

[54] **PACKAGING METHOD AND CONSTRUCTION**

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[51] Int. Cl. **B65d 85/48; B65d 5/50**

[58] Field of Search **206/62 R, 46 FR, 45.14, 206/45.19, 448, 521; 229/14 C, 14 BE, 14 B**

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[57] **ABSTRACT**

An open-ended carton having side walls and integral flaps for closing the open top and bottom ends is arranged to retain therein a corrugated paperboard support sheet having tabs arranged to be folded over and clamped to the edges of an elongated plate-type frangible article for containment within the carton, with other tabs coactingly engaged intermediate doubled portions of carton flaps at both top and bottom ends of the carton to retain the support and the article against movement in the carton. Ends of the support sheet are folded to form columnar spacers extending from the face of the support opposite the face against which the article abuts toward a side of the carton and providing vertical support and rigidity between the flap-closed ends of the carton. The columnar elements are triangular with the edge facing the side of the carton being scalloped for controlled crushability in impact.

9 Claims, 11 Drawing Figures

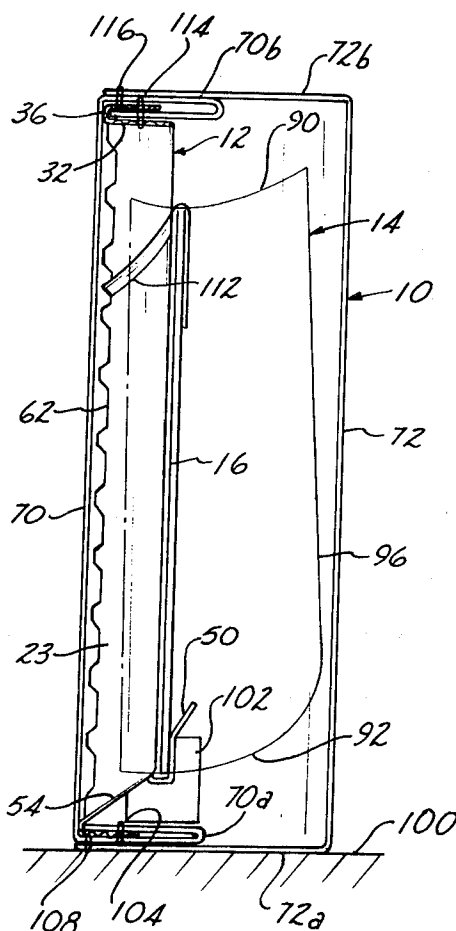


Fig-1

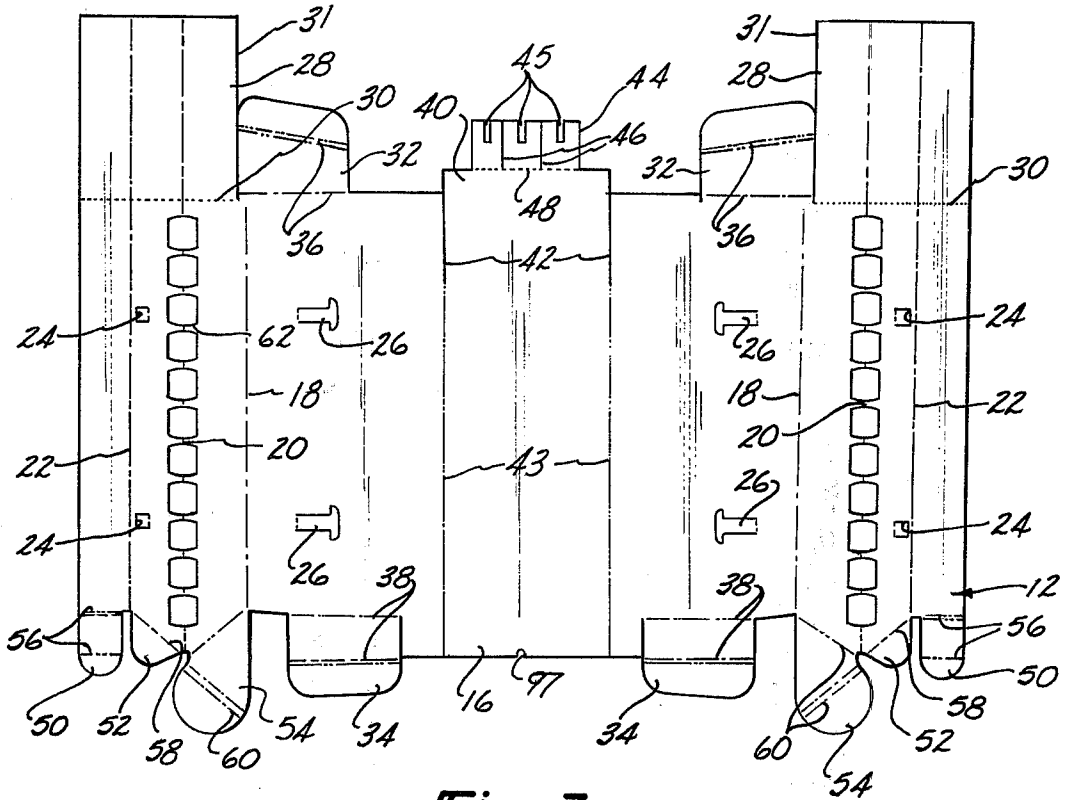


Fig-3

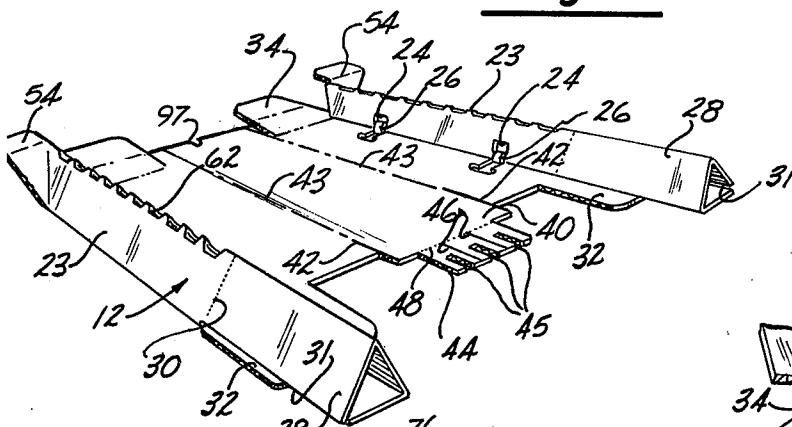


Fig-2

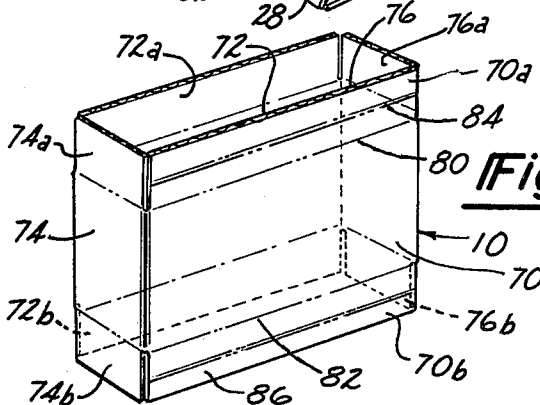
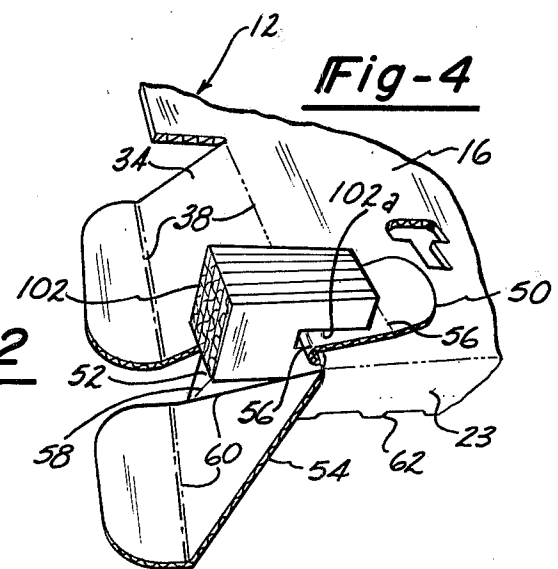
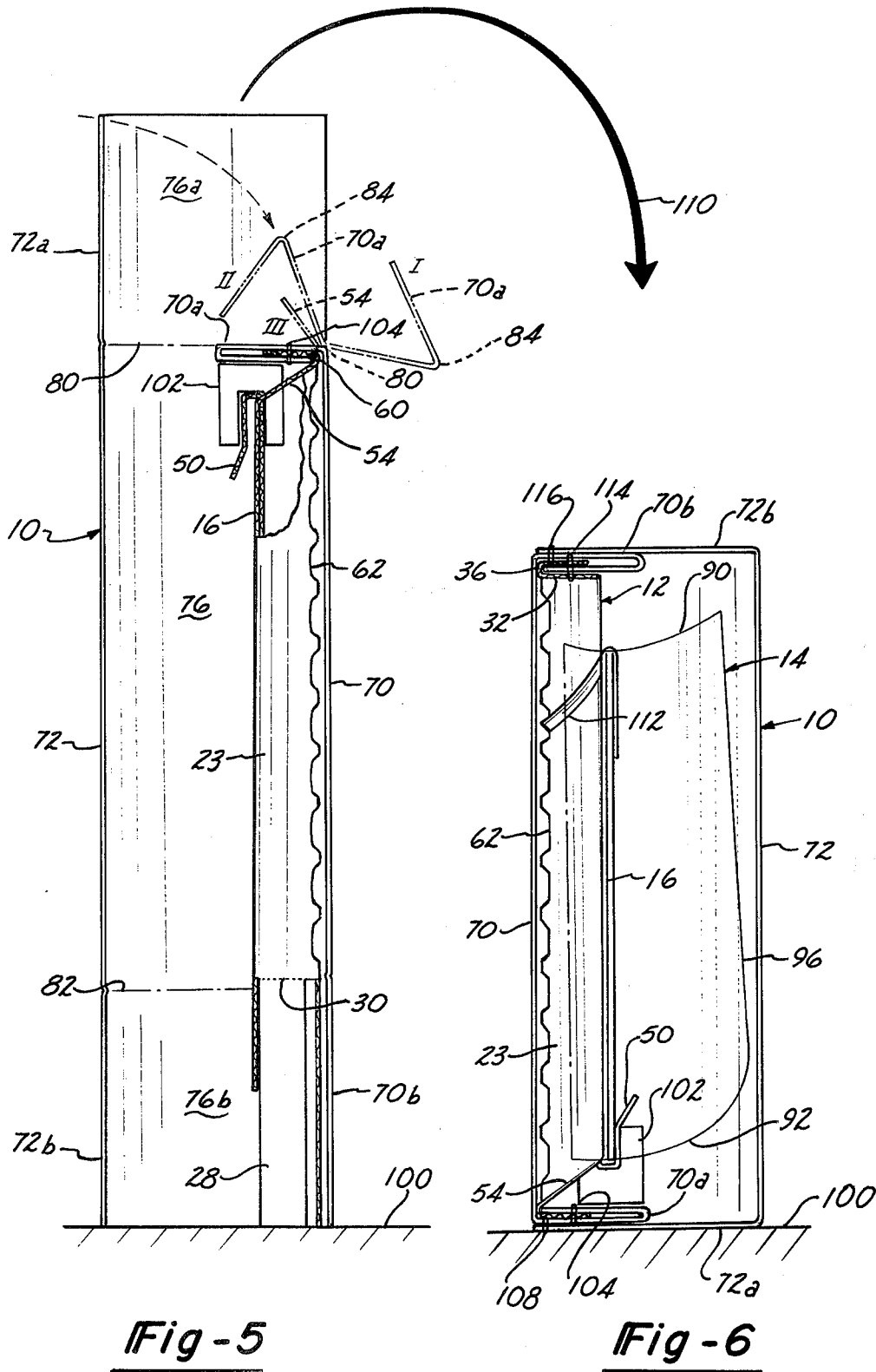


Fig-4





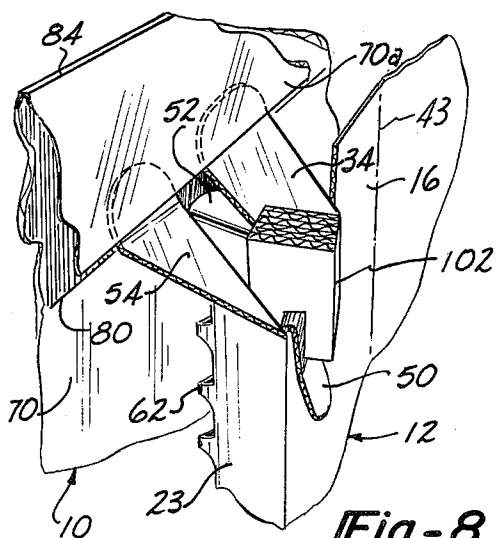


Fig-8

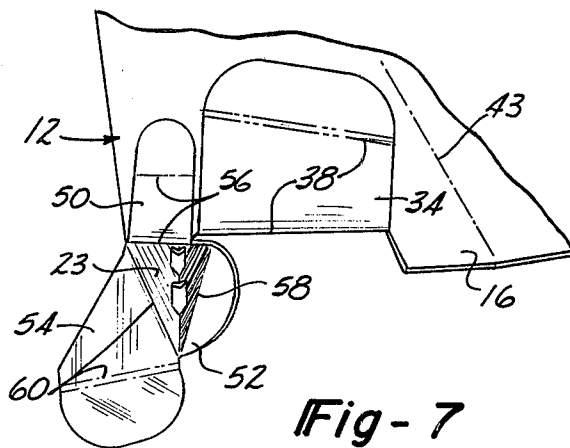


Fig-7

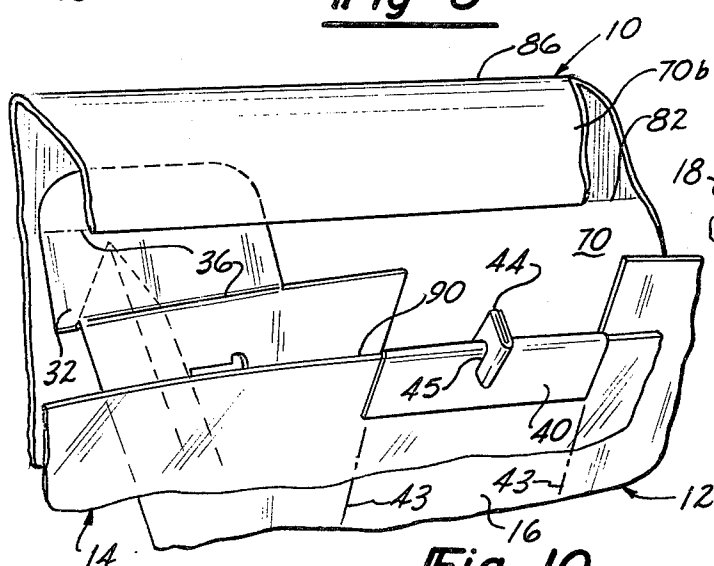


Fig-10

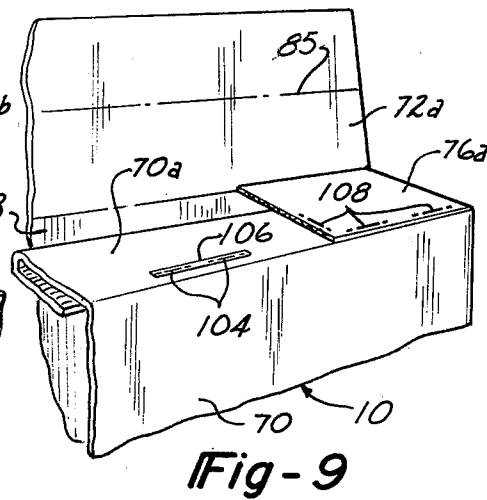


Fig-9

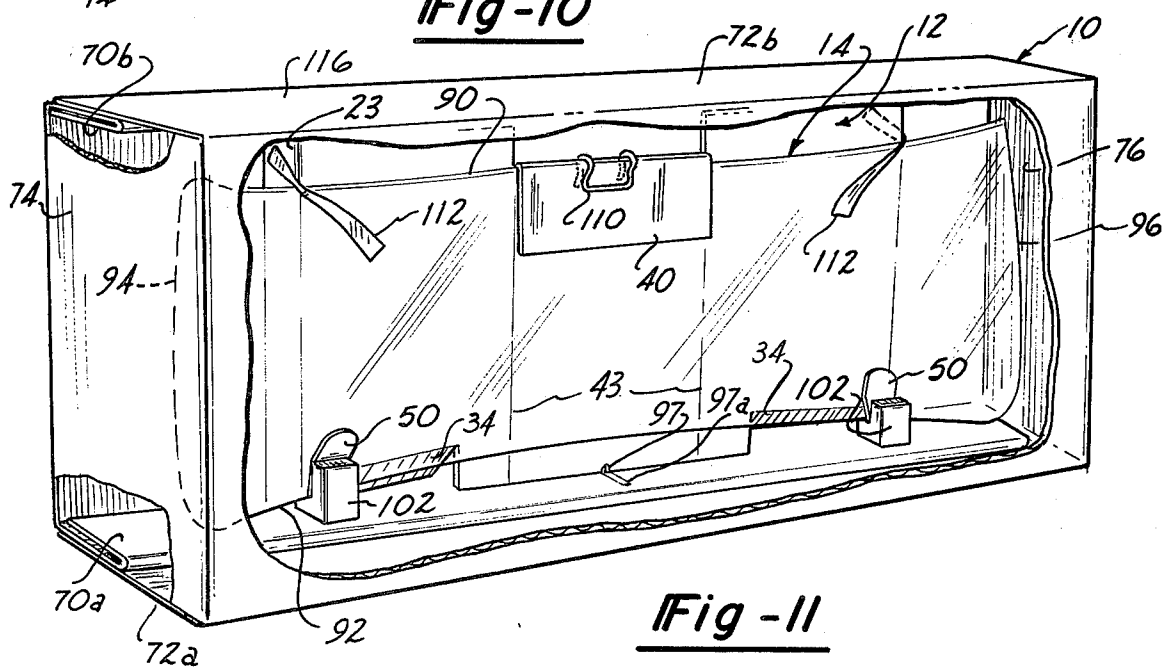


Fig-11

PACKAGING METHOD AND CONSTRUCTION

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates primarily to packaging or articles such as vehicle windshields and the like.

2. Description of the Prior Art

The following U.S. patents on such containers are known to me: No. 2,806,592 issued Sept. 17, 1957; No. 2,917,166 issued Dec. 15, 1959; No. 2,919,011 issued Dec. 29, 1959; No. 2,967,009 issued Jan. 3, 1961; No. 3,389,785 issued June 25, 1968; No. 3,389,786 issued June 25, 1968; No. 3,414,124 issued Dec. 3, 1968, and No. 3,519,244 issued July 7, 1970, all but No. 2,806,592 having been issued to an assignee of my inventions.

The above patents all disclose various packaging structures intended to enclose a sheet or sheets of glass or frangible material within a carton and space the glass from the ends and sides of the carton in a fashion to minimize damage. The support structures inserted in the cartons and to which the glass is secured are arranged to be secured in turn by various methods to various portions of the carton.

Problems with such constructions not only are that they sometimes fail to adequately protect the articles during handling, shipping and storage, but fabrication and packaging methods are expensive and time consuming.

SUMMARY OF THE INVENTION

The present invention solves the aforesaid problems by providing a basically two-part packaging construction, one part being an open-ended carton having flaps for closing the ends, and an integral support structure insertable in the carton and having various portions foldable to provide necessary spacer elements, tabs for engaging with the edges of the packaged article and other tabs engageable intermediate double carton flaps to hold the support structure and its article in a safe and secured position within the carton. The spacer elements not only provide resistance to crushing and impacts, but give superior stacking strength to the package as a whole. The support structure also is arranged to be readily formed, secured to the article and secured within the carton with a minimum number of manipulations and final stapling operations.

BRIEF DESCRIPTION OF THE DRAWINGS

For a more complete understanding of the invention, reference may be had to the accompanying drawings illustrating a preferred embodiment of the invention in which like reference characters refer to like parts throughout the several views, and in which:

FIG. 1 is a plan view of a die-cut paperboard support structure for use in the present invention;

FIG. 2 is a perspective view of an open-ended carton for cooperative use in the present invention with the structure of FIG. 1;

FIG. 3 is a perspective view of the structure of FIG. 1 illustrating the formation of spacer elements from portions of the structure;

FIG. 4 is a fragmentary perspective view illustrating a step in the formation of the support structure;

FIG. 5 is a vertical cross-sectional view, partially cut away, of the support structure of FIG. 1 as initially in-

serted into the carton of FIG. 2 and illustrating steps in securing flaps of the carton to the support structure;

FIG. 6 is a vertical cross-sectional view illustrating the support structure of FIG. 1 with an article secured thereto and fully enclosed within the carton of FIG. 2;

FIG. 7 is a fragmentary perspective view illustrating a portion of the support structure in an intermediate stage of assembly;

FIG. 8 is a fragmentary perspective view illustrating a step in the engagement of carton flaps with portions of the support structure;

FIG. 9 is a fragmentary perspective view illustrating a step in the closing of the carton;

FIG. 10 is a fragmentary perspective view illustrating an intermediate stage in the assembly of the support structure with the article and the enclosing carton; and

FIG. 11 is a perspective view, partially cut away, illustrating the completed packaging assembly.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The major components of the packaging assembly are a preferably corrugated relatively firm paperboard carton 10 (FIG. 2) and a preferably corrugated relatively firm paperboard support structure 12 (FIG. 1) formed, arranged and assembled in coacting fashion to contain and protect an article 14 (FIG. 11), which in the present case is shown as being a glass vehicle windshield, or the like frangible elongated plate element, having a contour and size which may vary depending on the vehicle or other use for which it is intended. It will be apparent that the present carton and support structure, with or without modification, may be used for packaging a wide variety of sizes and shapes of such articles. Note that the longitudinal lines of the paperboard corrugations extend between the open ends of the carton 10 and from left to right, as FIG. 1 is viewed, of the support structure 12, so that the corrugations of the support structure 12 extend normal to the corrugations of the carton 10 when finally assembled.

The support structure 12 is formed primarily from an integral preferably die-cut paperboard sheet 16 having an initial configuration when cut as shown in FIG. 1 and provided with appropriate creases for folding. For clarity, creases intended to be folded toward the viewer in FIG. 1 are shown thus (-.-.-) while creases intended to be folded away from the viewer in FIG. 1 are shown thus (-.-.-.-). Solid lines (—) in the sheet represents cuts, while perforations or tear lines are shown thus (.....).

Ends of the sheet 16 are creased as at the phantom lines 18, 20 and 22 in directions normal to the corrugations for folding into parallel triangular spacer elements 23 as illustrated in FIG. 3. Holes or tab cut-outs 24 therein are adapted to be engaged by the enlarged portions of T-shaped tab elements 26 punched and bent outwardly from the sheet 16 as shown in FIG. 3 to hold the triangular spacer elements 23 in place.

These spacer forming portions of the sheet 16 are extended as at 28, and are readily severed from the sheet 16 as will be hereinafter described by virtue of perforated or slotted tear lines 30 provided as shown.

Tab portions 32 and 34, cut as shown in FIG. 1 to extend from the sheet 16, are respectively provided with single and double fold creases as at 36 and 38 for subsequent formation as will be explained, and are disposed so that the triangular elements 33 when formed will be

in line with and overlie the tabs 32 and 34 as seen in FIG. 3. Side edges 31 of the extensions 28 are offset from the fold lines 18 to permit the tab portions 32 to extend outwardly of the spacer elements 23 as shown and to permit the assembler to grip them readily when they are to be severed or torn off from the main portion of the spacer elements 23.

Another tab 40 is cut from a central portion of the sheet 16 along the lines 42, and in one embodiment of the invention has an extended element 44 slotted as at 45 and provided with fold creases 46, to be readily severed from the tab 40 by virtue of perforations or slots provided along a tear line 48.

Further tabs 50, 52 and 54 are provided in the end portions of the sheet 16 as terminal parts of the spacer elements 23 and respectively have single and double fold creases 56, 58 and 60 as illustrated.

The spacer elements 23, along the crease lines 20, are each provided with a row of curve-sided openings 62 which, when the spacer elements 23 are formed, will present a scalloped appearance on one triangle edge as illustrated in FIG. 3.

FIG. 2 illustrates in perspective the preferred opened carton 10 as initially unfolded from a flat storing configuration, having opposite sides 70 and 72 spaced and connected by integral sides 74 and 76. Extending from and integral with the sides 70, 72, 74 and 76 respectively are flaps 70a and 70b, 72a and 72b, 74a and 74b, and 76a and 76b arranged to be folded inwardly along crease lines 80 and 82, extending peripherally around the top and bottom edges of the sides 70, 72, 74 and 76, to thereby close the open ends of the carton in a manner as will be explained. In addition, the side flaps 70a and 70b (and if desired the side flaps 72a and 72b) are respectively provided with double crease lines 84 and 86 extending parallel to the crease lines 80 and 82, for folding in order to secure and coact with the support structure 12 as will also be described hereinafter.

FIGS. 3 through 11 illustrate various steps in the formation and coaction of the carton 10 and support structure 12 in providing the support and protection to the packaged article 14, which, as previously described, comprises an elongated sheet member having upper and lower edges 90 and 92, and side edges 94 and 96 as indicated best in FIG. 11.

The first step is the folding of the support structure sheet 16 to form the triangular spacer elements 23 as previously described and shown in FIG. 3. Next, with the carton positioned as indicated in FIG. 2 and resting with an open side up on any convenient surface (reference numeral 100 in FIGS. 5 and 6), the support structure 12 is inserted through the top open end of the carton 10 so that the extensions 28 of the spacer elements 23 rest as shown in FIG. 5 on the surface 100 to elevate the bulk of the sheet 16 to a position within the main body of the carton 10 in which the main portion of the element 23 (excluding the extension 28) extends from near the carton crease line 82 to near the crease line 80 as indicated. The extensions 28 are dimensioned the same or nearly the same as the lower carton flaps 70b, 72b, 74b and 76b for this purpose. A small notch 97 located centrally of the sheet 16 will be lined up with a central mark 97a (FIG. 11) on the flap 70a of the carton 10 for proper central positioning of the support structure 12.

Either before or following the placement of the support structure 12 within the carton 10, the tabs 50 provided on the end corners of the sheet 16 and which, after the spacer elements 23 have been formed, will be found to extend from the base sides of the elements 23, are reverse folded along the innermost double crease line 56 to overlie a face of the sheet 16 opposite to the face from which the spacer elements 23 extend, and then the end of the tab 50 is bent up and slightly outwardly of the sheet 16 along the outermost single crease line 56, as indicated in FIG. 7. A support block element 102, formed preferably from laminated or folded corrugated paperboard and having a slot 102a, is engaged as shown in FIG. 4 over the tab 50 to hold it in place, leaving a space between it and the face of the sheet 16. The tab 52, which extends from one leg end of the spacer element 23, is bent outwardly to the side along the crease line 58 to underlie the tab 34 which, after the formation of the spacer element 23, will have a portion thereof underlying same. The tab 34 after being bent in the fashion shown in FIG. 7 to break the single crease line 38 is then reverse bent to the position shown in FIG. 4 overlying the tab 52. Also, the tab 54, extending from the other leg end of the triangular spacer element 23, will be bent outwardly therefrom along the crease lines 60 to take the position shown in FIGS. 4 and 7.

With the support structure 12 inserted in the carton 10 as indicated in FIG. 5, the tab 54 as well as the tab 34 (lying in the same plane and hence not seen in FIG. 5) will lie generally in the position indicated by phantom lines. The flap 78 is then bent outwardly along the crease line 80 and doubled along the crease line 84 to the position indicated at "I", then folded inwardly to the position indicated at "II". The outer portion of the flap 70a is then doubled completely to entrap the outer portions of the tabs 54 (and 34), finally taking the position indicated at "III" with the outer extremity of the tabs 54 (and 34) sandwiched between the doubled portions of the flap 70a, with the extremity thereof engaging flat on the outer facing top surface of the block element 102. This operation tends to draw the entire support assembly 12 toward the side 70 of the carton 10, but the tabs 54 and 34 are so dimensioned that the folded corner at the crease lines 60 (and 38) will abut the inner surface of the carton side 70 and space the scalloped edges 62 of the spacer elements 23 from this inner surface as shown in FIG. 5.

The formation of the tabs 50, 52, 54 and 34 and the intermediate step of doubling the flap 70a to engage the outer portions of the tabs 34 and 54 is illustrated from another perspective viewpoint in FIG. 8 to clarify the foregoing described operation. Note that double crease lines are provided on the tabs and flaps on lines which are to be bent around the edge of the paperboard portions to accommodate the other layer.

Next, as shown in FIG. 5, staples 104 are driven through the doubled flap 70a and the end of the tab 54 sandwiched therein. The flap 70a will preferably have an imprinted mark 106, as shown in FIG. 9, to identify the area through which staples 104 will pass to properly staple through the tab 34 or the tab 54, or preferably both tabs.

Next, the end flaps 74a and 76a are folded in over the ends of the side flap 70a as indicated in FIG. 9 (only one end flap 76a shown — end flap 74a being similar), and stapled thereto as indicated at 108.

Finally, the other side flap 72a is folded over the top end of the main body of the carton 10 and stapled as necessary to the side flap 70a and end flaps 74a and 76a. In FIG. 9, this side flap 72a is illustrated as being provided with a double crease 85 similar to the crease 84 in the flap 70a so that either flap may be doubled to engage the tabs of the support structure in the manner described, depending on which way the support structure 12 is inserted in the carton 10. Provision of this extra crease simplifies positioning from the assembler's standpoint since he can readily work from either side of the carton. The lower flap 72b may be provided with a similar crease (not shown) in this case.

The upper end of the carton 10 and the upper end of the support structure 12 as thus bound together by means of the coating and finally stapled tabs and flaps to form a solid, structurally sound, integrated base for the package.

Next, the assembler inverts the carton with its contained support structure 12, as indicated by the arrow 110 leading from FIG. 5 towards FIG. 6. The open end of the carton 10 with its flaps 70b, 72b, 74b and 76b open and the spacer element extension 28 protruding therefrom now face upwardly to the assembler. First, the extensions 28 are severed or torn off along the perforation lines 30 and are discarded. The glass article 14 is next lowered into the carton and its bottom edge 92 inserted in supporting position into the now upwardly facing opening provided between the tabs 50 and the face of the sheet 16 which faces the side 72 of the carton 10.

Then the element 44 upstanding from the top of the tab 40 (seen in FIGS. 1 and 3) is severed or torn off along the perforation line 48 and folded to form a laminated clip element. The tab 40 is folded over the top edge 90 of the article 14 as shown in FIG. 10, and held in place thereon by engagement in the slot 45 of the element 44 as provided for this purpose. The line on which the tab 40 is folded over the top edge 90 of the article 14 will depend on the vertical height of the article, which may vary, and thus, preferably, no crease need be provided. The element 44 may be eliminated entirely and the tab 40 clamped to the upper edge 90 of the article 14 instead by means of a simple spring wire clip 110 or other desired device, as illustrated in FIG. 11.

The article 14 is further secured to the support structure 12 by the use of a pair of lengths of high cut-resistant adhesive-backed tape 112 as illustrated in FIGS. 6 and 11. The tapes 112 are secured as shown to the outermost sides of the spacer elements 23 and extend over the top edge 90 of the article 14 and across a portion of the face of the article. This, together with frictional engagement between the article 14 and the broad expanse of the sheet 16, effectively prevents the article 14 from shifting endwise within the carton 10, thereby maintaining the side edges 94 and 96 spaced a sufficient distance from the end walls 74 and 76 of the carton to protect the article edges from damage.

After the article 14 is thus secured to the support structure 12, the flap 70b is doubled along the double crease line 86 and folded inward along the single crease line 82 in a fashion similar to that described for the flap 70a, the tabs 32 being bent along the double crease lines 36 as shown in FIG. 10 so that the outer extremity of the tabs 32 will be engaged between the doubled portions of the flap 70b, which is then folded inward

completely as shown in FIG. 6 to overlie the top edges of the spacer elements 23 from which the extensions 28 have been removed. The tabs 32 are dimensioned so that the outermost double fold line 36 adjacent the side 70 of the carton 10, similarly as the fold lines 38 and 60 of the tabs 34 and 54, thereby space the scalloped edge 62 of the spacer element 23 for its entire length from the side 70 of the carton 10, illustrated.

Staples 114 are next driven through the doubled flap 70b and the tabs 32 to retain them in place, after which the flaps 74b and 76b are folded inwardly in a fashion similar to the flap 76a shown in FIG. 9, being then stapled to the doubled flap 70b in a likewise similar fashion. The flap 72b is finally folded over to completely close the upper end of the carton 10, and its edge is stapled as by staples 116 to the underlying flaps and other elements of the support structure 12 where they may in turn underlie the flaps.

It will be noted that the outermost crease lines 36 of the tabs 32 and the outermost crease lines 38 and 60 respectively of the tabs 34 and 54, are preferably biased so that when the outer extremities of these tabs 32, 34 and 54 are enfolded between the doubled portions of the carton flaps 70a and 70b to draw the support structure 12 toward the carton side 70, a curvature of the support structure sheet 16 can thus be effected to generally conform with the expected curvature of the article 14, being facilitated by the provision of vertical crease lines 43 on the sheet 16 as seen in FIGS. 1, 3 and 11.

Then, when the article 14 is inserted into the space between the tabs 50 and the sheet 16, the tab 40 folded over the top edge 90 and clamped thereto, and the article 14 then taped by the tape 112 to the spacer elements 23 as previously described, the sheet 16 will be drawn into substantially total surface contact with the article 14, thereby providing security, frictional engagement, and a firm support for the article 14.

The scalloped edges 62 of the spacer elements 23, previously described as being spaced slightly from the carton side 70 by virtue of the dimensioning of the flap-embraced tabs 34, 36 and 54, serve a particularly important function. As noted, edges of the scallops are curved to provide increasing material bulk from the outermost edge toward the mass of the spacer elements 23 such that, in the event the carton side 70 is crushed inwardly in any manner, the scalloped edge 62 will also crush to absorb energy but with increasing resistance, transmitting the energy without shock to the main body of the support structure 12, thereby minimizing the danger of breaking the article 14 which is closest to this carton side 70.

Also, it will be seen that the many layers of material provided by the doubled flaps 70a and 70b, the tabs 32, 34, 50, 52 and 54, as well as the clamping element 102 bearing on the lower ends of the vertical spacer elements 23, provide an extremely strong columnar support from lower to upper end of the carton 10 both to resist damage in handling and shipping and to provide stacking strength to the cartons 10 when stored one on top of the other. Meanwhile, the article 14 secured to the support structure 12 is effectively prevented from shifting within the carton 10 in any direction, and is well protected from damage by any expected shock imparted to the carton 10. The carton 10 and support structure 12 thus become a complete shock and energy transmitting and resisting package, providing superior

protection to the article 14 over paperboard package assemblies made heretofore.

An alternative method for assembling the components shown and described hereinbefore is to first form the support structure 12 with its spacer elements 23 as in FIG. 3 and its tabs 50 prepared and held by the block elements 102 as in FIG. 4, then secure the article 14 to the support structure 12 with a lower edge of the article inserted into the spaces between the tabs 50 and sheet 16, the upper edge secured by the folded over tab 40 and clip 44 or 110 shown in FIGS. 10 and 11, as well as by the tapes 112 shown in FIGS. 6 and 11. The support structure 12 with the articles 14 thus secured thereto is next inverted to the position of FIG. 5 and lowered into the carton to rest on the spacer extensions 28. The flap 70a is folded and stapled to embrace and secure the tabs 34 and 54 as previously described and shown in FIGS. 5 and 7, and the other flaps 72a, 74a, 76a folded and stapled as described and shown in FIGS. 5 and 9 to close this end of the carton 10. Finally, the carton 10 with its contained components is inverted to the position of FIG. 6, the flap 70b doubled and stapled to embrace and secure the tabs 36 as previously described and shown in FIGS. 6 and 10, and the remaining flaps 72b, 74b, 76b folded and stapled as described and shown in FIG. 6 to close the second end of the carton 10. The final package is now the same in all respects as the package assembled as previously described.

In summary, from the foregoing description it will be seen that an extremely simplified yet highly effective packaging assembly has been provided for containment and protection of a packaged article, being very inexpensive relative to packages heretofore used for the purposes described, and being readily assembled by relatively unskilled handlers. The package, rather than merely being a carton and a contained support structure, comprises coacting structures both during assembly of the components and after packaging is completed, increasing the capabilities of both carton and support structure to perform their functions.

Although I have described only one preferred embodiment of my invention, it will be apparent to one skilled in the art to which the invention pertains that various changes and modifications may be made therein without departing from the spirit of the invention or the scope of the appended claims.

I claim:

1. A packaging assembly for containment and protection of an article comprising

a carton having side walls and at least one open end operable to be closed by flaps formed integrally with at least some of the walls,

a support structure inserted in said carton, said structure having means securing an article thereto and at least one locking element extending therefrom, and

one carton flap being folded upon itself to embrace said locking element in reverse fold relationship thereby retaining said support structure against movement in said carton.

2. A packaging assembly for containment and protection of an article, comprising

a carton having side walls and opposite open ends operable to be closed by flaps formed integrally with

at least some of said walls,

a support structure inserted in said carton, said structure having means securing an article thereto and locking elements extending therefrom, and one carton flap for each open end being folded upon itself to embrace a locking element thereby retaining said support structure against movement in said carton.

3. The assembly of claim 1 wherein said support structure comprises an integral sheet of relatively firm material having portions folded to form spacer elements spacing the bulk of said structure from one side of said carton and tabs folded to engage edges of said article to hold same against a face of said structure facing away from said one side toward an opposite side of said carton.

4. The assembly of claim 3 and including means clamping said tabs on said article edges.

5. The assembly of claim 1 wherein a second carton flap in its closed position overlies a portion at least of said one carton flap embracing said locking element whereby said flaps and said locking element are at least in part coextensive for stapling together.

6. The assembly of claim 1 wherein said one carton flap extends from a carton side wall at one open end, and being inwardly folded on a longitudinal line spaced between the flap outer extremity and the carton open end to embrace said locking element, the flap outer extremity thereby urging said locking element toward a side of said carton.

7. The assembly of claim 6 wherein said one carton flap in its folded position has its outer extremity in abutment with said locking element for holding it firmly into the juncture of said carton side wall and said flap.

8. The assembly of claim 1 wherein the carton and support structure each are formed of corrugated paperboard material.

9. A packing assembly for containment and protection of an article, comprising:

a carton having side walls and opposite open ends closeable by flaps formed integrally with at least some of said walls,

a support structure inserted in said carton and formed of an integral sheet of relatively firm material having portions folded to form on one side of said sheet spacer elements spacing the bulk of said carton and tabs folded to engage edges of said article to hold same against the other side of said sheet and spaced from all sides of said carton,

at least one carton flap and said support structure sheet having respectively integral elements coacting in reverse fold relationship with each other upon closing said carton ends to retain said structure in substantially immovable position within said carton,

said spacer elements comprising triangular tubes each having on edge facing one side carton, such tube edges having means for crushing under impact to absorb the shock thereof, said means comprising a scallop shape provided on each of said tube edges to progressively absorb and resist the energy of impact crushing said tube edges.

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