FIGURE S

(57) Abstract: A carton (50) of the top gripping type for receiving and retaining a group of cylindrical articles (C) said carton comprising a main panel (16) comprising apertures (22a, 22b, 22c, 22d, 22e, 22f) each for receiving and retaining an upper portion of a cylindrical article (C) wherein said apertures comprise a pair of opposing curved sections (80, 82) for forming curved edges of said main panel to engage with curved portions of a cylindrical article, said aperture also comprising at least one U-shaped section (84, 86), said U-shaped section being struck at least in part from a first portion (24a, 24b) of said main panel, said first portion of said main panel being foldable such that edges of said U-shaped section is engageable with an article receivable in said aperture, the carton further comprising an end retention structure (90a,90b) for retaining end most articles in a group of article within the carton.
Published:
- with international search report
Field of Invention

The present invention provides a carton for receiving one or more articles, more particularly, but not exclusively the carton provides a top gripping carrier for receiving and retaining said one or more articles.

Background Art

Cartons for engaging multiple articles are useful for enabling consumers to obtain and transport a desired quantity of individual articles such as soft drinks or other beverages or food stuffs.

It is well known to provide top gripping article carriers in which an aperture is formed in a panel of the carrier; wherein tabs are struck from said aperture. The tabs being displaced out of the plane of said panel when an article is received in the aperture: wherein said tabs engages the article generally about a flange or lip of the article.

Such a carrier is disclosed in US 2,936,070 to Poupitch and in US 5,188,225 to Jorbin. It can be difficult to remove the articles from such carriers without damaging the carton.

It is desirable to provide an article carrier which can be reused such that empty articles can be replaced in the carrier to facilitate transportation of the empty articles, for example to a recycling station or for return to the distributor.

It is also desirable for ecological and economic reasons to minimise the quantity of material required whilst at the same time providing a secure carrier for the articles.
Summary of Invention

A first aspect of the invention provides a carton of the top gripping type for receiving and retaining a group of cylindrical articles said carton having a main panel comprising apertures each for receiving and retaining an upper portion of a cylindrical article wherein said apertures comprise a pair of opposing curved sections for forming curved edges of said main panel engages with curved portions of a cylindrical article, said aperture also comprising at least one Li-shaped section, said U-shaped section being struck at least in part from a first portion of said main panel, said first portion of said main panel being foldable such that an edge of said U-shaped section is engagable with an article received therein, the carton further comprising an end retention structure for retaining endmost articles in a group of articles within the carton.

Preferably, the apertures comprise a second U-shaped section; said second U-shaped section opposing said at least one U-shaped section.

Preferably, the main panel comprises a second portion foldable to form second U-shaped edges which are engageable with an article and wherein said second U-shaped section is struck at least in part from said second portion.

Preferably, the second portion forms a part of a V-shaped structure foldable between a first and second article whereby forming a brace between said first and second articles.

Preferably, the end retention structure comprises a band hinged to between a pair of opposing side panels of the carton.

A second aspect of the invention provides a carton for a group of articles, comprising a first panel comprising apertures each for receiving and retaining a respective article in said group and a strap portion for maintaining lower regions of the articles within the group together wherein in use the strap portion is disposed beneath said first panel.

Preferably, the strap portion and said first panel are formed from a unitary blank.
Preferably, the strap portion is formed from a pair of side panels hinged to said first panel and pair of end portions hinged to each end, each end portion being hinged to a respective one of said pair of side panels.

Preferably, each end of each end portion is hinged to said respective one of said pair of side panels by at least one gusset panel.

Preferably, the gusset panel is secured in position between an adjacent side panel and an adjacent end portion.

A third aspect of the invention provides a carton comprising a main panel, said main panel comprising a non-circular aperture for receiving and retaining an article.

Preferably, the aperture defines at least one engaging edge of said main panel, wherein in use said at least one engaging edge is disposed in the plane of the main panel and engages with a portion of an article whereby retaining said article within the aperture.

Preferably, the aperture comprises at least one linear portion, for forming a or at least one engaging edge for engaging an article.

Preferably, the aperture comprises an arcuate section.

Preferably, the arcuate portion is suitable for forming a or the at least one engaging edge for engaging an article and said arcuate portion is complementary to a periphery of said article.

Preferably, the aperture is formed so that said main panel is engageable with an article at at least two discrete locations about said article.

Preferably, the aperture is formed so that said main panel is engageable with an article at at least four discrete locations about said article.

Preferably, the aperture is substantially octagonal in shape.

Preferably, the aperture comprises arcuate recessed portions and arcuate protruding portions wherein each of said arcuate protruding portions are engageable with an article at discrete locations about the articles periphery.
Preferably, the main panel is engageable with an article at eight discrete locations about its periphery.

A fourth aspect of the invention provides a package comprising carton as hereinbefore described and at least one article having a circular cross-section at the location where the carton engages with said article.

Preferably, wherein the article comprises a flange beneath which the carton engages the article.

A fifth aspect of the invention provides a blank for forming any of the cartons hereinbefore described.

**Brief Description of Drawings**

Exemplary embodiments of the present invention will now be described with reference to the accompanying drawings in which:

FIGURE 1 illustrates a plan view of a blank for forming the carton of Figure 3;

FIGURE 2 illustrates a perspective view of a section of the carton illustrated in Figure 3;

FIGURE 2A illustrates a side view of the section illustrated in Figure 2 in the direction of arrow A;

FIGURE 2B illustrates a side view of the section illustrated in Figure 2 in the direction of arrow B;

FIGURE 3 illustrates a package according to a first embodiment of the present invention;

FIGURE 4 shows a plan view of a blank according to a second embodiment of the present invention for following the package of Figure 7;

FIGURE 5 shows a plan view of a blank according to a third embodiment of the present invention;
FIGURE 6 shows a plan view of a blank for forming the package of Figure 7;

FIGURE 7 shows a perspective view of a package according to a second embodiment of the present invention.

Detailed Description of Exemplary Embodiments of the Present Invention

Referring to the drawings there is shown in Figure 1, a blank 10 for forming the carton 50 shown in Figure 3. Blank 10 comprises a top panel 16 having apertures 22a, 22b, 22c, 22d, 22e, 22f. Each of the apertures 22a, 22b, 22c, 22d, 22e and 22f are substantially the same; they will be described by reference to only aperture 22a.

Aperture 22a comprises first and second opposing curved sections 80, 83 and first and second opposing U-shaped sections 84, 86 respectively.

Top panel 16 comprises a plurality of fold lines 11, 13, 15a, 15b 17a, 17b and 19.

Fold lines 11, 13 hingedly connect top panel 16 to side panels 12 and 14 respectively.

Fold lines 15a and 15b, together with fold lines 11 and 13 respectively, define, at in part, outer shoulder portions 24a, 24b for folding about an inclined shoulder portion of an article C received in the aperture 22a as shown in Figures 2 and 2A. Fold lines 17a, 17b and 19 define, at least in part, inner shoulder portions 26a, 26b. Inner shoulder portions 26a, 26b fold about shoulder portions of articles C received in the apertures 22a; such that a "V" shaped section is formed between two rows of articles C. Blank 10 comprises a pair of end retention structures 90a, 90b hingedly connected to each of the side panels 12, 14.

Fold lines 17a, 17b, together with fold lines 15a, 15b respectively, define, at least in part, intermediate portions 35a, 35b that extend between the outer and inner shoulder portions 24a, 24b and 26a, 26b. Fold lines 15a, 15b hingedly connect intermediate portions 35a, 35b to outer shoulder portions 24a, 24b
respectively and provide respective upper edges of outer shoulder portions 24a, 24b. Fold lines 17a, 17b hingedly connect intermediate portions 35a, 35b to inner shoulder portions 26a, 26b respectively and provide respective upper edges of inner shoulder portions 26a, 26b. Fold line 19 hingedly connects inner shoulder portions 26a, 26b together and provides a common lower edge of inner shoulder portions 26a, 26b.

The end retention structures 90a comprise an end panel 18, 20 at each end of which a corner panel 28a, 28b; 30, 30b is hingedly connected along a fold line 21a, 21b; 23a, 23b respectively. Each corner panel 28a, 28b; 30, 30b is also hinged to a respective one of first gusset panel 32a, 32b; 34a, 34b.

First gusset panels 32a, 32b; 34a, 34b are hingedly connected to second gusset panels 36a, 36b; 38a, 38b respectively. Second gusset panels 38a, 36a are hingedly connected to opposing ends of side panel 12 whereas second gusset panels 36b, 38b are hingedly connected to opposing ends of side panel 14.

Turning now to Figure 3, there is shown a constructed carton 50 assembled around a group of articles, in this particular embodiment the group of articles C consist of six substantially cylindrical articles C, such as beverage cans, arranged in two rows of three articles C.

Figure 3 shows that side panel 12 has been folded about fold line 11. Second gusset panel 38a has been folded such that it is placed between side panel 12 and first gusset panel 34a.

Corner panel 30a has been folded substantially about the article C such that the end retentions structure 90a is assembled about the end of the group of articles C. End retention structure 90a forms a strap about the end of the group of articles C.

Further it can be seen that outer shoulder portion 24a has been folded about fold lines 11 and 15a as to form about a shoulder of the articles C.
Inner shoulder portions 26a, 26b have been folded about fold lines 17a, 17b and 19 to form a "V" shaped structure between the two rows of articles C.

Turning now to Figure 2 there is shown a partial view of constructed carton 50, it can be seen that an article C has been inserted into an aperture 22 in carton 50, of which only a partial section is shown about the aperture 27.

Outer shoulder portion 24a is folded about a shoulder of article C.

The U-shaped section 84 of aperture 22a, which is struck at least in part from outer shoulder portion 24a forms a U-shaped engaging edge of outer shoulder portion 24a by which the carton 50 may engage the article C. Similarly the U-shaped section 86 of aperture 22a (not shown in Figure 2) which is struck at least in part from inner shoulder portion 26a forms a U-shaped engaging edge by which the carton 50 may engage the article C. These U-shaped engaging edges 84, 86 are coupled to curved edges 80, 83 to define aperture 22a. Preferably, the U-shaped engaging edges 84, 86 each comprise a linear portion.

Referring to Figures 2A and 2B it can be seen that outer shoulder portion 24a and inner shoulder portion 26a engage beneath a lip or flange F of the article C.

Outer shoulder portion 24a and inner shoulder portion 26a deform about the shoulder portions of the article C. Curved sections 80, 83 of aperture 22a define curved engaging edges of intermediate panel 35a which engage the article C beneath the flange F. U-shaped sections 84, 86 of aperture 22a define respective engaging edges of outer and inner shoulder portions 24a, 26a which also engage the article C beneath the flange F. In some embodiments the intermediate panel 35a may deform as a consequence of article C being received in aperture 22.

The carton 50 is thus formed from blank 10, as shown in Figure 3 the blank 10 comprises shaped apertures 22 for receiving the upper portions of flanged or lipped articles C, which are cylindrical in nature. Each aperture 22 has a pair of opposing curved sections 80, 83 which opposing curved sections 80, 83 are longitudinally disposed in the carton 50. Apertures 22 also comprise opposing
U-shaped sections having elongate linear portions 84, 86, said opposing U-shaped sections being transversely disposed with respect to the carton 50. The curved sections 80, 83 accommodate curved walls of the articles C to provide a snug fit between the article C and the carton 50. The U-shaped sections project into and define slots disposed in shoulder portions or side flaps 12, 14 which shoulder portions 24a, 24b, 26a, 26b or side flaps 12, 14 are folded such that the U-shaped sections lateral engage the article C, preferably beneath said flange or lip of the article. Bands or strap portions 90a, 90b attached to ends of the side flaps provide assistance in retaining the end articles C in the resulting constructed package within the carton 50.

Turning now to Figures 4 to 7, there is shown a second embodiment of the present invention.

Figure 4 illustrates a plan view of a blank 110 for forming the carton 150 of Figure 7. Blank 110 comprises a main panel 116; from which apertures 122 are struck.

Apertures 122 are substantially octagonal in shape. Main panel 116 comprises finger tabs 140 defined in part by a cut line or weakened line of severance and in part by fold line 142. Finger tabs 140 can be used to grasp the carton 150.

Apertures 122 comprise recessed portions 146 and protruding portions 144. The protruding portions 144 are wider than recess portions 146. The dimension of the protruding portions 144 in a radial direction is substantially less than its dimension in a tangential direction.

Figure 5 illustrates an alternative blank 210 for use with blank 160 of Figure 6. Comparison of blank 210 with blank 120 shows that the finger tabs have been removed. Furthermore, apertures 222, which are identical in shape to apertures 122, have been rotated by an angle between 0 and 45° degrees and preferably an angle of about 22.5° degrees.

Turning now to Figure 6, there is shown a plan view of a blank 160 for forming a band or strap about the group of articles C as shown in Figure 7.
Blank 160 comprises five main panels, 162, 164, 166, 168 and 170 hinged together in series by fold lines 163, 165, 167, and 169 respectively. Panels 164 and 166 form parts of the strap wherein the panels 162, 164, 166, 168 and 170 extend about the articles C at the end of each row.

Panel 166 forms a part of said strap which part extends along the side of articles C within one of said rows of articles C.

Panels 162 and 170 together with securing panels 172, 174 form a composite section, which extends along the side of articles C of the other of said rows of articles C. Securing panels 172, 174 are respectively hinged to panels 162 and 170 along respective fold lines 161 and 171.

The composite section is secured together by engaging tab 176 with aperture 178. Aperture 178 is struck from one end of panel 162, whereas tab 176 is struck from panel 170. Tab 176 is integral with securing panel 174.

Turning now to Figure 7, it can be seen that articles C have been inserted into aperture 122; the apertures 122 retain upper portions of the articles. Blank 160 has been wraparound the group of articles C at a location below the point panel 116 engages the articles C. Blank 160 forms a strap which keeps the bases of the articles C in close proximity.

The present invention provides an economical carton requiring a minimal quantity of material to provide a multi-pack package, wherein a main panel comprises apertures for engaging articles and a strap portion for maintaining the bases of the articles in close proximity.

It will be further be appreciated that the apertures provided to engage the articles are non-circular in shape, the apertures each engage an article having a cylindrical shape or at least having a circular cross section at the point of engagement.

Due to the non-circular shape of the apertures the carton engages the articles at discrete locations about its periphery. Furthermore, it can be seen that the
aperture provides that gaps are formed between the carton and the articles at locations where the carton does not engage the articles.

Furthermore, the apertures engage the articles without providing tabs which fold out of the plane of the main panel when the carton engages with the articles. In this way the articles are engaged substantially in the plane of the main panel or top panel of the carton. The apertures form an engaging edge in the material forming the top panel which engaging edges are disposed in the plane of the top panel and which engaging edges engage with the articles.

In some embodiments substantially when articles are received in the carton, the articles introduce forces into the material forming the top panel or main panel.

These forces may be tensile or compressive in nature. These forces may also introduce some deformation of the main or top panel. The forces further serve to maintain the articles in their group formation. When the articles are received in the carton, the introduction of articles increases the rigidity of the top or main panel of the carton.

It can be appreciated that various changes may be made without departing from the scope of the present invention, for example, the size and shape of the panels may be adjusted to accommodate articles of differing size or shape.

Alternatively, the apertures may be arranged to engage with the articles at two, or three or any other integer number of locations about the periphery of the article.

It will also be appreciated that features described and/or illustrated with regard to one embodiment of the invention may be combined with, or replace, features of another embodiment.

It will be recognised that as used herein, directional references such as "top", "base", "end", "side", "inner", "outer", "upper" and "lower" do not limit the respective panels to such orientation, but merely serve to distinguish these panels from one another. Any reference to a frangible line can also be construed as a cut line, score line, perforate line or slit, without departing from
the scope of invention. Also, any reference to hinged connection should not be construed as necessarily referring to a single fold line only; indeed it is envisaged that hinged connection can be formed from one or more of the following, a line of demarcation or weakened line, a score line, a frangible line or a fold line without departing from the scope of invention.
1. A carton of the top gripping type for receiving and retaining a one or more cylindrical articles said carton comprising a main panel having one or more apertures each for receiving and retaining an upper portion of a respective one of said one or more cylindrical articles wherein each aperture comprises a pair of opposing curved sections for forming curved edges of said main panel which engage with curved portions of said respective one of said one or more cylindrical articles, said curved sections being struck from a first portion of said main panel, each aperture also comprising at least one U-shaped section for forming U-shaped edge of said main panel, said U-shaped section being struck at least in part from a second portion of said main panel, said second portion being hingedly connected to said first portion such that said U-shaped edge is engagable with an article received in said each aperture, the carton further comprising an end retention structure for retaining an end-most article of said one or more cylindrical articles within the carton.

2. A carton according to claim 1 wherein each aperture comprise a second U-shaped section, said second U-shaped section opposing said at least one U-shaped section.

3. A carton according to claim 1 or 2 wherein said main panel comprises a third portion hingedly connected to said first portion to provide a second U-shaped section of said each aperture which is engagable with said respective one of said one or more cylindrical articles and wherein said second U-shaped section is struck at least in part from said third portion.

4. A carton according to claim 3 wherein said third portion forms a part of a V-shaped structure disposed between a first cylindrical article and a second cylindrical article whereby forming a brace between said first and second cylindrical articles
5. A carton according to any one of claims 1 to 4 wherein said end retention structure comprises a band hingedly connected between a pair of opposing side panels of the carton.

6. A blank for forming the carton of any one of claims 1 to 5.

7. A carton comprising a main panel, said main panel comprising a non-circular apertures for receiving and retaining an article wherein said aperture defines at least one engaging edge of said main panel, wherein in use said at least one engaging edge is disposed in the plane of the main panel and engages with a portion of an article whereby retaining said article within the aperture.

8. A carton according to claim 7 wherein said aperture comprises at least one linear portion for forming a or at least one engaging edge for engaging an article.

9. A carton according to claim 7 or 8 wherein said aperture comprises a curved section.

10. A carton according to claim 9 wherein said curved section is suitable for forming a or the at least one engaging edge for engaging an article and said curved section is complementary to a periphery of said article.

11. A carton according to any one of claims 7 to 10 wherein said aperture is formed so that said main panel is engageable with an article at at least two discrete locations about said article.

12. A carton according to any one of claims 7 to 10 wherein said aperture is formed so that said main panel is engageable with an article at at least four discrete locations about said article.

13. A carton according to claim 7 wherein said aperture is substantially octagonal in shape.

14. A carton according to any one of claims 7 to 13 wherein the aperture comprises arcuate recessed portions and arcuate protruding portions
wherein each of said arcuate protruding portions are engageable with an article at discrete locations about the article's periphery.

15. A carton according to either one of claims 13 or 14 wherein the main panel is engageable with an article at eight discrete locations about its periphery.

16. A package comprising the carton of any one of claims 7 to 15 and at least one article having a circular cross-section at the location where the carton engages with said article.

17. A package according to claim 16 wherein the article comprises a flange beneath which the carton engages the article.

18. A blank for forming the carton of claims 7 to 17.
INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER

INTERNATIONAL APPLICATION No

PCT/US2008/073284

A. CLASSIFICATION OF SUBJECT MATTER

INV. B65D71/42

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 database consulted during the international search (name of database and, where practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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

X See patent family annex.

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Date of the international search completion: 19 November 2008

Date of mailing of the international search report: 28/11/2008

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