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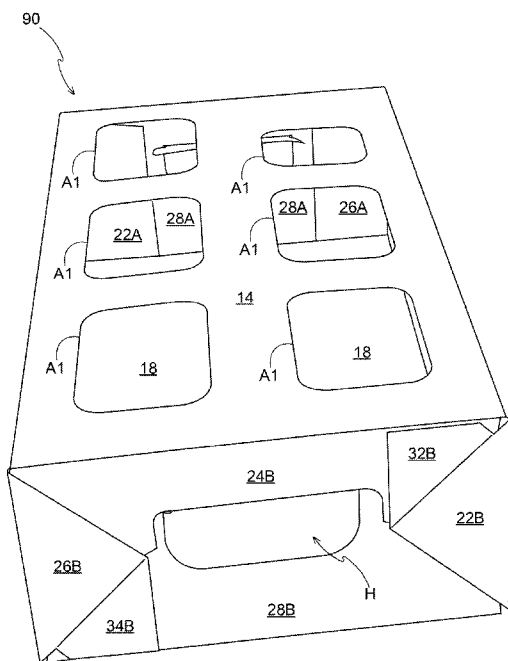


FIG. 4

(57) Abstract: The present disclosure provides an article carrier (90), blank (10) and an auto-end closure structure, an automatically erectable or foldable end closure (22B/24B/26B/28B/32B/34B), for a tubular carrier (90). The auto-end closure structure comprises at least three overlapping end closure flaps (22B, 24B, 26B, 28B, 32B, 34B). The end closure includes a pair of innermost flaps (24B, 28B) which are hinged to respective ones of a pair of opposing panels (14, 18) of the tubular carrier (90) and provide a multiply handle (H). At least one of the pair of innermost flaps (24B, 28B) comprises a handle opening. At least one of the pair of innermost flaps (24B, 28B) may comprise a handle flap (60B).



END CLOSURE, ARTICLE CARRIER AND BLANK THEREFOR

TECHNICAL FIELD

The present invention relates to a carton and blank for forming the same more specifically, but
5 not exclusively, to a flat collapsible carton configured comprising a collapsible wall having a
handle structure which is automatically erected when the carton is erected into a tubular form.

BACKGROUND

In the field of packaging, it is often required to provide consumers with a package comprising
10 multiple primary product containers. Such multi-packs are desirable for shipping and distribution
purposes and for the display of promotional information. For cost and environmental
considerations, such cartons or carriers need to be formed from as little material as possible and
cause as little wastage as possible in the materials from which they are formed. Another
consideration is the strength of the packaging and its suitability for holding and transporting large
15 weights of articles.

It is desirable to provide a carton comprising a handle structure for facilitating transport of the
carton. It is desirable to provide the carton in a flat collapsible form and to minimise or eliminate
gluing steps in a converter plant when the carton is erected and loaded with a product.

20 The present invention seeks to overcome or at least mitigate the problems of the prior art.

SUMMARY

According to a first aspect of the present disclosure there is provided an auto-end closure
25 structure for a tubular carrier. The structure comprises at least three overlapping end closure flaps
including a pair of innermost flaps which are hinged to respective ones of a pair of opposing
panels of the tubular carrier and provide a multi-ply handle.

According to a second aspect of the present disclosure there is provided an auto-end closure
30 structure for a tubular carrier. The structure comprises at least three overlapping end closure flaps
including a pair of innermost flaps which are hinged to respective ones of a pair of opposing
panels of the tubular carrier. The pair of innermost flaps is arranged to be disposed in, at least
partial, overlapping relationship with each other and provides a multi-ply handle. At least one of

the pair of innermost flaps comprises a handle opening providing a first edge. The other one of the pair of innermost flaps comprises second edge reinforcing the first edge.

Optionally, at least one of the pair of innermost flaps comprises a handle flap.

5

Optionally, the handle flap, at least a part thereof, is disposed internally of the carrier in use and is received in the handle opening.

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Optionally, the at least three overlapping end closure flaps comprises a first outer end closure flap hinged to first panel adjacent to each of the pair of opposing panels, the first outer end closure flap comprises a first securing flap hingedly connected to the first outer end closure flap and secured to one of the pair of innermost flaps.

15

Optionally, the at least three overlapping end closure flaps comprises a second outer end closure flap hinged to second panel opposing the first panel, the second outer end closure flap comprises a second securing flap hingedly connected to the second outer end closure flap and secured to the other one of the pair of innermost flaps.

20

Optionally, a first one of the pair of innermost flaps is disposed outside a second one of the pair of innermost flaps.

25

According to a third aspect of the present disclosure there is provided a carton for packaging one or more articles. The carton comprises a plurality of panels for forming a tubular structure. The carton comprises an automatically erectable end closure structure for forming an end wall. The end closure structure comprises at least three overlapping end closure flaps including a pair of innermost flaps which are hinged to respective ones of a pair of opposing panels of the article carrier. The pair of innermost flaps is arranged to be disposed in, at least partial, overlapping relationship with each other. The pair of innermost flaps provide a multi-ply handle, at least one of the pair of innermost flaps comprises a handle opening providing a first edge. The other one of the pair of innermost flaps comprises second edge reinforcing the first edge.

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According to a fourth aspect of the present disclosure there is provided a carton for packaging one or more articles. The carton comprises a plurality of panels for forming a tubular structure. The carton comprises an automatically erectable end closure structure for forming an end wall.

The end closure structure comprises at least three overlapping end closure flaps including a pair of innermost flaps which are hinged to respective ones of a pair of opposing panels of the article carrier. The pair of innermost flaps is arranged to be disposed in, at least partial, overlapping relationship with each other. The pair of innermost flaps provide a multi-ply handle; at least one of the pair of innermost flaps comprises a handle opening providing a first edge defining a first handle portion. The other one of the pair of innermost flaps comprises a second handle portion disposed in face-to-face relationship with first handle portion to provide reinforcement.

According to a fifth aspect of the present disclosure there is provided an end closure structure for a tubular carrier comprising inner and outer overlapping end flaps hinged to respective ones of a first pair of opposing panels of the tubular structure. The tubular carrier comprises a pair of first and second outermost end flaps hinged to respective ones of a second pair of opposing panels of the tubular structure. The first outermost end flap has a first hinged securing flap portion secured to the outside surface of the inner flap. The second outermost end flap has a second hinged securing flap portion secured to the outside surface of the outer end flap. At least one of the inner and outer end flaps comprises a handle disposed between the outermost end flaps such that it is exposed to view from the outside of the carrier.

According to a sixth aspect of the present disclosure there is provided a blank for forming a carton. The blank comprises a plurality of panels for forming a tubular structure and an automatically erectable end closure structure for closing an end of the tubular structure. The end closure structure comprises at least three overlapping end closure flaps including a pair of innermost flaps which are hinged to respective ones of a pair of opposing panels of the article carrier. The pair of innermost flaps is arranged to be disposed in, at least partial, overlapping relationship with each other in a set-up condition. The pair of innermost flaps provide a multi-ply handle. At least one of the pair of innermost flaps comprises a handle opening providing a first edge, the other one of the pair of innermost flaps comprising second edge reinforcing the first edge.

According to a seventh aspect of the present disclosure there is provided a blank for forming a carton. The blank comprises a plurality of panels for forming a tubular structure and an automatically erectable end closure structure for closing an end of the tubular structure. The end closure structure comprises at least three overlapping end closure flaps including a pair of innermost flaps which are hinged to respective ones of a pair of opposing panels of the article carrier. The pair of innermost flaps is arranged to be disposed in, at least partial, overlapping

relationship with each other in a set-up condition. The pair of innermost flaps provide a multi-ply handle. At least one of the pair of innermost flaps comprises a handle opening providing a first edge defining a first handle portion. The other one of the pair of innermost flaps comprises a second handle portion disposed in face-to-face relationship with first handle portion to provide reinforcement.

Further features and advantages of the present invention will be apparent from the specific embodiments illustrated in the drawings and discussed below.

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

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

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

BRIEF DESCRIPTION OF THE DRAWINGS

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

Figure 1 is a plan view from above of a blank for forming a carton according to an embodiment of the invention;

Figures 2A to 3B illustrate stage of construction of the blank of Figure 1; and

Figure 4 is a perspective view from above of a carton formed from the blank of Figure 1.

DETAILED DESCRIPTION OF EXEMPLARY EMBODIMENTS

Detailed descriptions of specific embodiments of the end closure, 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. Indeed, it will be understood that the end closures, packages, blanks and cartons described herein may be embodied in various and alternative forms. The Figures are not necessarily to scale and some features may be exaggerated or minimised to show details of particular components. Well-known components, materials or methods are not necessarily described in great detail in order to avoid obscuring the present disclosure. Any specific structural and functional details disclosed herein are not to be interpreted as limiting, but merely as a basis for the claims and as a representative basis for teaching one skilled in the art to variously employ the invention.

Referring to Figures 1 and 4 there is shown a blank 10 for forming a carton 90 capable of accepting an input of primary products such as, but not limited to, food products such as apples, hereinafter referred to as articles.

The blank 10 comprises a plurality of main panels 12, 14, 16, 18, 20 hinged one to the next in a linear series. A first side panel 12 is hinged to a top panel 14 by a hinged connection such as a fold line 13. A second side panel 16 is hinged to the top panel 14 by a hinged connection such as a fold line 15. A base panel 18 is hinged to the second side wall panel 16 by a hinged connection in the form of a fold line 17. A glue panel 20 is hinged to base panel 18 by a hinged connection such as a fold line 19.

The first side panel 12 comprises at least one opening or aperture A3, the aperture A3 may provide ventilation to the interior of the carton 90 and may serve to provide a display window to inspect the carton contents. The illustrated embodiment comprises three apertures A3, the apertures A3 may be generally rectangular or stadium shaped.

The second side panel 16 comprises at least one opening or aperture A2, the aperture A2 may provide ventilation to the interior of the carton 90 and may serve to provide a display window to inspect the carton contents. The illustrated embodiment comprises three apertures A2, the apertures A2 may be generally rectangular or stadium shaped.

The top panel 14 comprises at least one opening or aperture A1, the aperture A1 may provide ventilation to the interior of the carton 90 and may serve to provide a display window to inspect the carton contents and may allow removal of the carton contents therethrough. The illustrated embodiment comprises three apertures A1, the apertures A1 may be generally rectangular or square in shape.

The plurality of main panels 12, 14, 16, 18, 20 of the blank 10 form walls of an open-ended tubular structure in a set-up condition. The tubular structure is at least partially closed by end closure structures. The tubular structure has a tubular axis defining a longitudinal direction.

Each of the ends of the tubular structure is at least partially closed by end closure panels which form end walls of the tubular structure. In the illustrated embodiment, the ends of the tubular structure are fully closed by end closure panels 22A, 24A, 26A, 28A, 30A, 22B, 24B, 26B, 28B, 32B, 34B.

End closure panels 22A, 24A, 26A, 28A, 30A are configured to close a first end of the tubular structure and end closure panels 22B, 24B, 26B, 28B, 32B, 34B are configured to close a second end of the tubular structure.

The first end of the tubular structure is closed by a first end closure panel 22A, a second end closure panel 24A, a third end closure panel 26A and a fourth end closure panel 28A. The first end closure panel 22A is hinged to a first end of the first side panel 12 by a hinged connection such as a fold line 23A. The second end closure panel 24A is hinged to a first end of the top panel 14 by a hinged connection such as a fold line 25A. The third end closure panel 26A is hinged to a first end of the second side panel 16 by a hinged connection such as a fold line 27A. The fourth end closure panel 28A is hinged to a first end of the base panel 18 by a hinged connection such as a fold line 29A.

The second end of the tubular structure is closed by a fifth end closure panel 22B, a sixth end closure panel 24B, seventh end closure panel 26B and an eighth end closure panel 28B. The fifth end closure panel 22B is hinged to a second end of the first side panel 12 by a hinged connection such as a fold line 23B. The sixth end closure panel 24B is hinged to a second end of the top panel 14 by a hinged connection such as a fold line 25B. The seventh end closure panel 26B is hinged to a second end of the second side panel 16 by a hinged connection such as a fold line

27B. The eighth end closure panel 28B is hinged to a second end of the base panel 18 by a hinged connection such as a fold line 29B.

The eighth end closure panel 28B may comprise a cutaway or recess R struck from a side edge thereof. The recess R may be struck from a side edge of the eighth end closure panel 28B adjacent to the seventh end closure panel 26B. The recess R may define, at least in part, a tab T in a distal portion of the eighth end closure panel 28B, the distal portion being opposed to a proximal portion adjacent to the fold line 29B.

The tab T may facilitate the carton 90 adopting a substantially square configuration, the side walls being disposed substantially perpendicularly to the base panel 18 and the top panel 14, and may improve the rigidity of the carton 90 in the setup condition. The edge of the tab T may abut the inner surface of the second side panel 16 in a set-up condition.

The first end closure panel 22A and the third end closure panel 26A each form a minor end closure panel at the first end of the tubular structure.

The second end closure panel 24A and the fourth end closure panel 28A each form a major end closure panel at the first end of the tubular structure. The fourth end closure panel 28A may substantially close the entire open end of the tubular structure. The fourth end closure panel 28A may extend substantially between the base panel 18 and the top panel 14. A locking flap 30A may be hingedly connected to the fourth end closure panel 28A by a hinged connection in the form of a fold line 31A. The locking flap 30A may engage with the first end closure panel 22A and the third end closure panel 26A to secure the fourth end closure panel 28A in a closed condition.

The blank comprises a handle structure. The fourth end closure panel 28A comprises a handle opening in the form of a handle aperture HA.

The third end closure panel 24A may comprise a handle flap 60A hingedly connected thereto by a hinged connection in the form of a fold line 61A. The handle flap 60A may provide a cushioning flap and may be arranged to fold, about fold line 61A through the handle aperture HA in the fourth end closure panel 28A. Folding the handle flap 60A through the handle aperture HA in the fourth end closure panel 28A may secure the third end closure panel 24A in position.

The third end closure panel 24A may be disposed outermost and provides a reinforcing feature to the handle structure. The third end closure panel 24A may be arranged to reinforce at least an engaging or carrying edge E1 of the handle aperture HA.

- 5 The fifth end closure panel 22B and the seventh end closure panel 26B each form a minor end closure panel at the second end of the tubular structure.

The sixth end closure panel 24B and the eighth end closure panel 28B each form a major end closure panel at the second end of the tubular structure.

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The eighth end closure panel 28B comprises a handle opening in the form of a handle aperture HA.

- 15 The sixth end closure panel 24B may comprise a handle flap 60B hingedly connected thereto by a hinged connection in the form of a fold line 61B. The handle flap 60B may provide a cushioning flap and may be arranged to fold, about fold line 61B through the handle aperture HA in the eighth end closure panel 28B. Folding the handle flap 60B through the handle aperture HA in the eighth end closure panel 28B may secure the sixth end closure panel 24B in position.

- 20 The sixth end closure panel 24B may be disposed outermost and provides a reinforcing feature of the handle structure. The third end closure panel 24A may be arranged to reinforce at least an engaging or carrying edge E2 of the handle aperture HA.

- 25 The fifth end closure panel 22B comprises a first securing flap 32B hingedly connected thereto by a hinged connection in the form of a fold line 33B. The fold line 33B is obliquely oriented with respect to the fold line 23B hinging the fifth end closure panel 22B to the first side panel 12. Fold line 33B and fold line 23B may define a non-zero angle therebetween, the angle may be about 45°.

- 30 The seventh end closure panel 26B comprises a second securing flap 34B hingedly connected thereto by a hinged connection in the form of a fold line 35B. The fold line 35B is obliquely oriented with respect to the fold line 27B hinging the seventh end closure panel 26B to the second side panel 16. Fold line 35B and fold line 27B may define a non-zero angle therebetween, the angle may be about 45°.

The first securing flap 32B is configured to be secured to the sixth end closure panel 24B.

The second securing flap 34B is configured to be secured to the eighth end closure panel 28B.

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The carton 90 can be formed by a series of sequential folding operations in a straight-line machine so that the carton 90 may not be 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. During loading and assembly of the carton 90, the carton
10 90 may be orientated such that the end closure panels 22B, 24B 26B, 28B, 32B, 34B at the second end of the tubular structure form a loading surface wherein a tubular axis of the tubular structure is substantially vertical. The carton 90 may be top loaded through the first end of the tubular structure which forms an upper end in the loading orientation. Alternatively, the carton 90 may be orientated such that the base panel 18 forms a loading or base surface, the carton 90
15 may be side loaded through the first end of the tubular structure wherein the tubular axis of the tubular structure is substantially horizontal.

The main panel 14 forms the top panel (top wall) 14 when the handle structure H is in use as a carrying handle by a user.

20

The main panel 18 forms the base panel 12 when the handle structure H is in use as a carrying handle by a user. The main panel 12 may also form the base panel 12 when the articles are being dispensed from the carton 90 or when the carton 90 is at rest upon a surface such as a shelf. As such, it will be understood that descriptive terms "top", "base", and "side" do not necessarily limit
25 the carton 90 to adopting a particular orientation but serve to distinguish those panels from one another.

Turning to the construction of the carton 90 as illustrated in Figure 2, the blank 10 is folded about the fold line 17 such that the second side panel 18 is disposed in overlying relationship with the
30 top panel 16 and such that the securing panel 20 is disposed in face contacting relationship with the first side panel 14.

The fifth end closure panel 22B is folded about the fold line 23B to be brought into contact with the first side panel 12, as shown in Figure 2.

The sixth end closure panel 24B is folded about the fold line 25B to be brought into contact with the top panel 14.

- 5 The seventh end closure panel 26B is folded about the fold line 27B to be brought into contact with the second side panel 16.

The eighth end closure panel 28B is folded about the fold line 29B to be brought into contact with the base panel 18.

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The first securing flap 32B is folded about the fold line 33B to be brought into contact with the fifth end closure panel 22B.

- 15 The second securing flap 34B is folded about the fold line 35B to be brought into contact with the seventh end closure panel 26B.

Glue G or other adhesive treatment is applied to a surface of the second securing flap 34B. Alternatively, glue G or other adhesive treatment may be applied to a corresponding portion of the eighth end closure panel 28B.

20

The blank 10 is folded about fold line 17, as shown in Figure 3A. The base panel 18 is brought into face-to-face relationship with the second side panel 16 and a portion of the top panel 14. The glue panel 20 is brought into face-to-face relationship with the top panel 14. The eighth end closure panel 28B is brought into face contacting relationship with the second securing flap 34B.

- 25 The eighth end closure panel 28B is secured to the second securing flap 34B.

Glue G or other adhesive treatment is applied to a surface of the first securing flap 32B. Alternatively, glue G or other adhesive treatment may be applied to a corresponding portion of the sixth end closure panel 26B.

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Glue G or other adhesive treatment is applied to a surface of the glue panel 20. Alternatively, glue G or other adhesive treatment may be applied to a corresponding portion of the first side panel 12.

The blank 10 is folded about fold line 13, as shown in Figure 3B. The first side panel 12 is brought into face contacting relationship with the glue panel 20. The first side panel 12 is secured to the glue panel 20. The first side panel 12 is brought into face-to-face relationship with the top panel 14. The first securing flap 32B is brought into face contacting relationship with the sixth end closure panel 26B. The first securing flap 32B is secured to the sixth end closure panel 26B.

The blank 10 is thus formed into a flat collapsed tubular structure 10B which can be readily shipped or distributed to a convertor plant, at which the flat collapsed tubular structure 10B may be erected into an open-ended tubular structure and loaded with articles.

The flat collapsed tubular structure 10B may be erected to form a tubular structure open at one end by unfolding the first side panel 12 with respect to the base panel 18 such that the first side panel 12 is disposed substantially perpendicularly with respect to the base panel 18.

The end closure panels 22B, 24B, 26B, 28B, 32B, 34B are erected automatically to form an end wall closing an end of the tubular structure

Once the carton 90 has been loaded with articles (not shown) the open end of the carton 90 is closed.

The first end of the tubular structure is closed by folding the first end closure panel 22A about fold line 23A and by folding the third end closure panel 26A about fold line 27A.

The fourth end closure panel 28A is then folded about the fold line 29A to be brought into contact with the first and third end closure panels 22A, 26A. The locking flap 30A is folded with respect to the fourth end closure panel 28A and inserted into the interior of the carton 90 as the fourth end closure panel 28A is then folded about the fold line 29A.

The second end closure panel 24A is then folded about the fold line 25A to be brought into contact with the fourth end closure panel 28A.

The handle flap 60A is then folded about the fold line 61A and inserted into the handle aperture HA in the fourth end closure panel 28A so as to secure the second end closure panel 24A in a folded condition.

The present disclosure provides an auto-end closure structure, an automatically erectable or foldable end closure 22B/24B/26B/28B/32B/34B, for a tubular carrier 90, comprising at least three overlapping end closure flaps 22B, 24B, 26B, 28B, 32B, 34B. The end closure includes a pair of innermost flaps 24B, 28B which are hinged to respective ones of a pair of opposing panels 14, 18 of the tubular carrier 90 and provide a multi-ply handle. At least one of the pair of innermost flaps 24B, 28B comprises a handle opening. At least one of the pair of innermost flaps 24B, 28B may comprise a handle flap 60B.

The pair of innermost flaps 24B, 28B is disposed in at least partial overlapping relationship with each other; a first one of the pair of innermost flaps 24B, 28B being disposed outside a second one of the pair of innermost flaps 24B, 28B.

The first one of the pair of innermost flaps 24B, 28B may comprise a handle flap 60B. The second one of the pair of innermost flaps 24B, 28B may comprise a handle aperture HA. The handle flap 60B is received in the handle aperture HA.

The present disclosure provides an end closure structure for a tubular carrier 90 comprising inner 28B and outer 24B overlapping end flaps hinged to first 18 and second 14 opposing panels of the tubular structure. The tubular carrier 90 comprises a pair of first and second outermost end flaps 26B, 22B hinged to third and fourth opposing panels 16, 12 of the tubular structure. The first outermost end flap 26B has a first hinged securing flap portion 34B secured to the outside surface of the inner flap 28B. The second outermost end flap 22B has a second hinged securing flap portion 32B secured to the outside surface of the outer end flap 24B. At least one of the inner and outer end flaps 28B, 26B has a handle H disposed between the outermost end flaps 26B, 22B such that it is exposed to view from the outside of the carrier 90.

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.

Whilst the foregoing embodiments have been described with reference to a fully enclosed carton it is envisaged that the dispenser may be employed in cartons of alternative design such as, but not limited to, wraparound style cartons, basket carries and top gripping clips.

It will be recognised that as used herein, directional references such as "top", "base", "front", "back", "end", "side", "inner", "outer", "upper" and "lower" do not limit the respective panels to such orientation, but merely serve to distinguish these panels from one another. Any reference to "hinged connection" should not be construed as necessarily referring to a single fold line only; indeed, it is envisaged that a hinged connection can be formed from one or more of the following: a short slit, a frangible line or a fold line, without departing from the scope of the invention. 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.

As used herein, the term "cutaway" may refer to one of the following: a recess, a notch, a slot, an opening, a cutline, a line of perforations, a line of short slits, a line of half-cuts, a single half-cut, an interrupted cut line, aligned slits, a line of short scores and any combination of the aforesaid options, without departing from the scope of the invention.

As used herein, the terms "hinged connection" and "fold line" each refers to all manner of lines that define hinge features of the blank or substrate of sheet material, facilitate folding portions of the blank or substrate of sheet material with respect to one another, or otherwise indicate optimal panel folding locations for the blank or substrate of sheet material. 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 one or more fold lines.

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 cut line, aligned slits, a line of short scores and any combination of the aforesaid options, without departing from the scope of the invention.

As used herein, the term "severance line" may refer to all manner of lines formed in the blank or substrate of sheet material that facilitate separating portions of the blank or substrate of sheet material from one another, or otherwise that indicate optimal separation locations on the blank or substrate. As used herein, the term "severance line" may refer to one of the following: a single cut line, a single partial-depth cut line (e.g., a single half-cut line), an interrupted cut line, a score line, an interrupted score line, a line of perforations, a line of short cuts, a line of short slits, a line of

short partial-depth cuts (e.g., a line of short half cuts), and any combination of the aforementioned options.

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

CLAIMS

1. An auto-end closure structure for a tubular carrier, the structure comprising at least three overlapping end closure flaps including a pair of innermost flaps which are hinged to respective ones of a pair of opposing panels of the tubular carrier and provide a multi-ply handle.
2. An auto-end closure structure for a tubular carton, the structure comprising at least three overlapping end closure flaps including a pair of innermost flaps which are hinged to respective ones of a pair of opposing panels of the tubular carton, the pair of innermost flaps being arranged to be disposed in, at least partial, overlapping relationship with each other and provide a multi-ply handle, at least one of the pair of innermost flaps comprising a handle opening providing a first edge, the other one of the pair of innermost flaps comprising a second edge reinforcing the first edge.
3. A carton according to claim 2, wherein at least one of the pair of innermost flaps comprises a handle flap.
4. A carton according to claim 2, wherein the handle flap is internally of the carton in use and is received in the handle opening.
5. A carton according to claim 2, wherein the at least three overlapping end closure flaps comprises a first outer end closure flap hinged to first panel adjacent to each of the pair of opposing panels and comprising a first securing flap hingedly connected to the first outer end closure flap and secured to one of the pair of innermost flaps.
6. A carton according to claim 5, wherein the at least three overlapping end closure flaps comprises a second outer end closure flap hinged to second panel opposing the first panel and comprising a second securing flap hingedly connected to the second outer end closure flap and secured to the other one of the pair of innermost flaps.
7. A carton according to claim 2, wherein a first one of the pair of innermost flaps is disposed outside a second one of the pair of innermost flaps.
8. An article carrier for packaging one or more articles, the article carrier comprising a tubular structure and an automatically erectable end closure structure for closing an end of the tubular

structure, wherein the end closure structure comprises at least three overlapping end closure flaps including a pair of innermost flaps which are hinged to respective ones of a pair of opposing panels of the article carrier, the pair of innermost flaps being arranged to be disposed in, at least partial, overlapping relationship with each other, and wherein the pair of innermost flaps provide a multi-ply handle, at least one of the pair of innermost flaps comprises a handle opening providing a first edge, the other one of the pair of innermost flaps comprising second edge reinforcing the first edge.

9. An article carrier for packaging one or more articles, the article carrier comprising a tubular structure and an automatically erectable end closure structure for closing an end of the tubular structure, wherein the end closure structure comprises at least three overlapping end closure flaps including a pair of innermost flaps which are hinged to respective ones of a pair of opposing panels of the article carrier, the pair of innermost flaps being arranged to be disposed in, at least partial, overlapping relationship with each other, and wherein the pair of innermost flaps provide a multi-ply handle, at least one of the pair of innermost flaps comprises a handle opening providing a first edge defining a first handle portion, the other one of the pair of innermost flaps comprises a second handle portion disposed in face-to-face relationship with first handle portion to provide reinforcement.
10. An end closure structure for a tubular carrier comprising inner and outer overlapping end flaps hinged to respective ones of a first pair of opposing panels of the tubular structure, the tubular carrier comprising a pair of first and second outermost end flaps hinged to respective ones of a second pair of opposing panels of the tubular structure, wherein the first outermost end flap has a first hinged securing flap portion secured to the outside surface of the inner flap, the second outermost end flap has a second hinged securing flap portion secured to the outside surface of the outer end flap, and wherein at least one of the inner and outer end flaps has a handle disposed between the outermost end flaps such that it is exposed to view from the outside of the carrier.
11. A blank for forming a carton, the blank comprising a plurality of panels for forming a tubular structure and an automatically erectable end closure structure for closing an end of the tubular structure, wherein the end closure structure comprises at least three overlapping end closure flaps including a pair of innermost flaps which are hinged to respective ones of a pair of opposing panels of the carton, the pair of innermost flaps being arranged to be disposed in,

at least partial, overlapping relationship with each other in a set-up condition, and wherein the pair of innermost flaps provide a multi-ply handle, at least one of the pair of innermost flaps comprises a handle opening providing a first edge, the other one of the pair of innermost flaps comprising second edge reinforcing the first edge.

12. A blank for forming a carton, the blank comprising a plurality of panels for forming a tubular structure and an automatically erectable end closure structure for closing an end of the tubular structure, wherein the end closure structure comprises at least three overlapping end closure flaps including a pair of innermost flaps which are hinged to respective ones of a pair of opposing panels of the carton, the pair of innermost flaps being arranged to be disposed in, at least partial, overlapping relationship with each other in a set-up condition, and wherein the pair of innermost flaps provide a multi-ply handle, at least one of the pair of innermost flaps comprises a handle opening providing a first edge defining a first handle portion, the other one of the pair of innermost flaps comprises a second handle portion disposed in face-to-face relationship with first handle portion to provide reinforcement.

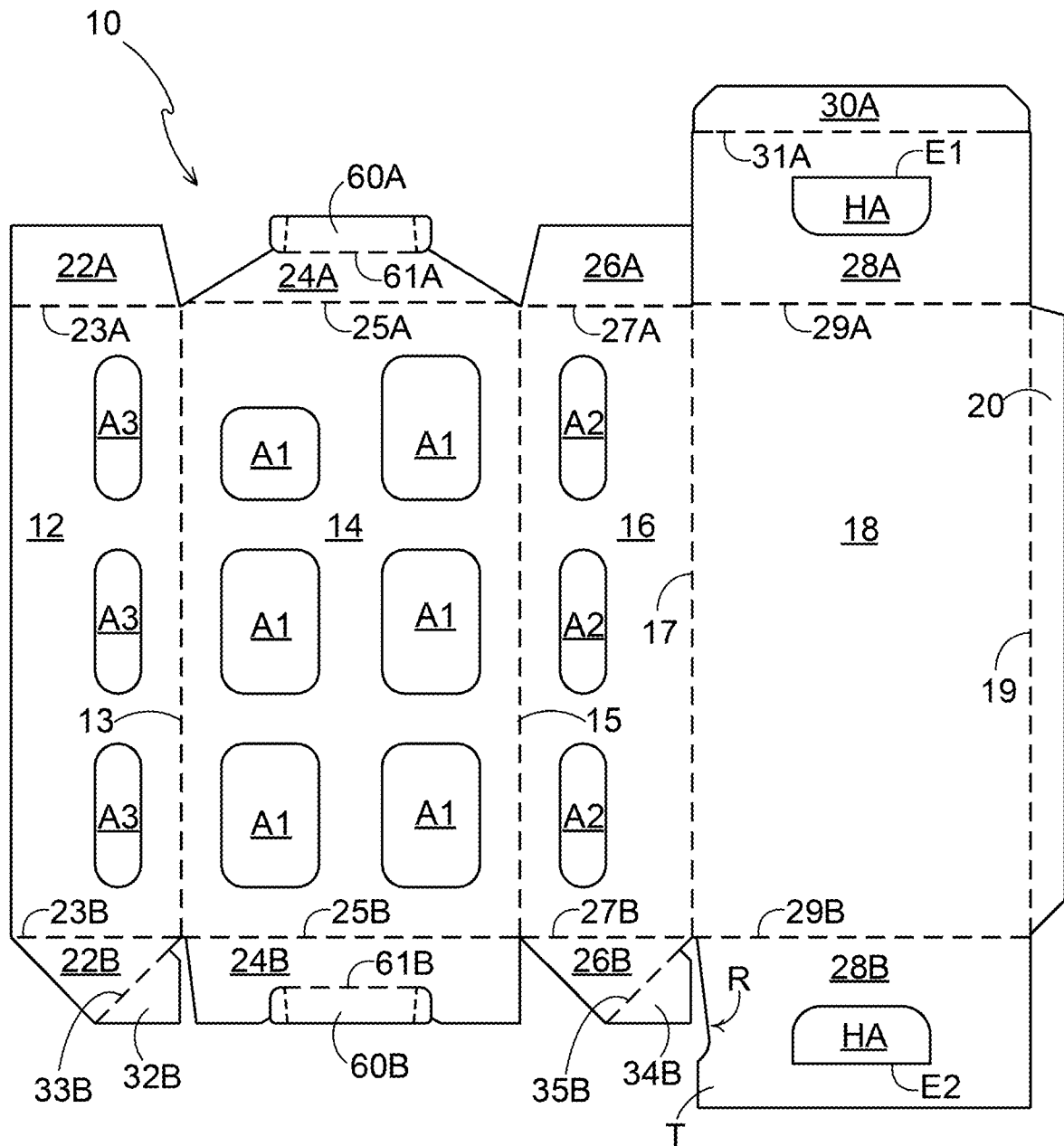


FIG. 1

2 / 4

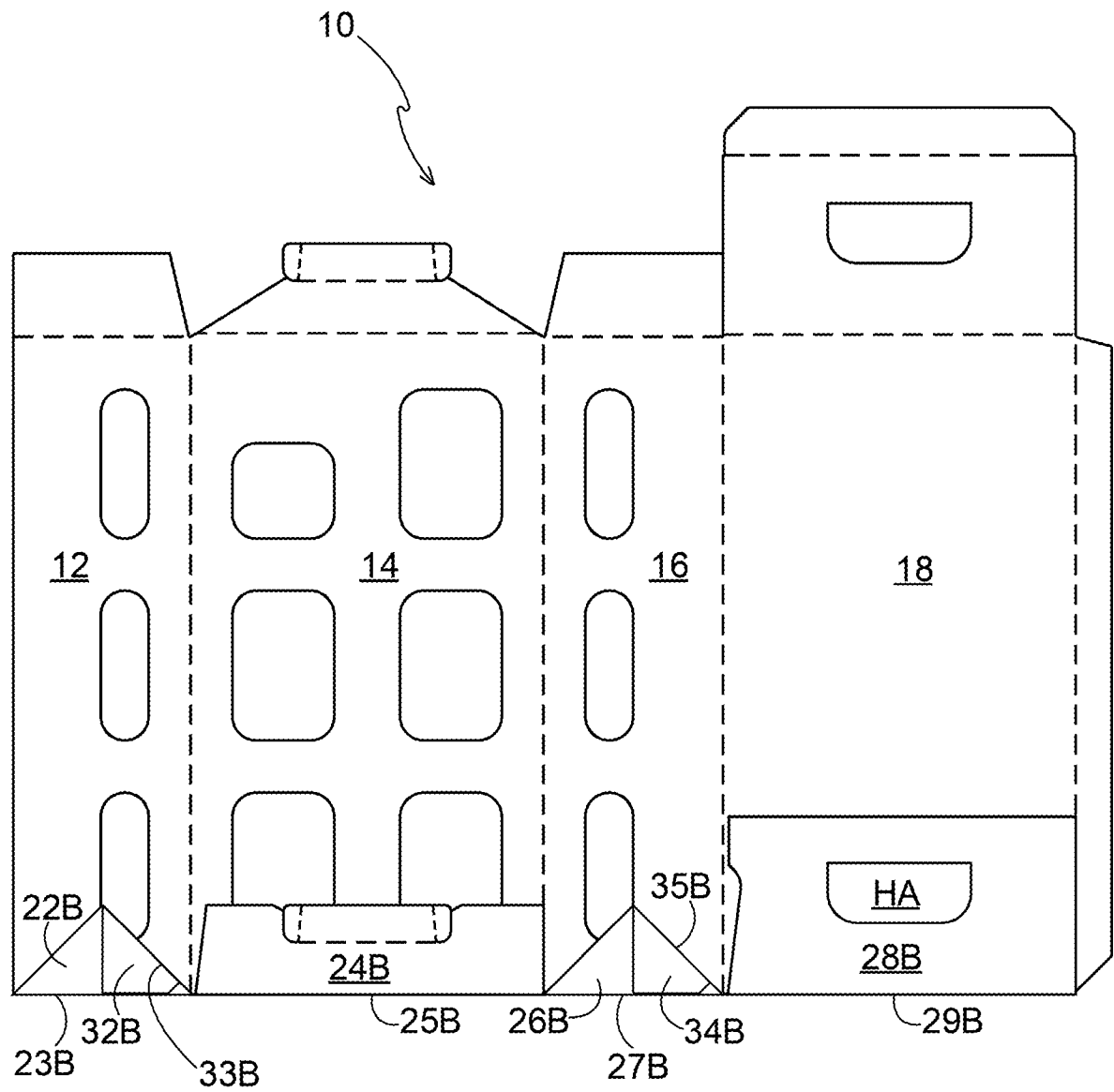


FIG. 2

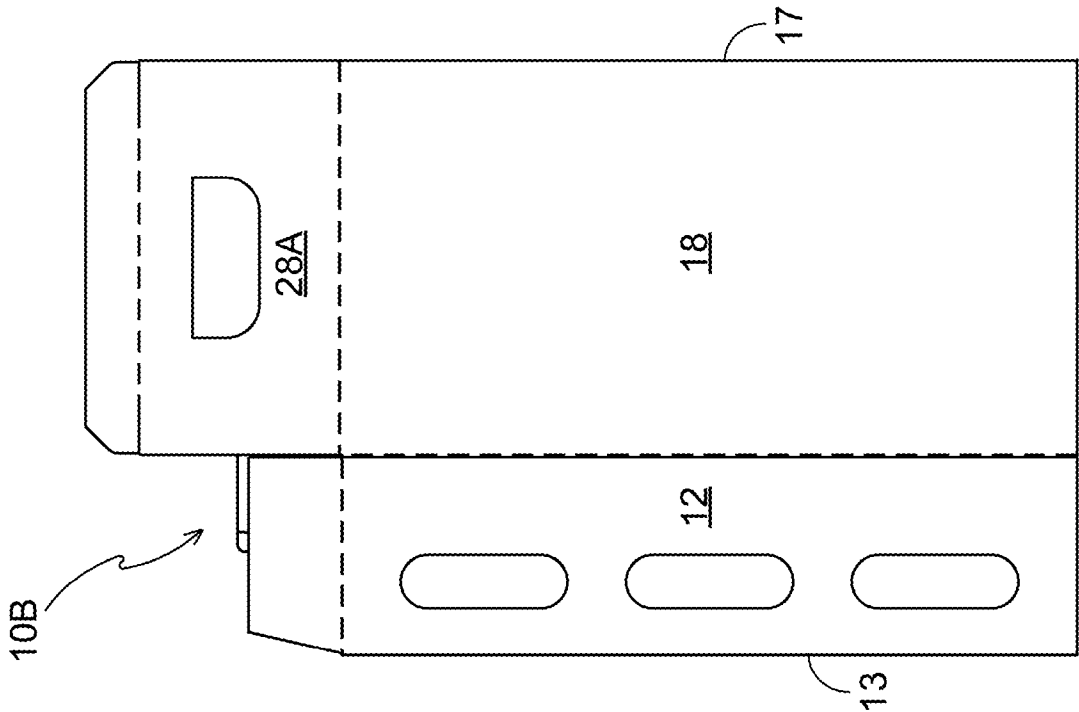


FIG. 3B

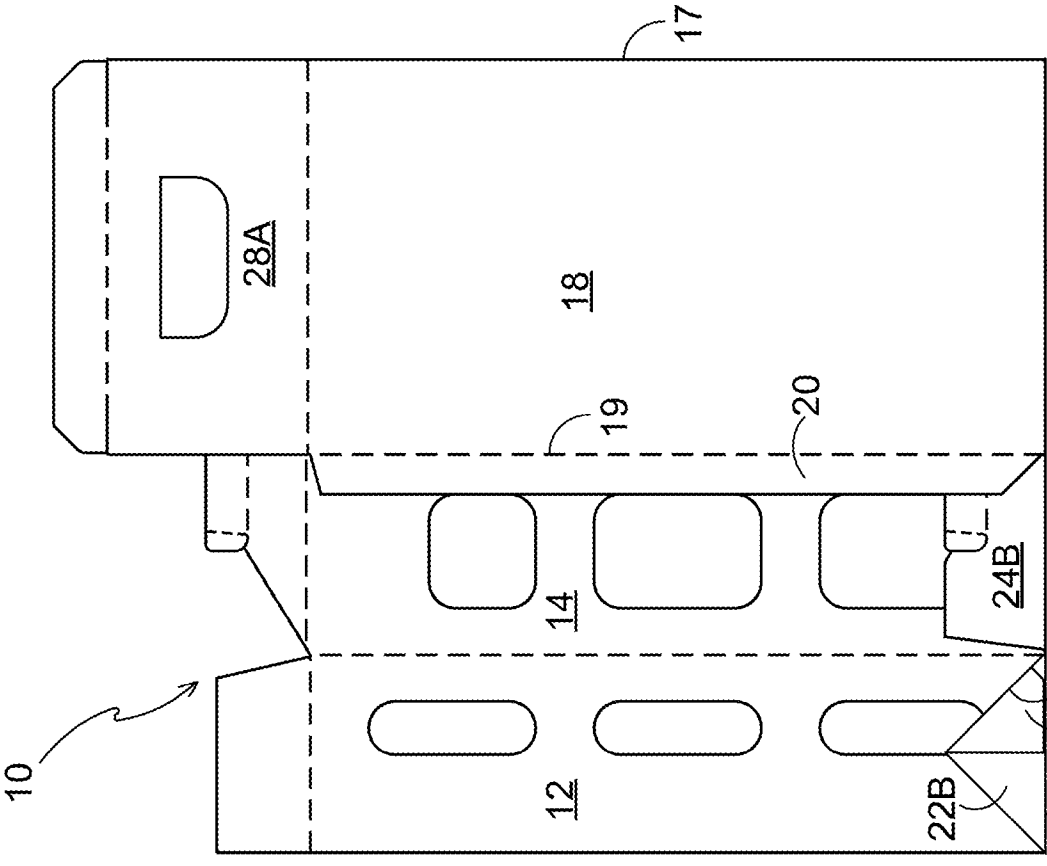


FIG. 3A

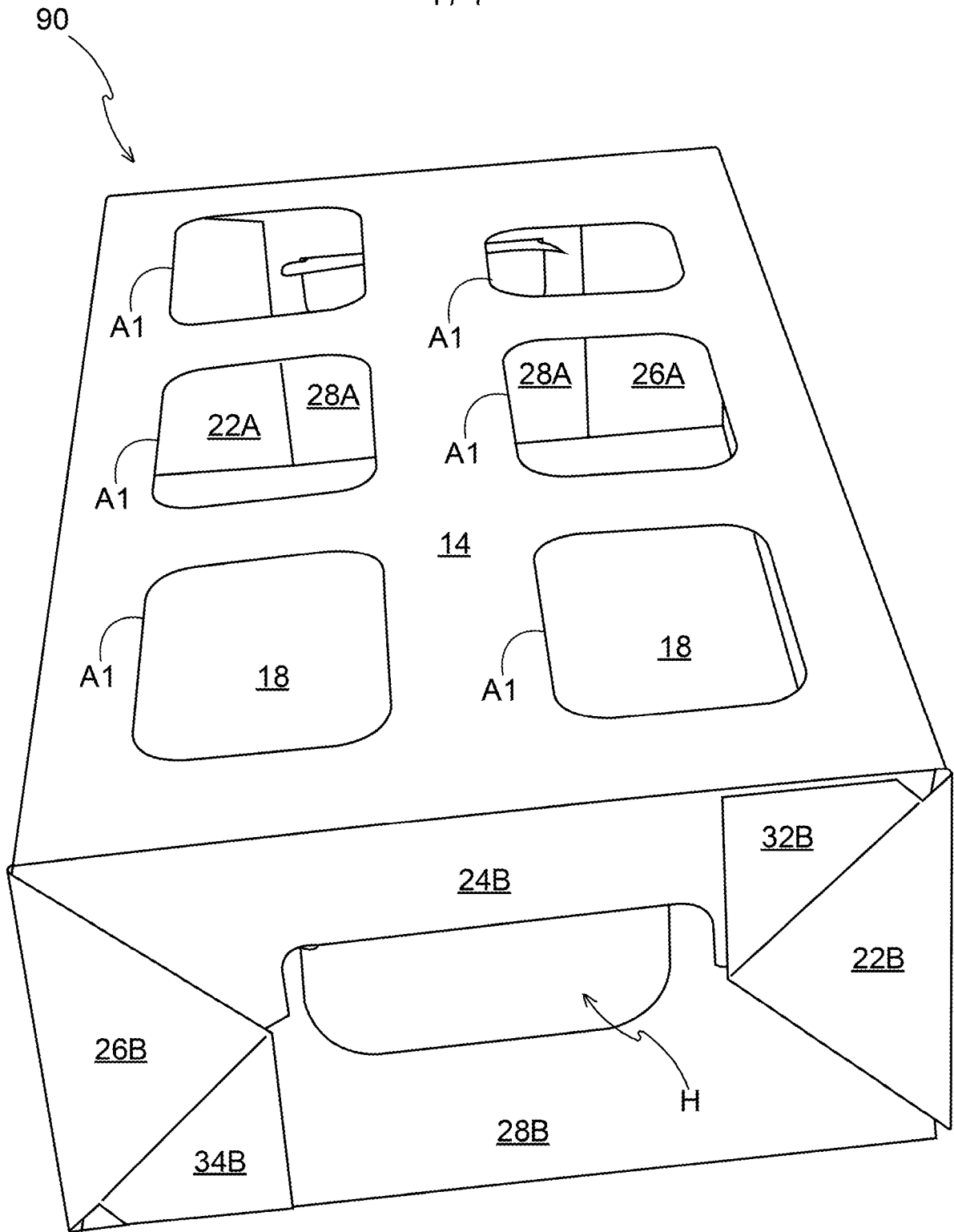


FIG. 4

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2022/033818

A. CLASSIFICATION OF SUBJECT MATTER

INV. B65D5/36 B65D5/46
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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6 092 716 A (SMITH MICHAEL J [US])	1, 10
A	25 July 2000 (2000-07-25) column 1 - column 7; figures 1-4 -----	2-9, 11, 12

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

☒ See patent family annex.

* Special categories of cited documents :

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"&" document member of the same patent family

Date of the actual completion of the international search

20 September 2022

Date of mailing of the international search report

28/09/2022

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Le Bihan, Nicolas

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2022/033818

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 6092716 A	25-07-2000	GB 2343439 A	10-05-2000
		US 6092716 A	25-07-2000
