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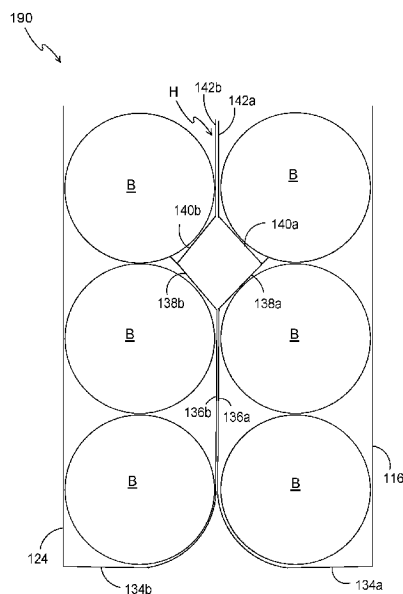


FIGURE 6D

(57) Abstract: A carton for packaging one or more articles includes an extendible handle. The handle includes at least one handle panel and a collapsible structure. The collapsible structure couples the at least one handle panel to a main body of the carton. The collapsible structure comprises a pair of hinged panels. The hinged panels include an inner panel hingedly connected by a first fold line to an outer panel. The inner panel is hingedly connected to the main body of the carton. The outer panel is hingedly connected to the at least one handle panel. The collapsible tubular structure further includes an expansion facilitator which has at least one tab coupled to one of the inner and outer panels. The at least one tab interrupts the first fold line.



CARTON AND BLANK THEREFOR

TECHNICAL FIELD

5 The present invention relates to handle structure for a carton, to cartons and to blanks for forming the same. More specifically, but not exclusively, the invention relates to a carton having a retractable handle structure and to a tubular structure having an expansion facilitator.

BACKGROUND

10 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
15 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.

It is desirable to provide cartons with a carrying handle such that a consumer can readily transport the carton. It is desirable that the handle is retractable such that the carton can be
20 stacked with other cartons for distribution of the packages to points of sale.

The present invention seeks to provide an improvement in the field of cartons, typically formed from paperboard or the like.

SUMMARY

25 A first aspect of the invention provides a carton for packaging one or more articles. The carton comprises an extendible handle comprising at least one handle panel and a collapsible structure. The collapsible tubular structure couples the at least one handle panel to a main body of the carton. The collapsible tubular structure comprises a first pair of hinged panels and a second pair of hinged panels. The first pair of hinged panels comprises an inner panel
30 hingedly connected by a first fold line to an outer panel. The second pair of hinged panels comprises an inner panel hingedly connected by a second fold line to an outer panel. The inner panels are hingedly connected to the main body of the carton. The outer panels are hingedly connected to the at least one handle panel. The collapsible tubular structure further
35 comprises an expansion facilitator for facilitating separation movement of the first pair of hinged panels from the second pair of hinged panels. The expansion facilitator comprises at least one tab coupled to one of the inner and outer panels of each of the first and second pairs

of hinged panels. The at least one tab of the first pair of hinged panels interrupts the first fold line. The at least one tab of the second pair of hinged panels interrupts the second fold line.

5 Optionally, the carton comprises a plurality of walls including; a top wall, a first side wall, a second side wall and a base wall, the plurality of walls forming the main body of the carton.

Optionally, the handle is movable between a retracted position and an extended position.

10 Optionally, the carton body includes at least one partition panel and at least one end panel.

Optionally, at least one end panel is hingedly connected to one of the first and second side walls.

15 Optionally, at least one partition panel is hingedly connected to the at least one end panel.

Optionally, the collapsible tubular structure defines a tubular axis and the at least one tab of the first pair of hinged panels is offset in the direction of the tubular axis from the at least one tab of the second pair of hinged panels.

20 Optionally, the at least one tab of the first pair of hinged panels is joined to the inner panel of the first pair of hinged panels.

Optionally, the at least one tab of the second pair of hinged panels is joined to the inner panel of the second pair of hinged panels

25

Optionally, the at least one tab of the second pair of hinged panels is joined to the outer panel of the second pair of hinged panels.

30 Optionally, the at least one tab of the first pair of hinged panels is integral with the inner panel of the first pair of hinged panels.

Optionally, the at least one tab of the second pair of hinged panels is integral with the inner panel of the second pair of hinged panels

35 Optionally, the at least one tab of the second pair of hinged panels is integral with the outer panel of the second pair of hinged panels.

A second aspect of the invention provides a carton having an extendible handle, the carton comprising a plurality of walls forming a carton body, the body of the carton comprises an outer shell defining at least in part the interior of the carton for receiving articles, the handle comprising at least one handle panel and a collapsible structure, wherein the collapsible tubular structure comprises a pair of panels including an inner panel hingedly connected by a fold line to an outer panel, the inner panel is hingedly connected to the main body of the carton by a hinged connection, the outer panel is hingedly connected to the at least one handle panel, the hinged connection between the inner panel and the carton body is disposed inside the interior of the carton such that the collapsible structure may be brought into engagement with one or more articles in the carton when the handle is in a retracted position.

Optionally, the plurality of walls includes; a top wall, a first side wall, a second side wall and a base wall.

Optionally, the hinged connection is disposed below an upper edge of the outer shell-forming section when the handle H is in use.

Optionally, the upper edge is a free edge at an open end of the outer shell-forming section.

Optionally, the collapsible structure is disposed in a space or void between two adjacent articles when the handle is in the retracted position.

Optionally, the collapsible structure comprises an article engaging feature for locking the handle in the retracted position.

Optionally, the article engaging feature comprises one of the elements selected from the group consisting of: at least one engaging tab; at least one embossment protruding from the outer panel; at least one dot or strip of friction material on the outer panel; fugitive glue on the outer panel and friction tape on the outer panel.

A third aspect of the invention provides a blank for forming a carton, the blank comprising a plurality of panels forming a main body of the carton in set-up condition, the plurality of panels including; a top panel, a first side panel, a second side panel and a base panel, the blank comprising an extendible handle, the handle comprising at least one handle panel and a collapsible structure, the collapsible tubular structure coupling the at least one handle panel to one of the plurality of panels forming the main body of the carton, the collapsible tubular structure comprising a first pair of hinged panels and a second pair of hinged panels, the first

pair of hinged panels comprising an inner panel hingedly connected by a first fold line to an outer panel, the second pair of hinged panels comprising an inner panel hingedly connected by a second fold line to an outer panel, wherein the inner panels are hingedly connected a respective one of the plurality of panels forming the main body of the carton, the outer panels
5 being hingedly connected to the at least one handle panel, wherein the collapsible tubular structure further comprises an expansion facilitator for facilitating separation movement of the first pair of hinged panels from the second pair of hinged panels, the expansion facilitator comprises at least one tab coupled to one of the inner and outer panels of each of the first and second pairs of hinged panels, the at least one tab of the first pair of hinged panels interrupts
10 the first fold line, the at least one tab of the second pair of hinged panels interrupts the second fold line.

A fourth aspect of the invention provides a blank for forming a carton, the blank comprising a plurality of panels forming a carton body having an outer shell defining at least in part the
15 interior of the carton for receiving articles in a set-up condition, the plurality of panels including; a top panel, a first side panel, a second side panel and a base panel, wherein the blank comprises an extendible handle, the handle comprising at least one handle panel and a collapsible structure, wherein the collapsible tubular structure comprises a pair of panels including an inner panel hingedly connected by a fold line to an outer panel, the inner panel is
20 hingedly connected to one of the plurality of panels forming the carton body by a hinged connection, the outer panel is hingedly connected to the at least one handle panel, the hinged connection between the inner panel and said one of the plurality of panels is configured to be disposed inside the interior of a set-up carton such that the collapsible structure may be brought into engagement with one or more articles in the carton when the handle is in a
25 retracted position.

A fifth aspect of the invention provides an extendible handle for a carton. The extendible handle comprises at least one handle panel and a collapsible structure. The collapsible tubular structure couples the at least one handle panel to a main body of a carton. The collapsible
30 tubular structure comprises a first pair of hinged panels and a second pair of hinged panels. The first pair of hinged panels comprises an inner panel hingedly connected by a first fold line to an outer panel. The second pair of hinged panels comprises an inner panel hingedly connected by a second fold line to an outer panel. The inner panels are hingedly connected to the main body of the carton. The outer panels are hingedly connected to the at least one
35 handle panel. The collapsible tubular structure further comprises an expansion facilitator for facilitating separation movement of the first pair of hinged panels from the second pair of hinged panels. The expansion facilitator comprises at least one tab coupled to one of the inner

and outer panels of each of the first and second pairs of hinged panels. The at least one tab of the first pair of hinged panels interrupts the first fold line. The at least one tab of the second pair of hinged panels interrupts the second fold line.

- 5 Within the scope of this application it is envisaged 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 taken independently or in any combination thereof. For example, features described in connection with one embodiment are applicable to all embodiments unless there is incompatibility of features.

10

BRIEF DESCRIPTION OF THE DRAWINGS

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

- 15 Figure 1 is a plan view from above of a blank for forming a carton according to a first embodiment;

Figure 2 is a side view of a carton formed from the blank of Figure 1;

Figure 3 is a perspective view of a portion of the carton of Figure 2 showing a carrying handle in a deployed condition;

- 20 Figure 4 is a perspective view of a portion of the carton of Figure 2 showing the carrying handle in a stowed condition;

Figure 5 is a perspective view of the carton of Figure 2 showing the carrying handle in use;

Figure 6 is a plan view from above of a blank for forming a carton according to a second embodiment;

- 25 Figures 6A to 6C illustrate stages of forming a carton from the blank of Figure 6;

Figure 6D is a sectional view of a carton formed from the blank of Figure 6 showing a carrying handle in a stowed condition;

Figure 7 is a plan view from above of a blank for forming a carton according to a third embodiment;

- 30 Figure 8 is a sectional view of a carton formed from the blank of Figure 7 showing a carrying handle in a stowed condition;

Figure 9 is a plan view from above of a blank for forming a carton according to a fourth embodiment;

- 35 Figure 10 is a sectional view of a carton formed from the blank of Figure 9 showing a carrying handle in a stowed condition;

Figure 11 is a plan view from above of a blank for forming a carton according to a fifth embodiment; and

Figure 12 is a sectional view of a carton formed from the blank of Figure 11 showing a carrying handle in a stowed condition.

DETAILED DESCRIPTION OF EMBODIMENTS

5 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,
10 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
15 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.

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

25 Figures 6, 7, 8 and 11 each show a plan view of a blank 110; 210; 310; 410 capable of forming a carton or carrier 190; 290; 390; 490 for containing and carrying a group of primary products such as, but not limited to, beverage cans, hereinafter referred to as articles B. The blanks 110; 210; 310; 410 form secondary packages for packaging at least one primary product container or package.

30

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 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
35 tapered and/or cylindrical. Other exemplary containers include bottles (for example metallic,

glass or plastics bottles), cans (for example aluminium cans), tins, cups, pots, pouches, packets and the like.

The blanks 10; 110; 210; 310; 410 are each 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.

The packaging structure or carton 90 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.

In the embodiment illustrated in Figure 1, the blank 10 is configured to form a carton or carrier 90 for packaging an exemplary arrangement of exemplary articles B. In the illustrated embodiment the arrangement is an $m \times n$ matrix or array, having two rows ($m=2$) and two columns ($n=2$) such that the carton 90 comprises two rows of two articles B. The articles B may be 330ml beverage cans.

In the embodiment illustrated in Figure 6, the blank 110 is configured to form a carton or carrier 190 for packaging an exemplary arrangement of exemplary articles B. In the illustrated embodiments, the arrangement is an $m \times n$ matrix or array, having two rows ($m=2$) and three columns ($n=3$). The blank 110 forms a carton 190 which accommodates two rows of three articles B and the articles B are 355ml beverage cans.

In the embodiment illustrated in Figures 9 and 11, the blanks 310; 410 are configured to form a carton or carrier 390; 490 for packaging an exemplary arrangement of exemplary articles B.

In the illustrated embodiments the arrangement is an $m \times n$ matrix or array, having two rows ($m=2$) and three columns ($n=3$). The cartons 390; 490 comprise two rows of three articles B and the articles B are 375ml beverage cans.

- 5 In the embodiment illustrated in Figure 7, the blank 210 is configured to form a carton or carrier for packaging an exemplary arrangement of exemplary articles B. In the illustrated embodiment the arrangement is an $m \times n$ matrix or array, having one row ($m=1$) and two columns ($n=2$).; The blank 210 forms a carton 290 which comprises one row of two articles B and the articles B are 330ml beverage cans.

10

Alternatively, the blanks 10; 110; 210; 310; 410 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 for example, but not limited to, fully enclosed cartons or basket carriers, the articles B may be bottles or cans.

15

Turning to Figure 1, there is illustrated a blank 10 for forming a carton 90 (see Figure 2) according to a first embodiment. The blank 10 comprises a plurality of main panels 12, 14, 16, 18, 20, 22, 24, 26, 28 for forming a tubular structure. The tubular structure forms a main body of the carton 90. The plurality of main panels 12, 14, 16, 18, 20, 22, 24, 26, 28 comprises a
20 base panel 12, a first lower bevel panel 14, a first side panel 16, a first upper bevel panel 18, a top panel 20, a second upper bevel panel 22, a second side panel 24, a second lower bevel panel 26 and a securing panel 28. The plurality of panels 12, 14, 16, 18, 20, 22, 24, 26, 28 may be arranged in a linear series hinged one to the next by corresponding fold lines 15, 17, 19, 21, 25, 27, 29, 31.

25

In alternative embodiments, the first and second lower bevel panels 14, 26 may be omitted, the fold lines 17, 29 may be omitted. In alternative embodiments, the first and second upper bevel panels 18, 22 may be omitted, the fold lines 19, 27 may be omitted.

- 30 The first and second lower bevel panels 14, 26 may be considered to form lower portions of the respective one of the first or second side panels 16, 20 to which they are hingedly connected.

The first and second upper bevel panels 18, 22 may be considered to form upper portions of
35 the respective one of the first or second side panels 16, 20 to which they are hingedly connected.

The blank 10 is foldable to form a package 90 as illustrated in Figure 2. The base panel 12 is secured to the securing panel 28 in an overlapping relationship to form a composite base wall 12/28 of the carton 90. The base panel 12 and securing panel 28 may be secured to each other by an adhesive or a mechanical fastener such as staples or by other suitable securing mechanisms.

The base panel 12 may comprise an optional fold line 13 extending longitudinally thereacross. The fold line 13 may bisect the base panel 12.

The top panel 20 may comprise an optional fold line 23 extending longitudinally thereacross. The fold line 23 may bisect the top panel 20.

Optionally, the first and second lower bevel panels 14, 26 may comprise at least one heel engagement structure for engaging with a heel or lower portion of an article B. The blank 10 illustrated in Figure 1 comprises four heel engagement structures each is provided for engaging a respective article B. Each of the heel engagement structures comprises an opening A1. The openings A1 are struck, at least, from one of the first and second lower bevel panels 14, 26. The openings A1 may be struck, in part, from one of the first and second lower bevel panels 14, 26 and in part from the one of the first and second side panels 16, 24. In other embodiments, the openings A1 may be struck from one of the first and second side panels 16, 24. The openings A1 may be struck in part from the base panel 12 or from the securing panel 28.

The heel engagement structures comprise protrusions formed from material which would otherwise form one of the first and second lower bevel panels 14, 26 or one of the first and second side panels 16, 24. The protrusions are integral with the base panel 12 or the securing panel 28. The protrusions form a tab which is disposed proximate to the base of an article B, and may be considered to form a part of the base wall of the carton 90. The tabs protect the base of the article B below which they are located.

The openings A1 of the heel engagement structures in the first lower bevel panel 14 interrupt the fold line 17 that couples the first lower bevel panel 14 to the first side panel 16. The fold line 17 comprises a first portion 17A and a second portion 17B which converge towards an upper corner of an endmost opening A1. The first portion 17A and the second portion 17B extend from a first free end edge of the blank 10 towards the endmost opening A1.

The first portion 17A is convergently arranged with respect to the fold line 15 that couples the first lower bevel panel 14 to the base panel 12. The second portion 17B is convergently arranged with respect to the fold line 15 that couples the first lower bevel panel 14 to the base panel 12. This may have the effect of tightening an end portion of the first lower bevel panel 14 and/or the first side panel 16 about an adjacent endmost article B whereby reducing the likelihood of unintentional egress of said endmost article B from the carton 90.

The fold line 17 comprises a third portion 17C extending between the endmost opening A1 and an adjacent opening A1. In the illustrated embodiment the adjacent opening A1 forms a second endmost opening A1.

The third portion 17C of fold line 17 is arcuate or curvilinear in shape, in other embodiments the third portion 17C of fold line 17 may be non-linear, for example formed from two or more contiguous linear sections which are divergently arranged with respect to each other. This may have the effect of tightening a portion of the first lower bevel panel 14 and/or the first side panel 16 disposed between the endmost opening A1 and an adjacent opening A1 such that said portion is tightened about the endmost article B and an adjacently disposed article B whereby securely locating said articles B within the carton 90.

The fold line 17 comprises a fourth portion 17D extending between the second endmost opening A1 a second, opposing, free end edge of the blank 10. The fourth portion 17D is convergently arranged with respect to the fold line 15 that couples first lower bevel panel 14 to the base panel 12. This may have the effect of tightening a second, opposing, end portion of the first lower bevel panel 14 and/or the first side panel 16 about a second adjacent endmost article B, disposed at a second opposing end of the carton 90, whereby reducing the likelihood of unintentional egress of the second endmost article B from the carton 90.

The openings A1 of the heel engagement structures in the second lower bevel panel 26 interrupt the fold line 29 that couples the second lower bevel panel 26 to the second side panel 24. The fold line 29 comprises a first portion 29A and a second portion 29B which converge towards an upper corner of an endmost opening A1 in the second lower bevel panel 26. The first portion 29A and the second portion 29B extend from a first free end edge of the blank 10 towards said endmost opening A1.

The first portion 29A is convergently arranged with respect to the fold line 31 that couples second lower bevel panel 26 to the securing panel 28. The second portion 29B is convergently arranged with respect to the fold line 31 that couples the second lower bevel panel 26 to the

securing panel 28. This may have the effect of tightening an end portion of the second lower bevel panel 26 and/or the second side panel 24 about an adjacent endmost article B whereby reducing the likelihood of unintentional egress of said endmost article B from the carton 90.

- 5 The fold line 29 comprises a third portion 29C extending between the endmost opening A1 and an adjacent opening A1. In the illustrated embodiment the adjacent opening A1 forms a second endmost opening A1 at an opposing end of the carton 90.

10 The third portion 29C of fold line 29 is arcuate or curvilinear in shape, in other embodiments the third portion 29C of fold line 29 may be non-linear, for example formed from two or more contiguous linear sections which are divergently arranged with respect to each other. This may have the effect of tightening a portion of the second lower bevel panel 26 and/or the second side panel 24 disposed between the endmost opening A1 and the adjacent opening A1 such that said portion is tightened about the endmost article B and an adjacently disposed
15 article B whereby securely locating said articles B within the carton 90.

The fold line 29 comprises a fourth portion 29D extending between the second endmost opening A1 a second, opposing, free end edge of the blank 10. The fourth portion 29D is convergently arranged with respect to the fold line 31 that couples the second lower bevel
20 panel 26 to the securing panel 28. This may have the effect of tightening a second, opposing, end portion of the second lower bevel panel 26 and/or the second side panel 24 about a second, opposing, endmost article B whereby reducing the likelihood of unintentional egress of the second endmost article B from the carton 90.

25 Optionally, the first and second upper bevel panels 18, 22 may comprise at least one shoulder engagement structure for engaging with a shoulder or upper portion of an article B. The blank 10 illustrated in Figure 1 comprises four shoulder engagement structures, each is provided for engaging a respective article B. Each of the shoulder engagement structures comprises an opening A2. The openings A2 are struck, at least, from one of the first and second upper bevel
30 panels 18, 22. The openings A2 may be struck, in part, from one of the first and second upper bevel panels 18, 22 and in part from the one of the first and second side panels 16, 24. In other embodiments, the openings A2 may be struck from one of the first and second side panels 16, 24. The openings A2 may be struck in part from the top panel 20.

35 The shoulder engagement structures comprise protrusions formed from material which would otherwise form one of the first and second upper bevel panels 18, 22 or one of the first and second side panels 16, 24. The protrusions are integral with the top panel 20. The protrusions

form a tab which is disposed proximate to the top of an article B, and may be considered to form a part of the top wall of the carton 90. The tabs protect the top of the article B above which they are located.

- 5 The openings A2 of the shoulder engagement structures in the first upper bevel panel 18 interrupt the fold line 19 that couples the first upper bevel panel 18 to the first side panel 16. The fold line 19 comprises a first portion 19A and a second portion 19B which converge towards a lower corner of an endmost opening A2. The first portion 19A and the second portion 19B extend from a first free end edge of the blank 10 towards the endmost opening A2.

10

The first portion 19A is convergently arranged with respect to the fold line 21, which couples first upper bevel panel 18 to the top panel 20. The second portion 19B is convergently arranged with respect to the fold line 21 that couples first upper bevel panel 18 to the top panel 20. This may have the effect of tightening an end portion of the first upper bevel panel 18 and/or the first side panel 16 about an adjacent endmost article B whereby reducing the likelihood of unintentional egress of said endmost article B from the carton 90.

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The fold line 19 comprises a third portion 19C extending between the endmost opening A2 and an adjacent opening A2. In the illustrated embodiment the adjacent opening A2 forms a second endmost opening A2.

25

The third portion 19C of fold line 19 is arcuate or curvilinear in shape, in other embodiments the third portion 19C of fold line 19 may be non-linear, for example formed from two or more contiguous linear sections which are divergently arranged with respect to each other. This may have the effect of tightening a portion of the first upper bevel panel 18 and/or the first side panel 16 disposed between the endmost opening A2 and an adjacent opening A2 such that said portion is tightened about the endmost article B and an adjacently disposed article B whereby securely locating said articles B within the carton 90.

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The fold line 19 comprises a fourth portion 19D extending between the second endmost opening A2 a second, opposing, free end edge of the blank 10. The fourth portion 19D is convergently arranged with respect to the fold line 21 that couples the first upper bevel panel 18 to the top panel 20. This may have the effect of tightening a second, opposing, end portion of the first upper bevel panel 18 and/or the first side panel 16 about a second adjacent endmost article B, disposed at a second opposing end of the carton 90, whereby reducing the likelihood of unintentional egress of the second endmost article B from the carton 90.

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The openings A2 of the heel engagement structures in the second upper bevel panel 22 interrupt the fold line 27 that couples the second lower bevel panel 26 to the second panel 24. The fold line 27 comprises a first portion 27A and a second portion 27B which converge towards a lower corner of an endmost opening A2 in the second upper bevel panel 22. The first portion 27A and the second portion 27B extend from a first free end edge of the blank 10 towards said endmost opening A2.

The first portion 27A is convergently arranged with respect to the fold line 25, which couples second upper bevel panel 22 to the top panel 20. The second portion 27B is convergently arranged with respect to the fold line 25 that couples second upper bevel panel 22 to the top panel 20. This may have the effect of tightening an end portion of the second upper bevel panel 22 and/or the second side panel 24 about an adjacent endmost article B whereby reducing the likelihood of unintentional egress of said endmost article B from the carton 90.

The fold line 27 comprises a third portion 27C extending between the endmost opening A2 and an adjacent opening A2. In the illustrated embodiment the adjacent opening A2 forms a second endmost opening A2 at an opposing end of the carton 90.

The third portion 27C of fold line 27 is arcuate or curvilinear in shape, in other embodiments the third portion 27C of fold line 27 may be non-linear, for example formed from two or more contiguous linear sections which are divergently arranged with respect to each other. This may have the effect of tightening a portion of the second upper bevel panel 22 and/or the second side panel 24 disposed between the endmost opening A2 and the adjacent opening A2 such that said portion is tightened about the endmost article B and an adjacently disposed article B whereby securely locating said articles B within the carton 90.

The fold line 27 comprises a fourth portion 27D extending between the second endmost opening A2 a second, opposing, free end edge of the blank 10. The fourth portion 27D is convergently arranged with respect to the fold line 25 that couples the second upper bevel panel 22 to the top panel 20. This may have the effect of tightening a second, opposing, end portion of the second upper bevel panel 22 and/or the second side panel 24 about a second, opposing, endmost article B whereby reducing the likelihood of unintentional egress of the second endmost article B from the carton 90.

The blank 10 comprises a handle structure H1/H2. The handle structure H1/H2 comprises a first end panel 34a hingedly connected to the first side panel 16 by a fold line 33a and a first handle panel 1 hingedly connected to the first end panel 34a by a fold line 35a.

The first handle panel 1 comprises an upper panel part 42a (or handle section) having a pair of handle openings. The handle openings may be defined, at least in part, by a handle aperture A3. Each handle opening may be defined, at least in part, by a cushioning tab 52 hingedly connected along an upper edge thereof to the upper panel part 42a by a fold line 51.

The first handle panel 1 comprises adjacent collapsing sections 40a and 38a which may be considered to form a first pair of hinged panels. A first collapsing section 40a is hingedly connected along an upper edge thereof to the upper panel part 42a by a fold line 41a. A second collapsing section 38a is hingedly connected along an upper edge thereof to the first collapsing section 40a by a fold line 39a.

The first handle panel 1 comprises a lower panel part 36a (or partition section). The lower panel part 36a is hingedly connected along an upper edge thereof to the second collapsing section 38a by a fold line 37a. The lower panel part 36a is hingedly connected along a lower edge thereof to the first end panel 34a by a fold line 35a. The lower panel part 36a forms a partition panel separating the articles B in one row of articles B from an adjacent row of articles B.

The first handle panel 1 may comprise a recess R1 struck from a free side edge of the adjacent collapsing sections 40a and 38a. The recess R1 may be arcuate or curvilinear in shape.

The fold line 39a hinging the first collapsing section 40a to the second collapsing section 38a is interrupted by a pair of cut lines or severance lines 43a, 45a. A first cut line 43a may be arcuate or curvilinear in shape. A second cut line 45a may be substantially trapezoidal in shape. The first cut line 43a defines in part a first tab T1. The second cut line 45a defines in part a second tab T2.

Optionally, the handle structure H1/H2 comprises a second end panel 34b hingedly connected to the second side panel 24 by a fold line 33b and a second handle panel 2 hingedly connected to the second end panel 34b by a fold line 35b.

The second handle panel 2 comprises a second upper panel part 42b (or second handle section) having a pair of handle openings. The handle openings may be defined, at least in part, by a handle aperture A3. Each handle opening may be defined, at least in part, by a cushioning tab 52 hingedly connected along an upper edge thereof to the second upper panel part 42b by a fold line 51.

The second handle panel 2 comprises adjacent collapsing sections 40b and 38b which may be considered to form a second pair of hinged panels. A third collapsing section 40b is hingedly connected along an upper edge thereof to the second upper panel part 42b by a fold line 41b.

5 A fourth collapsing section 38b is hingedly connected along an upper edge thereof to the third collapsing section 40b by a fold line 39b.

The second upper panel part 42b may reinforce the upper panel part 42a of the first handle panel 1. The second upper panel part 42b together with the upper panel part 42a of the first
10 handle panel 1 form a two ply or layered structure.

The second handle panel 2 comprises a second lower panel part 36b. The second lower panel part 36b is hingedly connected along an upper edge thereof to the fourth collapsing section 38b by a fold line 37b. The second lower panel part 36b is hingedly connected along a lower
15 edge thereof to the second end panel 34b by a fold line 35b.

The second handle panel 2 may comprise a second recess R2 struck from a free side edge of the adjacent collapsing sections 40b and 38b. The second recess R2 may be arcuate or curvilinear in shape.
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The fold line 39b hinging the third collapsing section 40b to the fourth collapsing section 38b is interrupted by a pair of cut lines or severance lines 43b, 45b. A third cut line 43b may be arcuate or curvilinear in shape. A fourth cut line 45b may be substantially trapezoidal in shape. The third cut line 43a defines in part a third tab T3. The fourth cut line 45b defines in part a
25 fourth tab T4.

The first and second handle panels 1, 2 may be generally wider in dimension than the first or second end panel 34a, 34b to which they are hinged. In this way the first and second handle panels 1, 2 substantially extend between the top wall 20 and the base wall 12 of the carton
30 90.

Referring now to Figures 6 to 6C there is shown an alternative embodiment of the present disclosure. In the alternative 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
35 features belong to the second embodiment. The second embodiment shares many common features with the embodiment of Figures 1 to 5 and therefore only the differences from the embodiment illustrated in Figures 1 to 5 will be described in any greater detail.

Figure 6 illustrates a blank 110 for forming a carton 190 (see Figure 6D) 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 base panel 112, a first lower bevel panel 114, a first side panel 116, a first upper bevel panel 118, a top panel 120, a second upper bevel panel 122, a second side panel 124, a second lower bevel panel 126 and a securing 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 115, 117, 119, 121, 125, 127, 129, 131.

The blank 110 is adapted to accommodate six articles B in a 2x3 arrangement. The blank 110 comprises six heel engagement structures each is provided for engaging a respective article B. Each of the heel engagement structures comprises an opening A1. The first lower bevel panel 114 comprises three openings A1.

A first central opening A1 is provided between the first and second endmost openings A1 in the first lower bevel panel 114. The first endmost opening A1 is coupled to the first central opening A1 by a third portion 117C of fold line 117 which couples the first lower bevel panel 114 to the first side panel 116. The third portion 117C of fold line 117 may be arcuate or curvilinear in shape.

The first central opening A1 is coupled to the second endmost opening A1 by a fifth portion 117E of fold line 117 which couples the first lower bevel panel 114 to the first side panel 116. The fifth portion 117E of fold line 117 may be arcuate or curvilinear in shape, in other embodiments the fifth portion 117E of fold line 117 may be non-linear, for example formed from two or more contiguous linear sections which are divergently arranged with respect to each other. This may have the effect of tightening a portion of the first lower bevel panel 114 and/or the first side panel 116 disposed between the second endmost opening A1 and the first central opening A1 such that said portion is tightened about the endmost article B and an adjacently disposed article B whereby securely locating said articles B within the carton 90.

The second lower bevel panel 126 comprises three openings A1.

A second central opening A1 is provided between the first and second endmost openings A1 in the second lower bevel panel 126. The first endmost opening A1 is coupled to the second central opening A1 by a third portion 129C of fold line 129 which couples the second lower

bevel panel 126 to the second side panel 124. The third portion 129C of fold line 129 may be arcuate or curvilinear in shape.

5 The second central opening A1 is coupled to the second endmost opening A1 by a fifth portion 129E of fold line 129 which couples the second lower bevel panel 126 to the second side panel 124. The fifth portion 129E of fold line 129 may be arcuate or curvilinear in shape, in other embodiments the fifth portion 129E of fold line 129 may be non-linear, for example formed from two or more contiguous linear sections which are divergently arranged with respect to each other. This may have the effect of tightening a portion of the second lower
10 bevel panel 126 and/or the second side panel 124 disposed between the second endmost opening A1 and the second central opening A1 such that said portion is tightened about the endmost article B and an adjacently disposed article B whereby securely locating said articles B within the carton 90.

15 The blank 110 comprises six shoulder engagement structures each is provided for engaging a respective article B. Each of the shoulder engagement structures comprises an opening A2. The first upper bevel panel 118 comprises three openings A2.

A first central opening A2 is provided between the first and second endmost openings A2 in
20 the first upper bevel panel 118. The first endmost opening A2 is coupled to the first central opening A2 by a third portion 119C of fold line 119 which couples the first upper bevel panel 118 to the first side panel 116. The third portion 119C of fold line 119 may be arcuate or curvilinear in shape.

25 The first central opening A2 is coupled to the second endmost opening A2 by a fifth portion 119E of fold line 119 which couples the first upper bevel panel 118 to the first side panel 116. The fifth portion 119E of fold line 119 may be arcuate or curvilinear in shape, in other embodiments the fifth portion 119E of fold line 119 may be non-linear, for example formed from two or more contiguous linear sections which are divergently arranged with respect to
30 each other. This may have the effect of tightening a portion of the first upper bevel panel 118 and/or the first side panel 116 disposed between the second endmost opening A2 and the first central opening A2 such that said portion is tightened about the endmost article B and an adjacently disposed article B whereby securely locating said articles B within the carton 90.

35 The second upper bevel panel 122 comprises three openings A2.

A second central opening A2 is provided between the first and second endmost openings A2 in the second upper bevel panel 122. The first endmost opening A2 is coupled to the second central opening A2 by a third portion 127C of fold line 127 which couples the second upper bevel panel 122 to the second side panel 124. The third portion 127C of fold line 127 may be arcuate or curvilinear in shape.

The second central opening A2 is coupled to the second endmost opening A2 by a fifth portion 127E of fold line 127 which couples the second upper bevel panel 122 to the second side panel 124. The fifth portion 127E of fold line 127 may be arcuate or curvilinear in shape, in other embodiments the fifth portion 127E of fold line 127 may be non-linear, for example formed from two or more contiguous linear sections which are divergently arranged with respect to each other. This may have the effect of tightening a portion of the second upper bevel panel 122 and/or the second side panel 124 disposed between the second endmost opening A2 and the second central opening A2 such that said portion is tightened about the endmost article B and an adjacently disposed article B whereby securely locating said articles B within the carton 90.

The blank 110 comprises a first handle panel 101 including a first lower panel part 136a. The first lower panel part 136a is longer in dimension than the first lower panel part 36a of the embodiment of Figure 1; this accommodates the increase in length of the first side panel 116 due to the fact a greater number of articles B are being packaged. In this way, the upper panel part 142a of the first handle panel 101 is able to be disposed between the endmost articles B at the open end of the tubular structure formed by the main panels 112, 114, 116, 118, 120, 122, 124, 126, 128.

The second lower panel part 136b of the second handle panel 102 is similarly adjusted in length when provided.

Construction of the cartons 90; 190; 290; 390; 490 from the blanks 10; 110; 210; 310; 410 is substantially similar will now be described with reference to the embodiment illustrated in Figure 6 to 6D. The carton 190 (shown in Figure 6D) can be formed from the blank 110 of Figure 6 by a series of sequential folding operations in a straight line machine so that the blank 110 or carton 190 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.

The first end panel 134a and the first handle panel 101 are folded together, with respect to the first side panel 116, about fold line 133a as indicated by direction arrow D1 in Figure 6A. The first end panel 134a and the first lower panel part 134a are brought into face contacting relationship with the first side panel 116.

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The second end panel 134b and the second handle panel 102 are folded together, with respect to the second side panel 124, about fold line 133b as indicated by direction arrow D2 in Figure 6A. The second end panel 134b and the second lower panel part 134b are brought into face contacting relationship with the second side panel 124.

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Glue G or other adhesive treatment is applied to an outer surface of the first lower panel part 134a and to an outer surface of the first upper panel part 142a. Alternatively, glue G or other adhesive treatment may be applied to an outer surface of the second lower panel part 134b and to an outer surface of the second upper panel part 142b.

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The top panel 120 is folded, with respect to itself, about fold line 123 as indicated by direction arrow D3 in Figure 6B. The second side panel 124 is brought into overlying registry with the first side panel 116. The second end panel 134b is disposed in face contacting relationship with first end panel 134a. The second upper panel part 142b and the second lower panel part 134b are disposed in face contacting relationship with first upper panel part 142a and the first lower panel part 134a respectively. The second upper panel part 142b is secured to first upper panel part 142a. The second lower panel part 134b is secured to the first lower panel part 134a.

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Glue G or other adhesive treatment is applied to an outer surface of the securing panel 128. Alternatively, glue G or other adhesive treatment may be applied to an inner surface of a corresponding portion of the base panel 112.

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The base panel 112 is folded with respect to itself, about fold line 113 as indicated by direction arrow D4 in Figure 6C. A distal portion of the base panel 112 is brought into overlying registry with a proximal portion of the base panel 112. The distal portion of the base panel 112 is brought into face contacting relationship with the securing panel 128. The distal portion of the base panel 112 is secured to the securing panel 128.

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The blank 110 is thus formed into a flat collapsed tubular structure which can be readily shipped or distributed to a convertor plant, at which the flat collapsed tubular structure may be

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erected into a tubular structure open at one end thereof and loaded with articles B through the open end.

The flat collapsed tubular structure may be erected to form an open-ended tubular structure by unfolding the top panel 120 and the base panel 112 about fold lines 123, 113 respectively. In doing the second side panel 124 is separated or spaced apart from the first side panel 116 to define an interior chamber divided by the first and second handle panel 101, 102.

The carton 190 is loaded with articles B through the open end thereof.

Figure 2 illustrates a carton 90 formed from the blank 10 of Figure 1. The carton 90 is shown with a carrying handle H (formed from the handle structures H1, H2) in a stowed condition. The carrying handle H is retracted within the interior of the tubular structure formed by the main panels 12, 14, 16, 18, 20, 22, 24, 26, 28 and is not visible in Figure 2.

Figure 5 illustrates the carrying handle H in a deployed condition. The carrying handle H is extended to pass through the open end of the tubular structure formed by the main panels 12, 14, 16, 18, 20, 22, 24, 26, 28 such that it can be readily grasped by a user. The handle opening A3 are disposed above the endmost articles B.

Figures 3 and 4 illustrate the carrying handle H in the stowed condition, one of the endmost cartons B has been removed for illustrative purposes. The collapsing sections 38a, 40a of the first handle panel 1 and the collapsing sections 38b, 40b of the second handle panel 2 are folded about fold lines 35a, 37a, 39a, 41a and fold lines 35b, 37b, 39b, 41b respectively.

The collapsing sections 38a, 40a of the first handle panel 1 and the collapsing sections 38b, 40b of the second handle panel 2 fold outwardly, away from each other to as to define a tubular formation or structure. The tubular formation comprises an axis which is perpendicular to the tubular axis of the tubular structure of an outer shell of the carton 90 formed by the main panels 12, 14, 16, 18, 20, 22, 24, 26, 28.

The tubular formation occupies a void between four adjacently disposed articles B. In this way the tubular formation may serve to stabilise the articles B when in the stowed condition. The collapsing sections 38a, 40a, 38b, 40b may brace the articles B, preventing or inhibiting movement of the articles B within the carton 90.

The upper panel parts 42a, 42b are disposed between a pair of adjacently disposed endmost articles B; the upper panel parts 42a, 42b may be sandwiched therebetween such that said articles B may pinch or squeeze the upper panel parts 42a, 42b. In this way the endmost articles B may frictionally engage the upper panel parts 42a, 42b. This frictional engagement may be overcome by user pulling upper panel parts 42a, 42b upwardly.

The lower panel parts 36a, 36b are disposed between a second pair of articles B disposed adjacent to the endmost articles B. In the embodiment of Figures 3 and 4 the second pair of articles B forms a pair of endmost articles at a second, opposing end of the carton 90. The lower panel parts 36a, 36b may be sandwiched therebetween such that said second pair of articles B may pinch or squeeze the lower panel parts 36a, 36b. In this way the endmost articles B may frictionally engage the lower panel parts 36a, 36b.

In the embodiment of Figure 6 to 6D, the carton 190 is shown with the carrying handle in a stowed condition in Figure 6D. The lower panel parts 136a, 136b are disposed between a second pair of articles B disposed adjacent to the endmost articles B, the second pair of articles B forms a pair of central articles substantially in the middle of the carton 90. The lower panel parts 136a, 136b may be sandwiched between the second pair of articles B such that said articles B may pinch or squeeze the lower panel parts 136a, 136b. In this way the endmost articles B may frictionally engage the lower panel parts 136a, 136b. The lower panel parts 136a, 136b may also be disposed between a third pair of articles B disposed adjacent to the central articles B, the third pair of articles B may form a pair of endmost articles at a second, opposing end of the carton 90. The lower panel parts 136a, 136b may be sandwiched between the third pair of articles B such that said articles B may pinch or squeeze the lower panel parts 136a, 136b. In this way the third pair of articles B may frictionally engage the lower panel parts 136a, 136b.

Sandwiching the lower panel parts 36a, 36b; 136a, 136b in this way may prevent or restrict movement of the lower panel parts 36a, 36b; 136a, 136b and/ or the end panels 34a, 34b; 134a, 134b downwardly when the carrying handle H is moved into the stowed condition.

The movement of the collapsing sections 38a, 40a; 138a, 140a of the first handle panel 1; 101 and the collapsing sections 38b, 40b; 138b, 140b of the second handle panel 2; 102, when the carrying handle H is being stowed away, may be restricted or limited by the adjacently disposed articles. In this way the tubular formation adopts a rhombus shaped cross-sectional shape best illustrated in Figure 6D.

The cut lines 43a, 45a, 43b, 45b; 143a, 145a, 143b, 145b define tabs or protrusions T1, T2, T3, T4. The tabs T1, T2, T3, T4 are formed from material which would otherwise form the first collapsing section 40a; 140a or third collapsing section 40b; 140b respectively. The tabs T1, T2, are integral with the second collapsing section 38a; 138a. The tabs T3, T4 are integral with the fourth collapsing section 38b; 138b. The tabs T1, T2, T3, T4 serve to ensure the collapsing sections 38a, 40a; 138a, 140a of the first handle panel 1; 101 and the collapsing sections 38b, 40b; 138b, 140b of the second handle panel 2; 102 fold outwardly, away from each other to adopt a tubular formation. Folding the collapsing sections 38a, 40a; 138a, 140a of the first handle panel 1; 101 and the collapsing sections 38b, 40b; 138b, 140b of the second handle panel 2; 102 outwardly requires less force than folding in the opposing direction since the structure offer less resistance to folding in the outward direction.

Folding the collapsing sections 38a, 40a; 138a, 140a of the first handle panel 1; 101 or the collapsing sections 38b, 40b; 138b, 140b of the second handle panel 2; 102 in the opposite direction would require folding of the material provided by the respective tabs.

In this way the tabs T1, T2 defined, in part, by fold lines 43a, 45a; 143a, 145a serve to control the direction that the collapsing sections 38a, 40a; 138a, 140a of the first handle panel 1; 101 fold with respect to each other, similarly the tabs T3, T4 defined, in part, by fold lines 43b, 45b; 143b, 145b serve to control the direction that the collapsing sections 38b, 40b; 138b, 140b of the second handle panel 2; 102 fold.

The tabs T1, T2, T3, T4 form an expansion facilitator which guides or directs the collapsible tubular formation to fold or move so as to separate the collapsing sections 38a, 40a; 138a, 140a of the first handle panel 1 from the collapsing sections 38b, 40b; 138b, 140b of the second handle panel 2; 102.

The cut lines 43a, 45a, 43b, 45b; 143a, 145a, 143b, 145b are arranged such that the cut lines 43a, 45a; 143a, 145a may be offset with respect to the cut lines 43b, 45b; 143b, 145b. In this way the tabs T1, T2 formed in collapsing sections 38a, 40a; 138a, 140a of the first handle panel 1; 101 are misaligned or offset with respect to the tabs T3, T4 formed the collapsing sections 38b, 40b; 138b, 140b of the second handle panel 2; 102.

The tabs T1, T2, T3, T4 may be shaped and dimensioned such that at least one of the tabs T1, T2 provided by one of the collapsing sections 38a, 40a; 138a, 140a of the first handle panel 1; 101 or at least one of the tabs T3, T4 provided by one of the collapsing sections 38b, 40b; 138b, 140b of the second handle panel 2; 102 cannot pass through an opening in the

collapsing sections 38a, 40a; 138a, 140a, 38b, 40b; 138b, 140b of the other of the first and second handle panels 1; 101, 2; 102. Said openings are created when each collapsing section 38a, 40a, 38b, 40b; 138a, 140a, 138b, 140b is folded, about a hinged connection (fold lines 39a, 39b, 139a, 139b), with respect to the adjacent collapsing section 38a, 40a, 38b, 40b; 138a, 140a, 138b, 140b to which it is hinged.

For example, the arcuate tab T1, defined by the cutline 43a; 143a, cannot pass through a trapezoidal opening created in the third collapsing section 40b, 140b and formed by displacement of the tab T4 out of the plane of the third collapsing section 40b, 140b, when the third collapsing section 40b, 140b is folded, about fold line 39b, 139b, with respect to the fourth collapsing section 38b, 138b.

Referring now to Figures 7 to 12 there is shown alternative embodiments of the present disclosure. In the alternative illustrated embodiments, like numerals have, where possible, been used to denote like parts, albeit with the addition of the prefix "200", "300", "400" to indicate that these features belong to the third, fourth and fifth embodiments respectively. The alternative embodiments share many common features with the embodiments of Figures 1 to 6D and therefore only the differences from the embodiment illustrated in Figures 1 to 6D will be described in any greater detail.

Figure 7 illustrates a blank 210 according to a third embodiment. The blank 210 comprises a plurality of main panels 212, 214, 216, 218, 220, 222, 224, 226, 228 for forming a tubular structure. The plurality of main panels 212, 214, 216, 218, 220, 222, 224, 226, 228 comprises a base panel 212, a first lower bevel panel 214, a first side panel 216, a first upper bevel panel 218, a top panel 220, a second upper bevel panel 222, a second side panel 224, a second lower bevel panel 226 and a securing panel 228. The plurality of panels 212, 214, 216, 218, 220, 222, 224, 226, 228 may be arranged in a linear series hinged one to the next by corresponding fold lines 215, 217, 219, 221, 225, 227, 229, 231.

The blank 210 is adapted to accommodate two articles B in a 1x2 arrangement. The blank 210 comprises four heel engagement structures, opposing engagement structures engage the same article B. In this way each article B is engaged on opposing sides by a respective one of the heel engagement structures. Each of the heel engagement structures comprises an opening A1. The first lower bevel panel 214 comprises two openings A1. The second lower bevel panel 226 comprises two openings A1.

The blank 210 comprises four shoulder engagement structures, opposing shoulder structures engage the same article B. In this way each article B is engaged on opposing sides by a respective one of the shoulder engagement structures. Each of the shoulder engagement structures comprises an opening A2. The first upper bevel panel 218 comprises two openings A2. The second upper bevel panel 222 comprises two openings A2.

The blank 210 comprises only one end panel 234b. The first end panel 34a, 134a of the previous embodiments has been omitted. The end panel 234b is hingedly connected to the second side panel 224 by a fold line 233b.

The blank 210 comprises only one handle panel 202. The first handle panel 1; 101 of the previous embodiments has been omitted. The handle panel 202 is hingedly connected to the end panel 234b by a fold line 235b.

The top panel 220 is unitary or unfoldable with respect to itself, that is to say the fold line 23; 123 of the previous embodiments has been omitted.

The base panel 212 is unitary or unfoldable with respect to itself, that is to say the fold line 13; 113 of the previous embodiments has been omitted. The base panel 212 forms a base wall of the carton 290 in combination with the securing panel 228.

The lower panel part 236b of the handle panel 202 may be secured to the first side panel 216 in a set-up carton 90.

The handle structure H2 is disposed between the pair of articles B and the first side panel 216 as shown in Figure 8.

The adjacent collapsing sections 240a and 238a fold with respect to each other and with respect to the respective one of the upper and lower panel parts 242b, 236b to which they are hinged. The adjacent collapsing sections 240a and 238a fold to occupy a void between the pair of articles B and the first side panel 216 in a collapsed or stowed condition. In the stowed condition the adjacent collapsing sections 240a and 238a define a "V" shape.

In order to deploy the handle structure H2 the upper panel part 242b may be pulled outwardly of the carton 90 through the open end of the tubular structure such that the adjacent collapsing sections 240a and 238a become substantially coplanar. The adjacent collapsing sections 240a and 238a become substantially coplanar with the upper and lower panel parts 242b,

236b. The adjacent collapsing sections 240a and 238a are brought into close proximity with the first side panel 216.

The lower panel part 236b may be secured to the first side panel 216.

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Figure 9 illustrates a blank 310 according to a third embodiment. The blank 310 comprises a plurality of main panels 312, 314, 316, 318, 320, 322, 324, 326, 328 for forming a tubular structure. The plurality of main panels 312, 314, 316, 318, 320, 322, 324, 326, 328 comprises a base panel 312, a first lower bevel panel 314, a first side panel 316, a first upper bevel panel 318, a top panel 320, a second upper bevel panel 322, a second side panel 224, a second lower bevel panel 326 and a securing panel 328. The plurality of panels 312, 314, 316, 318, 320, 322, 324, 326, 328 may be arranged in a linear series hinged one to the next by corresponding fold lines 315, 317, 319, 321, 325, 327, 329, 331.

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The blank 310 is adapted to accommodate six articles B in a 2x3 arrangement. The blank 310 comprises six heel engagement structures three of which engage a first row of articles B and the remaining three engage a second row of articles B. The blank 310 comprises six shoulder engagement structures three of which engage the first row of articles B and the remaining three engage the second row of articles B.

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The blank 310 comprises a handle structure H1/H2. The handle structure H1/H2 comprises a first end panel 334a hingedly connected to the first side panel 316 by a fold line 333a and a handle panel 301 hingedly connected to the first end panel 334a by a fold line 335a.

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The handle panel 301 comprises an upper panel part 342a (or handle section) having a pair of handle openings. The handle openings may be defined, at least in part, by a handle aperture A3.

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The handle panel 301 comprises adjacent collapsing sections 340a and 338a. A first collapsing section 340a is hingedly connected along an upper edge thereof to the upper panel part 342a by a fold line 341a. A second collapsing section 338a is hingedly connected along an upper edge thereof to the first collapsing section 340a by a fold line 339a.

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The handle panel 301 comprises a lower panel part 336a. The lower panel part 336a is hingedly connected along an upper edge thereof to the second collapsing section 338a by a fold line 337a. The lower panel part 336a is hingedly connected along a lower edge thereof to the first end panel 334a by a fold line 335a.

The handle panel 301 may comprise a recess R1 struck from a free side edge of the adjacent collapsing sections 340a and 338a. The recess R1 may be arcuate or curvilinear in shape.

- 5 The fold line 339a hinging the first collapsing section 340a to the second collapsing section 338a is interrupted by a pair of cut lines or severance lines 343a, 345a. A first cut line 343a may be arcuate or curvilinear in shape. A second cut line 345a may be substantially trapezoidal in shape. The first cut line 343a defines in part a first tab T1. The second cut line 345a defines in part a second tab T2.

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The handle structure H1/H2 comprises a second end panel 334b hingedly connected to the second side panel 324 by a fold line 333b and a second handle panel 302 hingedly connected to the second end panel 334b by a fold line 335b.

- 15 The second handle panel 302 comprises a second upper panel part 342b (or second handle section) having a pair of handle openings. The handle openings may be defined, at least in part, by a handle aperture A3.

- 20 The second handle panel 302 comprises adjacent collapsing sections 340b and 338b. A third collapsing section 340b is hingedly connected along an upper edge thereof to the second upper panel part 342b by a fold line 341b. A fourth collapsing section 338b is hingedly connected along an upper edge thereof to the third collapsing section 340b by a fold line 339b.

- 25 The second handle panel 302 comprises a second lower panel part 336b. The second lower panel part 336b is hingedly connected along an upper edge thereof to the fourth collapsing section 338b by a fold line 337b. The second lower panel part 336b is hingedly connected along a lower edge thereof to the second end panel 334b by a fold line 335b.

- 30 The second handle panel 302 may comprise a second recess R2 struck from a free side edge of the adjacent collapsing sections 340b and 338b. The second recess R2 may be arcuate or curvilinear in shape.

- 35 The fold line 339b hinging the third collapsing section 340b to the fourth collapsing section 338b is interrupted by a pair of cut lines or severance lines 343b, 345b. A third cut line 343b may be arcuate or curvilinear in shape. A fourth cut line 345b may be substantially trapezoidal in shape.

The third cut line 343a defines in part a third tab T3. The fourth cut line 345b defines in part a fourth tab T4. In the embodiment of Figure 9 the third tab T3 is arranged to be aligned with the first tab T1 and the fourth tab T4 is arranged to be aligned with the second tab T2.

- 5 The first and second collapsing sections 340a, 338a are adapted to fold in the same direction as the third and fourth collapsing section 340b, 338b; that is to say rather than fold in the opposite as direction as the embodiments of Figures 1 to 6D, the first collapsing sections 340a, 338a fold inside the third and fourth collapsing sections 340b, 338b. In this way the first collapsing section 340a remains in face contacting relationship with the third collapsing section
10 340b and the second collapsing section 338a remains in face contacting relationship with the fourth collapsing section 338b when in the stowed condition, as illustrated in Figure 10, and when in the deployed condition.

The cut lines 343a, 345a, 343b, 345b define tabs or protrusions T1, T2, T3, T4. The tabs T1, T2, T3, T4 are formed from material which would otherwise form the first collapsing section 340a or the third collapsing section 340b respectively. The tabs T1, T2, T3, T4 are integral with the second collapsing section 338a or with the fourth collapsing section 338b. The tabs T1, T2, T3, T4 serve to ensure the collapsing sections 338a, 340a; of the first handle panel 301 and the collapsing sections 338b, 340b of the second handle panel 302 fold together in
15 the same direction to adopt a "V" shaped arrangement.

The cut lines 343a, 345a, 343b, 345b are arranged such that the first cut line 343a is aligned with respect to the third cut line 343b and the second cut line 345a is aligned with respect to the fourth cut line 345b. The first and third cut lines 343a, 343b have substantially the same shape albeit the first cut line 343a is dimensioned such that the tab T1 it defines is smaller than the tab T3 defined by the third cut line 343b. The second and fourth cut lines 345a, 345b have substantially the same shape albeit the second cut line 345a is dimensioned such that the tab T2 it defines is smaller than the tab T4 defined by the fourth cut line 345b. (In the
25 embodiments of Figures 1 and 6 the first and third cut lines 343a, 343b are arranged so as to be misaligned when the first handle panel 1; 101 is disposed in face to face relationship with the second handle panel 2; 202; similarly the second and fourth cut lines 345a, 345b have are misaligned.)

In this way the tabs T1, T2 formed in collapsing sections 338a, 340a; of the first handle panel 101 can pass through a respective opening in the collapsing sections 338b, 340b of the second handle panel 302. Openings are created in the third collapsing section 340b when the collapsing sections 338b, 340b are folded with respect to each other about fold line 339b. The
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tabs T1, T2, defined by the cut lines 343a, 345a, in the collapsing sections 338a, 340a of the first handle panel 101 are smaller in dimension and are aligned with a corresponding opening, defined by a respective one of the cut lines 343b, 345b, in the third collapsing section 340b.

- 5 Figure 11 illustrates a blank 410 according to a third embodiment. The blank 410 comprises a plurality of main panels 412, 414, 416, 418, 420, 422, 424, 426, 428 for forming a tubular structure. The plurality of main panels 412, 414, 416, 418, 420, 422, 424, 426, 428 comprises a base panel 412, a first lower bevel panel 414, a first side panel 416, a first upper bevel panel 418, a top panel 420, a second upper bevel panel 422, a second side panel 424, a second lower bevel panel 426 and a securing panel 428. The plurality of panels 412, 414, 416, 418, 420, 422, 424, 426, 428 may be arranged in a linear series hinged one to the next by corresponding fold lines 415, 417, 419, 421, 425, 427, 429, 431.

- 15 The blank 410 is adapted to accommodate six articles B in a 2x3 arrangement. The blank 410 comprises six heel engagement structures three of which engage a first row of articles B and the remaining three engage a second row of articles B. The blank 410 comprises six shoulder engagement structures three of which engage the first row of articles B and the remaining three engage the second row of articles B.

- 20 The blank 410 comprises a handle structure H1/H2. The handle structure H1/H2 comprises a first end panel 434a hingedly connected to the first side panel 416 by a fold line 433a and a first handle panel 401 hingedly connected to the first end panel 434a by a fold line 435a.

- 25 The handle structure H1/H2 comprises a second end panel 434b hingedly connected to the second side panel 424 by a fold line 433b and a second handle panel 402 hingedly connected to the second end panel 434b by a fold line 435b.

- 30 The second handle panel 402 comprises a second upper panel part 442b (or second handle section) having a pair of handle openings. The handle openings may be defined, at least in part, by a handle aperture A3.

- 35 The second handle panel 402 comprises adjacent collapsing sections 440b and 438b. A third collapsing section 440b is hingedly connected along an upper edge thereof to the second upper panel part 442b by a fold line 441b. A fourth collapsing section 438b is hingedly connected along an upper edge thereof to the third collapsing section 440b by a fold line 439b.

The second handle panel 402 comprises a second lower panel part 436b. The second lower panel part 436b is hingedly connected along an upper edge thereof to the fourth collapsing section 438b by a fold line 437b. The second lower panel part 436b is hingedly connected along a lower edge thereof to the second end panel 434b by a fold line 435b.

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The second handle panel 402 may comprise a second recess R2 struck from a free side edge of the adjacent collapsing sections 440b and 438b. The second recess R2 may be arcuate or curvilinear in shape.

10 The first handle panel 401 comprises an upper panel part 456a (or handle section) having a pair of handle openings. The handle openings may be defined, at least in part, by a handle aperture A3. The upper panel part 456a of first handle panel 401 is longer in dimension than the upper panel part 442b of second handle panel 402.

15 The first handle panel 401 comprises adjacent collapsing sections 454a and 452a. A first collapsing section 454a is hingedly connected along an upper edge thereof to the upper panel part 456a by a fold line 457a. A second collapsing section 452a is hingedly connected along an upper edge thereof to the first collapsing section 454a by a fold line 455a.

20 The first handle panel 401 comprises a lower panel part 450a. The lower panel part 450a is hingedly connected along an upper edge thereof to the second collapsing section 452a by a fold line 453a. The lower panel part 450a is hingedly connected along a lower edge thereof to the first end panel 434a by a fold line 451a. The lower panel part 450a of first handle panel 401 is shorter in dimension than the lower panel part 436b of second handle panel 402, in this
25 way the adjacent collapsing sections 454a and 452a of the first handle panel 401 are disposed in closer proximity to the first end panel 434a than the adjacent collapsing sections 440b and 438b of the second handle panel 402 are disposed to the second end panel 434b.

30 The first handle panel 401 may comprise a recess R1 struck from a free side edge of the adjacent collapsing sections 454a and 452a. The recess R1 may be arcuate or curvilinear in shape.

The fold line 455a hinging the first collapsing section 454a to the second collapsing section 452a is interrupted by a pair of cut lines or severance lines 443a, 445a. A first cut line 443a
35 may be arcuate or curvilinear in shape. A second cut line 445a may be substantially trapezoidal in shape.

The fold line 441b hinging the third collapsing section 440b to the fourth collapsing section 438b is interrupted by a pair of cut lines or severance lines 443b, 445b. A third cut line 443b may be arcuate or curvilinear in shape. A fourth cut line 445b may be substantially trapezoidal in shape.

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The third and fourth collapsing section 440b, 438b are adapted to fold in a first void between a first pair of endmost articles B, disposed adjacent the open end of the carton 490, and a second pair of articles B disposed adjacent to the first pair of articles B. The second pair of articles B is centrally located in the illustrated embodiment. The upper panel part 456a of the first handle panel 401 is unfolded in this first void and extends substantially straight or directly through the first void.

The first and second collapsing sections 454a, 452a are adapted to fold in a second void between a third pair of endmost articles B, disposed adjacent the closed end of the carton 490, and an adjacent pair of articles B. In the illustrated embodiment, the adjacent pair of articles B is the second or central pair of articles B. The lower panel part 436a of the second handle panel 402 is unfolded in this second void and extends substantially straight or directly through the second void.

The first and second collapsing sections 454a, 452a fold or collapse in a different void to that which the third and fourth collapsing section 440b, 438b fold or collapse in.

The first and second collapsing sections 454a, 452a fold in an opposing direction to the third and fourth collapsing section 440b, 438b. In this embodiment an upper portion of the lower panel part 436b is disposed in face to face relationship with a lower portion of the upper panel part 456a. The lower panel part 436b and upper panel part 456a are arranged in a sliding relationship with respect to each other. In this way the degree or amount of overlap between the lower panel part 436b and the upper panel part 456a increases when the carrying handle is in the stowed condition.

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The present disclosure provides a carton 90; 190; 290; 390; 490 for packaging articles B. The carton 90; 190; 290; 390; 490 comprises plurality of walls 12, 14, 16, 18, 20, 22, 24, 26; 112, 114, 116, 118, 120, 122, 124, 126; 212, 214, 216, 218, 220, 222, 224, 226; 312, 314, 316, 318, 320, 322, 324, 326; 412, 414, 416, 418, 420, 422, 424, 426 including; a top wall 20; 120; 220; 320; 420, a first side wall 16; 116; 216; 316; 416, a second side wall 24; 124; 224; 324; 424 and a base wall 12; 112; 212; 312; 412. The plurality of walls 12, 14, 16, 18, 20, 22, 24,

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26; 112, 114, 116, 118, 120, 122, 124, 126; 212, 214, 216, 218, 220, 222, 224, 226; 312, 314, 316, 318, 320, 322, 324, 326; 412, 414, 416, 418, 420, 422, 424, 426 forming a carton body.

5 The carton 90; 190; 290; 390; 490 comprises an extendible handle H, the handle is movable between a retracted position (stowed condition) to an extended position (deployed condition).

The handle H comprises at least one handle panel 42a, 42b; 142a, 142b; 342a, 342b; 456a, 442b and a collapsible structure 38a/40a/38b/40b; 138a/140a/138b/140b; 338a/340a/338b/340b; 452a/454a/438b/440b. The collapsible tubular structure
10 38a/40a/38b/40b; 138a/140a/138b/140b; 338a/340a/338b/340b; 452a/454a/438b/440b connects or couples the at least one handle panel 42a, 42b; 142a, 142b; 342a, 342b; 456a, 442b to the main body of the carton 90; 190; 390; 490. The collapsible tubular structure 38a/40a/38b/40b; 138a/140a/138b/140b; 338a/340a/338b/340b; 452a/454a/438b/440b comprises a first pair of hinged panels 38a, 40a; 138a, 140a; 338a, 340a; 452a, 445a and a
15 second pair of hinged panels 38b, 40b; 138b, 140b; 338b, 340b; 438b, 440b. The first pair of hinged panels 38a, 40a; 138a, 140a; 338a, 340a; 452a, 445a comprising an inner panel 38a, 138a, 338a, 452a hingedly connected by a first fold line 39a; 139a, 339a; 455a to an outer panel 40a; 140a; 340a; 445a. The second pair of hinged panels 38b, 40b; 138b, 140b; 338b, 340b; 438b, 440b comprising an inner panel 38b, 138b, 338b, 438b hingedly connected by a
20 second fold line 39b; 139b, 339b; 439b to an outer panel 40b; 140b; 340b; 440b. The inner panels 38a, 38b; 138a, 138b; 338a, 338b; 452a, 438b are hingedly connected to the main body of the carton 90; 190; 390; 490. The outer panels 40a, 40b; 140a, 140b; 340a, 340b; 454a, 440b are hingedly connected to the at least one handle panel 42a, 42b; 142a, 142b; 342a, 342b; 456a, 442b. The collapsible tubular structure 38a/40a/38b/40b; 138a/140a/138b/140b; 338a/340a/338b/340b; 452a/454a/438b/440b further comprises an
25 expansion facilitator for facilitating separation movement of the first pair of hinged panels 38a, 40a; 138a, 140a; 338a, 340a; 452a, 445a from the second pair of hinged panels 38b, 40b; 138b, 140b; 338b, 340b; 438b, 440b. The expansion facilitator comprises at least one tab T1, T2, T3, T4 coupled to one of the inner panels 38a, 38b; 138a, 138b; 338a, 338b; 452a, 438b and outer panels 40a, 40b; 140a, 140b; 340a, 340b; 454a, 440b of each of the first 38a, 40a; 138a, 140a; 338a, 340a; 452a, 445a and second 38b, 40b; 138b, 140b; 338b, 340b; 438b, 440b pairs of hinged panels. The at least one tab T1, T2, of the first pair of hinged panels 38a, 40a; 138a, 140a; 338a, 340a; 452a, 445a interrupting the first fold line 39a; 139a, 339a; 455a, the at least one tab T3, T4 of the second pair of hinged panels 38b, 40b; 138b, 140b; 338b, 340b; 438b, 440b interrupting the second fold line 39b; 139b, 339b; 439b.
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The carton body includes at least one partition panel 36a, 36b; 136a, 136b; 236b; 336a, 336b; 450a, 436b and at least one end panel 34a, 34b; 134a, 134b; 234b; 334a, 334b; 434a, 434b.

The at least one end panel 34a, 34b; 134a, 134b; 234b; 334a, 334b; 434a, 434b is hingedly connected to one of the first and second side walls 16; 116; 216; 316; 416, 24; 124; 224; 324; 424. The at least one partition panel 36a, 36b; 136a, 136b; 236b; 336a, 336b; 450a, 436b is hingedly connected to the at least one end panel 34a, 34b; 134a, 134b; 234b; 334a, 334b; 434a, 434b.

The present disclosure also provides a carton 90; 190; 290; 390; 490 having an extendible handle. The carton 90; 190; 290; 390; 490 comprises plurality of walls 12, 14, 16, 18, 20, 22, 24, 26; 112, 114, 116, 118, 120, 122, 124, 126; 212, 214, 216, 218, 220, 222, 224, 226; 312, 314, 316, 318, 320, 322, 324, 326; 412, 414, 416, 418, 420, 422, 424, 426 forming a carton body. The body of the carton 90; 190; 290; 390; 490 comprises an outer shell defining at least in part the interior of the carton 90; 190; 290; 390; 490 for receiving articles. The plurality of walls 12, 14, 16, 18, 20, 22, 24, 26; 112, 114, 116, 118, 120, 122, 124, 126; 212, 214, 216, 218, 220, 222, 224, 226; 312, 314, 316, 318, 320, 322, 324, 326; 412, 414, 416, 418, 420, 422, 424, 426 may include; a top wall 20; 120; 220; 320; 420, a first side wall 16; 116; 216; 316; 416, a second side wall 24; 124; 224; 324; 424 and a base wall 12; 112; 212; 312; 412.

The handle H comprises at least one handle panel 42a, 42b; 142a, 142b; 242b; 342a, 342b; 456a, 442b and a collapsible structure 38a/40a/38b/40b; 138a/140a/138b/140b; 238b/240b; 338a/340a/338b/340b; 452a/454a/438b/440b. The collapsible tubular structure 38a/40a/38b/40b; 138a/140a/138b/140b; 238b/240b; 338a/340a/338b/340b; 452a/454a/438b/440b comprises a pair of panels 38a/40a, 38b/40b; 138a/140a, 138b/140b; 238b/240b; 338a/340a, 338b/340b; 452a/445a, 438b/440b including an inner panel 38a, 38b; 138a, 138b; 238b; 338a, 338b; 452a, 438b hingedly connected by a fold line 39a, 39b; 139a, 139b; 239b; 339a, 339b; 455a, 439b to an outer panel 40a, 40b; 140a, 140b; 240b; 340a, 340b; 454a, 440b. The inner panel 38a, 38b; 138a, 138b; 238b; 338a, 338b; 452a, 438b is hingedly connected to the main body of the carton 90; 190; 290; 390; 490 by a hinged connection 37a, 37b; 137a, 137b; 237b; 337a, 337b; 455a, 437b. The outer panel 40a, 40b; 140a, 140b; 240b; 340a, 340b; 454a, 440b is hingedly connected to the at least one handle panel 42a, 42b; 142a, 142b; 242b; 342a, 342b; 456a, 442b. The hinged connection 37a, 37b; 137a, 137b; 237b; 337a, 337b; 455a, 437b between the inner panel 38a, 38b; 138a, 138b; 238b; 338a, 338b; 452a, 438b and the carton body is disposed inside the interior of the carton 90; 190; 290; 390; 490 such that the collapsible structure 38a/40a/38b/40b; 138a/140a/138b/140b; 238b/240b; 338a/340a/338b/340b; 452a/454a/438b/440b may be

brought into engagement with one or more articles B in the carton 90; 190; 290; 390; 490 when the handle H is in a retracted position.

The collapsible tubular structure defines a tubular axis, the at least one tab T1, T2, of the first pair of hinged panels 38a, 40a; 138a, 140a; 338a, 340a; 452a, 445a may be offset in the direction of the tubular axis from the at least one tab T3, T4 of the second pair of hinged panels 38b, 40b; 138b, 140b; 338b, 340b; 438b, 440b.

The at least one tab T1, T2, of the first pair of hinged panels 38a, 40a; 138a, 140a; 338a, 340a; 452a, 445a may be joined to, or integral with, the inner panel 38a, 138a, 338a, 452a of the first pair of hinged panels 38a, 40a; 138a, 140a; 338a, 340a; 452a, 445a, and the at least one tab T3, T4 of the second pair of hinged panels 38b, 40b; 138b, 140b; 338b, 340b; 438b, 440b may be joined to, or integral with, the inner panel 38b, 138b, 338b, 438b of the second pair of hinged panels 38b, 40b; 138b, 140b; 338b, 340b; 438b, 440b. In some embodiments, the at least one tab T3, T4 of the second pair of hinged panels 38b, 40b; 138b, 140b; 338b, 340b; 438b, 440b may be joined to, or integral with, the outer panel 40b; 140b; 340b; 440b of the second pair of hinged panels 38b, 40b; 138b, 140b; 338b, 340b; 438b, 440b.

The hinged connection 37a, 37b; 137a, 137b; 237b; 337a, 337b; 455a, 437b may be disposed below an upper edge of a section of the carton forming the outer shell when the handle H is in use. The upper edge may be a free edge at an open end of the outer shell-forming section.

The collapsible structure 38a/40a/38b/40b; 138a/140a/138b/140b; 238b/240b; 338a/340a/338b/340b; 452a/454a/438b/440b may be disposed in a space or void between two adjacent articles B when the handle H is in the retracted position.

The collapsible structure 38a/40a/38b/40b; 138a/140a/138b/140b; 238b/240b; 338a/340a/338b/340b; 452a/454a/438b/440b comprises an article engaging feature for locking the handle in the retracted position.

The article engaging feature may take the form of at least one engaging tab T1, T2, T3, T4 joined to the inner panel 38a, 38b; 138a, 138b; 238b; 338a, 338b; 452a, 438b. The article engaging feature may take the form of at least one embossment protruding from the outer panel 40a, 40b; 140a, 140b; 240b; 340a, 340b; 454a, 440b. The article engaging feature may take the form of at least one dot or strip of friction material, such as but not limited to fugitive glue or friction tape, on the outer panel 40a, 40b; 140a, 140b; 240b; 340a, 340b; 454a, 440b.

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.

5 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.

10 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
15 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
20 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.

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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.

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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
35 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.

5 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,
10 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.

CLAIMS

1. A carton comprising an extendible handle, the handle comprising at least one handle panel and a collapsible structure, the collapsible structure comprising a first pair of hinged panels, the first pair of hinged panels comprising an inner panel hingedly connected by a first fold line to an outer panel, wherein the inner panel is disposed between the outer panel and a main body of the carton, and the outer panel is hingedly connected to the at least one handle panel, the carton further comprising a cooperative feature disposed alongside the first pair of hinged panels, the collapsible structure further comprising an expansion facilitator for facilitating separation movement of the first pair of hinged panels from the cooperative feature, the expansion facilitator comprising at least one tab coupled to one of the inner and outer panels, the at least one tab of the first pair of hinged panels interrupting the first fold line.
2. A carton according to claim 1 wherein the main body comprising a plurality of walls including: a top wall, a first side wall, a second side wall and a base wall.
3. A carton according to claim 1 wherein the at least one handle panel is movable between a retracted position and an extended position.
4. A carton according to claim 2 wherein the handle further comprises at least one end panel that is hingedly connected to one of the first and second side walls.
5. A carton according to claim 4 wherein the handle further comprises at least one partition panel hingedly connecting between the at least one end panel and the inner panel.
6. A carton according to claim 1 wherein the at least one handle panel comprises first and second handle panels wherein the first handle panel being hingedly connected to the outer panel wherein the collapsible structure further comprises a second pair of hinged panels, and wherein the cooperative feature comprises the second pair of hinged panels.
7. A carton according to claim 6 wherein the first and second pairs of hinged panels forms a tubular structure which defines a tubular axis, the expansion facilitator further comprises at least one tab coupled to one of the hinged panels of the second pair, and

the at least one tab of the first pair of hinged panels is offset in the direction of the tubular axis from the at least one tab of the second pair of hinged panels.

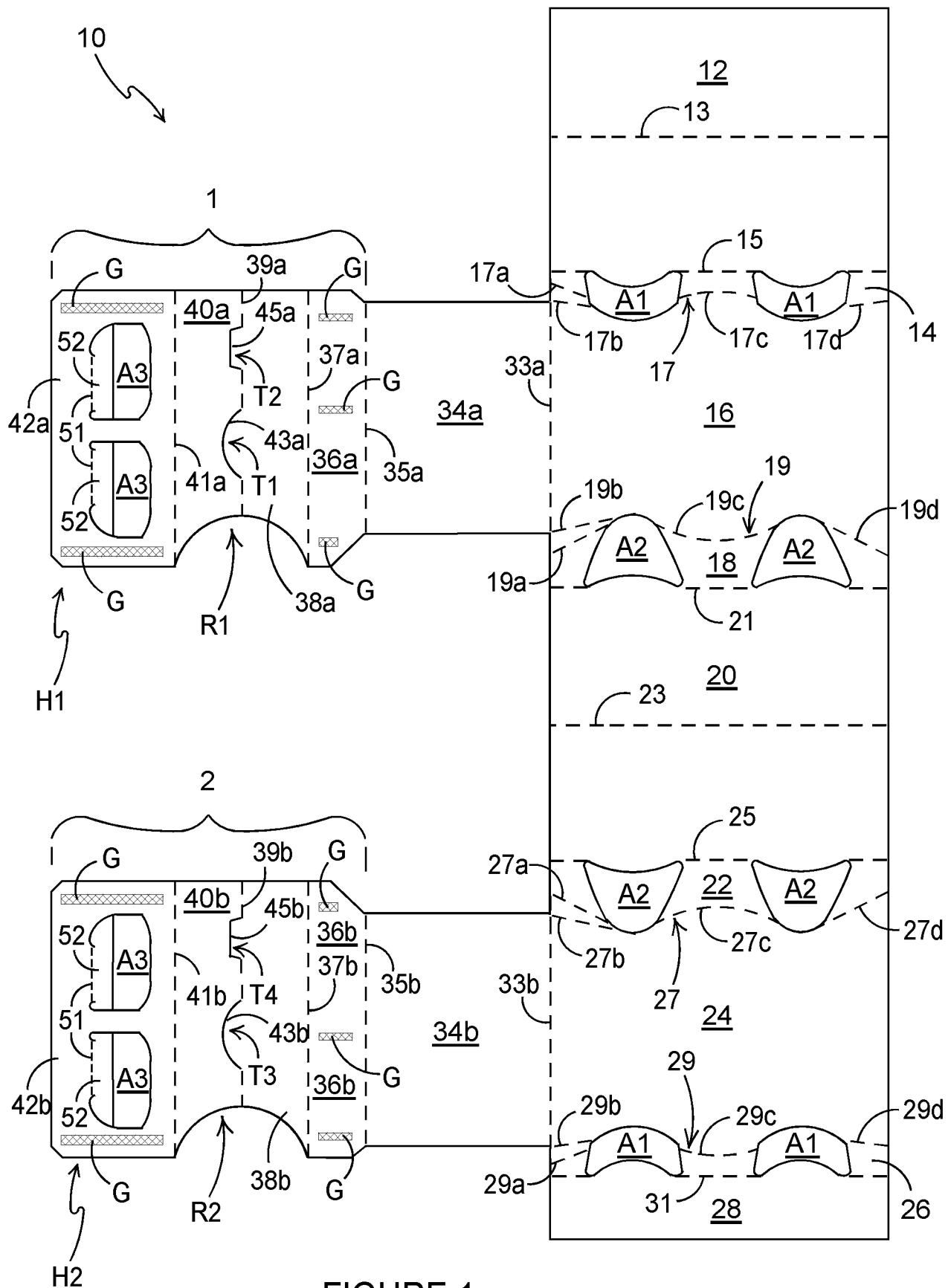
8. A carton according to claim 1 wherein the at least one tab of the first pair of hinged panels is joined to the inner panel of the first pair of hinged panels.
9. A carton according to claim 7 wherein the at least one tab of the second pair of hinged panels is joined to the inner panel of the second pair of hinged panels
10. A carton according to claim 7 wherein the at least one tab of the second pair of hinged panels is joined to the outer panel of the second pair of hinged panels.
11. A carton according to claim 1 wherein the at least one tab of the first pair of hinged panels is integral with the inner panel of the first pair of hinged panels.
12. A carton according to claim 9 wherein the at least one tab of the second pair of hinged panels is integral with the inner panel of the second pair of hinged panels
13. A carton according to claim 10 wherein the at least one tab of the second pair of hinged panels is integral with the outer panel of the second pair of hinged panels.
14. A carton having an extendible handle, the carton comprising a plurality of walls forming a main body, the main body comprising an outer shell defining at least in part the interior of the carton for receiving articles, the handle comprising at least one handle panel and a collapsible structure, the collapsible structure comprising a pair of panels including an inner panel hingedly connected by a fold line to an outer panel, the inner panel being hingedly connected by a hinged connection to a partition panel within the interior of the carton, the outer panel being hingedly connected to the at least one handle panel, the hinged connection being disposed inside the interior of the carton such that the collapsible structure may be brought into engagement with one or more articles in the carton when the handle is in a retracted position.
15. A carton according to claim 14 wherein the plurality of walls includes: a top wall, a first side wall, a second side wall and a base wall.
16. A carton according to claim 14 wherein the hinged connection is disposed below an upper edge of the outer shell when the handle is in use.

17. A carton according to claim 16 wherein the upper edge is a free edge at an open end of the outer shell.
18. A carton according to claim 14 wherein the collapsible structure is disposed in a space or void between two adjacent articles when the handle is in the retracted position.
19. A carton according to claim 14 wherein the collapsible structure comprises an article engaging feature for locking the handle in the retracted position.
20. A carton according to claim 19 wherein the article engaging feature comprises one of the elements selected from the group consisting of: at least one engaging tab; at least one embossment protruding from the outer panel; at least one dot or strip of friction material on the outer panel; fugitive glue on the outer panel; and friction tape on the outer panel.
21. A blank for forming a carton, the blank comprising a plurality of panels forming a main body of the carton in a set-up condition, the main body defining at least part of an interior of the carton in a set-up condition, the plurality of panels including; a top panel, a first side panel, a second side panel and a base panel, the blank comprising an extendible handle, the handle comprising at least one handle panel and a collapsible structure, the collapsible structure coupling the at least one handle panel to a partition panel which is disposed within the interior of the carton in a set-up condition, the collapsible structure comprising a first pair of hinged panels, the first pair of hinged panels comprising an inner panel hingedly connected by a first fold line to an outer panel, wherein the inner panel is hingedly connected to the partition panel, the outer panels being hingedly connected to the at least one handle panel, where in the blank further comprising a cooperative feature which is disposed alongside the first pair of hinged panels in a set-up condition, wherein the collapsible structure further comprises an expansion facilitator for facilitating separation movement of the first pair of hinged panels from the cooperative feature, the expansion facilitator comprises at least one tab coupled to one of the inner and outer panels of the first pairs of hinged panels, the at least one tab of the first pair of hinged panels interrupts the first fold line.
22. A blank for forming a carton, the blank comprising a plurality of panels forming a carton body having an outer shell defining at least in part the interior of the carton for receiving articles in a set-up condition, the plurality of panels including; a top panel, a first side panel, a second side panel and a base panel, wherein the blank comprises an extendible handle, the handle comprising at least one handle panel and a collapsible

tubular structure, wherein the collapsible tubular structure comprises a pair of panels including an inner panel hingedly connected by a fold line to an outer panel, the inner panel is hingedly connected by a hinged connection to a partition panel which is disposed within the interior of the carton in a set-up condition, the outer panel is hingedly connected to the at least one handle panel, the hinged connection is configured to be disposed inside the interior of a set-up carton such that the collapsible tubular structure may be brought into engagement with one or more articles in the carton when the handle is in a retracted position.

23. A extendible handle for a carton, the extendible handle comprising at least one handle panel and a collapsible tubular structure, the collapsible tubular structure coupling the at least one handle panel to at least one partition panel within an interior of a carton, the collapsible tubular structure comprising a first pair of hinged panels and a second pair of hinged panels, the first pair of hinged panels comprising an inner panel hingedly connected by a first fold line to an outer panel, the second pair of hinged panels comprising an inner panel hingedly connected by a second fold line to an outer panel, wherein the inner panels are hingedly connected to the at least one partition panel, the outer panels are hingedly connected to the at least one handle panel, the collapsible tubular structure further comprising an expansion facilitator for facilitating separation movement of the first pair of hinged panels from the second pair of hinged panels, the expansion facilitator comprising at least one tab coupled to one of the inner and outer panels of each of the first and second pairs of hinged panels, the at least one tab of the first pair of hinged panels interrupting the first fold line and the at least one tab of the second pair of hinged panels interrupting the second fold line.
24. A carton according to claim 2 wherein the at least one handle panel and the collapsible structure are disposed alongside an inside surface of one of the first and second side walls and wherein the cooperative feature comprises a part of the one of the first and second side walls.
25. A carton according to claim 1 wherein the at least one handle panel comprises first and second handle panels wherein the first handle panel is hingedly connected to the outer panel, and wherein the cooperative feature comprises a part of the second handle panel.

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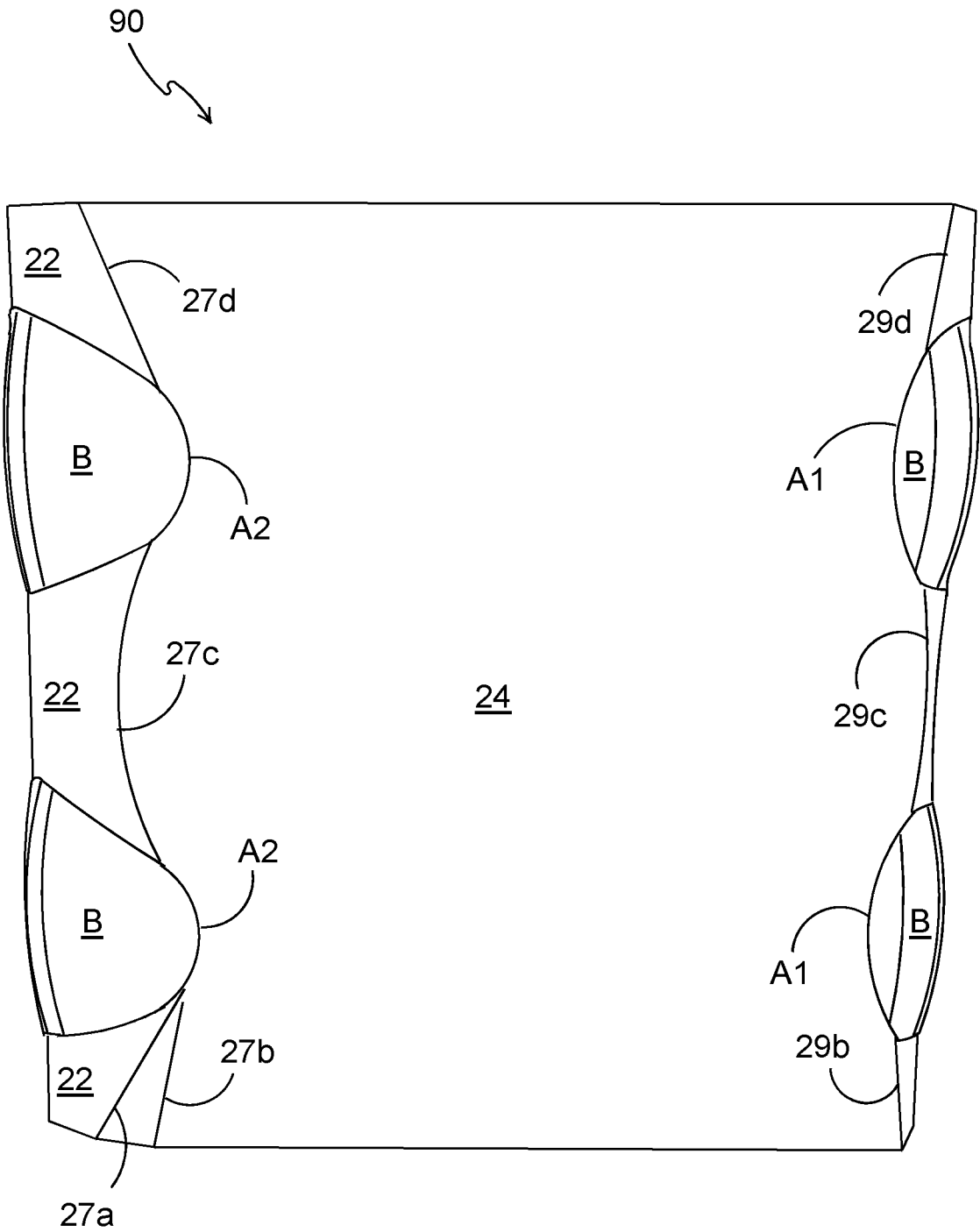


FIGURE 2

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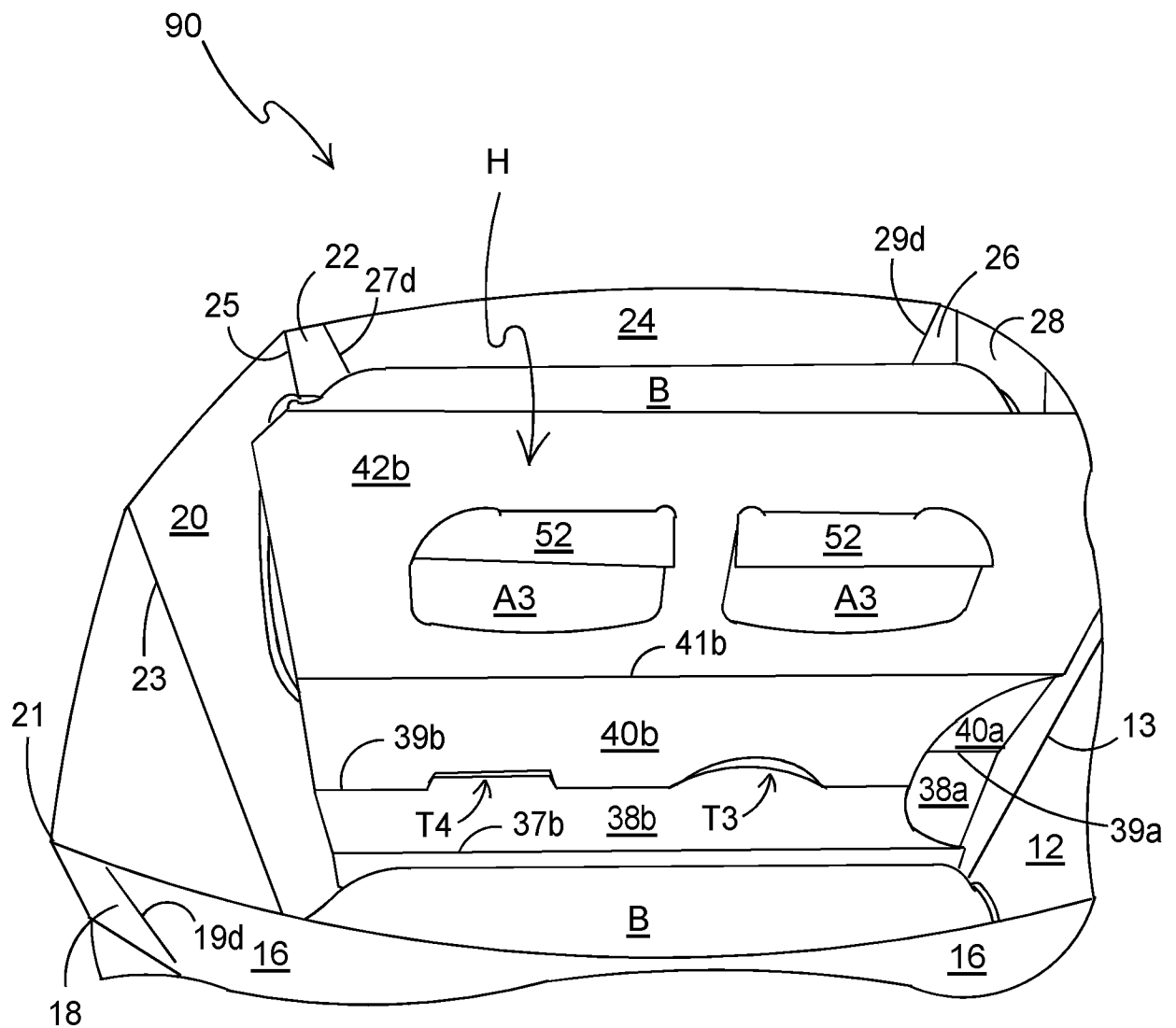


FIGURE 3

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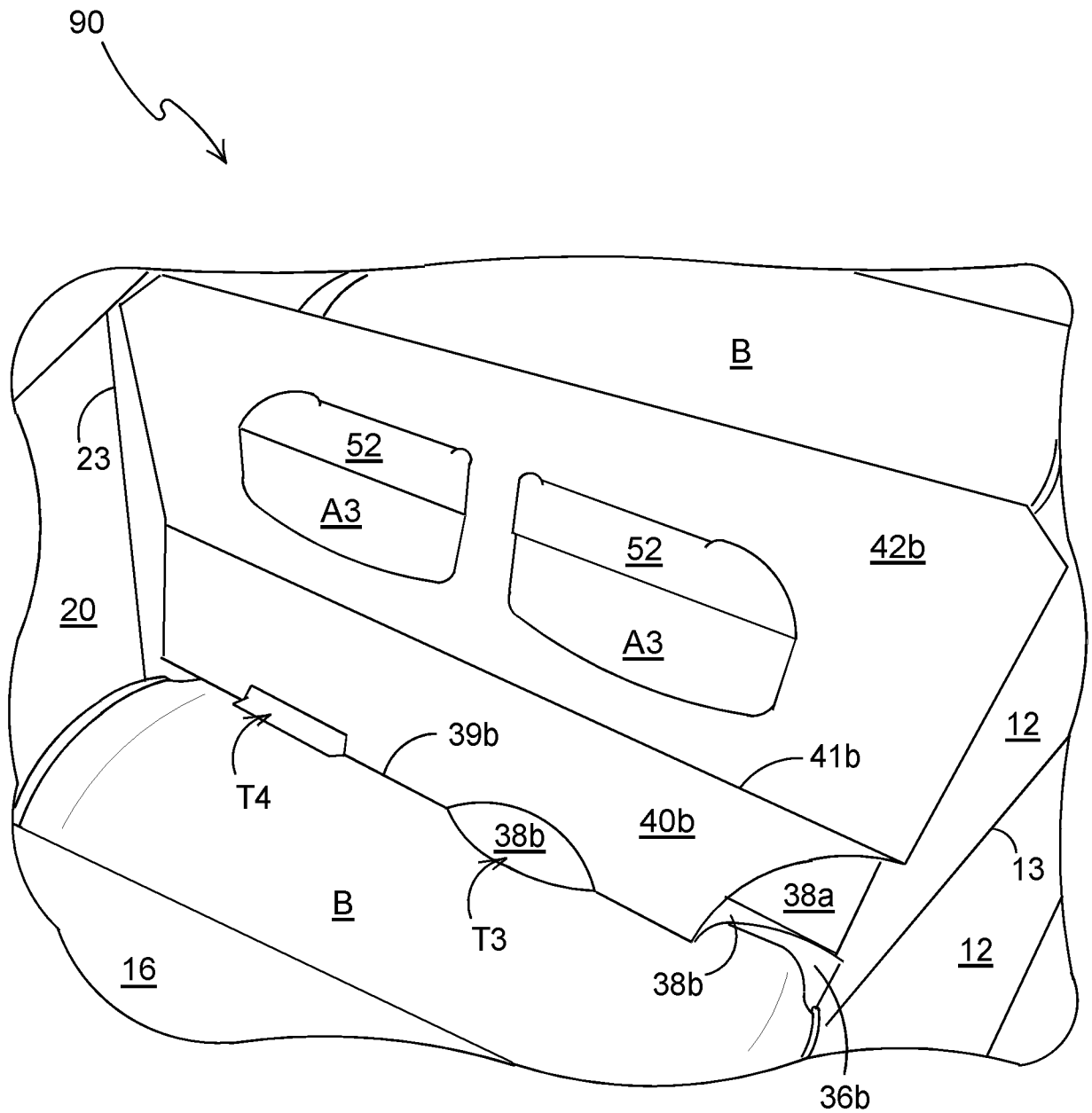


FIGURE 4

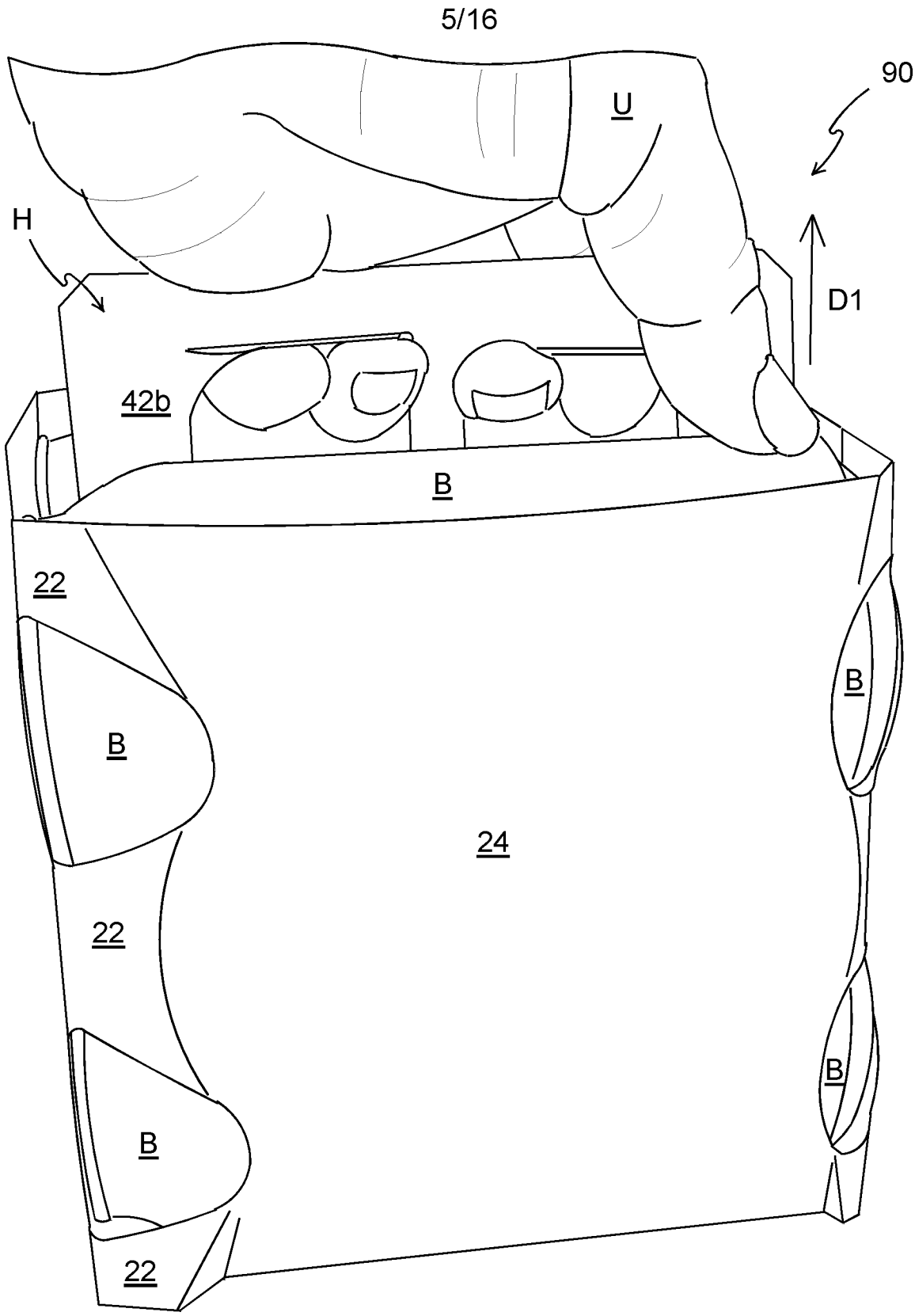


FIGURE 5

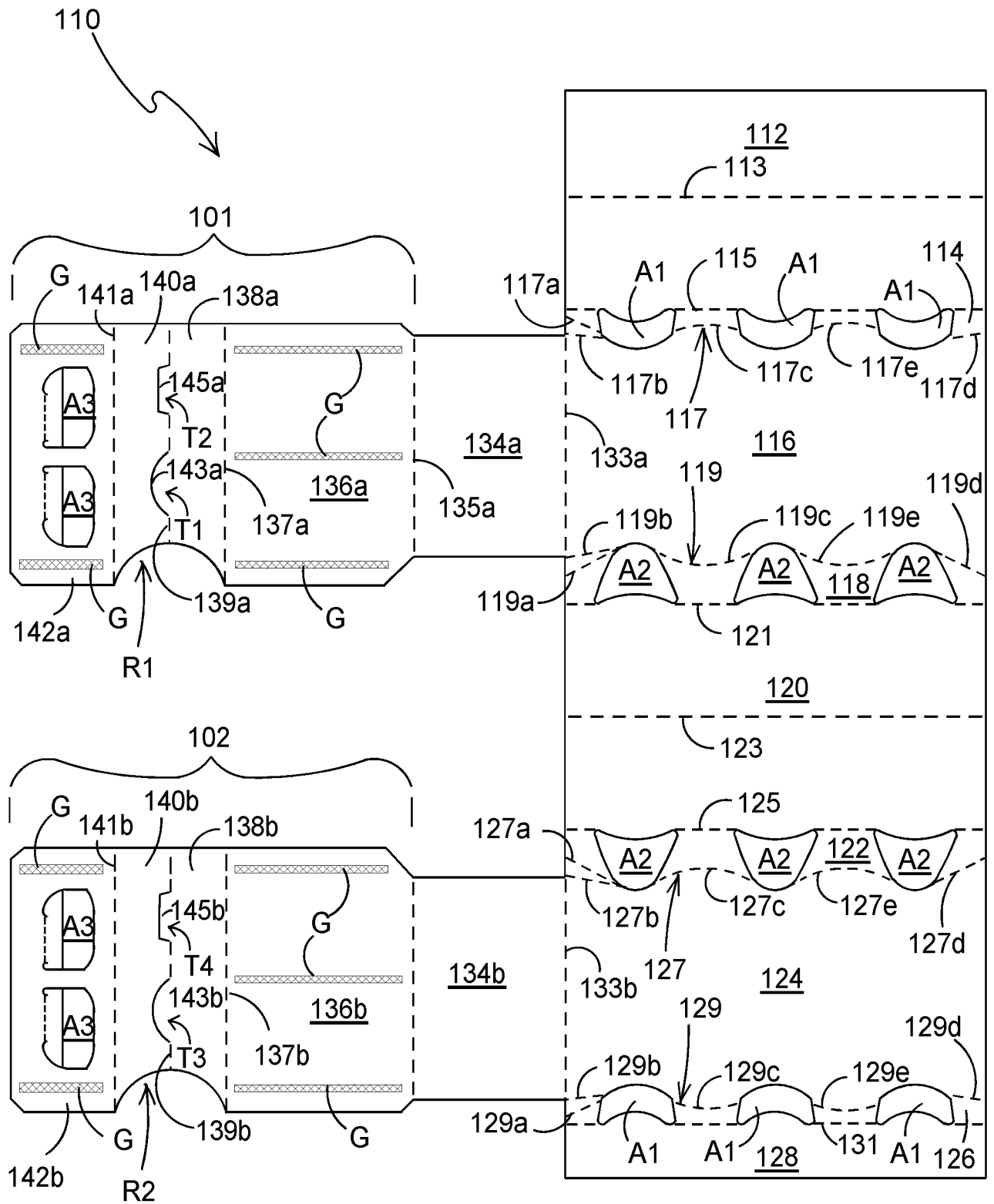


FIGURE 6

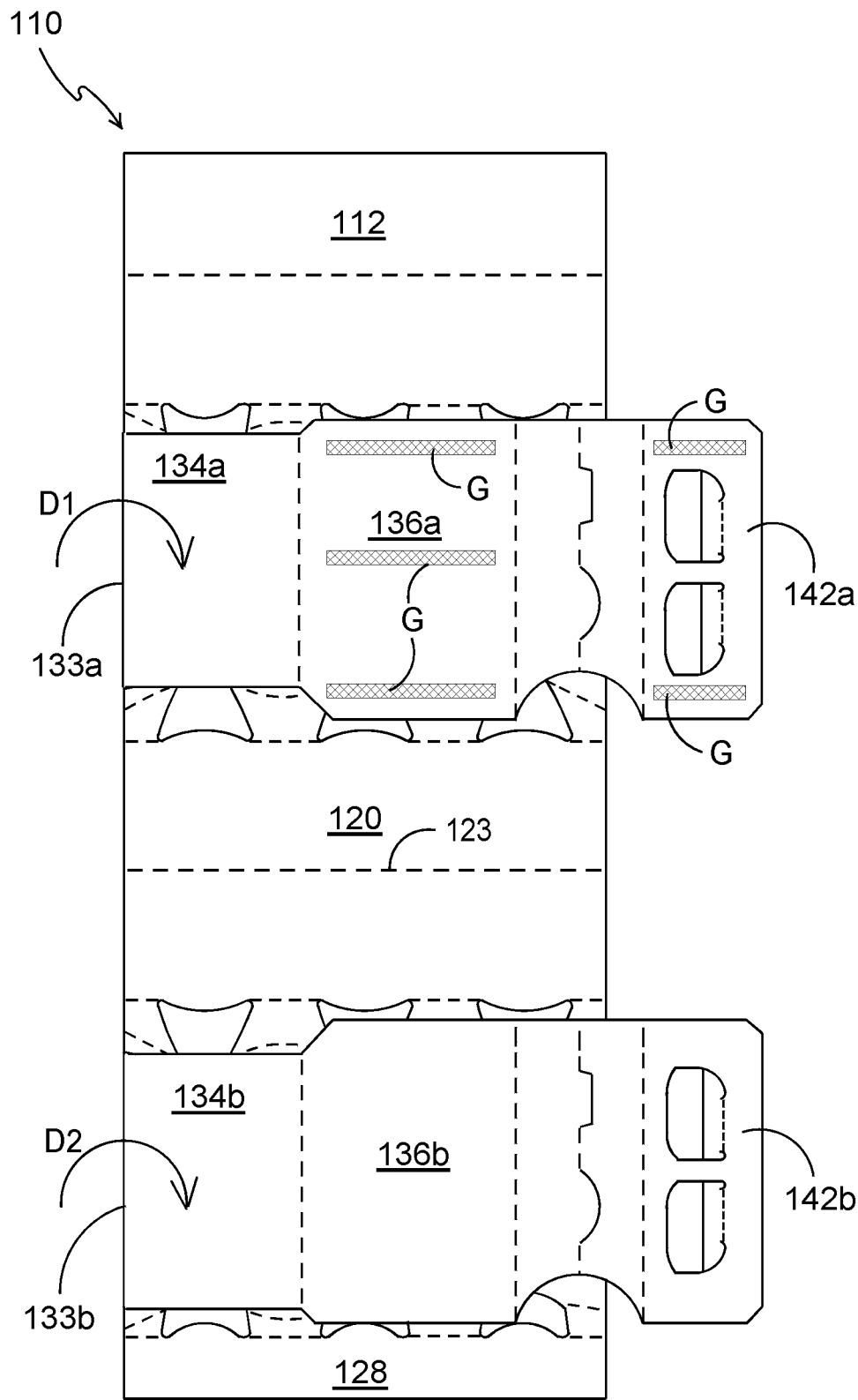


FIGURE 6A

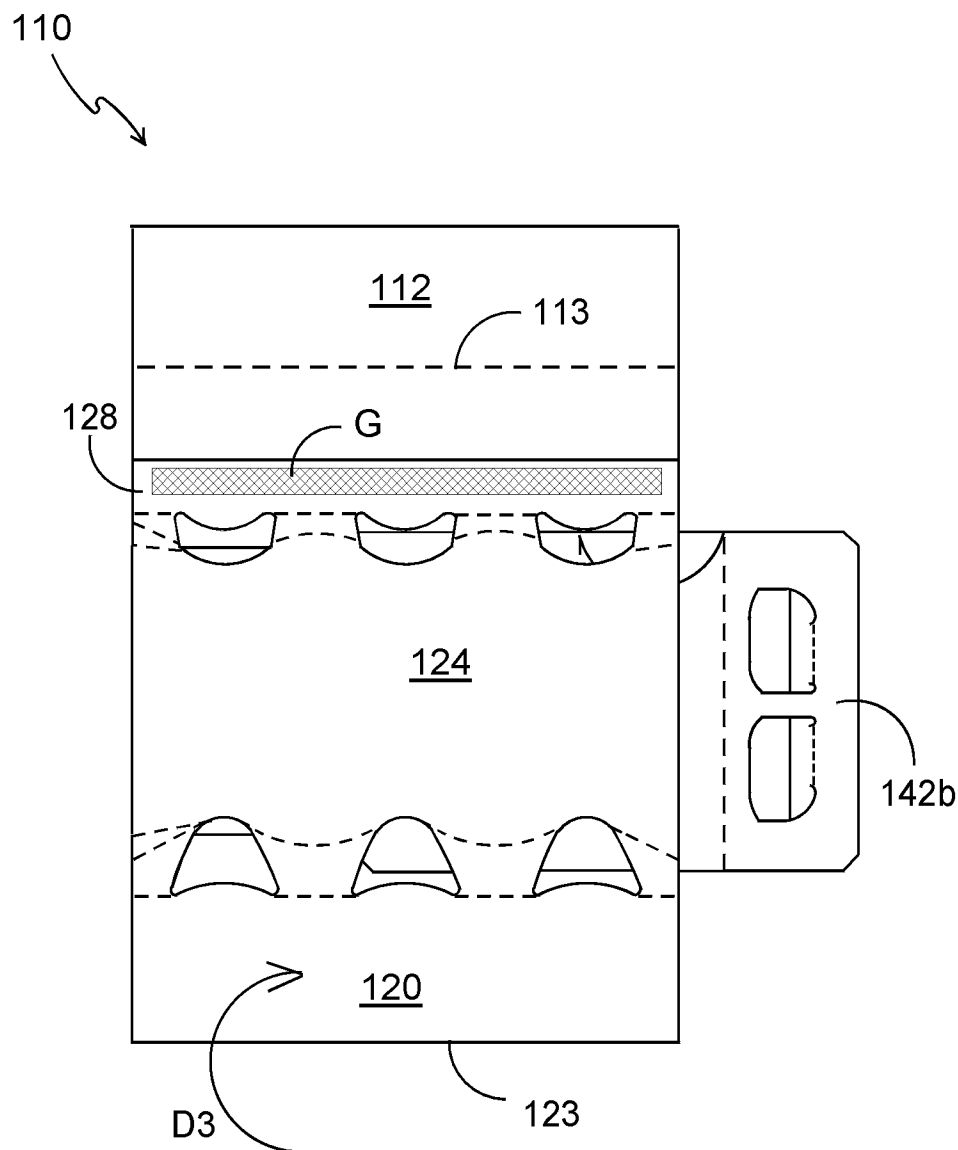


FIGURE 6B

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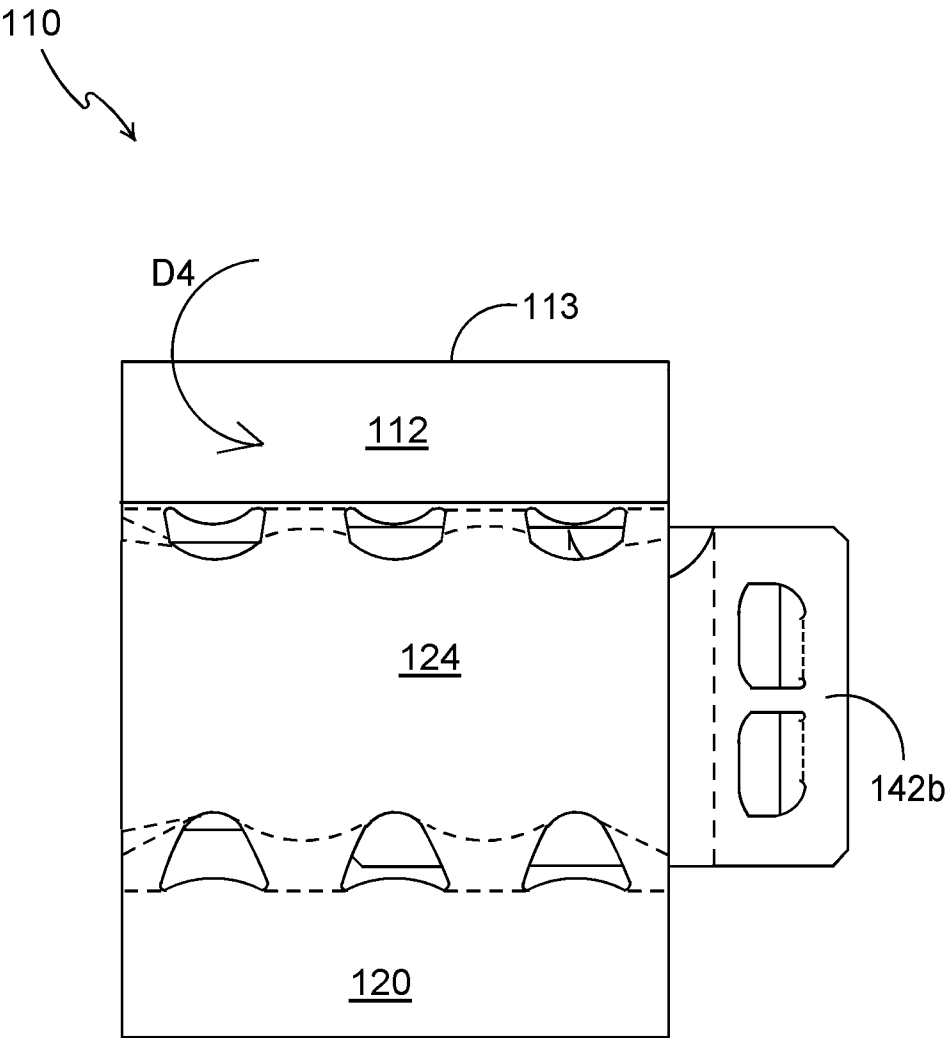


FIGURE 6C

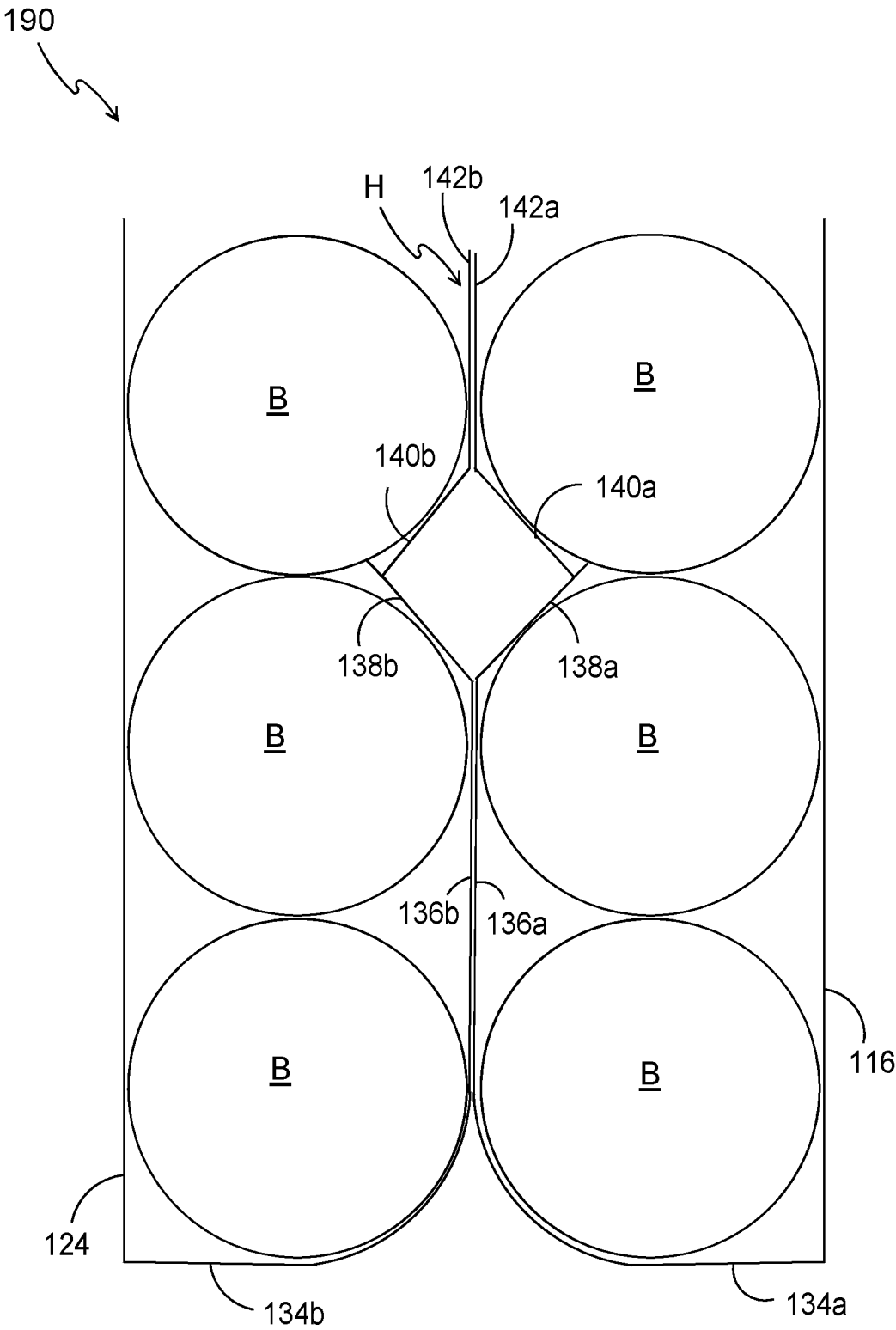


FIGURE 6D

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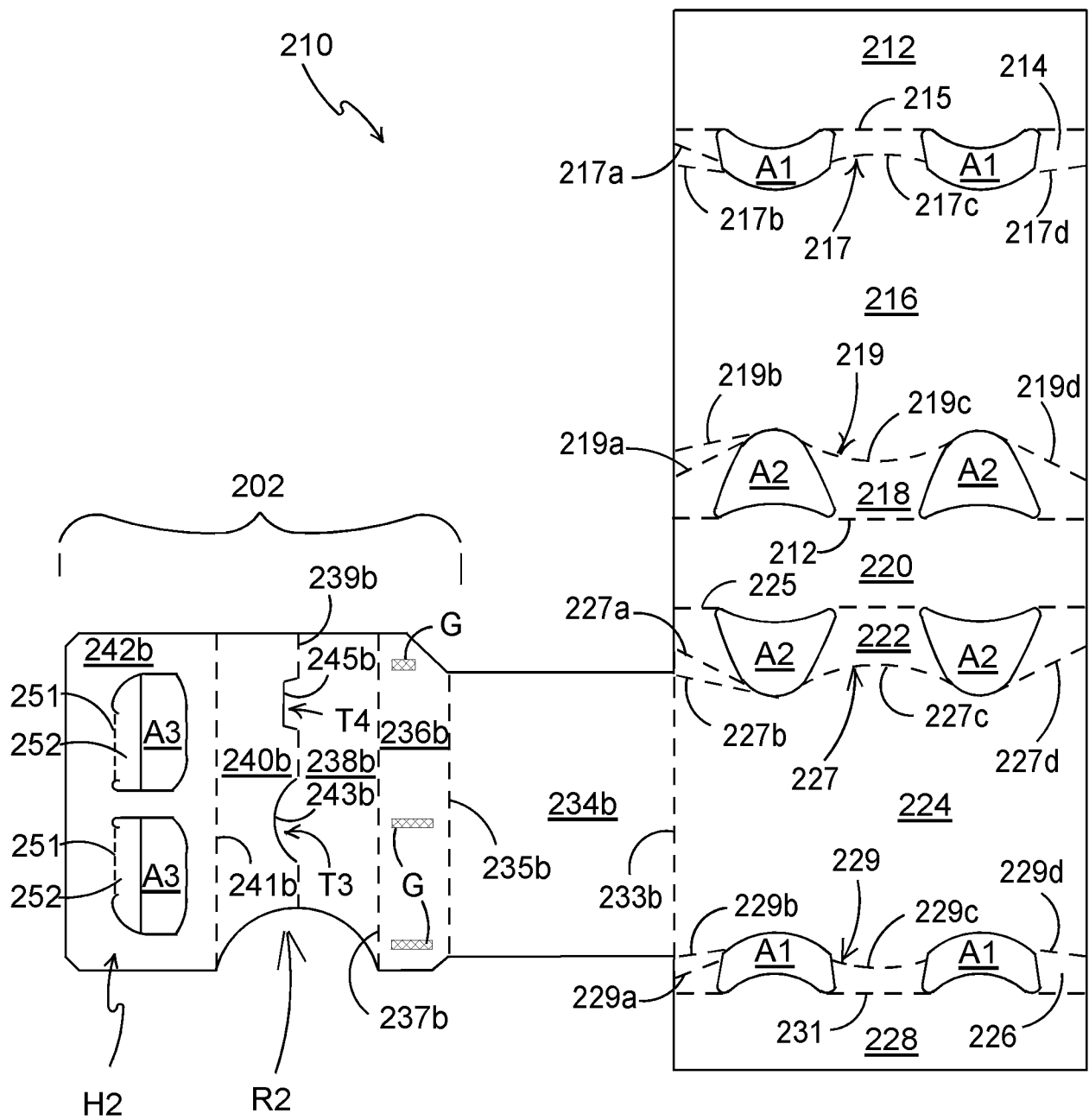


FIGURE 7

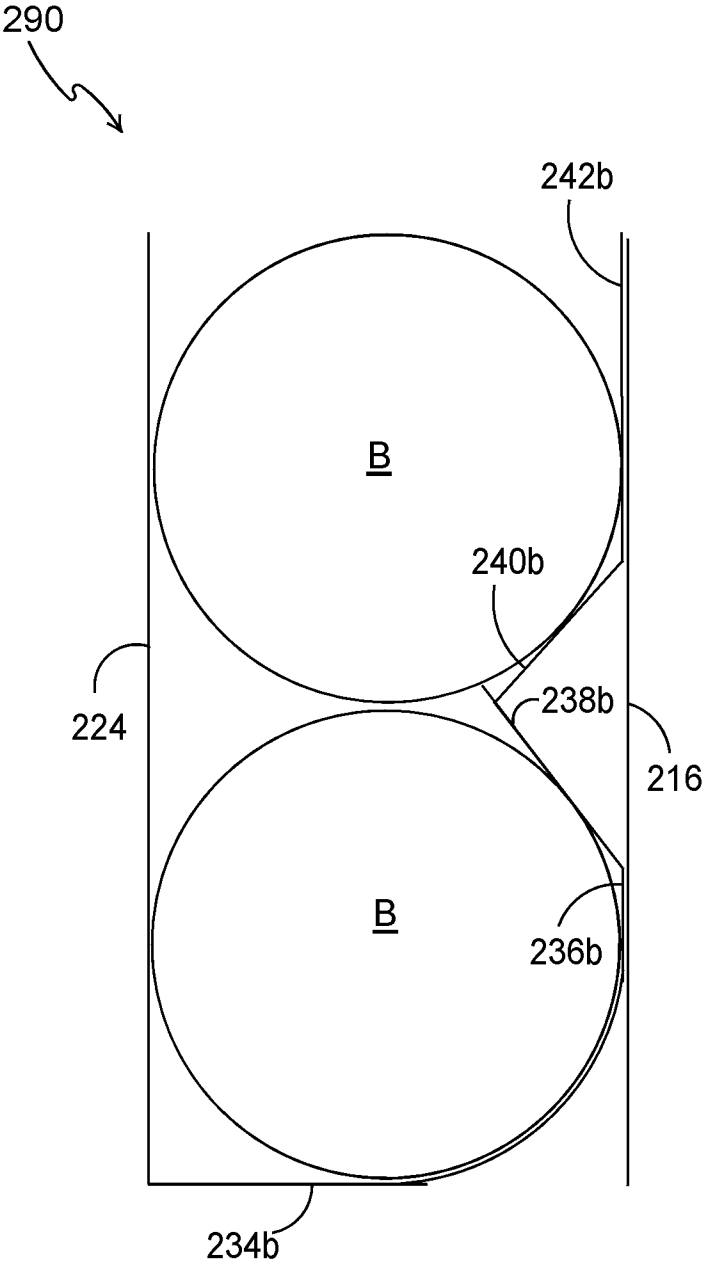


FIGURE 8

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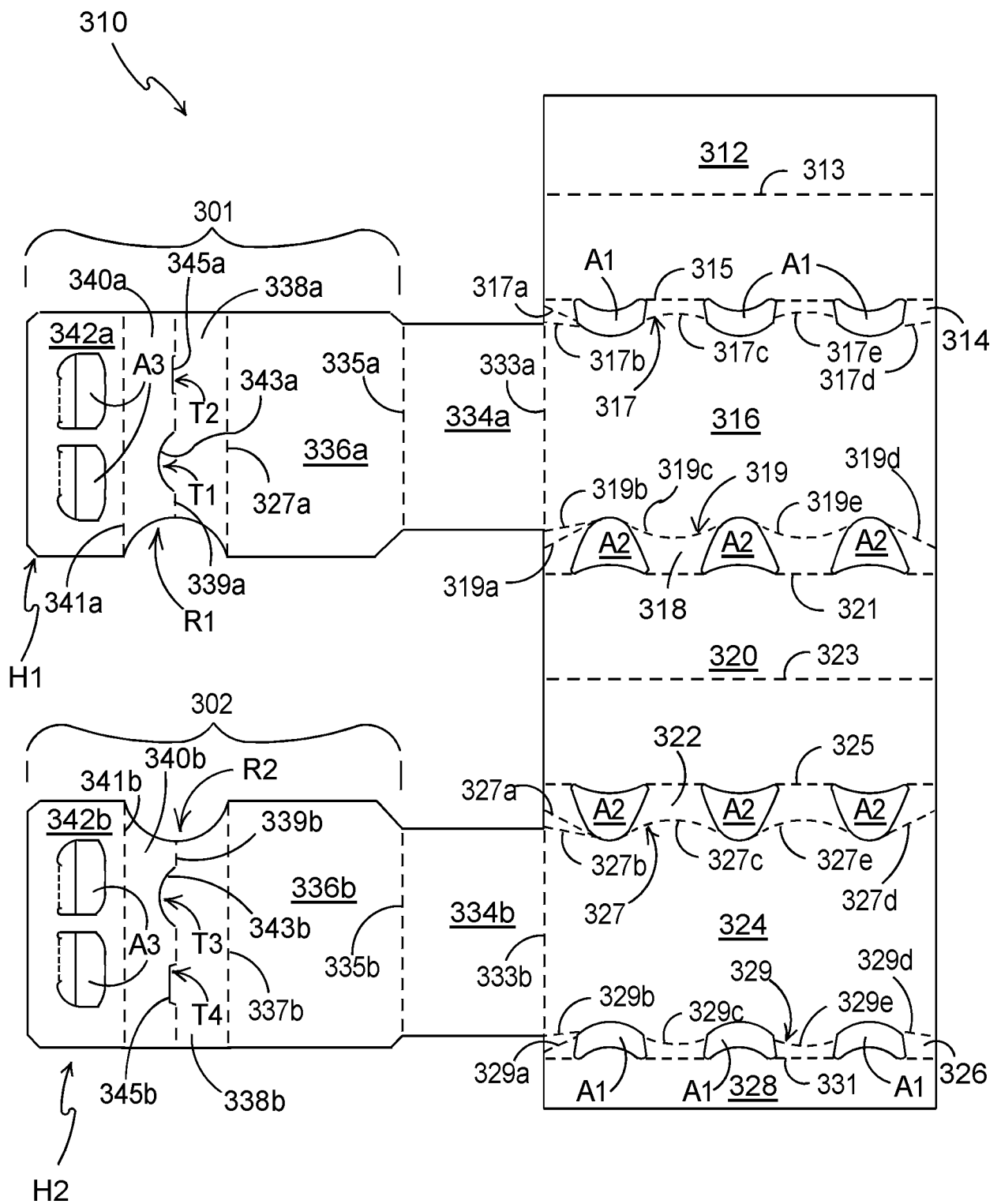


FIGURE 9

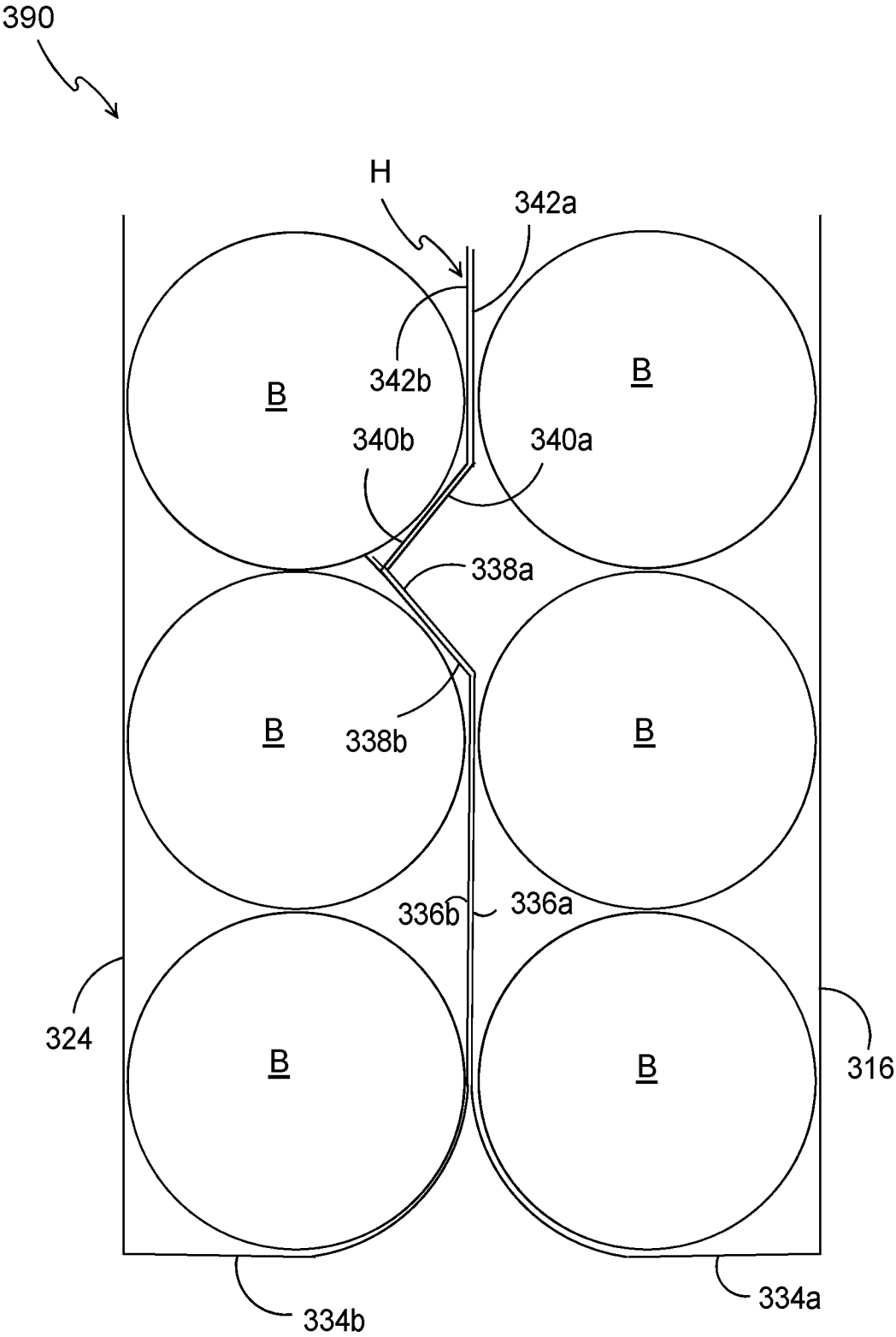


FIGURE 10

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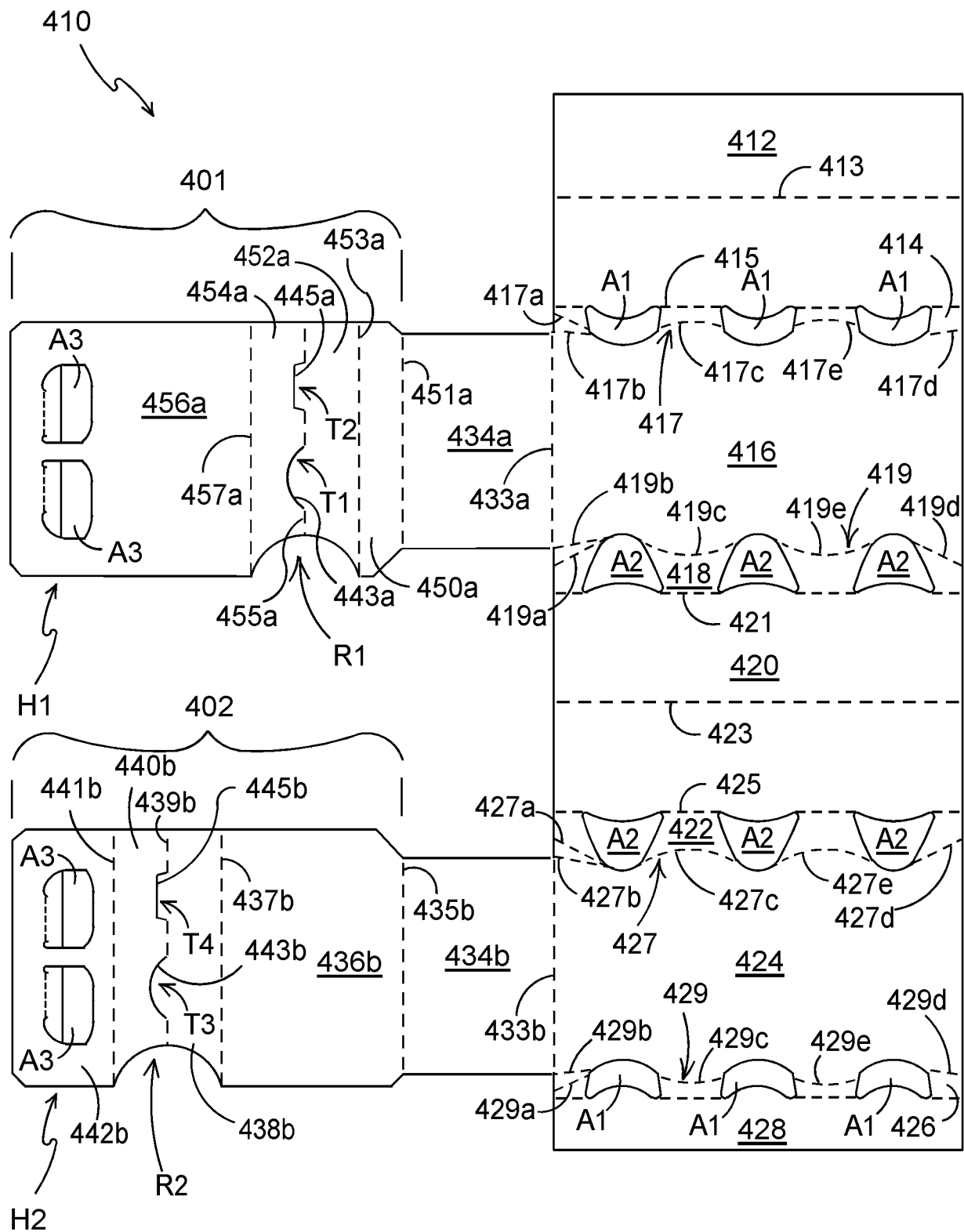


FIGURE 11

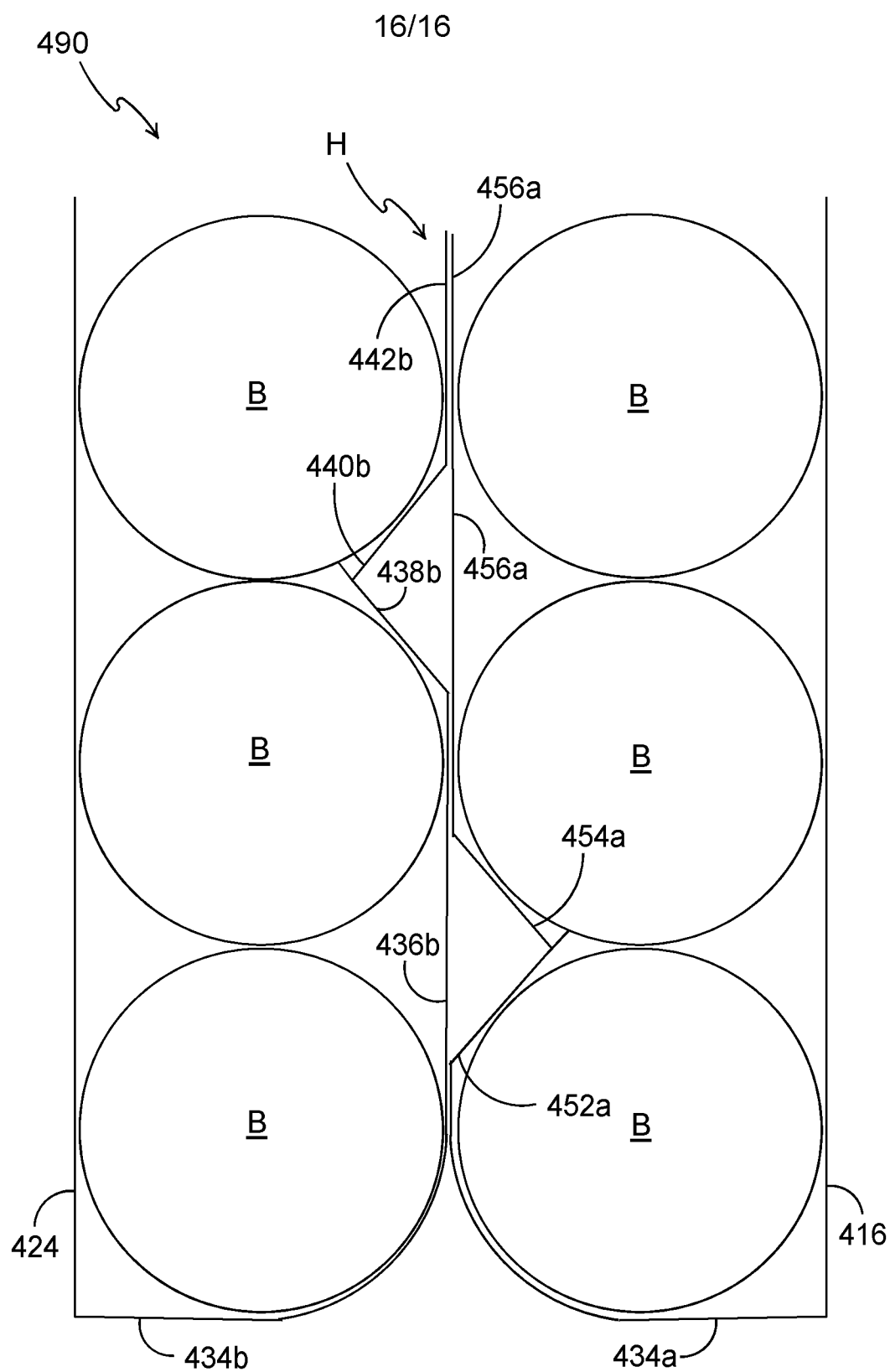


FIGURE 12

INTERNATIONAL SEARCH REPORT

International application No

PCT/US2018/063725

A. CLASSIFICATION OF SUBJECT MATTER

INV. B65D71/30

ADD.

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

B65D

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

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 03/106288 A1 (MEADWESTVACO PACKAGING SYSTEMS [US]; AUCLAIR JEAN-MICHEL [FR]) 24 December 2003 (2003-12-24) page 5, line 29 - page 7, line 8; figures 1-10	1-25
A	US 2014/166519 A1 (ALEXANDER O'NEAL [US]) 19 June 2014 (2014-06-19) paragraph [0020] - paragraph [0029]; figures 1-8	1-25



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents :

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"E" earlier application or patent but published on or after the international filing date

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"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

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Date of the actual completion of the international search

20 February 2019

Date of mailing of the international search report

06/03/2019

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Authorized officer

Derrien, Yannick

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2018/063725

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