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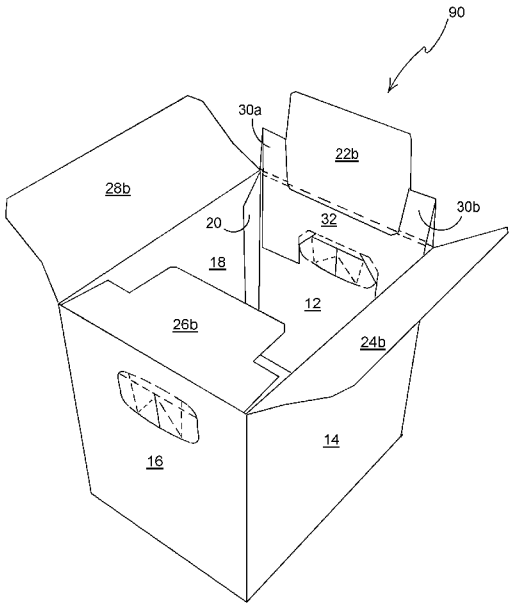

FIGURE 5

(57) Abstract: Aspects of the disclosure relate to a carton (90) for packaging one or more articles (B). The carton (90) comprises a plurality of panels (12, 14, 16, 18) for forming a tubular structure. The plurality of panels comprises: a first side wall panel (12); a first end wall panel (14); a second side wall panel (16); and a second end wall panel (18). A first handle structure (H) is defined in a first one of the plurality of panels (12). The first handle structure (H) comprises a severance line (60) defining at least in part a handle opening. A first end closure panel (22b) forms, at least in part, a top wall (22b/24b/26b/28b) which at least partially closes an upper end of the tubular structure and is hingedly connected to the first one of the plurality of panels (12) by a first hinged connection (23b).

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CARTON AND CARTON BLANK

TECHNICAL FIELD

The present invention relates to a carton and blank for forming the same and more specifically, but not exclusively, to a carton comprising at least one reinforced handle structure.

BACKGROUND

In the field of packaging it is often required to provide consumers with a package comprising 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 weights of articles.

It is desirable to provide a carton comprising a handle structure for forming a carrying handle to transport the carton. The carrying handle must be sufficiently robust and strong to withstand the load of the carton contents.

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

SUMMARY

A first aspect of the invention provides a carton for packaging one or more articles, the carton comprising: a first panel; and a second panel hingedly connected by a first hinged connection to the first panel; the first panel comprising a handle structure, the handle structure comprising a severance line defining at least in part a handle opening; the second panel having a handle reinforcing panel hingedly connected to the second panel by two further hinged connections; wherein the two further hinged connections are spaced from the first hinged connection.

Optionally, the handle reinforcing panel comprises a cutaway shaped in a complementary manner to at least a portion of the handle opening and the remainder of the handle reinforcing panel is shaped similarly to an upper portion of the first panel to reinforce an area of the first panel either side of and above the handle structure in the first panel.

Optionally, the two further hinged connections are spaced apart from the first hinged connection and are parallel to the first hinged connection.

Optionally, the two further hinged connections each extend into the second panel by a distance of between 10% and 20% of the maximum width of that second panel such that the two hinged connections are spaced apart from each other and from the first hinged connection.

Optionally, the second panel forms a minor end closure panel.

Optionally, the handle structure comprises a handle flap defining at least in part the handle opening.

Optionally, the handle reinforcing panel comprises a cushioning flap arrangement which co-operates with said handle flap.

Optionally, the handle reinforcing panel is hingedly connected to the second panel via a pair of connecting panels.

Optionally, the pair of connecting panels are not secured to the second panel and the handle reinforcing panel is secured to the first panel.

Optionally, the connecting panels of said pair of connecting panels are each formed from material that would otherwise form part of the second panel and wherein the connecting panels are hingedly connected to the second panel by said two further hinged connections.

Optionally, the first panel forms a side wall panel or wherein the first panel forms an end wall panel.

A second aspect of the invention provides a blank for forming a carton, the blank comprising: a first panel; a second panel hingedly connected by a first hinged connection to the first panel; the first panel comprising a handle structure, the handle structure comprising a severance line defining at least in part a handle opening; and a handle reinforcing panel hingedly connected to the second panel by a first pair of connecting panels which first pair of connecting panels is hingedly connected to the second panel by two further hinged

connections, wherein the two further hinged connections are spaced from the first hinged connection.

Optionally, the handle reinforcing panel comprises a cutaway shaped in a complementary manner to at least a portion of the handle opening and the remainder of the handle reinforcing panel is shaped similarly to an upper portion of the first panel for providing a reinforcement of an area of the first panel either side of and above the handle structure in the first panel.

Optionally, the two further hinged connections are spaced apart from the first hinged connection; are parallel to the first hinged connection; and are spaced apart from one another.

A third aspect of the invention provides a carton for packaging one or more articles, the carton comprising: a plurality of panels for forming a tubular structure, the plurality of panels comprising: a first side wall panel; a first end wall panel; a second side wall panel; and a second end wall panel, a first handle structure defined in a first one of the plurality of panels, the first handle structure comprising a severance line defining at least in part a handle opening; a first end closure panel forming, at least in part, a top wall which at least partially closes an upper end of the tubular structure and is hingedly connected to the first one of the plurality of panels by a first hinged connection; a first handle reinforcing panel hingedly connected to the first end closure panel by a pair of connecting panels hinged to the first end closure panel by two further hinged connections; wherein the two further hinged connections are spaced from the first hinged connection.

Optionally, the handle reinforcing panel comprises a cutaway shaped in a complementary manner to at least a portion of the handle opening and the remainder of the handle reinforcing panel is shaped similarly to an upper portion of the first one of the plurality of panels to reinforce an area of the first one of the plurality of panels either side of and above the handle structure in the first panel.

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.

BRIEF DESCRIPTION OF THE DRAWINGS

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;

Figure 1A illustrates an enlarged view of a handle structure H for use with the blank of Figure 1;

Figures 2 to 6 illustrate stages of construction of a carton from the blank of Figure 1; and

Figure 7 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 packages, 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 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 1A 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, bottles or cans, hereinafter referred to as articles B. In one application, the articles are glass bottles, each containing 12oz (340ml) of beverage, and twelve such bottles are to be loaded into the carton 90. Optionally, the carton is top loaded and the carton is a crate style carton. Optionally, the carton is capable of supporting a large weight of about 6.5kg to about 7.5kg in total weight. To lift such a weight a strong and robust carrying handle is provided. It is convenient to position the carrying handles opposite one another and near to the top of the carton to form a crate style carton.

Referring again to Figure 1, the blank 10 comprises a plurality of main panels 20, 12, 14, 16, 18 hinged one to the next in a linear series. A glue panel 20 is hinged by a hinged connection such as a fold line 19 to a first side wall panel 12. The first side wall panel 12 is hinged to a first end wall panel 14 by a hinged connection such as a fold line 13. The first end wall panel 14 is hinged to a second side wall panel 16 by a hinged connection such as a fold line 15. The second side wall panel 16 is hinged to a second end wall panel 18 by a hinged connection such as a fold line 17.

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 (or top and bottom 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; and 22b, 24b 26b, 28b respectively.

End closure panels 22a, 24a, 26a, 28a are configured to close a first end of the tubular structure and form a composite base panel of a carton 90. End closure panels 22b, 24b, 26b, 28b are configured to close a second end of the tubular structure and form a composite top panel of the carton 90.

The first end (bottom) 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 wall 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 first end wall 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 wall 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 second end wall 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, a 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 wall 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 first end wall 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 wall 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 second end wall panel 18 by a hinged connection such as a fold line 29b.

The first, third, fifth and seventh end closure panels 22a, 26a, 22b, 26b form minor end closure panels (also referred to as dust flaps). The first, third, fifth and seventh end closure panels 22a, 26a, 22b, 26b may be disposed innermost.

The second, fourth, sixth and eighth end closure panels 24a, 28a, 24b, 28b form major end closure panels. The second, fourth, sixth and eighth end closure panels 24a, 28a, 24b, 28b may be disposed outermost.

The blank 10 comprises at least one handle structure H for forming a carrying handle H. The illustrated embodiment shows a first handle structure H formed in the first side wall panel 12 and a second handle structure H formed in the second side wall panel 16. In alternative embodiments, a handle structure may be provided in either of the first and/or second end wall panels 14, 18. In still other embodiments a handle structure may be provided in each of the side and end wall panels 12, 14, 16, 18. The provision of two handle structures disposed opposite to one another provides for a crate-style carton that is lifted close to the top of the carton.

The first and second handle structures H are substantially the same in construction and will be described in further detail by reference to Figure 1A which illustrates an enlarged view of a handle structure H.

Each handle structure H optionally has the same configuration and comprises a flap 50 defined by a severance line 60 and a hinged connection in the form of a first fold line 51. The flap 50 defines an opening (not shown) in a panel forming the carton 90 into which opening a user may insert at least a portion of their hand.

The flap 50 in the undeployed state optionally acts as a dust cover preventing ingress of dirt into the carton 90. In the deployed state the flap 50 acts as a cushioning flap so as to make a comfortable carrying handle. This is particularly beneficial where the load contained in the carton 90 is heavy and there would otherwise exist a risk of a bare handle edge cutting into, or making sore, a user's hand.

The flap 50 is hinged to the panel from which it is struck (in this arrangement first side wall panel 12 or second side wall panel 16) by first fold line 51. The flap 50 may comprise an optional second fold line 57 disposed in a parallel manner to the first fold line 51. Optionally the second fold line 57 is disposed proximate the first fold line 51, and may be longer than the first fold line 51. The flap 50 may comprise an optional second severance line 54 which extends between the second fold line 57 and the severance line 60 so as to substantially bisect a portion of the flap 50.

The flap 50 may optionally comprise a third fold line 52, a fourth fold line 53, a fifth fold line 55 and a sixth fold line 56, which together are arranged in a substantially "W" shape. The third and fifth fold lines 52, 55 form a first "V" shape on a first side of the second severance line 54. The fourth and sixth fold lines 53, 56 form a second "V" shape on a second side of the second severance line 54. The fifth and sixth fold lines 55, 56 extend between the first fold line 51 and the severance line 60. The fifth and sixth fold lines 55, 56 are arranged divergently with respect to each other and diverge towards the first fold line 51. The second and third fold lines 52, 53 are arranged divergently with respect to each other and diverge towards the severance line 60.

In addition to the handle structures H, the blank 10 comprises a first handle reinforcing structure R1 and a second handle reinforcing structure R2. In this arrangement a reinforcing structure R1, R2 is provided for each of the handle structures H formed in the first side wall panel 12 and second side wall panel 16. In other arrangements where a handle structure may be provided in each of the side and end wall panels 12, 14, 16, 18, other numbers of reinforcing structure may be provided.

The first handle reinforcing structure R1 comprises a first pair of connecting panels 30a, 30b and a first reinforcing panel 32. The connecting panels 30a, 30b of the first pair of connecting panels 30a, 30b are spaced apart and are each hinged to the fifth end closure panel 22b by a hinged connection in the form of a fold line 33a, 33b. Fold line 33a extends from a first edge of the fifth end closure panel 22b, about half-way along that first edge, into the fifth end closure panel 22b. The fold line 33a may extend into the fifth end closure panel 22b by a distance equal to between about 10% and about 20% of the maximum width of that fifth end closure panel 22b. Further optionally, the fold line 33a may extend into the fifth end closure panel 22b by a distance equal to about 14% of the maximum width of that fifth end closure panel 22b.

Similarly, fold line 33b extends from a second edge of the fifth end closure panel 22b, about half-way along that second edge, into the fifth end closure panel 22b. The fold line 33b may extend into the fifth end closure panel 22b by a distance equal to between about 10% and about 20% of the maximum width of that fifth end closure panel 22b. Further optionally, the fold line 33a may extend into the fifth end closure panel 22b by a distance equal to about 14% of the maximum width of that fifth end closure panel 22b. The fold lines 33a, 33b are in line with one another and are similarly sized. The connecting panels 30a, 30b are each further defined, at least in part, by a first severance or cut line 5 and a second severance or cut line 7 respectively.

The connecting panels 30a, 30b are each hinged to the first reinforcing panel 32 by a hinged connection in the form of a double crease fold line arrangement 31a, 31b. The hinged connections 31a, 31b are structured and arranged, such that when the first handle reinforcing structure R1 is formed, a crease line of each double crease line arrangement of hinge connection 31a, 31b is disposed just either side of fold line 23b (between the first side wall panel 12 and the fifth end closure panel 22b.

Accordingly, the connecting panels 30a, 30b are struck, at least in part, from the fifth end closure panel 22b. The first reinforcing panel 32 is hinged to the the fifth end closure panel 22b by virtue of the hinged connections 31a, 31b and is otherwise separated therefrom by cut or severance line 31. Severance line 31 extends between the hinged connection 31a and hinged connection 31b.

The first reinforcing panel 32 comprises a cutaway C1. Cutaway C1 is shaped to be complementary to the shape of the opening defined by the flap 50. Accordingly, the first reinforcing panel 32 is substantially square “U”-shaped and has a shape complimentary to an upper portion of the first side wall panel 12.

The first reinforcing panel 32 may comprise one or more cushioning flaps 34, 36, 38. The illustrated embodiment comprises a first cushioning flap 34 hinged to first reinforcing panel 32 by a fold line 35, a second cushioning flap 36 hinged to the first reinforcing panel 32 by a fold line 37, and a third cushioning flap 38 hinged to the first reinforcing panel 32 by a fold line 39. Fold line 39 is arranged to be substantially parallel to cut line 31. Fold line 35 is arranged divergently with respect to fold line 39. Fold line 37 is arranged divergently with

respect to fold line 39. Fold line 35 is convergently arranged with respect to fold line 37 and converges towards fold line 39.

The second handle reinforcing structure R2 comprises a similar structure as the first reinforcing structure R1. As can be seen in Figure 1, the second handle reinforcing structure R2 comprises a second pair of connecting panels 40a, 40b and a second reinforcing panel 42. The connecting panels 40a, 40b of the second pair of connecting panels 40a, 40b are spaced apart and are each hinged to the seventh end closure panel 26b by a hinged connection in the form of a fold line 43a, 43b.

Fold line 43a extends from a first edge of the seventh end closure panel 26b, at a point about half-way along that first edge, into the seventh end closure panel 26b. The fold line 43a, may extend into the seventh end closure panel 26b by a distance equal to between about 10% and about 20% of the maximum width of that seventh end closure panel 26b. Further optionally, the fold line 43a may extend into the seventh end closure panel 26b by a distance equal to about 14% of the maximum width of that seventh end closure panel 26b. Similarly, fold line 43b extends from a second edge of the seventh end closure panel 26b, about half-way along that second edge, into the seventh end closure panel 26b. The fold line 43b may extend into the seventh end closure panel 26b by a distance equal to between about 10% and about 20% of the maximum width of that seventh end closure panel 26b. Further optionally, the fold line 43a may extend into the seventh end closure panel 26b by a distance equal to about 14% of the maximum width of that seventh end closure panel 26b. The fold lines 43a, 43b are in line with one another and are similarly sized. The connecting panels 40a, 40b are each further defined, at least in part, by a first severance or cut line 9 and a second severance or cut line 11 respectively.

The connecting panels 40a, 40b are each hinged to the second reinforcing panel 42 by a hinged connection in the form of a double crease fold line arrangement 41a, 41b. The hinged connections 41a, 41b are structured and arranged, such that when the second handle reinforcing structure R2 is formed, a crease line of each double crease line arrangement of hinge connection 41a, 41b is disposed just either side of fold line 29b (between the second side wall panel 16 and the seventh end closure panel 26b.

Accordingly, the connecting panels 40a, 40b of the second handle reinforcing structure R2 are struck, at least in part, from the seventh end closure panel 26b. The second reinforcing panel 42 is hinged to the seventh end closure panel 26b by virtue of the hinged connections

43a, 43b and is otherwise separated therefrom by cut or severance line 41. Severance line 41 extends between the hinged connection 41a and hinged connection 41b.

The second reinforcing panel 42 comprises a cutaway C1. Cutaway C1 is shaped to be complementary to the shape of the opening defined by the flap 50. Accordingly, the second reinforcing panel 42 is substantially square "U"-shaped and has a shape complimentary to an upper portion of the second side wall panel 16.

The second reinforcing panel 42 may comprise one or more cushioning flaps 44, 46, 48. The illustrated embodiment comprises a first cushioning flap 44 hinged to second reinforcing panel 42 by a fold line 45, a second cushioning flap 46 hinged to the second reinforcing panel 42 by a fold line 47, and a third cushioning flap 48 hinged to the second reinforcing panel 42 by a fold line 49. Fold line 49 is arranged to be substantially parallel to cut line 41. Fold line 45 is arranged divergently with respect to fold line 49. Fold line 47 is arranged divergently with respect to fold line 44. Fold line 45 is convergently arranged with respect to fold line 47 and converges towards fold line 49.

The carton 90 (see Figure 7) 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.

Turning to the construction of the carton 90 as illustrated in Figures 2 to 6, glue G or other adhesive treatment is applied to an inner surface of the second handle reinforcing panel 32. Alternatively, glue G or other adhesive treatment may be applied to a corresponding portion of an inner surface of the first side panel 12.

Glue G or other adhesive treatment is applied to an inner surface of the second handle reinforcing panel 42. Alternatively, glue G or other adhesive treatment may be applied to a corresponding portion of an inner surface of the second side panel 16.

Optionally, in other arrangements glue or other adhesive treatment may be applied to inner surfaces of the connecting panels 30a, 30, 40a, 40b or to equivalent regions of the first and second side wall panels 12, 16 respectively. Optionally and as in the present arrangement, the connecting panels 30a, 30b, 40a, 40b are not affixed by any adhesive treatment or by any other means to the first and second side wall panels 12, 16 respectively.

The blank 10 is folded (as indicated by direction arrow D1 in Figure 2) about the fold lines 33a and 33b such that the connecting panels 30a, 30b are disposed in overlying relationship with the fifth end closure panel 22b and such that the first handle reinforcing panel 32 is disposed in face contacting relationship with the first side panel 12. The creases of double crease arrangement 31a, 31b are positioned above and either side of fold line 23b.

The connecting panels 30a, 30b are not secured to the fifth end closure panel 22b. The first handle reinforcing panel 32 is secured to the first side panel 12. Fold line 39 for cushioning flap 38 is disposed substantially on top of part of first fold line 51 of the handle structure H. Cushioning flap 38 is sized such that it does not overlap and stops short of the second fold line 57 of the handle structure H in the first side panel 12.

The blank 10 is folded (as indicated by direction arrow D2 in Figure 2) about the fold lines 43a and 43b, such that the connecting panels 40a, 40b are disposed in overlying relationship with the seventh end closure panel 26b and such that the fourth handle reinforcing panel 42 is disposed in face contacting relationship with the second side panel 16. The creases of double crease arrangement 41a, 41b are positioned above and either side of fold line 27b.

The connecting panels 40a, 40b of the second handle reinforcing structure R2 are not secured to the seventh end closure panel 26b. The second handle reinforcing panel 42 is secured to the second side panel 16. Fold line 49 for cushioning flap 48 is disposed substantially on top of at least part of first fold line 51 of the handle structure H. Cushioning flap 48 is sized such that it does not overlap i.e. it stops short of the second fold line 57 of the handle structure H in the second side panel 16.

The blank 10 is then folded about the fold line 13 (as indicated by direction arrow D3 in Figure 3) such that the first side panel 12 is disposed in overlying relationship with the first end panel 14, and such that the glue panel 20 is disposed in overlying relationship with the first end panel 14.

Glue G or other adhesive treatment is applied to an outer surface of the glue panel 20. Alternatively, glue G or other adhesive treatment may be applied to a corresponding edge portion of an inner surface of the second end panel 18.

The blank 10 is then folded about the fold line 17 (as indicated by direction arrow D4 in Figure 4) such that the second end panel 18 is disposed in overlying relationship with the second side panel 16 and the glue panel 20. In this way, the second end panel 18 is secured to the glue panel 20.

The blank 10 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 erected into an open ended tubular structure and loaded with articles B.

The flat collapsed tubular structure may be erected to form an open-ended tubular structure by unfolding the first side panel 12 with respect to the first end panel 14 such that the first side panel 12 is disposed substantially perpendicularly with respect to the first end panel 14.

The carton 90, in its open ended tubular form, may be loaded with articles B through either or both open ends thereof.

It will be appreciated that in some embodiments one of the open ends of the carton 90 may be closed before loading the interior with articles B through the remaining open end.

The flat collapsed tubular structure may be closed at a first end by the first end closure panel 22a, second end closure panel 24a, third end closure panel 26a and fourth end closure panel 28a and orientated such that the first end closure panel 22a, second end closure panel 24a, third end closure panel 26a and fourth end closure panel 28a form a composite base panel. The upper end of the carton 90 remains open such that articles B can be top-loaded therethrough as shown in Figure 6.

Once the carton 90 has been loaded with articles B the open ends of the carton 90 are closed.

The method for closing each of the open ends of the carton 90 is substantially the same and will be described by reference to closing the second open end shown in Figure 5.

The second end of the tubular structure is closed by folding the fifth end closure panel 22b about fold line 23b and by folding the seventh end closure panel 26b about fold line 27b as shown in Figure 6. The provision of the double crease arrangements 31a, 31b, 41a, 41b

allows the fifth and seventh end closure panels 22b, 26b to fold and close in a manner unfettered by the presence of the reinforcing structures R1, R2.

Glue or other adhesive treatment may be applied to appropriate areas of an outer surface of the fifth end closure panel 22b and the seventh end closure panel 26b. In alternative embodiments glue or other adhesive treatment may be applied to a corresponding portion of an inner surface of sixth end closure panel 24b.

The sixth end closure panel 24b is then folded about the fold line 25b to be brought into contact with each of the fifth and seventh end closure panels 22b, 26b. The sixth end closure panel 24b is secured to each of the fifth and seventh end closure panels 22b, 26b.

Glue or other adhesive treatment may be applied to appropriate areas of an outer surface of the fifth end closure panel 22b and the seventh end closure panel 26b. In alternative embodiments glue or other adhesive treatment may be applied to a corresponding portion of an inner surface of the eighth end closure panel 28b.

The eighth end closure panel 28b is then folded about the fold line 29b to be brought into contact with each of the fifth and seventh end closure panels 22b, 26b. The eighth end closure panel 28b is secured to each of the fifth and seventh end closure panels 22b, 26b.

In alternative embodiments the eighth end closure panel 28b may be folded about fold line 29b before, or simultaneously with, folding the sixth end closure panel 24b about fold line 25b.

In other embodiments alternative securing means may be employed to secure the end closure panels 22a, 24a, 26a, 28a, 22b, 24b, 26b, 28b for example, but not limited to, mechanical locking devices such as staples or punch locks integrally formed within the end closure panels 22a, 24a, 26a, 28a; 22b, 24b, 26b, 28b.

Figure 7 illustrates the assembled carton 90 forming a package with a plurality of articles B.

The handle structure H in the first side wall panel 12 is substantially the same as the handle structure H in the second side wall panel 16 and the reinforcing structure associated with the fifth end closure panel 22b is substantially the same as the reinforcing structure associated with the seventh end closure panel 26b. Therefore, the carrying handle will be described in

more detail by reference to the handle structure H in the first side wall panel 12 and the reinforcing structure associated with the fifth end closure panel 22b.

As can be seen in Figure 7, once the package is complete, a user can break the severance line 60 and push the flap 50 internally of the carton 90. The flap 50 can fold about the third, fourth, fifth and sixth fold lines 52, 53, 55, 56. The second severance line 54 can break, substantially dividing the flap 50 into two parts. In this way the flap 50 can fold internally of the carton 90; the flap 50 can fold about the articles B (not shown in Figure 7) disposed in the carton 90. The flap 50 may fold about one or more of the third, fourth, fifth and sixth fold lines 52, 53, 55, 56 in response to making contact with one or more articles B disposed in the carton 90.

The cushioning flaps 34, 36, 38 can be displaced out of the plane of the second handle reinforcing panel 32 as a consequence of the internal displacement of the flap 50.

The cushioning flap 38 may act as a mandrel or guide about which the flap 50 may fold.

The cushioning flap 38 may facilitate or guide folding of the flap 50 about the second fold line 57. The cushioning flap 38 may be dimensioned such that a free edge of the cushioning flap 38, (the free edge which opposes a hinged edge defined by the fold line 39), is arranged to be in registry or aligned with the second fold line 57.

The first handle reinforcing panel 32 provides a second ply of material in the region immediately around the handle structure H, both above the handle structure H and either side thereof (as shown in Figure 5). The second handle reinforcing panel 32 is hinged to the fifth end closure panel 22b indirectly (via first pair of connecting panels 30a, 30b) by fold lines 33a, 33b. Fold lines 33a, 33b are offset from the fold line 23b. The fold lines 33a, 33b are spaced apart from fold line 23b. The fold lines 33a, 33b are inset into the fifth end closure panel 22b. In this way the fold line 23b is uninterrupted; this may provide a more aesthetically desirable appearance. In this way, the majority of the fifth end closure flap 22b serves as a dust flap reducing the likelihood of ingress of dirt or dust into the carton 90.

The connecting panels 30a, 30b of the first handle reinforcing structure R1 are struck from material which would otherwise form the fifth end closure panel 22b. The first handle reinforcing panel 32 is sized similarly to an upper portion of the first side panel 12 to provide a greater area for being secured to first side panel 12 for reinforcing the handle structure H; and upper region of the first side panel 12 which will be subject to a significant load when the

carton 90 is carried; and at the same time sufficient material of the fifth end closure panel 22b remains for securing the sixth and eighth end closure panels 24b, 28 thereto

Accordingly, a carton 90 for packaging one or more articles B has been formed. The carton comprises a first panel 12 and a second panel 22b hingedly connected by a first hinged connection 23b to the first panel 12. The first panel 12 comprises a handle structure H. The handle structure H comprises a severance line 60 defining at least in part a handle opening. The second panel 22b has a handle reinforcing panel 32 hingedly connected thereto by two further hinged connections (33a, 33b). The two further hinged connections (33a, 33b) are spaced from the first hinged connection. The two further hinged connections (33a, 33b) are spaced from the one another and are formed in the second panel 22b. In this way, the handle reinforcing panel 32 reinforces a region of the first panel 12 and beneficially a carton 90 with a strong and robust carrying arrangement is provided. The carton 90 is formed from as economical amount of material as possible, yet due to the substantial reinforcement and 2-ply region above and either side of the handle structures H, a strong and robust carrying arrangement is provided. 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 reinforced handle structure may be employed in cartons of alternative design such as, but not limited to, wraparound style cartons, basket carriers and top gripping clips.

It will be recognized 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 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.

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. 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. A carton for packaging one or more articles, the carton comprising:

a first panel; and

a second panel hingedly connected by a first hinged connection to the first panel;

the first panel comprising a handle structure, the handle structure comprising a severance line defining at least in part a handle opening;

the second panel having a handle reinforcing panel hingedly connected to the second panel by two further hinged connections;

wherein the two further hinged connections are spaced from the first hinged connection.

2. A carton according to claim 1, wherein the handle reinforcing panel comprises a cutaway shaped in a complementary manner to at least a portion of the handle opening and the remainder of the handle reinforcing panel is shaped similarly to an upper portion of the first panel to reinforce an area of the first panel either side of and above the handle structure in the first panel.

3. A carton according to claim 1 or 2, wherein the two further hinged connections are spaced apart from the first hinged connection and are parallel to the first hinged connection.

4. A carton according to claim 1, wherein the two further hinged connections each extend into the second panel by a distance of between 10% and 20% of the maximum width of that second panel such that the two hinged connections are spaced apart from each other and from the first hinged connection.

5. A carton according to claim 1, wherein the second panel forms a minor end closure panel.

6. A carton according to claim 1 wherein the handle structure comprises a handle flap defining at least in part the handle opening.

7. A carton according to claim 6 wherein the handle reinforcing panel comprises a cushioning flap arrangement which co-operates with said handle flap.

8. A carton according to any preceding claim, wherein the handle reinforcing panel is hingedly connected to the second panel via a pair of connecting panels.

9. A carton according to claim 8 wherein, the pair of connecting panels are not secured to the second panel and the handle reinforcing panel is secured to the first panel.

10. A carton according to claim 8 or 9 wherein the connecting panels of said pair of connecting panels are each formed from material that would otherwise form part of the second panel and wherein the connecting panels are hingedly connected to the second panel by said two further hinged connections.

11. A carton according to claim 1, wherein the first panel forms a side wall panel or wherein the first panel forms an end wall panel.

12. A blank for forming a carton, the blank comprising:

a first panel;

a second panel hingedly connected by a first hinged connection to the first panel;

the first panel comprising a handle structure, the handle structure comprising a severance line defining at least in part a handle opening; and

a handle reinforcing panel hingedly connected to the second panel by a first pair of connecting panels which first pair of connecting panels is hingedly connected to the second panel by two further hinged connections,

wherein the two further hinged connections are spaced from the first hinged connection.

13. A blank according to claim 12 wherein the handle reinforcing panel comprises a cutaway shaped in a complementary manner to at least a portion of the handle opening and the remainder of the handle reinforcing panel is shaped similarly to an upper portion of the first panel for providing a reinforcement of an area of the first panel either side of and above the handle structure in the first panel.

14. A blank according to claim 13, wherein the two further hinged connections are spaced apart from the first hinged connection; are parallel to the first hinged connection; and are spaced apart from one another.

15. A carton for packaging one or more articles, the carton comprising:

a plurality of panels for forming a tubular structure, the plurality of panels comprising:

a first side wall panel;

a first end wall panel;

a second side wall panel; and

a second end wall panel,

a first handle structure defined in a first one of the plurality of panels, the first handle structure comprising a severance line defining at least in part a handle opening;

a first end closure panel forming, at least in part, a top wall which at least partially closes an upper end of the tubular structure and is hingedly connected to the first one of the plurality of panels by a first hinged connection;

a first handle reinforcing panel hingedly connected to the first end closure panel by a pair of connecting panels hinged to the first end closure panel by two further hinged connections;

wherein the two further hinged connections are spaced from the first hinged connection.

16. A carton according to claim 15, wherein the handle reinforcing panel comprises a cutaway shaped in a complementary manner to at least a portion of the handle opening and the remainder of the handle reinforcing panel is shaped similarly to an upper portion of the first one of the plurality of panels to reinforce an area of the first one of the plurality of panels either side of and above the handle structure in the first panel.

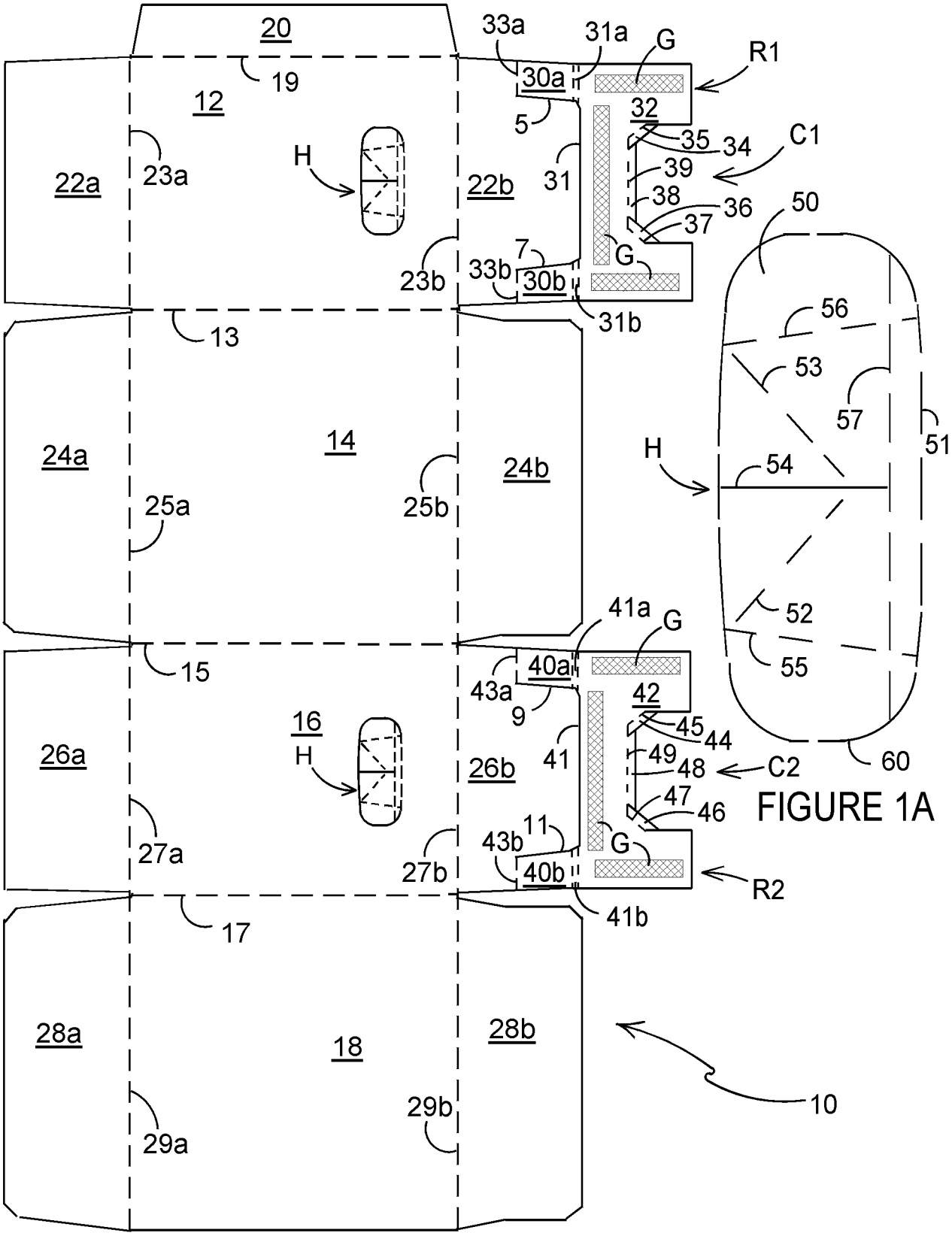
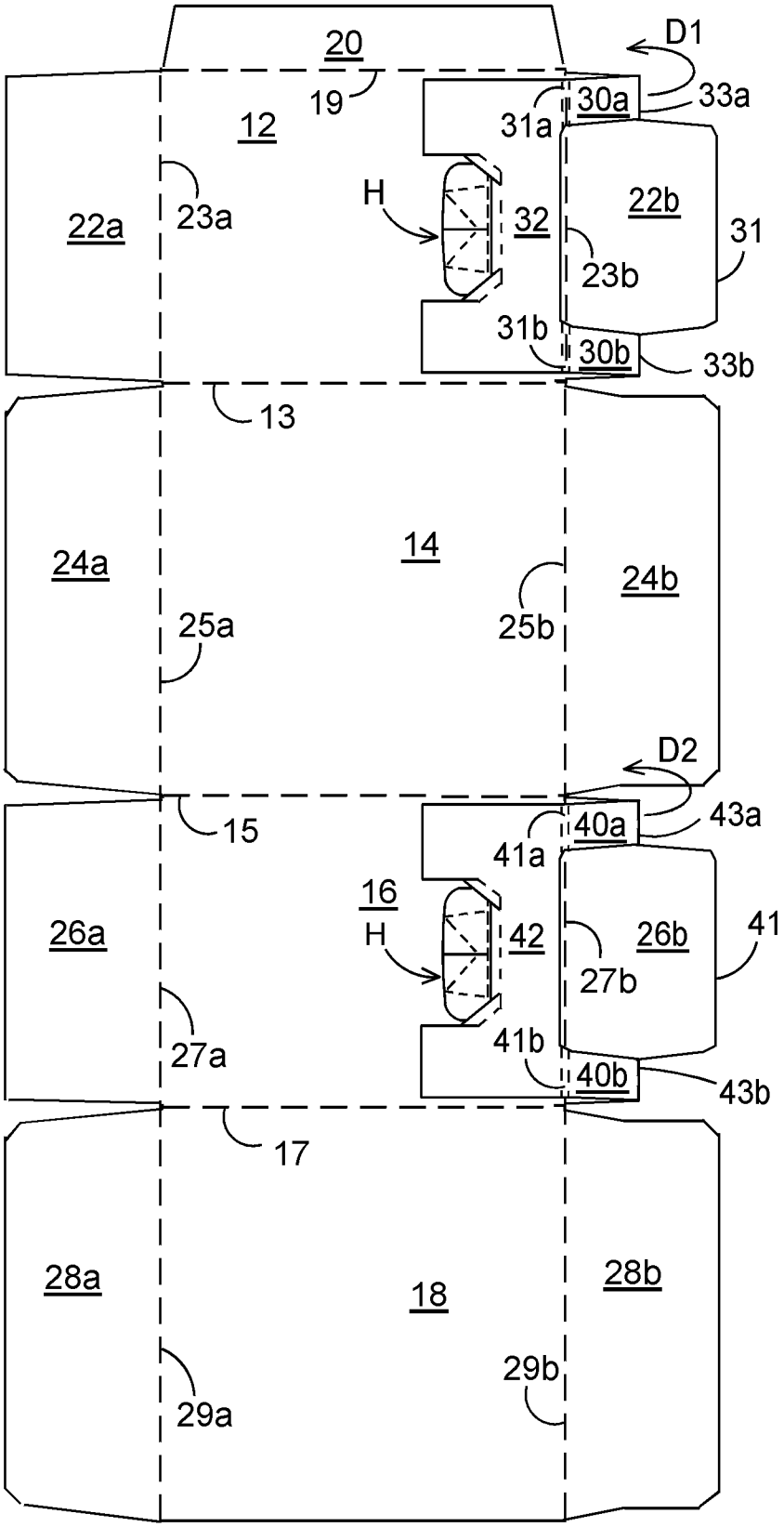


FIGURE 1A

FIGURE 1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19
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33a
31a
12
H
32
22b
31
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23a
23b
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14
24a
24b
25a
25b
D2
15
40a
43a
41a
16
H
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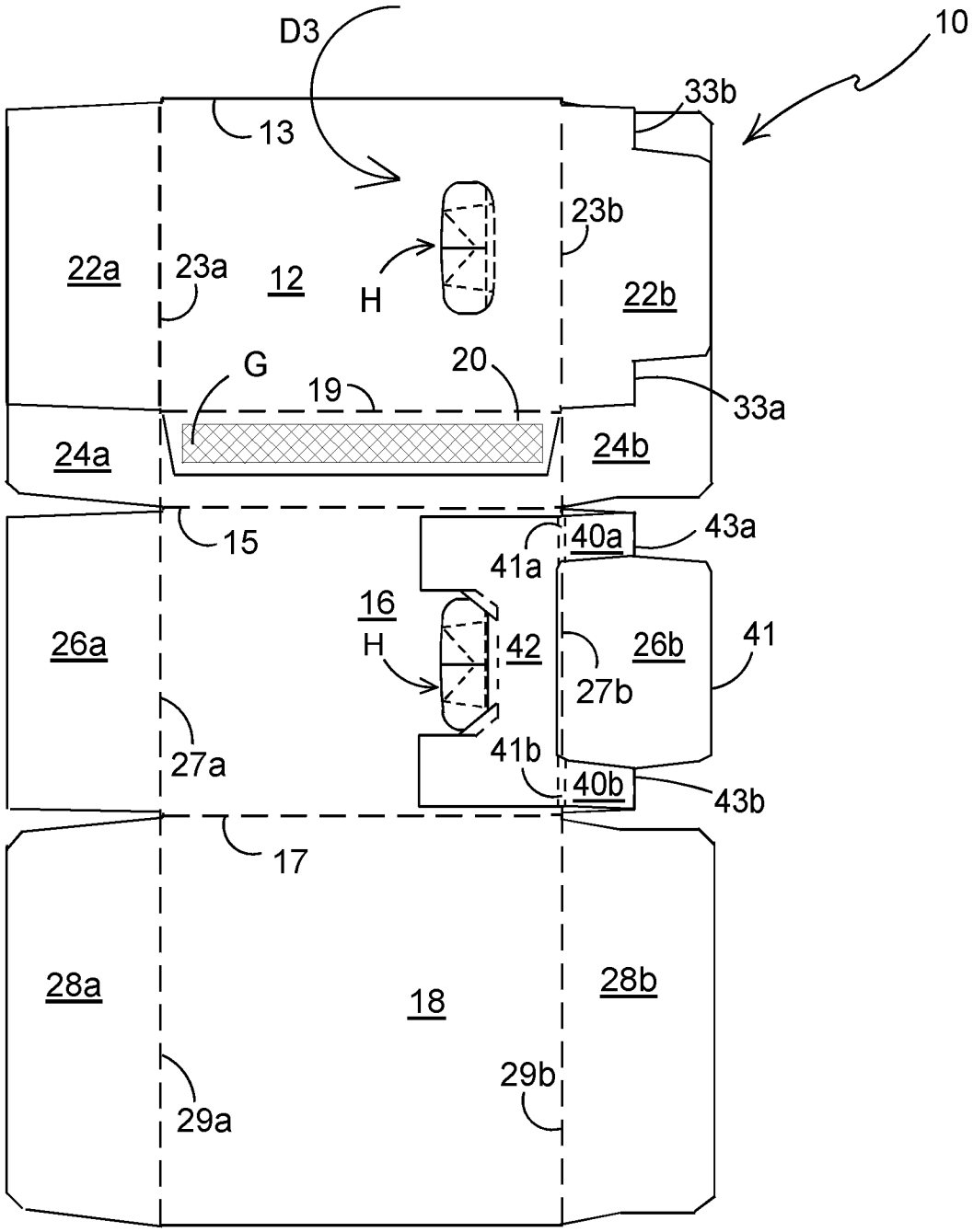
18
29b
29a

FIGURE 2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22a
23a
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22b
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43a
41a
16
H
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29a

FIGURE 3

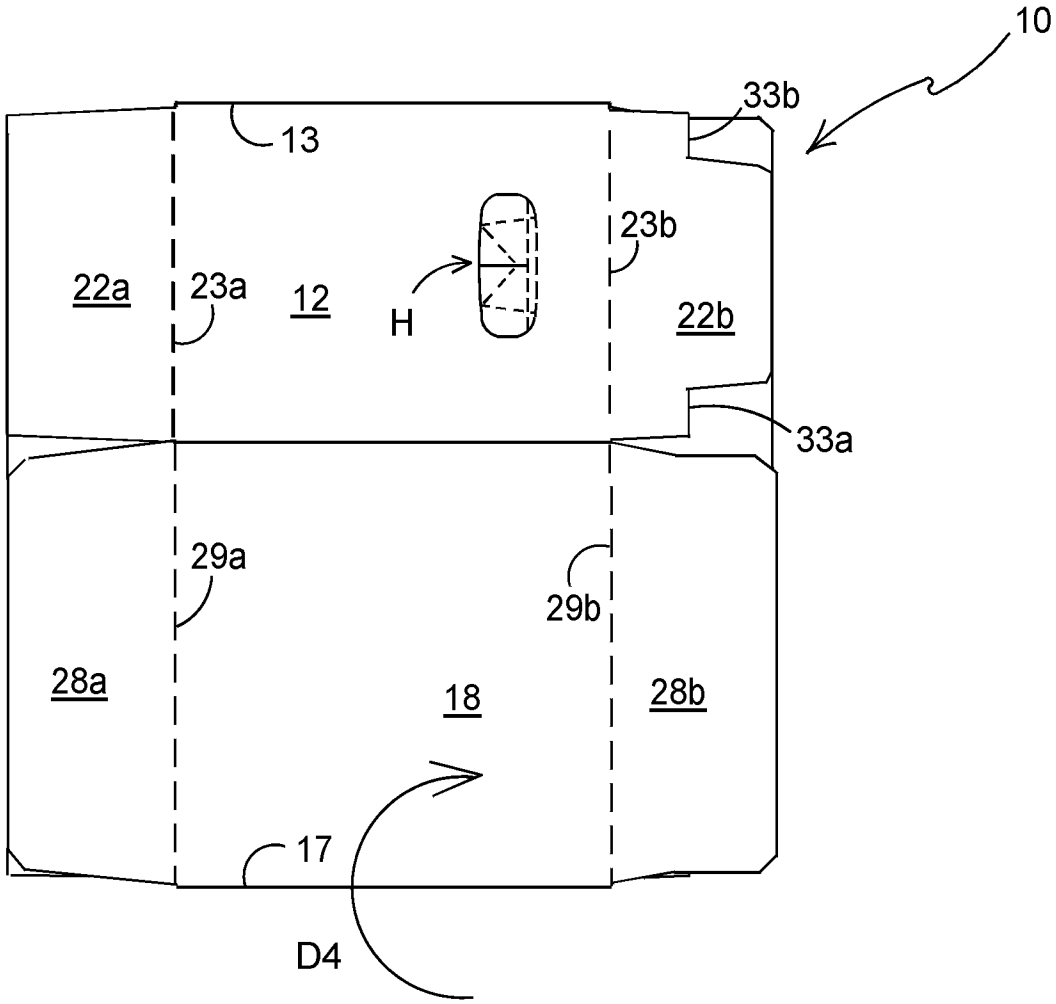

FIGURE 4

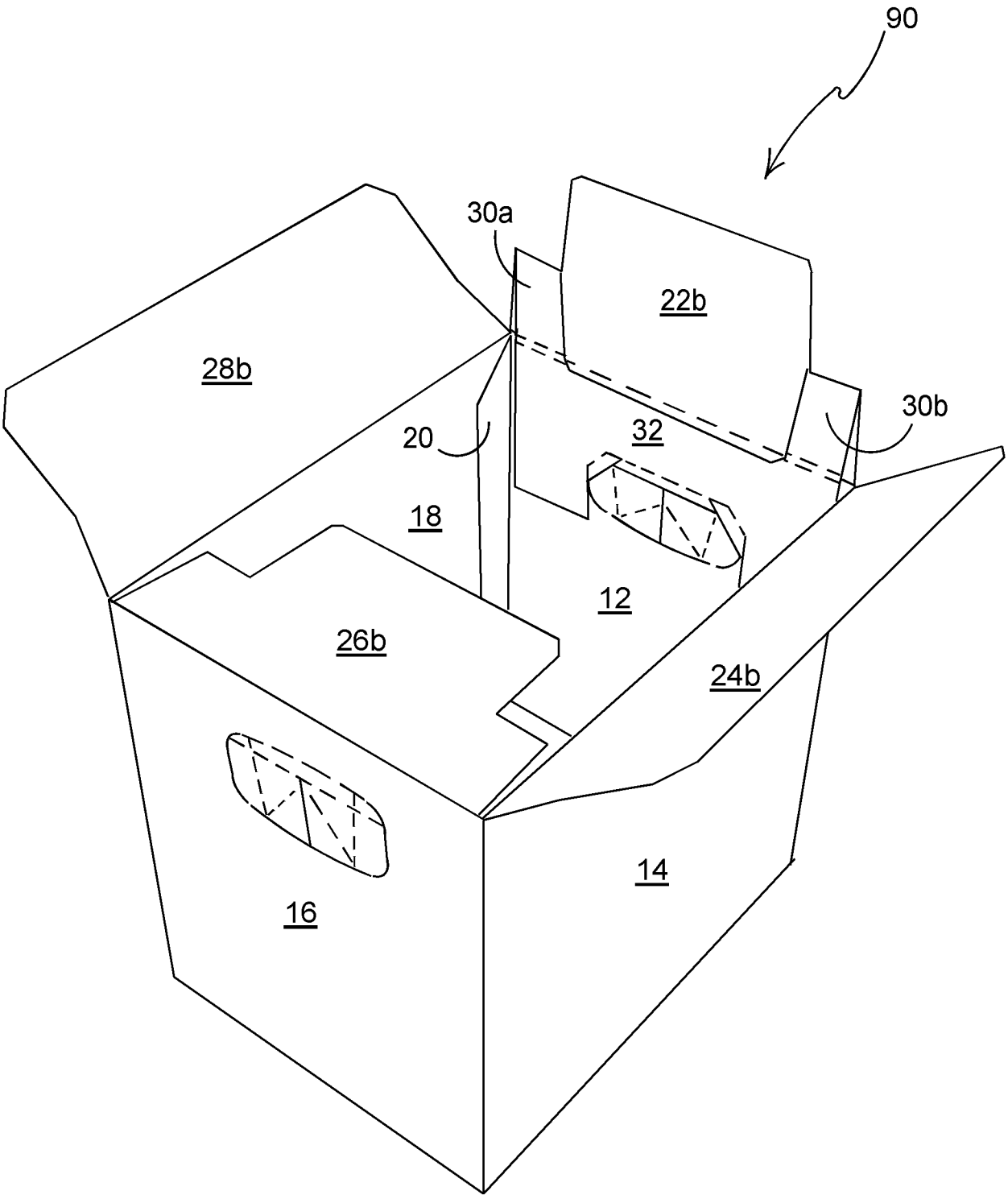

FIGURE 5

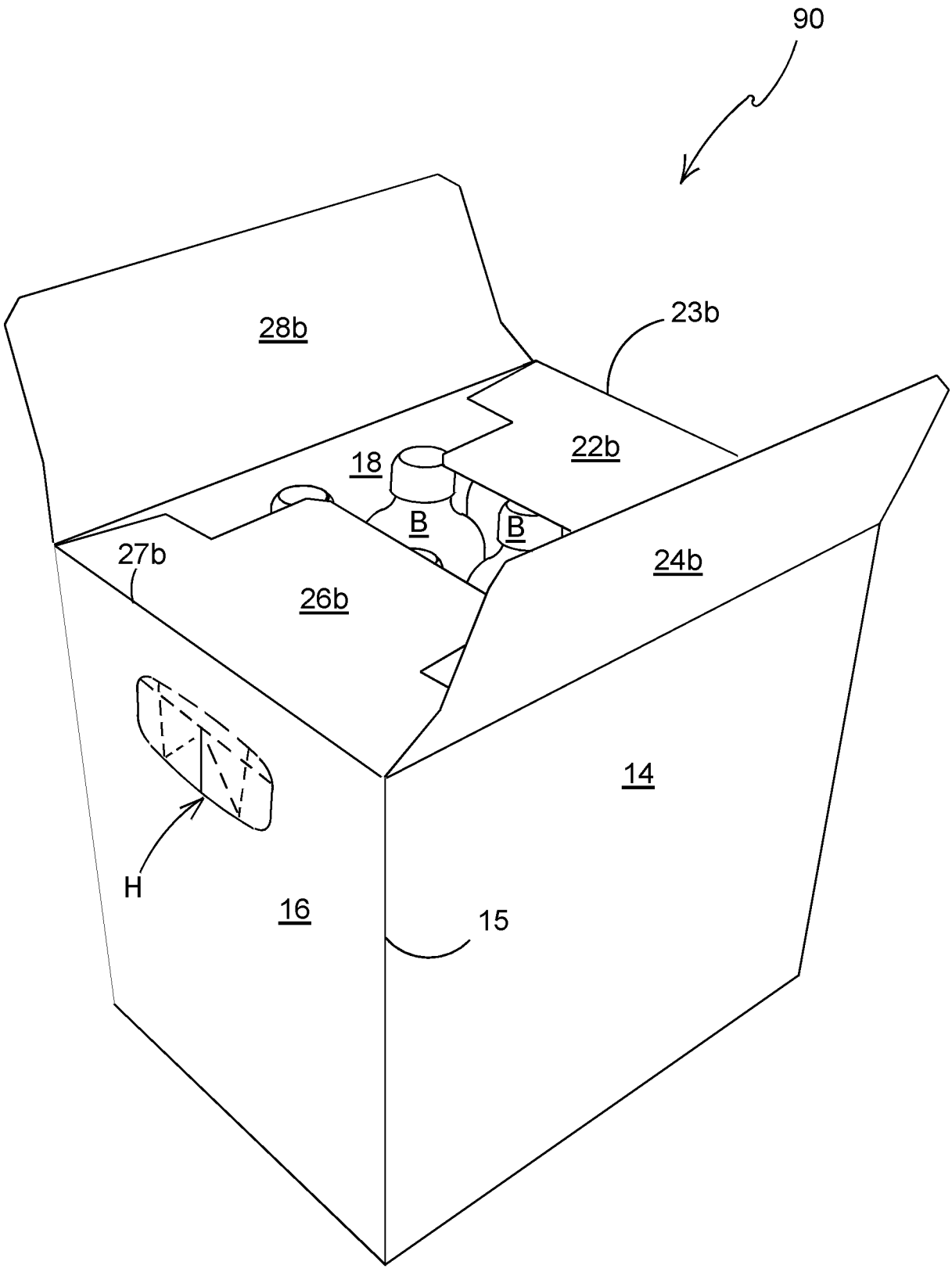

FIGURE 6

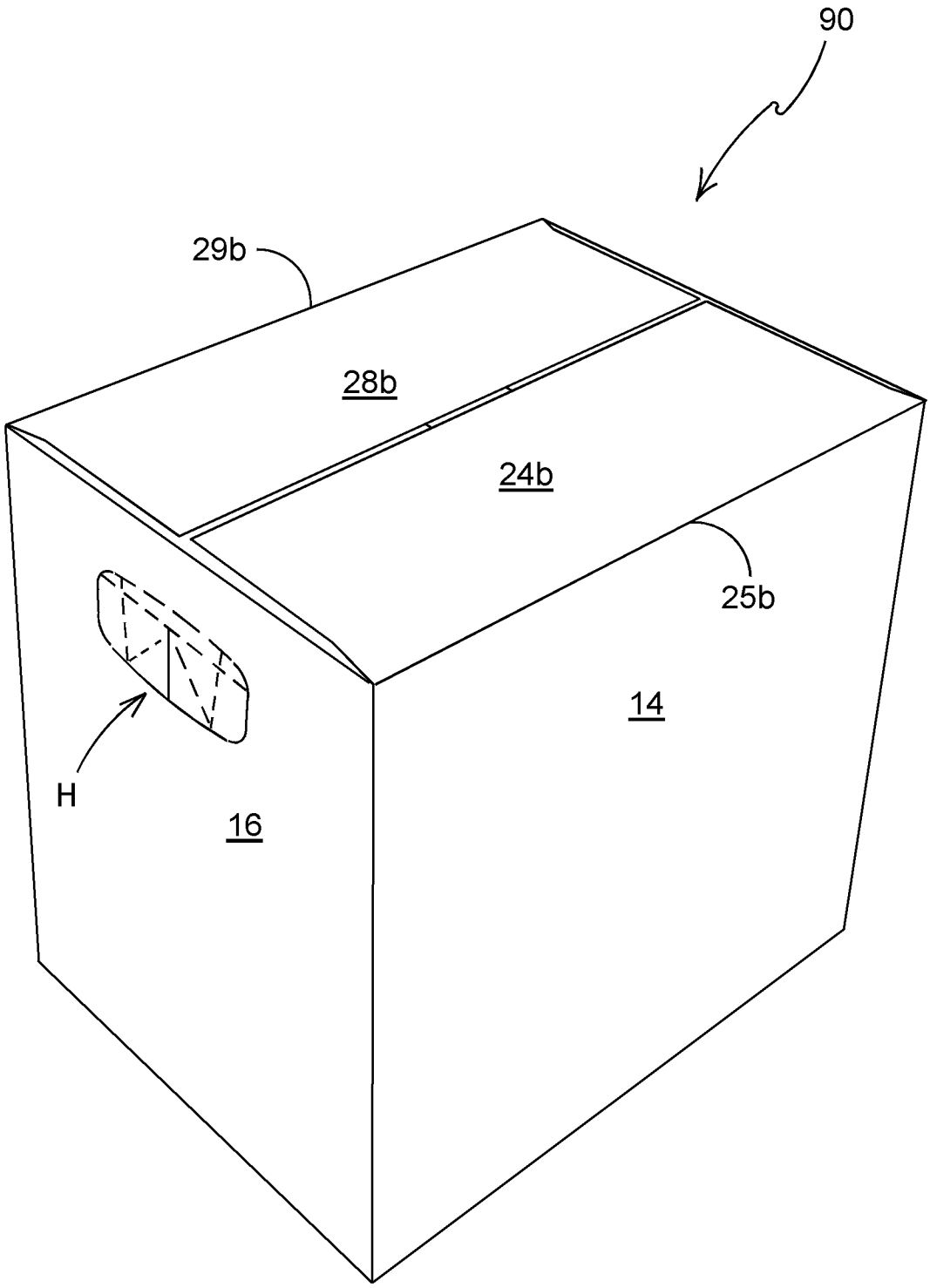

FIGURE 7

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2017/053993

A. CLASSIFICATION OF SUBJECT MATTER
INV. B65D5/02 B65D5/44 B65D5/468
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	WO 2016/154247 A1 (WESTROCK PACKAGING SYSTEMS LLC [US]) 29 September 2016 (2016-09-29) the whole document -----	1-16

☐ 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

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

"O" document referring to an oral disclosure, use, exhibition or other means

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

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

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
21 November 2017	30/11/2017

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Serrano Galarraga, J

1

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/US2017/053993

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2016154247 A1	29-09-2016	TW 201636271 A	16-10-2016
		WO 2016154247 A1	29-09-2016