

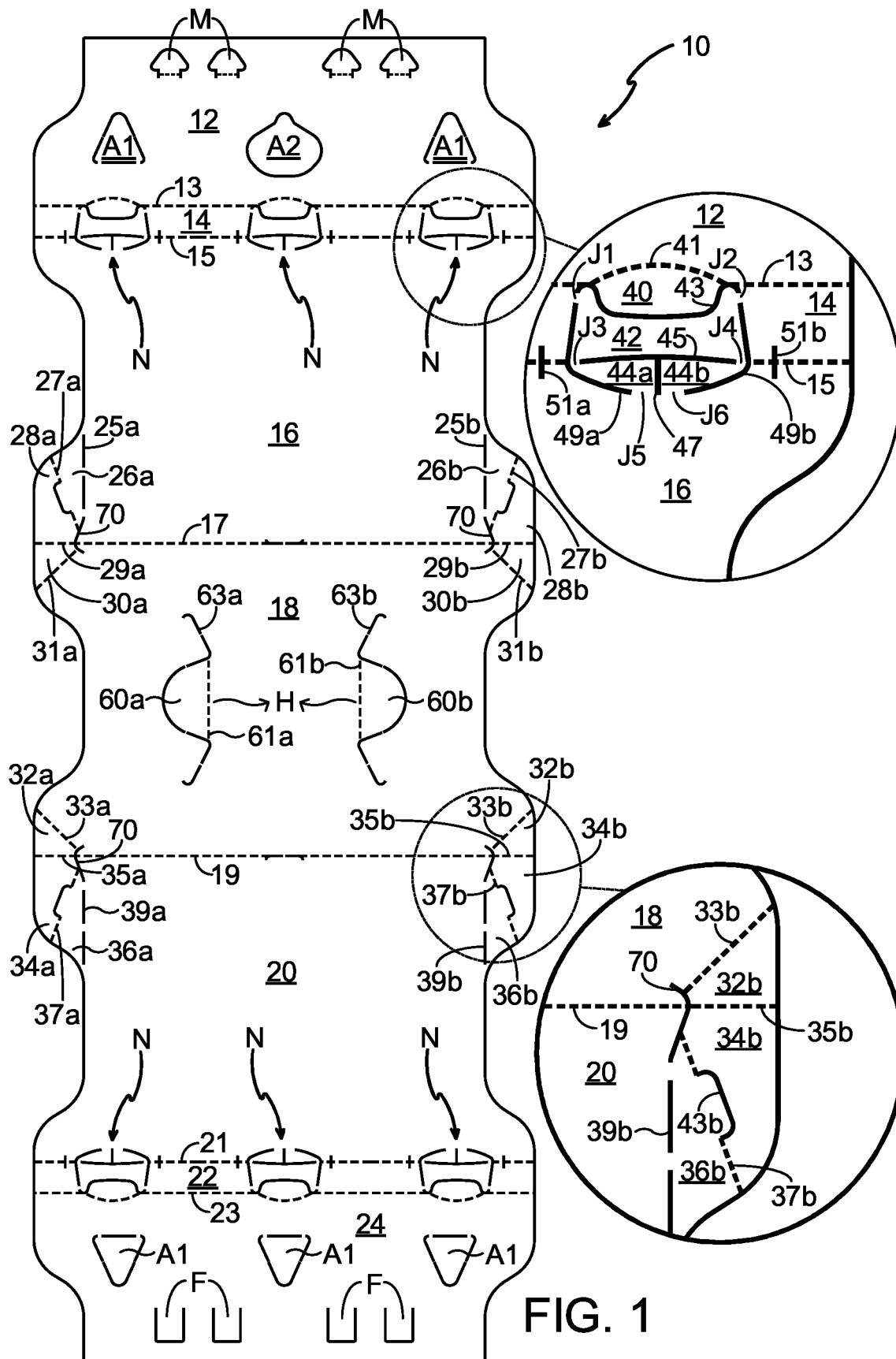


FIG. 1

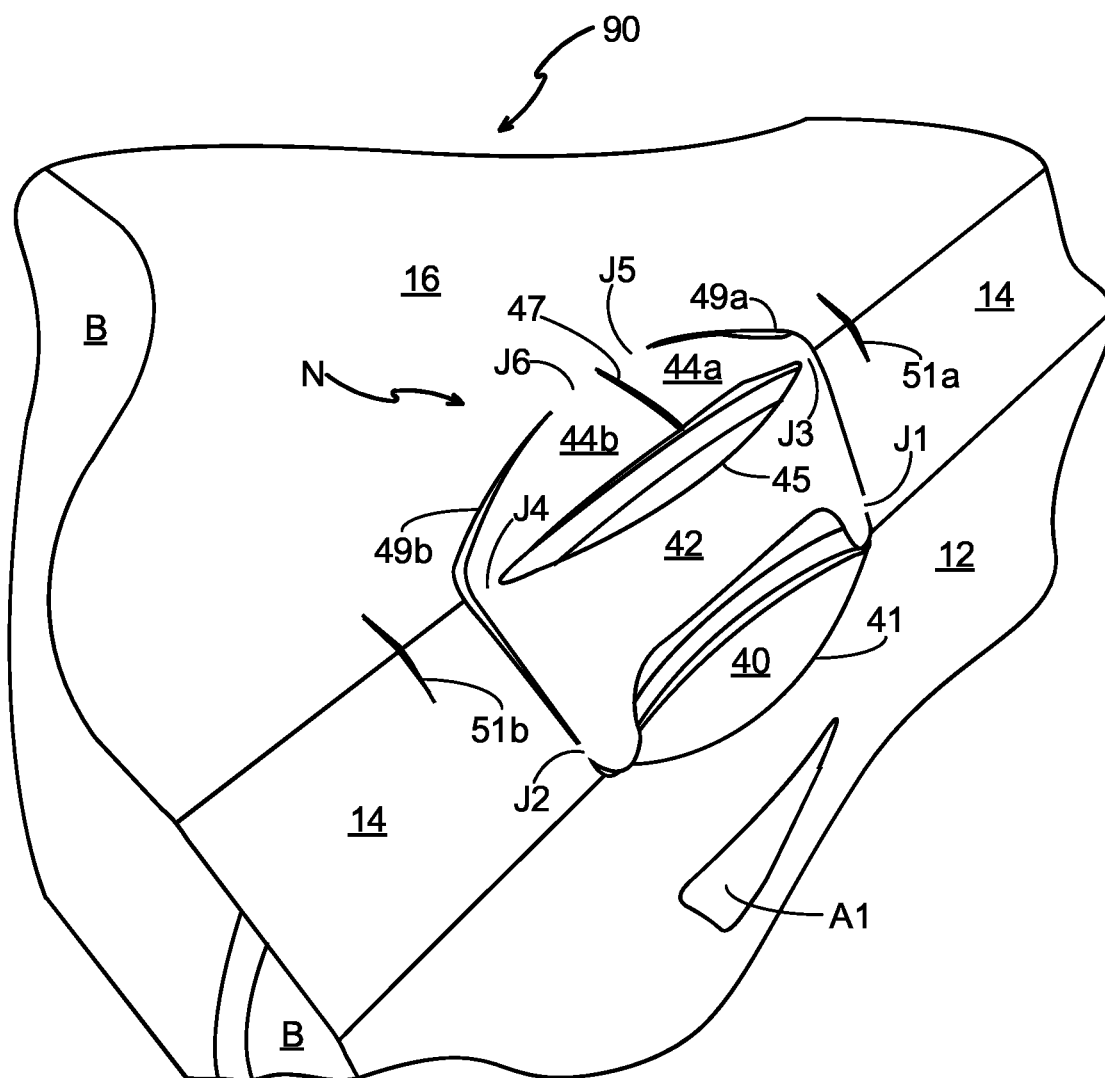
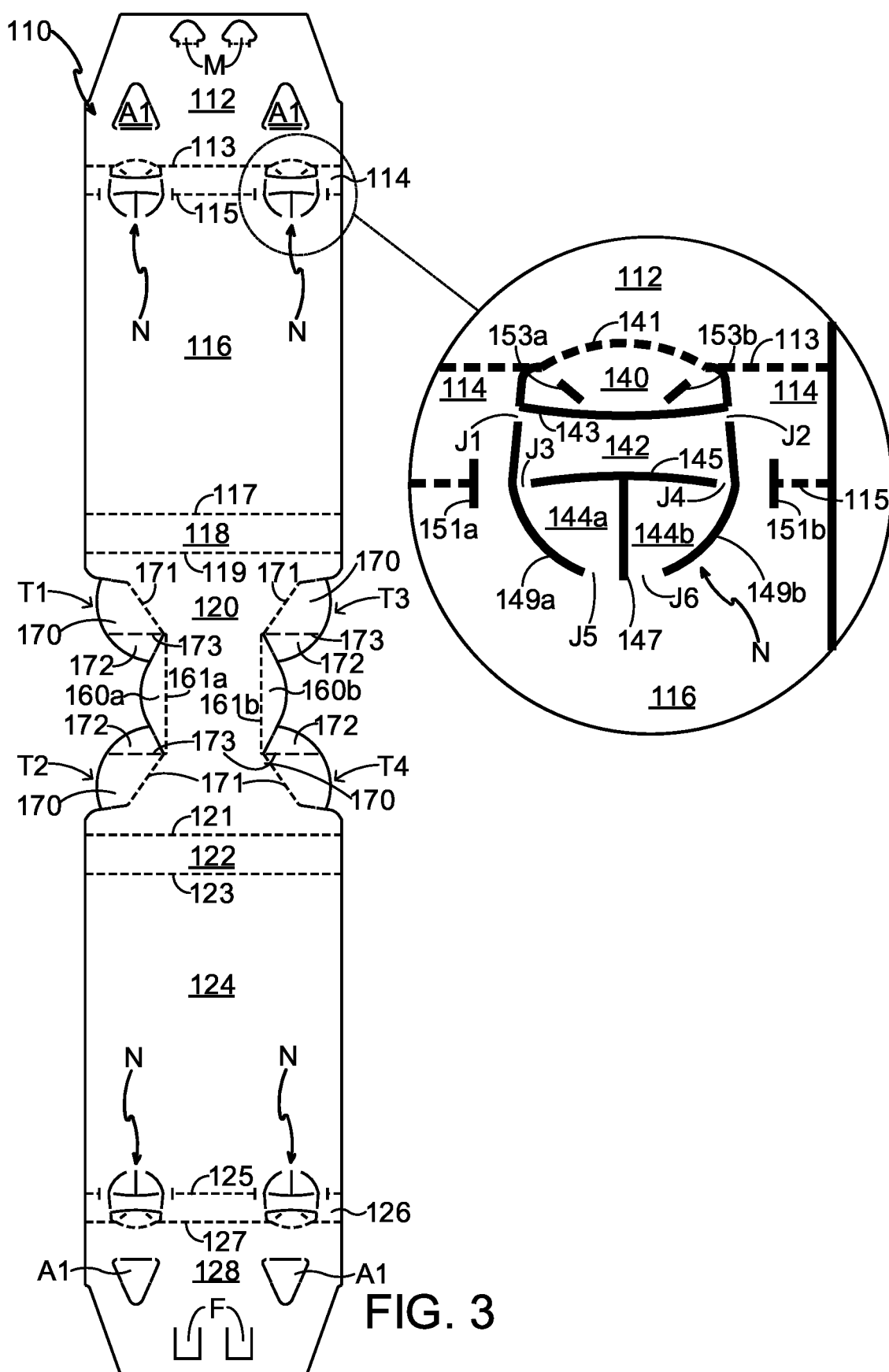


FIG. 2



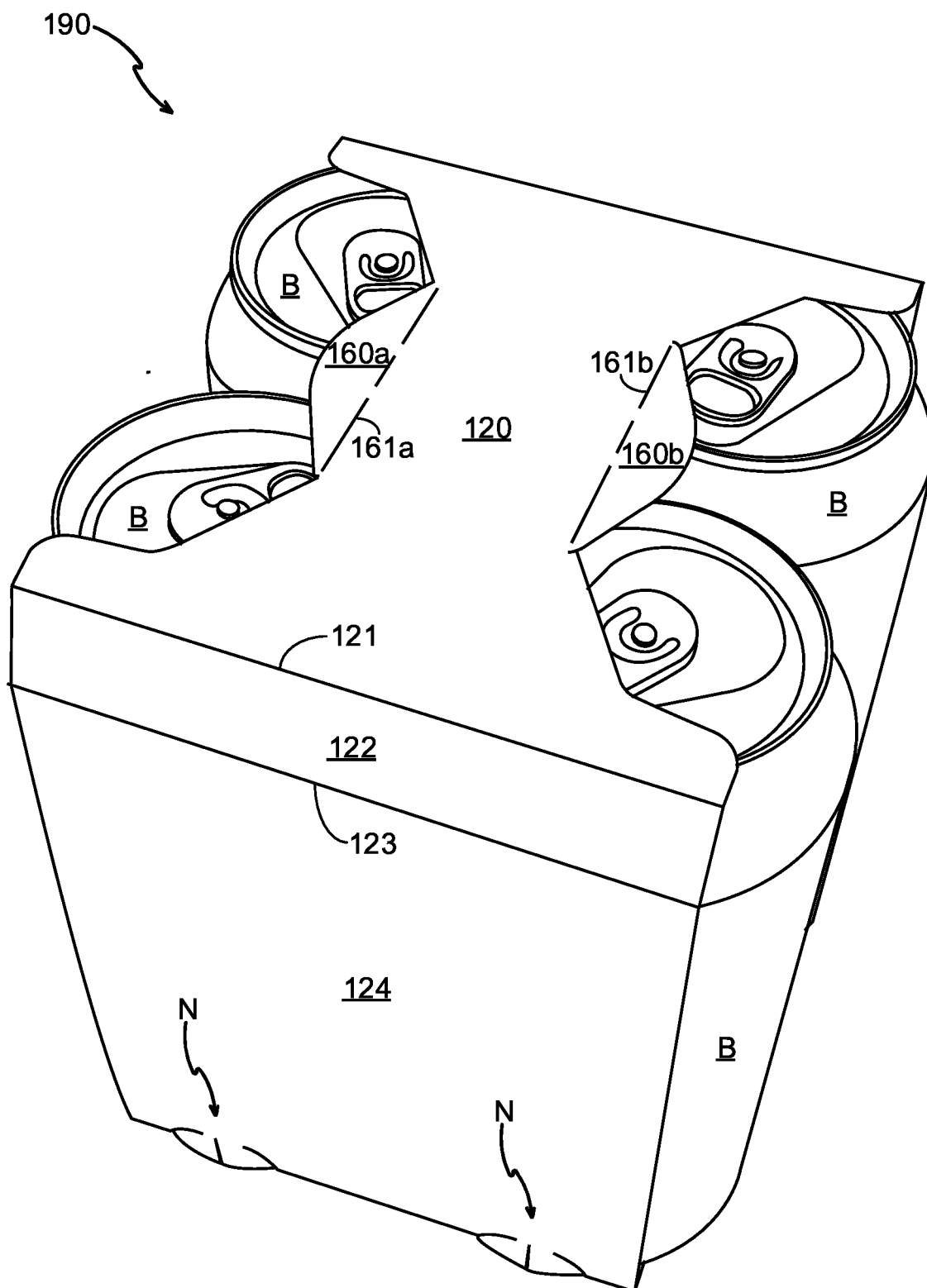


FIG. 4

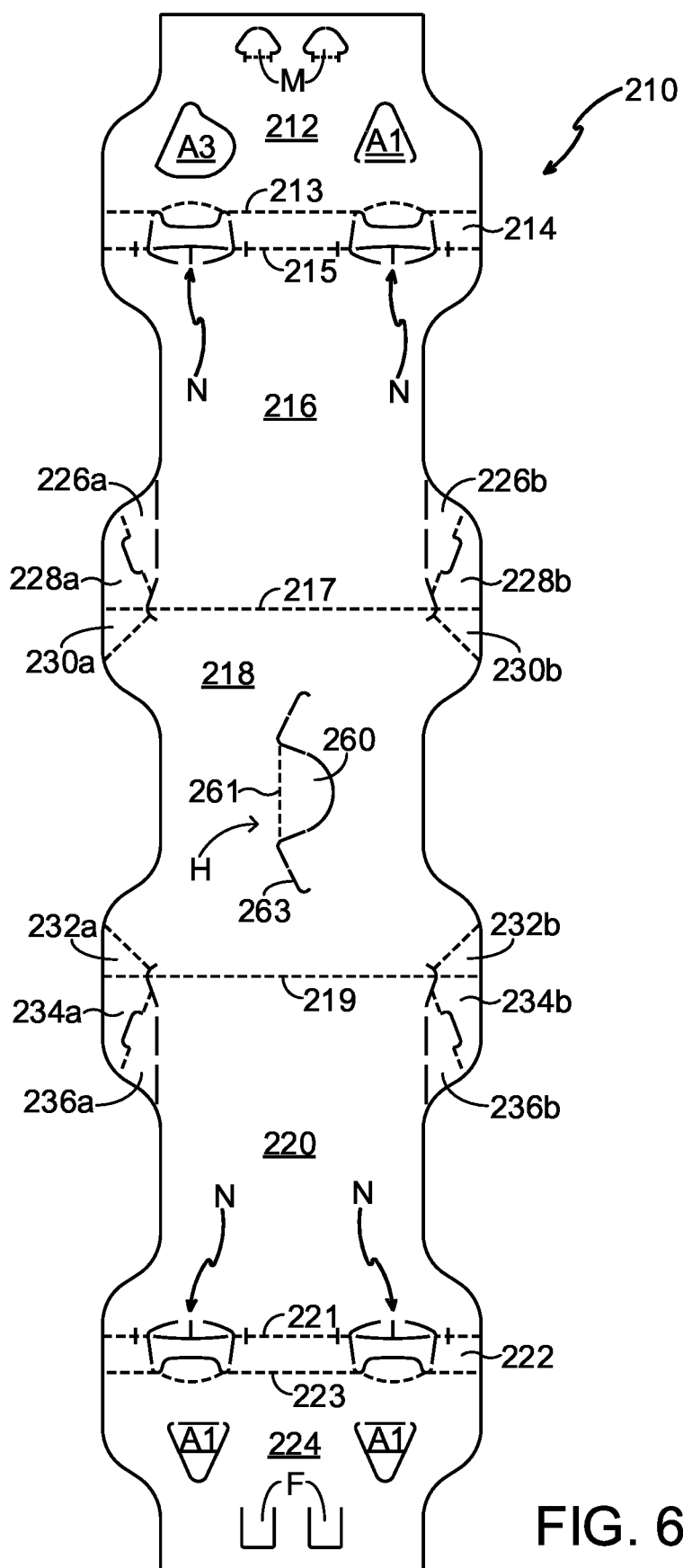
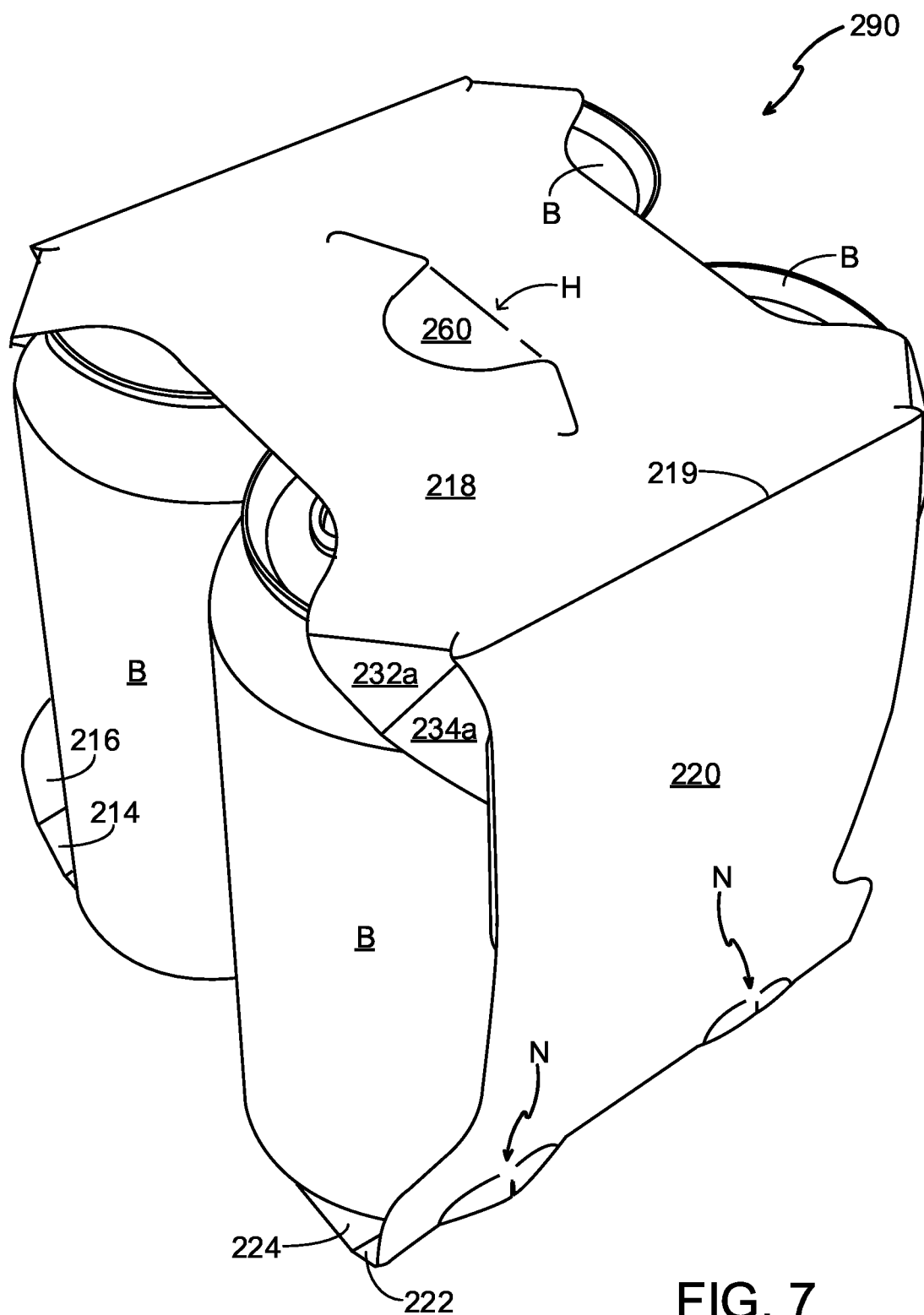


FIG. 6



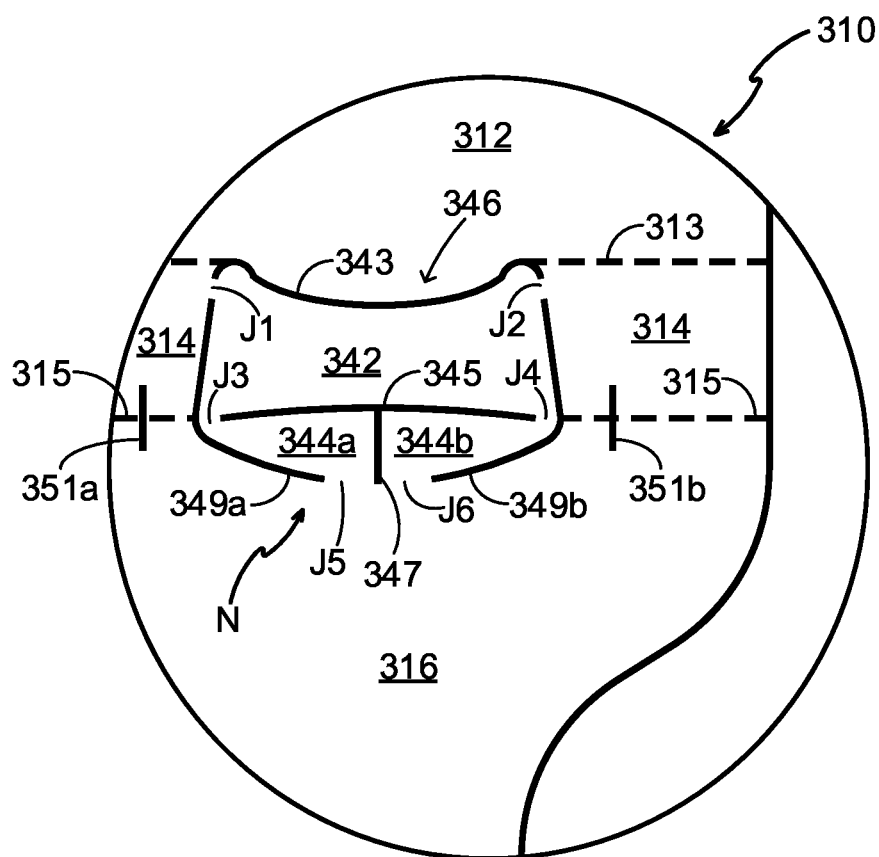


FIG. 8

CARTON AND BLANK THEREFOR**CROSS REFERENCE TO RELATED APPLICATION**

[0001] This application claims the benefit of U.S. Provisional Patent Application No. 62/958,024 filed Jan. 7, 2020. The disclosure of which is herein incorporated by reference in its entirety.

TECHNICAL FIELD

[0002] The present invention relates to cartons or carriers and to blanks for forming the same. More specifically, but not exclusively, the invention relates to an article-retaining device and a carrier comprising the same.

BACKGROUND

[0003] In the field of packaging it is known to provide cartons for carrying multiple articles. Cartons are well known in the art and are useful for enabling consumers to transport, store and access a group of articles for consumption. For cost and environmental considerations, such cartons or carriers need to be formed from as little material as possible and cause as little wastage in the materials from which they are formed as possible. Further considerations are the strength of the carton and its suitability for holding and transporting large weights of articles. It is desirable that the contents of the carton are secure within the carton.

[0004] It is an object of the present disclosure to provide an article carrier having improved machine handling characteristics.

[0005] The present invention seeks to provide an improvement in the field of cartons, typically formed from paper-board or the like.

SUMMARY

[0006] An aspect of the invention provides a blank for forming a carton. The blank comprises a first panel and a second panel hingedly connected to the first panel. The blank comprises an article-retaining device for receiving and engaging a portion of an article. The article-retaining device comprises an opening and a deformable member. The opening is defined, at least in part, in the second panel and the deformable member is formed from at least part of the second panel. The deformable member extends continuously across the opening such that the deformable member is connected at its opposite side edges to the second panel by first and second joints respectively. The deformable member is further connected at an adjacent end edge to the second panel by a third joint.

[0007] Optionally, the deformable member is disconnected from the first panel by a separation line.

[0008] Optionally, the deformable member is defined at least by a pair of first and second cut lines, the first cut line extends between the first joint and the third joint, the second cut line extends between the second joint and the third joint.

[0009] Optionally, the deformable member comprises a first expansion slit, the expansion slit extends from a first end thereof near the first cut line to and a second opposite end thereof near the second cut line, the first and second terminal ends are disposed within the deformable member.

[0010] Optionally, the first expansion slit divides the deformable member into a major portion and a minor portion, the major portion is connected to the second panel

by the first and second joints, the minor portion is connected to the second panel by the third joint.

[0011] Optionally, the first end of the expansion slit is spaced apart from the first cut line such that major and minor portions are yet partially connected by a fourth joint, and wherein the second end of the expansion slit is spaced apart from the second cut line such that major and minor portions are yet partially connected by a fifth joint.

[0012] Optionally, the deformable member further comprises a second expansion slit extending from the first expansion slit toward the third joint, wherein the second expansion slit divides the minor portion into a pair of half minor portions and further divides the third joint into sixth and seventh joints such that one of the half minor portion is connected to the second panel by the sixth joint and the other half minor portion is connected to the second panel by the seventh joint.

[0013] Another aspect of the invention provides a blank for forming a carton. The blank comprises a first panel and a second panel hingedly connected to the first panel. The blank comprises an article-retaining device for receiving and engaging a portion of an article. The article-retaining device comprises an opening defined, at least in part, in the second panel. The article-retaining device comprises a unitary deformable member formed from at least part of the second panel. The unitary deformable member extends continuously across the opening such that the unitary deformable member bridges between opposed side edges of the opening. The unitary deformable member further continuously extending to an adjacent end edge of the opening.

[0014] Optionally, the unitary deformable member is defined or circumscribed by a separation line and by a weakened line, the separation line disconnects the unitary deformable member from the first panel, and the weakened line connects the unitary deformable member to the second panel such that the unitary deformable member may be displaceable from the plane of the second panel.

[0015] Optionally, the weakened line comprises at least two cut lines and at least three connecting nicks for connecting the unitary deformable member with the second panel along the cut.

[0016] Optionally, first and second ones of the at least three connecting nicks connect the unitary deformable member with the second panel at the opposed side edges of the opening, a third one of the at least three connecting nicks connects the unitary deformable member with the second panel at the adjacent end edge of the opening.

[0017] Optionally, the first panel is a top panel of a carton. Optionally, the first panel is a bottom panel of a carton. Optionally, the second panel is a side panel of a carton.

[0018] Optionally, the adjacent end edge of the opening is an upper edge. Optionally, the adjacent end edge of the opening is a lower edge.

[0019] A further aspect of the invention provides a carton for packaging one or more articles. The carton comprises a plurality of panels forming walls of a tubular structure having an interior. The plurality of panels includes a first panel and a second panel hingedly connected to the first panel. The carton comprises an article-retaining device for receiving and engaging a portion of an article. The article-retaining device comprises an opening and a deformable member. The opening is formed, at least in part, in the second panel. The deformable member is formed from at least part of the second panel. The deformable member

extends continuously across the opening such that the deformable member is connected at its opposite side edges to the second panel by first and second joints respectively. The deformable member is further connected at one of its upper and lower edges to the second panel by a third joint.

[0020] Yet another aspect of the invention provides a carton for packaging one or more articles. The carton comprises a plurality of panels forming walls of a tubular structure having an interior. The plurality of panels includes a first panel and a second panel hingedly connected to the first panel. The carton comprises an article-retaining device for receiving and engaging a portion of an article. The article-retaining device comprises an opening formed, at least in part, in the second panel and a unitary deformable member formed from at least part of the second panel. The unitary deformable member extends continuously across the opening such that the unitary deformable member bridges between opposed side edges of the opening. The unitary deformable member further continuously extends to an adjacent end edge of the opening.

[0021] Within the scope of this application it is envisaged or intended that the various aspects, embodiments, examples, features and alternatives set out in the preceding paragraphs, in the claims and/or in the following description and drawings may be considered or taken independently or in any combination thereof.

[0022] Features or elements described in connection with, or relation to, one embodiment are applicable to all embodiments unless there is an incompatibility of features. One or more features or elements from one embodiment may be incorporated into, or combined with, any of the other embodiments disclosed herein, said features or elements extracted from said one embodiment may be included in addition to, or in replacement of one or more features or elements of said other embodiment.

[0023] A feature, or combination of features, of an embodiment disclosed herein may be extracted in isolation from other features of that embodiment. Alternatively, a feature, or combination of features, of an embodiment may be omitted from that embodiment.

BRIEF DESCRIPTION OF THE DRAWINGS

[0024] Embodiments of the invention will now be described with reference to the accompanying drawings, in which:

[0025] FIG. 1 is a plan view from above of a blank for forming a carton according to a first embodiment;

[0026] FIG. 2 is a perspective view of a portion of a carton formed from the blank of FIG. 1;

[0027] FIG. 3 is a plan view from above of a blank for forming a carton according to a second embodiment;

[0028] FIG. 4 is a perspective view from above of a carton formed from the blank of FIG. 3;

[0029] FIG. 5 is a perspective view from below of a portion of a carton formed from the blank of FIG. 3;

[0030] FIG. 6 is a plan view from above of a blank for forming a carton according to a third embodiment;

[0031] FIG. 7 is a perspective view from above of a carton formed from the blank of FIG. 6; and

[0032] FIG. 8 is a plan view from above of a portion of a blank for forming a carton according to a fourth embodiment.

DETAILED DESCRIPTION OF EMBODIMENTS

[0033] Detailed descriptions of specific embodiments of the package, blanks and cartons are disclosed herein. It will be understood that the disclosed embodiments are merely examples of the way in which certain aspects of the invention can be implemented and do not represent an exhaustive list of all of the ways the invention may be embodied. As used herein, the word “exemplary” is used expansively to refer to embodiments that serve as illustrations, specimens, models, or patterns. Indeed, it will be understood that the packages, blanks and cartons described herein may be embodied in various and alternative forms. The Figures are not necessarily to scale and some features may be exaggerated or minimised to show details of particular components. Well-known components, materials or methods are not necessarily described in great detail in order to avoid obscuring the present disclosure. Any specific structural and functional details disclosed herein are not to be interpreted as limiting, but merely as a basis for the claims and as a representative basis for teaching one skilled in the art to variously employ the invention.

[0034] Referring to FIG. 1, there is shown a plan view of a blank **10** capable of forming a carton or carrier **90**, as shown in FIG. 2, for containing and carrying a group of primary products such as, but not limited to, bottles or cans, hereinafter referred to as articles B, as shown in FIG. 2. The blank **10** forms a secondary package for packaging at least one primary product container or package.

[0035] Referring to FIG. 3, there is shown a plan view of a blank **110** capable of forming a carton or carrier **190**, as shown in FIGS. 4 and 5, for containing and carrying a group of primary products.

[0036] Referring to FIG. 6, there is shown a plan view of a blank **210** capable of forming a carton or carrier **290**, as shown in FIGS. 7, for containing and carrying a group of primary products.

[0037] Referring to FIG. 8 there is shown a plan view of a portion of a blank **310** capable of forming a carton or carrier (not shown), for containing and carrying a group of primary products.

[0038] In the embodiments detailed herein, the terms “carton” and “carrier” refer, for the non-limiting purpose of illustrating the various features of the invention, to a container **90**; **190**; **290** for engaging and carrying articles B, such as primary product containers B. It is contemplated that the teachings of the invention can be applied to various product containers B, which may or may not be tapered and/or cylindrical. Exemplary containers include bottles B (for example metallic, glass or plastics bottles), cans (for example aluminium cans), tins, pouches, packets and the like.

[0039] The blanks **10**; **110**; **210**; **310** are formed from a sheet of suitable substrate. It is to be understood that, as used herein, the term “suitable substrate” includes all manner of foldable sheet material such as paperboard, corrugated board, cardboard, plastic, combinations thereof, and the like. It should be recognised that one or other numbers of blanks may be employed, where suitable, for example, to provide the carrier structure described in more detail below.

[0040] The packaging structures or cartons described herein may be formed from a sheet material such as paperboard, which may be made of or coated with materials to increase its strength. An example of such a sheet material is tear-resistant NATRALOCK® paperboard made by

WestRock Company. It should be noted that the tear resistant materials may be provided by more than one layer, to help improve the tear-resistance of the package. Typically, one surface of the sheet material may have different characteristics to the other surface. For example, the surface of the sheet material that faces outwardly from a finished package may be particularly smooth and may have a coating such as a clay coating or other surface treatment to provide good printability. The surface of the sheet material that faces inwardly may, on the other hand, be provided with a coating, a layer, a treatment or be otherwise prepared to provide properties such as one or more of tear-resistance, good glue-ability, heat sealability, or other desired functional properties.

[0041] In the embodiment illustrated in FIG. 1 the blank 10 is configured to form a carton or carrier 90 for packaging an exemplary arrangement of exemplary articles B. In the embodiments illustrated the arrangement is a 3×2 matrix or array; in the illustrated embodiment two rows of three articles B are provided and the articles B are 12 oz (approx. 355 ml) aluminium beverage cans.

[0042] In the embodiment illustrated in FIGS. 3 and 6, the blanks 110; 210 are configured to form a carton or carrier 190; 290 for packaging an exemplary arrangement of exemplary articles B. In the embodiments illustrated the arrangement is a 2×2 matrix or array; in the illustrated embodiment two rows of two articles B are provided, and the articles B are 16 oz (approx. 473 ml) beverage cans.

[0043] Alternatively, the blanks 10; 110; 210; 310 can be configured to form a carrier for packaging other types, number and size of articles B and/or for packaging articles B in a different arrangement or configuration.

[0044] The present invention relates generally to a carton 90; 190; 290 for packaging articles B which carton 90; 190; 290 comprises an article retention structure.

[0045] Turning to FIG. 1, there is illustrated a blank 10 for forming a carton 90 (see FIG. 2) according to a first embodiment. The blank 10 comprises a plurality of main panels 12, 14, 16, 18, 20, 22, 24 for forming a tubular structure. The plurality of main panels 12, 14, 16, 18, 20, 22, 24 comprises; a first base panel 12, a first corner panel 14, a first side panel 16, a top panel 18, a second side panel 20, a second corner panel 22 and a second base panel 24. The plurality of panels 12, 14, 16, 18, 20, 22, 24 may be arranged in a linear series hinged one to the next by corresponding fold lines 13, 15, 17, 19, 21, 23.

[0046] In alternative embodiments, the first and second corner panels 14, 22 may be omitted, the fold lines 15, 21 may be omitted.

[0047] The first and second corner panels 14, 22 may be considered to form lower portions of the respective one of the first and second side panels 16, 20 to which they are hingedly connected.

[0048] The blank 10 is foldable to form a package 90 as illustrated in FIG. 2. The first and second base panels 12, 24 are engageable with one another in an overlapping relationship to form a composite base wall 12/24 of the carton 90. The blank 10 may comprise a complementary locking mechanism for securing the second base panel 24 to the first base panel 12. The first base panel 12 may comprise at least one first part M of the complementary locking mechanism. The second base panel 24 may comprise at least one second part F of the complementary locking mechanism. In the illustrated embodiment, the second base panel 24 comprises

a plurality of female tabs F defining openings in the first base panel 12. The first base panel 12 comprises a plurality of male tabs M, the openings in the second base panel 24 being configured to receive a respective one of the male tabs M. The female tabs F are arranged to be displaced out of the second base panel 24 to form the opening and to bear against the male tabs M when received therein. In some embodiments the complementary locking mechanism M/F may be omitted, the first and second base panels 12, 24 may be secured to each other by other means such as but not limited to adhesive or staples.

[0049] Optionally, the first and second base panels 12, 24 may comprise at least one first aperture A1; the first apertures A1 may be defined at least in part by a tab foldably or severably connected to a respective one of the first and second base panels 12, 24. In the illustrated embodiment, the first base panel 12 comprises two first apertures A1, and the second base panel 24 comprises three first apertures A1. Optionally, the first and second base panels 12, 24 may comprise at least one second aperture A2. In the illustrated embodiment, the first base panel 12 comprises one second aperture A2. The first and second apertures A1, A2 may be employed to facilitate construction of the carton 90. A packaging machine component may engage with the first and second apertures A1, A2 to enable the plurality of panels 12, 14, 16, 18, 20, 22, 24 to be tightened about a group of articles B. The first and second apertures A1, A2 may also be employed to facilitate alignment of the first and second base panels 12, 24 with respect to each other or to align the first part of the complementary locking mechanism with the second part of the complementary locking mechanism. The complementary locking mechanism illustrated and described is entirely optional.

[0050] The first apertures A1 are substantially triangular in shape.

[0051] The second aperture A2 may be substantially oval in shape, or stadium shaped, and comprise a notch or recess extending from one side thereof. The notch or recess is provided on a side of the oval facing the free end edge of the first base panel 12.

[0052] The blank 10 comprises at least one article engagement structure N (also referred to herein as article-retaining device) for engaging with a heel or lower portion of an article B, or, in alternative embodiments, for engaging with a shoulder or upper portion of an article B. The blank 10 illustrated in FIG. 1 illustrates article engagement structures N engaging with the heels of articles B and are referred to herein as heel engagement structures N. The blank 10 illustrated in FIG. 1 comprises six heel engagement structures N each is provided for engaging a respective article B. Each of the heel engagement structures N is substantially similar in construction and will be described by reference to a heel engagement structure N provided in the first side panel 16 and in the first corner panel 14.

[0053] The heel engagement structure N comprises an opening; the opening is defined, at least in part, in the first side panel 16. The opening may also be defined, at least in part, in the first corner panel 14.

[0054] The heel engagement structure N comprises a deformable member formed from at least part of the first side panel 16. The deformable member may also be formed from at least part of the first corner panel 14. The deformable member extends continuously across the opening such that the deformable member is connected at opposing side ends

or edges to the first side panel 16, or first corner panel 14 when present, by first and second joints J1, J2 respectively.

[0055] The deformable member is connected to the first side panel 16 along an adjacent edge by a third joint J5/J6. In the illustrated embodiment the adjacent edge defines an upper end or edge of the deformable member. In other embodiments the adjacent edge may define a lower end or edge of the deformable member.

[0056] The deformable member may comprise a first expansion slit 45 in the form of a first cut or severable line 45. The first cut line 45 divides the deformable member into a major tab or portion 42 and a minor tab or portion 44a/44b.

[0057] The major portion 42 is connected to the first side panel 16, or first corner panel 14 when present, by the first and second joints J1, J2. The minor portion 44a/44b is connected to the first side panel 16 by the third joint J5/J6.

[0058] The deformable member may comprise a second expansion slit 47 in the form of a second cut or severable line 47. The second cut line 47 divides the minor portion 44a/44b into a first minor tab 44a and a second minor tab 44b. First and second minor tabs 44a, 44b are also referred to herein as half minor portions 44a, 44b.

[0059] The deformable member is defined in part by a first separation line 43. The first separation line 43 may take the form of a cutline or severable line 43. The first separation line 43 disconnects the deformable member from the blank 10. The first separation line 43 may disconnect the deformable member from the first side panel 16, the first corner panel 14 or the first base panel 12 or any combination thereof.

[0060] The first separation line 43 may comprise an arcuate portion at each end thereof. Each of the arcuate portions interrupt or intersect the fold line 13; a section of the arcuate portions may be collinear with the fold line 13 and may be contiguous with the fold line 13 and fold line 41. In this way the fold line 41 is separated from the fold line 13 by the first separation line 43, specifically the arcuate portions.

[0061] The deformable member is defined in part by a pair of second separation lines 49a, 49b. Each of the pair of second separation lines 49a, 49b may take the form of a cutline or severable line.

[0062] The pair of second separation lines 49a, 49b may be substantially “L” shaped. A first one of the pair of second separation lines 49a is spaced apart from a second one of the pair of second separation lines 49a. The third joint J5/J6 is defined between terminal ends of the pair of second separation lines 49a, 49b.

[0063] The first one of the pair of second separation lines 49a extends between the first joint J1 and the third joint J5/J6.

[0064] The second one of the pair of second separation lines 49b extends between the second joint J2 and the third joint J5/J6.

[0065] The first expansion slit 45 extends substantially between opposed side edges of the deformable member. The first expansion slit 45 comprises a first end proximate the first one of the pair of second separation lines 49a and extends across the deformable member to a second opposite end disposed proximate the second one of the pair of second separation lines 49b. The first and second terminal ends of the first expansion slit 45 are disposed within the deformable member.

[0066] The first end of the expansion slit 45 is spaced apart from the first one of the pair of second separation lines 49a

such that the major portion 42 is connected to the first minor tab 44a by a fourth joint J3. The second end of the expansion slit 45 is spaced apart from the second one of the pair of second separation lines 49b such that the major portion 42 is connected to the second minor tab 44b by a fifth joint J4. [0067] In this way the major and minor portions can be considered to be partially severed from each other, the fourth and fifth joints J3, J4 provide connecting nicks or bridges therebetween.

[0068] The fourth and fifth joints J3, J4 may lie upon a notional line defined by the fold line 15.

[0069] The second expansion slit 47 may extend from the first expansion slit 45 toward the third joint J5/J6.

[0070] The second expansion slit 47 may divide the third joint J5/J6 into sixth and seventh joints J5, J6. The first minor tab 44a is connected to the first side panel 16 by the sixth joint J5. The second minor tab 44b is connected to the first side panel 16 by the seventh joint J6.

[0071] The first expansion slit 45 and second expansion slit 47 define a “T” shaped cut line.

[0072] It will be appreciated that the article-retaining device comprises a unitary deformable member formed from at least part of the first side panel 16 and/or first corner panel 14, when present. The unitary deformable member extends continuously across the opening such that the unitary deformable member bridges between opposed side edges of the opening. Additionally, the unitary deformable member continuously extend to one of upper and lower end edges of the opening.

[0073] The deformable member can be considered to be defined or circumscribed by a separation line 43 and a weakened line. The weakened line comprises the pair of second separation lines 49a, 49b, the first joint J1, the second joint J2, the sixth joint J5 and the seventh joint J6. The separation line 43 disconnects the deformation member from the first base panel 12. The weakened line connects the deformable member to the first side panel 16 and/or first corner panel 14 (when present) via three or more connecting nicks provided by the joints J1, J2, J5, J6. In this way the deformable member may be displaceable from the plane of the first side panel 16 and/or first corner panel 14, when present.

[0074] The opening may be defined in part by a heel tab 40. The heel tab 40 is hingedly connected to the first base panel 12 by a fold line 41. The heel tab 40 may be struck, at least in part, from the first corner panel 14, when present, or from the first side panel 16. The heel tab 40 may be struck, at least in part, from the first base panel 12.

[0075] The fold line 41 interrupts the fold line 13 hingedly connecting the first base panel 12 to the first corner panel 14. The fold line 41 may be non-linear, in the illustrated embodiment the fold line 41 is curved or arcuate in shape, in other embodiments it may be formed from at least two linear cut lines divergently arranged with respect to each other and contiguous with each other.

[0076] The heel tab 40 may comprise a pair of divergently arranged fold lines (not shown in FIG. 1) which may define foldable corner portions of the heel tab 40.

[0077] The heel tab 40 is defined in part by the first separation line 43, or at least a part thereof. The first separation line 43 is common to both the heel tab 40 and the deformable member or major tab 42.

[0078] The heel tab 40 is narrower in width than the deformable member. The heel tab 40 is narrower in width

than the major tab **42** and the heel tab **40** is narrower in width than the combined width of the pair of minor tabs **44a**, **44b**.

[0079] In the blank **10** form, or when the heel engagement structure **N** is in an undeployed condition, the opening is closed by the deformable member—major and minor tabs **42**, **44a**, **44b**—and the heel tab **40**.

[0080] The top panel **18** may comprise an optional handle structure **H**. The handle structure **H** comprises a pair of foldable finger tabs **60a**, **60b**. The finger tabs **60a**, **60b** are spaced apart from each other. The finger tabs **60a**, **60b** are hingedly connected to the top panel **18** by fold lines **61a**, **61b** and are defined in part by a cut line or severance line **63a**, **63b**. A first one of the finger tabs **60a** is hingedly connected to the top panel **18** in opposition to a second one of the finger tabs **60b**.

[0081] Each of the panels **12**, **16**, **18**, **20**, **24** may be formed with a pair of cut-outs or recesses. The cut-outs are defined in opposed end edges of the blank **10**. The cut-outs comprise full, major cut-outs in the first and second side panels **16**, **20** and the top panel **18** and partial or minor cut-outs in the first and second base panels **12**, **24**.

[0082] A first cut-out is defined in the top panel **18** around the midway along each of its opposed end edges. A second cut-out is defined in each end edge of the first side panel **16**. A third cut-out is defined in each end edge of the second side panel **20**.

[0083] A partial or minor cut-out is defined in each of the opposed end edges of each of the first and second base panels **12**, **24**.

[0084] As a result, the blank **10** is provided along either longitudinal edge thereof with four tabs or projections each interposed between adjacent ones of the cut-outs.

[0085] As illustrated in FIG. 1, a first upper projection is positioned astride the adjacent fold line **17**. A second upper projection is positioned astride the adjacent fold line **19**.

[0086] A first lower projection is positioned astride the adjacent fold lines **13**, **15**. A second lower projection is positioned astride the adjacent fold lines **21**, **23**.

[0087] Each of the first and second upper projections provided material for forming, or assisting in forming of, an end retention structure for preventing the contents of the carton **90** from dislodging from the carton **90** when said blank **10** is erected into the carton **90**. Each of the first and second upper projections is provided with cut and fold lines to form a top-engaging structure when it is folded along the fold lines.

[0088] More specifically, each upper projection comprises an anchoring panel **26a**, **26b**, **36a**, **36b** hingedly connected to the adjacent side panel **16**, **20** along a fold line **25a**, **35b**, **39a**, **39b**. Each upper projection comprises a gusset panel **28a**, **28b**, **34a**, **34b** hingedly connected to the anchoring panel **26a**, **26b**, **36a**, **36b** along a fold line **27a**, **27b**, **37a**, **37b**.

[0089] Each upper projection comprises a web panel **30a**, **30b**, **32a**, **32b** (also referred herein as a top end closure panel) hingedly connected to the gusset panel **28a**, **28b**, **34a**, **34b** along an extension **29a**, **29b**, **35a**, **35b** of respective one of the fold lines **17**, **19**. Each upper projection comprises a covering portion that is integrally formed with the top panel **18**. Each web panel **30a**, **30b**, **32a**, **32b** is hingedly connected to the respective covering portion by a fold line **31a**, **31b**, **33a**, **33b**.

[0090] The blank **10** may comprise a corner folding arrangement, in the illustrated embodiment a gusseted cor-

ner arrangement is provided which is free of a punched-out opening. An opening or aperture is usually placed in corner gusset panels to facilitate folding of the gusset panels see, for example, US20150225155 to Ikeda. Such openings create pieces of scrap paper board which need to be separated from the blank **10**, in high-speed die-cutting and blanking processes the scrap pieces may tend to hang or snag on the blank **10** or they may be scattered around the die cutting station. These rogue scrap pieces may find their way into subsequent packaging machinery where they may interfere with the assembly process causing jams or downtime. They may cause damage to the machinery or packages.

[0091] The blank **10** comprises four corner folding arrangements at each corner of the top panel **18**, the corner folding arrangements are substantially the same and will be described with regard to an enlarged view of one of the corner arrangements shown in FIG. 1.

[0092] The corner folding arrangement comprises a severance line **70** in the form of a cut line. The severance line **70** extends across or intersects the fold line **19** between the top panel **18** and the second side panel **20**, this fold line is also referred to herein as second fold line **19**.

[0093] The severance line **70** extends from the fold line **39b** between the second side panel **20** and an anchoring panel **36b**, the fold line **39b** is also referred to herein as fourth fold line **39b**.

[0094] The severance line **70** extends towards the fold line **33b** between the top panel **18** and an end flap **32b**. The severance line **70** may extend to the fold line **33b** between the top panel **18** and an end flap **32b**. The severance line **70** extends beyond or past the fold line **33b** between the top panel **18** and an end flap **32b** so as to extend into the top panel **18**. The fold line **33b** is also referred to herein as first fold line **33b**.

[0095] The severance line **70** extends across or through the fold line **35b** between the top end closure panel **32b** and the gusset panel **34b**, this fold line is also referred to herein as third fold line **35b**.

[0096] The severance line **70** extends across or through the fold line **37b** between anchoring panel **36b** and the gusset panel **34b**, this fold line is also referred to herein as fifth fold line **37b**.

[0097] The severance line **70** can be considered to intersect or terminate each of the first, second, third, fourth and fifth fold lines **33b**, **19**, **35b**, **39b**, **37b**.

[0098] The severance line **70** in the illustrated embodiment is non-linear and may be curvilinear. In other embodiments the severance line **70** may be defined by two or more linear sections divergently arranged with respect to each other. In still other embodiments the severance line **70** may be linear. In embodiments in which the severance line **70** is linear the severance line **70** may be divergently arranged with respect to the first and/or fourth fold lines **33b**, **39b**. The severance line **70** may be divergently arranged with respect to second fold line **19** and may be obliquely oriented thereto.

[0099] The severance line **70** extends between the first fold line **33b** and fourth fold line **39b**.

[0100] The severance line **70** bypasses a notional intersection or vertex between a notional extension of the first fold line **33b** and the second fold line **19** such that the notional intersection is located on one side of the severance line **70**. The notional intersection is located on a first side of the severance line **70** and anchor and gusset panels **36b**, **34b** are located on a second, opposing, side of the severance line

70. The notional intersection may be spaced apart from the anchor and gusset panels **36b**, **34b**.

[0101] The third fold line **39b** may intersect or pass through the notional vertex. Notional extensions of the fourth and fifth fold lines **39b**, **37b** may intersect or pass through the notional vertex.

[0102] The fifth fold line **37b** may be interrupted by a “U” shaped cut line **43b** to define a tab portion struck from material which would otherwise form the gusset panel **34b**. The tab portion is integral with the anchor panel **36b**.

[0103] The severance line **70** intersects with the third fold line **35b** at a first intersection. The first intersection is disposed at a position closer to the gusset panel **34b** than the notional intersection of the first fold line **33b** and second fold line **19**.

[0104] In an alternative embodiment of the corner folding arrangement the severance line **70** may comprise an extension, the extension extends the severance line **70** further into the top panel **18**. Whereas in the embodiment of FIG. **1** the severance line **70** terminates in the top panel **18** at a location substantially lying upon a notional extension of the fourth fold line **39b** in the alternative embodiment the extension extends the severance line **70** beyond the notional extension of fourth fold line **39b**. In further alternative embodiments the severance line **70** may terminate at other locations, and may terminate at the end edge of the top panel **18** defined by the first fold line **33b**. In some embodiments the severance line **70** may extend into the second side panel **20**.

[0105] Folding of each upper tab is achieved during the erection of the carton. To form a top end closure structure out of each upper tab, the anchoring panel **26a**, **26b**, **36a**, **36b** is folded about 180 degrees to bring it into a face-contacting relationship with the inside surface of the adjacent side panel **16**, **20**. The anchoring panel **26a**, **26b**, **36a**, **36b** is held in the folded position by being pressed by one of the packaged articles B against the adjacent side panel **16**, **20**. The folding of the anchoring panel **26a**, **26b**, **36a**, **36b** causes the gusset panel **28a**, **28b**, **34a**, **34b** to be folded outwardly about the fold line **27a**, **27b**, **37a**, **37b** so that the gusset panel **28a**, **28b**, **34a**, **34b** extends outwardly from the fold line **27a**, **27b**, **37a**, **37b** along the side wall of the one packaged article B. At the same time, the web panel **30a**, **30b**, **32a**, **32b** is caused to fold downwardly along the fold line **31a**, **31b**, **33a**, **33b** and is thereby brought to a folded position where it extends between the fold line **31a**, **31b**, **33a**, **33b** and the outer edge of the gusset panel **28a**, **28b**, **34a**, **34b**. The top end closure structure thus completed is illustrated in FIG. **2** wherein the structure is shown as tightly engaging the top of the one article B.

[0106] Each lower projection serves to provide sufficient material in which the adjacent heel engagement structure N and its associated opening is defined. More particularly, the heel engagement structure N adjacent to each lower projection is positioned such that sufficient material surrounds the heel engagement structure N even when the opening extends into that lower projection. During the erection and packaging of articles B, the blank **10** is manipulated so that each opening receives the bottom of a respective article B to retain said article B within the carton **90**. The heel tabs **40** may also be folded internally of the carton **90** to engage a portion of an article to assist in retaining the articles B. The heel tabs **40** may be received in a recess in the lower (or upper) end of the article B.

[0107] Turning to the construction of the carton **90** as illustrated in FIG. **2**, the carton **90** can be formed by a series of sequential folding operations in a straight line machine so that the carton **90** is not required to be rotated or inverted to complete its construction. The folding process is not limited to that described below and may be altered according to particular manufacturing requirements.

[0108] A group of articles B is assembled; in the embodiment illustrated in FIG. **2** six articles B are arranged in a 3×2 array. The top panel **18** of the blank **10** is disposed above the group of articles B to provide a top wall **18** of the carton **90**.

[0109] The first and second side walls **16**, **22** are folded, with respect to the top panel **18** about fold lines **17**, **19** respectively, about opposing sides of the group of articles B so as to be disposed about the opposing sides of the group of articles B.

[0110] The anchor portions **26a**, **26b**, **36a**, **36** may be folded into face contacting relationship with the respective one of the first and second side panels **16**, **20** substantially simultaneously with folding the first and second side walls **16**, **20** with respect to the top panel **18**, to form the top end closure structures described above.

[0111] Alternatively, the top engaging structures may be formed subsequent to erection of the carton **90** into a tubular form. The anchor portions **26a**, **26b**, **36a**, **36** may be tucked between the respective one of the first and second side panels **16**, **20** to which they are hingedly connected and an adjacently disposed article B.

[0112] The first and second corner panels **14**, **22** are folded, with respect to the respective one of the first and second side walls **16**, **20** about fold lines **15**, **21** respectively, about the heels or lower portions of adjacently disposed articles B.

[0113] The heel tabs **40** may be folded out of the plane of the first and second corner panels **14**, **22**, about fold line **41**, prior to folding the first and second corner panels **14**, **22** the respective one of the first and second side walls **16**, **20**.

[0114] The second base panel **24** is folded about the fold line **23** so as to be disposed adjacent the base of the group of articles B, the first base panel **12** is then folded about the fold line **13** so as to be in at least partial overlapping relationship with the second base panel **24**; in doing so each of the heel tabs **40** may be brought into engagement with a base of a respective article B.

[0115] The first and second base panels **12**, **24** are secured together. Each of the male tabs M is displaced inwardly out of the plane of the first base panel **12**. In so doing, each of the female tabs F is displaced inwardly creating a corresponding opening in the second base panel **24**. The male tabs M are received in respective ones of the openings so as to lock the first and second base panels **12**, **24** together. In this way a tubular structure is formed about the group of articles B.

[0116] The assembled carton **90**, or at least a portion thereof, is shown in FIG. **2**. It can be observed that the deformable member has been displaced relative to the adjacent regions of the carton **90**. The deformable member may be bent or bowed outwardly at its centre so as to appear convex when viewed from an external vantage point. Region of the deformable member surrounding the first separation line **45** may deform such that the first separation line **45** opens up to create an aperture in therein. The pair of second

separation lines **49a**, **49b** and the second expansion slit **47** may open up similarly so as to relieve stress in blank **10** and deformable member.

[0117] The major tab **42** and minor tabs **44a**, **44b** may provide some degree of protection to the portion of the article B received in the opening.

[0118] The article-retaining devices may be advantageous in that they allow creation of openings in the blank **10** or carton **90** without creating pieces of scrap material (paper board) which need to be separated from the blank **10**. In high-speed die-cutting and blanking processes such scrap pieces may tend to hang or snag on the blank **10** or they may be scattered around the die cutting station. Rogue scrap pieces may find their way into subsequent packaging machinery where they may interfere with the assembly process causing jams or downtime. They may cause damage to the machinery or packages.

[0119] Referring now to FIGS. 3 to 5 there is shown an alternative embodiment of the present disclosure. In the second illustrated embodiment, like numerals have, where possible, been used to denote like parts, albeit with the addition of the prefix “100” to indicate that these features belong to the second embodiment.

[0120] Turning to FIG. 3, there is illustrated a blank **110** for forming a carton **190**, as shown in FIGS. 4 and 5, according to a second embodiment. The blank **110** comprises a plurality of main panels **112**, **114**, **116**, **118**, **120**, **122**, **124**, **126**, **128** for forming a tubular structure. The plurality of main panels **112**, **114**, **116**, **118**, **120**, **122**, **124**, **126**, **128** comprises; a first base panel **112**, a first lower corner panel **114**, a first side panel **116**, a first upper corner panel **118**, a top panel **120**, a second upper corner panel **122**, a second side panel **124**, a second corner side panel **126**, and a second base panel **128**. The plurality of panels **112**, **114**, **116**, **118**, **120**, **122**, **124**, **126**, **128** may be arranged in a linear series hinged one to the next by corresponding fold lines **113**, **115**, **117**, **119**, **121**, **123**.

[0121] The first base panel **112** is hinged to the first lower corner panel **114** by a hinged connection in the form of a fold line **113**. The first lower corner panel **114** is hinged to the first side panel **116** by a hinged connection in the form of a fold line **115**. The first side panel **116** is hinged to the first upper corner panel **118** by a hinged connection in the form of a fold line **117**. The first upper corner panel **118** is hinged to the top panel **120** by a hinged connection in the form of a fold line **119**. The top panel **120** is hinged to the second upper corner panel **122** by a hinged connection in the form of a fold line **121**. The second upper corner panel **122** is hinged to the second side panel **124** by a hinged connection in the form of a fold line **123**. The second side panel **124** is hinged to the second lower corner panel **126** by a hinged connection in the form of a fold line **125**. The second lower corner panel **126** is hinged to the second base panel **128** by a hinged connection in the form of a fold line **127**.

[0122] The first upper corner panel **118** and the first lower side panel **114** form a first side wall **114/116** of a carton **190**. The second upper side panel **120** and the second lower side panel **122** form a second side wall **120/122** of a carton **190**.

[0123] The first and second lower corner panels **114**, **126** may be considered to form lower portions of the respective one of the first or second side panels **116**, **124** (or marginal portions of the first or second base panel **112**, **128**) to which they are hingedly connected.

[0124] The first and second upper corner panels **118**, **122** may be considered to form upper portions of the respective one of the first or second side panels **116**, **124** (or marginal portions of the top panel **120**) to which they are hingedly connected.

[0125] In alternative embodiments, the first and second lower corner panels **114**, **126** may be omitted, the fold lines **115**, **125** may be omitted. The first and second upper corner panels **118**, **122** may be omitted, the fold lines **117**, **123** may be omitted.

[0126] The blank **110** may comprise at least one article retention device **T1**, **T2**, **T3**, **T4** for engaging an upper end of the articles B. The blank **110** illustrated in FIG. 3 comprises four article retention devices **T1**, **T2**, **T3**, **T4**.

[0127] Each of the article retention devices **T1**, **T2**, **T3**, **T4** comprises a flap **170** hingedly connected to the top panel **120**. First and second article engagement structures **T1**, **T2** each comprise a flap **170** hingedly connected to the top panel **120** to a first end of the top panel **120**. Third and fourth article engagement structures **T3**, **T4** each comprise a flap **170** hingedly connected to the top panel **120** to a second end of the top panel **120**.

[0128] The flaps **170** of the first and second article engagement structures **T1**, **T2** are inset from a first outer edge of the blank **110**.

[0129] The first and second article engagement structures **T1**, **T2** may be inset with respect to a first end edge of the first or second side panels **116**, **124**.

[0130] The first and second article engagement structures **T1**, **T2** may be inset with respect to marginal edge portions of the top panel **120**.

[0131] The flaps **170** of the first and second article engagement structures **T1**, **T2** may be inset from a first free end edge of the top panel **120**.

[0132] The flaps **170** of the third and fourth article engagement structures **T3**, **T4** are inset from a second outer edge of the blank **110**.

[0133] The third and fourth article engagement structures **T3**, **T4** may be inset with respect to a second end edge of the first or second side panels **116**, **124**.

[0134] The third and fourth article engagement structures **T3**, **T4** may be inset with respect to marginal edge portions of the top panel **120**.

[0135] The flaps **170** of the third and fourth article engagement structures **T3**, **T4** may be inset from a second free end edge of the top panel **120**.

[0136] The flaps **170** of the article engagement structures **T1**, **T2**, **T3**, **T4** do not extend beyond the footprint of the top panel **120**. The flaps **170** of the article engagement structures **T1**, **T2**, **T3**, **T4** are contained entirely within the footprint of the top panel **120**.

[0137] The flaps **170** do not extend beyond the ends of the top panel **120**.

[0138] The flaps **170** of the article engagement structures **T1**, **T2**, **T3**, **T4** do not extend beyond edges of the blank **110** defined, at least in part, by the first and second side panels **116**, **124**.

[0139] Marginal portions of the top panel **120** hingedly connected to each of the first and second side panels **116**, **124**, or first and second upper corner panels **118**, **122** when present, are equal in length to the first and second side panels **116**, **124** (or first and second upper corner panels **118**, **122**) and to the bottom panels **112**, **128** or at least portions of the bottom panels **112**, **128**; said at least portions of the bottom

panels 112, 128 may be marginal portions each being hingedly to one of the first and second side panels 116, 124, or first and second lower corner panels 114, 126 when present.

[0140] A first recess is provided in the first end of the top panel 120, the flaps 170 of the first and second article engagement structures T1, T2 can be considered to be located in the first recess. The flaps 170 of the first and second article engagement structures T1, T2 define, in part, the first recess and when folded out of the plane of the top panel 120 increase the size of the first recess.

[0141] The first recess is arranged to accommodate the entirety of the flaps 170 and wing tabs 172 when present.

[0142] The first recess is defined only in the top panel 120 and does not extend into the first and second side panels 116, 114 or first and second upper corner panels 118, 122.

[0143] The flap 170 of the first article engagement structure T1 is hingedly connected to the top panel 120 by a hinged connection in the form of a fold line 171 which is obliquely oriented with respect to the fold line 119 hinging the top panel 120 to the first upper corner panel 118.

[0144] The flap 170 of the second article engagement structure T2 is hingedly connected to the top panel 120 by a hinged connection in the form of a fold line 171 which is obliquely oriented with respect to the fold line 121 hinging the top panel 120 to the second upper corner panel 122.

[0145] The fold line 171 hinging the flap 170 of the first article engagement structure T1 to the top panel 120 is divergently arranged with respect to the fold line 171 hinging the flap 170 of the second article engagement structure T2 to the top panel 120. The fold line 171 hinging the flap 170 of the first article engagement structure T1 to the top panel 120 and the fold line 171 hinging the flap 170 of the second article engagement structure T2 to the top panel 120 define an angle therebetween the angle may be less than 120° and in some embodiments may be around 110°. The angle may be greater than 80° and may be greater than 90°.

[0146] The fold line 171 hinging the flap 170 of the first article engagement structure T1 to the top panel 120 and the fold line 171 hinging the flap 170 of the second article engagement structure T2 to the top panel 120 are arranged to diverge towards the first end of the top panel 120.

[0147] The fold line 171 hinging the flap 170 of the first article engagement structure T1 to the top panel 120 and the fold line 171 hinging the flap 170 of the second article engagement structure T2 to the top panel 120 are arranged to converge towards the centre or middle of the top panel 120.

[0148] In this way the flap 170 of the first article engagement structure T1 and the flap 170 of the second article engagement structure T2 fold away from each other.

[0149] A second recess is provided in the second end of the top panel 120, the flaps 170 of the third and fourth article engagement structures T3, T4 can be considered to be located in the second recess. The flaps 170 of the third and fourth article engagement structures T3, T4 define, in part, the second recess and when folded out of the plane of the top panel 120 increase the size of the second recess.

[0150] The second recess is defined only in the top panel 120 and does not extend into the first and second side panels 116, 124 or first and second upper corner panels 118, 122.

[0151] The second recess is arranged to accommodate the entirety of the flaps 170 and wing tabs 172 when present.

[0152] The flap 170 of the third article engagement structure T3 is hingedly connected to the top panel 120 by a hinged connection in the form of a fold line 171 which is obliquely oriented with respect to the fold line 119 hinging the top panel 120 to the first upper corner panel 118.

[0153] The flap 170 of the fourth article engagement structure T4 is hingedly connected to the top panel 120 by a hinged connection in the form of a fold line 171 which is obliquely oriented with respect to the fold line 121 hinging the top panel 120 to the second upper corner panel 122.

[0154] The fold line 171 hinging the flap 170 of the third article engagement structure T3 to the top panel 120 is divergently arranged with respect to the fold line 171 hinging the flap 170 of the fourth article engagement structure T4 to the top panel 120.

[0155] The fold line 171 hinging the flap 170 of the third article engagement structure T3 to the top panel 120 and the fold line 171 hinging the flap 70 of the fourth article engagement structure T4 to the top panel 120 are arranged to diverge towards the first end of the top panel 120.

[0156] The fold line 171 hinging the flap 170 of the third article engagement structure T3 to the top panel 120 and the fold line 171 hinging the flap 170 of the fourth article engagement structure T4 to the top panel 120 are arranged to converge towards the centre or middle of the top panel 120.

[0157] In the blank form the flaps 170 define, in part, free end edges of the top panel 120. The edge portions of the top panel 120 defined by the flaps 170 are arcuate or curvilinear in shape.

[0158] The flap 170 of each of the first, second, third and fourth article engagement structures T1, T2, T3, T4 is partially defined by at least one cut which separates that flap 170 from the top panel 120.

[0159] A first cut extends from a first or inner end of the fold line 171 to the respective one of the first and second recesses. The first cut may separate the flap 170 from a portion of the top panel 120, said portion of the top panel 120 may be provided by a cushioning flap 160a, 160b of a handle structure.

[0160] A second cut is disposed between the flap 170 and a respective one of the adjacently disposed fold lines 119, 121 hinging the top panel 120 to the first or second side panel 116, 124 (or first or second upper corner panel 118, 122 when present).

[0161] The first and second cut lines are divergently arranged with respect to each other.

[0162] A first end edge of the top panel 120 which extends between the fold lines 171 of the flaps 170 of the first and second article engagement structures T1, T2 is non-linear. It may be arcuate or curvilinear. The first end edge is convex such that it can be considered to define a portion of the top panel 120 protruding into the first recess. The first end edge may be provided by a first cushioning flap 160a of a handle structure.

[0163] A second end edge of the top panel 120 which extends between the fold lines 171 of the flaps 170 of the third and fourth article engagement structures T3, T4 is non-linear. It may be arcuate or curvilinear. The second end edge is convex such that it can be considered to define a portion of the top panel 120 protruding into the second recess. The second end edge may be provided by a second cushioning flap 160b of a handle structure.

[0164] Each of the article engagement structures T1, T2, T3, T4 comprises a wing tab 172 hingedly connected to the flap 170 by a hinged connection in the form of a fold line 173.

[0165] The fold line 173 may form a keel when the article engagement structures T1, T2, T3, T4 are in use engaging an article B. The keel may form a ridge to increase stability or rigidity of the article engagement structures T1, T2, T3, T4. The flap 170 and the wing tab 172 may adopt a non-coplanar arrangement, for example, but not limited to, when an article B moves outwardly through the open end of the tubular structure forming the article carrier B. The wing tab 172 may fold with respect to the flap 170.

[0166] The fold line 173 may be obliquely oriented with respect to the fold line 171 and may define an acute angle therebetween.

[0167] The wing tabs 172 are connected only to the flaps 170 and are free from connection to the top panel 120 other than the indirect connection by virtue of being coupled to the flaps 170, that is to say there is no direct connection of the wing tabs 172b to the top panel 120. The flaps 170 interconnect the wing tabs 172 and the top panel 120.

[0168] In the unfolded condition in the blank 110 the fold lines 173 are oriented substantially parallel with the fold lines 119, 121 hinging the side or upper corner panels 114, 124; 118, 122 to the top panel 120.

[0169] When the flaps 170 are folded about their respective fold line 171 into face to face relationship with the top panel 120, the fold lines 173 may be obliquely oriented with respect to the fold lines 119, 121.

[0170] The blank 110 comprises at least one article engagement structure N (also referred to herein as article-retaining device) for engaging with a portion of an article B. The blank 110 illustrated in FIG. 3 illustrates an article engagement structure N engaging with a heel or lower portion of an article B and is referred to herein as heel engagement structure N. The blank 110 illustrated in FIG. 3 comprises four heel engagement structures N each is provided for engaging a respective article B. Each of the heel engagement structures N is substantially similar in construction and will be described by reference to a heel engagement structure N provided in the first side panel 16 and in the first corner panel 14.

[0171] The heel engagement structure N comprises an opening; the opening is defined at least in part in the first side panel 116. The opening may also be defined, at least in part, in the first corner panel 14.

[0172] The heel engagement structure N comprises a deformable member formed from at least part of the first side panel 116. The deformable member may also be formed from at least part of the first corner panel 114. The deformable member extends continuously across the opening such that the deformable member is connected at opposing side ends or edges to the first side panel 116, or first corner panel 114 when present, by first and second joints J1, J2 respectively.

[0173] The deformable member is connected to the first side panel 116 along an adjacent edge by a third joint J5/J6. In the embodiment illustrated the adjacent edge defines an upper end or edge of the deformable member. In other embodiments illustrated the adjacent edge defines a lower end or edge of the deformable member.

[0174] The deformable member may comprise a first expansion slit 145 in the form of a first cut or severable line

145. The first cut line 145 divides the deformable member into a major tab or portion 142 and a minor tab or portion 144a/144b.

[0175] The minor tabs 144a, 144b are defined at least in part by a respective separation line 149a, 149b. The separation lines 149a, 149b are arranged such that the minor tabs 144a, 144b extend further into the first side panel 116 than those of the embodiment of FIG. 1. The separation lines 149a, 149b comprise a linear section and an arcuate section arranged contiguous therewith.

[0176] The deformable member is spaced apart from the fold line 115, the fold line 115 terminates at cut lines 151a, 151b which traverse the fold line 115. The cut lines 151a, 151b are arranged perpendicular to the fold line 115. In this way an uninterrupted connection between the first corner panel 114 and the first side panel 116 is provided on opposing sides of the deformable member.

[0177] The heel tab 140 comprises a pair of crease or fold lines 153a, 153b. The crease lines 153a, 153b may be defined in part by a cut line 153a, 153b. The crease lines 153a, 153b are divergently arranged with respect to each other and allow or facilitate folding of corner or marginal edge regions of the heel tab 140 with respect to a central or intermediate region.

[0178] The heel tab 140, or at least a portion thereof, has a width equal to that of the major tab 142 or portion thereof. The heel tab 140 comprises a pair of opposing side edges defined by a pair of cut lines extending between the fold line 113 and the first separation line 143. Each of the pair of cut lines may be perpendicular to the first separation line 143 or end portion thereof. The pair of cut lines may comprise linear portions which are divergently arranged with respect to each other. The linear portions may diverge towards the first separation line 143. The fold line 141 may extend between terminal ends of the pair of cut lines. A portion of each of the pair of cut lines may be collinear with the fold line 113 and may be contiguous with the fold line 113 and fold line 141. In this way the fold line 141 is separated from the fold line 113 by each of the pair of cut lines.

[0179] The first and second joints J1, J2 of the deformable member of the embodiment of FIG. 3 are spaced further from the fold line 113 than those of the embodiment of FIG. 1.

[0180] Referring now to FIGS. 6 to 8 there are shown further alternative embodiments of the present disclosure. In the third and fourth illustrated embodiment, like numerals have, where possible, been used to denote like parts, albeit with the addition of the prefix “200”, “300” to indicate that these features belong to the third and fourth embodiments respectively. The third and fourth embodiments share many common features with the embodiments of FIGS. 1 to 5, therefore only the differences from the embodiment illustrated in FIGS. 1 to 4 will be described in any greater detail.

[0181] FIG. 6 shows a blank 210 for forming a carrier 290 (see FIG. 7) and comprises a plurality of main panels 212, 214, 216, 218, 220, 222, 224 for forming a tubular structure. The plurality of main panels 212, 214, 216, 218, 220, 222, 224 comprises; a first base panel 212, a first lower corner panel 214, a first side panel 216, a top panel 218, a second side panel 220, a second lower corner panel 222, and a second base panel 224. The plurality of panels 212, 214, 216, 218, 220, 222, 224 may be arranged in a linear series hinged one to the next by corresponding fold lines 213, 215, 217, 219, 221, 223.

[0182] The first base panel 212 comprises a first aperture A1 and a third aperture A3. First aperture A1 is substantially similar to those of the previous embodiments. The third aperture A3 takes the form of a truncated version of the second apertures A2 of the previous embodiments. The third aperture A3 may have a truncated oval shape with a notch or recess extending from one side. The oval shape may be truncated at an oblique angle to the fold line 213 and is truncated at an end adjacent to a free side edge of the blank 210. In this way the third aperture A3 is spaced apart from the free side edge of the blank 210, this may improve the strength and/or durability of the carton 190, reducing the likelihood of tear propagation in the first base panel 212.

[0183] The blank 210 comprises an optional handle structure H. The handle structure H comprises a single foldable finger tab 260. The finger tab 260 is hingedly connected to the top panel 218 by a fold line 261 and is defined in part by a cut line or severance line 263. The finger tab 260 is disposed centrally in the top panel 218.

[0184] FIG. 8 shows a portion of a blank 310 for forming a carrier (not shown), the blank 310 comprises a plurality of main panels 312, 314, 316. The plurality of main panels 312, 314, 316 comprises; a first panel 312, a second panel 316, and an optional third panel 314. The plurality of main panels 312, 314, 316, may be arranged in a linear series hinged one to the next by corresponding fold lines 313, 315.

[0185] In some embodiments the third panel 316 may be omitted, in such embodiments the fold line 315 may be omitted.

[0186] The blank 310 comprises at least one article-retaining device N for engaging with a portion of an article B.

[0187] The article-retaining device N comprises an opening; the opening is defined at least in part in the second panel 316. When the third panel 314 is present the opening is defined at least in part in the third panel 314.

[0188] The article-retaining device N comprises a deformable member formed from at least part of the second panel 316 and/or third panel 314. The deformable member extends continuously across the opening such that the deformable member is connected at opposing side ends or edges to the third panel 14, or second panel 316 when the third panel 314 is omitted, by first and second joints J1, J2 respectively.

[0189] The deformable member is connected to the second panel 316 along an adjacent edge by a third joint J5/J6. The adjacent edge may define an upper or lower end (or edge) of the deformable member.

[0190] The deformable member may comprise a first expansion slit 345 in the form of a first cut or severable line 345. The first cut line 345 divides the deformable member into a major tab or portion 342 and a minor tab or portion 344a/344b.

[0191] The major portion 342 is connected to the third panel 314 (second panel 316 when the third panel 314 is omitted) by the first and second joints J1, J2. The minor portion 344a/344b is connected to the second panel 316 by the third joint J5/J6.

[0192] The deformable member may comprise a second expansion slit 347 in the form of a second cut or severable line 347. The second cut line 347 divides the minor portion 344a/344b into a first minor tab 344a and a second minor tab 344b. First and second minor tabs 344a, 344b are also referred to herein as half minor portions 344a, 344b.

[0193] The deformable member is defined in part by a first separation line 343. The first separation line 343 may take the form of a cutline or severable line 343. The first separation line 343 disconnects the deformable member from the blank 310. The first separation line 343 may disconnect the deformable member from the first panel 312, the second panel 316, the third panel 314 or any combination thereof.

[0194] The first separation line 343 may comprise an arcuate portion at each end thereof. Each of the arcuate portions interrupt or intersect the fold line 313, a section of the arcuate portions may be collinear with the fold line 313 and may be contiguous with the fold line 313 and fold line 341. In this way the fold line 341 is separated from the fold line 313 by the first separation line 343, specifically the arcuate portions.

[0195] The deformable member is defined in part by a pair of second separation lines 349a, 349b. Each of the pair of second separation lines 349a, 349b may take the form of a cutline or severable line.

[0196] The pair of second separation lines 349a, 349b may be substantially “L” shaped. A first one of the pair of second separation lines 349a is spaced apart from a second one of the pair of second separation lines 349b. The third joint J5/J6 is defined between terminal ends of the pair of second separation lines 349a, 349b.

[0197] The first one of the pair of second separation lines 349a extends between the first joint J1 and the third joint J5/J6.

[0198] The second one of the pair of second separation lines 349b extends between the second joint J2 and the third joint J5/J6.

[0199] The first expansion slit 345 extends substantially between opposed side edges of the deformable member. The first expansion slit 345 comprises a first end proximate the first one of the pair of second separation lines 349a and extends across the deformable member to a second opposite end disposed proximate the second one of the pair of second separation lines 349b. The first and second terminal ends of the first expansion slit 345 are disposed within the deformable member.

[0200] The first end of the expansion slit 345 is spaced apart from the first one of the pair of second separation lines 349a such that the major portion 342 is connected to the minor portion 344a/344b by a fourth joint J3. The second end of the expansion slit 345 is spaced apart from the second one of the pair of second separation lines 349b such that the major portion 342 is connected to the minor portion 344a/344b by a fifth joint J4.

[0201] In this way the major and minor portions can be considered to be partially severed from each other, the fourth and fifth joints J3, J4 provide connecting nicks or bridges therebetween.

[0202] The fourth and fifth joints J3, J4 may lie upon a notional line defined by the fold line 315.

[0203] The second expansion slit 347 may extend from the first expansion slit 345 toward the third joint J5/J6.

[0204] The second expansion slit 347 may divide the third joint J5/J6 into sixth and seventh joints J5, J6. The first minor tab 344a is connected to the second panel 316 by the sixth joint J5. The second minor tab 344b is connected to the second panel 316 by the seventh joint J6.

[0205] The first expansion slit 345 and second expansion slit 347 define a “T” shape.

[0206] It will be appreciated that the article-retaining device N comprises a unitary deformable member formed from at least part of the second panel 316 and/or third panel 314 when present. The unitary deformable member extends continuously across the opening such that the unitary deformable member bridges between opposed side edges of the opening. Additionally, the unitary deformable member continuously extend to one of upper and lower end edges of the opening.

[0207] The deformable member can be considered to be defined or circumscribed by a separation line 343 and a weakened line. The weakened line comprises the pair of second separation lines 349a, 349b, the first joint J1, the second joint J2, the sixth joint J5 and the seventh joint J6. The separation line 343 disconnects the deformation member from the first panel 312. The weakened line connects the deformable member to the second panel 316 and/or third panel 314 (when present) via three or more connecting nicks provided by the joints J1, J2, J5, J6. In this way the deformable member may be displaceable from the plane of the second panel 316 and/or third panel 314, when present.

[0208] In the embodiment of FIG. 8 the heel tab is omitted. The first separation line 343 defines at least in part a projection or lobe 346 extending from the first panel 312. The lobe 346 is integral with the first panel 312. The lobe 346, when the article-retaining device is in use, may extend over or under an end of an article B being engaged. The lobe 346 may provide a protective cover to a portion of the article B protruding through the opening of the article-retaining device.

[0209] In the blank 310 form, or when the article-retaining device N is in an undeployed condition, the opening is closed by the deformable member—by the major and minor tabs 342, 344a, 344b—and by the lobe 346.

[0210] When the article-retaining device N is in a deployed condition the opening is formed in the second panel 316 to receive an article B. The first separation line 343 may open to form an aperture between the deformable member (major tab 342) and the lobe 346. The first expansion slit 345 may open to form a slot or aperture in the deformable member, between the major tab 342 and the minor tabs 344a, 344b. The second expansion slit 347 may open to form a slot or aperture in the deformable member, between the minor tabs 344a, 344b.

[0211] The present disclosure provides a carton 90; 190; 290 for packaging one or more articles B and a blank 10; 110; 210; 310 for forming the carton 90; 190; 290. The carton 90; 190; 290 and/or blank 10; 110; 210; 310 comprise a first panel 12, 24; 112, 128; 212, 224; 312 and a second panel 14/16, 20/22; 114/116, 124/126; 214/216, 220/222; 314/316 hingedly connected to the first panel 12, 24; 112, 128; 212, 224; 312.

[0212] The carton 90; 190; 290 and/or blank 10; 110; 210; 310 comprises an article-retaining device N for receiving and engaging a portion of an article B. The article-retaining device N comprises an opening and a deformable member. The opening is defined at least in part in the second panel 14/16, 20/22; 114/116, 124/126; 214/216, 220/222; 314/316 and the deformable member is formed from at least part of the second panel 14/16, 20/22; 114/116, 124/126; 214/216, 220/222; 314/316. The deformable member extends continuously across the opening such that the deformable member is connected at its opposite side edges to the second panel by first and second joints respectively J1, J2. The

deformable member is further connected at an adjacent end edge to the second panel by a third joint J5/J6.

[0213] The deformable member may be disconnected from the first panel 12, 24; 112, 128; 212, 224; 312 by a separation line 43; 143; 243; 343.

[0214] The deformable member may be defined at least by a pair of first and second cut lines 49a, 49b; 149a, 149b; 249a, 249b; 349a, 349b, the first cut line 49a; 149a; 249a; 349a extends between the first joint J1 and the third joint J5/J6, the second cut line 49b; 149b; 249b; 349b extends between the second joint J2 and the third joint J5/J6.

[0215] The deformable member may comprise a first expansion slit 45; 145; 245; 345. The first expansion slit 45; 145; 245; 345 extends from a first end thereof near the first cut line 49a; 149a; 249a; 349a to a second opposite end thereof near the second cut line 45; 145; 245; 345, the first and second terminal ends are disposed within the deformable member.

[0216] The first expansion slit 45; 145; 245; 345 may divide the deformable member into a major portion 42; 142; 242; 342 and a minor portion 44a/44b; 144a/144b; 244a/244b; 344a/344b. The major portion 42; 142; 242; 342 is connected to the second panel 14/16, 20/22; 114/116, 124/126; 214/216, 220/222; 314/316 by the first and second joints J1, J2. The minor portion 44a/44b; 144a/144b; 244a/244b; 344a/344b is connected to the second panel 14/16, 20/22; 114/116, 124/126; 214/216, 220/222; 314/316 by the third joint J5/J6.

[0217] The first end of the first expansion slit 45; 145; 245; 345 is spaced apart from the first cut line 49a; 149a; 249a; 349a such that major portion 42; 142; 242; 342 and minor portion 44a/44b; 144a/144b; 244a/244b; 344a/344b are yet partially connected by a fourth joint J3. The second end of the first expansion slit 45; 145; 245; 345 is spaced apart from the second cut line 45; 145; 245; 345 such that major portion 42; 142; 242; 342 and minor portion 44a/44b; 144a/144b; 244a/244b; 344a/344b are yet partially connected by a fifth joint J4.

[0218] The deformable member may further comprise a second expansion slit 47; 147; 247; 347 extending from the first expansion slit 45; 145; 245; 345 toward the third joint J5/J6. The second expansion slit 47; 147; 247; 347 divides the minor portion 44a/44b; 144a/144b; 244a/244b; 344a/344b into a pair of half minor portions 44a, 44b; 144a, 144b; 244a, 244b; 344a, 344b and further divides the third joint J5/J6 into a sixth joint J5 and a seventh joint J6 such that one of the half minor portions 44a; 144a; 244a; 344a is connected to the second panel 14/16, 20/22; 114/116, 124/126; 214/216, 220/222; 314/316 by the sixth joint J5 and the other half minor portion 44b; 144b; 244b; 344b is connected to the second panel 14/16, 20/22; 114/116, 124/126; 214/216, 220/222; 314/316 by the seventh joint J6.

[0219] The present disclosure also provides an article-retaining device N for receiving and engaging a portion of an article B. The article-retaining device N comprises an opening defined at least in part in the second panel 14/16, 20/22; 114/116, 124/126; 214/216, 220/222; 314/316. The article-retaining device N comprises a unitary deformable member formed from at least part of the second panel 14/16, 20/22; 114/116, 124/126; 214/216, 220/222; 314/316. The unitary deformable member extends continuously across the opening such that the unitary deformable member bridges between opposed side edges of the opening. The unitary

deformable member further continuously extending to an adjacent end edge of the opening.

[0220] The unitary deformable member may be defined or circumscribed by a separation line 43; 143; 243; 343 and a weakened line J1, 49a, J5, J6, 49b, J2; J1, 149a, J5, J6, 149b, J2; J1, 249a, J5, J6, 249b, J2; J1, 349a, J5, J6, 349b, J2. The separation line 43; 143; 243; 343 disconnects the unitary deformable member from the first panel. The weakened line J1, 49a, J5, J6, 49b, J2; J1, 149a, J5, J6, 149b, J2; J1, 249a, J5, J6, 249b, J2; J1, 349a, J5, J6, 349b, J2 connects the unitary deformable member to the second panel 14/16, 20/22; 114/116, 124/126; 214/216, 220/222; 314/316 such that the unitary deformable member may be displaceable from the plane of the second panel 14/16, 20/22; 114/116, 124/126; 214/216, 220/222; 314/316.

[0221] The weakened line J1, 49a, J5, J6, 49b, J2; J1, 149a, J5, J6, 149b, J2; J1, 249a, J5, J6, 249b, J2; J1, 349a, J5, J6, 349b, J2 comprises at least two cut lines 49a, 49b; 149a, 149b; 249a, 249b; 349a, 349b and at least three connecting nicks J1, J5, J6, J2 for connecting the unitary deformable member with the second panel 14/16, 20/22; 114/116, 124/126; 214/216, 220/222; 314/316 along the cut.

[0222] First and second ones J1, J2 of the at least three connecting nicks J1, J5, J6, J2 may connect the unitary deformable member with the second panel 14/16, 20/22; 114/116, 124/126; 214/216, 220/222; 314/316 at the opposed side edges of the opening. A third one J5, J6 of the at least three connecting nicks J1, J5, J6, J2 connects the unitary deformable member with the second panel 14/16, 20/22; 114/116, 124/126; 214/216, 220/222; 314/316 at the adjacent end edge of the opening.

[0223] It can be appreciated that various changes may be made within the scope of the present invention. For example, the size and shape of the panels and apertures may be adjusted to accommodate articles of differing size or shape.

[0224] It will be recognised that as used herein, directional references such as “top”, “bottom”, “base”, “front”, “back”, “end”, “side”, “inner”, “outer”, “upper” and “lower” do not necessarily limit the respective panels to such orientation, but may merely serve to distinguish these panels from one another.

[0225] As used herein, the terms “hinged connection” and “fold line” refer to all manner of lines that define hinge features of the blank, facilitate folding portions of the blank with respect to one another, or otherwise indicate optimal panel folding locations for the blank. Any reference to “hinged connection” should not be construed as necessarily referring to a single fold line only; indeed a hinged connection can be formed from two or more fold lines wherein each of the two or more fold lines may be either straight/linear or curved/curvilinear in shape. When linear fold lines form a hinged connection, they may be disposed parallel with each other or be slightly angled with respect to each other. When curvilinear fold lines form a hinged connection, they may intersect each other to define a shaped panel within the area surrounded by the curvilinear fold lines. A typical example of such a hinged connection may comprise a pair of arched or arcuate fold lines intersecting at two points such that they define an elliptical panel therebetween. A hinged connection may be formed from one or more linear fold lines and one or more curvilinear fold lines. A typical example of such a hinged connection may comprise a combination of a linear

fold line and an arched or arcuate fold line which intersect at two points such that they define a half moon-shaped panel therebetween.

[0226] As used herein, the term “fold line” may refer to one of the following: a scored line, an embossed line, a debossed line, a line of perforations, a line of short slits, a line of half-cuts, a single half-cut, an interrupted cutline, a line of aligned slits, a line of scores and any combination of the aforesaid options.

[0227] It should be understood that hinged connections and fold lines can each include elements that are formed in the substrate of the blank including perforations, a line of perforations, a line of short slits, a line of half-cuts, a single half-cut, a cutline, an interrupted cutline, slits, scores, any combination thereof, and the like. The elements can be dimensioned and arranged to provide the desired functionality. For example, a line of perforations can be dimensioned or designed with degrees of weakness to define a fold line and/or a severance line. The line of perforations can be designed to facilitate folding and resist breaking, to facilitate folding and facilitate breaking with more effort, or to facilitate breaking with little effort.

[0228] The phrase “in registry with” as used herein refers to the alignment of two or more elements in an erected carton, such as an aperture formed in a first of two overlapping panels and a second aperture formed in a second of two overlapping panels. Those elements in registry with each other may be aligned with each other in the direction of the thickness of the overlapping panels. For example, when an aperture in a first panel is “in registry with” a second aperture in a second panel that is placed in an overlapping arrangement with the first panel, an edge of the aperture may extend along at least a portion of an edge of the second aperture and may be aligned, in the direction of the thickness of the first and second panels, with the second aperture.

1. A blank for forming a carton, the blank comprising a first panel, a second panel hingedly connected to the first panel and an article-retaining device for receiving and engaging a portion of an article, the article-retaining device comprising an opening defined, at least in part, in the second panel and a deformable member formed from at least part of the second panel and extending continuously across the opening such that the deformable member is connected at its opposite side ends to the second panel by first and second joints respectively, wherein the deformable member is further connected at one of its upper and lower ends to the second panel by a third joint.

2. The blank of claim 1, wherein the deformable member is disconnected from the first panel by a separation line.

3. The blank of claim 1, wherein the deformable member is defined at least by a pair of first and second cut lines, the first cut line extends between the first joint and the third joint, the second cut line extends between the second joint and the third joint.

4. The blank of claim 3, wherein the deformable member comprises a first expansion slit, the expansion slit extends from a first end thereof near the first cut line to and a second opposite end thereof near the second cut line, the first and second terminal ends are disposed within the deformable member.

5. The blank of claim 4, wherein the first expansion slit divides the deformable member into a major portion and a minor portion, the major portion is connected to the second

panel by the first and second joints, the minor portion is connected to the second panel by the third joint.

6. The blank of claim 5, wherein the first end of the expansion slit is spaced apart from the first cut line such that major and minor portions are yet partially connected by a fourth joint, and wherein the second end of the expansion slit is spaced apart from the second cut line such that major and minor portions are yet partially connected by a fifth joint.

7. The blank of claim 6, wherein the deformable member further comprises a second expansion slit extending from the first expansion slit toward the third joint, wherein the second expansion slit divides the minor portion into a pair of half minor portions and further divides the third joint into sixth and seventh joints such that one of the half minor portion is connected to the second panel by the sixth joint and the other half minor portion is connected to the second panel by the seventh joint.

8. A blank for forming a carton, the blank comprising a first panel, a second panel hingedly connected to the first panel and an article-retaining device for receiving and engaging a portion of an article, the article-retaining device comprising an opening defined, at least in part, in the second panel and a unitary deformable member formed from at least part of the second panel and extending continuously across the opening such that the unitary deformable member bridges between opposed side edges of the opening, the unitary deformable member further continuously extending to an adjacent end edge of the opening.

9. The blank of claim 8, wherein the unitary deformable member is circumscribed by a separation line and by a weakened line, the separation line disconnects the unitary deformable member from the first panel, and the weakened line connects the unitary deformable member to the second panel such that the unitary deformable member may be displaceable from the plane of the second panel.

10. The blank of claim 9, wherein the weakened line comprises at least two cut lines and at least three connecting nicks for connecting the unitary deformable member with the second panel along the cut.

11. The blank of claim 10, wherein first and second ones of the at least three connecting nicks connect the unitary deformable member with the second panel at the opposed side edges of the opening, a third one of the at least three

connecting nicks connects the unitary deformable member with the second panel at the adjacent end edge of the opening.

12. The blank of claim 8, wherein the first panel is a top panel of a carton.

13. The blank of claim 8, wherein the first panel is a bottom panel of a carton.

14. The blank of claim 8, wherein the second panel is a side panel of a carton.

15. The blank of claim 8, wherein the adjacent end edge of the opening is an upper edge.

16. The blank of claim 8, wherein the adjacent end edge of the opening is a lower edge.

17. A carton for packaging one or more articles comprising a plurality of panels forming walls of a tubular structure having an interior, the plurality of panels including:

a first panel;

a second panel hingedly connected to the first panel; and wherein the carton comprises an article-retaining device for receiving and engaging a portion of an article, the article-retaining device comprising an opening formed, at least in part, in the second panel and a deformable member formed from at least part of the second panel and extending continuously across the opening such that the deformable member is connected at its opposite side edges to the second panel by first and second joints respectively, wherein the deformable member is further connected at one of its upper and lower edges to the second panel by a third joint.

18. A carton for packaging one or more articles comprising a plurality of panels forming walls of a tubular structure having an interior, the plurality of panels including:

a first panel;

a second panel hingedly connected to the first panel; and wherein the carton comprises an article-retaining device for receiving and engaging a portion of an article, the article-retaining device comprising an opening formed, at least in part, in the second panel and a unitary deformable member formed from at least part of the second panel and extending continuously across the opening such that the unitary deformable member bridges between opposed side edges of the opening, the unitary deformable member further continuously extending to an adjacent end edge of the opening.

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