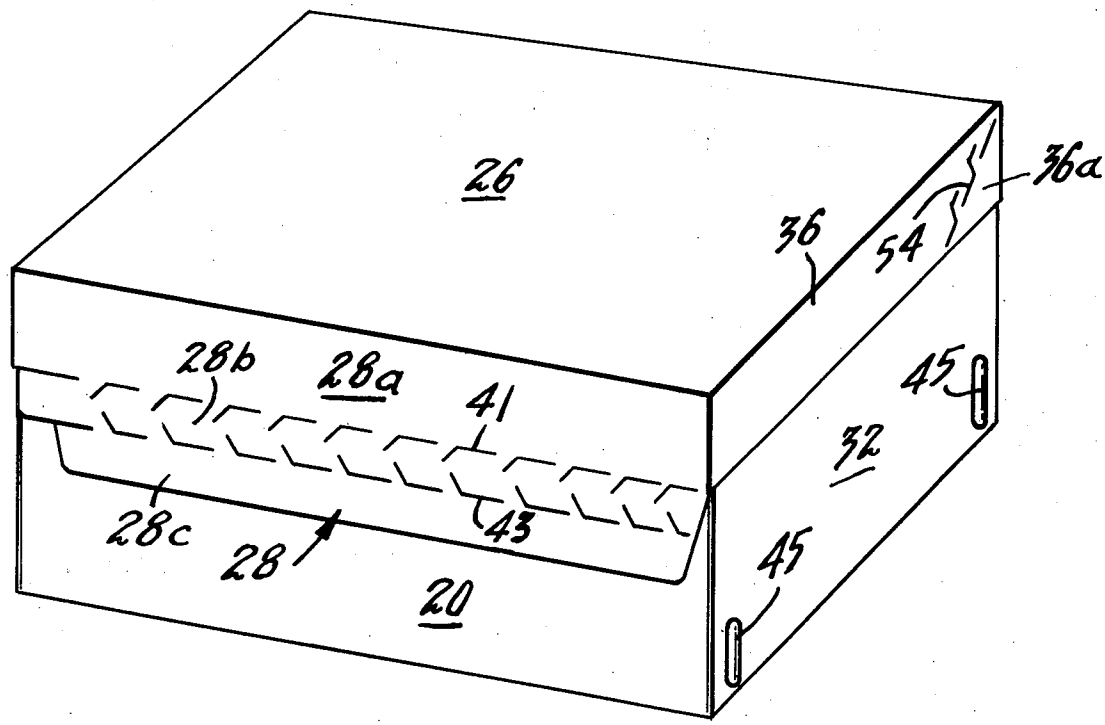


FIG. 1

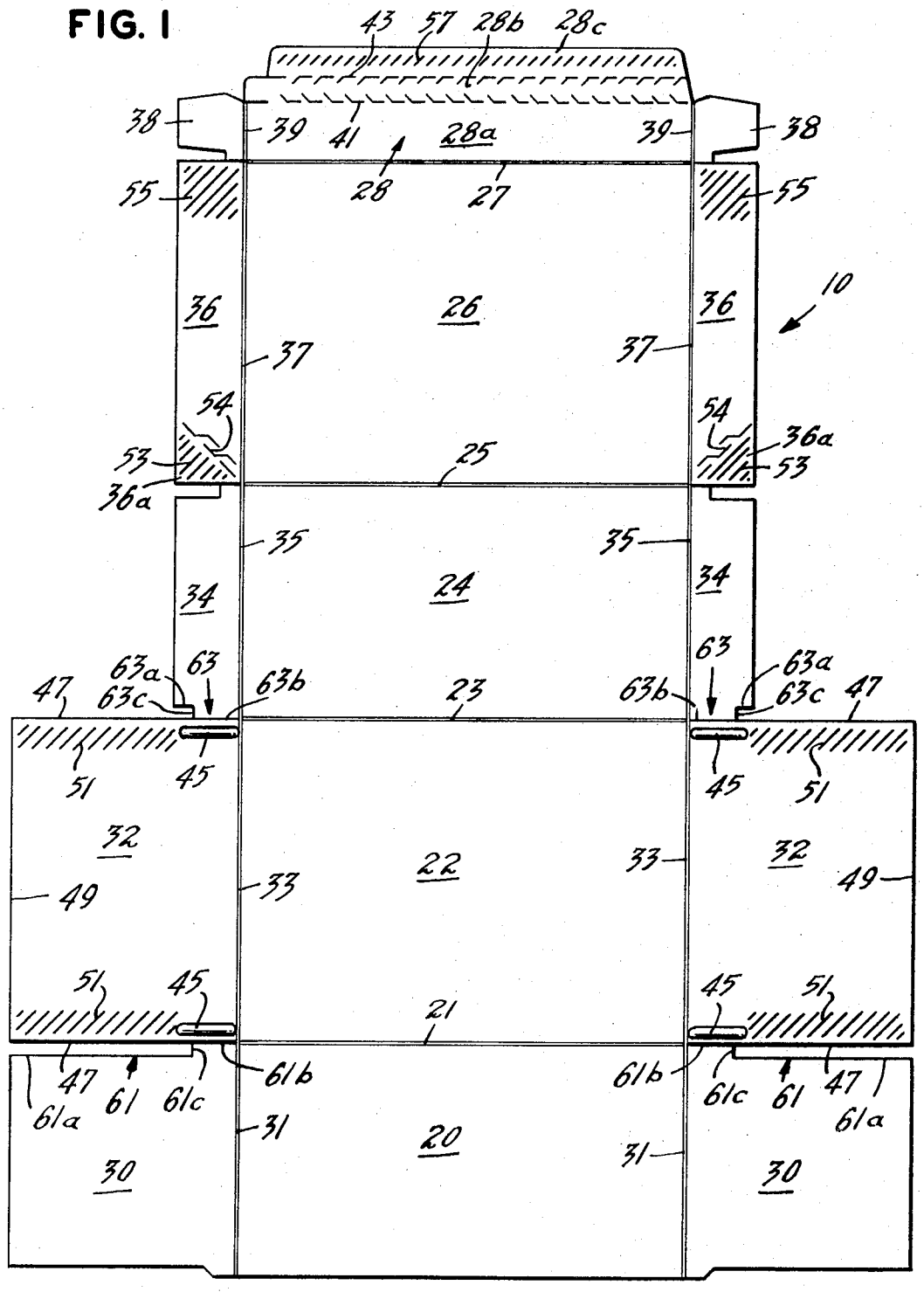

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FIG. 2

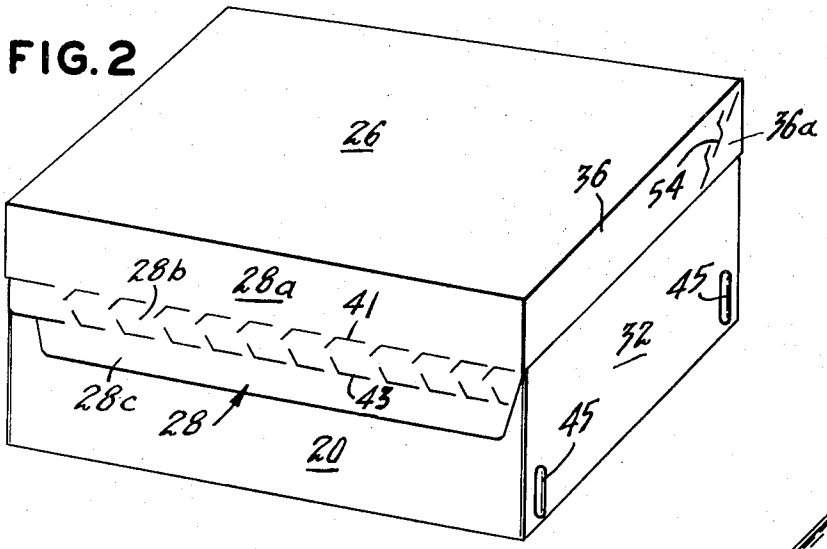


FIG. 4

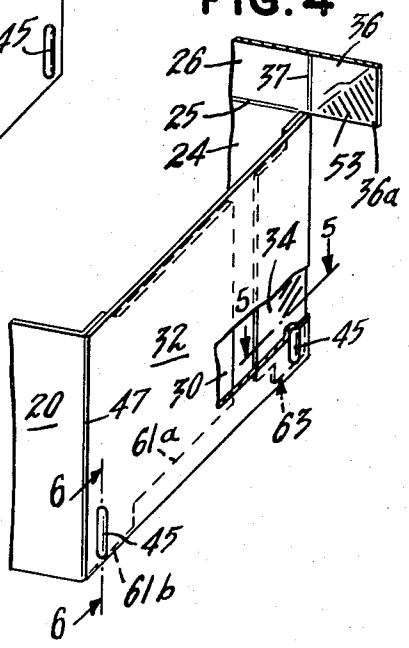


FIG. 3

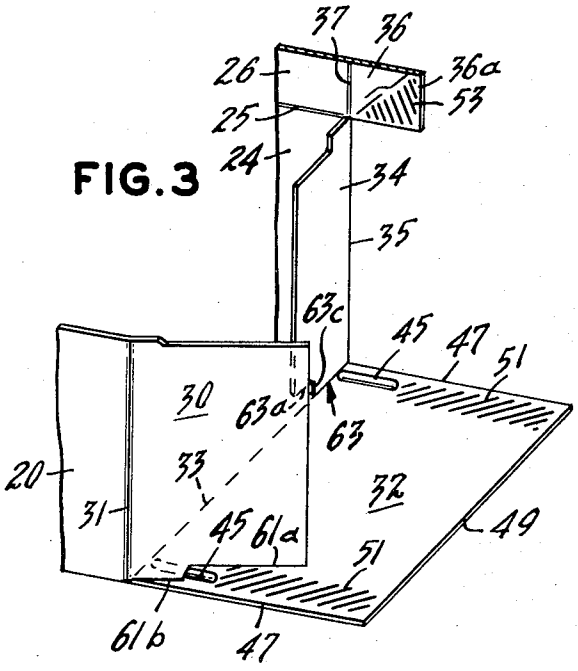


FIG. 5

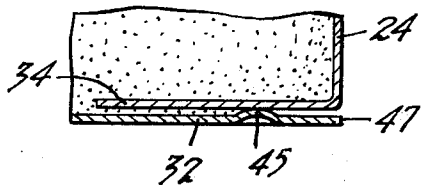


FIG. 6

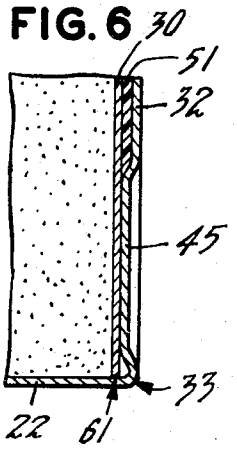


FIG. 7

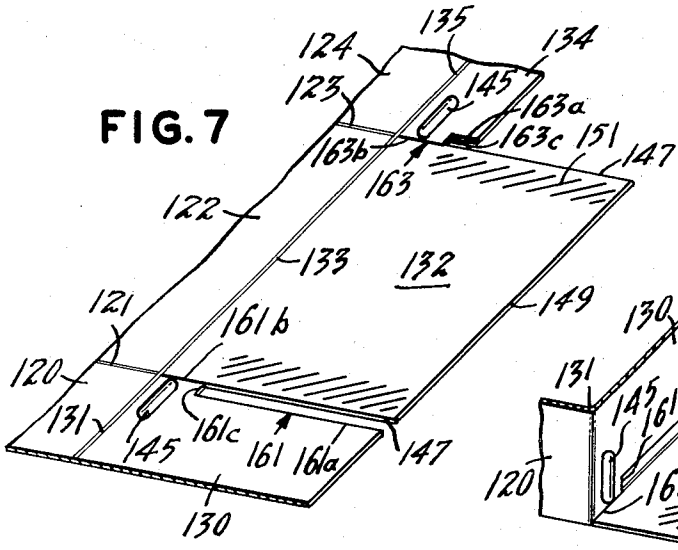


FIG. 8

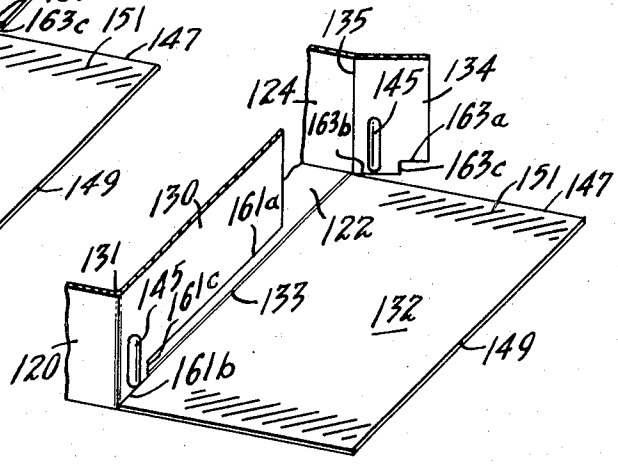


FIG. 9

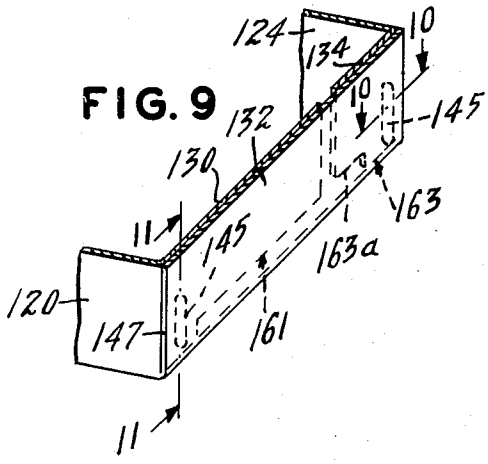


FIG. 11

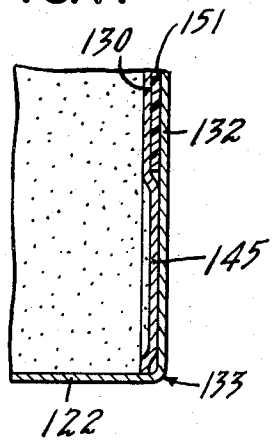
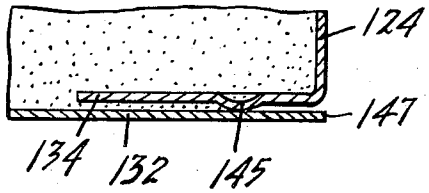


FIG. 10



END WALL CONSTRUCTION FOR A CARTON

BACKGROUND OF THE INVENTION

This invention relates to a paperboard carton construction and more particularly to improved means in trunk-type folding paperboard cartons for preventing seepage or leakage of semi-fluid products such as partially frozen ice cream from between the overlapping end panels of the carton.

Ice cream is commonly packaged for home consumption in trunk-type cartons made from a single, coated paperboard blank having front, bottom, rear and cover wall panels and a cover closure flap in consecutive, hingedly connected relationship with certain of said panels having end wall panels hingedly appended along the end edges thereof. When the carton is in erected condition preparatory to being filled with the product to be packaged, the carton end walls comprise inner and outer end wall panels in overlapped and partially adhered relationship. Since the end wall includes a plurality of panels which overlap one another to varying degrees, and which are not in complete, overall sealed contact one with another, there is a distinct possibility of leakage or seepage of the product between the various overlapped panels. The possibility of leakage of product between the end wall panels is, of course, related to the fluidity of the product. Ice cream is generally packaged in a semi-frozen state which is not highly fluid and which therefore does not flow rapidly through the narrow passageway between overlapped carton panels. Further, as soon as a carton is filled with the semi-frozen ice cream mass, every effort is made to transfer the filled package to a hard freeze room maintained at a sufficiently low temperature to completely solidify the product so that fluid seepage cannot occur, and it is intended that the ice cream be maintained in the hard frozen state until ready for consumption in the home of the ultimate purchaser.

In many cases, however, seepage does occur at some time between the filling of the carton and the consumption of the product, either because the product was not packaged in a sufficiently frozen state, there was a delay in the hard freezing process, or the product was allowed to soften somewhat at some point during dealer storage, transportation, merchandising and/or consumer storage. In any of these cases, leakage of the product from the end flap areas generally results in contamination of neighboring packages and is unsightly as well as undesirable for merchandising, health and aesthetic reasons.

It is an object of this invention to provide an improved carton construction suitable for use in packaging ice cream or similar products and which minimizes the possibility of seepage or leakage of the packaged product from the areas of overlapping wall panels which constitute the end wall structure of the carton.

It is a further object to provide such an improved carton construction at substantially no increased cost of manufacture, economy of production being of great importance in the production of commodity packaging components.

SUMMARY OF THE INVENTION

The invention in one form may be readily understood as applied, for example, to a trunk type carton having a body portion and a hingedly connected cover portion with an end wall structure at each end of the body or receptacle portion, each end wall structure including inner end wall panels hingedly attached to an end edge of receptacle portion front and rear walls and an outer end wall panel hingedly attached to an end edge of the receptacle portion bottom wall and folded into overlying and adhered relationship thereto. In such construction, the invention comprises at least one vertically oriented embossment formed in the outer end wall panel at each lower corner thereof adjacent the side edge of the panel and extending vertically for some distance from the hinge line connecting the outer end wall panel with the receptacle portion bottom panel. Each such embossment comprises a narrow, vertically oriented portion of the outer end wall panel, which is forced out of the overall plane of the panel in a direction toward the plane of the underlying, inner end wall panels and spanning the space therebetween to be in intimate contact with the underlying panel in the narrow area occupied by the boss.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention may be most readily understood by the following detailed description in conjunction with the accompanying drawing, in which:

FIG. **1** is a plan view of the interior surface of a paperboard carton blank incorporating this invention,

FIG. **2** is a perspective view of a completed carton made from the blank of FIG. **1**,

FIG. **3** is a cutaway perspective view of the carton showing the end wall construction of the carton in a stage of partial erection,

FIG. **4** is a cutaway perspective view of the carton showing the end wall in a completely erected condition,

FIG. **5** is a cross-sectional view taken along line **5—5** of FIG. **4**,

FIG. **6** is a cross-sectional view taken along line **6—6** of FIG. **4**,

FIG. **7** is a cutaway plan view of a carton blank including an alternate embodiment of the invention,

FIG. **8** is a cutaway perspective view of a carton formed from the blank of FIG. **7** and showing an end wall in a stage of partial erection,

FIG. **9** is a cutaway perspective view of the carton of the alternate embodiment showing the end wall fully erected,

FIG. **10** is a cross-sectional view along line **10—10** of FIG. **9**, and

FIG. **11** is a cross-sectional view along line **11—11** of FIG. **9**.

DESCRIPTION OF A PREFERRED EMBODIMENT

In a preferred embodiment thereof, the present invention concerns an improvement in the end wall construction of a conventional paperboard carton assembled from a one-piece blank generally designated by the numeral **10** of paperboard suitably cut and scored to provide, in hingedly connected sequence, a front receptacle wall panel **20**, a bottom receptacle wall panel **22**, a back receptacle wall panel **24**, a cover panel **26** and a front cover closure panel **28**, the hinge score lines connecting the above-listed panels being designated **21, 23, 25** and **27**, respectively. Hingedly connected to the ends of front panel **20** along score lines **31** are front

inner end wall panels **30**, and in similar manner, outer end wall panels **32** are hinged along score lines **33** to the ends of the bottom panel **22**, rear inner end wall panels **34** are hinged along score lines **35** to the ends of rear panel **24**, cover end panels **36** are hinged along score lines **37** to the cover panel **26**, and cover glue flaps **38** are hinged along score lines **39** to the ends of the upper portion of front cover closure panel **28**. Front cover closure panel **28** is divided into three portions, an upper portion **28***a*, hinged directly to the cover panel, a lower or edge portion, **28***c*, which is adapted for adherence to the receptacle front wall panel **20** when the carton is sealed in closed position and a central, detachable portion **28***b*, which is adapted to serve as a zipper opening strip by virtue of its connection along parallel lines of weakness **41** and **43** to the upper portion **28***a* and lower portion **28***c*, respectively, of front closure panel **28**.

Formed in outer end wall panels **32** are score line embossments **45**, each positioned parallel with and adjacent to a respective one of the side edges **47** of the end wall panels **32** and extending outwardly toward the remote free edge **49** of the respective panel **32** from a point of junction of the embossment **45** with the respective hinge score line **33** connecting end wall panel **32** to the bottom panel **22**. The embossments **45** are so formed that the boss, or raised portion of the embossment, appears on the inner surface of the outer end wall panel **32**. Thus, in the area of the score line embossments **45**, the paperboard fibers forming the body of panel **32** are displaced out of the main plane of the panel and appear on the interior surface of the panel as raised areas. Conversely, the embossments appear as depressed areas when viewed from the outer surface of end wall panels **32**. The function of these embossments will be discussed in detail hereinafter as being essential to the concept of this invention.

In forming a receptacle from the carton blank **10**, a suitable water-resistant adhesive such as a wax-resin based adhesive of the hot melt type is applied to selected portions of the inner surfaces of outer end wall panels **32**, as indicated by the hatched areas **51** in FIG. **1**, and the front receptacle panel **20** and rear receptacle panel **24** are forced about a forming mandrel into vertical relationship normal to bottom panel **22**. The front and rear inner end wall panels **30** and **34**, respectively, are then swung about their respective hinge lines **31** and **35**, as shown in FIG. **3**, into positions co-planar with each other and normal to the front, back and bottom receptacle wall panels. The inner end wall panels **30** and **34** thus form partial end walls of the receptacle, and the end walls are completed by swinging the outer end wall panels **32** about hinge lines **33** to bring them into overlying adhesive engagement with the inner end wall panels **30** and **34**, as shown in FIG. **4**. The receptacle portion of the carton is then ready to receive the product, such as soft or semi-frozen ice cream.

When the receptacle portion of the carton has been filled with the desired product, a suitable water-resistant adhesive is applied to selected areas of the panels forming the cover portion and the cover is closed and adhered to the receptacle portion, thus forming the completed carton as shown in FIG. **2**. The areas of the cover section panels receiving adhesive on the interior surface thereof are shown in FIG. **1** as hatched areas **53**, **55** and **57**. Adhesive **53** is applied in small triangular areas **36***a* lying adjacent the rear edges of cover end panels **36** and each connected to the main body of a respective one of said cover end panels **36** along a diagonal line of weakness **54** extending from the rear upper corner of panel **36** to a point along the free edge thereof remote from the hinge line **37** connecting cover end panel **36** to cover panel **26**. Adhesive **55** is applied to a rectangular area of cover end panel **36** slightly smaller than glue flap **38** and positioned adjacent the forward edge of panel **36**. Adhesive **57** is applied to the inner surface of edge portion **28***c* of front cover closure panel **28**.

The cover portion may be formed by swinging cover closure panel **28** inward about hinge line **27** to a position normal to cover panel **26**, swinging glue flaps **38** inward about hinge lines **39** to positions normal to closure panel **28**, and swinging cover end panels **36** inward about hinge lines **37** to positions normal to cover panel **26**. In this position, each cover end panel **36** comes into overlying adhesive contact with a respective cover glue flap **38**, thereby establishing the integrity of the cover front corners of the carton. To close and seal the carton, the cover is swung about hinge line **25** to a position wherein cover end panels **36** and cover closure panel **28** overlie the upper portions of end wall panels **32** and front wall panel **20**, respectively, and the portions of the cover portion panels designated **36***a* and **28***c* are adhesively secured to the respective underlying wall panels by virtue of the adhesive areas **53** and **57**. It is to be noted that the cover may be formed and closed by various sequences of steps, as desired, the above sequence being exemplary only and unrelated to the present invention.

The carton may be opened for removal of any portion of its contents by tearing out the center section **28***b* of the cover closure flap and swinging the cover section upward about hinge line **25**. Upward movement of the cover will sever the weakness lines **54** in the cover end panels **36**, leaving triangular segments **36***a* adhered to the underlying receptacle end wall panel. The carton is readily reclosable by telescoping the cover section over the upper portions of the receptacle front and end walls.

As the receptacle portion of the carton is being set up or formed around a forming mandrel, the inner end wall panels **30** and **34** are swung through a 90° arc to form a partial end wall as shown in FIG. **3** after the receptacle front and rear walls have been brought into erected condition. During the process of swinging panels **30** and **34** through the aforementioned arcuate path, as best indicated in FIG. **3**, the side edges **61** and **63** respectively of these panels which are adjacent the outer end wall panels **32** are caused to scrape across the inside surface of the outer end panel **32** in frictional engagement therewith as they approach their final erected position. In the erected carton, these inner end panel side edges **61** and **63** lie immediately adjacent to the hinge score line **33** joining the outer end wall panel **32** to the bottom panel **22**. This relationship is shown in cross section in FIG. **6**. In order to prevent the inner panel edges **61** and **63** from picking up and transferring to the mandrel surface any of the adhesive **51** with which the inner surface of outer panel **32** is partially coated, the inner panel edges **61** and **63** are stepped as shown in FIG. **1** to provide a recessed portion (**61***a* and **63***a*, respectively) which does not frictionally engage the surface of outer end panel **32** and a foreshortened extended portion (**61***b* and **63***b*, respectively) which en-

gages the surface of outer end panel **32** only in an area not coated with adhesive. The extended edge portions **61***b* and **63***b* are joined to the recessed edge portions **61***a* and **63***a* by step or shoulder portions **61***c* and **63***c*, respectively. The length of the foreshortened extended edge portions **61***b* and **63***b* is governed primarily by the requirements of the carton set-up machinery and is preferably between about 3/8 inch and 1¼ inch in the standard 1/2 gallon ice cream carton, for example. A length of about 3/4 inch is particularly suitable, although this will vary with overall carton size.

In order to positively prevent the scraping off and transfer to the shaping mandrel of adhesive from the surface of the outer end wall panel **32** by either of the inner end wall flaps **30** and **34,** the adhesive pattern **51** is so limited that the outer end wall panel **32** carries no adhesive in the area contacted by the extended edge portions **61***b* and **63***b* of the inner end wall panels as they pivot about their hinge lines during the erection thereof into receptacle-forming position. This is accomplished by limiting the adhesive pattern **51** to that portion of outer end wall panels **32** lying more remote from hinge score line **33** than a line drawn on the carton blank between the shoulder portion **61***c* of the side edge **61** of front inner end wall panel **30** and the equivalent shoulder portion **63***c* of rear inner end wall panel **34.**

When the end wall panels are all in erected position, lapped and adhered together by means of adhesive **51,** the possibility of product seepage and leakage from between the inner end wall panels, **30** and **34,** and the outer end wall panels **32** is prevented by the tight adhesion of these panels in the lap areas where adhesive had been applied to outer panels **32** and, in the lap areas where the adhesive was omitted, seepage is prevented by the embossments **45,** which tightly bridge the narrow gap between the lapped inner and outer panels in these areas. To serve this purpose effectively, the embossments must extend from immediately adjacent hinge line **33** outwardly toward the free edge **49** of outer end panel **32** remote from hinge score **33** for a distance at least sufficient to intercept the adhesive pattern at its nearest point to score line **33.** Normally, the embossments will extend to a point slightly beyond the line which may be drawn between the stepped edge shoulder areas **61***c* of front inner end panel **30** and **63***c* of rear inner end panel **34,** respectively, and will thus have at least a small area of coincidence with adhesive pattern **51,** which extends inwardly from the remote edge **49** of panel **32** almost to the aforementioned line between shoulders **61***c* and **63***c*. Thus, the lines of water-resistant adhesive, **51,** together with the embossments **45,** form a continuous barrier to seepage from the lap area of the end wall panels, the barrier extending from the hinge score line **33** joining the outer end wall panel **32** to the bottom panel **22** outwardly toward the remote free edge **49** of panel **32** and terminating adjacent said free edge **49.** As hereinbefore described and illustrated, the composite adhesive-embossment barrier lies as a narrow band along a line parallel with and adjacent to each side edge **47** of the outer end wall panel **32.** The bridging of the lap space by (1) the embossments **45** near the score line **33** and (2) the adhesive **51** in the area lying outward of the embossments may be noted in the crosssectional view of FIG. **6.** FIG. **5** illustrates the barrier effect of embossment **45** in cross section.

The score line embossments **45** are of critical importance to constructions according to the present invention since they serve to substantially reduce or eliminate seepage and leaking of fluid product from cartons having an end wall construction of simple overlapped and adhered inner and outer end wall panels, such as that hereinbefore described and illustrated. It is recognized that carton constructions in which the receptacle portion is completely leakproof can be achieved through the use of webbed corners, for example. The webbed corner cartons, however, are substantially more expansive in construction because they require a larger paperboard area to achieve a receptacle of a given size. The setting up of the web-type carton is also more difficult to achieve on high-speed packaging machinery. The folded-in web corners are bulky and tend to trap the packaged product in the folds of the webs, making removal of the last portions of the product from the package difficult for the consumer and making the package aesthetically less appealing, as well.

In forming the receptacle portion about the shaping mandrel, the overlapped end panels are forced tightly together in the lapped, adhesive bearing areas by externally applied pressure to form a firm adhesive bond therebetween which will prevent product seepage from between the inner and outer panels in the area of overlap bonded by the adhesive. The pressure exerted in the bonding operation also presses the inner and outer end panels together in the lap area spanned by the embossments **45.** The raised bosses are thus forced into tight engagement with the outer surface of the inner end wall panels **30** and **34,** respectively. The embossments **45,** by virtue of the natural resiliency of the paperboard fibers, maintain tight contact with the inner end wall panels after the receptacle forming pressure is removed and thus serve as effective dams against leakage between the inner and outer end flaps.

In order that the embossments be sufficiently resilient to maintain the desired cushion-like pressure contact with the opposed inner end wall panels, it is desirable that they be relatively narrow, preferably between about 1/16 in. and 3/16 in. in width. Such embossments may be conveniently formed in the carton blank by use of scoring rules of suitable width inserted in the conventional cutting and scoring dies used to blank out the carton in conventional manner. Although it is possible to utilize a plurality of embossments which are in parallel, spaced relationship, such an arrangement has not been found substantially more effective in eliminating product seepage than a single, narrow embossment at each lower corner of the outer end wall panel as previously described. It is believed that it is more desirable and effective to concentrate the pressure contact between the inner and outer end panels upon single, relatively narrow embossments rather than to increase the embossment area either by use of more embossments or by increasing the width of a single embossment. The use of a plurality of embossments in spaced parallel array is also considered to be within the scope of this invention, however.

It is necessary that the seepage preventing barrier, either in the form of an adhesive bond area closing the gap between overlapped panels or an embossment which similarly blocks the gap between lapped panels, must extend continuously from the hinge score line **33** joining the bottom panel **22** and the outer end wall panel **32** substantially to the free outer edge **49** of the

outer end wall panel **32** along a line adjacent each side edge **47** of the outer end wall panel **32.**

In a further embodiment of the invention, as illustrated in FIGS. **7** through **11** of the drawings, embossments **145** are formed in the inner end panels **130** and **134** in parallel, spaced, but closely adjacent relationship to respective hinge score lines **131** and **135,** which join the inner end panels to receptacle front and rear panels **120** and **124,** respectively. The embossments extend inward of the panels from extended edge portions **161***b* and **163***b*, respectively, and are impressed in the paperboard in such manner that the bosses, or raised areas, are on the outer surface of the inner end panels. Thus, in the erected state of the receptacle portion of the carton, as shown in FIGS. **9** through **11,** the embossments **145** assume the same position in the end wall construction as the embossments **45** of the previously discussed embodiment and serve the same function, differing only in that the bosses are formed to extend outward from the plane of the inner end panels rather than inward from the plane of the outer end panels as described in the previous embodiment.

In a further modified embodiment involving use of a matched pair of embossments at each corner and wall corner, one member of the pair is formed to extend inwardly from the outer end wall panel and the other to extend outwardly from the overlapped inner end wall panel in such manner that the two embossments lie in superposed relationship or are closely juxtaposed.

Although embossments formed in either the outer or inner end wall panels are equally effective in preventing seepage of ice cream or other similar product from between the end flaps, it is generally more desirable to form the embossments in the outer end wall panels, since these embossments are impressed in the paperboard from the same side as the hinge score lines between the various panels. Conversely, placing the embossments in the inner end wall panels requires reverse scoring, or working the paperboard from the opposite side. This is more difficult and expensive to accomplish and is thus generally less desirable, economically.

In a protracted test of ice cream cartons constructed in accordance with this invention, the incidence of product seepage from between the lapped area of the end panels was completely eliminated from the commercial production of a major manufacturer of highest quality ice cream during an entire summer season. This contrasted sharply with conditions of the previous summer when leakage from cartons without the embossments herein described as essential constituted a major production problem.

Having now disclosed and described in detail preferred forms of the invention, it is obvious that many modifications are possible without departing from the spirit thereof. Therefore, no limitations on the invention are intended except as specifically set forth in the appended claims.

I claim:

1. An end wall construction for a paperboard carton having front, bottom and rear receptacle panels, cover and cover closure panels hingedly connected in sequence, comprising front and rear inner end wall panels hingedly connected to said front and rear receptacle panels, respectively, and an outer end wall panel hingedly connected to said bottom receptacle panel and lying in superposed and adhered relationship to said inner end wall panels,

the side edges of said front and rear inner end wall panels lying adjacent to the hinge score line joining said outer end wall panel to said bottom receptacle panel having foreshortened extended portions adjacent their hinge connections to the respective receptacle wall panels, the remainder of said side edges being recessed with respect to said extended portions, and

a continuous anti-seepage barrier bridging the lap space between said inner and outer end wall panels and extending as a narrow band from the hinge score connecting said outer end panel with said bottom receptacle panel along a line parallel with and adjacent to a side edge of said outer end panel to terminate adjacent the free edge of said outer end panel remote from said hinge score line, said barrier comprising (1) an embossment formed in one of said inner and outer end wall panels extending from said hinge score line a distance slightly greater than the length of said foreshortened extended edge portion of said respective inner end wall panel and (2) a line of water-resistant adhesive extending continuously from the remote end of said embossment to the point of termination of the barrier adjacent the remote free edge of said outer end wall panel.

2. A carton end wall construction according to claim **1** wherein said embossment is formed in said outer end wall panel and protrudes toward the underlying inner end wall panel.

3. A carton end wall construction according to claim **2** wherein said embossment is between 1/16 inch and 3/16 inch in width and is impressed in said end wall panel by a scoring rule.

4. A carton end wall construction according to claim **2** wherein said adhesive is a wax-resin based hot melt type adhesive.

5. A carton end wall construction according to claim **3** wherein said foreshortened extended portions of said front and rear inner end wall panel side edges have a length of between 3/8 inches and 1¼ inches.

6. In an end wall construction for a sealed end paperboard carton formed of a single blank cut and scored to provide front, bottom and rear receptacle panels, a cover panel and a cover closure panel in hingedly connected sequence, said end wall construction including inner end wall panels hinged to said front and rear receptacle panels and an outer end wall panel hinged to said bottom receptacle panel, said outer end wall panel being in overlying relationship to said inner end wall panels, the side edges of said inner end wall panels lying adjacent the hinge score line joining said outer end wall panel to said bottom receptacle panel having foreshortened extended portions with the remainder of said edges being recessed with respect thereto, the improvement comprising:

a continuous anti-seepage barrier formed between and bridging the lap space between the outer and one of said inner end wall panels along a line parallel and adjacent to a side edge of said outer end wall panel and extending from the hinge score line joining said outer end wall panel and said bottom receptacle panel outward toward the free edge of the outer end wall panel remote from said hinge score line and terminating adjacent said remote free edge,

said barrier comprising: (1) an embossment formed in one of said overlapped end wall panels and protrud-

ing to bridge the lap space between said overlapped panels, said embossment extending from said hinge score line toward said remote free edge a distance slightly greater than the length of said foreshortened edge of said inner end wall panel, and (2) a line of water-resistant adhesive extending continuously from the remote end of said embossment to a point adjacent said remote free edge of said outer end wall panel.

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