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(54) **Titre : CARTON ET EBAUCHE DE CARTON**
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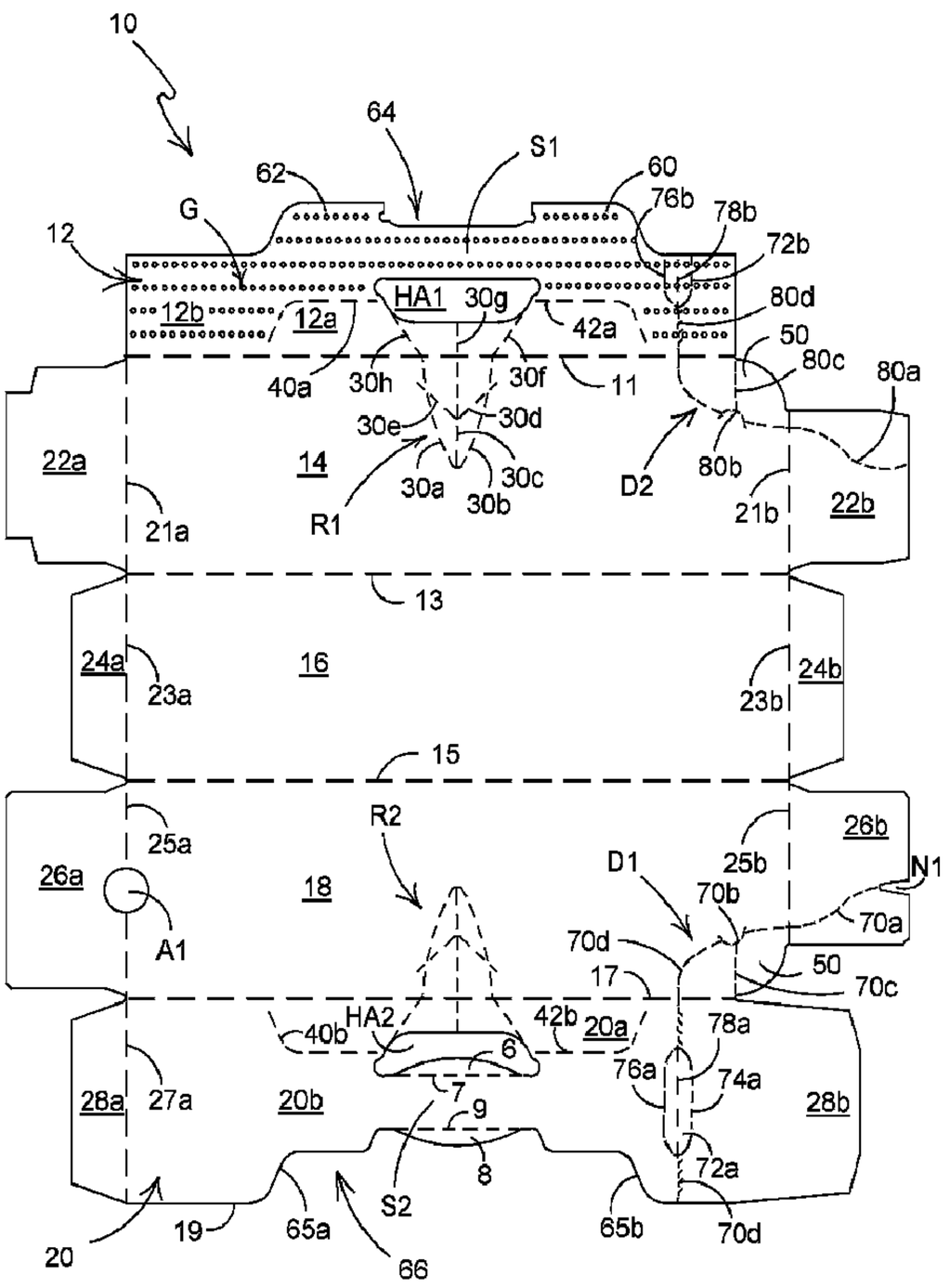

FIGURE 1

(57) **Abrégé/Abstract:**
A carton includes panels forming a tubular structure. The panels include a first top panel (12), a second top panel (20), a first side panel (14), a second side panel (18) and a base panel (16). The first top panel is secured to an inner surface of the second top

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(57) **Abrégé(suite)/Abstract(continued):**
panel. The first top panel extends from the first side panel of the carton and partially across the tubular structure, wherein at least a portion of the second top panel extends from the second side panel of the carton and across the tubular structure to the first side panel. The second top panel includes a handle strap (S2) for carrying the carton while the first top panel includes a protruding portion (60, 62) defining at least in part a handle reinforcing member (S1) for reinforcing the handle strap.

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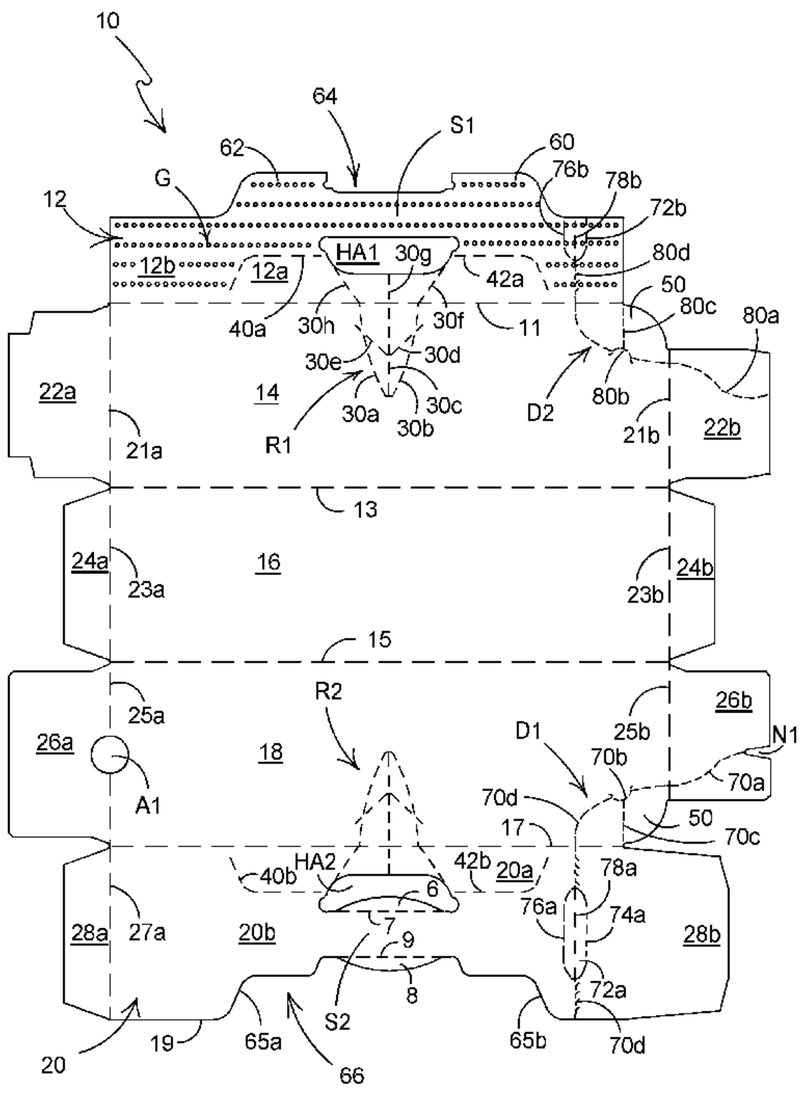

FIGURE 1

(57) **Abstract**: A carton includes panels forming a tubular structure. The panels include a first top panel (12), a second top panel (20), a first side panel (14), a second side panel (18) and a base panel (16). The first top panel is secured to an inner surface of the second top panel. The first top panel extends from the first side panel of the carton and partially across the tubular structure, wherein at least a portion of the second top panel extends from the second side panel of the carton and across the tubular structure to the first side panel. The second top panel includes a handle strap (S2) for carrying the carton while the first top panel includes a protruding portion (60, 62) defining at least in part a handle reinforcing member (S1) for reinforcing the handle strap.

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CARTON AND CARTON BLANK

TECHNICAL FIELD

The present invention relates to a carton and to a blank for forming the carton more specifically, but not exclusively, to a carton having a handle structure for carrying the carton.

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 and for 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 in the materials from which they are formed as possible. 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 with a carrying handle which is robust and readily accessed.

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 invention there is provided a blank for forming a carton the blank comprising a plurality of panels for forming a tubular structure, the plurality of panels being hinged one to the next in a linear series and including a first top panel, a first side panel, a base panel, a second side panel and a second top panel, the first top panel comprising a protruding portion forming a handle reinforcing member for reinforcing a handle strap provided in the second top panel, the handle strap extending substantially longitudinally with respect to a tubular axis of the tubular structure, the protruding portion extending from a side edge of the first top panel, the second top panel comprising a recess defined along a side edge thereof, at least part of the recess being shaped in a complementary manner to the protruding portion such that a protruding portion of a first blank is nestable within a recess of a second, similar, blank, wherein the recess defines an edge of the second top panel and an edge of the handle strap and wherein the recess is shaped so as to redirect load forces in the handle strap towards a side edge of the second top panel.

Optionally, the blank comprises one or more end closure panels for at least partially closing the ends of the tubular structure.

Optionally, at least one of the end closure panels is dimensioned to be less than the full height of the panel to which it is hinged.

Optionally, a second handle reinforcing member is provided and is hinged to the first top panel by a first fold line.

Optionally, the first top panel is shorter in length than the first side panel to which it is hinged such that a portion of the second handle reinforcing member is provided by material disposed adjacent to the first top panel.

Optionally, the first top panel is hinged to the first side panel by a second fold line, the first fold line and the second fold line defining a nonzero angle therebetween.

Optionally, the first fold line and the second fold line define a non-perpendicular angle therebetween.

Optionally, the first fold line and the second fold line define an oblique angle therebetween.

Optionally, the blank further comprises a tab hinged at least to the second top panel, which tab is for being disposed about a free side edge of the first top panel, which free side edge is formed by folding the second handle reinforcing member into face contacting relationship with the first top panel.

Optionally, the first top panel comprises a second recess along a free side edge thereof, the second recess being configured and arranged such that a tab of a similar second blank is nestable in the second recess of the blank when the first and second blanks are being formed.

Optionally, the second handle reinforcing member is severably attached to an end closure panel hinged to the first side panel.

According to a second aspect of the present invention there is provided a carton comprising a plurality of panels forming a tubular structure, the plurality of panels including a first top panel, a second top panel, a first side panel, a second side panel and a base panel, the first

top panel being secured to an inner surface of the second top panel, the first top panel extending from the first side panel of the carton and partially across the tubular structure, wherein at least a portion of the second top panel extends from the second side panel of the carton and across the tubular structure to the first side panel, the second top panel comprising a handle strap for carrying the carton, the first top panel comprising a protruding portion defining at least in part a handle reinforcing member for reinforcing the handle strap, the handle strap extending substantially longitudinally with respect to the tubular structure, the protruding portion extending from a side edge of the first top panel, the second top panel comprising a recess defined along a free side edge thereof, the recess being configured and arranged in a complementary manner, at least in part, to the protruding portion, wherein the recess defines an edge of the second top panel and an edge of the handle strap the recess being shaped so as to redirect load forces in the handle strap towards a side edge of the second top panel.

Optionally, the second top panel comprises a fold line configured and arranged to direct redirect load forces in the handle strap towards an opposing side edge of the second top panel hinged to the second side panel.

Optionally, the first top panel comprises a fold line configured and arranged to direct redirect load forces in the handle strap towards a side edge of the first top panel hinged to the first side panel.

Optionally, the carton comprises one or more end closure panels for at least partially closing the ends of the tubular structure.

Optionally, at least one upper end of the carton is rounded in shape.

Optionally, at least one of the end closure panels provided at the rounded end of the carton is dimensioned to be less than the full height of the panel to which it is hinged.

Optionally, a second handle reinforcing member is provided and is hinged to the first top panel by a first fold line.

Optionally, the first top panel is shorter in length than the first side panel to which it is hinged such that a portion of the second handle reinforcing member is provided by material disposed adjacent to the first top panel.

Optionally, the first top panel is hinged to the first side panel by a second fold line, and wherein the first fold line and the second fold line define a nonzero angle therebetween.

Optionally, the first fold line and the second fold line define a non-perpendicular angle therebetween.

Optionally, the second handle reinforcing member is disposed in face contacting relationship with the first top panel and wherein the first fold line and the second fold line define an acute angle therebetween.

Optionally, a tab is hinged, at least, to the second top panel and is disposed about a free side edge of the first side panel, which free side edge was formed by folding the second handle reinforcing member into face contacting relationship with the first top panel.

According to a third aspect of the present invention there is provided a carton comprising a plurality of panels forming a tubular structure, the plurality of panels including a first top panel, a second top panel, a first side panel, a second side panel and a base panel, the first top panel being secured to an inner surface of the second top panel, the second top panel comprising a handle strap for carrying the carton, the first top panel comprising a protruding portion defining at least in part a handle reinforcing member for reinforcing the handle strap, the handle strap extending substantially longitudinally with respect to the tubular structure, the protruding portion extending from a side edge of the first top panel, the carton comprising a second handle reinforcing member hinged to the first top panel by a first fold line.

Optionally, the first top panel is hinged to the first side panel by a second fold line, the first fold line and the second fold line defining a nonzero angle therebetween.

Optionally, the first fold line and the second fold line define a non-perpendicular angle therebetween.

Optionally, the first fold line and the second fold line define an acute angle therebetween when the second handle reinforcing member is disposed in face contacting relationship with the first top panel.

Optionally, a tab is hinged, at least, to the second top panel and is disposed about a free side edge of the first side panel formed by folding the second handle reinforcing member into face contacting relationship with the first top panel.

According to a fourth aspect of the present invention there is provided a carton comprising a plurality of panels forming a tubular structure, the plurality of panels including a first top panel, a second top panel, a first side panel, a second side panel and a base panel, the first top panel being secured to an inner surface of the second to panel, the first top panel extending from a first side of the carton partially across the tubular structure, wherein at least a portion of the second top panel extends from a second side of the carton across the tubular structure to the first side, the second top panel comprising a handle strap for carrying the carton, the first top panel comprising a protruding portion defining at least in part a handle reinforcing member for reinforcing the handle strap, the handle strap extending substantially longitudinally with respect to a tubular axis of the tubular structure, the protruding portion extending from a side edge of the first top panel, the second top panel comprising a recess defined along a free side edge thereof, the recess being configured and arranged in a complementary manner, at least in part, to the protruding portion, and wherein the recess and the protruding portion define a nonlinear seam between the first top panel and the second top panel.

Within the scope of this application it is envisaged and 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 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

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 a first embodiment;

Figure 2 is a plan view from above of a sheet of material and illustrates how a plurality of blanks similar to that of Figure 1 may be cut from the sheet;

Figure 3 is perspective view from above of a carton formed from the blank of Figure 1;

Figures 4 is a perspective view of the carton formed of Figure 3 showing a carrying handle in use;

Figure 5 is a plan view from above of a blank for forming a carton according to a second embodiment;

Figure 6 is a plan view from above of a sheet of material and illustrates how a plurality of blanks similar to that of Figure 5 may be cut from the sheet; and

Figure 7 is perspective view from above of a carton formed from the blank of Figure 5 illustrating the handle in use.

DETAILED DESCRIPTION OF EMBODIMENTS

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

Figure 1 shows a plan view of a blank 10 capable of forming a carton 90, as shown in Figures 3 and 4, for primary products such as, but not limited to, cans, hereinafter referred to as articles C. Figures 3 and 4 illustrate a carton 90 having a handle structure in accordance with an embodiment of the invention.

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 for engaging, carrying, and/or dispensing articles, such as product containers. It is contemplated that the teachings of the invention can be applied to various product containers, which may or may not be tapered and/or cylindrical. Exemplary containers include bottles (for example metallic, glass or plastics bottles), cans (for example aluminium cans), tins, pouches, packets and the like.

The blanks described herein are formed from a sheet of suitable substrate. It is to be understood that, as used herein, the term “suitable substrate” includes all manner of foldable sheet material such as paperboard, corrugated board, cardboard, plastic, combinations thereof, and the like. It should be recognized that one or other numbers of blanks may be

employed, where suitable, for example, to provide the carrier structure described in more detail below.

In the exemplary embodiments, the blanks 10, 110 are configured to form a carton 90, 190 or carrier 90,190 for packaging an exemplary arrangement of exemplary articles C. In a first illustrated exemplary embodiment, the arrangement is a 2 x 6 matrix or array and the articles are cans. The blank can be alternatively configured to form a carrier for packaging other types, number and size of article and/or for packaging articles in a different arrangement or configuration.

Figure 2 depicts a sheet of material X and illustrates how a plurality of carton blanks B1, B2, B3, B4, B5, B6, B7, B8, B9 may be nested or tessellated to maximize use of the sheet of material X. In the industry it is known to provide large sheets of material of standard dimension and standard area.

Figures 3 and 4 illustrate the transverse alignment of cans C with respect to the handle structure H of the carton 90 in accordance with a first embodiment of the invention. Figure 4 depicts the manner in which the top wall of the carton 90 including its handle structure bows upwardly when a force F is applied to lift a strap member S by a user U.

The blank 10 comprises a plurality of main panels 12, 14, 16, 18, 20 hinged one to the next in a linear series. The blank 10 comprises a first top panel 12 hinged to a first side panel 14 by a fold line 11. The first side panel 14 is hinged to a base panel 16 by a fold line 13. The base panel 16 is hinged to a second side panel 18 by a fold line 15. The second panel 18 is hinged to a second top panel 20 by a fold line 17.

The plurality of main panels 12, 14, 16, 18, 20 of the first blank 10 form an open ended tubular structure when in a set-up condition.

Each of the ends of the tubular structure is at least partially closed by end closure panels. 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 end panels 22b, 24b, 26b, 28b are configured to close a second end of the tubular structure.

A first end closure panel 22a is hinged to a first end of first side panel 14 by a fold line 21a. A second end closure panel 24a is hinged to a first end of base panel 16 by a fold line 23a. A third end closure panel 26a is hinged to a first end of second side panel 18 by a fold line 25a. A fourth end closure panel 28a is hinged to a first end of the second top panel 20 by a fold line 27a.

A fifth end closure panel 22b is hinged to a second end of the first side panel 14 by a fold line 21b. A sixth end closure panel 24b is hinged to a second end of the base panel 16 by a fold line 23b. A seventh end closure panel 26b is hinged to a second end of second side panel 18 by a fold line 25b. An eighth end closure panel 28b is coupled to a second end of second top panel 20.

The first end closure panel 22a and the third end closure panel 26a each form a major end closure panel. The sixth end closure panel 24b and the eighth end closure panel 28b each form a minor side end closure panel.

The second end closure panel 24a and the fourth end closure panel 28a each form a minor end closure panel. The fifth end closure panel 22b forms a major end closure panel. The seventh end closure panel 26b forms a major end closure panel albeit it is dimensioned to be less than the full height of the second side panel 18 to which it is hinged.

Blank 10 comprises a first aperture A1, first aperture A1 is defined in part by the second side panel 18 and the third end closure panel 26a. In the illustrated embodiment first aperture A1 is arranged so as to be aligned with a void formed between a pair of end most cylindrical articles C disposed within the carton 90. In this way a user may readily insert a finger into the carton 90 to facilitate removal of the carton 90 from a shelf or other display apparatus.

The blank 10 comprises components for forming an access device or dispenser D (see Figure 3). The access device D comprises a plurality of severance lines 70a, 70b, 70c, 70d, 76a, 80a, 80b, 80c, 80d, 76b. The access device D is defined by a first portion D1 and a second portion D2.

The first portion D1 comprises a first severance line 70a that commences from a slot or notch N1 provided in the seventh end closure panel 26b (see Figure 1). The notch N1 extends from a side edge of the seventh end closure panel 26b and partially thereacross. The notch N1 is dimensioned to be substantially equal in length to the lateral distance of overlap between the fifth and seventh end closure panels 22b, 26b when the blank 10 is

assembled into the carton 90. The first severance line 70a extends through the seventh end closure panel 26b, into the second side panel 18, and to a first side of a first “horse shoe” shaped severance line 70b, which is defined in the second side panel 18. A second severance line 70d extends from a second side of the first “horse shoe” shaped severance line 70b. The second severance line 70d extends into the second top panel 20. A third severance line 70c extends from a central portion of the first “horse shoe” shaped severance line 70b toward the fold line 17 between the second side panel 18 and the second top panel 20. The second severance line 70d extends across the second top panel 20 and is interrupted by a tear initiation device which is formed in part from a first tab 72a. The first tab 72a is defined by a fourth severance line 76a and a first fold line 74a. The first tab 72a is substantially elongate in shape and in the embodiment of Figure 1 is stadium shaped. The first tab 72a comprises a second fold line 78a which extends transversely with respect to the tubular axis of the carton 90 and bisects the first tab 72a.

The second portion D2 comprises a fifth severance line 80a that commences from a side edge of the fifth end closure panel 22b. The fifth severance line 80a extends through the fifth end closure panel 22b, into the first side panel 14, and to a first side of a second “horse shoe” shaped severance line 80b which is defined in the first side panel 14. A sixth severance line 80d extends from a second side of the second “horse shoe” shaped severance line 80b. The sixth severance line 80d extends into the first top panel 12. A seventh severance line 80c extends from a central portion of the second “horse shoe” shaped severance line 80b toward the fold line 11 between the first side panel 14 and the first top panel 12. The sixth severance line 80d extends across the first top panel 12 and is interrupted by a tear initiation device formed in part from a second tab 72b. The second tab 72b is defined by an eighth severance line 76b and a further fold line. The second tab 72b is substantially similar in shape to a portion of the first tab 72a. The second tab 72b comprises a fold line 78b which extends transversely with respect to the tubular axis of the carton 90 and bisects the second tab 72b.

In a setup carton 90 (see Figures 3 and 4) the first portion D1 and the second portion D2 are arranged to form a continuous loop such that a corner portion of the carton 90 is at least partially severable or removable from the carton 90. The second tab 72b is disposed in vertical registry with an overlying portion of the first tab 72a.

Referring again to Figure 1, it can be seen that the blank 10 also comprises a handle structure which is defined in part in the first top panel 12 and in part in the second top panel 20. The second top panel 20 is an outer top panel and the first top panel 12 is an inner top

panel. The second top panel 20 comprises a handle strap S2 that is defined in part by a first handle aperture HA2 and in part by a recess 66. The recess 66 is defined along a free, unhinged, side edge 19 of the second top panel 20; the recess 66 defines two shoulders 65a, 65b. The handle strap S2 comprises a first cushioning flap 6 hinged to a first side edge of the handle strap S2 by a fold line 7 and a second cushioning flap 8 hinged to a second, opposing side edge of the handle strap S2 by a fold line 9.

The first top panel 12 comprises a reinforcing handle strap S1 (also referred to as “handle reinforcing member”) for forming a two ply structure with the handle strap S2 of the second top panel 20. The reinforcing handle strap S1 is defined in part by a second handle aperture HA1 and in part by a free side edge of the first top panel 12. The free side edge may comprise a recess 64 defined therein. The first top panel 12 comprises a protruding portion or flange having two shoulders 60, 62. The protruding portion is shaped in a manner that is complementary to the shape of the recess 66 such that the protruding portion of a first blank B1 can be nested in the recess of a second blank B4 (see Figure 2). In this way the protruding portion of the first top panel 12 of the blank B1 is effectively formed from material that may be considered as taken from within the footprint of the second top panel 20 of the second blank B4. In the erected carton 90 shown in Figure 3, the recess 64 is disposed in substantial registry with the handle aperture HA2 in the second top panel 20 such that the shoulders 60, 62 underlines the areas of the second top panel 20 on the opposite sides of the handle aperture HA2.

The handle structure comprises a pair of relief structures R1, R2. A first relief structure R1 is defined in part in the first top panel 12 and in part in the first side panel 14; and a second relief structure R2 is defined in part in the second top panel 20 and in part in the second side panel 18. The first and second relief structures R1, R2 are substantially the same in construction and will be described in further detail by reference only to the first relief structure R1.

The first relief structure R1 comprises a first fold line 30h defined in the first top panel 12 and extending from a first end of the second handle aperture HA1 to the fold line 11 between the first top panel 12 and the first side panel 14. The first relief structure R1 comprises a second fold line 30f defined in the first top panel 12 and extending from a second opposing end of the second handle aperture HA1 to the fold line 11 between the first top panel 12 and the first side panel 14. The first and second fold lines 30h, 30f converge towards the fold line 11.

The first relief structure R1 comprises a third fold line 30a defined in the first side panel 14 and extending from a first end of the first fold line 30h, about at the point it intersects the fold line 11, into the first side panel 14.

The first relief structure R1 comprises a fourth fold line 30b defined in the first side panel 14 and extending from a first end of the second fold line 30g, about at the point it intersects the fold line 11, into the first side panel 14. The third fold line 30a and the fourth fold line 30b converge at a point distal from the fold line 11 to form a generally “V” shaped configuration.

The first relief structure R1 comprises a fifth fold line 30c defined in the first side panel 14 and extending from the fold line 11 to the vertex between the third fold line 30a and the fourth fold line 30b. The fifth fold line 30c bisects the generally “V” shaped configuration formed by the third fold line 30a and the fourth fold line 30b.

The first relief structure R1 comprises a sixth fold line 30g defined in the first top panel 12 and extending from the fold line 11 to a central point on the second handle aperture HA1. The sixth fold line 30g is arranged to be collinear and continuous with the fifth fold line 30c.

The first relief structure R1 further comprises a seventh fold line 30e and an eighth fold line 30d defined in the first side panel 14. The seventh fold line 30e and the eighth fold line 30d converge at a point on the fifth fold line 30c. The point of convergence of the seventh and eighth fold lines 30e, 30d is distal from the fold line 11, and distal from the vertex between the third and fourth fold lines 30a, 30b.

Optionally, the first top panel 12 comprises a first relief fold line 40a and a second relief fold line 42a. The first relief fold line 40a is nonlinear in shape (i.e. not simply straight) and optionally comprises: a first linear portion extending longitudinally (along the tubular axis X-X in Figure 3) from a first end of the second handle aperture HA1; and a second linear portion extending from the first linear portion at an oblique angle, with respect to the first linear portion, and extending towards the fold line 11 between the first top panel 12 and the first side panel 14. The second relief fold line 42a is nonlinear in shape (i.e. not simply straight) and optionally comprises: a first linear portion extending longitudinally from a second end of the second handle aperture HA1; and a second linear portion extending from the first linear portion, at an oblique angle with respect to the first linear portion, and extending towards the fold line 11 between the first top panel 12 and the first side panel 14.

The first relief fold line 40a and a second relief fold line 42a are shaped in a complementary manner relative to the shoulders 65a, 65b of the recess 66 in the second top panel 20. The first relief fold line 40a and the second relief fold line 42a define in part a first portion 12a of the first top panel 12 and a second portion 12b of the first top panel 12. The second portion 12b forms an overlapping portion, which is adhesively secured to an inner surface of the second top panel 20. The first portion 12a is exposed to view by the recess 66 when the second top panel 20 is secured in face contacting relationship with the first top panel 12, as illustrated in Figure 3.

Optionally, the second top panel 20 comprises a third relief fold line 40b and a fourth relief fold line 42b. The third relief fold line 40b is nonlinear in shape and optionally comprises: a first linear portion extending longitudinally from a first end of the first handle aperture HA2; and a second linear portion extending from the first linear portion, at an oblique angle with respect to the first linear portion, and extending towards the fold line 17 between the second top panel 20 and the second side panel 18. The fourth relief fold line 42b is nonlinear in shape and optionally comprises: a first linear portion extending longitudinally from a second end of the first handle aperture HA2 and a second linear portion, extending from the first linear portion at an oblique angle, with respect to the first linear portion and extending towards the fold line 17 between the second top panel 20 and the second side panel 18.

The third relief fold line 40b and a fourth relief fold line 42b are shaped in a complementary manner, at least in part, to the protruding portion or flange of the first top panel 20. The third relief fold line 40b and the fourth relief fold line 42b define in part a first portion 20a of the second top panel 20 and a second portion 20b of the second top panel 20.

Turning to the construction of the carton 90 as illustrated in Figures 3 and 4, the carton 90 can be formed by a series of sequential folding operations in a straight line machine so that the carton 90 is not required to be rotated or inverted to complete its construction. The folding process is not limited to that described below and may be altered according to particular manufacturing requirements.

The blank 10 is folded about fold line 13, such that the first top panel 12 and first side panel 14 are folded thereabouts. The first top panel 12 is brought into face contacting relationship with the second side panel 18; the first side panel 14 is brought into face contacting relationship with the base panel 16 and a portion of the second side panel 18.

Glue G or other adhesive treatment is applied to second portion 12b of the first top panel 12 or, in alternative embodiments, to a corresponding portion of the second top panel 20. Optionally, glue is applied in a plurality of linear beads extending longitudinally across the second portion 12b of the first top panel 12.

The second top panel 20 is folded about the fold line 17 such that the second top panel 20 overlies a portion of the first top panel 12.

The second top panel 20 is secured to the first top panel 12 to form a flat collapsed carton. The carton may be shipped or distributed in this flat collapsed form. The recess 66 and the protruding portion of the first panel 12 define a nonlinear seem or region of overlap between the first top panel 12 and the second top panel 20, as illustrated in Figure 3.

In alternative embodiments the second top panel 20 may be secured to the first top panel 12 by alternative securing means for example, but not limited to, staples or other mechanical fixing means.

The flat collapsed carton may be erected into a tubular structure by separating the composite top panel 12/20 from the base panel 16.

The carton 90, in its open ended tubular form, may be loaded with articles C through one or both open ends. It will be appreciated that in other embodiments one of the open ends of the carton 90 may be closed before loading the carton 90 with articles C through the remaining open end.

Once the carton 90 is loaded with articles C the ends of the tubular structure are closed.

A first end of the tubular structure is closed by folding the second end closure panel 24a about fold line 23a and by folding the fourth end closure panel 28a about fold line 27a.

The first end closure panel 22a is then folded about the fold line 21a to be brought into contact with the second and fourth end closure panels 24a, 28a and optionally is adhesively secured thereto.

Glue or other adhesive treatment is applied to an outer surface of the first end closure panel 22a, or in alternative embodiments to an inner surface of the third end closure panel 26a.

The third end closure panel 26a is then folded about the fold line 25a to be brought into contact with at least the first end closure panel 22a and is secured thereto.

A second end of the tubular structure is closed by folding the sixth end closure panel 24b about fold line 23b and by folding the eighth end closure panel 28b with respect to the second top panel 20.

The seventh end closure panel 26b is then folded about the fold line 25b to be brought into contact with the sixth and eighth end closure panels 24b, 28b and optionally is adhesively secured thereto.

Glue or other adhesive treatment is applied to an outer surface of the seventh end closure panel 26b, or in alternative embodiments to an inner surface of the fifth end closure panel 22b.

The fifth end closure panel 22b is then folded about the fold line 21b to be brought into contact with at least the seventh end closure panel 26b and is secured thereto.

Upper corners 50 of the first and second side panels 14, 18 are rounded at the second end of the tubular structure. The eighth end closure panel 28b is bent or deformed, optionally folded or creased so as to conform to the shape of the rounded corners 50. In this way the upper end of the carton 90 is rounded or arcuate in shape, the carton 90 is arranged to provide a close fit with the articles C. The articles C may be substantially cylindrical in shape and arranged such that a cylindrical axis is transversely oriented between the first and second side panels 14, 18. The eighth end closure panel 28b is deformed or bent around the outer surface of the uppermost endmost article C, said article C may act as mandrel for bending the eighth end closure panel 28b.

The primary elements of the handle structure of the subject invention are the strap member S and the shoulders 65a, 65b defined by the recess 66. The recess 66 allows the blank 10 to be nested in such a way that a reinforcing portion is provided by the protruding portion or flange extending from the first top panel 12 without requiring additional material or increasing waste when cutting multiple blanks from the sheet X, which may have a pre-defined and standard size, since the blanks B1, B2, B3 and so on can be tessellated. This provides economic and ecological benefits and at the same time provides a robust and strong two ply handle structure. The protruding portion or flange increases the overlapping region between the first and second top panels 12, 20 thereby improving the strength of the handle without

providing a first or inner top panel 12 which is dimensioned to be the full width of the carton 90. In this way the handle strap S and the adjacent end regions are two ply in construction.

The recess 66 provides an additional benefit when the carrying handle is in use such that when a force F is exerted upon a centrally disposed region of the carrying handle in a direction substantially perpendicular to a plane (or notional plane) in which the composite top panel 12/20 lies, the strap member S which flexes outwardly of the plane, as illustrated in Figure 4. The shape of the recess 66 and the shoulders 65a, 65b redirect load forces in the strap S from a longitudinal direction with respect to the tubular axis X-X (see Figure 3) of the carton 90 towards a transverse direction. The load forces are directed towards the side edges of the composite top panel 12/20 thus reducing the likelihood of tears propagating. This is further enhanced when relief fold line 40a, 40b, 42a, 42b are provided.

The shape of the recess 66 and the shoulders 65a, 65b may also act as a brake or stopper such that they stop shearing or separation of the first top panel 12 from the second top panel 20 when the handle is in use.

Referring now to Figures 5 to 7, there is shown an additional embodiment of the present invention. In the second illustrated embodiment, like numerals have, where possible, been used to denote like parts, albeit with the addition of the prefix “100” to indicate that these features belong to the second embodiment. The second embodiment shares many common features with the first embodiment and therefore only the differences from the embodiment illustrated in Figures 1 to 4 will be described in any greater detail.

The blank 110 comprises a plurality of main panels 112, 114, 116, 118, 120 hinged one to the next in a linear series. The blank 110 comprises a first top panel 112 hinged to a first side panel 114 by a fold line 111. The first side panel 114 is hinged to a base panel 116 by a fold line 113. The base panel 116 is hinged to a second side panel 118 by a fold line 115. The second panel 118 is hinged to a second top panel 120 by a fold line 117.

The plurality of main panels 112, 114, 116, 118, 120 of the first blank 110 form an open ended tubular structure when in a first assembly condition.

Each of the ends of the tubular structure is at least partially closed by end closure panels. In the illustrated embodiment the ends of the tubular structure are fully closed by end closure panels 122a, 124a, 126a, 128a; and 122b, 124b, 126b, 128b respectively.

The second relief structure R2 comprises a plurality of fold lines 181, 183, 185, 187, 189. A first fold line 187 defined in the second top panel 120 and extending from a first end of the first handle aperture HA2 to the fold line 117 between the second top panel 120 and the second side panel 118. The second relief structure R2 comprises a second fold line 189 defined in the second top panel 120 and extending from a second opposing end of the first handle aperture HA2 to the fold line 117 between the second top panel 120 and the second side panel 118. The first and second fold lines 187, 189 terminate at the fold line 117.

A third fold line 185 extends form a central region of the first handle aperture HA2 transversely across the second top panel 120 to the fold line 117 and into the second side panel 118. Fourth and fifth fold lines 181, 183 form an inverted “V” with the vertex between the fourth and fifth fold lines 181, 183 being disposed at the terminus of the third fold line 185 in the second top panel 118; in this way the third, fourth and fifth fold lines 185, 181, 183 form an arrow head shape. The first and second fold lines 187, 189 converge in a direction angled towards the vertex of the arrow head shape formed between the fourth and fifth fold lines 181, 183 or the third fold line 185.

The second top panel 120 comprises a first tab T1 and a second tab T2. The first tab T1 extends from a side edge of the second top panel 120 and is hinged thereto by a fold line 119. The second tab T2 extends from a side edge of the second top panel 120 and a side edge of the eighth end closure panel 128b and is hinged thereto by a fold line 119. The second severance line 170d of the access device extends through and across the second tab T2.

The first tab T1 and a second tab T2 define in part a recess 166 in the side edge of the second top panel 120.

The first top panel 112 comprises a first recess 168a and a second recess 168b. The first recess 168a and a second recess 168b are shaped in a complementary manner relative to the first and second tabs T1, T2 respectively. In this way the first and second tabs T1, T2 of first blank B1 can be nested against the respective one of first and second recesses 168a, 168b of a second blank B4 as shown in see Figure 6. A common cut line may define the edge of the first and second tabs T1, T2 of first blank B1 and the first and second recesses 168a, 168b of a second blank B4 which may make the cutting process simpler and quicker.

The blank 110 comprises a relief aperture A3. The relief aperture A3 is elongate in shape and interrupts the fold line 111 between the first top panel and the first side panel 114. The

relief aperture A3 is configured to be aligned vertically with the fold line 119 of the first tab T1 when the carton 190 is assembled. The relief aperture A3 facilitates folding of the first tab T1 and reduces the thickness of material at the corner of the carton 190 in the region of overlap between the fold line 119 and the fold line 111.

The blank 110 comprises a handle reinforcing panel 192 (also referred to as “second handle reinforcing member”). The handle reinforcing panel 192 provides a third ply to the handle structure. The handle reinforcing panel 192 is hinged to the first top panel 112 by a fold line 191. The fold line 191 terminates at the fold line 111, which in this embodiment is not co-extensive with the first side panel 114. The fold line 191 is orientated so as to define an (optionally acute) angle with the fold line 111. The angle is non-zero and is preferably non-perpendicular. The handle reinforcing panel 192 is severably attached to the sixth end closure panel 122b along an upper edge thereof by a connecting nick portion 193. The handle reinforcing panel 192 is shaped to be complementary in shape, at least in part to the shape of the strap S1. The handle reinforcing panel 192 is disposed about the rounded corner of the first side panel 114. By comparison of the nested arrangement of blanks B1, B2, B3, B4, B5, B6, B7, B8 shown in Figure 2 with the nested arrangement of blanks B1, B2, B3, B4, B5, B6, B7, B8 shown in Figure 6 it can be seen that the handle reinforcing panel 192 is formed in part from material which would otherwise form the first top panel 112 and in part from material which would otherwise be wasted. The blank 110 provides an efficient way to provide a three ply handle structure which maximizes the number of blanks 110 that can be struck from the sheet Y.

The handle reinforcing panel 192 is separated from the first side panel by an aperture A2 and a cutline 195. Cutline 195 is collinear with fold line 111 and extends from a vertex between fold line 191 and fold line 111 to aperture A2.

The blank 110 is assembled into the carton 190 and loaded in substantially the same manner as the first embodiment of Figures 1 to 4. The first and second tabs T1, T2 are folded about the fold lines 119 and secured to the first side panel 114. The second tab T2 is arranged so as to secure the second top panel 120 in the region of the cut line 195. The second tab T2 hinged at is disposed about a free side edge of the first top panel 112, which free side edge defined by the cutline 195 and is formed by folding the handle reinforcing panel 192 into face contacting relationship with the first top panel 112.

The strap handle is deployed in the same manner as described above, albeit with the handle reinforcing panel 192 sandwiched between the first and second straps S1, S2.

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.

It will be recognised that as used herein, directional references such as "top", "base", "front", "back", “rear”, "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.

The term “longitudinal direction” as used herein refers to either direction along the tubular axis of the tubular structure of the carton. An example of such a tubular axis is shown in Figure 3 at “X-X”. The term “longitudinally” as used herein means in other words “along the tubular axis of the tubular structure of the carton” or “substantially parallel to the tubular axis of the tubular structure of the carton”.

As used herein, the term “hinged” refers to all manner of connections provided by one or more fold lines that define hinge features of the blank or substrate of sheet material. Such one or more fold lines 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” should not be construed as necessarily referring to a connection provided by a single fold line only; indeed “hinged” may refer to a connection formed from two or more fold lines.

The term “fold line” as used herein refers to any line that defines a hinge line in a foldable sheet material, such as paperboard, for facilitating folding of portions of a blank of sheet material with respect to one another, or otherwise indicating optimal panel folding locations on the blank. A fold line may be formed by a single score, a single half cut, a line of perforations, a line of cuts, a line of short slits, a line of half cuts, a line of scores, any combination thereof, or the like.

The term “severance line” as used herein refers to any line that defines a separation line in a foldable sheet material, such as paperboard, for facilitating separation of portions of a blank of sheet material from one another, or otherwise indicating optimal separation locations on the blank. A severance line may be formed by a single cut, a single half cut, a line of perforations, a line of cuts, a line of short slits, a line of half cuts, any combination thereof, or the like.

It should be understood that the elements of a fold line or severance line, such as cuts, scores, half cuts, slits, perforations or the like, may be dimensioned and arranged to provide the desired functionality. For example, a line of perforations can be dimensioned or designed with degrees of weakness to define a fold line and/or a severance line. The line of perforations can be designed to facilitate folding and resist breaking, to facilitate folding and facilitate breaking with more effort, or to facilitate breaking with little effort.

CLAIMS

1. A blank for forming a carton the blank comprising a plurality of panels for forming a tubular structure, the plurality of panels being hinged one to the next in a linear series and including a first top panel, a first side panel, a base panel, a second side panel and a second top panel, the first top panel comprising a protruding portion forming a handle reinforcing member for reinforcing a handle strap provided in the second top panel, the handle strap extending substantially longitudinally with respect to a tubular axis of the tubular structure, the protruding portion protruding from a free side edge of the first top panel, the second top panel comprising a recess defined along a free side edge thereof, at least part of the recess being shaped in a complementary manner to the protruding portion such that a protruding portion of a similar blank is nestable within the recess, wherein the recess defines an edge of the second top panel and an edge of the handle strap and wherein the recess is shaped so as to redirect load forces in the handle strap towards the free side edge of the second top panel.

2. The blank of claim 1, wherein a second handle reinforcing member is provided and is hinged to the first top panel by a first fold line.

3. The blank of claim 2, wherein the first top panel is shorter in length than the first side panel to which it is hinged such that a portion of the second handle reinforcing member is provided by material disposed adjacent to the first top panel.

4. The blank of claim 2, wherein the first top panel is hinged to the first side panel by a second fold line, and the first fold line and the second fold line define a non-perpendicular angle therebetween.

5. The blank of claim 4, wherein the first fold line and the second fold line define an oblique angle therebetween.

6. The blank of claim 3, further comprising a tab hinged at least to the second top panel, which tab is for being disposed about a free side edge of the first top panel, which free side edge is formed by folding the second handle reinforcing member into face contacting relationship with the first top panel.

7. The blank of claim 6, wherein the first top panel comprises a second recess along a free side edge thereof, the second recess being configured and arranged such that a tab of a similar second blank is nestable in the second recess of the blank when the first and second blanks are being formed.

8. The blank of claim 1, wherein the second top panel comprises a fold line configured and arranged to redirect load forces in the handle strap towards an opposing side edge of the second top panel hinged to the second side panel.

9. The blank of claim 1, wherein the first top panel comprises a fold line configured and arranged to redirect load forces in the handle strap towards a side edge of the first top panel hinged to the first side panel.

10. The blank of claim 1, wherein the first and second top panels overlaps each other when the blank is erected into the tubular structure, the second top panel has an handle aperture which defines part of the handle strap, the protruding portion comprises a pair of shoulders and a recess defined between the shoulders, and the recess is positioned and dimensioned such that the recess is disposed in substantial registry with the handle aperture in the second top panel in the tubular structure.

11. A carton comprising a plurality of panels forming a tubular structure, the plurality of panels including a first top panel, a second top panel, a first side panel, a second side panel and a base panel,

the first top panel being secured to an inner surface of the second top panel, the first top panel extending from the first side panel of the carton and partially across the tubular structure, wherein at least a portion of the second top panel extends from the second side panel of the carton and across the tubular structure to the first side panel,

the second top panel comprising a handle strap for carrying the carton,

the first top panel comprising a protruding portion defining at least in part a handle reinforcing member for reinforcing the handle strap,

the handle strap extending substantially longitudinally with respect to a tubular axis of the tubular structure, the protruding portion protruding from a free side edge of the first top panel,

the second top panel comprising a recess defined along a free side edge thereof, the recess being configured and arranged in a complementary manner, at least in part, to the protruding portion, wherein the recess defines an edge of the second top panel and

an edge of the handle strap, the recess being shaped so as to redirect load forces in the handle strap towards a side edge of the second top panel.

12. The carton of claim 11, wherein the second top panel comprises a fold line configured and arranged to redirect load forces in the handle strap towards an opposing side edge of the second top panel hinged to the second side panel.

13. The carton of claim 11, wherein the first top panel comprises a fold line configured and arranged to redirect load forces in the handle strap towards a side edge of the first top panel hinged to the first side panel.

14. The carton of claim 11, wherein a second handle reinforcing member is provided and is hinged to the first top panel by a first fold line.

15. The carton of claim 14, wherein the first top panel is shorter in length than the first side panel to which it is hinged such that a portion of the second handle reinforcing member is provided by material disposed adjacent to the first top panel.

16. The carton of claim 14, wherein the first top panel is hinged to the first side panel by a second fold line, and wherein the first fold line and the second fold line define a non-perpendicular angle therebetween.

17. The carton of claim 16, wherein the second handle reinforcing member is disposed in face contacting relationship with the first top panel and wherein the first fold line and the second fold line define an acute angle therebetween.

18. The carton of claim 17, wherein a tab is hinged, at least, to the second top panel and is disposed about a free side edge of the first side panel, which free side edge was formed by folding the second handle reinforcing member into face contacting relationship with the first top panel.

19. The carton of claim 11, wherein the second top panel partially overlies the first top panel, the second top panel has an handle aperture which defines part of the handle strap, the protruding portion comprises a pair of shoulders and a recess defined

between the shoulders, and the recess is disposed in substantial registry with the handle aperture in the second top panel such that the shoulders underlines areas of the second top panel on the opposite sides of the handle aperture.

20. A carton comprising a plurality of panels forming a tubular structure, the plurality of panels including a first top panel, a second top panel, a first side panel, a second side panel and a base panel,

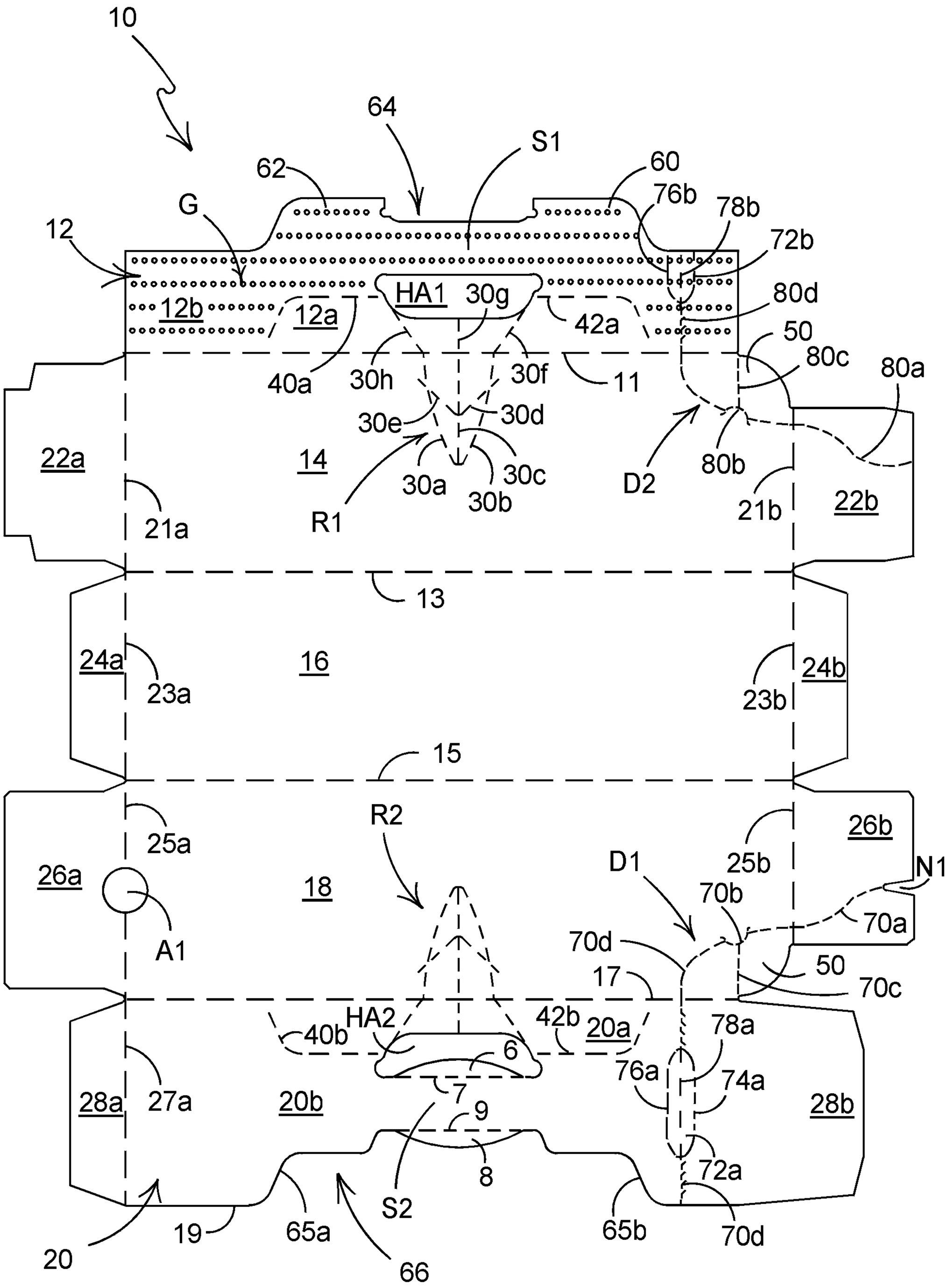
the first top panel being secured to an inner surface of the second to panel, the first top panel extending from a first side of the carton partially across the tubular structure, wherein at least a portion of the second top panel extends from a second side of the carton across the tubular structure to the first side,

the second top panel comprising a handle strap for carrying the carton,

the first top panel comprising a protruding portion defining at least in part a handle reinforcing member for reinforcing the handle strap,

the handle strap extending substantially longitudinally with respect to a tubular axis of the tubular structure, the protruding portion extending from a side edge of the first top panel,

the second top panel comprising a recess defined along a free side edge thereof, the recess being configured and arranged in a complementary manner, at least in part, to the protruding portion, and wherein the recess and the protruding portion define a nonlinear seam between the first top panel and the second top panel.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62
S1
60
G
76b
78b
12
72b
HA1
30g
80d
12b
12a
42a
50
80c
80a
40a
30h
30f
11
30e
30d
22a
14
30a
30c
D2
80b
30b
R1
21b
22b
21a
13
24a
16
24b
23a
23b
15
R2
26b
25a
25b
D1
N1
26a
18
70b
70a
A1
70d
50
17
70c
HA2
42b
20a
78a
40b
6
76a
74a
7
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27a
20b
28b
8
72a
S2
65b
70d
19
65a
20
66

FIGURE 1

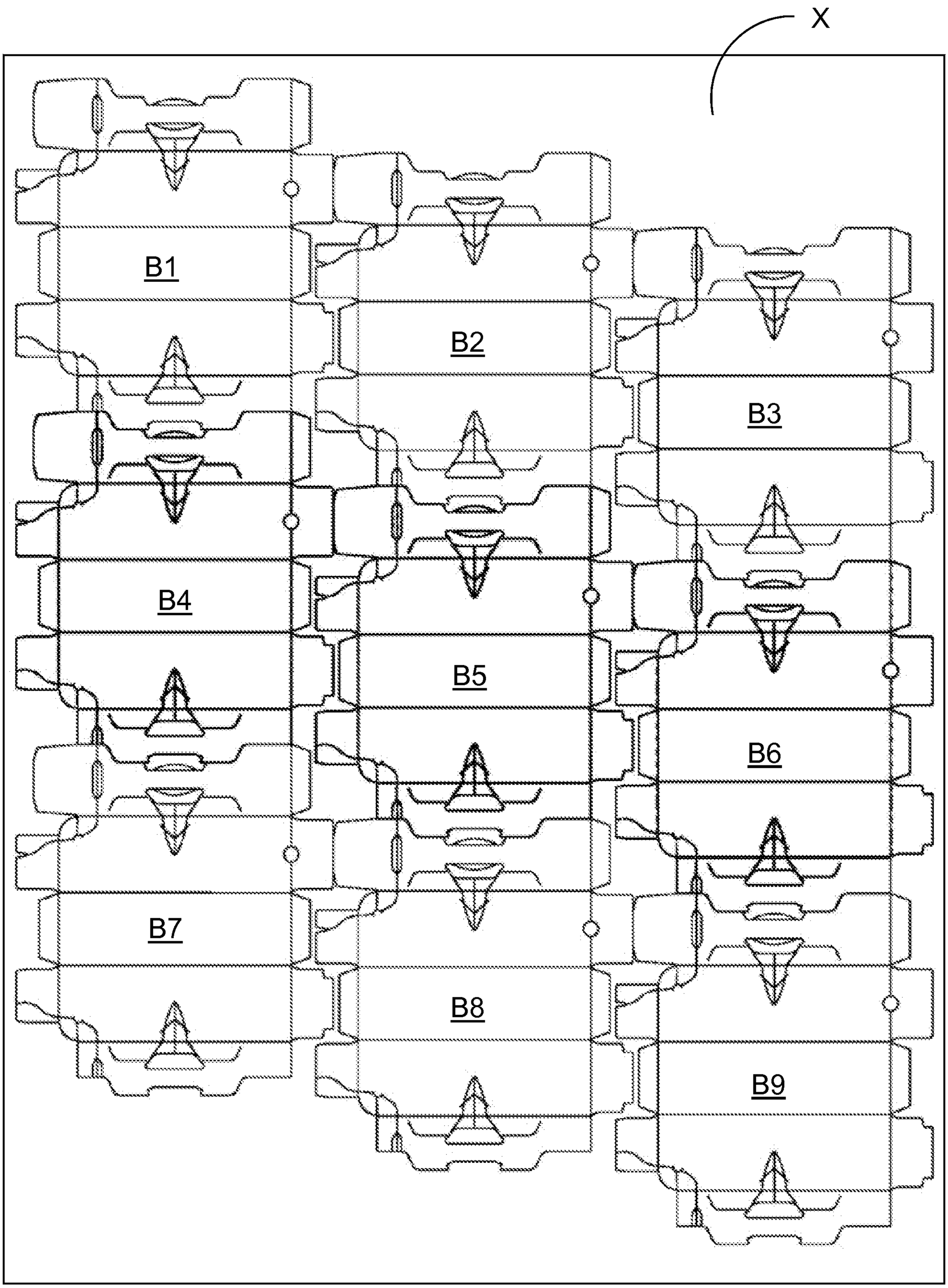
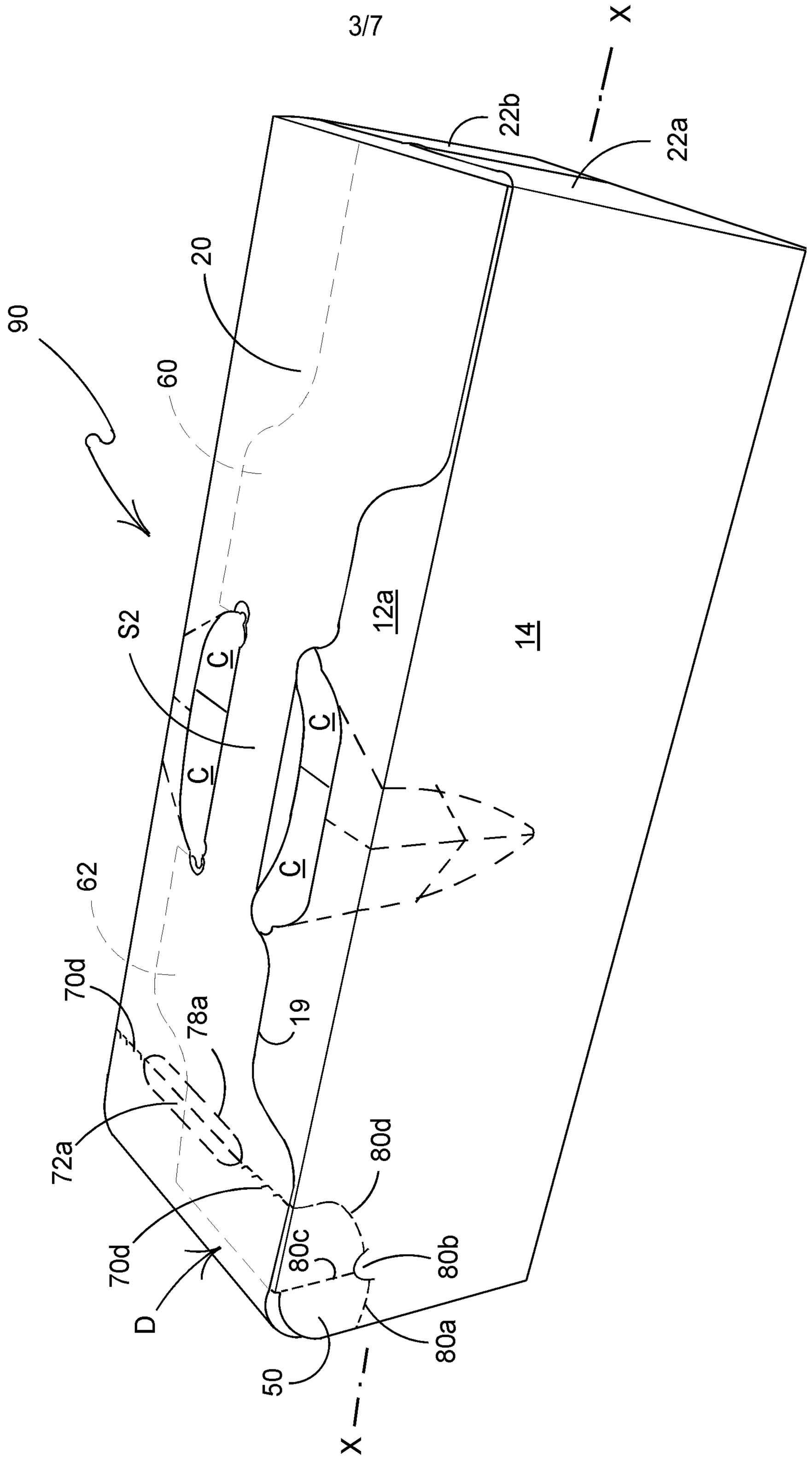


FIGURE 2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22b
22a
20
90
60
S2
C
12a
14
C
C
C
62
70d
78a
19
72a
80d
80c
80b
70d
D
80a
50
X

FIGURE 3

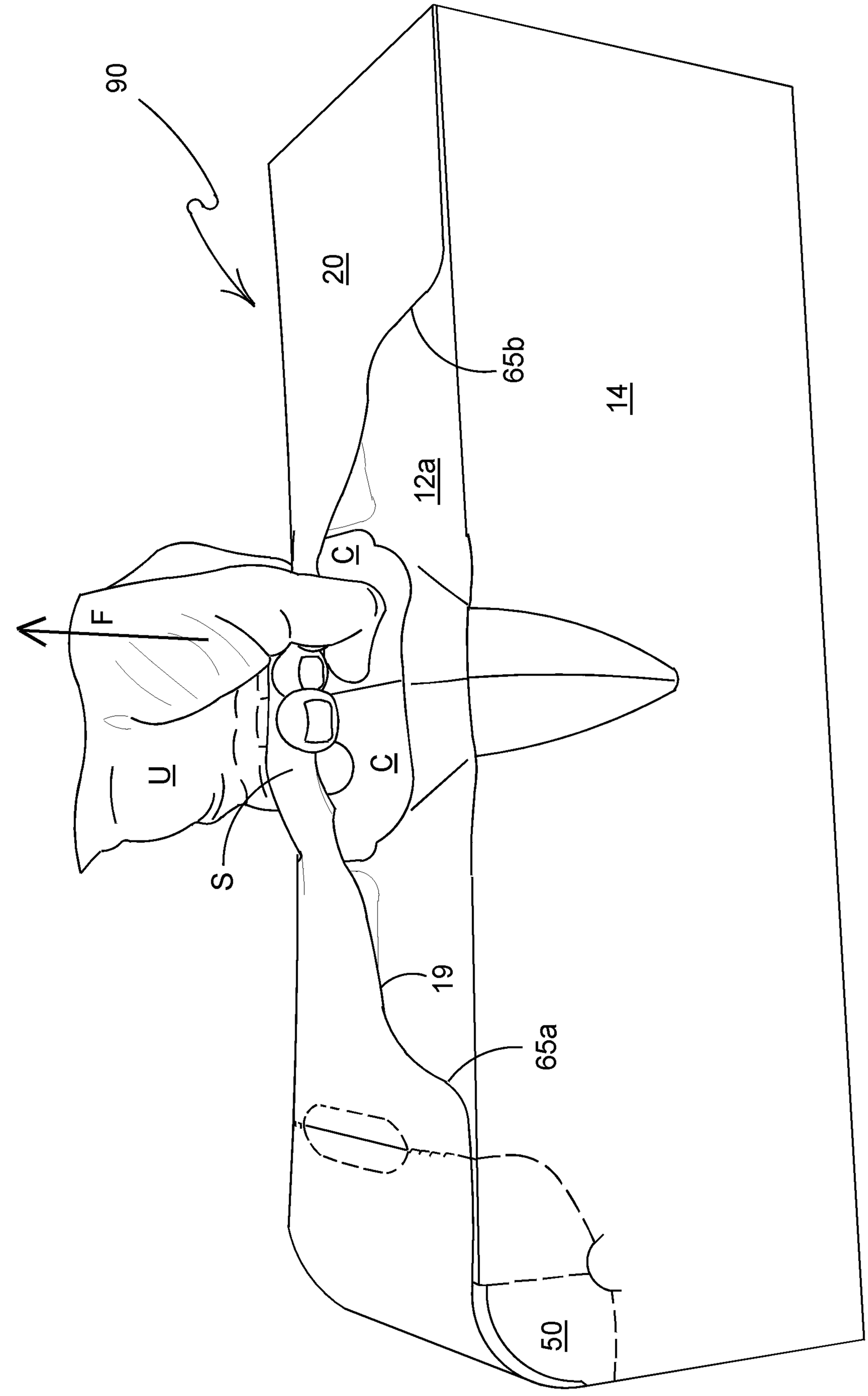
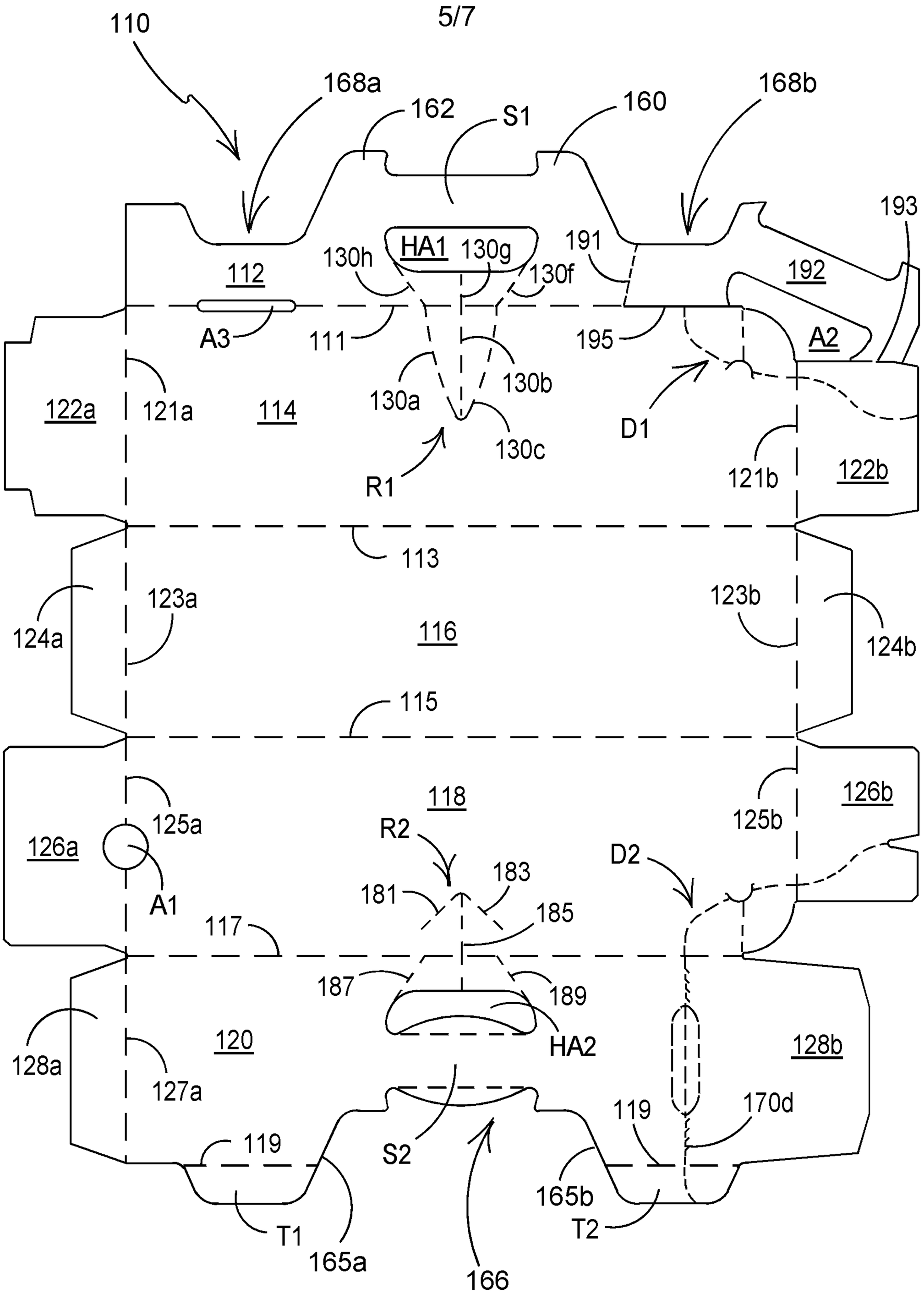


FIGURE 4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168a
162
S1
160
168b
193
HA1
130g
130h
191
112
130f
192
A3
111
195
A2
130a
130b
122a
121a
114
D1
130c
R1
121b
122b
113
123a
123b
124a
116
124b
115
118
125a
125b
126b
126a
R2
D2
183
181
185
117
187
189
A1
HA2
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128b
128a
127a
119
170d
S2
165b
T1
T2
165a
166

FIGURE 5

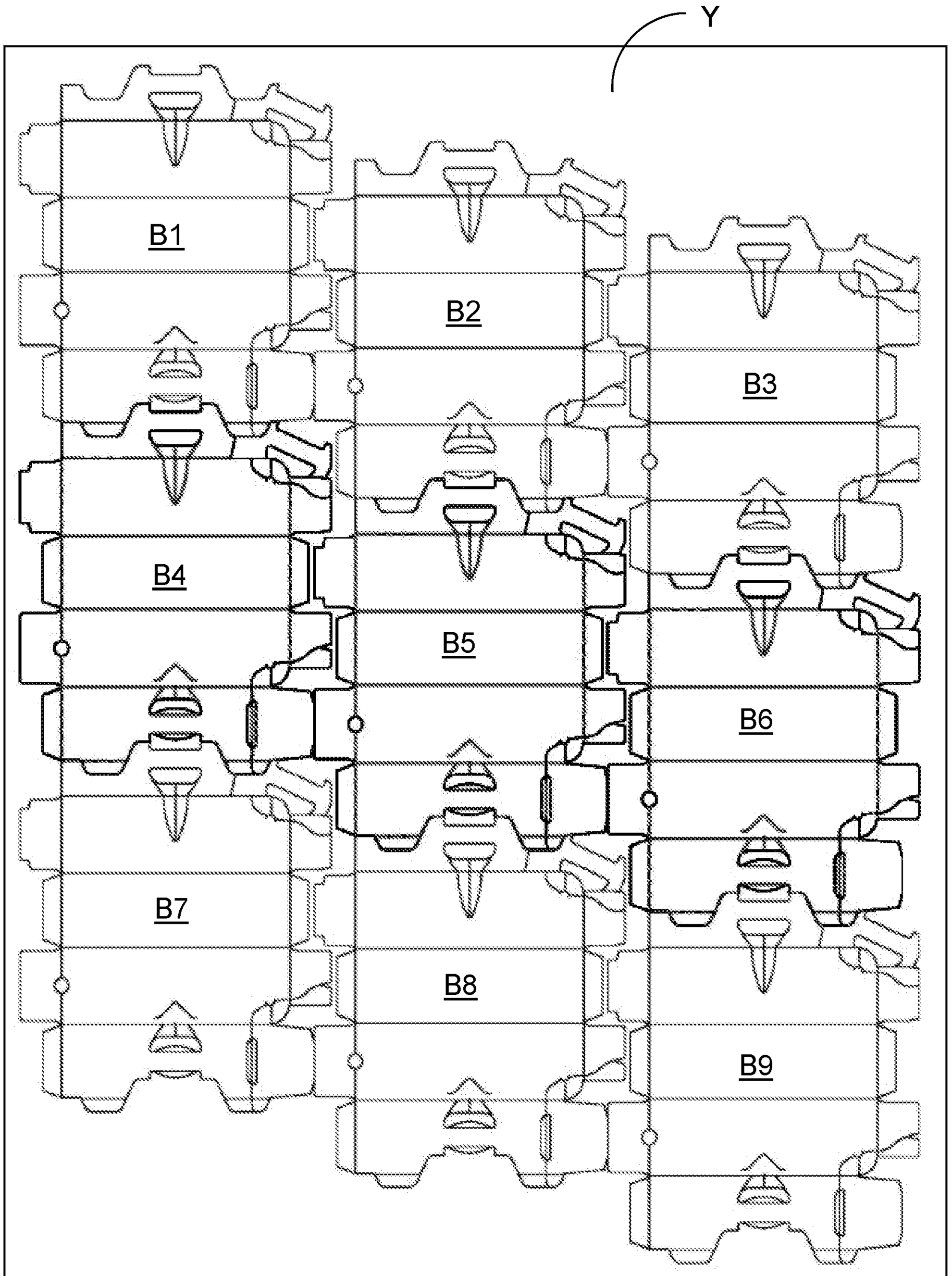
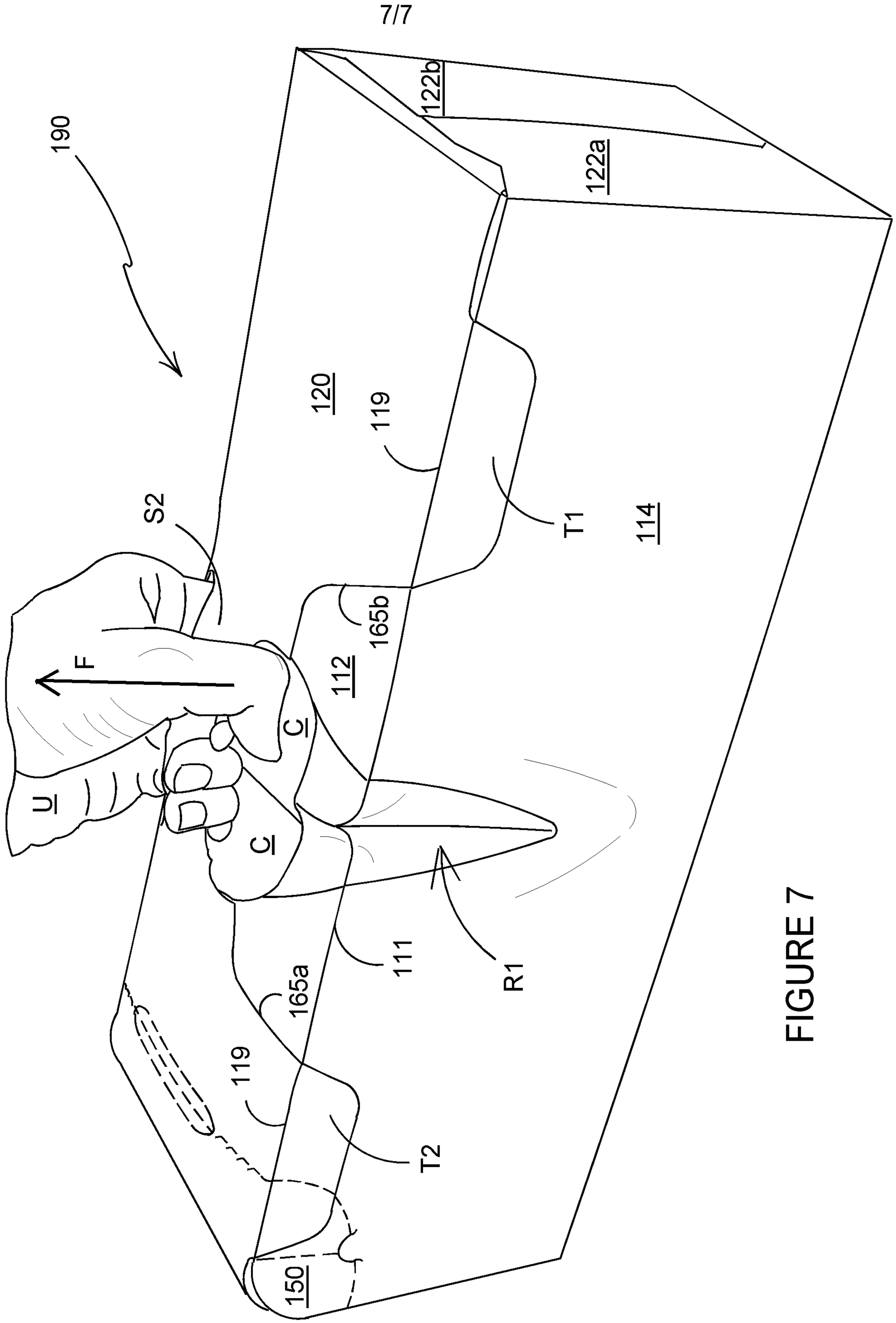


FIGURE 6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122b
122a
120
119
S2
T1
114
165b
112
F
C1
U1
C1
111
R1
165a
119
T2
150

FIGURE 7

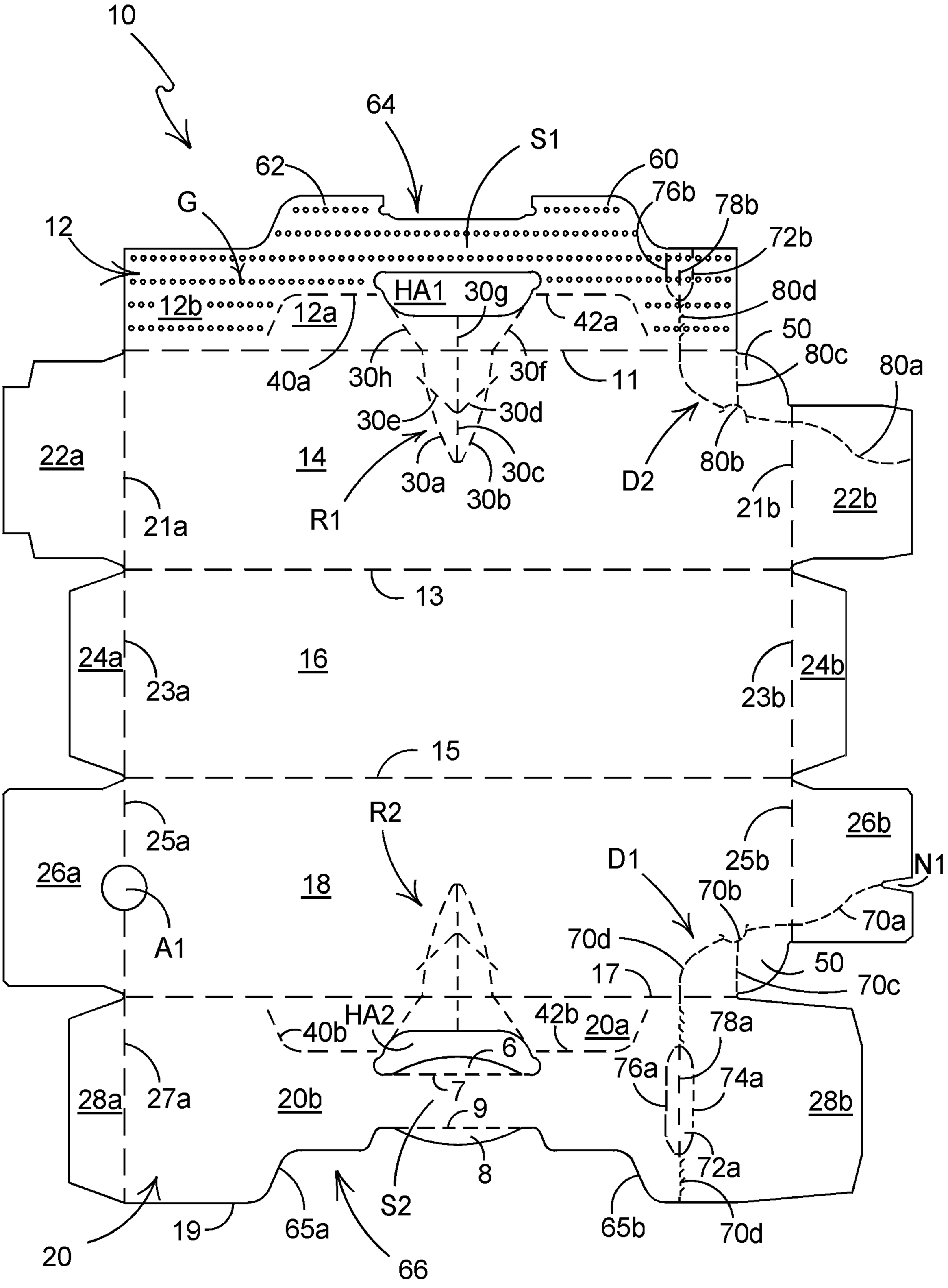
10
64
S1
62
60
G
76b
78b
12
72b
HA1
30g
80d
12b
12a
42a
50
40a
30h
30f
11
80c
80a
30e
30d
22a
14
30a
30c
D2
80b
30b
R1
21b
22b
21a
13
24a
16
23b
24b
23a
15
R2
25a
26b
D1
25b
N1
26a
18
70b
70a
A1
70d
50
17
70c
HA2
42b
20a
78a
40b
6
76a
74a
7
28a
27a
20b
9
28b
8
72a
S2
65b
70d
19
65a
20
66

FIGURE 1