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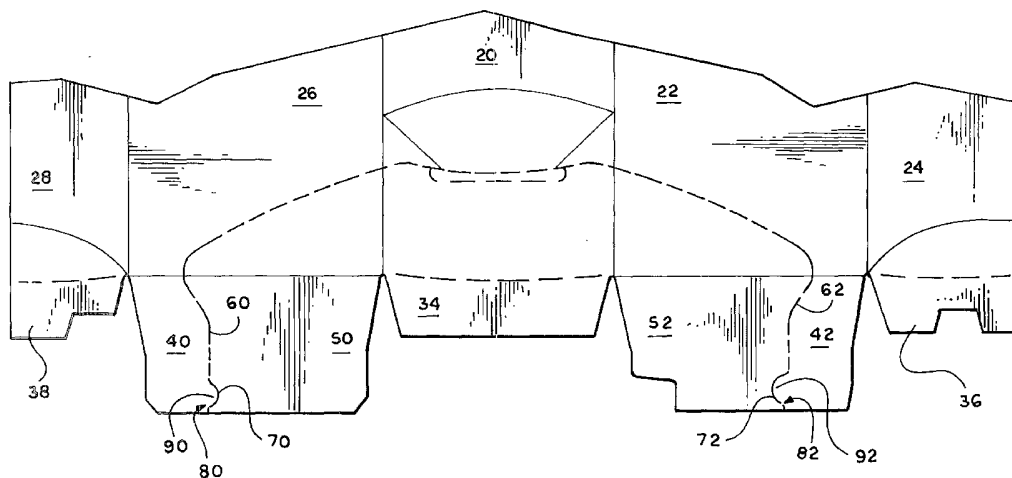
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(54) Title: SEVERABLE CARTON WALL



(57) Abstract: A severable carton wall includes a composite wall formed from a pair of panels (50, 52) joined along a seam (58), and a frangible line extending across the composite wall, traversing the seam, defining a line of severance. A segment of the frangible line that traverses the seam is an extensively weakened segment. The extensively-weakened segment is formed by terminal cut lines (70, 72) formed respectively in the panels (50, 52) that overlap to form the seam. The cut lines (70, 72) are disposed adjacent respective end edges (54, 56) of the panels.

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## SEVERABLE CARTON WALL

### Technical Field of the Invention

The invention relates to cartons, and more particularly to cartons having a wall severable along a frangible line of severance wherein the line of severance traverses a joinder of panels.

### Background of the Invention

Cartons made of flexible material, such as paperboard, are often used in a manner that requires that one of the carton walls be partially or fully severed to gain partial or full access to the interior of the carton. Sometimes access is for the purpose of removing or depositing articles such as beverage cans or bottles. Typically, the carton is severable along a frangible region or line such as a perforated line or tear strip. An example of a carton wherein at least a portion of the carton wall is severable is US patent number 5,518,111.

In order to be effective for the packaging of articles, a carton typically must be constructed in some type of arrangement wherein a partially or fully enclosed structure is formed. For example, a quadrilateral-shaped tubular structure such as the carton of US patent number 5,518,111. Cartons are typically erected from flat sheets known as blanks. To form such a closed carton structure, it is typically necessary to join certain regions of the blank in some fashion. The ends of carton panels are typically joined by adherence such as gluing. A seam is generally formed where the panel ends overlap.

Often, it may be desirable to sever a carton wall across a joinder of panels. It is generally more difficult to tear across a carton seam than an un-joined carton wall. The seam is essentially a reinforced region because it is multiple-ply and any adhesive used typically adds its own resistance to shearing. A carton wall may de-laminate, that is, come apart in layers, or otherwise have portions that give way in an undesirable manner due to the resistance to shearing presented by a seam. Thus, it can be appreciated that it would be useful to have a means for severing a carton wall across a seam.

### Summary of the Invention

5 In accordance with a preferred embodiment of the invention, a frangible line defines a line of severance by extending across a carton wall that has a seam. The frangible line is extensively weakened along a predetermined segment where it traverses the seam. Preferably, the predetermined segment is extensively weakened by substantially disjoining the panel regions on either side of the line. Disjoinder is preferably achieved by making the predetermined segment a cut line.

10 In accordance with another aspect of the preferred embodiment of the invention, the predetermined extensively weakened segment is arcuate.

15 In accordance with another aspect of a preferred embodiment of the invention, in the portion of each panel that overlaps to form the seam, the frangible line terminates in an arcuate extensively-weakened segment. The arcuate segments are disposed to substantially align with one another when the seam is formed.

20 In accordance with a further embodiment of the invention, the arcuate segments are at least slightly offset from one another when the seam is formed.

25 In accordance with still another embodiment of the invention, the terminal end of an extensively weakened line segment of a panel is frangibly joined to the panel adjacent the edge of the panel. Preferably joining is by means of a nick member.

Other advantages and objects of the present invention will be apparent from the following description, the accompanying drawings, and the appended claims.

### Brief Description of the Drawings

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Exemplary embodiments of the invention will now be described by way of example only, with reference to accompanying drawings in which:

Fig. 1 is a perspective illustration of a carton having a severable wall in accordance with a preferred embodiment of the invention;

Fig. 2 is a perspective view of the carton of Fig. 1 wherein a trough that is hinged to the carton along a frangible line also serving as a severance line has been flipped down;

Fig. 3 is a perspective view of the trough of Fig. 2 in removed condition with respect to the remainder of the carton;

Fig. 4 is an elevational view of the trough of Fig. 3;

Fig. 5 is a plan of a blank for forming the carton of Fig. 1; and

Fig. 6 is an enlarged plan view of a portion of the blank of Fig. 5.

#### Detailed Description of the Preferred Embodiments

Throughout the drawings, the same reference numerals are used to denote the same or like features of the invention.

Referring first to Fig. 1, therein is illustrated a carton 10 having a severable carton wall in accordance with the teachings of the present invention. For purposes of describing the invention, an elongated tubular carton 10 is illustrated. However, the teachings of the invention are not limited to any particular carton shape or configuration.

The carton 10 has an end region that terminates in a composite wall formed from panels that overlap along a seam 58. The seam 58 is the overlapping portion between panel edges 54 and 56. In the illustrations of the erected carton, one panel edge 54 or 56 will be

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shown as hidden through use of a dotted line. For convenience of understanding the carton 10 structure will first be discussed. For this purpose, reference is now made simultaneously to Fig. 1 and Fig. 5. Fig. 5 is an illustration of a blank 12 for forming the carton of Fig. 1. The blank 12 is shown from its inner surface. That is, the carton 10 is formed by folding the blank 12 outwardly from the plane in which the illustration lies.

Using the disposition of the carton in Fig. 1 as a point of reference, a top panel, side panels 22, 26, and bottom wall panels 24, 28 are interconnected and form the basic tubular structure of the erected carton 10. A handle 21 is formed in the top panel 20. End structures of the carton are formed from what are typically referred to in the carton field as major and minor flaps.

The terms "flap" and "panel" will be used interchangeably in this discussion. Minor flaps 34, 36, 38 provide innermost closure for the end of the carton 10. For convenience and ease of understanding, the major flaps are described as left and right upper and lower portions. These orientations have been used as an aid in describing the invention and not as limitations upon its teachings. The right major flap (as viewed from a point of orientation facing the page illustrating the erected carton) has lower 40 and upper 50 portions. Likewise, the left major flap has lower 42 and upper 52 portions. Closure of the ends of the carton is accomplished by securing the end regions of the major flaps 40/50, 42/52 to one another in overlapping condition. The overlap of the end regions creates a seam 58 (as briefly mentioned above) defined between the edges 54, 56 of the major flaps.

A frangible line 60, 62 extends across each major panel 40/50, 42/52 and, in the carton illustrated, into other portions of the carton. The full extension of the frangible line defines a trough 100 that is separable from the carton 10. The trough 100 will be discussed later in this description. The frangible line 60, 62 is used as a reference point for denoting the lower 40, 42 and upper 50, 52 portions of the major flaps.

The frangible line 60, 62 may be any weakened line that facilitates separation of the panel portions lying on either side of the line. The invention contemplates frangible lines to

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include but not be limited to perforated lines, tear strips, fold lines and cut lines intermittently joined by nick members. In the carton-making field a "nick member" is generally considered to be an interconnecting sliver (or similar extremely small portion) of material bridging disjoined portions of material.

5

The frangible line that extends across the end wall of the carton results from the coincidence of the frangible line 60, 62 that extends across each major end flap 40/50, 42/52. Each frangible line segment that extends across the major flaps terminates at an edge 54, 56 of each major flap 40/50, 42/52. Each segment of the frangible line that extends across the seam (that is, the overlapping or overlapable portion of the major flap) is extensively weakened. That is, is more weakened than the other portion of the frangible line to enable even greater ease of separation. The extensively-weakened segments 70, 72 lie adjacent the edges of the major flaps. Extensive weakening may be accomplished by a deeper score or a more severely interrupted perforated line. In one aspect of the preferred embodiment of the invention, extensive weakening is accomplished by creating a cut line.

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In a further aspect of the preferred embodiment, each extensively-weakened line segment 70, 72 includes a nick member 80, 82 near the line segment's 70, 72 intersection with the flap edge 54, 56, particularly when a cut line is used. The nick member helps stabilize the edge region of the flap during erection of the blank 12 into a carton 10.

20

The frangible line 60, 62 creates a line along which portions of the carton wall that lie on either side of the line may be severed from one another. The frangible line also creates a hinge about which the opposing panel portions may be pivoted with respect to one another. Reference now may also be made to Fig. 2 wherein the frangible line serves as a hinge 64 between lower 40, 42 and upper 50, 52 major flap portions. The hinged portions may thereafter also be separated from one another by tearing along the hinge/frangible line. The extensively-weakened line segment 70, 72 of the frangible line helps lessen or eliminate the impact of the reinforced carton region resulting from the seam 58. Along the extensively-weakened segments 70, 72 there is no carton material that will inhibit tearing or bending. At most, only an adhesive such as glue that may be used in joining the flaps will be present.

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In accordance with another aspect of a preferred embodiment of the invention, the extensively-weakened line segments 70, 72 are arcuate. The arcuate line segment configuration facilitates greater ease of clean separation of panel portions and lessens the tendency of the panels to de-laminate at the seam 58. The curvature of the arcuate segments produces an offset between the line where tearing or shearing stresses are being primarily applied and the region of the seam 58 where stresses are applied. In the case where the lower and upper portions of the end wall are pivoted out of a single plane along the hinge formed by the frangible line, as illustrated in Fig. 2, the offset created by the curvature causes opposing panel portions to completely sever from one another on either side of the extensively-weakened, or cut, line. Thus, there is no connection of wall or panel portions across the seam 58 at this juncture. Once the seam has been eliminated, tearing along the frangible line is easily accomplished. The curvature of the arcuate line segments also results in the creation of protrusions 90, 92 on one side of the line segments and notches on the opposing side. The protrusions are reinforced because of the panel overlap. Thus, as can be seen in Fig. 2, an upright member is created in the erected carton that helps facilitate separation of the wall/panel portions along the seam 58.

The line segments are disposed for substantial alignment with respect to one another when the edge regions of the major flaps are overlapped and joined to one another. Although the invention teaches substantial alignment of the line segments 70, 72, in accordance with another aspect of the preferred embodiment, this alignment also contemplates a slight offset between arcuate segments. This offset is accomplished when one arcuate segment 72 has a curvature greater than the other arcuate segment 70. The difference in degree of curvature of the line segments 70, 72 can be more clearly seen in the enlarged view of a portion of the blank 12 illustrated in Fig. 6 and in the trough illustrations of Figs. 3 and 4 (which will be described in greater detail below). The resulting difference in size of protrusions 90, 92 can be seen in the exaggerated depiction of these features in Fig. 2. When the arcuate segments and protrusions are offset, the lower and upper wall portions may be more easily separated, particularly when pivoted, because clearance between the protrusion and notch is provided for. In the preferred embodiment, the arcuate segment 72 that lies within the inner ply of the

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seam 58 in flap 52 is made larger than the arcuate segment 70 that lies in the outer ply in flap 50 to provide the necessary clearance.

The invention is particularly useful in providing a hinge 64 that can subsequently  
5 serve as a line of severance for a trough 100 formed at the end of a carton 10. Figs. 1 and 2  
show the manner in which a frangible line inscribes a trough that can be pivoted downward to  
serve as a receptacle for articles such as cans 5. The pivoted trough can be removed by  
tearing along the hinge/severance line without resistance from the seam 58. The removed  
trough is shown in Figs. 3 and 4. These views also illustrate the offset of the arcuate lien  
10 segments 70, 72 discussed above.

The invention provides a means for reliably severing a carton panel across a seam  
while maintaining the integrity of the carton formation process. The invention essentially  
offsets a region of reinforcement (created by the seam) from the line of severance (a frangible  
15 line). Because of the teachings of the invention, severance of a carton wall at a predetermined  
region is attainable in a carton that has been formed in a typical manner with seams disposed  
as appropriate for its function. The invention enables a severance mechanism to be utilised  
without being limited by the disposition of a carton seam. As illustrated above, the invention  
is particularly useful in the case where the line of severance serves as a hinge prior to  
20 severance. In this manner, the reinforced seam is even further isolated from the line of  
severance.

Use of terms such as top, bottom, side, end, longitudinal and transverse are used for  
convenience and to provide a point of reference in the description of the preferred  
25 embodiment of the invention and are not meant to limit the scope of the invention.  
Modifications may be made in the foregoing without departing from the scope and spirit of  
the claimed invention.



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CLAIMS

1. A severable carton wall comprising:  
a composite wall formed from a pair of panels joined along a seam; and  
5 a frangible line extending across the composite wall, traversing the seam, defining a  
line of severance;

wherein a segment of the frangible line that traverses the seam is an extensively  
weakened segment, and

wherein the extensively-weakened segment is formed by terminal cut lines formed  
10 respectively in said panels that overlap to form said seam, said cut lines being disposed  
adjacent respective end edges of said panels.

2. The invention of claim 1, wherein said cut lines are disposed offset from each other to  
form the extensively-weakened segment .

15 3. The invention of claim 2, wherein each of said cut lines is arcuate, and the cut line  
in the panel that is disposed outermost with respect to the seam has a first radius at least  
slightly smaller than a second radius of the cut line of the innermost panel.

20 4. The invention of claim 2, wherein each of said cut lines includes a nick member  
proximate said end edge of a respective one of the panels.

5. A carton comprising:  
top, bottom and a pair of side walls interconnected to form a substantially tubular  
25 structure having at least one end region terminating in a composite end wall having a seam,  
said composite wall being formed from a pair of panels joined together along a seam; and  
a separable trough formed from a portion of the end region hingably and severably  
connected to the end wall along a frangible line that traverses the seam;

30 wherein a segment of the frangible line that traverses the seam is an extensively  
weakened segment, and

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wherein the extensively-weakened segment is formed by terminal cut lines formed respectively in said panels that overlap to form said seam, said cut lines being disposed adjacent respective end edges of said panels.

5 6. The invention of claim 5, wherein said cut lines are disposed offset from each other to form the extensively-weakened segment .

7. The invention of claim 6, wherein each of said cut lines is arcuate, and the cut line in the panel that is disposed outermost with respect to the seam has a first radius at least  
10 slightly smaller than a second radius of the cut line of the innermost panel.

8. The invention of claim 6, wherein each of said cut lines includes a nick member proximate said end edge of a respective one of the panels.

15 9. The invention of claim 5, wherein the trough is formed in part from the top wall, in part from the end wall and in part from the side walls, the trough being severably connected to the top and side walls.

10. The invention of claim 9, wherein said frangible line is disposed across the end wall  
20 and extends into the side walls so that the trough is severably connected to the side walls.

11. The invention of claim 10, wherein said frangible line extends into the top wall such that the frangible line extends across the top wall.

25 12. A blank for forming an erected carton having a severable carton wall, the blank comprising:

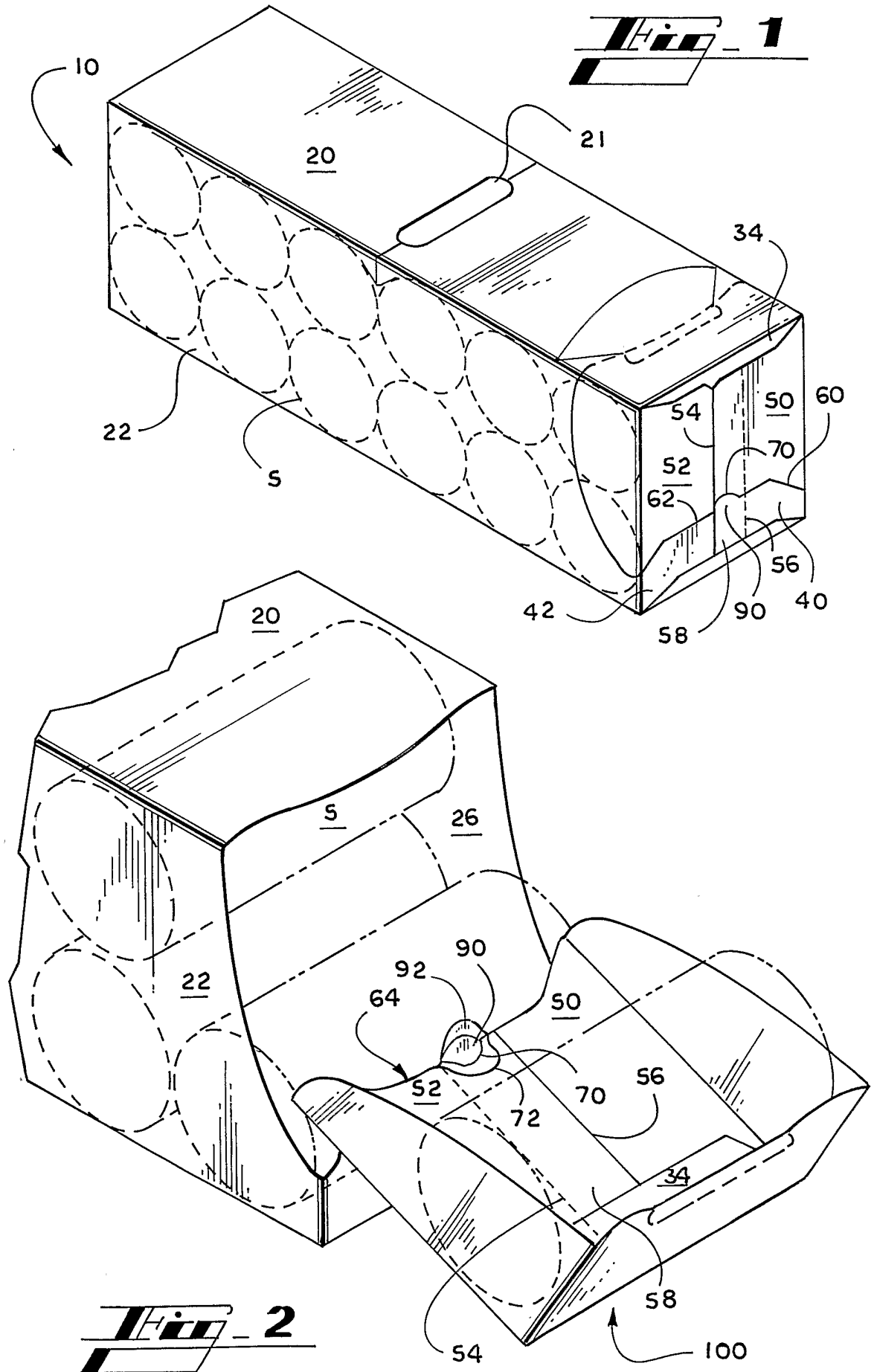
a pair of panels for forming a composite wall joined along a seam in the erected carton; and

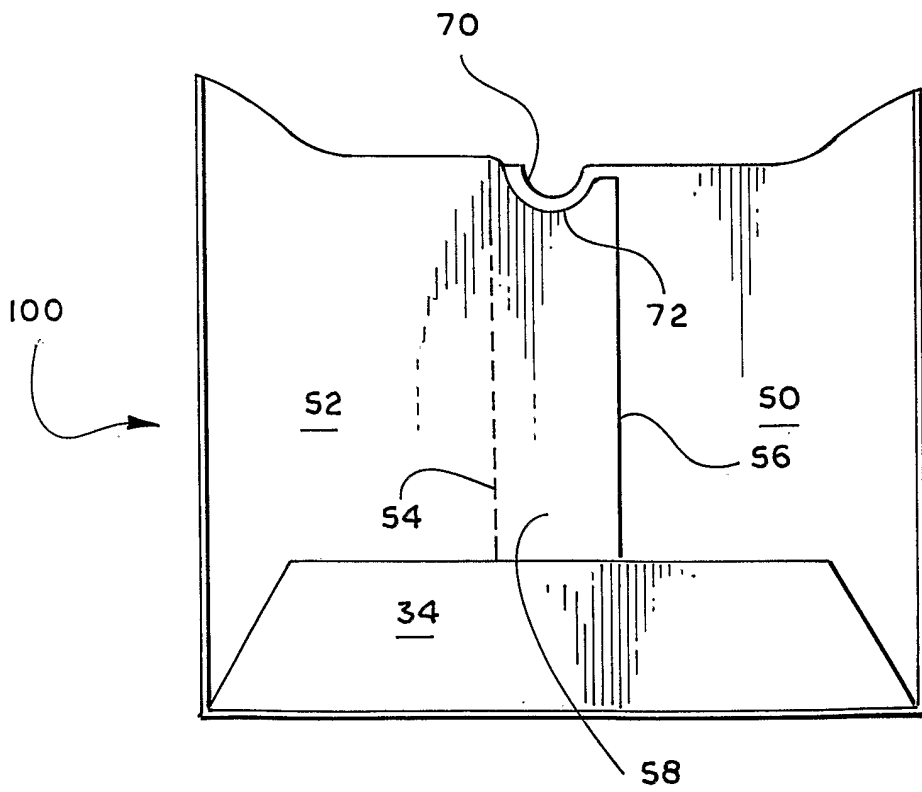
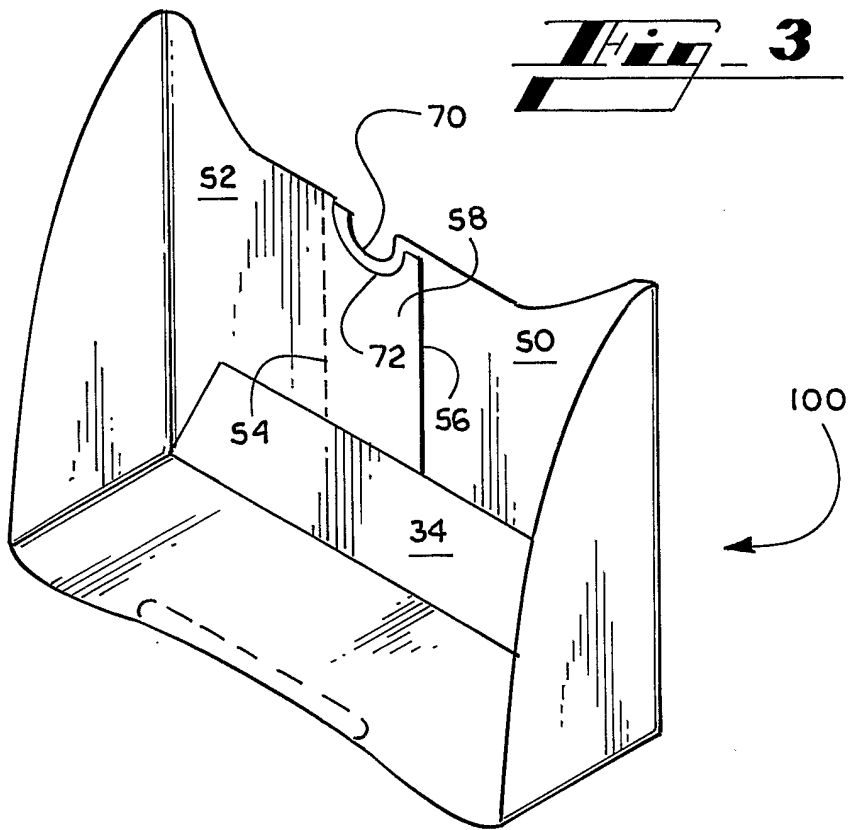
a frangible line extending across each of the panels, said frangible lines being  
30 disposed for defining a line of severance upon erection of the carton, the line of severance extending across said composite wall and traversing the seam in the erected carton;

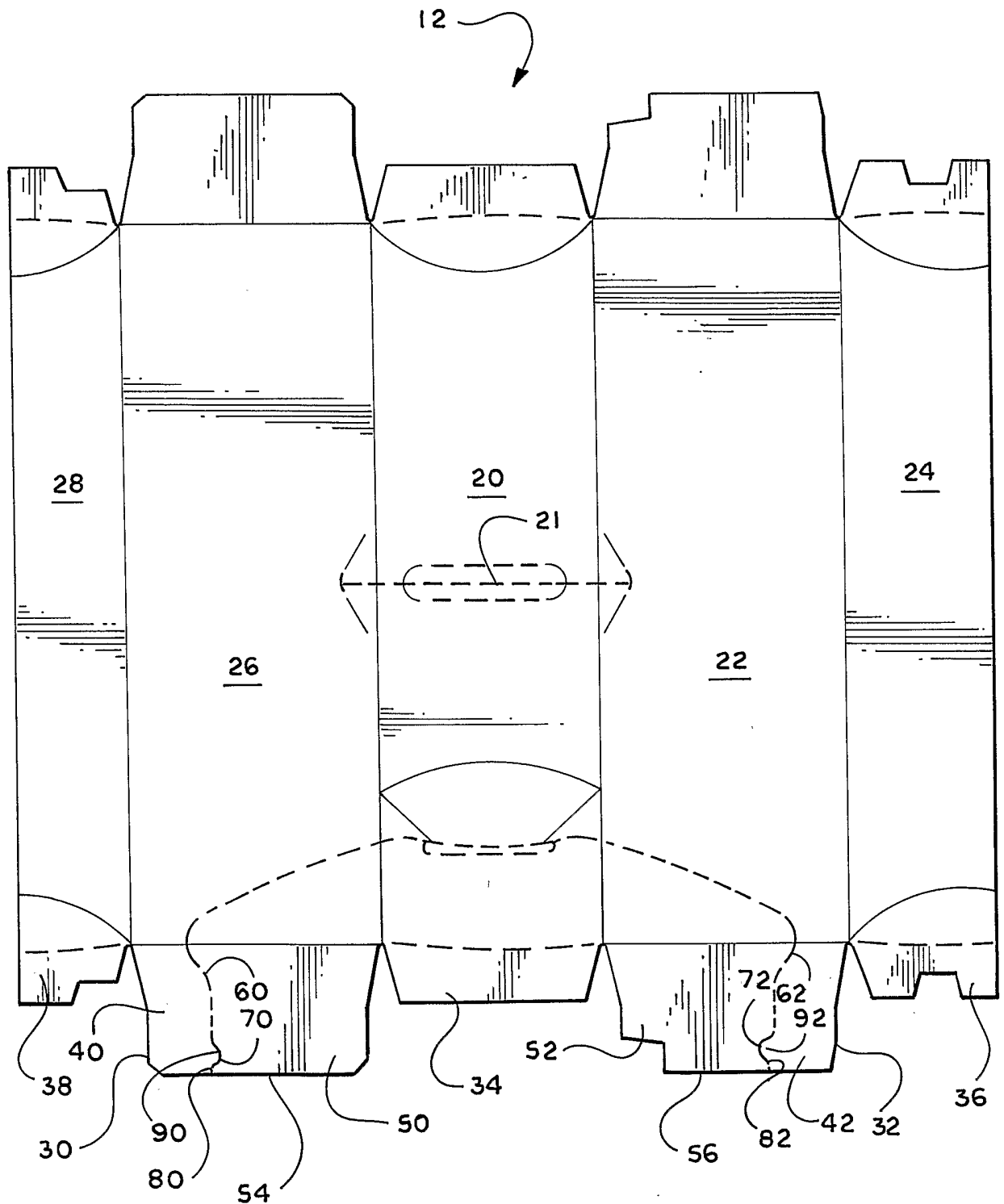
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wherein a segment of each of the frangible lines next to an end edge of a respective one of the panels comprises a cut line so that the cut lines together form an extensively-weakened segment of said line of severance traversing the seam in the erected carton.

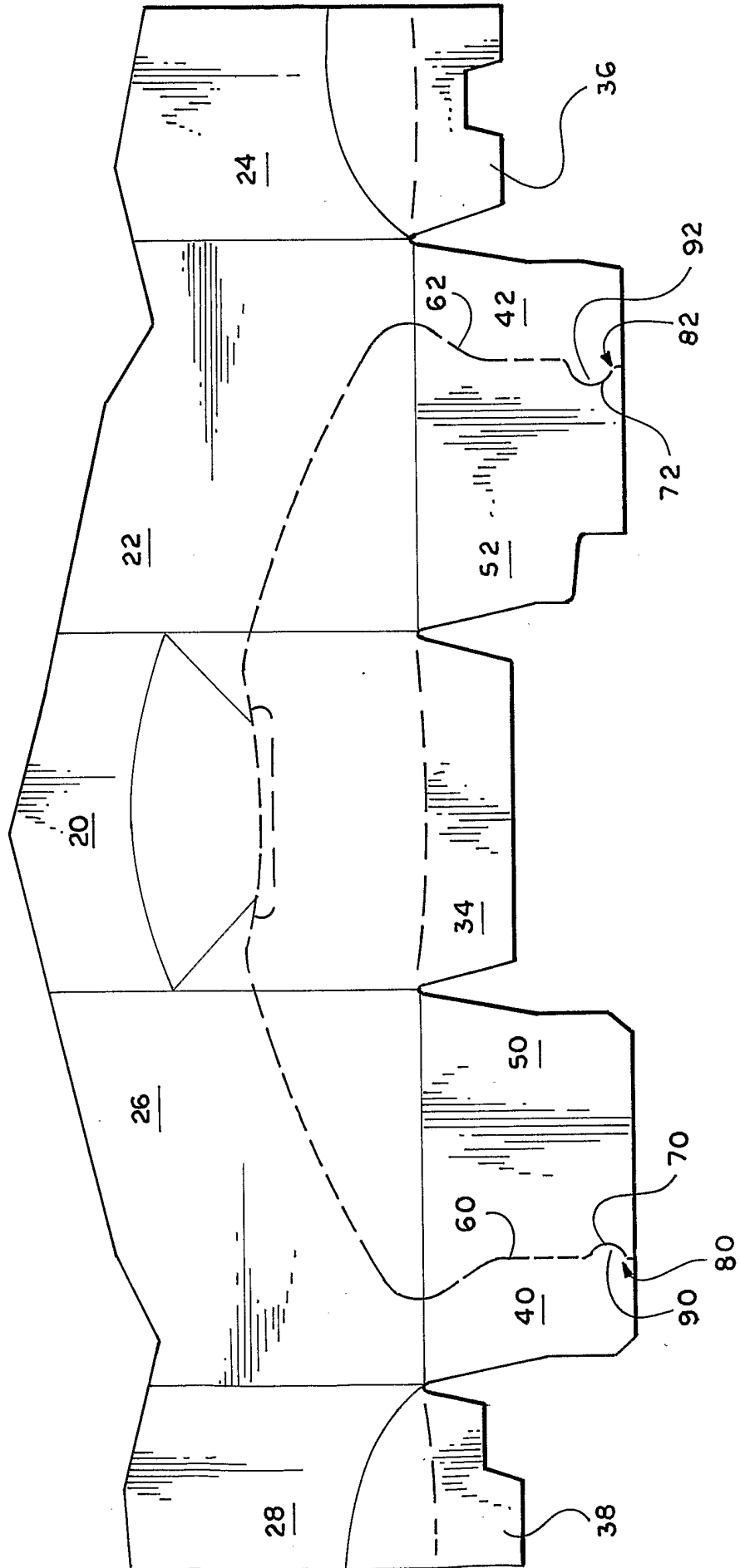
- 5 13. The invention of claim 12, wherein the cut line in one of the panels has a first radius at least slightly smaller than a second radius of the cut line of the other of the panels.
14. The invention of claim 12, wherein each of said cut lines includes a nick member proximate said end edge of a respective one of the panels.







**Fig. 5**



**INTERNATIONAL SEARCH REPORT**

Internati	Application No
PCT/US	03/19071

**A. CLASSIFICATION OF SUBJECT MATTER**  
 IPC 7 B65D5/54 B65D71/36 B31B1/14

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**  
 Minimum documentation searched (Classification system followed by classification symbols)  
 IPC 7 B65D B31B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)  
 EPO-Internal

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 02 47990 A (BATES AARON ;MEAD CORP (US)) 20 June 2002 (2002-06-20) page 11, line 12 - line 14; figure 6	1,5,9-12

Further documents are listed in the continuation of box C.  Patent family members are listed in annex.

\* Special categories of cited documents :

- \*A\* document defining the general state of the art which is not considered to be of particular relevance
- \*E\* earlier document but published on or after the international filing date
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- \*O\* document referring to an oral disclosure, use, exhibition or other means
- \*P\* document published prior to the international filing date but later than the priority date claimed
- \*T\* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- \*X\* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- \*Y\* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- \*Z\* document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
30 September 2003	09/10/2003

Name and mailing address of the ISA European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Authorized officer  Bridault, A
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# INTERNATIONAL SEARCH REPORT

Information on patent family members

Internat	Application No
PCT/US	03/19071

Patent document cited in search report		Publication date		Patent family member(s)	Publication date
WO 0247990	A	20-06-2002	AU	3084902 A	24-06-2002
			NO	20032640 A	07-08-2003
			WO	0247990 A2	20-06-2002
			US	2002070139 A1	13-06-2002
			US	2003141313 A1	31-07-2003
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