ABSTRACT: The disclosure relates to improvements in tear opening structures for end filled, end sealed cartons and, more specifically, to an improved opening structure for membrane sealed cartons of the type in which a separate “safety shield” material of polyethylene coated glassine or the like is heat sealed or otherwise tightly secured to the outfolded end flaps and side flaps of a carton prior to the infolding and adhering of at least a pair of said flaps to one another to complete the end structure.
MEMBRANE SEALED CARTON

BACKGROUND OF THE INVENTION

Many airtight, siftproof, and moistureproof paperboard carton constructions for liquid and pulvcrent materials are formed from parallelipiped cartons and have their opposite ends tightly sealed by the "safety shield" members or membranes adhered to the carton end flaps and side flaps (dust flaps). The membrane material and/or the inner surfaces of the flaps to which they are adhered are thermoplastic. For example, a resin, wax, or other material which may be easily heat sealed may be coated thereon. This moistureproofness and siftproofness of such cartons is often enhanced by the formation of tufts in each of the corners of the carton before the membrane is sealed to the flaps.

With the development of improved coated and laminated paperboard materials and improved plastic films, the tightness and imperviousness of membrane sealed cartons of the aforementioned-type have been greatly improved, and these cartons have continued to find ever increasing acceptance and widespread use in diverse packaging applications. However, the improved strengths of the heat seal bonds of the membrane to the carton flaps have often introduced serious opening problems for the ultimate consumer. Accordingly, it is to one solution of these opening problems that the present invention is directed.

SUMMARY OF THE INVENTION

In membrane sealed cartons erected from laminated or plastic coated paperboard blanks, the cartons may, of course, be opened and access to the contents may be had by puncturing the membrane or by peeling it from the carton body. However, this is extremely difficult and often impossible due to the integrity and high strength of the heat seal bond between the membrane material and the flaps. Where the carton is a plastic coated foil laminate, for example, peeling removal of the membrane is resisted by the strong and hard bond of the membrane. Since the membrane plastic coating bond is stronger than the bond between the foil and paperboard, removal of the membrane is best effected by fiber tear delaminating the adhered foil and peeling the foil and membrane from the carton end. However, this delamination tends to be of the entire area or of large portion of the end flaps, and effecting such a delamination is extremely difficult.

In accordance with the principles of the present invention, delamination of the inner stratum of paperboard to which the safety shield is bonded is greatly facilitated by appropriately limited the area of the inner stratum of flap material which need be delaminated to accommodate membrane removal. These narrow delamination zones on the carton end flaps (the flaps which are parallel to the direction of safety shield removal) may be provided by suitably impressing a series of cut scores from the outside of the carton blank in a manner to define lines of weakness adjacent to and parallel to the outer edge of the sealing membrane or, alternatively, by removing substantially all of the end flap portions which lie beyond the outer edges of the sealed membrane.

More specifically and in accordance with the invention, initiation of the aforementioned delamination or peeling of the safety shield from the end flaps may be started by twisting one of the side flaps (dust flaps) to which the membrane is adhered away from the carton body. The severed dust flap and the adhered membrane may then be drawn away from the carton body to peel the membrane from the body along the aforementioned narrow zones. Once the membrane is removed completely from the side flaps, the carton end will be completely opened for dispensing its contents. Should it be desired to completely remove the membrane from the carton, delamination of the membrane from the remaining flap is quite simple, owing to the fact that it is usually a comparatively small area and that, in any event, substantial peeling leverage is available through the comparatively large size of the previously delaminated membrane.

In accordance with a more specific aspect of the invention, the reduction in size of the carton end flaps to provide narrow delamination zones is effected by forming a compound tear strip in the carton end structure. The tear lines defining the strip are disposed in the end flaps and are substantially adjacent to the edges of the safety shield. Removal of the tear strip from the carton will have the effect of opening the mutually adhered end flaps of the carton to expose the underlying sealed membrane as well as substantially reducing the size of the end flaps to facilitate the peeling of the safety shield, as explained hereinabove. In lieu of a tear strip arrangement, conventional "lift open" end sealing arrangements may be used in which one of the end flaps has a tab formed therein and the other has a slot formed therein. Such an arrangement is especially advantageous, as will be appreciated, where it is desirable to reclose the carton after dispensing less than all of its contents.

For a better understanding of the present invention and its attendant advantages, reference should be made to the following detailed description taken in conjunction with the accompanying drawings, in which:

DESCRIPTION OF DRAWINGS

FIG. 1 is a plan elevational view of the inner surfaces of a carton blank from which a carton embodying the principles of the invention may be fabricated.

FIG. 2 is an end elevational view of a sealed carton having a compound tear strip and embodying the principles of the invention.

FIG. 3 is a perspective view of the carton of FIG. 2 with the compound tear strip partially removed.

FIG. 4 is a fragmentary, perspective view of an end of a carton showing the commencement of the safety shield removal by delamination in accordance with the principles of the invention.

FIG. 5 is an end elevational view of a carton representing an alternate embodiment of the invention.

FIG. 6 is a fragmentary, perspective view showing the commencement of the safety shield removal from the carton of FIG. 5 in accordance with the principles of the invention.

FIG. 7 is an enlarged, fragmentary, cross-sectional view showing the laminated structure of the board from which the carton of the invention is manufactured.

DESCRIPTION OF PREFERRED EMBODIMENT

Referring to FIGS. 1 and 7, a blank 10, from which the carton of the invention may be erected, is advantageously a laminate comprised of a base layer of paperboard 9 to which a very thin foil layer F is adhered, which foil layer is itself coated with polyethylene 36. The polyethylene coating is the inner surface of the erected carton and is the side of the blank depicted in FIG. 1.

As shown, the blank 10 includes contiguous first side, front, second side, and rear wall panels 11—14, respectively, and a glue flap panel 15 consecutively articulated along vertical score lines 16—19. End flaps 20—23 are articulated to the front and rear wall panels 12, 14 along horizontal score lines 24—27, as shown. A pair of first side flaps (dust flaps) 28, 29 are articulated to the first sidewall panel 11 along horizontal score lines 30, 31. A pair of second side flaps (dust flaps) 32, 33 are articulated to the second sidewall along tear lines 34 which connect the score lines 24, 25 and 26, 27. In accordance with the invention, the tear lines 34 are defined by cuts 35 (FIG. 3) which are impressed from the outer side of the blank and do not perforate the inner plastic coating 36; thereby assuring the moistureproofness of the finished carton. Advantageously and as shown, all of the carton flaps are separated from one another by cuts 40 which terminate short of the horizontal score lines in order to score lines in order that the outflowing of all of the flaps will form tufts at the carton corners pursuant to the teachings of U.S. Pat. No. 2,886,231; No. 2,795,364; and No. 2,867,159, which are known to the art as the "Expresso" patents.
In accordance with a most important aspect of the invention, lines of weakness 37, comprised of a series of check-shaped cuts 38 which are impressed from the outside of the carton and extend completely therethrough, delineate delaminable zones or strata 39 adjacent the carton end edges at score lines 24—27. Furthermore and in accordance with the principles of the invention, the apices of the check-shaped cuts 38 lie along a line which is generally coincident with the edges 51 (FIG. 4) of the sealing membranes 50 (FIG. 4) which are subsequently applied to the open ends of the carton to seal the same. It will be appreciated that all of the aforementioned cuts, scores, perforations, etc., may be impressed from the outside of the blank when the blank is cut from stock laminate material.

In accordance with the invention, an easily openable membrane end sealed carton is fabricated from the blank 10 as follows: The blank is first formed into a collapsed carton tube by folding panels 14, 15 about the score line 18, then folding sidewall panel 11 about the score line 16, and finally gluing or otherwise suitably adhering the underlying glue flap 15 to the overlying sidewall panel 11. As will be understood, the flattened tubes may be economically and conveniently shipped from the manufacturer to the packaging plant where they are to be squared and filled most advantageously by machinery embodying the concepts disclosed in the aforementioned U.S. Pat. No. 2,867,159.

Preparatory to filling, the carton tube is squared, and then the bottom side or dust flaps 29, 33 and bottom end flaps 22, 23 are outfolded into a horizontal plane, thereby forming fibrous tufts at the corners of the cartons. Thereafter, the sealing membrane 50 is heat sealed to the outfolded flaps in a manner whereby the edges 51 of the membrane lie generally along and/or between the lines of weakness 37 defined by the check cuts 38. The bottom end closure is then completed by infolding the dust flaps 29, 33; then infolding the end flap 23; infolding the flap 22; and, finally, suitably securing by adhesive or otherwise the overlap portion 22' of the flap 22 to the overlap portion 23' of the underlying flap 23. At this stage, the carton may be filled with a liquid, semiliquid, granular or pulvulent material or the like, through the open top end after which the top end is sealed with another membrane 50 and completed in the identical manner as that described for the bottom end.

The completed end structures, a plan view of which is shown in FIG. 2, will include a compund tear strip 53 formed by the adhering of the overlap flap portions 22', 23', and 20', 21'. To facilitate removal of the tear strip 53 and to emphasize its presence, notches 54 are formed in the end flaps 20—23, as shown in FIG. 1. While the described carton is openable from both ends, it will be understood that the opening arrangement need be formed only at one end.

In accordance with the principles of the invention, the new carton may be opened simply and efficiently by the consumer as follows: The compound tear strip 53 is removed by grasping the end located between the notches 54 and tearing upwardly and outwardly, a motion which severs the overlap portions 22', 23' from the remainder of the end flaps 22, 23. Thereafter, the dust flap 33 is grasped and twisted, a motion which will sever it from the carton and begin the fiber tearing delamination of the foil layer of the paperboard carton from the paperboard portion 9 of the remaining portions of the remaining portions of the flaps 22, 23 along the delamination zones 39. As explained hereinabove, the absent the narrow delamination zones 39, it would be very difficult, if not impossible, for a consumer to peel or to otherwise delaminate the membrane 50 from the flaps 22, 23, for, in such a case, it would be necessary to over-

come the foil-paperboard bonds of the very large end flap areas.

In an alternative form of the invention, intended for applications in which less than all of the carton contents are to be dispensed at one time, a "lift open" type of end flap arrangement may be employed in lieu of the compound tear strip 53. In this version of the carton, all of the elements are identical to those described hereinabove with the exception of the end flap configurations which differ only slightly. That is to say and as shown in FIGS. 5 and 6, the last folded end flap 23a is provided with a tab 70, while the first folded and underlying end flap 22a is provided with a mating slot 71. When the carton is initially closed, the flap 23a is adhered to the end flap 22a with an adhesive which forms a bond which may be broken without substantial effort. The carton is opened by lifting the flap 23 to break the aforementioned bond; then severing the dust flap tab 22; and, finally, peeling back the membrane 50 to effect fiber tearing delamination in the manner described hereinabove. As in the carton of FIGS. 1—4, the foil F of the carton of FIGS. 5 and 6 will delaminate from the end flaps 22a, 23a, along the zones 39 by virtue of the cuts 38. It should be appreciated that, although the delamination zones 39 are established at the inner surfaces of the carton blank, the check cuts 38 which delineate those zones are impressed from the outside of the blank. Therefore, the blanks of the invention may be manufactured by conventional procedures and without multiple cutting and scoring operations.

It should be understood that the cartons of the invention herein illustrated and described are intended to be representative only, as certain changes may be made therein without departing from the scope of the invention. For example, for certain applications, the lift open configuration and/or the tear strip configuration may be arranged to open only half of the top and/or the bottom of the carton. Accordingly, reference should be made to the following appended claims in determining the full scope of the invention.

I claim:

1. An end sealed carton fabricated from a thermoplastic coated sheet material including a paperboard layer and a barrier layer, said carton comprising:
   a. a carton body having consecutively articulated first side, front wall, second side and rear wall panels;
   b. flaps articulated to the ends of each said wall panels along hinge lines;
   c. a sealing membrane having parallel side edges;
   d. means strongly bonding said membrane to the inner surfaces of all said flaps to close off the ends of said carton;
   e. a line of weakness formed in each of a pair of said flaps at one end of the carton body proximate to said hinge lines and generally coincident with said parallel side edges of the membrane;
   f. the lines of weakness with said hinge lines thereby delineating the edges of narrow delamination zones in the inner stratum of the paperboard of said flaps; and
   g. at least one of the remaining flaps at said one end of the carton being freely severable from said carton body along its hinge line.

2. The carton of claim 1, in which:
   a. the lines of weakness are formed by a series of check-shaped cuts impressed through the blank from the outer side thereof.

3. The carton of claim 1, in which:
   a. the flaps having said lines of weakness are adhered and the portions lying between said lines of weakness constitute a readily removable compound tear strip.

4. The carton of claim 1, in which:
   a. one of the pairs of flaps having said lines of weakness therein further includes a tab portion at its free edge while the other flap of said pair further includes a mating slot portion.

5. The carton of claim 1, in which:
a. said freely severable flap is articulated to said carton body by cuts impressed partially, but not completely, through the sheet material.

6. The carton of claim 1, in which:
   a. said front and rear walls are wider than said sidewalls;
   b. said lines of weakness are formed in the flaps articulated to said front and rear walls.

7. A one-piece paperboard blank for an end-filling carton adapted to be end sealed with a membrane of predetermined width, comprising:
   a. first sidewall, front wall, second sidewall, rear wall, and glue flap panels consecutively articulated along parallel vertical score lines;
   b. dust flaps articulated to the ends of said sidewall panels along horizontal fold lines, at least one of said dust flaps is articulated to a sidewall panel along a line of severance;
   c. end flaps articulated to the ends of said front and rear wall panels along horizontal score lines;
   d. delaminable narrow strata of paperboard formed in said end flaps and bounded by said horizontal score lines and lines of weakness parallel thereto;
   e. said lines of weakness being defined by a series of cuts and being arranged to be mutually spaced a distance substantially equal to said predetermined width of the membrane sealing material when said blank is formed into a parallelepiped carton tube and said end flaps are outfolded into a horizontal plane, whereby said delaminable strata may be readily separated from the remainder of said carton tube along with said membrane.

8. The blank of claim 7, further characterized in that:
   a. said cuts are check-shaped.