(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
29 June 2006 (29.06.2006)

PCT

(10) International Publication Number
WO 2006/069166 A1

(51) International Patent Classification:
B65D 5/72 (2006.01)

(21) International Application Number:
PCT/US2005/046405

(22) International Filing Date:
20 December 2005 (20.12.2005)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
60/637,826 20 December 2004 (20.12.2004) US

(71) Applicant *(for all designated States except US)*: **MEAD-WESTVACO PACKAGING SYSTEMS, LLC** [US/US]; Law Department, One High Ridge Park, Stamford, CT 06905 (US).

(72) Inventor; and

(75) Inventor/Applicant *(for US only)*: **BATES, Aaron** [US/US]; 4537 Planters Hill Drive, Powder Springs, Georgia 30127 (US).

(74) Agent: **SUZUKI, Tsugihiko**; MeadWestvaco Corporation, 4850d North Church Lane, Smyrna, GA 30080, (US).

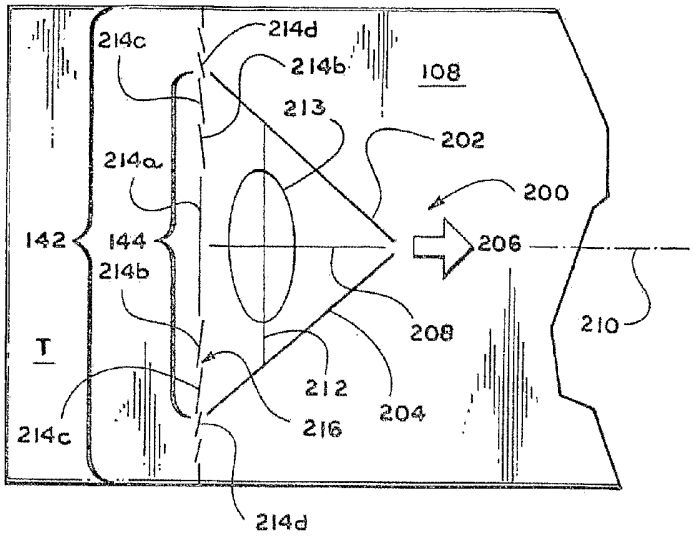
(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, LY, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:
— *with international search report*
— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) **Title:** CARTON WITH PRESSURE SENSITIVE OPENING DEVICE



(57) **Abstract:** A device (200) for breaking a series of perforations or cuts to open a carton or otherwise separate materials connected by a frangible severance line (140) includes a pair of fold lines (202, 204) that converge away from the severance line, a collapsible line (208) perpendicular to the severance line and between the pair of fold lines, and third fold line (212) perpendicular to and intersecting the collapsible line. A tear along the severance line is initiated by applying pressure in vicinity of the intersection of the collapsible line and the third fold line, which causes the device to apply tension to the frangible line, which is further weakened by having an elongated perforation (214a) that is centered on the axis of tension (210), and neighboring perforations (214b, 214c) that are angled toward the axis of tension. The angle of each perforation with respect to the axis of tension preferably varies depending on its location relative to the axis of tension.

WO 2006/069166 A1

CARTON WITH PRESSURE SENSITIVE OPENING DEVICE

TECHNICAL FIELD

[0001] This invention relates generally to cartons for packaging multiple articles such as beverage cans or bottles, and more particularly, to a carton with an article dispenser that is opened using a pressure sensitive opening device.

BACKGROUND OF THE INVENTION

[0002] Cartons for encasing and dispensing multiple articles such as soft drink cans or bottles are useful for enabling consumers to transport, store, and access the articles for consumption. The consumer typically prefers the flexibility of easily accessing the articles without reducing the ability of the carton to enclose the remaining articles. To that end, some cartons have dispensers which allow one or more articles to be removed through an opening, as the carton continues to encase the remaining articles. The consumer tears out a portion of the carton to form an opening from which articles may be dispensed.

[0003] Beverage cartons with an article dispenser formed by a removable section are known in the art. Typically, the removable section is defined by a tear line. To open the carton, a finger flap is pressed such that a portion of the removable section is separated from the carton. Then, the removable section is gripped and pulled outwardly, which causes the tear line to break all the way down to the bottom wall. In so doing, the removable section is allowed to swing down together with a part of the bottom end flap, which creates an access opening through which the cans in the carton are exposed. The opening is so dimensioned that at least part of the periphery of the opening serves as a can stopper that prevents the cans from undesirably rolling out of the carton through the opening.

[0004] However, the typical finger flap has been found not to be user-friendly because it is not easy to separate it from the carton wall. This is because the entire side carton wall may yield to the pressing force applied to the finger flap and, as a

result, sufficient shearing stress is not induced along the tear line. Moreover, consumers such as children may not be able to apply sufficient force to initiate a tear to open the carton to retrieve an article. Furthermore, even when the finger flap successfully initiates separation of the removable section from the carton wall, the consumer must insert one or more fingers in the narrow space between that portion of the removable section and the remaining carton wall. Thus, the known means for tearing the carton to form the opening can be somewhat difficult, particularly if the consumer is unable to visibly distinguish the finger flap from the remainder of the frangible line so as to find the appropriate point at which to initiate the tear. The addition of a precut aperture such as an insertion flap compromises the structural integrity of the carton and increases its susceptibility to infiltration of light, moisture, and dust.

[0005] What is needed, therefore, is a carton that includes article dispenser that is conveniently opened. Such a carton should have a user-friendly means for initiating the removal of the removable portion, and for grasping and removing the removable portion, as well as a reliable article stopper.

SUMMARY OF THE INVENTION

[0006] The present invention solves the problems identified above by advantageously reducing the effort required to open a carton dispenser to access the articles contained therein. More specifically, the various embodiments of the invention provide an improved means for opening a carton dispenser. The means for opening the carton dispenser is pressure sensitive, and thus, a user simply applies pressure to break the connection between the dispenser and the remainder of the carton. The configuration of the means for opening the carton dispenser reduces the amount of pressure that is required to open the dispenser without significantly degrading the integrity of the carton before and after the dispenser has been opened.

[0007] Generally, the invention is described in the context of a carton having a top wall, a pair of opposed side walls hingedly connected to the top wall, a bottom wall

hingedly connected to the side walls, and an end wall hingedly connected to end edges of each of the side, top, and bottom walls.

[0008] The carton includes an article dispenser with a fully or partially removable portion that is formed from one or more of the carton walls. The periphery of the removable portion is defined at least in part by a frangible line or a series of cooperating frangible lines.

[0009] The means for opening the carton dispenser includes an opening device for breaking the frangible line. The opening device is bounded by at least a portion of the frangible line and by a pair of convergent fold lines. Each of the convergent fold lines originates at or near the frangible line and converges toward the other and away from the frangible line. In other words, the convergent fold lines converge toward one another, but do not necessarily meet or intersect one another. The divergent ends of the convergent fold lines abut, meet, or intersect the frangible line.

[0010] A collapsible severance line is disposed between the convergent fold lines, effectively bisecting the triangle formed by the convergent fold lines and the frangible line. One advantage of the severance line is that it reduces the amount of pressure required to break the frangible line by causing the carton to collapse inward, thereby buckling the top wall of the carton so as to exert force upon the frangible line.

[0011] A transverse fold line extends between the convergent fold lines, and in one embodiment is generally perpendicular to and intersects the severance line. This fold line directs externally applied pressure away from the frangible line, thereby pulling the frangible line apart.

[0012] In certain embodiments, the opening device also includes an elliptical score line disposed between the convergent fold lines. The elliptical score line preferably has a major axis that coincides with at least part of the transverse fold line. The elliptical score line provides a target by which the user can identify the appropriate point to apply pressure to open the dispenser, and further encourages breakage of the frangible line.

[0013] The frangible line is advantageously configured to respond to the pressure applied to open the dispenser. To that end, in some embodiments at least a portion

of the frangible line is substantially weakened, such as by means of an extended cut line that may be adjacent and perpendicular to said collapsible severance line. Here, this cut line is the weakest portion of the frangible line and is configured to separate first, thereby initiating the separation of the remainder of the frangible line, which is relatively stronger. In other embodiments, the remainder of the shared portion of the frangible line that defines the opening device comprises multiple interrupted cut lines in series with one another and with the cut line. Each of the cut lines is angled toward the collapsible severance line, creating a saw-tooth or zigzag tear when the frangible line is broken. The angled cut lines may be continued along the entirety of the frangible line, or some other combination series of cuts, half cuts, scores, or perforations may be used to complete the periphery of the article dispenser.

[0014] The foregoing has broadly outlined some of the aspects and features of the present invention, which should be construed to be merely illustrative of various potential applications of the invention. Other beneficial results can be obtained by applying the disclosed information in a different manner or by modifying the disclosed embodiments. Accordingly, other aspects and a more comprehensive understanding of the invention may be obtained by referring to the detailed description of the exemplary embodiments taken in conjunction with the accompanying drawings, in addition to the scope of the invention defined by the claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0015] FIG. 1 is a blank for forming an exemplary carton having an article dispenser.

[0016] FIG. 2 is an enlarged plan view of an opening device according to an exemplary embodiment of the invention.

[0017] FIG. 3 is a carton formed from the blank of FIG. 1, the carton including the opening device of FIGs. 1 and 2.

[0018] FIG. 4 illustrates the application of finger pressure to activate the exemplary opening device.

[0019] FIG. 5 illustrates a user using the exemplary opening device to access the edge of a removable portion.

[0020] FIG. 6 illustrates the carton of FIG. 3 in an opened condition with the removable portion partially removed.

[0021] FIG. 7 illustrates the carton of FIG. 3 in an opened condition with the removable portion completely removed.

DETAILED DESCRIPTION

[0022] As required, detailed embodiments of the present invention are disclosed herein. It will be understood that the disclosed embodiments are merely examples to illustrate aspects of the invention that may be embodied in various and alternative forms. The figures are not necessarily to scale, and some features may be exaggerated or minimized to show details of particular components. In other instances, well-known materials or methods have not been described in detail to avoid obscuring the present invention. Therefore, specific structural and functional details disclosed herein are not to be interpreted as limiting, but as a basis for the claims and for teaching one skilled in the art to variously employ the present invention.

[0023] Referring now to the drawings in which like numerals indicate like elements throughout the several views, the drawings illustrate certain of the various aspects of exemplary embodiments of a carton opening device according to the teachings of the present invention. In the embodiments detailed herein, the term carton refers, for the non-limiting purpose of illustrating the various features of the invention, to a container for enclosing, carrying, and dispensing articles such as beverage cans. However, it is contemplated that the teachings of the invention can be applied to any container, the opening of which requires the breaking a frangible connection.

[0024] The features and aspects of the invention are described with reference to an exemplary carton **300** formed from a foldable sheet material such as paperboard, corrugated board, plastic, laminates, any combination thereof, or the like. To encourage an understanding of the various aspects of the invention, the construction

of an exemplary carton will now be described in some detail. The foldable sheet material is typically provided as a unitary blank **100**, the inside surface of which is shown in FIG. 1. The blank **100** includes a bottom panel **102** hingedly connected along longitudinal fold line **103** to a first side panel **104**, which is hingedly connected along fold line **106** to a top panel **108**, which is hingedly connected along fold line **110** to a second side panel **112**, which is hingedly connected along fold line **114** to an edge flap **116**. Each of the panels is hingedly connected, respectively, to end flaps **118a**, **120a**, **136a** or end wall panels **122a**, **124a**, which are defined in part by respective transverse fold lines **126a**, **130a**, **138a**, **128a**, **132a** disposed along one edge of the blank **100**. At the opposite edge of the blank **100**, the panels may also include hinged connections to similar end flaps **118b**, **120b**, **136b** or end wall panels **122b**, **124b** defined in part by transverse fold lines **126b**, **130b**, **138b**, **128b**, **132b**. More specifically, first side panel **104** is hingedly connected to end wall panels **122a**, **122b** along respective fold lines **128a**, **128b**. Top panel **108** is hingedly connected to end flaps **120a**, **120b** along respective fold lines **130a**, **130b**. Second side panel **112** is hingedly connected to end wall panels **124a**, **124b** along respective fold lines **132a**, **132b**. Bottom panel **102** is hingedly connected to end flaps **118a**, **118b** along respective fold lines **126a**, **126b**. Edge flap **116** is hingedly connected to end flaps **136a**, **136b** along respective fold lines **138a**, **138b**.

[0025] The blank **100** includes a frangible line **140**, which when the carton is erected, defines a removable portion **T**. The removable portion **T** can have any shape, size, or orientation that is suitable for dispensing articles, and thus, the illustrated version is provided as a non-limiting example. To define the exemplary removable portion **T**, the frangible line **140** curves somewhat as it extends from the distal edge of end wall panel **122a** across fold line **128a** and onto side panel **104**. The frangible line **140** traverses a portion of side panel **104**, extending longitudinally from fold line 128a toward end wall panel **122b**, transversely toward bottom panel **102**, longitudinally again toward end wall panel **122b**, and transversely toward top panel **108**. The frangible line **140** crosses fold line **106** to traverse top panel **108**, then crosses fold line **110** onto side panel **112**. The frangible line **140** extends across a portion of side panel **112** and across the length of end wall panel **124a** so as to trace a mirror image

of its path across side panel **104** and end wall panel **122a**. Thus, the exemplary removable portion **T** is symmetrical, although symmetry is not requisite for implementation of the systems or methods of the invention. It is contemplated that the frangible line **140** includes, but is not limited to, a line of perforations, a line of short slits, a line of half cuts, a single half cut, any combination of slits, score lines, and half cuts, or the equivalent, as will be understood by those skilled in the art.

[0026] The section of frangible line **140** that traverses the top panel **108** will now be referred to as frangible section **142**. FIG. 2 provides an enlarged view of the top panel **108**, including the opening device **200**. A subsection **144** of frangible section **142** is adjacent to and defines one edge of the opening device **200** of the present invention. The opening device **200** is further defined by a first fold line **202** and a second fold line **204**. The fold lines **202**, **204** converge toward one another. The direction of convergence **206** of the fold lines **202**, **204** is substantially perpendicular to the subsection **144**. In the embodiment shown, a slit, cut, half-cut, or series of slits, cuts or half-cuts form a severance line **208** that is in alignment with the direction of convergence **206**. The extent of the severance line **208**, as defined by the depth, width, and length of the cuts or slits comprising the severance line **208**, is sufficient to compensate for or negate the stiffness of the carton material when pressure is applied to the opening device **200**, so as to encourage the opening device **200** to collapse inward toward the interior of the carton. An additional fold line **212** extends transversely between the fold lines **202**, **204**, thereby directing the applied pressure away from the frangible subsection **144**, which is itself placed in tension. The configuration of the opening device **200** concentrates and focuses the force generated by a user pressing the opening device **200**, preferably at or in the vicinity of the intersection of the severance line **208** and the fold line **212**. The axis of tension **210** created by this pressure preferably coincides with the direction of convergence **206**. As the pressure exerted on the opening device **200** increases, the tension applied to subsection **144** also increases. When the tension exceeds the tear strength of the frangible subsection **144**, the subsection **144** separates so as to initiate separation of the remainder of frangible line **140**. Elliptical score line **213** indicates the preferred pressure point for tearing subsection **144** and further

promoting an inward collapse. It is contemplated that each of the fold lines in this embodiment includes, but is not limited to, a line of perforations, a score line, a line of short slits, a line of half cuts, a single half cut, any combination of slits, score lines, and half cuts, or the equivalent, as will be understood by those skilled in the art.

[0027] As is also illustrated in FIG. 2, the subsection **144** includes multiple angled perforations **214** that may include any means for controllably weakening the carton, including slits, cuts, or half-cuts. The perforations **214** are interrupted by ties or nicks **216** that maintain the integrity of the subsection **144** until it is desirable to initiate tearing thereof. It is known to relate the depth and length of the perforations **214** and the width of the ties **216** that interrupt the perforations **214** to create a frangible line with sufficient tear strength to withstand the forces generated by carrying, stacking, or otherwise handling the carton **300** prior to opening the carton **300**, and to prevent the frangible line from excessively reducing the burst strength of the carton wall. Thus, such determinations are design choices dependent at least in part upon the size of the package, configuration, and weight of the contents. The angle of each perforation **214** is preferably determined by referencing the axis of tension **210**, so that at least some of the perforations **214** comprising the top panel section **142** of the frangible line **140** are angled toward the axis of tension **210**. The perforation **214a** at the center of the subsection **144** is preferably elongated to comprise the weakest segment of subsection **144**, thereby encouraging the tear to initiate at the center of top **panel 108** and to radiate toward either side **panel 104, 112**. This result can be intensified if the centermost perforation **214a** is also centered on and perpendicular to the axis of tension **210**. The angle of each perforation **214** with respect to the axis of tension **210** preferably varies depending on its location with respect to the axis of tension **210**. For example, the angle of perforations **214** may decrease in inverse proportion to their distance from the axis of tension **210** such that the angle of perforation **214d** is less than that of the adjacent perforation **214c** that is less than the angle of center perforation **214a**. It is also preferred that the length of each perforation **214** varies depending on its location with respect to the axis of tension **210**. For example, the length of perforations **214** may decrease in inverse proportion to their distance from the axis of tension **210** such that the length of perforation **214d**

is less than that of the adjacent perforation **214c** that is less than the length of center perforation **214a**.

[0028] To erect the carton **300** shown in FIG. 3, the bottom panel **102** of the blank **100** is glued or is otherwise secured to the edge flap **116** to form the composite bottom wall **102/116** of carton **300**, which is at this point open-ended and tubular. End flaps **136a**, **136b** are secured to respective end flaps **118a**, **118b** to form composite end flaps **118a/136a** and **118b/136b**. The first side panel **104** becomes the first side wall **304** of the erected carton **300**. Similarly, the top panel **108** becomes the top wall **308**, and second side panel **112** forms the second side wall **312** of the erected carton **300**.

[0029] After articles are grouped and loaded through either or both of the open ends of the carton **300**, the end flaps and end wall panels are folded and secured together to form opposing end closure structures of carton **300**. End wall panel **124a** is secured to the inside surface of end wall panel **122a**. Additionally, end flaps **120a**, 118a/**136a** may optionally support the integrity of the carton **300** by being secured to end wall panel **122a** and/or to end wall panel **124a**. The end flaps **120b**, 118b/**136b**, and end wall panels **122b** and **124b**, cooperate similarly to form the opposing end closure structure. As readily apparent from FIG. 3 (showing the carton **300** in a closed condition), the end closure structures form respective end walls **302a** and **302b**.

[0030] The exemplary carton **300** illustrated in the drawings is adapted to hold a group of similarly dimensioned, cylindrical articles **C** (best shown in FIG. 6), in one or more vertically arranged rows. The articles in each row are disposed on their sides in a side-by-side parallel fashion. Referring again to FIG. 3, side walls **304** and **312** are disposed alongside the ends of the articles of the group, while each end wall **302a** and **302b** of the carton is disposed adjacent to the side walls of the respective endmost articles. The carton **300** further comprises a suitable known handle **H** to allow the user to carry the carton.

[0031] A method for opening the exemplary article dispenser will now be described with reference to FIGs. 4 through 7. A user applies downward force **400** (FIG. 4) to

activate the exemplary opening device **200**. The force is applied between the convergent fold lines **202**, **204** and the frangible subsection **144**, and preferably is concentrated within the bounds of elliptical score **213**. The applied force **400** is preferably continuous and increases in magnitude until subsection **144** begins to tear. The user can apply the force **400** by pressing with one or more fingers, or by using any implement to initiate separation of subsection **144**. As shown in FIG. 5, once subsection **144** is at least partially torn or otherwise separated, the user inserts an implement or one or more fingers between the opening device **200** and the removable portion **T** so as to grasp the removable portion **T**. The user can then break the remainder of frangible line **140** to at least partially remove removable portion **T**, as can be seen in FIG. 6. If desired, the removable portion **T** is completely removed (FIG. 7).

[0032] The present invention has been illustrated in relation to a particular embodiment which is intended in all respects to be illustrative rather than restrictive. Those skilled in the art will recognize that the present invention is capable of many modifications and variations without departing from the scope of the invention. For example, as used herein, directional references such as "top", "base", "bottom", "end", "side", "inner", "outer", "upper", "middle", "lower", "front" and "rear" do not limit the respective walls of the carton to such orientation, but merely serve to distinguish these walls from one another. Any reference to hinged connection should not be construed as necessarily referring to a junction including a single hinge only; indeed, it is envisaged that hinged connection can be formed from one or more potentially disparate means for hingedly connecting materials.

[0033] Moreover, the principles of the opening device can be applied to any container that is opened by means of a frangible severance line, or to any device or method for tearing a frangible connection between disparate materials or adjacent sections of the same material. Thus, the configuration, manufacture, and dimensions of cartons and articles described herein merely provide a point of reference for an understanding of an example of a suitable application for implementing the systems and methods of the invention. Accordingly, the scope of

the present invention is described by the claims appended hereto and supported by the foregoing.

CLAIMS

1. A carton, comprising:

a first wall having a frangible line formed therein; and

an opening device for breaking said frangible line, said opening device being defined by at least a portion of said frangible line and by a pair of convergent fold lines each originating near said frangible line, the opening device comprising:

a collapsible line disposed between said convergent fold lines such that said collapsible line is disposed transversely to said frangible line;

wherein said convergent fold lines and said collapsible line cooperate to break said frangible line when pressure is applied proximate to said collapsible line.

2. The carton of Claim 1, wherein the opening device further comprises a transverse fold line disposed between said convergent fold lines such that said transverse fold line is disposed perpendicular to and intersecting said collapsible line.

3. The carton of Claim 2, wherein said opening device further comprises:

an elliptical score line disposed between said convergent fold lines and having a major axis that coincides at least in part with said transverse fold line.

4. The carton of Claim 1, wherein at least a portion of said frangible line defining said opening device comprises a weakened portion that is adjacent to said collapsible line.

5. The carton of Claim 4, wherein a portion of said frangible line comprises a plurality of interrupted cut lines in series with one another and with said weakened portion, the plurality of cut lines being angled toward said collapsible line.

6. The carton of Claim 1, wherein said collapsible is disposed along the direction of convergence of said convergent fold lines.

7. The carton of Claim 4, wherein said weakened portion is perpendicular to said collapsible line.

8. A carton, comprising:

a top wall;

a pair of opposed side walls each having upper and lower edges and each hingedly connected along said upper edges to said top wall;

a bottom wall having side edges hingedly connected to said lower edges of said side walls;

an end wall hingedly connected to end edges of each of said side, top, and bottom walls;

an article dispenser including a removable portion formed from at least a portion of said side, top, and end walls, the removable portion being defined by a frangible line; and

an opening device for breaking said frangible line, said opening device being defined by at least a portion of said frangible line and by a pair of convergent fold lines each originating near said frangible line, the opening device comprising:

a severance line disposed between said convergent fold lines, said severance line being disposed along the direction of convergence of said convergent fold lines; and

a fold line disposed between said convergent fold lines and perpendicular to said severance line.

9. The carton of Claim 8, wherein said frangible line is continuous.

10. The carton of Claim 8, further comprising a collapsible line disposed between said convergent fold lines, said collapsible line being disposed along the direction of convergence of said convergent fold lines.

11. The carton of Claim 10, wherein a portion of said frangible line comprises a plurality of interrupted cut lines in series with one another and with a

weakened portion, the plurality of cut lines being angled toward said collapsible line, and the weakened portion being adjacent and perpendicular to said collapsible line.

12. An opening device for breaking a frangible line connecting a first section of material to a second section of material, said opening device being defined by at least a portion of said frangible line and by a pair of convergent fold lines each originating near said frangible line, the opening device comprising:

a collapsible line disposed between said convergent fold lines;

a fold line disposed between said convergent fold lines and perpendicular to and intersecting said collapsible line;

wherein said fold line, said convergent fold lines, and said collapsible line cooperate to break said frangible line when pressure is applied proximate to the intersection between said fold line and said collapsible line.

13. The opening device of Claim 12, wherein said collapsible line is disposed along the direction of convergence of said convergent fold lines.

14. The opening device of Claim 12, wherein said collapsible line is perpendicular to said frangible line.

15. The opening device of Claim 12, wherein said first section of material and said second section of material are disparate.

16. The opening device of Claim 12, wherein said first section of material and said second section of material are constructed of the same kind of material.

17. A method for opening a carton, wherein the carton includes a top wall, a pair of opposed side walls each having upper and lower edges and each hingedly connected along said upper edges to said top wall, a bottom wall having side edges hingedly connected to said lower edges of said side walls, an end wall hingedly connected to end edges of each of said side, top, and bottom walls, and an article dispenser including an at least partially removable portion formed from at least one

of said side, top, end, and bottom walls, the removable portion being defined at least in part by at least one frangible line, the method comprising:

applying downward pressure to an opening device for breaking said frangible line, said opening device being defined by at least a portion of said frangible line and by a pair of convergent fold lines each originating near said frangible line, the opening device comprising:

a collapsible line disposed between said convergent fold lines, said collapsible line being disposed along the direction of convergence of said convergent fold lines;

a fold line disposed between said convergent fold lines intersecting said collapsible line;

discontinuing the application of pressure when said frangible line tears sufficiently to grasp an edge of said removable portion, said edge being defined by said frangible line;

grasping said edge; and

tearing at least a portion of the remainder of said frangible line until the carton is open.

18. A carton, comprising:

a first wall having a frangible line formed therein; and

an opening device for breaking said frangible line, said opening device being defined by at least a portion of said frangible line and by a pair of convergent fold lines each originating near said frangible line, the opening device comprising:

a fold line extending between said convergent fold lines such that said fold line is disposed transversely to said convergent fold lines;

wherein said fold line and said convergent fold lines cooperate to break said frangible line when pressure is applied proximate to said fold line.

19. An opening device for breaking a frangible line connecting a first section of material to a second section of material, comprising a collapsible line disposed perpendicular and adjacent to said frangible line;

wherein said frangible line is broken when pressure is applied proximate to said collapsible line.

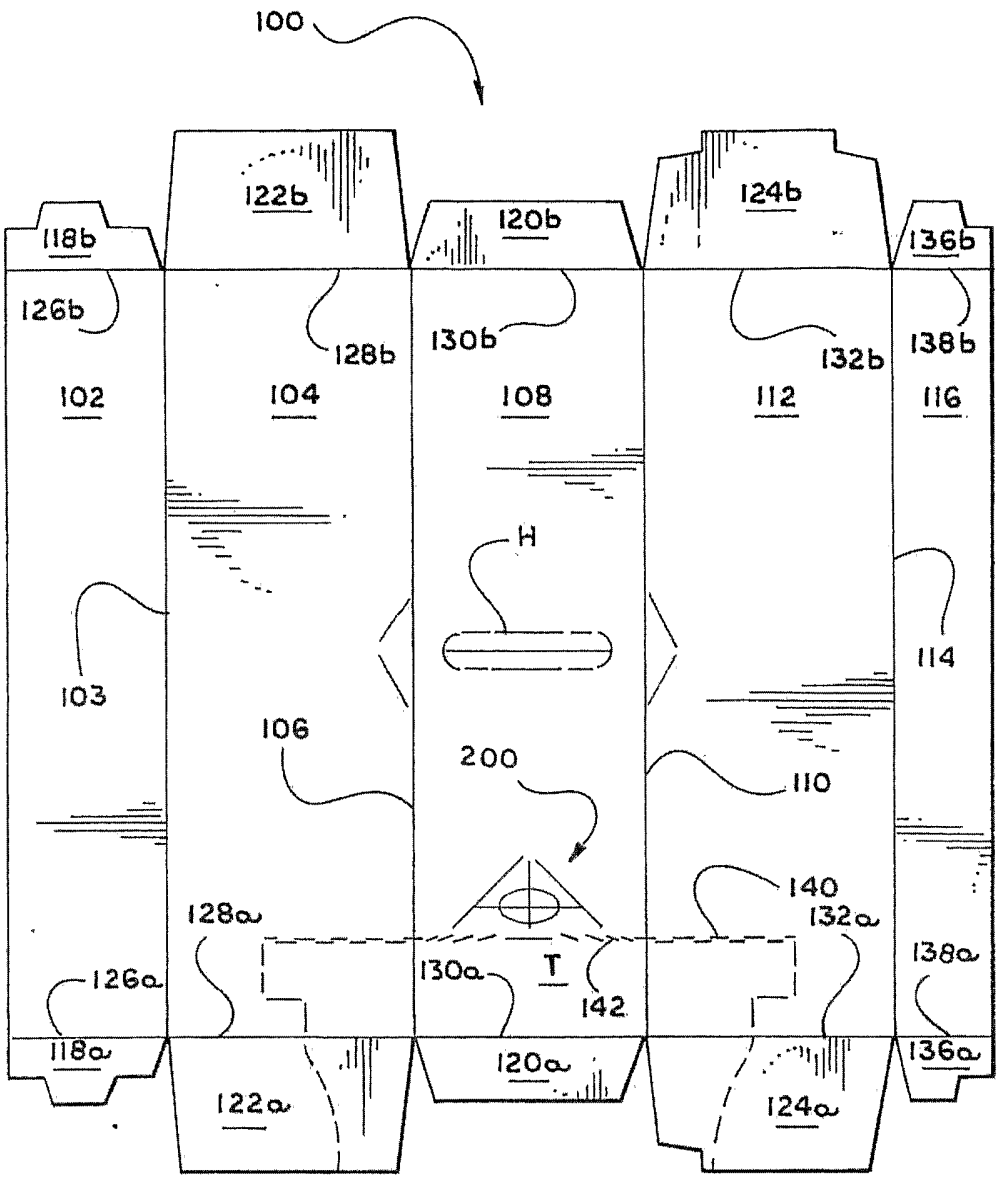

100
122b
120b
124b
118b
136b
126b
128b
130b
132b
138b
102
104
108
112
116
H
103
114
106
200
110
140
128a
132a
126a
130a
T
142
138a
118a
120a
136a
122a
124a

Fig. 1

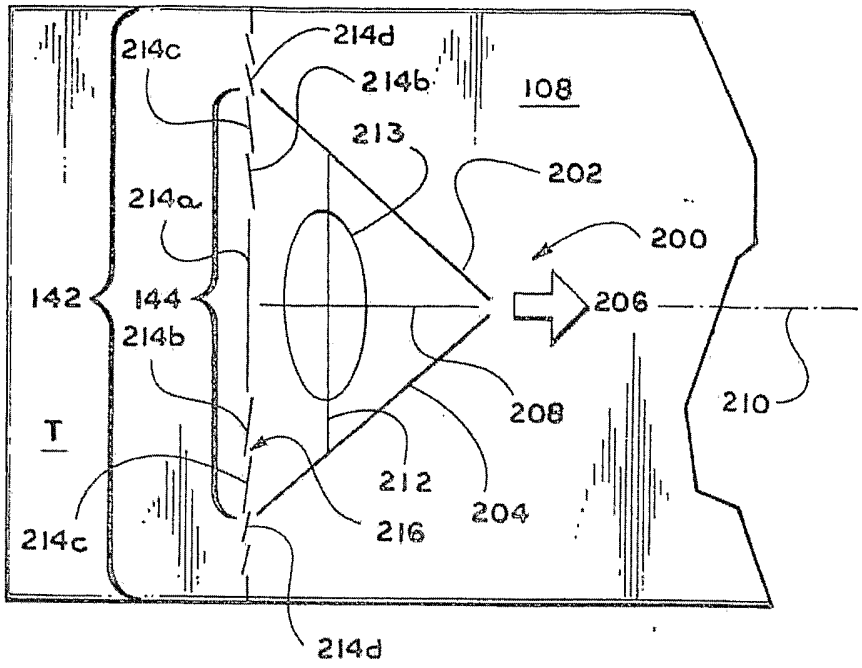

214c
214d
214b
108
213
202
214a
200
142
144
206
214b
208
210
T
212
204
214c
216
214d

Fig. 2

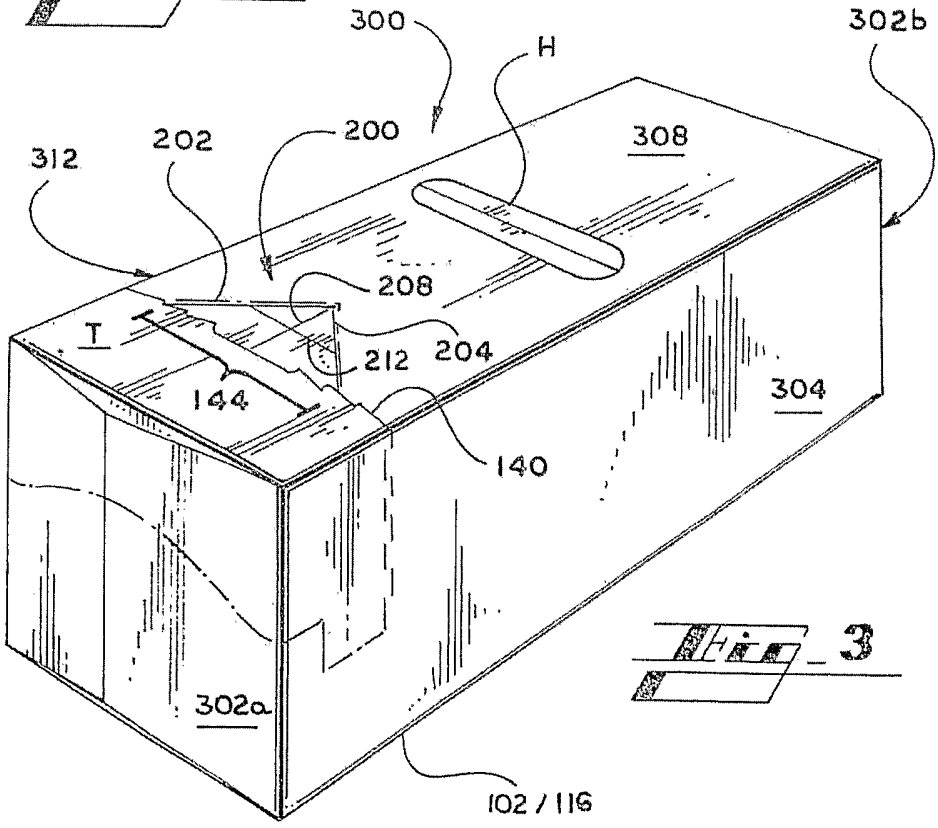

300
H
302b
312
202
200
308
208
T
212
204
144
304
140
302a
102 / 116

Fig. 3

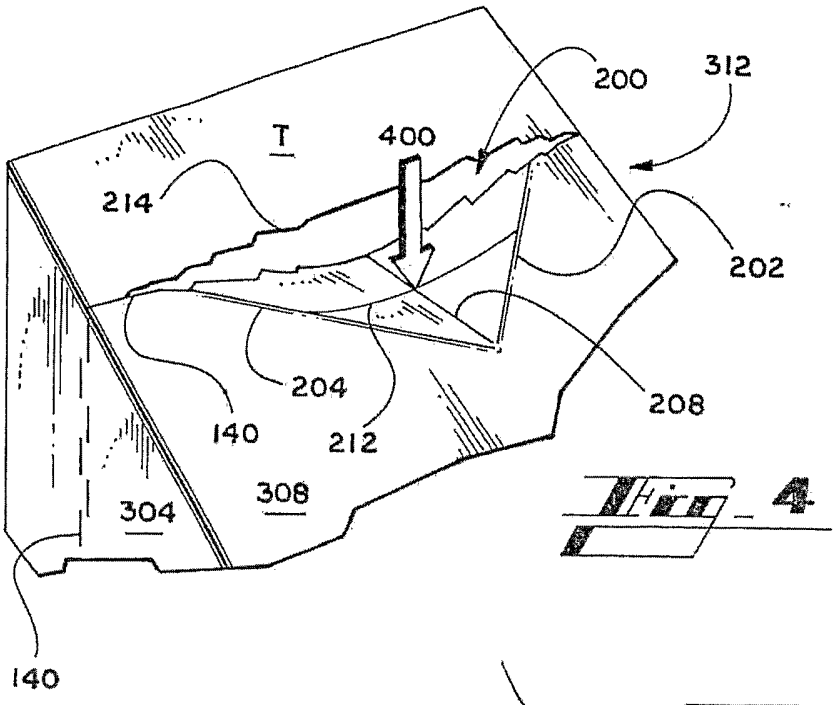
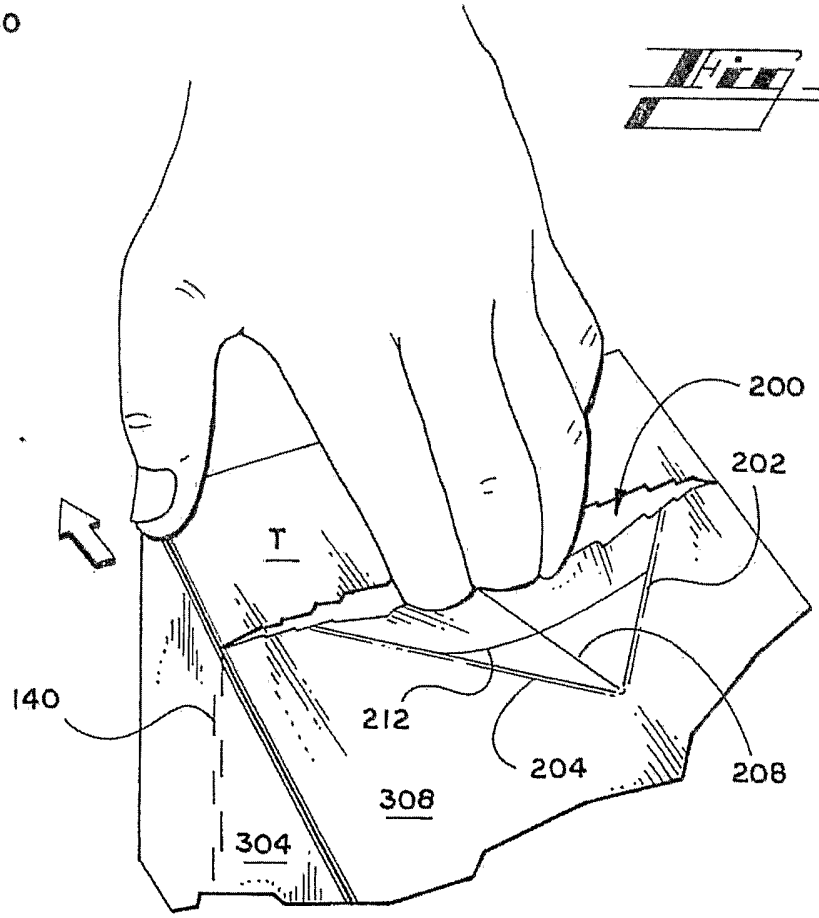

200
312
T
400
214
202
204
208
140
212
308
304
140

Fig. 4

Fig. 5


200
202
T
140
212
204
208
308
304

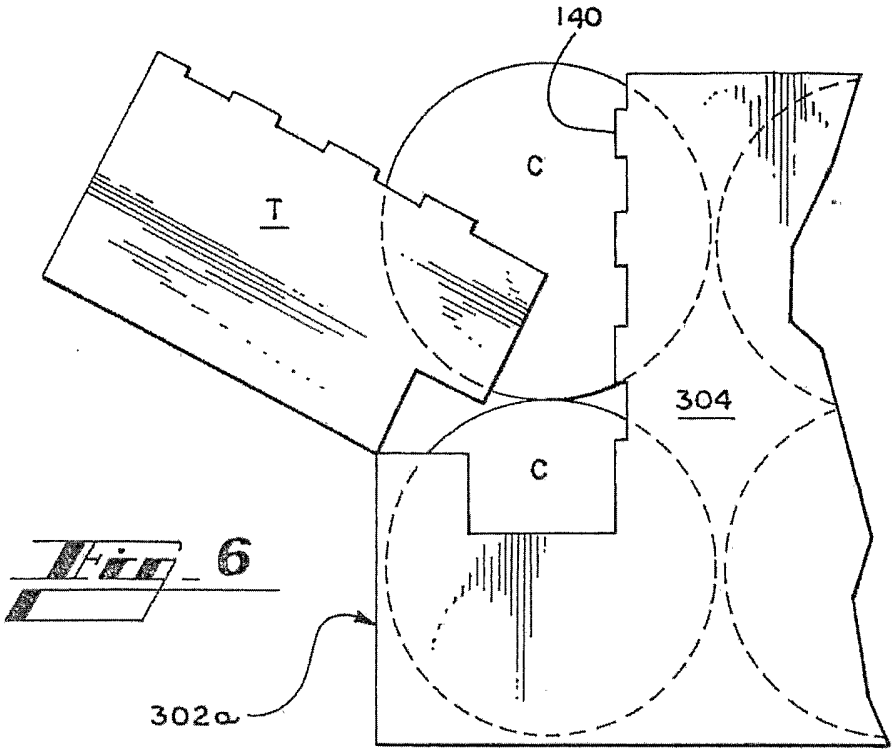


Fig. 6

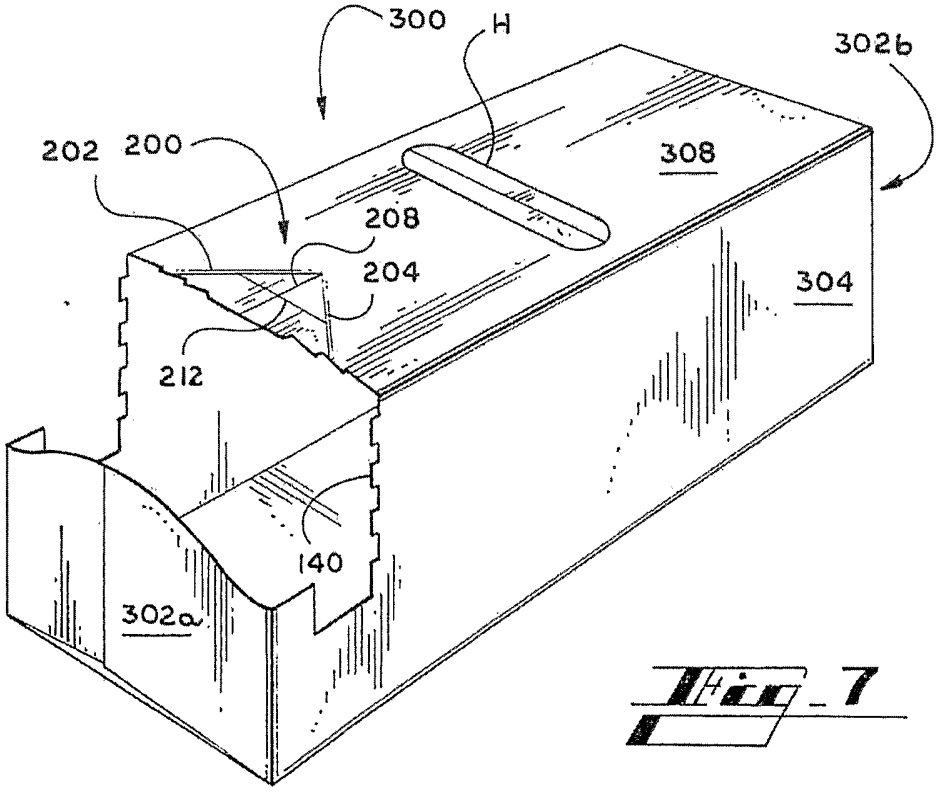


Fig. 7

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2005/046405

A. CLASSIFICATION OF SUBJECT MATTER
INV. B65D5/72

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)
B65D

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 2004/087523 A (MEADWESTVACO PACKAGING SYSTEMS LLC; HOLLEY, JOHN, M, JR) 14 October 2004 (2004-10-14) abstract; figures 1-7 page 5, line 21 - page 10, line 27	1-19
X	US 4 785 991 A (SCHUSTER ET AL) 22 November 1988 (1988-11-22) column 4, line 39 - column 6, line 63 column 10, last paragraph - column 11, paragraph 1; figures 1-8	12-16,19
A	US 2003/192905 A1 (SPIVEY RAYMOND RUDOLPH) 16 October 2003 (2003-10-16) paragraph [0025]; figures 1-4 paragraph [0031]; figure 5	1-19

-/--

[X] Further documents are listed in the continuation of Box C.

[X] See patent family 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

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"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.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
12 April 2006	24/04/2006

Name and mailing address of the ISA/	Authorized officer
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	Segerer, H

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2005/046405

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2004/188277 A1 (AUCLAIR JEAN-MICHEL) 30 September 2004 (2004-09-30) paragraph [0020] - paragraph [0028]; figures 1-3	1-19
A	GB 1 602 857 A (MEAD CORP) 18 November 1981 (1981-11-18) claim 1; figures 1-3	1-19

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2005/046405

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2004087523 A	14-10-2004	AU 2004226020 A1	14-10-2004
		CA 2519834 A1	14-10-2004
		EP 1615841 A1	18-01-2006
		US 2004188509 A1	30-09-2004
US 4785991 A	22-11-1988	AU 585672 B2	22-06-1989
		AU 6595686 A	19-05-1987
		BR 8606931 A	03-11-1987
		CA 1269965 A1	05-06-1990
		DK 333387 A	29-06-1987
		EP 0245438 A1	19-11-1987
		ES 2003445 A6	01-11-1988
		FI 872665 A	16-06-1987
		IE 59437 B1	23-02-1994
		JP 7005132 B	25-01-1995
		KR 9310376 B1	23-10-1993
		NZ 218100 A	27-01-1989
		WO 8702648 A1	07-05-1987
US 2003192905 A1	16-10-2003	EP 1408798 A1	21-04-2004
		WO 02102208 A1	27-12-2002
		US 2002185499 A1	12-12-2002
		US 2002088820 A1	11-07-2002
		US 2002088821 A1	11-07-2002
US 2004188277 A1	30-09-2004	AU 2004226019 A1	14-10-2004
		CA 2519831 A1	14-10-2004
		EP 1613537 A1	11-01-2006
		WO 2004087522 A1	14-10-2004
GB 1602857 A	18-11-1981	NONE	