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(54) **BOX WITH IMPROVED RESISTANCE TO CLOSURE PANEL OPENING**

(57) A box formed from a single cardboard sheet and having a closure panel (10) from which there projects a lip (18) insertable into the box interior between the box front panel (3) and the edges adjacent thereto of two flaps (11,12) projecting from the box side panels (2,4). The lip

is separated from the closure panel by a folding line (19), at each end of which a cut (20) is provided into which a flexible appendix (23) projecting from each flap (11,12) is inserted, with the free end of the flap making contact with the inner surface of the front panel in the box when closed.

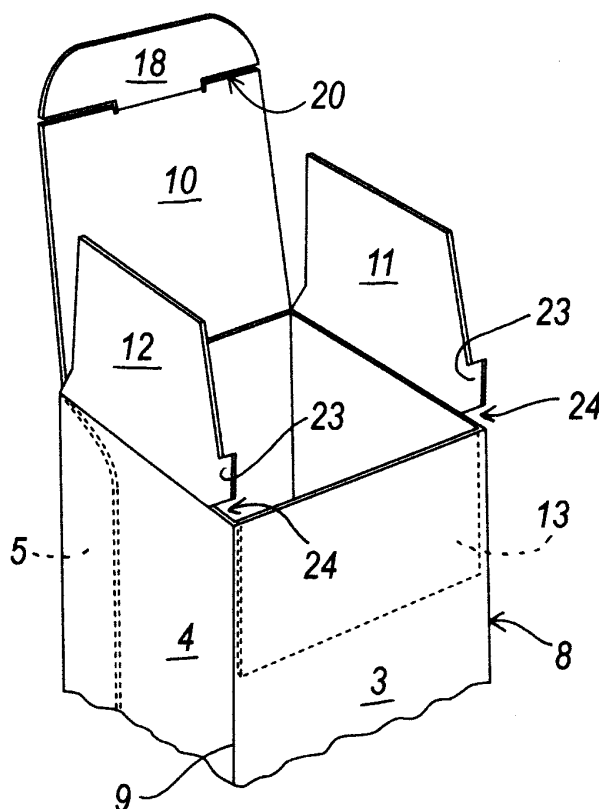


FIG. 3

Description

[0001] The present invention relates to a box formed of cardboard and having at least one closure panel which, after the box has been closed, presents improved resistance to fraudulent panel opening.

[0002] Many types of boxes formed from a single piece of punched and crease-lined cardboard are known, these boxes having one or both ends closed by a closure panel which has to be openable to enable the product contained in the box to be freely extracted therefrom.

[0003] A lip projecting from the closure panel is separated from this panel by a folding line about which the lip can be rotated, to be then inserted into the box in contact with the inner surface of the front main panel of the box when this in its closed state, with the closure panel resting on two flaps projecting from the ends of the two side main panels of the box. At each end of the folding line which separates the closure panel from the respective flap there is provided a cut into which a profiled portion of the longitudinal side edge of the flap adjacent to said flap is inserted: the edge of the profiled portion of the flap is spaced (within the closed box) from the adjacent inner surface of the front main panel of the box, to enable said lip to be freely inserted and slide between said inner surface of the main panel and the edge of the longitudinal profiled portion of the flap when the box is closed, to prevent the free edge of the lip from resting on the lateral portions of the flaps during box closure (which is achieved by automatic machines operating at high speed), to hence deform this lip.

[0004] When the box is to be opened, the side edges of the closure panel are gripped by two fingers and pulled outwards from the box to cause the lip to emerge from the box and consequently open the box. During this operation (commonly carried out to open the box) the closure panel becomes curved (by the effect of the traction exerted thereon by the two fingers of the hand), hence displacing the lip projecting from it towards the box interior and consequently causing the profiled portions of the box flaps to penetrate into the respective cuts in the lip folding line, so hindering opening of the box lid.

[0005] The same identical behaviour occurs when the box is closed and a relatively heavy product (for example a medicament bottle) is present in it. When the closed box lying in an erect position is lifted laterally by the hands, the weight of its contained product acts on the underlying closure panel, with the same aforesaid effect.

[0006] As stated, in a closed box the profiled longitudinal flap edge facing the lip of the closure panel is spaced from the inner surface of the front main panel of the box. This represents a serious drawback because if, with the box closed, a thin resistant blade is inserted between the closure panel and the flaps below it, the said lip can be thrust and moved towards and against the inner surface of the box front panel and the closure panel can then be rotated, to lift its lip out of the box, without this lip coming

into contact with the adjacent edges of the flaps. The box can hence be fraudulently opened and its contents be tampered with without this being detectable by the naked eye, because the box can be closed again, no portion of it having been deformed or broken during its fraudulent opening.

Similar boxes, all presenting the aforesaid drawbacks, are illustrated for example in U.S. 4,890,789 and in the corresponding EP-B-0318750; in EP-B-0709293; in U.S. 6,860,421B2 and in the corresponding EP-B-11340684; in U.S. 6,923,315B2 and in the corresponding EP-B-1346922; in EP-A-1538090 and in further patents.

[0007] The main object of the present invention is to provide a box, the closure panel of which presents improved resistance to any accidental or fraudulent opening stress.

[0008] This and other objects are attained by a box formed from a single piece of punched and crease-line cardboard or the like comprising:

- four consecutive main panels 1-4 and a secondary panel 5 which projects from the first main panel 1;
- parallel longitudinal folding lines 6-9 separating the main panels 1-4 and the secondary panel 5 from each other,
- a closure panel 10 for at least one end of the box, projecting from at least one end of one of the main panels and separated from it by a first transverse folding line 14 about which the closure panel 10 can rotate between an open position and respectively a closed position of said end of the box;
- a lip 18 projecting from the free end of the closure panel 10 and separated from it by a second folding line 19, at each end of which a cut 20 is provided;
- at least one flap 11, 12 projecting from the end of at least one of those main panels 2, 4 different from that 1 from which said closure panel 10 projects in the same direction, said flap 11, 12 being separated from the respective panel 2, 4 by a transverse folding line 15, 17 about which the flap can rotate towards the box interior, characterised in that from that longitudinal edge of said flap 11, 12 furthest from said closure panel 10 there projects an elongate flexible appendix 23 the free end of which is substantially aligned with the folding line 8, 9 which separates that main panel 2, 4 from which said flap 11, 12 projects, from the main panel 3 consecutive to it, said flexible appendix 23 being positioned such as to be inserted, when the box is closed, into the cut 20 provided in the adjacent end of said second folding line 19 between said lip 18 and the panel 10 from which the lip extends.

[0009] Preferably the sides of said flexible appendix 23 are defined by cuts and recesses 24 provided in that flap 11, 12 of which the appendix 23 forms part.

[0010] Again preferably, one of said recesses 24 of the flap 11, 12 extends from the longitudinal edge of the flap

to the folding line 15, 17 separating it from the main panel 2, 4 with which it is rigid.

[0011] The structure and characteristics of the box according to the invention will be more apparent from the ensuing non-limiting description of one embodiment thereof, given with reference to the accompanying drawings, in which:

Figure 1 is a plan view of a punched and crease-lined cardboard sheet for forming the box;

Figure 2 is similar to Figure 1 but with some portions of the cardboard sheet folded onto other portions thereof;

Figures 3 and 4 are perspective representations of an end portion of the already finished box, with its panel and flaps completely open and, respectively, with just its flaps folded towards the box interior;

Figures 5, 6 and 7 are perspective views of a top portion of a finished box, shown in the position which it assumes during closure of its lid, in the position in which the lid is completely closed and, respectively, in the position at the commencement of lid opening;

Figure 8 is a section through the closed box, on the line 8-8 of Figure 6.

[0012] Reference will firstly be made to Figure 1 which shows a plan view of a punched and crease-lined cardboard sheet comprising four main panels 1-4 and a secondary panel 5 projecting from the first main panel, these panels being consecutive and separated from each other by longitudinal folding lines (crease lines) 6-9.

[0013] A closure panel 10 projects from both ends of the panel 1, while flaps 11, 12 project from both ends of the two panels 2, 4, and a panel 13 projects from both ends of the panel 3. The panels 10-13 are separated from the respective main panels 1-4 by transverse folding lines 14-17.

[0014] Finally, it can be seen that a lip 18 projects from the closure panel 10 and is separated from it by a transverse folding line 19, at each end of which a cut 20 is provided.

[0015] The box described up to this point is substantially identical to those shown in the drawings of all the prior patents cited in the introduction to the present patent specification, in particular in U.S. 4,890,789.

[0016] In a first step of its production, a thin strip of glue is applied along the free edge of the panels 13 (Figure 1), these panels 13 are folded about the respective folding lines 16 and are pressed against the respective panel 3, on which they become fixed by the glue (Figure 2), a thin strip of glue 22 is applied in proximity to the free edge of the main panel 4, and the secondary panel 5 is turned onto the main panel 1 shown in Figure 2.

[0017] The cardboard sheet is then folded about the folding line 8 so that the strip of glue 22 rests on the outer surface of the panel 5; this step is not shown in the drawings as it is obvious and totally similar to that illustrated in the already cited prior patents. Box production is hence

terminated and it is ready to be shaped (by the firm using the box) into the form shown in Figure 3, with a lid and closure panel completely open to enable the box to receive the product which it is to contain.

[0018] A fundamental characteristic of the present invention is that from that longitudinal edge of each of the flaps 11, 12 which is furthest from the closure panel 10 in the box when made up, there projects an elongate flexible appendix 23 the free end of which - when the box is made up and with the flaps closed (Figures 4 and 8), i.e. folded towards the box interior - is substantially aligned with the folding lines 16 which separate the panels 13 from the panel 3, which means that the free edge of the appendices 23 grazes or is in light contact with the inner surface of the panels 13 which are fixed onto the inner surface of the main panel 3, with which they form a single piece.

[0019] The elongate flexible appendices 23 are defined by cuts and recesses provided in the flaps, in particular by a recess 24 provided in each flap at the folding line 15, 17 which separates it from the main panel from which it projects.

[0020] The position and size of each elongate appendix 23 are such that, when the box is closed (Figures 6 and 8), they become inserted into the adjacent cut 20 provided in the folding line 19, so greatly increasing the resistance of the corresponding box closure panel to opening. To understand this, reference should firstly be made to Figure 4 in which the box lid 10, 18 is open, whereas the flaps 11, 12 are folded towards the box interior, with the free edges of the appendices 23 very close to or in light contact with the adjacent (inner) surface of the panel 13. When the closure panel is rotated about the folding line 14 to close the box lid, at a certain point the free edge of the lip 18 comes into contact with the upper surface (with respect to the drawings) of the appendices 23, causing them to flex downwards (Figure 5) and hence enable the lip 18 to slide into the box without undergoing deformation, into contact with the inner surface of the panel 13 on one side and in contact with the free ends of the appendices 23 on the other side.

[0021] On termination of the rotation and downward movement of the panel 10 and lip 18, the free ends of the appendices 23 hence lie positioned in front of the corresponding cuts 20 in the folding lines, returning elastically to their original flat position and extending through these cuts, with the free edge of the appendices returning into contact with the opposing surface of the panel 13 (Figures 6 and 8), to hence rigidly retain the box lid in its closed position.

[0022] When the box lid is to be reopened, the upward movement of the panel 10 together with the lip 18 drags the appendix 23 upwards so that it curves upwards (Figure 7) until the free end of this appendix emerges and becomes free of the cut 20 in the folding line 19.

[0023] It is important to note that the lip 18 cannot slide freely between the surface of the panel 13 and the free end of the appendices 23, so preventing the box lid from

being able to be opened fraudulently using a thin blade inserted between the panel 10 and the flaps 11, 12: in this respect, if those cuts, holes or knurlings represented in EP-B-0709293, in U.S. 6,860,421B2, in EP 1538090A and in many further patents were present in the panel and/or in the respective lip, the appendices would present a resistance to the upward movement of the lip 18, so causing partial or total detachment of this lip from the panel.

[0024] It is also important to note that the presence of the panels 13 folded and fixed to the inside of the main panel 3 prevents this panel from being able to be fraudulently pushed outwards (using a blade inserted into the box) to cause the appendices 23 to escape from the cuts 20 and hence enable the panel 10 with its lip 18 to be raised upwards.

[0025] It is worth repeating that in known boxes the outer longitudinal ends of the flaps always remain spaced from the opposing surface of the front panel adjacent to them, to enable the box lid to be closed without the lip of this lid interfering with the flaps (which do not have flexible elongate appendices able to be curved by the lip and be inserted in all cases and under all conditions into the cuts provided at the ends of the folding lines from which these lips extend).

said closure panel (10) there projects an elongate flexible appendix (23) the free end of which is substantially aligned with the folding line (8, 9) which separates that main panel (2, 4) from which said flap (11, 12) projects, from the main panel (3) consecutive to it, said flexible appendix (23) being positioned such as to be inserted, when the box is closed, into the cut (20) provided in the adjacent end of said second folding line (19) between said lip (18) and the panel (10) from which the lip extends.

2. A box as claimed in claim 1, **characterised in that** the sides of said flexible appendix (23) are defined by cuts and recesses (24) provided **in that** flap (11, 12) of which the appendix (23) forms part.
3. A box as claimed in claim 2, **characterised in that** one of said recesses (24) of the flap (11, 12) extends from the longitudinal edge of the flap to the folding line (15, 17) separating it from the main panel (2, 4) with which it is rigid.

Claims

1. A box with improved resistance to closure panel opening, comprising:
 - four consecutive main panels (1-4) and a secondary panel (5) which projects from the first main panel (1);
 - parallel longitudinal folding lines (6-9) separating the main panels (1-4) and the secondary panel (5) from each other;
 - a closure panel (10) for at least one end of the box, projecting from at least one end of one of the main panels and separated from it by a first transverse folding line (14) about which the closure panel (10) can rotate between an open position and respectively a closed position of said end of the box;
 - a lip (18) projecting from the free end of the closure panel (10) and separated from it by a second folding line (19), at each end of which a cut (20) is provided;
 - at least one flap (11, 12) projecting from the end of at least one of those main panels (2, 4) different from that (1) from which said closure panel (10) projects in the same direction, said flap (11, 12) being separated from the respective panel (2, 4) by a transverse folding line (15, 17) about which the flap can rotate towards the box interior, **characterised in that** from that longitudinal edge of said flap (11, 12) furthest from

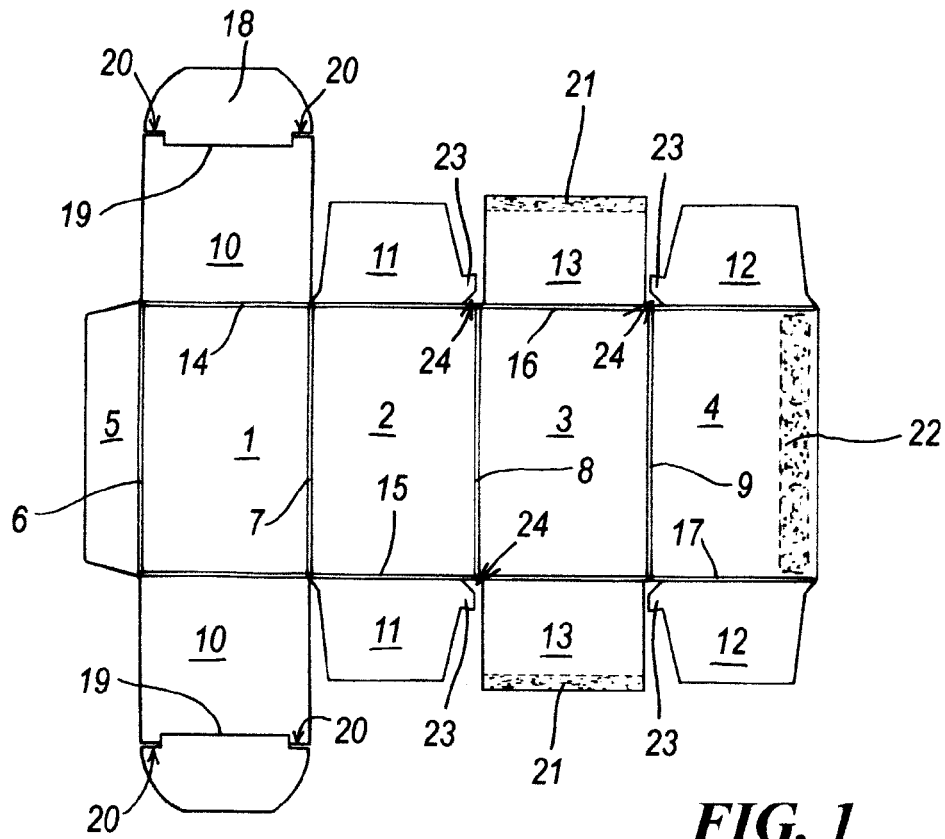


FIG. 1

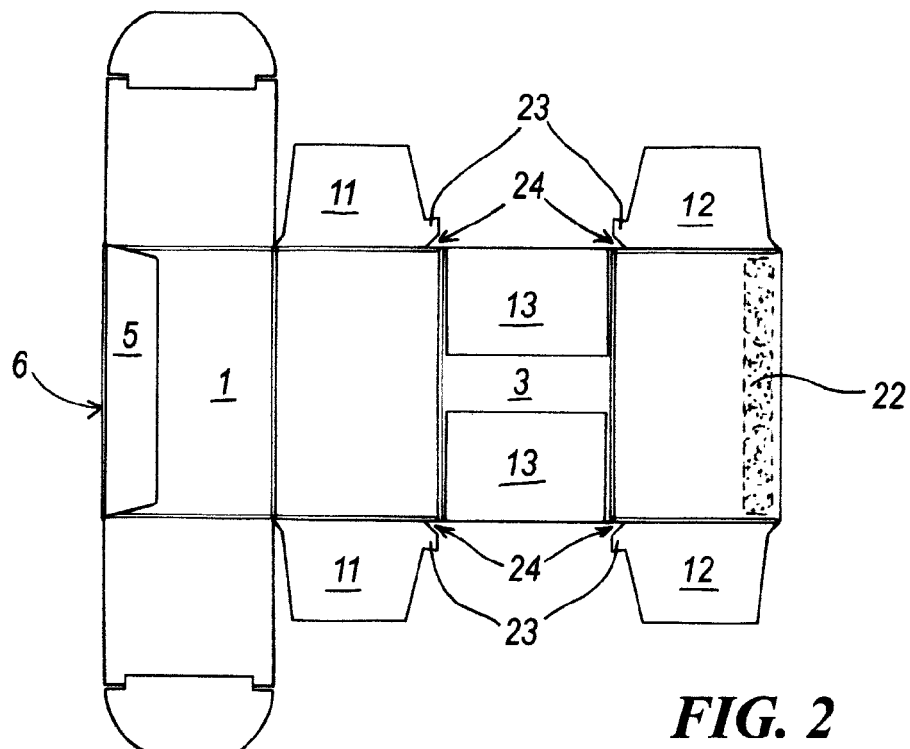


FIG. 2

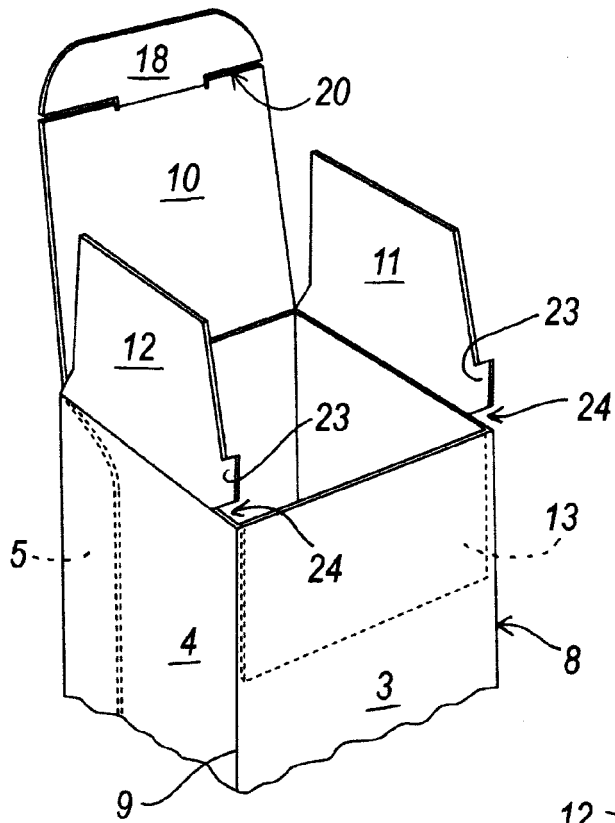


FIG. 3

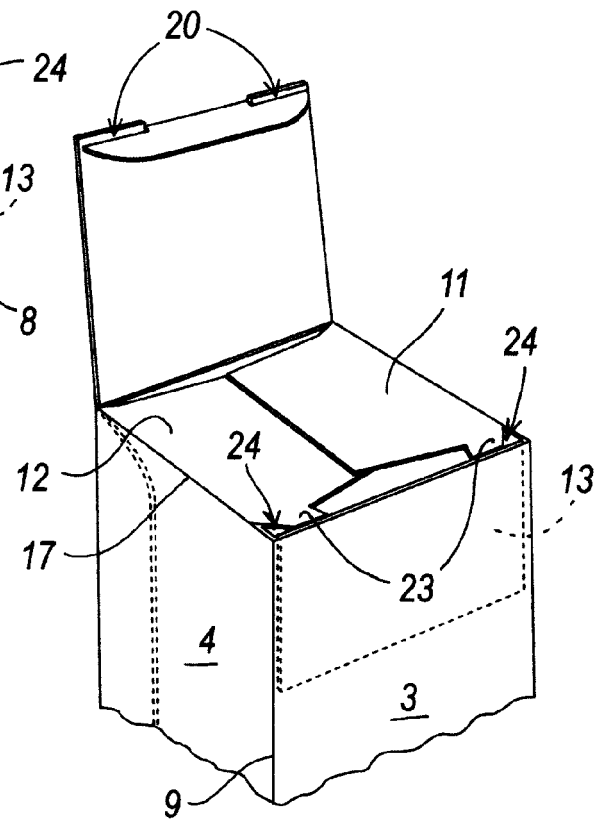


FIG. 4

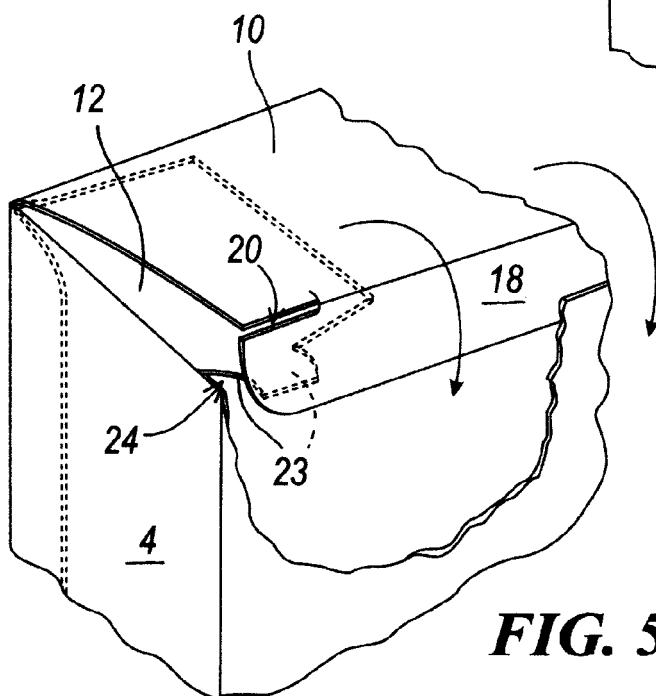


FIG. 5

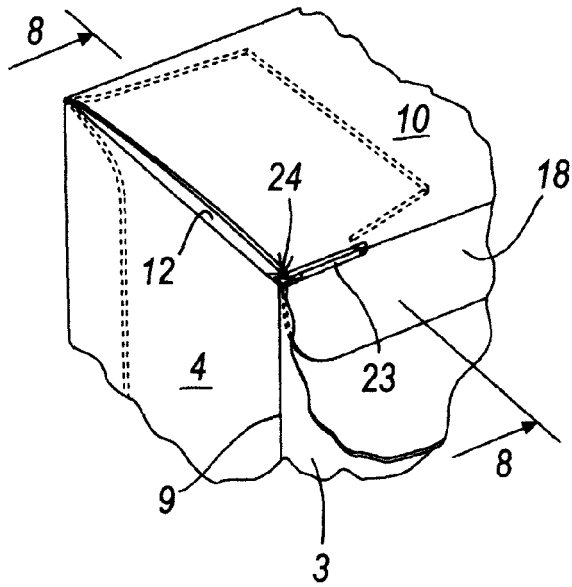


FIG. 6

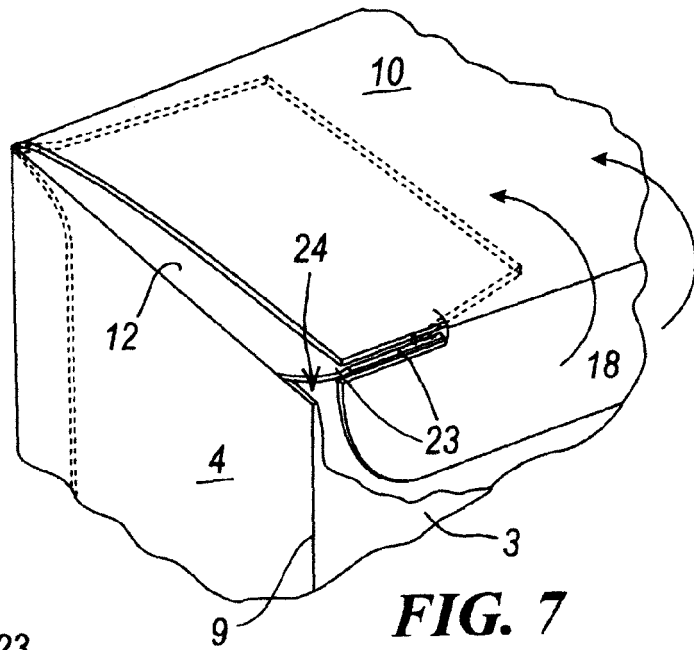


FIG. 7

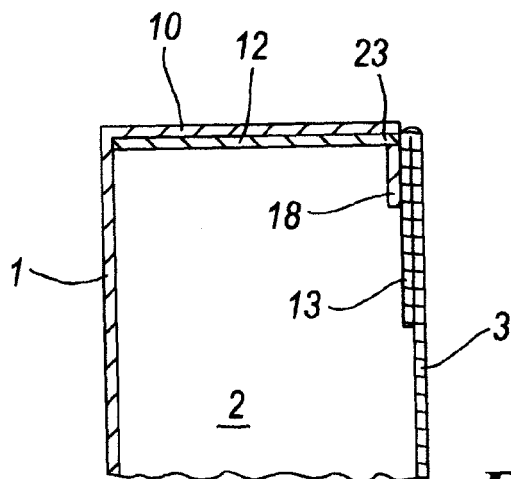


FIG. 8



European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 07 10 1720

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	EP 1 528 002 A (ALLIORA SHF [FR]) 4 May 2005 (2005-05-04) * paragraph [0026] * * paragraph [0042]; figures * -----	1	INV. B65D5/02
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			TECHNICAL FIELDS SEARCHED (IPC)
			B65D
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 23 May 2007	Examiner Bridault, Alain
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**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 07 10 1720

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23-05-2007

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