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(54) Title: ARTICLE CARRIER, SHIPPING CARTON & PACKAGE SYSTEM

(57) Abstract: Aspects of the invention provide a package system comprising: at least one secondary packaging container or carrier (790; 1090; 1190; 1290) holding at least one primary container ('B'); a tertiary packaging carton (10; 90; 110; 310; T) holding the at least one secondary packaging container; and a blank (110; 1110; 1210; 1310; 1410; 1510; 1610; 710; 810) for forming the carrier (790; 1090; 1190; 1290). The blank comprising a top or bottom panel which is asymmetrical in shape about a centre axis of the top or bottom panel. The top or bottom panel by itself providing a single-layer top or bottom wall when a carton is erected from the blank. A first free side edge of the blank extends transversely with respect to the centre axis, at least a part of the first free edge being symmetrical about a point of symmetry.

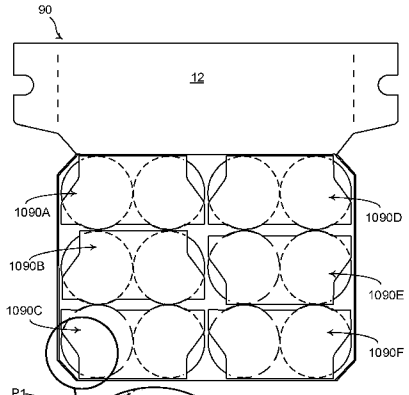

FIG. 15

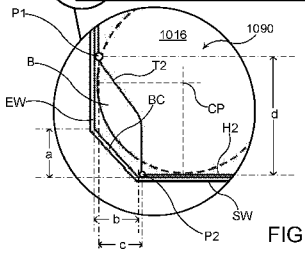

FIG. 15A

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ARTICLE CARRIER, SHIPPING CARTON & PACKAGE SYSTEM

TECHNICAL FIELD

The present invention relates to secondary package containers such as, but not limited to, wrap-around carriers. More specifically, but not exclusively, the invention relates to a package system comprising a secondary carrier housing one or more primary product containers and a tertiary shipping carton accommodating a plurality of the secondary carriers.

BACKGROUND

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

It is an object of the present invention to provide to a secondary carrier formed from a nestable blank. It is desirable to minimise or reduce the material required to produce the carrier for economic and environmental benefit.

It is desirable to transport the secondary carrier, once loaded with articles, in a tertiary package. The strength of the tertiary package and its suitability for holding and transporting large weights of articles is an important consideration.

The present invention seeks to provide an improvement in the field of packaging by providing a tertiary shipping carton having at least one corner structure and/or at least one mitred corner. Beneficially, the strength and stackability of the shipping carton is thereby improved. Additionally, there is provided a secondary carrier adapted to the mitred corner structure of the tertiary shipping carton so that one, two or more secondary packages can fit within the tertiary shipping carton.

SUMMARY

According to a first aspect of the present disclosure there is provided a combination of a tertiary carton and a plurality of packages received in the tertiary carton wherein the tertiary carton comprises a bottom panel and a plurality of side and end panels each extending upward from the bottom panel to form side and end walls, the plurality of side and end walls including a first side wall and a first end wall disposed at about a right angle with respect to one another, and a bevelled corner panel hingedly connecting between the first side wall and the first end wall, the plurality of packages includes a corner package which comprises a secondary carton having a tubular structure and one or more generally cylindrical primary containers each received at least in part in the secondary carton, the tubular structure comprising a pair of opposing carton side panels, wherein the corner package is disposed with a terminal end e1 thereof facing the inside surface of the first end wall with the tubular axis of the secondary carton thereof extending generally perpendicularly to the first end wall, wherein the secondary carton of the corner package is in contact at one of the carton side panels thereof with the first side wall, and wherein the one or more primary containers of the corner package each is disposed with the cylindrical axis thereof extending generally perpendicularly to the bottom panel, the combination being characterized by the following formula: $a1 \leq 1/2\ d, a2 \leq 1/2\ d$ and $a1 \leq b1$

where “d” is the maximum diameter (maximum lateral size) of each of the one or more primary containers, “a1” is the distance between a notional plane containing the inside surface of the first end wall and the fold line F1 between the corner panel and the first end wall, “a2” is the distance between a notional plane containing the inside surface of the first side wall and the fold line F2 between the corner panel and the first end wall, and “b1” is the distance between a notional plane containing the terminal end e1 and a maximum width point P1 along an end edge of the one carton side panel adjacent to the corner panel, the maximum width point P1 defining the maximum width of the secondary carton extending between itself and a point on the other carton side panel of the secondary carton, the notional plane containing the terminal end e1 being parallel to or containing the inside surface of the first end wall.

Optionally, the distance a2 is equal to or greater than a distance b2, $(a2 \geq b2)$ wherein the distance b2 is a distance between a notional plane containing the maximum width point P1 and a second point P2 on the corner package, the notional plane containing the maximum width point P1 being parallel to or containing the inside surface of the first side wall, the second point P2 being spaced apart from the maximum width point P1, the second point P2 being in contact with the corner panel or closer to the corner panel than any other points on the corner package excluding the maximum width point P1.

Optionally, the second carton of the corner package comprises a bevelled corner edge extending from the maximum width point P1 to the second point P1.

Optionally, the bevelled corner edge is provided by a top panel of the secondary carton of the corner package wherein a retention panel for engaging a primary container is hingedly connected to the bevelled corner edge.

Optionally, the bevelled corner edge is provided by a base panel of the second carton of the corner package wherein an opening for receiving a primary container is defined in the base panel.

Optionally, the bevelled corner edge is parallel to or in contact with the corner panel.

Optionally, the second point P2 on the corner package is located on a corner primary container of the corner package.

Optionally, the distance a1 is equal to or less than 30% of the maximum diameter d ($a1 \leq 0.3d$).

Optionally, the maximum diameter d of each of the one or more primary containers is defined by a cross section of a shape selected from the group consisting of a circle, an elliptic, a squircle and a rounded rectangle.

Optionally, the bevelled corner edge defines an angle x with respect to the notional plane containing the maximum width point P1, the angle x being equal to or greater than 10 degrees.

Optionally, the corner panel defines an angle y2 with respect to the notional plane containing the inside surface of the first side wall, the angle y2 being equal to or greater than the angle x.

Optionally, the corner panel defines an angle y1 with respect to the notional plane containing the inside surface of the first end wall, the angle y1 being equal to or greater than the angle y2.

Optionally, the maximum width point P1 is in contact with the first side wall of the tertiary carton.

Optionally, the maximum width point P1 is located adjacent to the fold line F1 between the corner panel and the first side wall.

Optionally, the terminal end e1 of the corner package is in contact with the first end wall.

Optionally, the second point P2 on the corner package is in contact with the corner panel.

Optionally, the second point P2 on the corner package is located between the fold lines F1 and F2.

Optionally, the second point P2 on the corner package is located adjacent to the fold line F2 between the corner panel and the first end wall.

According to a second aspect of the present disclosure there is provided a blank for forming a carrier comprising a top or bottom panel which is asymmetrical in shape about a centre axis of the top or bottom panel. The top or bottom panel by itself provides a single-layer top or bottom wall when a carton is erected from the blank. A first free side edge of the blank extends transversely with respect to the centre axis. At least a part of the first free edge is symmetrical about a point of symmetry. The top or bottom panel provides at least a part of the first free edge. The blank is nestable with another blank of the same size and configuration such that the symmetrical part of the first free edge of the blank and that of the other blank are formed by a single die cut blade.

Optionally, the symmetrical part of the first free edge is non-linear.

Optionally, the top or bottom panel is disposed over or below only a part of an endmost article.

According to a third aspect of the present disclosure there is provided a package comprising an article carrier and one or more articles, the article carrier being formed from the blank of the foregoing paragraphs, wherein the top or bottom panel is placed on or below, respectively, one of the opposite ends of said one or more articles and wherein said one or more articles are each generally columnar in shape.

According to a fourth aspect of the present disclosure there is provided a package system comprising the combination of one or more secondary carriers each including one or more primary product containers and a tertiary package loaded with said one or more secondary carriers. The tertiary package comprises mitred corners provided by one or more corner

panels. Each of the one or more secondary carriers comprises a top panel having opposing side edges. A first side edge has a first length and a second edge has a second length, the second length is less than the first length.

According to a fifth aspect of the present disclosure there is provided a package comprising an arrangement of a plurality of secondary carriers each comprising one or more articles and loaded within a tertiary carton. The secondary carriers each have a front end horizontal dimension which is less than a rear end horizontal dimension. At least two adjacent secondary carriers are disposed in a back-to-back contacting relationship within the tertiary package.

According to a sixth aspect of the present disclosure there is provided a secondary package comprising a secondary carrier loaded with a group of articles. The secondary carrier comprises a plurality of panels forming tubular structure having a tubular axis. The plurality of panels includes a top panel hinged to a first side panel along a first fold line having a first length dimension. The group of articles defines a second length dimension in a longitudinal direction along the tubular axis of the secondary carrier. The second length dimension is substantially equal to the first length dimension. The top panel is hinged to a second side panel along a second fold line having a third length dimension. The third length dimension is less than the first and second length dimensions. The group of articles comprises a first article at a first end of the tubular structure and a second article at a second end of the tubular structure. The centre of the first article is spaced a distance from the centre of the second article. The third length dimension is greater than the distance between the centres of the first and second articles.

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

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

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

embodiment may be included in addition to, or in replacement of one or more features or elements of said other embodiment.

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

BRIEF DESCRIPTION OF THE DRAWINGS

Embodiments of the present disclosure 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 tertiary package or shipping carton according to various embodiments of the invention;

Figure 2 is a perspective view from above of a tertiary package constructed from the blank of Figure 1;

Figure 3 is a plan view from above of a blank for forming a carrier of a secondary package according to a first embodiment;

Figure 4 is a perspective view from above of a secondary package comprising a secondary carrier formed from the blank of Figure 3 loaded with a group of primary product containers or articles;

Figure 5 is a top view the secondary package of Figure 4;

Figure 6 is a plan view from above of a plurality of the blanks shown in Figure 3 laid out in a nested arrangement;

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

Figure 8 is a perspective view from above of a secondary carrier formed from the blank of Figure 7;

Figure 9 is a plan view from above of a plurality of the blanks shown in Figure 7 laid out in a nested arrangement;

Figure 10 is a plan view from above of a blank for forming a carrier according to a third embodiment;

Figure 11 is a perspective view from above of a secondary carrier formed from the blank of Figure 10;

Figure 12 is a perspective view from above of a secondary package comprising the carrier of Figure 11 loaded with a group of primary product containers or articles;

Figure 13 is a plan view from above of a plurality of the blanks shown in Figure 10 laid out in a nested arrangement;

Figure 14 is a top view of a stage of construction of a package system comprising the shipping carton of Figure 2, loaded with a first arrangement of a plurality of secondary carriers of Figure 4 (each secondary carrier being loaded with a plurality of primary product containers);

Figure 15 is a top view of a stage of construction of a package system comprising the shipping carton of Figure 2, loaded with a second, alternative, arrangement of a plurality of secondary carriers of Figure 4 (each secondary carrier being loaded with a plurality of primary product containers), in the illustration one of the top panels has been omitted for illustrative purposes;

Figure 15A is an enlarged view of a corner portion of the package system of Figure 15;

Figure 16 is a plan view from above of an alternative blank for forming an alternative tertiary package or shipping carton according to various embodiments of the invention;

Figure 17 is a perspective view from above of the alternative tertiary package constructed from the blank of Figure 16;

Figure 18 is a schematic top view of an alternative package system comprising a further alternative shipping carton, loaded with a further arrangement of a plurality of secondary carriers of the embodiment of Figure 12 (each secondary carrier being loaded with a plurality of primary product containers) in the illustration a top wall of shipping carton has been omitted for illustrative purposes;

Figure 19 is a plan view from above of a blank for forming a carrier of a secondary package according to a fourth embodiment;

Figure 20 is a perspective view from above of a secondary package comprising a secondary carrier formed from the blank of Figure 19 loaded with a group of primary product containers or articles;

Figure 21 is a plan view from above of a blank for forming a carrier of a secondary package according to a fifth embodiment;

Figure 22 is a perspective view from above of a secondary package comprising a secondary carrier formed from the blank of Figure 21 loaded with a group of primary product containers or articles;

Figure 23 is a plan view from above of a blank for forming a carrier of a secondary package according to a sixth embodiment;

Figure 24 is a perspective view from above of a first side of a secondary package comprising a secondary carrier formed from the blank of Figure 23 loaded with a group of primary product containers or articles;

Figure 25 is a perspective view from above of a second side of a secondary package comprising a secondary carrier formed from the blank of Figure 23 loaded with a group of primary product containers or articles;

Figure 26 is a plan view from above of a blank for forming a carrier of a secondary package according to a seventh embodiment;

Figure 27 is a perspective view from above of a secondary package comprising a secondary carrier formed from the blank of Figure 26 loaded with a group of primary product containers or articles;

Figure 28 is a plan view from above of a further alternative blank for forming a further alternative tertiary package or shipping carton according to various embodiments of the invention;

Figure 29 is a perspective view from above of the further alternative tertiary package constructed from the blank of Figure 28;

Figure 30A is a top view of a stage of construction of a package system comprising the shipping carton of Figure 2, loaded with an arrangement of a plurality of secondary carriers of Figure 24 (each secondary carrier being loaded with a plurality of primary product containers), in the illustration one of the top panels has been omitted for illustrative purposes;

Figure 30B is an enlarged view of a first corner portion of the package system of Figure 30A;

Figure 30C is an enlarged view of a second corner portion of the package system of Figure 30A;

Figures 31A to 31D and Figures 32A to 32C show various arrangements of primary products container employed with secondary carriers disposed within a tertiary package;

Figure 33 is a plan view from above of a blank for forming a secondary package or carton according to an eighth embodiment of the disclosure;

Figure 34 is a perspective view from above of a secondary package comprising a carrier constructed from the blank of Figure 33 and loaded with a plurality of primary product containers;

Figure 35 is a plan view from above of a blank for forming a carrier of a secondary package according to a ninth embodiment of the disclosure;

Figure 36 is a plan view from above of the blank of Figure 33 showing the position and/or alignment of articles with respect to a top panel of the blank;

Figure 37 is a plan view from above a partially assembled package system comprising a shipping carton, loaded with an arrangement of a plurality of secondary packages of Figure 34 (each secondary carrier being loaded with a plurality of primary product containers);

Figure 38 is a plan view from above of the secondary package of Figure 34; and

Figure 39 is an enlarged plan view from above of a portion of the arrangement shown in Figure 37.

DETAILED DESCRIPTION OF EMBODIMENTS

Detailed descriptions of specific embodiments of the package system, shipping cartons, secondary carriers and blanks 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 in which 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 package system, shipping cartons, secondary carriers and blanks 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.

In the embodiments detailed herein, the terms "secondary package", "tertiary package", "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 secondary packages or primary product containers. It is contemplated that the teachings of the invention can be applied to various primary product containers, which may or may not be tapered and/or cylindrical. Optional containers include cups, pots having a foil or film lid, bottles (for example metallic, glass or plastics bottles), cans (for example aluminium cans), tins, pouches, packets and the like.

A package system is disclosed herein (see Figure 14, 15) that comprises a tertiary shipping carton 90; 190; 290; 390 (see Figures 2, 17, 18 and 28), a secondary package in the form of a wrap-around style carrier 1090; 1190; 1290; 1390; 1490; 1590; 1690 (see Figures 4, 8, 12, 20, 22, 24, 25, 27); and a plurality of articles 'B', arranged in groups and held within each secondary carrier 1090; 1190; 1290; 1390; 1490; 1590; 1690. The tertiary shipping cartons 90; 190; 390 are formed from blanks 10; 110, 310 (see Figures 1, 16 and 28) formed from a sheet of suitable substrate; and the secondary carriers 1090; 1190; 1290; 1390; 1490; 1590; 1690 are formed from blanks 1010; 1110; 1210; 1310; 1410; 1510; 1610 (see Figures 3, 7, 10, 19, 21, 23 and 26) formed from a sheet of suitable substrate. The blanks 10; 110; 1010; 1110; 1210; 1310; 1410; 1510; 1610 may be formed from the same or from different substrates. A further package system is disclosed herein (see Figure 30) that comprises a tertiary shipping carton 90 (see Figure 2), a secondary package in the form of a wrap-around

style carrier 1690 (see Figures, 24, 25); and a plurality of articles 'B', arranged in groups and held within each secondary carrier 1690.

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, fluted board, cardboard, plastic, combinations thereof, and the like that may be coated, uncoated, printed or not printed. It should be recognised that one or other numbers of blanks may be employed, where suitable, for example, to provide the structures described in more detail below. Optionally, the blanks 1010; 1110; 1210; 1310; 1410; 1510; 1610 for forming the secondary carrier 1090; 1190; 1290; 1390; 1490; 1590; 1690 may be formed from a paperboard that is bleached, coated and printed on one surface thereof and which is not bleached, coated or printed on the other (inside) surface thereof ("the brown side") such as, but not limited to, coated recycled board (CRB), clay-coated news back (CCNB), clay-coated kraftboard (CCKB), solid bleached board (SBB) or solid bleached sulphate (SBS). Optionally, the blanks 10; 110; 310 for forming the shipping cartons 90; 190; 290; 390 are formed from a corrugated board which provides structural rigidity and stacking strength such that the shipping cartons 90; 190; 290; 390 can accommodate a heavy load of articles.

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

In an illustrated and optional embodiment, the blanks 1010, 1110; 1210; 1310; 1410; 1510; 1610 are configured to form a wrap-around style carrier 1090; 1190; 1290; 1390; 1490; 1590; 1690 for packaging an optional arrangement of articles. In this illustrated embodiment, the arrangement is an m x n x t matrix or array, having one row (m=1), two columns (n=2) and arranged in two tiers (t=2); in the illustrated embodiment four articles are arranged in single row having two tiers of two articles B, and the articles B are individual 5.3oz cups with a cover

or film lid formed from a metallic or plastic material such as, but not limited to, aluminium or PET (polyester - polyethylene terephthalate). The blanks 1010, 1110; 1210; 1310; 1410; 1510; 1610 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.

In the illustrated and optional embodiments, the blanks 10; 110; 310 are configured to form a shipping carton 90; 190; 390 that can optionally accommodate six secondary carriers 1090; 1190; 1290; 1390; 1490; 1590; 1690 arranged in a 2x3 matrix or array; and as such the shipping carton 90; 190; 390 may comprise 24, 5.3oz cups 'B'. The shipping carton 290 is adapted to accommodate four secondary carriers 1090; 1190; 1290; 1390; 1490; 1590; 1690 arranged in a 2x2 matrix or array; and as such the shipping carton 290 may comprise 16, 5.3oz cups 'B'. Accordingly, the package system accommodates a significant load.

Referring now to Figure 1, the blank 10 comprises a series of main panels for forming the main walls of a tertiary package or shipping carton 90. The series of main panels comprises: a first top panel 12, a first side panel 14, a base panel 16, a second side panel 18 and a second top panel 20. Optionally, the series of main panels 12, 14, 16, 18, 20, are hinged together in a linear series by hinged connections in the form of fold lines 13, 15, 17, 19.

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

Each of the ends of the tubular structure is at least partially closed by end closure panels which form end walls of the tubular structure. In the illustrated embodiment the ends of the tubular structure are fully closed by end closure panels 22a, 24a, 24b, 26a, 28a, 28b, 30a, 22b, 24c, 24d, 26b, 28c, 28d, 30b.

End closure panels 22a, 24a, 24b, 26, 28a, 28b, 30a are configured to close a first end of the tubular structure and end closure panels 22b, 24c, 24d, 26b, 28c, 28d, 30b are configured to close a second end of the tubular structure.

The first end of the tubular structure is closed by a first end closure panel 22a, a second end closure panel 24a, a first corner panel 24b, a third end closure panel 26a, a fourth end closure panel 28a, a second corner panel 28b and a fifth end panel 30a. The first end closure panel 22a is hinged to a first end of the first top panel 12 by a hinged connection such as a fold line 21a. The second end closure panel 24a is hinged to a first end of a first corner panel 24b by

a hinged connection such as a fold line 23a. The first corner panel 24b is hinged to a first end of the first side panel 14 by a hinged connection such as a fold line 23b. The third end closure panel 26a is hinged to a first end of the base panel 16 by a hinged connection such as a fold line 25a. The fourth end closure panel 28a is hinged to a first end of a second corner panel 24b by a hinged connection such as a fold line 27a. The second corner panel 24b is hinged to a first end of the second side panel 18 by a hinged connection such as a fold line 23b. The fifth end closure panel 30a is hinged to a first end of the second top panel 20 by a hinged connection such as a fold line 29a.

The second end of the tubular structure is closed by a sixth end closure panel 22b, a seventh end closure panel 24c, a third corner panel 24d, an eighth end closure panel 26b, a ninth end closure panel 28c, a fourth corner panel 28d and a tenth end closure panel 30b. The sixth end closure panel 22b is hinged to a second end of the first top panel 12 by a hinged connection such as a fold line 21b. The seventh end closure panel 24c is hinged to a second end of a third corner panel 24d by a hinged connection in the form of a fold line 23c. The third corner panel 24d is hinged to a second end of the first side wall panel 14 by a hinged connection such as a fold line 23d. The eighth end closure panel 26b is hinged to a second end of the base panel 16 by a hinged connection such as a fold line 25b. The ninth end closure panel 28c is hinged to a second end of a fourth corner panel 28d by a hinged connection in the form of a fold line 27c. The fourth corner panel 24d is hinged to a second end of the second side wall panel 18 by a hinged connection such as a fold line 27d. The tenth end closure panel 30b is hinged to a second end of the second top panel 20 by a hinged connection such as a fold line 29b.

The first end closure panel 22a and the fifth end closure panel 30a each form upper end closure panels at the first end of the tubular structure. The sixth end closure panel 22b and the tenth end closure panel 30b each form upper end closure panels at the second end of the tubular structure.

The third end closure panel 26a and the eighth end closure panel 26b each form a lower end closure panel at opposing ends of the tubular structure.

The second end closure panel 24a and the fourth end closure panel 28a each form a minor side end closure panel or dust flap at the first end of the tubular structure. The seventh end closure panel 24c and the ninth end closure panel 28c each form a minor side end closure panel or dust flap at the second end of the tubular structure.

Optionally, the first end closure panel 22a comprises a cutaway in the form of a first recess R1 struck from a free end edge opposing the hinged connection between the first end closure panel 22a and the first top panel 12.

Optionally, the sixth end closure panel 22b comprises a cutaway in the form of a second recess R2 struck from a free end edge opposing the hinged connection between the sixth end closure panel 22b and the first top panel 12.

Optionally, the third end closure panel 26a comprises a pair of cutaways in the form of a third recess R3 and a fourth recess R4 struck from a free end edge opposing the hinged connection between the third end closure panel 26a and the base panel 16.

Optionally, the eighth end closure panel 26b comprises a pair of cutaways in the form of a fifth recess R5 and a sixth recess R6 struck from a free end edge opposing the hinged connection between the eighth end closure panel 26b and the base panel 16.

Optionally, the fifth end closure panel 30a comprises a cutaway in the form of a seventh recess R7 struck from a free end edge opposing the hinged connection between the fifth end closure panel 30a and the second top panel 20.

Optionally, the tenth end closure panel 30b comprises a cutaway in the form of an eighth recess R8 struck from a free end edge opposing the hinged connection between the tenth end closure panel 30b and the second top panel 20.

The first and third recesses R1, R3 may be arranged to form a first opening in the first end of the shipping carton 90 when in a set-up condition. The fourth and seventh recesses R4, R7 may be arranged to form a second opening in the first end of the shipping carton 90 when in a set-up condition.

The second and fifth recesses R2, R5 may be arranged to form a third opening A3 (see Figure 2) in the second end of the shipping carton 90 when in a set-up condition. The sixth and eighth recesses R6, R8 may be arranged to form a fourth opening A4 (see Figure 2) in the second end of the shipping carton 90 when in a set-up condition.

Optionally, the base panel 16 comprises a pair of apertures A1, A2.

The first, second, third and fourth openings together with the pair of apertures A1, A2 in the base panel 16 may provide ventilation orifices.

Turning to the construction of the shipping carton 90 as illustrated in Figure 2, it is envisaged that the shipping carton 90 can be formed by a series of sequential folding operations in a straight-line machine so that the shipping 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 shipping carton 90 may be formed into a tray open at the upper end as shown in Figure 14. The tray may then be loaded with secondary packages 1090A, 1090B, 1090C, 1090D, 1090E, 1090F.

Alternatively, a group of secondary packages 1090A, 1090B, 1090C, 1090D, 1090E, 1090F may be placed upon the base panel 16 of the blank 10, the shipping carton 90 may assembled or wrapped about the group of secondary packages 1090A, 1090B, 1090C, 1090D, 1090E, 1090F.

In order to form the tray shown in Figure 14 the first side panel 14 (together with the first top panel 12) is folded with respect to the base panel 16 about fold line 15 so as to be substantially perpendicular with the base panel 16. The second side panel 18 (together with the second top panel 20) is folded with respect to the base panel 16 about fold line 17 so as to be substantially perpendicular with the base panel 16.

The first corner panel 24b is folded with respect to the first side panel 14 about fold line 23b and the second end closure panel 24a is folded with respect to the first corner panel 24b about fold line 23a such that the second end closure panel 24a is oriented substantially perpendicular with the first side panel 14.

The second corner panel 28b is folded with respect to the second side panel 18 about fold line 27b and the fourth end closure panel 28a is folded with respect to the second corner panel 28b about fold line 27a such that the fourth end closure panel 28a is oriented substantially perpendicular with the second side panel 18.

Glue G or other adhesive treatment is applied to an outer surface of the second end closure panel 24a and to an outer surface of the fourth end closure panel 28a. Alternatively, glue G or

other adhesive treatment may be applied to a corresponding portion of an inner surface of the third end closure panel 26a.

The third end closure panel 26a is folded with respect to the base panel 16 about fold line 25a to be brought into face contacting relationship with the second and fourth end closure panels 24a, 28a.

The third end closure panel 26a is secured to the second and fourth end closure panels 24a, 28a.

The third corner panel 24d is folded with respect to the first side panel 14 about fold line 23d and the seventh end closure panel 24c is folded with respect to the third corner panel 24d about fold line 23c such that the seventh end closure panel 24c is oriented substantially perpendicular with the first side panel 14.

The fourth corner panel 28d is folded with respect to the second side panel 18 about fold line 27d and the ninth end closure panel 28c is folded with respect to the fourth corner panel 28d about fold line 27c such that the ninth end closure panel 28c is oriented substantially perpendicular with the second side panel 18.

Glue G or other adhesive treatment is applied to an outer surface of the seventh end closure panel 24c and to an outer surface of the ninth end closure panel 28c. Alternatively, glue G or other adhesive treatment may be applied to a corresponding portion of an inner surface of the eighth end closure panel 26b.

The eighth end closure panel 26b is folded with respect to the base panel 16 about fold line 25b to be brought into face contacting relationship with the seventh and ninth end closure panels 24c, 28c.

The eighth end closure panel 26b is secured to the seventh and ninth end closure panels 24c, 28c.

Optionally, the first top panel 12 (together with the first and sixth end closure panels 22a, 22b) may be folded outwardly, as shown in Figure 14 to facilitate loading through the upper open end.

Optionally, the second top panel 20 (together with the fifth and tenth end closure panels 30a, 30b) may be folded outwardly, as shown in Figure 14 to facilitate loading through the upper open end.

Construction of the loaded shipping carton 90 is completed by folding the first and second top panels 12, 20 (together with the first and sixth end closure panels 22a, 22b and the fifth and tenth end closure panels 30a, 30b) inwardly over the group of secondary packages 1090A, 1090B, 1090C, 1090D, 1090E, 1090F.

Glue G or other adhesive treatment is applied to an upper portion of the outer surface of the second end closure panel 24a and to an outer surface of the fourth end closure panel 28a. Alternatively, glue G or other adhesive treatment may be applied to a corresponding portion of an inner surface of the first and fifth end closure panels 22a, 30a.

The first and fifth end closure panels 22a, 30a are folded with respect to the one of first and second top panels 12, 20 to which they are hinged, about fold lines 21a, 29a respectively. The first end closure panel 22a is brought into face contacting relationship with the second end closure panel 24a. The first end closure panel 22a is secured the second end closure panel 24a.

The fifth end closure panel 30a is brought into face contacting relationship with the fourth end closure panel 28a. The fifth end closure panel 30a is secured the fourth end closure panel 28a.

Glue G or other adhesive treatment is applied to an upper portion of the outer surface of the seventh end closure panel 24c and to an outer surface of the ninth end closure panel 28c. Alternatively, glue G or other adhesive treatment may be applied to a corresponding portion of an inner surface of the sixth or tenth end closure panels 22b, 30b.

The sixth and tenth end closure panels 22b, 30b are folded with respect to the one of first and second top panels 12, 20 to which they are hinged, about fold lines 21b, 29b respectively. The sixth end closure panel 22b is brought into face contacting relationship with the seventh end closure panel 24c. The sixth end closure panel 22b is secured the seventh end closure panel 24c.

The tenth end closure panel 30b is brought into face contacting relationship with the ninth end closure panel 28c. The tenth end closure panel 30b is secured the ninth end closure panel 28c.

The completed shipping carton 90 is shown in Figure 2. The first and second top panels 12, 20 may be dimensioned such that a gap or slot is provided therebetween, the gap may extend across the top wall 12/20 of the shipping carton 90 formed by the first and second top panels 12, 20. The gap may provide a further ventilation access to the shipping carton 90.

The first and fifth end closure panels 22a, 30a, similarly the sixth and tenth end closure panels 22b, 30b, may be dimensioned such that a gap or slot is provided therebetween. The gap may provide a further ventilation access to the shipping carton 90.

Turning now to Figure 3, there is illustrated a blank 1010 for forming a secondary package or article carrier 1090 (see Figure 4) according to a first embodiment. The blank 1010 comprises a plurality of main panels 1012, 1014, 1016, 1018, 1020 for forming a tubular structure. The plurality of main panels 1012, 1014, 1016, 1018, 1020 comprises a first base panel (or outer layer) 1012, a first side panel 1014, a top panel 1016, a second side panel 1018 and a second base panel or securing flap (or inner layer) 1020. The plurality of panels 1012, 1014, 1016, 1018, 1020 may be arranged in a linear series hinged one to the next by corresponding fold lines 1013, 1015, 1017, 1019.

The term “top panel” as used herein refers to a panel that is placed upon one of the opposite ends of the primary products containers or articles B each having a generally columnar shape. The “top panel” provides a cover over at least a portion of the packaged article B in normal use. The term “base panel” as used herein refers to a panel that is placed below one of the opposite ends of the primary products containers or articles B or below a flange or protrusion of a primary products container or article B such that an upper surface supports the packaged article B in normal use. The primary products containers or articles B which are packaged by the secondary carrier 1090 are generally columnar in shape. The term “generally columnar shape” as used herein includes, but is not limited to, a generally truncated conical shape, generally truncated pyramidal shape, generally cylindrical shape, generally prismatic shape and the other similar shapes.

In some embodiments, the term “base panel” may refer to a panel disposed below a flange or skirt of an article B such that the article B can be suspended or supported therefrom.

The blank 1010 is foldable to form a package 1090 as illustrated in Figure 4. The first and second base panels 1012, 1020 are engageable with one another in an overlapping relationship to form a composite base wall 1012/1020 of the carrier 1090. The first and second base panels 1012, 1020 may be adhesively secured to each other. Alternatively, the blank 1010 may comprise a complementary locking mechanism for securing the first base panel 1012 to the second base panel 1020 or may be secured by use of a mechanical fixing such as, but not limited to, staples.

The blank 1010 is adapted to accommodate four articles B arranged in a 1x2x2 matrix or array. That is to say, the blank 1010 is arranged to accommodate two tiers of two adjacently disposed articles B. The blank 1010 comprises at least one top retention structure RT1, RT2 for engaging an article B disposed in the uppermost tier. The blank 1010 illustrated in Figure 3 comprises two top retention structures RT1, RT2 for engaging each article B disposed in the uppermost tier.

Each of the top engaging structures RT1, RT2 comprises an opening C1, C2 respectively. Each opening C1, C2 is struck, at least in part, from the second side panel 1018. Optionally, the openings C1, C2 interrupt the fold line 1017 between the top panel 1016 and the second side panel 1018. When the second side panel 1018 is folded with respect to the top panel 1016, about fold line 1017, the openings C1, C2 can receive a portion of a respective article B. In the illustrated embodiment the openings C1, C2 each receive a flange of an article B.

The openings C1, C2 each define, in part a protrusion P extending from the side edge of the top panel 1016 and integral therewith. The protrusions P are struck from material which would otherwise form the second side panel 1018. In this way, protrusions P may be considered to be struck from the second side panel 1018. The protrusions P each form a protective top cover for a portion of an article B which is received in the openings C1, C2.

The blank 1010 comprises at least one top engaging structure C3, C4 for engaging an article B disposed in a lower tier. The blank 1010, as illustrated in Figure 3, comprises two top engaging structures C3, C4 for engaging each article B disposed in the lower tier.

In the illustrated embodiment the blank 1010 comprises two top engaging structures C3, C4 for engaging each article B disposed in the bottom or lowermost tier. It will be appreciated that in article carriers arranged to accommodate more than two tiers further top engaging structures may be provided.

The top engaging structures C3, C4 each comprise a cutaway in the form of an aperture or slot struck from, or defined in, the second side panel 1018. In other embodiments, the top engaging structures C3, C4 may take alternative forms such as but not limited to one or more displaceable tabs defined, at least in part, by one or more cut lines. The tabs may be displaceable to form an opening in the second side panel 1018 for receiving a portion of an article B. The one or more tabs may each comprise an engaging edge for engagement with the article B.

The blank 10 may comprise at least one heel engagement structure C5, C6 for engaging with a heel or lower portion of an article B. The blank 1010 illustrated in Figure 3 comprises two heel engagement structures C5, C6 each is provided for engaging a respective article B disposed in the lowermost tier.

Each of the heel engagement structures C5, C6 comprises an opening or aperture struck, at least in part, from the second side panel 1018. Optionally, the openings C1, C2 interrupt the fold line 1019 between the base panel 1020 and the second side panel 1018. When the second side panel 1018 is folded with respect to the base panel 1020, about fold line 1019, the openings C5, C6 can receive a portion of a respective article B. In the illustrated embodiment the openings C5, C6 each receive a lower portion or heel of an article B.

The openings C5, C6 each define, in part a protrusion extending from the side edge of the base panel 1020 and integral therewith. The protrusions P are struck from material which would otherwise form the second side panel 1018. In this way, protrusions P may be considered to be struck from the second side panel 1018. The protrusions P each form a protective base for a portion of an article B which is received in the openings C5, C6.

Optionally, the blank 1010 comprises a first cutaway C7 in the form of a recess struck from a portion of a first free end edge of the first side panel 1014 and from a portion of a first free end edge of the first base panel 1012. Optionally, the blank 1010 comprises a second cutaway C8 in the form of a recess struck from a portion of a second free end edge of the first side panel 1014 and from a portion of a second free end edge of the first base panel 1012. In this way the fold line 1013 hinging the first base panel 1012 to the first side panel 1014 terminates at each end at one of the first and second cutaways C7, C8.

The first and second cutaways C7, C8 may be shaped so as to be complementary or similar in shape to a lower portion or heel of the articles B being packaged, best illustrated in Figure 4.

Turning to the construction of the article carrier 1090 as illustrated in Figure 4, it is envisaged that the article carrier 1090 can be formed by a series of sequential folding operations in a straight-line machine so that the article carrier 1090 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.

A group of articles B is assembled; in the embodiment illustrated in Figure 2 four articles B are arranged in two tiers of two articles. The top panel 1016 of the blank 10 is disposed above the group of articles B to provide a top wall 1016 of the article carrier 1090.

The first and second side walls 1014, 1018 are folded, with respect to the top panel 1016 about fold lines 1015, 1017 respectively, about opposing sides of the group of articles B so as to be disposed about the opposing sides of the group of articles B, as shown in Figure 4. A flange or skirt of each article B in the upper tier is received in a respective one of the openings C1, C2 of the retention structures RT1, RT2. A flange or skirt of each article B in the lower tier is received in a respective one of the openings of the top engaging structures C3, C3.

The second base panel 1020 is folded about the fold line 1019 so as to be disposed adjacent the base of the group of articles B.

Glue G or other adhesive treatment is applied to an outer surface of the second base panel 1020. Alternatively, glue G or other adhesive treatment may be applied to a corresponding portion of an inner surface of the first base panel 1012.

The first base panel 1012 is folded about the fold line 1013 so as to be disposed adjacent the base of the group of articles B. At least a portion of first base panel 1012 is brought into face contacting relationship with the second base panel 1020.

The first base panel 1012 is secured to the second base panel 1020.

The assembled article carrier 1090 is shown in Figure 4.

The flange F of each article B has been at least partially received in the opening of a retention structure RT1, RT2 or of a top engaging structure C3, C4. In the illustrated embodiment the articles B are disconnected or individual cups which are disposed in close proximity to their adjacent neighbours. The articles B are tapered in shape, they can be considered to be

substantially frusto-conical in shape, albeit inverted such that the end having the smaller diameter is disposed in closer proximity to the composite base panel 1012/1020 and the end having the larger diameter is disposed in closer proximity to the top panel 1016.

A void or gap exists between lower portions of two adjacent articles B.

A heel portion of each of the articles B disposed in the lowermost tier is disposed in a respective one of the heel engaging structures C5, C6.

The retention structure RT1, RT2, top engaging structures C3, C4 and heel engaging structures C5, C6 facilitate retention of the articles B within the article carrier 1090 preventing or inhibiting unintentional egress of the articles B from the article carrier 1090.

The article carrier 1090 comprises a tubular structure having two opposed open ends.

The top panel 1016 comprises a pair of opposed free end edges. Each of the pair of opposed free end edges comprises a contoured or tapered portion T1, T2. In this way the top panel 1016 comprises a first hinged edge H1, defined by fold line 1017, which is longer in dimension than a second hinged edge H2, defined by fold line 1015 (see Figure 5).

The top panel 1016 is shaped such that a portion of each endmost article B1, B2 projects or extends beyond a respective one of the opposed free end edges. The tapered portions T1, T2 have the effect of insetting the adjacent corners of the top panel 1016 on a first side of the group of articles B being packaged.

The secondary package 1090 illustrated in Figure 5 comprises a pair of articles B. The articles each comprises a diameter or width dimension and together the articles B define a length dimension L2 of the article group.

The first hinged edge H1 comprises a first dimension L1. The second hinged edge H2 comprises a second dimension L3. The first dimension L1 is greater than the second dimension L3 ($L1 > L3$).

The first dimension L1 of the first hinged edge H1 of the top panel 1016 is substantially or generally equal to the length dimension L2 of the group of articles B being packaged ($L1 \cong L2$).

The secondary package comprises a first article B1 disposed at first end of the tubular structure formed by the plurality of main panels 1012, 1014, 1016, 1018, 1020. The first article B1 is in touching contact with, or at least is closest to, the first side panel 1014 at a position defined by first point TP1. This is the position at which the first side panel 1014 is disposed tangentially to the first article B1.

The secondary package comprises a second article B1 disposed at second end of the tubular structure formed by the plurality of main panels 1012, 1014, 1016, 1018, 1020. The second article B2 is in touching contact with, or at least is closest to, the first side panel 1014 at a position defined by second point TP2. This is the position at which the first side panel 1014 is disposed tangentially to the second article B2.

The first point TP1 is spaced a linear dimension L4, along long the first side panel 1014, from the second point TP2. The linear dimension L4 is less than the second dimension L3 of the second hinged edge H2. Which in turn is less than first dimension L1 of the first hinged edge H1 and is also less than the length dimension L2 of the articles B being packaged ($L4 < L3 < L1 \cong L2$).

The linear dimension L4 may be also the distance between the respective centres of the first and second articles B1, B2.

The top panel 1016 may be shaped such that an endmost article B disposed in an article carrier 1090 may be disposed in touching contact with, or at least close proximity to, an adjacently disposed end closure panel 22a, 24a, 24b, 26a, 28a, 28b, 30a, 22b, 24c, 24d, 26b, 28c, 28d, 30b of the shipping carton 90 as shown in Figure 14. In this way the articles B may be tightly packaged by the shipping carton 90.

The top panel 1016 may be shaped such that an endmost article B disposed in a first article carrier 1090A may be disposed in touching contact with, or at least close proximity to, an adjacently disposed end closure panel 22a, 24a, 24b, 26a, 28a, 28b, 30a at a first end of the shipping carton 90.

The top panel 1016 may be shaped such that an endmost article B disposed at a second end of a first article carrier 1090A may be disposed in touching contact with, or at least close proximity to, an article B disposed at a first end of an adjacent second article carrier 1090D.

The top panel 1016 may be shaped such that an endmost article B disposed in the adjacent second article carrier 1090D may be disposed in touching contact with, or at least close proximity to, an adjacently disposed end closure panel 22b, 24c, 24d, 26b, 28c, 28d, 30b at a second end of the shipping carton 90.

In this way the articles B may be tightly packaged by the shipping carton 90, in at least a longitudinal direction of the shipping carton 90.

Figure 14 illustrates a first method of orienting a plurality of article carriers 1090 within the shipping carton 90. In the illustrated embodiment six article carriers 1090A, 1090B, 1090C, 1090D, 1090E, 1090F are provided within the shipping carton 90.

The shipping carton 90 comprises three rows of two secondary packages 1090. The outermost rows of secondary packages 1090 are oriented such that the short hinged edges H2 of their top panels 1016 face outwardly, towards the first or second side panel 14, 18 of the shipping carton 90.

The inner or middle row of secondary packages 1090 are oriented in the same direction as each other. In the illustrated embodiment the inner or middle row of secondary packages 1090 are oriented such that the short hinged edges H2 of their top panels 1016 face towards the first side panel 14 of the shipping carton 90. It will be appreciated that in other embodiments the short hinged edges H2 of the top panels 1016 of the middle row of secondary packages 1090 may face towards the second side panel 18 of the shipping carton 90.

Figure 15 illustrates a second method of orienting a plurality of article carriers 1090, in the illustrated embodiment six article carriers 1090A, 1090B, 1090C, 1090D, 1090E, 1090F, within the shipping carton 90. In the illustration the second top panel 20 of the shipping carton 90 has been omitted for illustrative purposes

The shipping carton 90 comprises three rows of two secondary packages 1090. The outermost rows of secondary packages 1090 are oriented such that the short hinged edges H2 of their top panels 1016 face outwardly, towards the first or second side panel 14, 18 of the shipping carton 90.

The inner or middle row of secondary packages 1090 are oriented in the opposing directions to each other such that the short hinged edge H2 of the top panel 1016B of a third secondary packages 1090B faces towards the first side panel 14 of the shipping carton 90 and the short

hinged edge H2 of the top panel 1016E of a fourth secondary packages 1090E faces towards the second side panel 18 of the shipping carton 90. The third secondary package 1090B and the adjacent fifth secondary package 1090C are disposed in a back-to-back contacting relationship. In this application, however, the expression "contacting relationship" is not limited to referring to an actually contacting or touching relationship but includes any relationship wherein two adjacent panels, walls or otherwise surfaces are facing or opposing to one another with a space therebetween but without any other packages or cartons therebetween.

Figure 15A is an enlarged view of a corner of the package system, the package system comprises the shipping carton 90, the secondary packages 1090A, 1090B, 1090C, 1090D, 1090E, 1090F and the articles B.

It can be seen that the top panel 1016 of the secondary package 1090 is configured to expose a portion of the endmost article B. A portion of the endmost article B extends or projects beyond the top panel 1016. The embodiment shown exposes the widest part of the article B. The tapered or contoured edge T2 of the top panel 1016 commences at a point P1. Point P1 is disposed a distance 'd' from the second hinged edge H2 of the secondary package 1090. In the illustrated embodiment the distance 'd' is greater than a radial dimension of the article B.

In the illustrated embodiment the distance 'd' is greater than an internal distance 'a', measured in a transverse direction with respect to the secondary package 1090, between the end wall EW and the sidewall SW of the shipping carton 90, in other embodiments is the distance 'd' is equal to or greater than distance 'a' ($d \geq a$).

The edge of the top panel 1016 terminates at second hinged edge H2 of the secondary package 1090 at a second point P2. Second point P2 is disposed a distance 'c' measured, in a longitudinal direction with respect to the secondary package 1090, from the point P1 or alternatively from the widest part of the secondary package 1090, which may be defined by the widest part of the top panel 1016 or the widest part of the article B). In the illustrated embodiment the distance 'c' is less than a radial dimension of the article B.

In the illustrated embodiment the distance 'c' is greater than an internal distance 'b', measured in a longitudinal direction with respect to the secondary package 1090, between the end wall EW and the sidewall SW of the shipping carton 90, in other embodiments is the distance 'c' is equal to or greater than distance 'b' ($c \geq b$).

The shipping carton 90 can form a close or snug fit with the exposed portion of the endmost article B. In some embodiments the end wall and/or beveled corner panel of the shipping carton 90 may be contactable with the exposed portion of the endmost article B.

Figure 6 shows a plurality of blanks 1010A through to 1010T of the form shown in Figure 3 laid out in a nested arrangement. Figure 6 shows twenty blanks 1010A-T. The blanks 1010A-T comprise opposed end edges portion of which are symmetrical between X and Y. The portion of the end edge which is symmetrical is symmetrical about a point of symmetry SP. The point of symmetry lies upon a notional line S-S' which defines a centrally disposed longitudinal axis of the top panel 1016 of the blanks 1010A-T. The notional line S-S' shown in Figure 6 lies upon a longitudinal centre axis of the top panel 1016, denoted in Figure 3 by dashed line Z-Z'. The longitudinal centre axis of the top panel 1016 Z-Z' and the notional line S-S' extend longitudinally across the base panel 1216 and pass through the tapered or contoured portions T1, T2. That is to say, the point of symmetry SP lies upon the tapered or contoured portions T1, T2, best illustrated in Figure 3.

The free end edges extend generally transversely with respect to the centre axis (S-S'). At least a part of the free end edge is symmetrical about a point of symmetry SP. The top panel 1016 provides at least a portion of the part of the free end edge which is symmetrical. A first blank 1010A is nestable with another blank 1010B which is of the same size and configuration as the first blank 1010A such that the symmetrical part of one of the free end edges of the first blank 1010A and that of the other blank 1010B are formed by a single die cut blade.

The portion of the end edge which is symmetrical is non-linear in shape. That is to say, it includes the tapered or contoured portion T1, T2 of the first or second end edges of the top panel 1016.

Referring now to Figures 7 to 9 there is shown an alternative embodiment of the present disclosure. In the second illustrated embodiment, like numerals have, where possible, been used to denote like parts, albeit with the addition of the prefix "1100" to indicate that these features belong to the second embodiment. The second embodiment shares many common features with the embodiment of Figures 3 to 6 and therefore only the differences from the embodiment illustrated in Figures 3 to 6 will be described in any greater detail.

Figure 7 illustrates a blank 1110 for forming a secondary package or article carrier 1190 (see Figure 8) according to a second embodiment. The blank 1110 comprises a plurality of main panels 1112, 1114, 1116, 1118, 1120 for forming a tubular structure. The plurality of main

panels 1112, 1114, 1116, 1118, 1120 comprises a first base panel (or outer layer) 1112, a first side panel 1114, a top panel 1116, a second side panel 1118 and a second base panel or securing flap (or inner layer) 1120. The plurality of panels 1112, 1114, 1116, 1118, 1120 may be arranged in a linear series hinged one to the next by corresponding fold lines 1113, 1115, 1117, 1119.

The blank 1110 is foldable to form a package 1190 as illustrated in Figure 8. The first and second base panels 1112, 1120 are engageable with one another in an overlapping relationship to form a composite base wall 1112/1120 of the carrier 1190.

The blank 1110 is adapted to accommodate four articles B arranged in a 1x2x2 matrix or array. That is to say, the blank 1110 is arranged to accommodate two tiers of two adjacently disposed articles B. The blank 1110 comprises at least one top retention structure RT1, RT2 for engaging an article B disposed in the uppermost tier. The blank 1110 illustrated in Figure 7 comprises two top retention structures RT1, RT2 for engaging each article B disposed in the uppermost tier.

The blank 1110 comprises at least one top engaging structure C3, C4 for engaging an article B disposed in a lower tier. The blank 10 illustrated in Figure 7 comprises two top engaging structures C3, C4 for engaging each article B disposed in the lower tier. In the illustrated embodiment the blank 1110 comprises two top engaging structures C3, C4 for engaging each article B disposed in the bottom or lowermost tier. It will be appreciated that in article carriers arranged to accommodate more than two tiers further top engaging structures may be provided.

The blank 1110 may comprise at least one heel engagement structure C5, C6 for engaging with a heel or lower portion of an article B. The blank 1110 illustrated in Figure 7 comprises two heel engagement structures C5, C6 each is provided for engaging a respective article B disposed in the lowermost tier.

Optionally, the blank 1110 comprises a first cutaway C7 in the form of a recess struck from a portion of a first free end edge of the first side panel 1114 and from a portion of a first free end edge of the first base panel 1112. Optionally, the blank 1110 comprises a second cutaway C8 in the form of a recess struck from a portion of a second free end edge of the first side panel 1114 and from a portion of a second free end edge of the first base panel 1112. In this way the fold line 1113 hinging the first base panel 1112 to the first side panel 1114 terminates at each end at one of the first and second cutaways C7, C8.

The article carrier 1190 as illustrated in Figure 8 can be constructed by employing a series of sequential folding operations similar to that described above in relation to the blank 1010 of Figure 3.

The blank 1110 comprises a pair of opposed free end edges E1, E2. A first free end edge E1 comprises a first tapered or contoured portion T1 provided by a first end edge of the top panel 1116.

A second free end edge E2 comprises a second tapered or contoured portion T2 provided by a second end edge of the top panel 1116. The second end edge of the top panel 1116 opposes the first end edge of the top panel 1116.

The first free end edge E1 comprises a third tapered or contoured portion T3 provided by a first end edge of the first side panel 1114.

The second free end edge E2 comprises a fourth tapered or contoured portion T4 provided by a second end edge of the first side panel 1114.

The third and fourth tapered or contoured portions T3, T4 have the effect of widening an upper portion of the first side panel 1114 with respect to a lower portion thereof. The upper portion of the first side panel 1114 is provided adjacent to the hinged connection 1115 between the first side panel 1114 and the top panel 1116.

The third and fourth tapered or contoured portions T3, T4 have the effect of widening a portion of the top panel 1116 of the blank 1110 of Figure 7 with respect to a corresponding portion of the top panel 1016 of the blank 1010 of Figure 3. The aforesaid widened portion of the top panel 1116 of the blank 1110 is provided adjacent to the hinged connection 1115 between the first side panel 1114 and the top panel 1116.

This has the effect of increasing the area of the first side panel 1114 and of the top panel 1116. This may advantageous for increasing a display area for providing information or branding to a consumer. The blank 1010 of Figure 3 is advantageous in that is reduces the substrate material require to form the blank 1010. The blank 1010 is nestable to a greater extent than the blank of Figure 7 enables a larger density of blanks 1010 to be provided by a substrate for a given carrier configuration. This is illustrated by comparison of Figures 6 and 9. The

substrate SH of Figure 6 comprises twenty blanks 1010A-T whereas the substrate SH of Figure 9 comprises eighteen blanks 1110A-R.

Referring now to Figures 10 to 13 there is shown a further alternative embodiment of the present disclosure. In the third illustrated embodiment, like numerals have, where possible, been used to denote like parts, albeit with the addition of the prefix "1200" to indicate that these features belong to the third embodiment. The third embodiment shares many common features with the embodiments of Figures 3 to 9 and therefore only the differences from the embodiments illustrated in Figures 3 to 9 will be described in any greater detail.

Figure 10 illustrates a blank 1210 for forming a secondary package or article carrier 1290 (see Figure 11 and 12) according to a third embodiment. The blank 1210 comprises a plurality of main panels 1212, 1214, 1216, 1218, 1220 for forming a tubular structure. The plurality of main panels 1212, 1214, 1216, 1218, 1220 comprises a first top panel (or outer layer) 1212, a first side panel 1214, a base panel 1216, a second side panel 1218 and a second top panel or securing flap (or inner layer) 1220. The plurality of panels 1212, 1214, 1216, 1218, 1220 may be arranged in a linear series hinged one to the next by corresponding fold lines 1213, 1215, 1217, 1219.

The first top panel 1212 comprises a pair of opposed free end edges each of which comprises a tapered or contoured portion T1, T2. This has the effect of decreasing the length of the edge of the first top panel 1212 along the hinged connection 1213 coupling the first top panel 1212 to the first side panel 1214 compared to a free side edge opposing the hinged connection 1213.

The blank 1210 comprises at least one top retention structures RT1, RT2 for engaging an article B disposed in an uppermost tier. The blank 1210 illustrated in Figure 10 comprises two top retention structures RT1, RT2 for engaging each article B disposed in the uppermost tier.

Each of the top engaging structures RT1, RT2 comprises an opening C1, C2 respectively. Each opening C1, C2 is struck, at least in part, from the second side panel 1218. Optionally, the openings C1, C2 interrupt the fold line 1219 between the second top panel 1220 and the second side panel 1218. When the second side panel 1218 is folded with respect to the second top panel 1220, about fold line 1219, the openings C1, C2 can receive a portion of a respective article B. In the illustrated embodiment the openings C1, C2 each receive a flange of an article B.

The openings C1, C2 each define, in part a protrusion P extending from the side edge of the second top panel 1220 and integrally formed therewith. The protrusions P are struck from material which would otherwise form the second side panel 1218. In this way protrusions P may be considered to be struck from the second side panel 1218. The protrusions P each form a protective top cover for a portion of an article B which is received in the openings C1, C2.

The base panel 1216 comprises a pair of opposed free end edges each of which comprises a mitred, chamfered or beveled corner portion M1, M2. This has the effect of decreasing the length of the edge of the base panel 1216 along the hinged connection 1215 coupling the base panel 1216 to the first side panel 1214 compared to a hinged side edge defined the hinged connection 1217 coupling the base panel 1216 to the second side panel 1218.

The base panel 1216 comprises a pair of article receiving apertures W1, W2. Each article receiving apertures W1, W2 is adapted to receive a portion of an article B. The article receiving apertures W1, W2 are dimensioned such that the articles B are prevented or inhibited from passing through the base panel 1216. Each article B comprises a flange, skirt or other radial projection which engages with an upper surface of the base panel 1216 proximate the article receiving apertures W1, W2. In this way the articles B can be suspended or hang from the base panel 1216.

The articles B received in the article receiving apertures W1, W2 form a lower tier of a group of articles B, best shown in Figure 12. A second upper tier of articles B are placed upon the lower tier.

The second tier of articles B is disposed within the tubular structure of the carrier 1290. The bases of the articles B in the second tier are disposed above the base panel 1216.

The first and second side walls 1214, 1218 are folded upwardly, with respect to the base panel 1216 about fold lines 1215, 1217 respectively, about opposing sides of the upper tier of the group of articles B so as to be disposed about the opposing sides thereof. A flange or skirt of each article B in the upper tier is received in a respective one of the openings C1, C2 of the retention structures RT1, RT2.

The second top panel 1220 is folded with respect to the second side panel 1218 about fold line 1219 to be disposed at least partially over the articles B in the upper tier.

Glue G or other adhesive treatment is applied to an outer surface of the second top panel 1220. Alternatively, glue G or other adhesive treatment may be applied to a corresponding portion of an inner surface of the first top panel 1212.

The first top panel 1212 is folded with respect to the first side panel 1214 about fold line 1213 to be disposed at least partially over the articles B in the upper tier.

The first top panel 1212 is brought into face contacting relationship with the second top panel 1220.

The first top panel 1212 is brought into at least partial overlapping relationship with the second top panel 1220.

The first top panel 1212 is secured to the second top panel 1220 to form the secondary package 1290 shown in Figure 12.

Figure 18 illustrates a top view of an alternative shipping carton 290 loaded with the secondary packages 1290 of the third embodiment. The alternative shipping carton 290 is configured to receive four secondary packages 1290A, 1290B, 1290C, 1290D arranged in a 2x2 matrix or array. The alternative shipping carton 290 is arranged to have corner panels which provide a beveled or mitred corner. In this way the shipping carton 290 adopts an octagonal shape as viewed from above in Figure 18.

It will be appreciated that the secondary packages 1290 of the third embodiment may also be employed with the shipping carton 90 of Figure 2 in a 2x3 matrix or array. Additionally, or alternatively the alternative shipping carton 290 may be loaded with the secondary packages 1090, 1190 of the first or second embodiments.

Returning to Figure 18 it can be seen that the alternative shipping carton 290 forms a close or snug fit about the group of secondary packages 1290A, 1290B, 1290C, 1290D. The mitred corners M1, M2 of the secondary carrier 1290 are disposed in close proximity to the corner panels of the shipping carton 290. The base panel 1216 is shaped so as to allow the secondary packages 1290A, 1290B, 1290C, 1290D to form a close fit with the beveled corner panels of the shipping carton 290.

A first column of secondary packages 1290A, 1290C is arranged such that the first side panel 1214 of each secondary package 1290A, 1290C faces a first one of a pair of opposed side panels of the shipping carton 290.

A second column of secondary packages 1290B, 1290D is arranged such that the first side panel 1214 of each secondary package 1290B, 1290D faces the a second one of a pair of opposed side panels of the shipping carton 290.

In this way the secondary packages 1290A, 1290C of the first column are disposed back to back with the secondary packages 1290B, 1290D of the second column. That is to say, each second side panels 1218 of the secondary packages 1290A, 1290C faces a respective one of the second side panels 1218 of one of the secondary packages 1290B, 1290D.

Figure 13 illustrates a plurality of blanks 1210A through to 1210Z of the form shown in Figure 10 laid out in a nested arrangement. Figure 13 shows twenty-six blanks 1210A-Z. The blanks 1210A-Z comprise opposed end edges, a portion of each edge is symmetrical, the symmetrical portion is denoted between X and Y in Figure 13. The portion of the end edge which is symmetrical is symmetrical about a point of symmetry SP. The point of symmetry lies upon a notional line S-S'. The notional line S-S' extends longitudinally across the base panel 1216 and passes through the mitred corner portions M1, M2. That is to say, the point of symmetry SP lies upon the mitred corner portions M1, M2, best illustrated in Figure 10. The notional line S-S' is offset from a longitudinal centre axis of the base panel 1216, denoted in Figure 10 by dashed line Z-Z'.

The free end edges of the blanks 1210A-Z extend generally transversely with respect to the centre axis (Z-Z'). At least a part of the free end edge is symmetrical about a point of symmetry SP. The base panel 1216 provides at least a portion of the part of the free end edge which is symmetrical. A first blank 1210A is nestable with another blank 1210B which is of the same size and configuration as the first blank 1210A such that the symmetrical part of one of the free end edges of the first blank 1210A and that of the other blank 1210B are formed by a single die cut blade.

The portion of the end edge which is symmetrical is non-linear in shape. That is to say, it includes the tapered or contoured portion T1, T2 of the first or second end edges of the top panel 1216 and/or the mitred corner portions M1, M2 of the base panel 1216.

Referring now to Figures 16 and 17 there is shown a further alternative embodiment of the shipping carton of the present disclosure. In the further alternative embodiment illustrated, like numerals have, where possible, been used to denote like parts, albeit with the addition of the prefix “100”. The further alternative embodiment shares many common features with the embodiment of Figures 1 and 2 and therefore only the differences from the embodiments illustrated in Figures 1 and 2 will be described in any greater detail.

The blank 110 and shipping carton 190 of Figures 16 and 17 respectively may be employed with any of the secondary packages described and/or illustrated.

Referring now to Figure 16, the blank 110 comprises a series of main panels for forming the main walls of a tertiary package or shipping carton 190. The series of main panels comprises: a first top panel 112, a first side panel 114, a base panel 116, a second side panel 118 and a second top panel 120. Optionally the series of main panels 112, 114, 116, 118, 120, are hinged together in a linear series by hinged connections in the form of fold lines 113, 115, 117, 119.

The plurality of main panels 112, 114, 116, 118, 120 of the blank 110 form walls of a tubular structure in a set-up condition. The tubular structure is at least partially closed by end closure structures. The tubular structure has a tubular axis defining a longitudinal direction.

Each of the ends of the tubular structure is at least partially closed by end closure panels which form end walls of the tubular structure. In the illustrated embodiment the ends of the tubular structure are fully closed by end closure panels 122a, 124a, 124b, 126a, 128a, 128b, 130a, 122b, 124c, 124d, 126b, 128c, 128d, 130b.

End closure panels 122a, 124a, 124b, 126, 128a, 128b, 130a are configured to close a first end of the tubular structure and end closure panels 122b, 124c, 124d, 126b, 128c, 128d, 130b are configured to close a second end of the tubular structure.

The first end of the tubular structure is closed by a first end closure panel 122a, a second end closure panel 124a, a first corner panel 124b, a third end closure panel 126a, a fourth end closure panel 128a, a second corner panel 128b and a fifth end panel 130a. The first end closure panel 122a is hinged to an upper edge end of the second end closure panel 124a by a hinged connection such as a fold line 121a. The first end closure panel 122a is separated from the first top panel 112 by a cutline or severable line 133a. The second end closure panel 124a is hinged to a first end of a first corner panel 124b by a hinged connection such as a fold line 123a. The first corner panel 124b is hinged to a first end of the first side panel 114 by a

hinged connection such as a fold line 123b. The third end closure panel 126a is hinged to a first end of the base panel 116 by a hinged connection such as a fold line 125a. The fourth end closure panel 128a is hinged to a first end of a second corner panel 124b by a hinged connection such as a fold line 127a. The second corner panel 124b is hinged to a first end of the second side panel 118 by a hinged connection such as a fold line 123b. The fifth end closure panel 130a is hinged to an upper edge end of the fourth end closure panel 128a by a hinged connection such as a fold line 129a. The fifth end closure panel 130a is separated from the second top panel 120 by a cutline or severable line 131a.

The second end of the tubular structure is closed by a sixth end closure panel 122b, a seventh end closure panel 124c, a third corner panel 124d, an eighth end closure panel 126b, a ninth end closure panel 128c, a fourth corner panel 128d and a tenth end closure panel 130b. The sixth end closure panel 122b is hinged to an upper edge end of the seventh end closure panel 124c by a hinged connection such as a fold line 121b. The sixth end closure panel 122b is separated from the first top panel 112 by a cutline or severable line 133b. The seventh end closure panel 124c is hinged to a second end of a third corner panel 124d by a hinged connection in the form of a fold line 123c. The third corner panel 124d is hinged to a second end of the first side wall panel 114 by a hinged connection such as a fold line 123d. The eighth end closure panel 126b is hinged to a second end of the base panel 116 by a hinged connection such as a fold line 125b. The ninth end closure panel 128c is hinged to a second end of a fourth corner panel 128d by a hinged connection in the form of a fold line 127c. The fourth corner panel 124d is hinged to a second end of the second side wall panel 118 by a hinged connection such as a fold line 127d. The tenth end closure panel 130b is hinged to an upper edge end of the ninth end closure panel 128c by a hinged connection such as a fold line 129b. The tenth end closure panel 130b is separated from the second top panel 120 by a cutline or severable line 131b.

The first end closure panel 122a and the fifth end closure panel 130a each form securing panels at the first end of the tubular structure. The sixth end closure panel 122b and the tenth end closure panel 130b each form securing panels at the second end of the tubular structure.

In a setup condition the first end closure panel 122a is folded about fold line 121a to be substantially perpendicular with the second end closure panel 124a. The first end closure panel 122a is folded over the group of secondary packages disposed with the shipping carton 190. The fifth end closure panel 130a is folded about fold line 129a to be substantially perpendicular with the fourth end closure panel 128a. The fifth end closure panel 130a is folded over the group of secondary packages disposed with the shipping carton 190. The first

end closure panel 122a and the fifth end closure panel 130a form an inner ply over which the first top panel 112 is folded to form an outer ply.

The first top panel 112 is secured to the first end closure panel 122a at one end and to the sixth end closure panel 122b at the other end.

The sixth end closure panel 122b is folded about fold line 121b to be substantially perpendicular with the seventh end closure panel 124b. The sixth end closure panel 122b is folded over the group of secondary packages disposed with the shipping carton 190. The tenth end closure panel 130b is folded about fold line 129b to be substantially perpendicular with the ninth end closure panel 128c. The tenth end closure panel 130b is folded over the group of secondary packages disposed with the shipping carton 190. The sixth end closure panel 122b and the tenth end closure panel 130b form an inner ply over which the second top panel 120 is folded to form an outer ply.

The second top panel 120 is secured to the fifth end closure panel 130a at one end and to the tenth end closure panel 130b at the other end.

The third end closure panel 126a and the eighth end closure panel 126b each form a lower end closure panels at opposing ends of the tubular structure. The third end closure panel 126a and the eighth end closure panel 126b extend substantially from the base panel 116 to the composite top wall 112/120 formed from the first and second top panels 112, 120. The third end closure panel 126a and the eighth end closure panel 126b are full depth panels that is to say, they have height substantially equal to the height of the first and second side panels 114, 118. (The third end closure panel 26a and the eighth end closure panel 26b of the embodiment of Figure 1 are partial depth end closure panels, similarly the first, fifth, sixth and tenth end closure panels 22a, 30a, 22b, 30b are partial depth end closure panels.)

The second end closure panel 124a and the fourth end closure panel 128a each form a minor side end closure panel or dust flap at the first end of the tubular structure. The seventh end closure panel 124c and the ninth end closure panel 128c each form a minor side end closure panel or dust flap at the second end of the tubular structure.

The third end closure panel 126a is secured to the second end closure panel 124a and to the fourth end closure panel 128a.

The eighth end closure panel 126b is secured to the seventh end closure panel 124c and to the ninth end closure panel 128c.

Optionally, the second end closure panel 124a comprises a cutaway in the form of a first aperture A3 struck therefrom.

Optionally, the seventh end closure panel 124b comprises a cutaway in the form of a second aperture A4 struck therefrom.

Optionally, the third end closure panel 126a comprises a pair of cutaways in the form of a third aperture A5 and a fourth aperture A6 struck therefrom.

Optionally, the eighth end closure panel 126b comprises a pair of cutaways in the form of a fifth aperture A7 and a sixth aperture A8 struck therefrom.

Optionally, the fourth end closure panel 128a comprises a cutaway in the form of a seventh aperture A9 struck therefrom.

Optionally, the ninth end closure panel 128c comprises a cutaway in the form of an eighth aperture A10 struck therefrom.

The first and third apertures A3, A5 may be arranged to form a first opening in the first end of the shipping carton 190 when in a set-up condition. The fourth and seventh apertures A6, A9 may be arranged to form a second opening in the first end of the shipping carton 190 when in a set-up condition.

The second and fifth apertures A4, A7 may be arranged to form a third opening in the second end of the shipping carton 190 when in a set-up condition. The sixth and eighth apertures A8, A10 may be arranged to form a fourth opening in the second end of the shipping carton 190 when in a set-up condition.

Optionally, the base panel 116 comprises a pair of apertures A1, A2.

Referring now to Figures 19 to 27 there is shown an alternative embodiments of the present disclosure. In the fourth, fifth, sixth and seventh illustrated embodiments of the secondary carrier, like numerals have, where possible, been used to denote like parts, albeit with the addition of the prefix “1300, 1400, 1500, 1600” to indicate that these features belong to the

fourth, fifth, sixth and seventh embodiments respectively. The fourth, fifth, sixth and seventh embodiments share many common features with the embodiments of Figures 3 to 9 and therefore only the differences from the embodiments illustrated in Figures 3 to 9 will be described in any greater detail.

Figure 19 illustrates a blank 1310 for forming a secondary package or article carrier 1390 (see Figure 20) according to a fourth embodiment. The blank 1310 comprises a plurality of main panels 1312, 1314, 1316, 1318, 1320 for forming a tubular structure. The plurality of main panels 1312, 1314, 1316, 1318, 1320 comprises a first base panel (or outer layer) 1312, a first side panel 1314, a top panel 1316, a second side panel 1318 and a second base panel or securing flap (or inner layer) 1320. The plurality of panels 1312, 1314, 1316, 1318, 1320 may be arranged in a linear series hinged one to the next by corresponding fold lines 1313, 1315, 1317, 1319.

The blank 1310 comprises a first base panel 1312 hinged to the first side panel 1314 by a hinged connection in the form of a fold line 1313. The blank 1310 comprises a second base panel 1320 hinged to the second side panel 1318 by a hinged connection in the form of a fold line 1319.

The first and second base panels 1312, 1320 are engageable with one another in an overlapping relationship to form a composite base wall 1312/1320 of the carrier 1390. The blank 1310 may comprise a complementary locking mechanism for securing the first base panel 1312 to the second base panel 1320. The first base panel 1312 may comprise at least one first part M of the complementary locking mechanism. The second base panel 1320 may comprise at least one second part F of the complementary locking mechanism. In the illustrated embodiment, the first base panel 1312 comprises two male tabs M struck therefrom so as to be defined within the first base panel 1312. Each of the male tabs M is hingedly connected to the first base panel 1312 by a hinged connection in the form of a fold line.

The second part F of the complementary locking mechanism forms a receiver. The receiver comprises an opening or slot for receiving the male tab M.

The second base panel 1320 comprises two optional female tabs each defining an opening or slot in the second base panel 1320; the female tabs forming at least part of the receiver.

The openings in the second base panel 1320 are configured to receive respective ones of the male tabs M.

The female tabs are arranged to be displaced out of the second base panel 1320 to form said openings and to bear against the respective male tab M when received therein. In some embodiments the complementary locking mechanism M/F may be omitted, the first and second base panels 1312, 1320 may be secured to each other by other means, such as but not limited to adhesive or staples.

Optionally, the first and second base panels 1312, 1320 may comprise at least one first aperture C9, C11. In the illustrated embodiment, each of the first and second base panels 1312, 1320 comprises two first apertures C9, C11. The first apertures C9, C11 may be employed to facilitate construction of the carton 1390. A packaging machine component or tool may engage with the first apertures C9, C11 to facilitate alignment of the first and second base panels 1312, 1320 with respect to each other or to align the first part M of the complementary locking mechanism with the second part F of the complementary locking mechanism. The complementary locking mechanism illustrated and described is entirely optional. Optionally, the second base panel 1320 comprises a pair of notches or recesses N each of which is arranged to be aligned with a respective one of the first apertures in the first base panel 1312.

The blank 1310 comprises end retention arrangements for securing endmost articles B within the carrier 1390. The end retention arrangements comprise a plurality of panels 1322A, 1324A, 1326A, 1328A, 1330A; 1322B, 1324B, 1326B, 1328B, 1330B; 1332A, 1334A, 1336A, 1338A, 1340A; 1332B, 1334B, 1336B, 1338B, 1340B adjacent end edges of the first and second side panel 1314, 1318.

Each of the end retention arrangements is substantially the same and will be described in further detail by reference to a first end retention arrangement adjacent a first end edge of the first side panel 1314. The first end retention arrangement comprises an anchor tab 1326A hingedly connected to the first end of the first side panel 1314 by a hinged connection in the form of a fold line 1327A. A lower retention panel 1324A is hingedly connected to a lower portion of the anchor tab 1326A by a hinged connection in the form of an oblique fold line 1325A which is inclined at an acute angle with respect to the fold line 1327A. An upper retention panel 1328A is hingedly connected to an upper portion of the anchor tab 1326A by a hinged connection in the form of an oblique fold line 1329A which is inclined at an acute angle with respect to the fold line 1327A.

The lower and upper retention panels 1324A, 1328A are partially separated from a central portion of the anchor tab 1326A by a pair of parallel cutlines CT1A, CT2A respectively. The lower and upper retention panels 1324A, 1328A may be generally trapezoidal in shape.

The lower retention panel 1324A is hingedly connected to a lower web panel 1322A by a hinged connection in the form of a fold line 1323A which is an extension of the fold line 1313 and aligned with the fold line 1313. The lower web panel 1322A is hingedly connected to the first base panel 1312 by a hinged connection in the form of a fold line 1321A which is inclined at an acute angle with respect to the fold line 1323A.

The upper retention panel 1328A is hingedly connected to an upper web panel 1330A by a hinged connection in the form of a fold line 1331A which is an extension of the fold line 1315 and aligned with the fold line 1315. The upper web panel 1330A is hingedly connected to the top panel 1316 by a hinged connection in the form of a fold line 1333A which is inclined at an acute angle with respect to the fold line 1331A.

Optionally, a first relief aperture C12 may be struck from material of the blank 1310 which would otherwise form the lower retention panel 1324A and the anchor tab 1326A. The first relief aperture C12 interrupts the fold lines 1321A, 1323A, 1325A and 1327A to provide a relief device at the notional point of intersection of fold lines 1321A, 1323A, 1325A and 1327A so as to facilitate folding of the first end retention arrangement.

Optionally, a second relief aperture C13 may be struck from material of the blank 1310 which would otherwise form the upper retention panel 1328A and the anchor tab 1326A. The second relief aperture C13 interrupts the fold lines 1327A, 1329A, 1331A and 1333A to provide a relief device at the notional point of intersection of fold lines 1327A, 1329A, 1331A and 1333A so as to facilitate folding of the first end retention arrangement.

Optionally, the first and second relief apertures C12, C13 are tapered for example but not limited to tear drop shaped.

The blank 1310 is constructed into a carrier 1390, as shown in Figure 20, by employing substantially the same method as previously described. During the process of folding the first and second side panels 1314, 1318 about opposing sides of the article group, the anchor tabs 1326A, 1326B, 1336A, 1336B are folded about fold lines 1327A, 1327B, 1341A, 1341B respectively to be brought into face to face relationship with the respective one of the first and second side panels 1314, 1318 to which they are hinged. The upper retention panels 1328A,

1328B, 1334A, 1334B and upper web panels 1330A, 1330B, 1332A, 1332B are folded automatically about upper portions of the endmost articles B in the upper tier of the article group to secure said articles B in the carrier 1390. The lower retention panels 1324A, 1324B, 1338A, 1338B are partially folded automatically about lower portions of the endmost articles B in the lower tier of the article group.

The second base panel 1320 is folded about fold line 1319 into proximity with the base of the article group, the first base panel 1312 is folded about fold line 1313 into proximity with the base of the article group so as to be in at least partial overlapping relationship with the second base panel 1320. In doing so the lower retention panels 1324A, 1324B, 1338A, 1338B and lower web panels 1322A, 1322B, 1340A, 1340B are folded automatically about lower portions of the endmost articles B in the lower tier of the article group to secure said articles B in the carrier 1390.

The first parts M of the complementary locking mechanism is engaged with respective second parts F of the complementary locking mechanism to secure the first base panel 1312 and the second base panel 1320 together.

Figure 20 shows a secondary package comprising the secondary carrier 1390 loaded with a group of articles B. The ends of the end most articles B protrude through the partially open ends of the secondary carrier 1390. The top panel 1316 is shorter in length than the article group. The web panels 1322A, 1322B, 1340A, 1340B engage side edges of the endmost articles B in the upper tier of the article group. Each of the web panels 1322A, 1322B, 1340A, 1340B is defined in part by a pair of fold lines 1321A/1323A, 1321B/1323B, 1345A/1347A, 1345B/1347B. Each of the pairs of fold lines 1321A/1323A, 1321B/1323B, 1345A/1347A, 1345B/1347B are divergently arranged and define an angle therebetween, optionally the angle is in the range 10° to 90°, optionally between 20° and 50° and in the illustrated embodiment the angle is 25°.

Figure 21 illustrates a blank 1410 for forming a secondary package or article carrier 1490 (see Figure 22) according to a fifth embodiment. The blank 1410 comprises a plurality of main panels 1412, 1414, 1416, 1418, 1420 for forming a tubular structure. The plurality of main panels 1412, 1414, 1416, 1418, 1420 comprises a first base panel (or outer layer) 1412, a first side panel 1414, a top panel 1416, a second side panel 1418 and a second base panel or securing flap (or inner layer) 1420. The plurality of panels 1412, 1414, 1416, 1418, 1420 may be arranged in a linear series hinged one to the next by corresponding fold lines 1413, 1415, 1417, 1419.

The blank 1410 comprises a first base panel 1412 hinged to the first side panel 1414 by a hinged connection in the form of a fold line 1413. The blank 1410 comprises a second base panel 1420 hinged to the second side panel 1418 by a hinged connection in the form of a fold line 1419.

Figure 22 shows a secondary package comprising the secondary carrier 1490 (formed from the blank 1410) loaded with a group of articles B. The tops of the end most articles B are fully covered so as to be protected by the top panel 1416. The top panel 1416 at least as long in dimension as the length of the article group. The web panels 1422A, 1422B, 1440A, 1440B engage side edges of the endmost articles B in the upper tier of the article group. Each of the web panels 1422A, 1422B, 1440A, 1440B is defined in part by a pair of fold lines 1421A/1423A, 1421B/1423B, 1445A/1447A, 1445B/1447B. Each of the pairs of fold lines 1421A/1423A, 1421B/1423B, 1445A/1447A, 1445B/1447B are divergently arranged and define an angle therebetween, optionally the angle is in the range 10° to 90°, optionally between 20° and 50° and in the illustrated embodiment the angle is 45°.

The web panels 1422A, 1422B, 1440A, 1440B extend further about the sides of the end most articles B in the upper tier of the article group than the web panels 1322A, 1322B, 1340A, 1340B of the embodiment of Figure 20.

Figure 23 illustrates a blank 1510 for forming a secondary package or article carrier 1590 (see Figure 24 and 25) according to a sixth embodiment. The blank 1510 comprises a plurality of main panels 1512, 1514, 1516, 1518, 1520 for forming a tubular structure. The plurality of main panels 1512, 1514, 1516, 1518, 1520 comprises a first base panel (or outer layer) 1512, a first side panel 1514, a top panel 1516, a second side panel 1518 and a second base panel or securing flap (or inner layer) 1520. The plurality of panels 1512, 1514, 1516, 1518, 1520 may be arranged in a linear series hinged one to the next by corresponding fold lines 1513, 1515, 1517, 1519.

The first side panel 1514 is similar in construction to the first side panel 1014 of the embodiment of Figure 3. The first side panel 1514 comprises two opposed free end edges, that is to say, the opposed end edges are free of connection to other panels, such as the first and second end retention arrangements provided in the embodiments of Figures 19 and 21.

The top panel 1516 is similar in construction to the top panel 1016 of the embodiment of Figure 3. The top panel 1516 comprises a pair of opposed free end edges. Each of the pair of

opposed free end edges comprises a contoured or tapered portion T1, T2. In this way the top panel 1516 comprises a first hinged edge, defined by fold line 1517, which is longer in dimension than a second hinged edge, defined by fold line 1515.

The top panel 1516 is shaped such that a portion of each endmost article B projects or extends beyond a portion of each one of the opposed free end edges, the exposed portions the endmost article B are disposed adjacent to first side panel 1514 and the shorter second hinged edge. The tapered portions T1, T2 have the effect of insetting the adjacent corners of the top panel 1516 on a first side of the group of articles B being packaged.

In the embodiment of Figure 23 the tapered portions T1, T2 of the opposed free end edges are closer in proximity to the second hinged edge than the first hinged edge.

The blank 1510 comprises an end retention arrangement at opposed ends of the second side panel 1518; the end retention arrangements secure endmost articles B within the carrier 1590. The end retention arrangements comprise a plurality of panels 1532A, 1534A, 1536A, 1538A, 1540A; 1532B, 1534B, 1536B, 1538B, 1540B adjacent end edges of the first and second side panel 1314, 1318.

Each of the end retention arrangements is substantially the same in construction as the end retention arrangements of the embodiment of Figure 19 and will be described in further detail by reference to a first end retention arrangement adjacent a first end edge of the second side panel 1518. The first end retention arrangement comprises an anchor tab 1536A hingedly connected to the first end of the second side panel 1518 by a hinged connection in the form of a fold line 1541A. A lower retention panel 1538A is hingedly connected to a lower portion of the anchor tab 1536A by a hinged connection in the form of an oblique fold line 1543A which is inclined at an acute angle with respect to the fold line 1541A. An upper retention panel 1534A is hingedly connected to an upper portion of the anchor tab 1536A by a hinged connection in the form of an oblique fold line 1539A which is inclined at an acute angle with respect to the fold line 1541A.

The lower and upper retention panels 1538A, 1534A are partially separated from a central portion of the anchor tab 1536A by a pair of parallel cutlines CT4A, CT3A respectively. The lower and upper retention panels 1538A, 1534A may be generally trapezoidal in shape.

The lower retention panel 1538A is hingedly connected to a lower web panel 1540A by a hinged connection in the form of a fold line 1545A which is an extension of the fold line 1519 and aligned with the fold line 1519. The lower web panel 1540A is hingedly connected to the second base panel 1520 by a hinged connection in the form of a fold line 1547A which is inclined at an acute angle with respect to the fold line 1545A.

The upper retention panel 1532A is hingedly connected to an upper web panel 1534A by a hinged connection in the form of a fold line 1537A which is an extension of the fold line 1517 and aligned with the fold line 1517. The upper web panel 1532A is hingedly connected to the top panel 1516 by a hinged connection in the form of a fold line 1535A which is inclined at an acute angle with respect to the fold line 1537A.

Optionally, a first relief aperture C12 may be struck from material of the blank 1510 which would otherwise form the upper retention tab 1534A and the anchor tab 1536A. The first relief aperture C12 interrupts the fold lines 1541A, 1539A, 1537A and 1532A to provide a relief device at the notional point of intersection of fold lines 1541A, 1539A, 1537A and 1532A so as to facilitate folding of the first end retention arrangement.

Optionally, a second relief aperture C13 may be struck from material of the blank 1510 which would otherwise form the lower retention panel 1538A and the anchor tab 1536A. The second relief aperture C13 interrupts the fold lines 1541A, 1543A, 1545A and 1547A to provide a relief device at the notional point of intersection of fold lines 1541A, 1543A, 1545A and 1547A so as to facilitate folding of the first end retention arrangement.

Optionally, the first and second relief apertures C12, C13 are tapered for example but not limited to tear drop shaped.

Figure 26 illustrates a blank 1610 for forming a secondary package or article carrier 1690 (see Figure 27) according to a seventh embodiment. The blank 1610 comprises a plurality of main panels 1612, 1614, 1616, 1618, 1620 for forming a tubular structure. The plurality of main panels 1612, 1614, 1616, 1618, 1620 comprises a first base panel (or outer layer) 1612, a first side panel 1614, a top panel 1616, a second side panel 1618 and a second base panel or securing flap (or inner layer) 1620. The plurality of panels 1612, 1614, 1616, 1618, 1620 may be arranged in a linear series hinged one to the next by corresponding fold lines 1613, 1615, 1617, 1619.

Opposed end edges of the blank 1610 are curvilinear in shape, the end edges are wave like in shape so that the blank 1610 is wider in the regions of the web panels 1622B, 1662B, 1630A, 1630B, 1632A, 1632B, 1640A, 1640B. The contoured shape of the end edges of the blank 1610 may facilitate nesting or tessellation of the blank 1610 with like blanks. In this way great number of blanks 1610 may be cut from a given area of sheet material compared to the blank 1410 of Figure 21, where the blank 1410 and the blank 1610 are arranged to accommodate an article group of the same size and arrangement.

The relief apertures C12, C13 are elliptical in shape, and are struck in part from a respective one of the top panel 1616, first base panel 1612 or second base panel 1620.

The first apertures C11, struck from the second base panel 1620, are adapted to accommodate the relief apertures C13; the first apertures C11 take a trapezoidal form in the embodiment of Figure 26, other shapes may be employed.

Referring now to Figures 28 and 29 there is shown a yet a further alternative embodiment of the shipping carton of the present disclosure. In this fourth illustrated embodiment, like numerals have, where possible, been used to denote like parts, albeit with the addition of the prefix “300”. The fourth illustrated embodiment shares many common features with the embodiments of Figures 1, 2, 16 and 17 and therefore only the differences from the embodiments illustrated in Figures 1, 2, 16 and 17 will be described in any greater detail.

The blank 310 and shipping carton 390 of Figures 28 and 29 respectively may be employed with any of the secondary packages described and/or illustrated.

Referring now to Figure 28, the blank 310 comprises a series of main panels for forming the main walls of a tertiary package or shipping carton 390. The series of main panels comprises: a first top panel 312, a first side panel 314, a base panel 316, a second side panel 318 and a second top panel 320. Optionally the series of main panels 312, 314, 316, 318, 320, are hinged together in a linear series by hinged connections in the form of fold lines 313, 315, 317, 319.

The blank 310 comprises a first opening A12 in the first top panel 312. The blank 310 comprises a second opening A15 in the second top panel 320. The blank 310 comprises a four openings A1, A2, A13, A14 in the base panel 316. The first opening A12, second opening A15 a third opening A13 and a fourth opening A14 are arranged collinearly with each other. In an assembled tertiary package 390, the first opening A12 is vertically aligned with the third opening A13, the second opening A15 is vertically aligned with the fourth opening A14. When

the tertiary package 390 is employed with the packages such as the secondary carriers 1590 for Figure 24 and 25 the first and third openings A12, A13 are aligned with a void between a first group of four secondary packages 1590A, 1590B, 1590D, 1590E, the second and fourth openings A15, A14 are aligned with a void between a second group of four secondary packages 1590B, 1590C, 1590E, 1590F, as illustrated in Figure 30A, the first and second top panel 312, 320 have been omitted for illustrative purposes.

The alignment of the openings A12/A13, A15/A14 with voids between secondary packages creates an air passage way to provide ventilation which may facilitate cooling of refrigerated products.

Figures 30C, 31A-D and 32A-C illustrate corner portions of various packaging systems, the package systems employ a tertiary package comprising opposed end walls EW and opposed side walls SW. A corner panel BC couples each end wall EW to one of the opposed side walls SW. The Figures 30C, 31A-D and 32A-C show only one corner of the package system, it will be appreciated that at least one other corner of the package system will be similarly arranged, and in some embodiments all corners of the package system are similarly arranged.

The package system is a combination of a tertiary carton and a plurality of packages received in the tertiary carton. The plurality of packages each comprise a secondary carton having a tubular structure and one or more generally cylindrical primary containers each received at least in part in the secondary carton. The primary containers each comprise a maximum diameter or maximum lateral dimension d.

The tertiary carton comprises a bottom panel (not shown in Figures 30C, 31A-D and 32A-C) and a plurality of side 14, 18; 114; 118; 314, 318 and end 22A, 24A, 26A, 28A, 30A,22B, 24B, 26B, 28B, 30B; 122A, 124A, 126A, 128A, 130A, 122B, 124B, 126B, 128B, 130B; 322A, 324A, 326A, 328A, 330A, 322B, 324B, 326B, 328B, 330B panels each extending upward from the bottom panel to form the opposed side walls SW and the opposed end walls EW. The plurality of side and end walls SW, EW include a first side wall SW and a first end wall EW disposed at about a right angle with respect to one another. A bevelled corner panel BC hingedly connects between the first side wall SW and the first end wall EW. The bevelled corner panel BC is hingedly connected to the first side wall SW by first fold line F1. The bevelled corner panel BC is hingedly connected to the first end wall SW by second fold line F2.

Referring to Figure 30C there is shown a tertiary carton 390 (see Figure 30A) which is loaded with six secondary cartons 1590A to 1590F.

The inside surface of the first end wall EW lies on or defines a first notional plane N1. The fold line F1 between the corner panel BC and the first end wall EW is spaced a distance a1 from the first notional plane N1 containing the inside surface of the first end wall EW.

The inside surface of the first side wall SW lies on or defines a second notional plane N2. The fold line F2 between the corner panel BC and the first side wall SW is spaced a distance a2 from the second notional plane N2 containing the inside surface of the first side wall SW.

The first notional line N1 defines a first angle y1 with the corner panel BC. The second notional line N2 defines a second angle y2 with the corner panel BC. The first angle y1 is equal to the second angle y2. The second angle y2 is 45°. The first angle y1 is 45°.

The secondary package 1590 comprises a terminal end e1, the terminal end e1 is disposed facing the inside surface of the first end wall EW. The terminal end e1 of secondary package 1590 is provided by a protruding portion of an endmost article B. A tubular axis of the secondary carton 1590 extends generally perpendicularly to the first end wall EW. One of the carton side panels 1514 of the secondary carton 1590 is in contact with the first side wall SW. The secondary carton 1590 comprises one or more primary containers each of which is disposed with their cylindrical axes extending generally perpendicularly to the bottom panel of the tertiary package 390.

The terminal end e1 of the secondary package 1590 lies on or defines a third notional plane. The secondary package 1590 comprises a maximum width point P1 along an end edge of the one carton side panel 1514 adjacent to the corner panel BC.

The maximum width point P1 defines the maximum width of the secondary carton 1590 extending between itself and a point on the other carton side panel 1518 of the secondary carton 1590. The notional plane containing the terminal end e1 is parallel to or contains the inside surface of the first end wall EW.

The maximum width point P1 of the secondary package 1590 is spaced a distance b1 from the third notional plane containing the terminal end e1 of the secondary package 1590.

The maximum width point P1 is spaced apart from the first fold line F1, the maximum width point P1 being closer to the centre of the secondary carton 1590A than the first fold line F1.

The secondary package, more specifically the endmost article B is in contact with the corner panel or closer to the corner panel than any other points on the corner package (excluding the maximum width point P1) at a second point P2.

The second point P2 of the secondary package 1590 lies on or defines a fourth notional plane which is spaced apart from the second notional plane N2 by distance b2. The distance a2 is equal to or greater than a distance b2, $(a2 \geq b2)$.

In the embodiment of Figure 30C the distance a2 is greater than the distance b2. The distance a1 is equal to the distance b1.

The second point P2 is spaced apart from the maximum width point P1.

Referring to Figure 31A there is shown a tertiary carton 90; 190; 390 which is loaded with at least one secondary carton 1390. The secondary carton 1390 of Figure 31A is substantially similar to that shown in Figures 19 and 20.

The inside surface of the first end wall EW lies on or defines a first notional plane N1. The fold line F1 between the corner panel BC and the first end wall EW is spaced a distance a1 from the first notional plane N1 containing the inside surface of the first end wall EW.

The inside surface of the first side wall SW lies on or defines a second notional plane N2. The fold line F2 between the corner panel BC and the first side wall SW is spaced a distance a2 from the second notional plane N2 containing the inside surface of the first side wall SW.

The second notional line N2 defines a second angle y2 with the corner panel BC. The second notional line N2 defines a third angle x with the web panel 1322A, 1322B, 1335A, 1335B or at least with the fold line 1321A, 1321B, 1335A, 1335B hinging the web panel 1322A, 1322B, 1335A, 1335B to the top panel 1316.

The second angle y2 is larger than the third angle x. The second angle y2 is 45°. The third angle x is 10°.

In the embodiment of Figure 31A the distance a2 is greater than the distance b2. The distance a1 is greater than the distance b1.

In the embodiment of Figure 31B the third angle x is increased to 25°. The second point P2 is spaced further from the first fold line and from the second notional plane.

Referring to Figure 31C there is shown a tertiary carton 90; 190; 390 which is loaded with at least one secondary carton 1490. The secondary carton 1490 of Figure 31C is substantially similar to that shown in Figures 21 and 22.

The terminal end e1 of secondary package 1490 is provided by an end of the top panel 1416 or by an end of the top panel 1416 and an end of the endmost article B.
The second angle y2 is equal to the third angle x. The second angle y2 is 45°. The third angle x is 45°.

The maximum width point P1 is substantially coincident with the first fold line F1. The second point P2 is substantially coincident with the second fold line F2.

In the embodiment of Figure 31C the distance a2 is equal to the distance b2. The distance a1 is equal to the distance b1.

Figure 31D illustrates similar arrangement to the embodiment of Figure 31C, in this embodiment however the secondary carton 1490 is adapted to accommodate a primary product container or article B which is rectangular in shape albeit with rounded corners.

Figure 32A illustrates similar arrangement to the embodiment of Figure 31B, in this embodiment however the secondary carton 1390 is adapted to accommodate a primary product container or article B which is elliptical in shape. The second angle y2 is greater than the third angle x. The second angle y2 is 45°. The third angle x is 30°.

Figure 32B illustrates similar arrangement to the embodiment of Figure 32A, in this embodiment however the tertiary package is adapted such that the second angle y2 is equal the third angle x. The second angle y2 is 30°. The third angle x is 30°. The first angle y1 is 60°. The distance a2 is greater than the distance b2. The distance a1 is equal to the distance b1. The maximum width point P1 is substantially coincident with the first fold line F1. The second point P2 is spaced apart from the second fold line F2.

Figure 32C illustrates similar arrangement to the embodiment of Figure 31D, in this embodiment however the secondary carton 1490 is adapted to accommodate at least primary

product container or articles B which are squircular in shape that is to say substantially squared shaped with rounded corners.

The combinations or package systems of Figures 30C, 31A-D and 32A-C are characterized by the following formulae:

$$a1 \leq \frac{1}{2}d;$$

$$a2 \leq \frac{1}{2}d \text{ ; and}$$

$$a1 \leq b1$$

The first, second, third and fourth openings in the end walls, the first, second, third and fourth openings in the top and bottom panels together with the pair of apertures A1, A2 in the base panel 116 may provide ventilation orifices.

The tertiary shipping cartons 90; 190; 290 (shown in Figures 2, 17 and 18) each comprise four corner panels 24b, 24d, 28b, 28d; 124b, 124d, 128b, 128d. The secondary packaging containers 1090; 1190; 1290 are shaped to be arranged to fit internally of and fit snugly with the bevelled corner structures of the tertiary shipping carton 90; 190; 290. Multiple tertiary shipping cartons 90; 190; 290 can be stacked one on top of the next due to the robust and strong structure. The stacking strength of the tertiary shipping cartons 90; 190; 290 may be enhanced by the provision of the beveled corner structures.

The present disclosure provides a secondary carrier 1090; 1190; 1290 having a top 1016; 1116; 1212/1220 and/or bottom 1012/1020; 1112/1120; 1216 panel which is asymmetrical in shape. The secondary carrier may comprise a 1090; 1190; 1290 having a top 1016; 1116; 1212/1220 and/or bottom 1012/1020; 1112/1120; 1216 panel which is generally trapezoidal in shape. The secondary carrier 1090; 1190; 1290 comprises a tubular structure having first open end and a second opposing open end. The top panel 1016; 1116; 1212/1220 is shaped to expose a portion of a first article B1 at the first end of the carrier and to expose a portion of a second article B2 at the second end of the carrier. Each of the portions of the first and second articles B1, B2 exposed are located adjacent to a first side wall 1014; 1114; 1214 of the tubular structure.

The secondary carrier 1090; 1190; 1290 can be placed within tertiary package 190; 190; 290 having mitred or beveled corner provided by one or more corner panels 24b, 24d, 28b, 28d; 124b, 124d, 128b, 128d. The corner panels 24b, 24d, 28b, 28d; 124b, 124d, 128b, 128d may be hinged or coupled to a side 14,18; 114,118 or end 24a, 24c, 28a, 28c; 124a, 124c, 128a,

128c panel of the tertiary package 190; 190; 290. The secondary carriers can be loaded such that one of the first or second articles is disposed in close proximity to or touching contact with one of the corner panels of the tertiary package. In some embodiments at least four secondary carriers are loaded into a tertiary package. The secondary carriers are arranged such that an endmost article from each secondary carrier is disposed close proximity to or touching contact with a respective one of each of the corner panels of the tertiary package.

The top or bottom panel of the secondary carrier comprise first and second opposed longitudinal edges H1, H2. At least one of the first and second longitudinal edges may be shorter in dimension L1, L3 than a longitudinal dimension L2 of a group of articles disposed with the carrier. The longitudinal dimension L2 may be defined as the distance between the outermost end of a first endmost article and the outermost end of a second endmost article at an opposing end of the tubular structure. The second longitudinal edge has a length dimension L3 which is less than the longitudinal dimension L2 of a group of articles disposed with the carrier and is greater than the distance L4 between the centre of the first endmost article and the centre of the second endmost article.

The first longitudinal edge H1 may define a rear end horizontal dimension L1 of the secondary carrier. The second longitudinal edge H2 may define a front end horizontal dimension L3 of the secondary carrier. The front end horizontal dimension L3 is less than the rear end horizontal dimension L1. A plurality of secondary carriers may be arranged in a tertiary package or shipping carton such that at least two secondary carriers disposed adjacent to each other are oriented in a back to back relationship such that the shorted front ends of the carrier are disposed outermost.

A package system is disclosed herein (see Figure 37) that comprises a tertiary shipping carton T, a secondary package in the form of a wrap-around style carrier 790 (see Figure 34); and a plurality of articles ‘B’, arranged in groups and held within each secondary carrier 790. The tertiary shipping carton T is formed from a blank constructed from a sheet of suitable substrate, such as the blank shown in Figure 1; and the secondary carriers 790 are formed from blanks 710; 810 (see Figures 33 and 35) constructed 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, fluted board, cardboard, plastic, combinations thereof, and the like that may be coated, uncoated, printed or not printed. It should be recognised that one or other numbers of blanks may be employed, where suitable, for example, to provide the structures described in more detail below. Optionally, the blanks

710; 810 forming the secondary carrier 790 may be formed from a paperboard that is bleached, coated and printed on one surface thereof and which is not bleached, coated or printed on the other (inside) surface thereof ("the brown side") such as, but not limited to, coated recycled board (CRB), clay-coated news back (CCNB), clay-coated kraftboard (CCKB), solid bleached board (SBB) or solid bleached sulphate (SBS). Optionally, the blank forming the shipping carton T may be formed from a corrugated board which provides structural rigidity and stacking strength such that the shipping carton T can accommodate a heavy load of articles.

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

In an illustrated and optional embodiment, the blank 710 is configured to form a wrap-around style carrier 790 for packaging an optional arrangement of articles. In this illustrated embodiment, the arrangement is an m x n x t matrix or array, having one row (m=1), two columns (n=2) and arranged in two tiers (t=2); in the illustrated embodiment four articles are arranged in single row having two tiers of two articles B, and the articles B are individual 5.3oz cups with a cover or film lid formed from a metallic or plastic material such as, but not limited to, aluminum or PET (polyester - polyethylene terephthalate). The blank 110 is configured to form a wrap-around style carrier (not shown) for packaging an optional arrangement of articles. In this illustrated embodiment, the arrangement is an m x n x t matrix or array, having two rows (m=2), three columns (n=3) and arranged in two tiers (t=2); in the illustrated embodiment twelve articles are arranged in two rows each having two tiers of three articles B, and the articles B are individual 5.3oz cups with a cover or film lid formed from a metallic or plastic material such as, but not limited to, aluminum or PET (polyester - polyethylene terephthalate). The blanks 710, 810 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.

In the illustrated and optional embodiments, the shipping carton T is configured to accommodate six secondary carriers 790 arranged in a 2x3 matrix or array; and as such the shipping carton T may comprise 24, 5.3oz cups 'B'. Accordingly, the package system accommodates a significant load.

Referring now to Figure 33, there is illustrated a blank 710 for forming a secondary package or article carrier 790 (see Figure 34) according to a first embodiment. The blank 710 comprises a plurality of main panels 712, 714a, 714b, 716, 718b, 718a, 720 for forming a tubular structure. The plurality of main panels 712, 714a, 714b, 716, 718b, 718a, 720 comprises a first base panel (or outer layer) 712, a first lower side panel 714a, a first upper side panel 714b, a top panel 716, a second upper side panel 718b, a second lower side panel 718a and a second base panel or securing flap (or inner layer) 720. The plurality of panels 712, 714a, 714b, 716, 718b, 718a, 720 may be arranged in a linear series hinged one to the next by corresponding fold lines 713, 715, 717, 719, 721, 723.

The term "top panel" as used herein refers to a panel that is placed upon one of the opposite ends of the primary products containers or articles B each having a generally columnar shape. The "top panel" provides a cover over at least a portion of the packaged article B in normal use. The term "base panel" as used herein refers to a panel that is placed below one of the opposite ends of the primary products containers or articles B or below a flange or protrusion of a primary products container or article B such that an upper surface supports the packaged article B in normal use. The primary products containers or articles B which are packaged by the secondary carrier 790 are generally columnar in shape. The term "generally columnar shape" as used herein includes, but is not limited to, a generally truncated conical shape, generally truncated pyramidal shape, generally cylindrical shape, generally prismatic shape and the other similar shapes.

The blank 710 is foldable to form a package 790 as illustrated in Figure 34. The first and second base panels 712, 720 are engageable with one another in an overlapping relationship to form a composite base wall 712/720 of the carrier 90. The blank 710 may comprise a complementary locking mechanism M/F for securing the first base panel 712 to the second base panel 720. Alternatively, the first and second base panels 712, 720 may be adhesively secured to each other or may be secured by use of a mechanical fixing such as, but not limited to, staples.

The first base panel 712 may comprise at least one first part M of the complementary locking mechanism. The second base panel 720 may comprise at least one second part F of the complementary locking mechanism. In the illustrated embodiment, the first base panel 712 comprises two male tabs M struck therefrom so as to be defined within the first base panel 712. Each of the male tabs M is hingedly connected to the first base panel 712 by a hinged connection in the form of a fold line.

The second part F of the complementary locking mechanism forms a receiver. The receiver comprises an opening or slot for receiving the male tab M.

The second base panel 720 comprises two optional female tabs each defining an opening or slot in the second base panel 720; the female tabs forming at least part of the receiver.

The openings in the second base panel 720 are configured to receive respective ones of the male tabs M.

The female tabs are arranged to be displaced out of the second base panel 720 to form said openings and to bear against the respective male tab M when received therein.

Optionally, the first and second base panels 712, 720 may comprise at least one first aperture G1, G2. In the illustrated embodiment, each of the first and second base panels 712, 720 comprises two first apertures G1, G2. The first apertures G1, G2 may be employed to facilitate construction of the carton 790. A packaging machine component or tool may engage with the first apertures G1, G2 to facilitate alignment of the first and second base panels 712, 720 with respect to each other or to align the first part M of the complementary locking mechanism with the second part F of the complementary locking mechanism. The complementary locking mechanism illustrated and described is entirely optional. Optionally, the second base panel 720 comprises a pair of notches or recesses R each of which is arranged to be aligned with a respective one of the first apertures G1 in the first base panel 712.

The first base panel 712 is shaped at a free side edge so as to comprise a central tongue in which the first parts M of the complementary locking mechanism are provided. In this way the first base panel 712 comprises rebated corners opposing the hinged connection to the first lower side panel 714a; the rebated corners are formed from generally step-shaped recesses cut from the free side edge of the first base panel 712. The rebated corners facilitate construction of the composite base panel 712/720, by preventing or reducing the likelihood of

the first base panel 712 being disposed in overlapping relationship with portions of the second base panel 720 comprising the first apertures G2.

The first apertures G1 provided in the first base panel 712 are longitudinally offset from the first apertures G2 provided in the second base panel 720.

The first apertures G1 provided in the first base panel 712 are spaced apart from the fold line 713 hingedly connecting the first base panel 712 to the first lower side panel 714a.

The first apertures G2 provided in the second base panel 720 interrupt the fold line 723 that hingedly connects the second base panel 720 to the second lower side panel 718a.

A central portion of the first base panel 712 extends substantially across the entire width of the composite base panel 712/720.

The first parts M of the complementary locking mechanism are provided proximate to the free side edge of the central tongue of the first base panel 712. The second parts F of the complementary locking mechanism are provided proximate to the fold line 723 hingedly connecting the second base panel 720 to the second lower side panel 718a.

The blank 710 is adapted to accommodate four articles B arranged in a 1x2x2 matrix or array. That is to say, the blank 710 is arranged to accommodate two tiers of two adjacently disposed articles B.

The blank 710 comprises end closure structures for closing each end of the tubular structure formed from the plurality of main panels 712, 714a, 714b, 716, 718b, 718a, 720. (The end closure structures are also referred to herein as retaining structures for retaining articles in the tubular structure). Each end closure structure comprises a pair of end retention arrangements EC1, EC3; EC2, EC4 for securing endmost articles B within the carrier 790. The end retention arrangements EC1, EC3; EC2, EC4 comprise a plurality of panels 722A, 724A, 726A, 728A, 730A, 732A; 734A, 736A, 738A, 740A, 742A, 744A; 722B, 724B, 726B, 728B, 730B, 732B; 734B, 736B, 738B, 740B, 742B, 744B adjacent end edges of the blank 710.

Each of the end retention arrangements is substantially the same and will be described in further detail by reference to a first end retention arrangement EC1 adjacent a first end edge of the first side panel 712, first base panel 712 and top panel 716. The first end retention arrangement comprises an anchor tab 726A/728A comprising an upper anchor tab 728A and

a lower anchor tab 26A each hingedly connected to a first end of the first side panel 712 by respective hinged connections in the form of fold lines 741A, 743A. The upper anchor tab 728A is hingedly connected to the lower anchor tab 726A by a hinged connection in the form of a fold line 715A. Fold line 715A is arranged to contiguous and collinear with the fold line 715 hinging the first lower side panel 714a to the first upper side panel 714b.

A lower retention panel 724A is hingedly connected to a lower portion of the lower anchor tab 726A by a hinged connection in the form of a fold line 727A. An upper retention panel 730A is hingedly connected to the upper anchor tab 728A by a hinged connection in the form of a fold line 729A.

The lower retention panel 724A is hingedly connected to a lower web panel 722A by a hinged connection in the form of a fold line 713A. Fold line 713A is arranged to contiguous and collinear with the fold line 713 hinging the first lower side panel 714a to the first base panel 712.

The lower web panel 722A is hingedly connected to the first base panel 712 by a hinged connection in the form of a fold line 725A.

The upper retention panel 730A is hingedly connected to an upper web panel 732A by a hinged connection in the form of a fold line 717A. Fold line 717A is arranged to contiguous and collinear with the fold line 717 hinging the first upper side panel 714b to the top panel 716. The upper web panel 732A is hingedly connected to the top panel 716 by a hinged connection in the form of a fold line 731A.

Optionally, a first relief aperture G3 may be struck from material of the blank 710 which would otherwise form the lower retention panel 714A and the lower anchor tab 726A. The first relief aperture G3 interrupts the fold lines 713, 713A, 725A and 727A to provide a relief device at the notional point of intersection of fold lines 713, 713A, 725A and 727A so as to facilitate folding of the first end retention arrangement EC1.

Optionally, a second relief aperture G4 may be struck from material of the blank 710 which would otherwise form the upper retention panel 730A and the upper anchor tab 728A. The second relief aperture G4 interrupts the fold lines 717, 717A, 729A and 731A to provide a relief device at the notional point of intersection of fold lines 717, 717A, 729A and 731A so as to facilitate folding of the first end retention arrangement.

Optionally, the first and second relief apertures G3, G4 are tapered for example but not limited to tear drop shaped.

Turning to the construction of the article carrier 790 as illustrated in Figure 34, the article carrier 790 may be formed by a series of sequential folding operations in a straight-line machine so that the article carrier 790 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.

A group of articles B is assembled; in the embodiment illustrated in Figure 34 four articles B are arranged in two tiers of two articles. The upper tier of articles B are inverted with respect to the lower tier. In this way a lid or cover of each article in the upper tier is disposed upon a lid or cover of a respective one of the articles in the lower tier. In embodiments where the articles B have a tapered or conical shape, the article group is arranged to be widest at the middle and narrower at the ends. The top panel 716 of the blank 710 is disposed above the group of articles B to provide a top wall 16 of the article carrier 790.

First and second side walls 714a/714b, 718a/718b are formed by folding the first upper and first lower side panels 714b, 714a and the second upper and second lower side panels 718b, 718a with respect to the top panel 716; by folding said panels 714b, 714a, 718b, 718a about fold lines 717, 719 respectively, about opposing sides of the group of articles B so as to be disposed about the opposing sides of the group of articles B, as shown in Figure 34.

During the process of folding the first upper and lower side panels 714b,714a and second upper and lower side panels 718b, 718a about the opposing sides of the article group, the anchor tabs 726A/728A, 726B/728B, 738A/740A, 38B/40B are folded about fold lines 741A, 743A, 741B, 743B, 745A, 747A, 745B, 47B respectively to be brought into face to face relationship with the respective one of the first and second side walls 714a/714b, 718a/718b to which they are hinged. The upper anchor tabs 728A, 728B are brought into face to face relationship with the first upper side panel 714b. The upper anchor tabs 738A, 738B are brought into face to face relationship with the second upper side panel 718b. The lower anchor tabs 726A, 726B are brought into face to face relationship with the first lower side panel 714a. The lower anchor tabs 740A, 740B are brought into face to face relationship with the second lower side panel 718a.

The upper retention panels 30A, 30B, 36A, 36B and upper web panels 732A, 732B, 734A, 734B are folded automatically about upper portions of the endmost articles B in the upper tier

of the article group to secure said articles B in the carrier 90. The lower retention panels 724A, 724B, 742A, 742B are partially folded automatically about lower portions of the endmost articles B in the lower tier of the article group.

The first lower side panel 714a is folded with respect to the first upper side panel 714b about fold line 715.

The second lower side panel 718a is folded with respect to the second upper side panel 718b about fold line 721.

In alternative embodiments, the fold lines 715,7 21 may be omitted, the first and second side walls may be deformed or bowed to form convex surfaces when viewed from an external point of view.

The second base panel 720 is folded about fold line 723 into proximity with the base of the article group, the first base panel 712 is folded about fold line 713 into proximity with the base of the article group so as to be in at least partial overlapping relationship with the second base panel 720. In doing so the lower retention panels 724A, 724B, 742A, 742B and lower web panels 722A, 722B, 744A, 744B are folded automatically about lower portions of the endmost articles B in the lower tier of the article group to secure said articles B in the carrier 790.

The first parts M of the complementary locking mechanism is engaged with respective second parts F of the complementary locking mechanism to secure the first base panel 712 and the second base panel 720 together.

The assembled article carrier 790 is shown in Figure 34.

A flange of each article B in the upper tier is disposed proximate a flange of an article B in the lower tier upon which the upper article B is disposed. The first and second side walls 714a/714b, 718a/718b are deformed or folded about said flanges. In embodiments in which the first and second side walls 714a/714b, 718a/718b comprise upper side panels 714b, 718b and lower side panels 714a, 718a the first and second side walls 714a/714b, 718a/718b are arranged such that the fold lines 715, 721 are adjacent to the flanges of the articles B.

In the illustrated embodiment the articles B are disconnected or individual cups which are disposed in close proximity to their adjacent neighbours. The articles B are tapered in shape, they can be considered to be substantially frusto-conical in shape, albeit inverted, when in

normal use. The articles B comprise a maximum lateral dimension or diameter d_{max} (see Figure 36), in the illustrated embodiment the maximum lateral dimension is provided at or by an upper end or top of the articles B. The articles B comprise a base having lateral dimension or diameter d_{base}. The articles B in the lower tier are arranged such that the end having the smaller diameter is disposed in closer proximity to the composite base panel 712/720 and the end having the larger diameter is disposed in closer proximity to the top panel 716. The articles B in the upper tier are arranged such that the end having the smaller diameter is disposed in closer proximity to the top panel 716 and the end having the larger diameter is disposed in closer proximity to the composite base panel 712/720.

A void or gap exists between lower portions of two adjacent articles B in the lower tier. This void or gap may receive at least portions of the complementary locking mechanism.

The end retention arrangements EC1, EC3; EC2, EC4 facilitate retention of the articles B within the article carrier 90 preventing or inhibiting unintentional egress of the articles B from the article carrier 790.

The article carrier 790 comprises a tubular structure having two opposed open ends which are partially closed by the end retention arrangements EC1, EC3; EC2, EC4.

The top panel 716 comprises a pair of opposed end edges. Each of the pair of opposed end edges is tapered towards each of the hinged connections 717, 719 to the first and second side wall 714a/714b, 18a/18b. In this way the top panel 716 is longer in dimension at its middle than at each of the hinged edges, defined by fold line 717, 719. A central portion of the top panel 16 is longer than each of the first and second side wall 714a/714b, 718a/718b.

The top panel 716 is configured to cover substantially all of the uppermost end of the articles B in the upper tier, this being the end of the articles B having the smaller lateral dimension or diameter, best illustrated in Figure 38.

Similarly, the composite base panel 712/720 is configured to cover substantially all of the lowermost end of the articles B in the lower tier, again this being the end of the articles B having the smaller lateral dimension or diameter.

The central portion of the top panel 716 defines a maximum longitudinal dimension l_T of the carrier 790 in a set up condition.

The article group comprises a maximum longitudinal dimension l_{max} which is given by $n \times d_{max}$; where n is an integer number of articles, given by the number of columns of articles and d_{max} is the maximum lateral dimension or diameter of the articles B.

The dimension l_{max} is greater than the maximum longitudinal dimension l_T of the carrier 790 in a set up condition. In this way and end-to-end length of each of the top, base and opposed side panels is less than a maximum end-to-end length of the group of articles.

The carton 790 is configured such that a portion of each endmost article B projects or extends beyond a respective one of the opposed end edges.

Figure 37 illustrates a plurality of article carriers 790 within the shipping carton T. In the illustrated embodiment six article carriers 790A, 790B, 790C, 790D, 790E, 790F are provided within the shipping carton T.

The shipping carton T comprises three rows of two secondary packages 790.

The shipping carton T can form a close or snug fit with the exposed portions of the endmost articles B. In some embodiments the end wall and/or beveled corner panel of the shipping carton 790 may be contactable with the exposed portion of the endmost article B.

Referring now to Figure 35 there is shown a ninth embodiment of the present disclosure. In the ninth illustrated embodiment, like numerals have, where possible, been used to denote like parts, albeit with the addition of the prefix “800” to indicate that these features belong to the ninth embodiment. The ninth embodiment shares many common features with the embodiment of Figures 33 and 34, therefore only the differences from the embodiment illustrated in Figures 33 and 34 will be described in any greater detail.

Figure 35 illustrates a blank 810 for forming a secondary package or article carrier (not shown) according to a second embodiment. The blank 810 comprises a plurality of main panels 812, 814, 816, 818, 820 for forming a tubular structure. The plurality of main panels 812, 814, 816, 818, 820 comprises a first base panel (or outer layer) 812, a first side panel 814, a top panel 816, a second side panel 818 and a second base panel or securing flap (or inner layer) 820. The plurality of panels 812, 814, 816, 818, 820 may be arranged in a linear series hinged one to the next by corresponding fold lines 813, 815, 817, 819.

The blank 810 is foldable to form a package; the first and second base panels 812, 820 are engageable with one another in an overlapping relationship to form a composite base wall 812/820 of the carrier.

An article carrier can be constructed by employing a series of sequential folding operations similar to that described above in relation to the blank 10 of Figure 1.

The complementary locking mechanism M/F and the first apertures A1, A2 have been omitted as have the fold lines dividing the side walls into upper and lower panels. These features may be included in other embodiments.

The top panel 816 and the first and second base panels 812/820 are adapted to accommodate two rows of articles B, each row comprising six articles B arranged in two tiers or three articles B.

The end closure structures hinged to the first side panel 814 engage an endmost article in each tier disposed adjacent to the first side panel 814. The end closure structures hinged to the second side panel 818 engage an endmost article in each tier disposed adjacent to the second side panel 818.

The tertiary shipping carton T (shown in Figure 37) comprises opposed side walls to each of which a lid panel is hinged, opposed end walls and four corner or bevel panels each of which couples an end wall to one of the side walls. The secondary packaging containers 90 are shaped to be arranged to fit internally of and fit snugly with the bevelled corner structures of the tertiary shipping carton T. Multiple tertiary shipping cartons T can be stacked one on top of the next due to the robust and strong structure. The stacking strength of the tertiary shipping cartons T may be enhanced by the provision of the beveled corner structures.

Referring to Figure 39 there is shown a portion of the tertiary carton T of Figure 37, which tertiary carton T is loaded with six secondary cartons 790A to 790F, only one of which is shown in Figure 39.

An inside surface of a first end wall EW lies on or defines a first notional plane N1. A fold line F1 between a corner panel BC and a first end wall EW is spaced a distance a1 from the first notional plane N1 containing the inside surface of the first end wall EW.

An inside surface of a first side wall SW lies on or defines a second notional plane N2. A fold line F2 between the corner panel BC and the first side wall SW is spaced a distance a2 from the second notional plane N2 containing the inside surface of the first side wall SW.

The first notional line N1 defines a first angle y1 with the corner panel BC. The second notional line N2 defines a second angle y2 with the corner panel BC. The first angle y1 is equal to the second angle y2. The second angle y2 is 45°. The first angle y1 is 45°.

The secondary package 790 comprises a terminal end e1, the terminal end e1 is disposed facing the inside surface of the first end wall EW. The terminal end e1 of secondary package 90 is provided by a protruding portion of an endmost article B. A tubular axis of the secondary carton 790 extends generally perpendicularly to the first end wall EW. One of the carton side panels 714 of the secondary carton 790 is in contact with, or close proximity to, the first side wall SW, in particular the fold line 715 is disposed contact with, or close proximity to, the first side wall SW. The secondary carton 790 comprises one or more primary containers each of which is disposed with their cylindrical axes extending generally perpendicularly to the bottom panel of the tertiary package T.

The terminal end e1 of the secondary package 90 lies on or defines a third notional plane.

The secondary package 790 comprises a maximum width point P1 along an end edge of the one carton side panel 714 adjacent to the corner panel BC.

The maximum width point P1 defines the maximum width of the secondary carton 790 extending between itself and a point on the other carton side panel 718 of the secondary carton 790. The notional plane containing the terminal end e1 is parallel to or contains the inside surface of the first end wall EW.

The maximum width point P1 of the secondary package 790 is spaced a distance b1 from the third notional plane containing the terminal end e1 of the secondary package 790.

The maximum width point P1 is adjacent to the first fold line F1, the maximum width point P1 being substantially coincident with the first fold line F1.

The secondary package 790 is in contact with the corner panel or closer to the corner panel than any other points on the corner panel at a second point P2.

The second point P2 of the secondary package 90 lies on or defines a fourth notional plane which is spaced apart from the second notional plane N2 by distance b2. In the illustrated embodiment the distance b2 is zero or is approaching zero. The distance a2 may be equal to or greater than the distance b2, $(a2 \geq b2)$.

In the embodiment of Figure 39 the distance a2 is greater than the distance b2. The distance a1 is equal to the distance b1.

The second point P2 is coincident with the maximum width point P1.

The present disclosure provides a secondary carrier 790 having a tubular structure having first open end and a second opposing open end. The carrier 790 is configured to expose a portion of a first article B at the first end of the carrier and to expose a portion of a second article B at the second end of the carrier.

The secondary carrier 790 can be placed within tertiary package T having mitred or beveled corner provided by one or more corner panels. The secondary carriers can be loaded such that one of the first or second articles is disposed in close proximity to or touching contact with one of the corner panels of the tertiary package. In some embodiments at least four secondary carriers are loaded into a tertiary package. The secondary carriers are arranged such that an endmost article from each secondary carrier is disposed close proximity to or touching contact with a respective one of each of the corner panels of the tertiary package.

It can be appreciated that various changes may be made within the scope of the present disclosure. 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", "bottom", “base”, "front", "back", "end", "side", "inner", "outer", "upper" and "lower" do not necessarily limit the respective panels to such orientation, but may merely serve to distinguish these panels from one another.

As used herein, the terms “hinged connection” and “fold line” refer to all manner of lines that define hinge features of the blank, facilitate folding portions of the blank with respect to one another, or otherwise indicate optimal panel folding locations for the blank. Any reference to “hinged connection” should not be construed as necessarily referring to a single fold line only;

indeed, a hinged connection can be formed from two or more fold lines wherein each of the two or more fold lines may be either straight/linear or curved/curvilinear in shape. When linear fold lines form a hinged connection, they may be disposed parallel with each other or be slightly angled with respect to each other. When curvilinear fold lines form a hinged connection, they may intersect each other to define a shaped panel within the area surrounded by the curvilinear fold lines. A typical example of such a hinged connection may comprise a pair of arched or arcuate fold lines intersecting at two points such that they define an elliptical panel therebetween. A hinged connection may be formed from one or more linear fold lines and one or more curvilinear fold lines. A typical example of such a hinged connection may comprise a combination of a linear fold line and an arched or arcuate fold line which intersect at two points such that they define a half moon-shaped panel therebetween.

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

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

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

CLAIMS

1. A combination of a tertiary carton and a plurality of packages received in the tertiary carton wherein the tertiary carton comprises a bottom panel and a plurality of side and end panels each extending upward from the bottom panel to form side and end walls, the plurality of side and end walls including a first side wall and a first end wall disposed at about a right angle with respect to one another, and a bevelled corner panel hingedly connecting between the first side wall and the first end wall, the plurality of packages includes a corner package which comprises a secondary carton having a tubular structure and one or more generally cylindrical primary containers each received at least in part in the secondary carton, the tubular structure comprising a pair of opposing carton side panels, wherein the corner package is disposed with a terminal end e1 thereof facing the inside surface of the first end wall with the tubular axis of the secondary carton thereof extending generally perpendicularly to the first end wall, wherein the secondary carton of the corner package is in contact at one of the carton side panels thereof with the first side wall, and wherein the one or more primary containers of the corner package each is disposed with the cylindrical axis thereof extending generally perpendicularly to the bottom panel, the combination being characterized by the following formula: $a1 \leq 1/2\ d, a2 \leq 1/2\ d\ and\ a1 \leq b1$

where “d” is the maximum diameter (maximum lateral size) of each of the one or more primary containers, “a1” is the distance between a notional plane containing the inside surface of the first end wall and the fold line F1 between the corner panel and the first end wall, “a2” is the distance between a notional plane containing the inside surface of the first side wall and the fold line F2 between the corner panel and the first end wall, and “b1” is the distance between a notional plane containing the terminal end e1 and a maximum width point P1 along an end edge of the one carton side panel adjacent to the corner panel, the maximum width point P1 defining the maximum width of the secondary carton extending between itself and a point on the other carton side panel of the secondary carton, the notional plane containing the terminal end e1 being parallel to or containing the inside surface of the first end wall.

2. The combination of claim 1 wherein the distance a2 is equal to or greater than a distance b2, ($a2 \geq b2$)

wherein the distance b2 is a distance between a notional plane containing the maximum width point P1 and a second point P2 on the corner package, the notional plane containing the maximum width point P1 being parallel to or containing the inside surface of the first side wall, the second point P2 being spaced apart from the maximum

width point P1, the second point P2 being in contact with the corner panel or closer to the corner panel than any other points on the corner package excluding the maximum width point P1.

3. The combination of claim 2 wherein the second carton of the corner package comprises a bevelled corner edge extending from the maximum width point P1 to the second point P1.

4. The combination of claim 3 wherein the bevelled corner edge is provided by a top panel of the secondary carton of the corner package wherein a retention panel for engaging a primary container is hingedly connected to the bevelled corner edge.

5. The combination of claim 3 wherein the bevelled corner edge is provided by a base panel of the second carton of the corner package wherein an opening for receiving a primary container is defined in the base panel.

6. The combination of claim 3 wherein the bevelled corner edge is parallel to or in contact with the corner panel.

7. The combination of claim 2 wherein the second point P2 on the corner package is located on a corner primary container of the corner package.

8. The combination of claim 1 wherein the distance a1 is equal to or less than 30% of the maximum diameter d, $(a1 \leq 0.3d)$.

9. The combination of claim 1 wherein the maximum diameter d of each of the one or more primary containers is defined by a cross section of a shape selected from the group consisting of a circle, an elliptic, a squircle and a rounded rectangle.

10. The combination of claim 3 wherein the bevelled corner edge defines an angle x with respect to the notional plane containing the maximum width point P1, the angle x being equal to or greater than 10 degrees.

11. The combination of claim 10 wherein the corner panel defines an angle y2 with respect to the notional plane containing the inside surface of the first side wall, the angle y2 being equal to or greater than the angle x.

12. The combination of claim 11 wherein the corner panel defines an angle y1 with respect to the notional plane containing the inside surface of the first end wall, the angle y1 being equal to or greater than the angle y2.

13. The combination of claim 1 wherein the maximum width point P1 is in contact with the first side wall of the tertiary carton.

14. The combination of claim 1 wherein the maximum width point P1 is located adjacent to the fold line F1 between the corner panel and the first side wall.

15. The combination of claim 1 wherein the terminal end e1 of the corner package is in contact with the first end wall.

16. The combination of claim 2 wherein the second point P2 on the corner package is in contact with the corner panel.

17. The combination of claim 16 wherein the second point P2 on the corner package is located between the fold lines F1 and F2.

18. The combination of claim 2 wherein the second point P2 on the corner package is located adjacent to the fold line F2 between the corner panel and the first end wall.

19. A blank for forming a carrier comprising:

a top or bottom panel which is asymmetrical in shape about a center axis of the top or bottom panel, the top or bottom panel by itself providing a single-layer top or bottom wall when a carton is erected from the blank; and

a first free side edge which extends transversely with respect to the center axis, at least a part of the first free edge being symmetrical about a point of symmetry;

wherein the top or bottom panel provides at least a part of the first free edge; and

wherein the blank is nestable with another blank of the same size and configuration such that the symmetrical part of the first free edge of the blank and that of the other blank are formed by a single die cut blade.

20. A blank according to claim 19 wherein the symmetrical part of the first free edge is non-linear.

21. A blank according to claim 19 wherein the top or bottom panel is disposed over or below only a part of an endmost article.

22. A package comprising an article carrier and one or more articles, the article carrier formed from the blank of claim 19, wherein the top or bottom panel is placed on or below, respectively, one of the opposite ends of said one or more articles and wherein said one or more articles are each generally columnar in shape.

23. A package system comprising a combination of one or more secondary carriers each including one or more primary product containers and a tertiary package loaded with said one or more secondary carriers, the tertiary package comprising mitred corners provided by one or more corner panels, wherein each of the one or more secondary carriers comprises a top panel having opposing side edges, a first side edge having a first length and a second edge having a second length, the second length being less than the first length.

24. A package comprising an arrangement of a plurality of secondary carriers within a tertiary carton, the plurality of secondary carriers each being loaded with one or more articles, wherein the plurality of secondary carriers each having a front end horizontal dimension less than a rear end horizontal dimension and wherein at least two adjacent secondary carriers of the plurality of secondary carriers are disposed in a back-to-back contacting relationship.

25. A secondary package comprising a secondary carrier loaded with a group of articles, the secondary carrier comprising a plurality of panels forming tubular structure having a tubular axis, the plurality of panels including;

a top panel hinged to a first side panel along a first fold line having a first length dimension;

wherein the group of articles defines a second length dimension in a longitudinal direction along the tubular axis of the secondary carrier, the second length dimension being generally equal to the first length dimension;

wherein the top panel is hinged to a second side panel along a second fold line having a third length dimension, the third length being less than the first and second length dimensions;

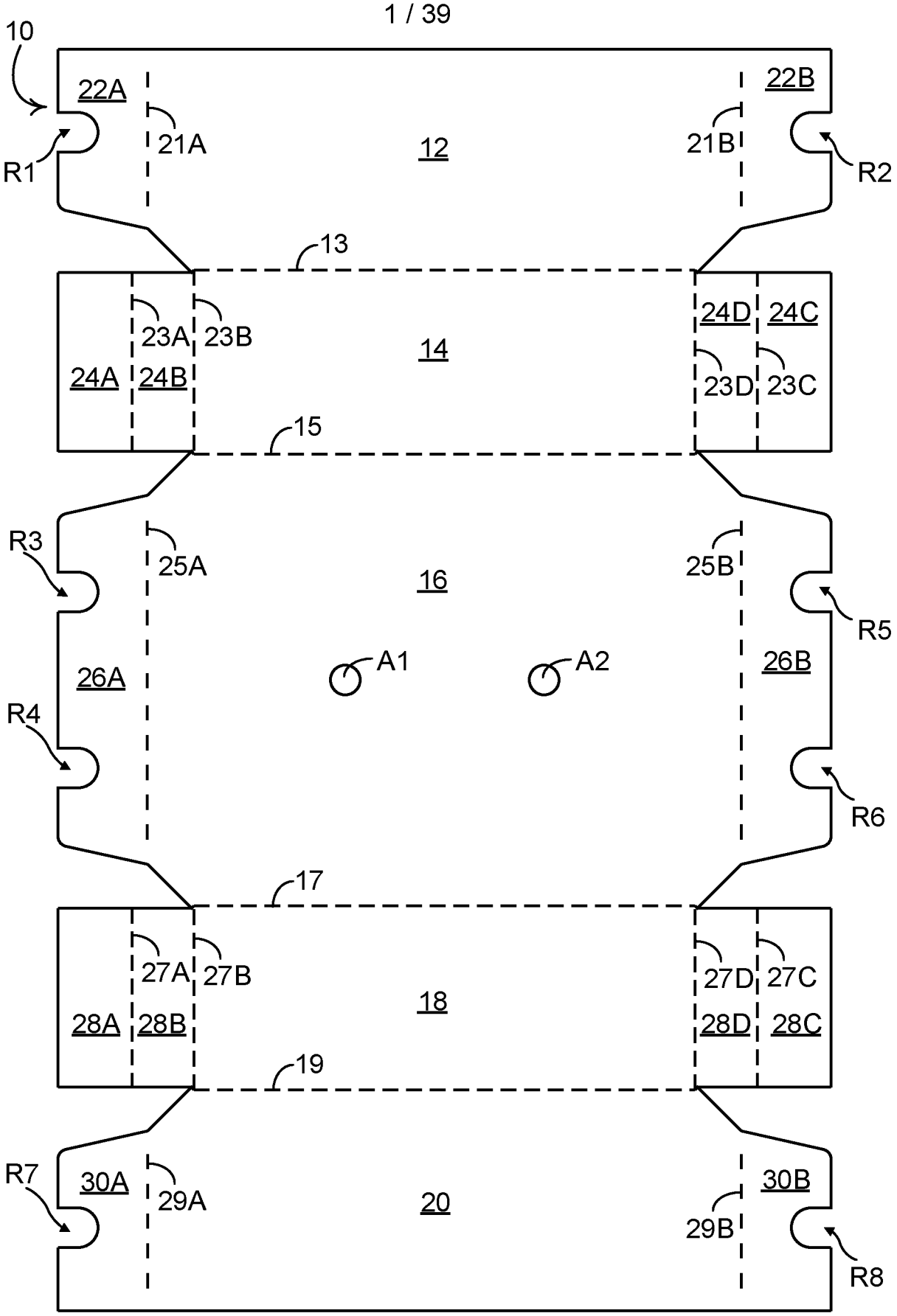
the group of articles comprises a first article at a first end of the tubular structure and a second article at a second end of the tubular structure, wherein the centre of the

first article is spaced a distance from the centre of the second article, wherein the third length dimension is greater than the distance between the centres of the first and second articles.

26. A secondary package comprising:

a plurality of articles arranged into a group of upper and lower vertically-aligned tiers each including at least one of the plurality of articles, each of the plurality of articles comprising a top and a bottom, the bottom having a first lateral dimension and the top having a second lateral dimension, the first lateral dimension being smaller than the second lateral dimension, wherein the top of the at least one article in the upper tier is arranged in contacting relationship with the top of the at least one article in the bottom tier; and

a carton disposed around the group of articles, the carton comprising a top panel disposed on the bottom of the at least one article in the upper tier, a bottom panel disposed under the bottom of the at least one article in the lower tier, and a pair of opposed side panels each extending between the top and bottom panels and disposed along respective sides of the group of articles, the carton further comprising a retaining structure for retaining the group of articles within the carton, the retaining structure being associated with the rest of the carton such that an end-to-end length of each of the top, bottom and opposed side panels is less than a maximum end-to-end length of the group of articles.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22A
21A
12
21B
22B
R1
R2
13
23A
23B
14
24D
24C
24A
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23D
23C
15
R3
25A
16
25B
R5
A1
A2
26A
26B
R4
R6
17
27A
27B
18
27D
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28D
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R7
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29A
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29B
30B
R8

FIG. 1

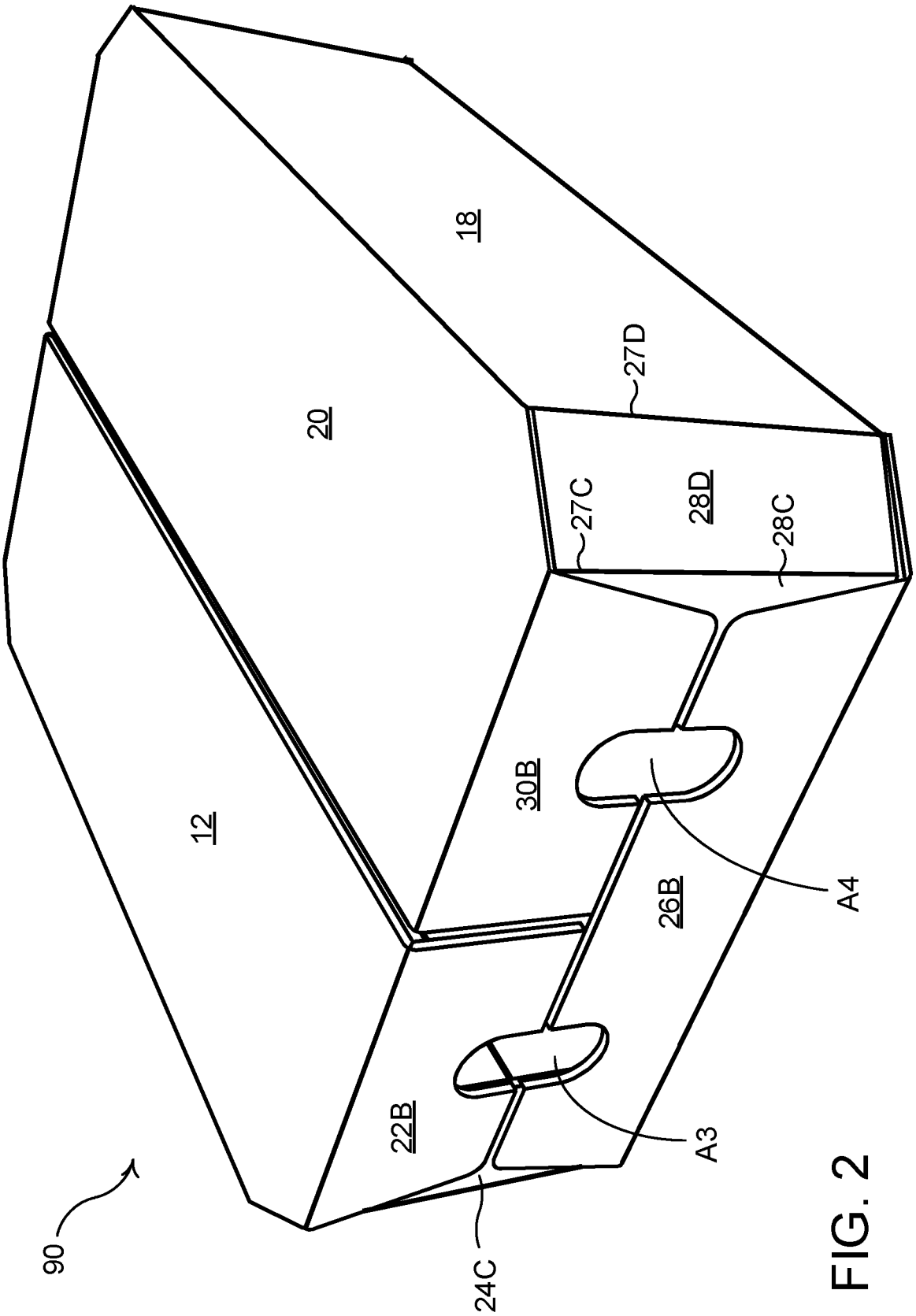
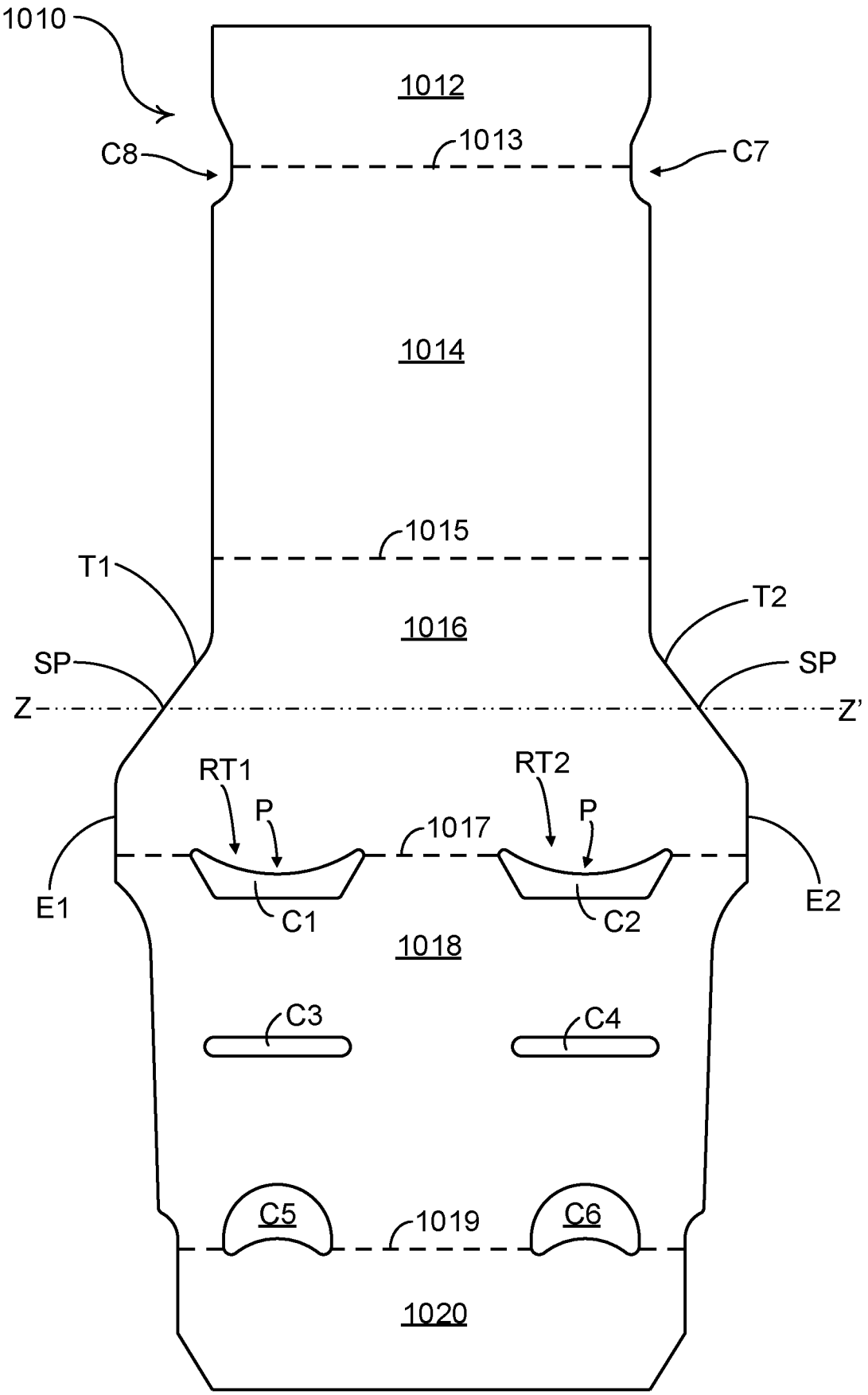


FIG. 2


1010
1012
C8
1013
C7
1014
1015
T1
T2
1016
SP
SP
Z
Z'
RT1
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E2
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C3
C4
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1019
C6
1020

FIG. 3

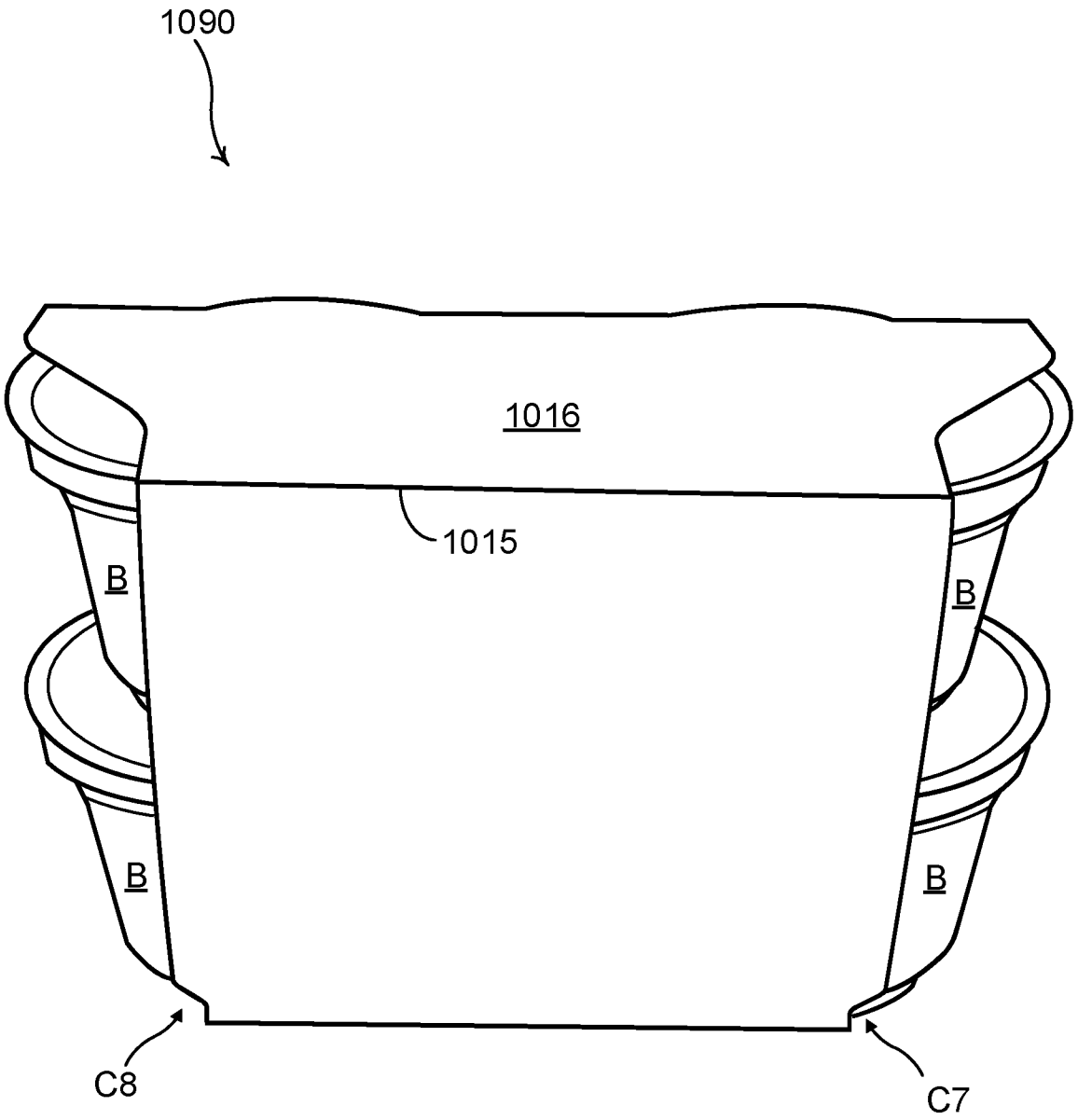

FIG. 4

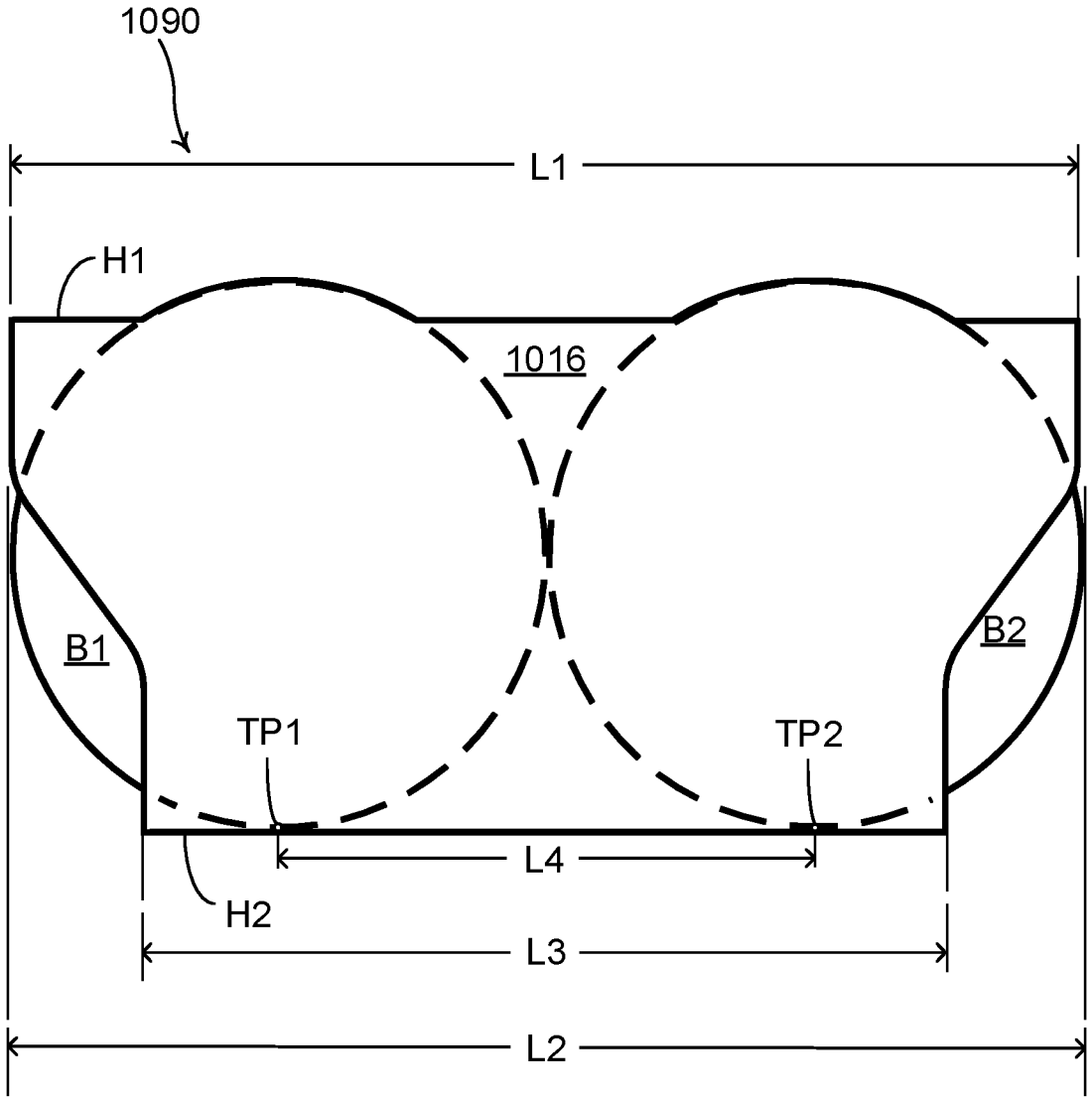

FIG. 5

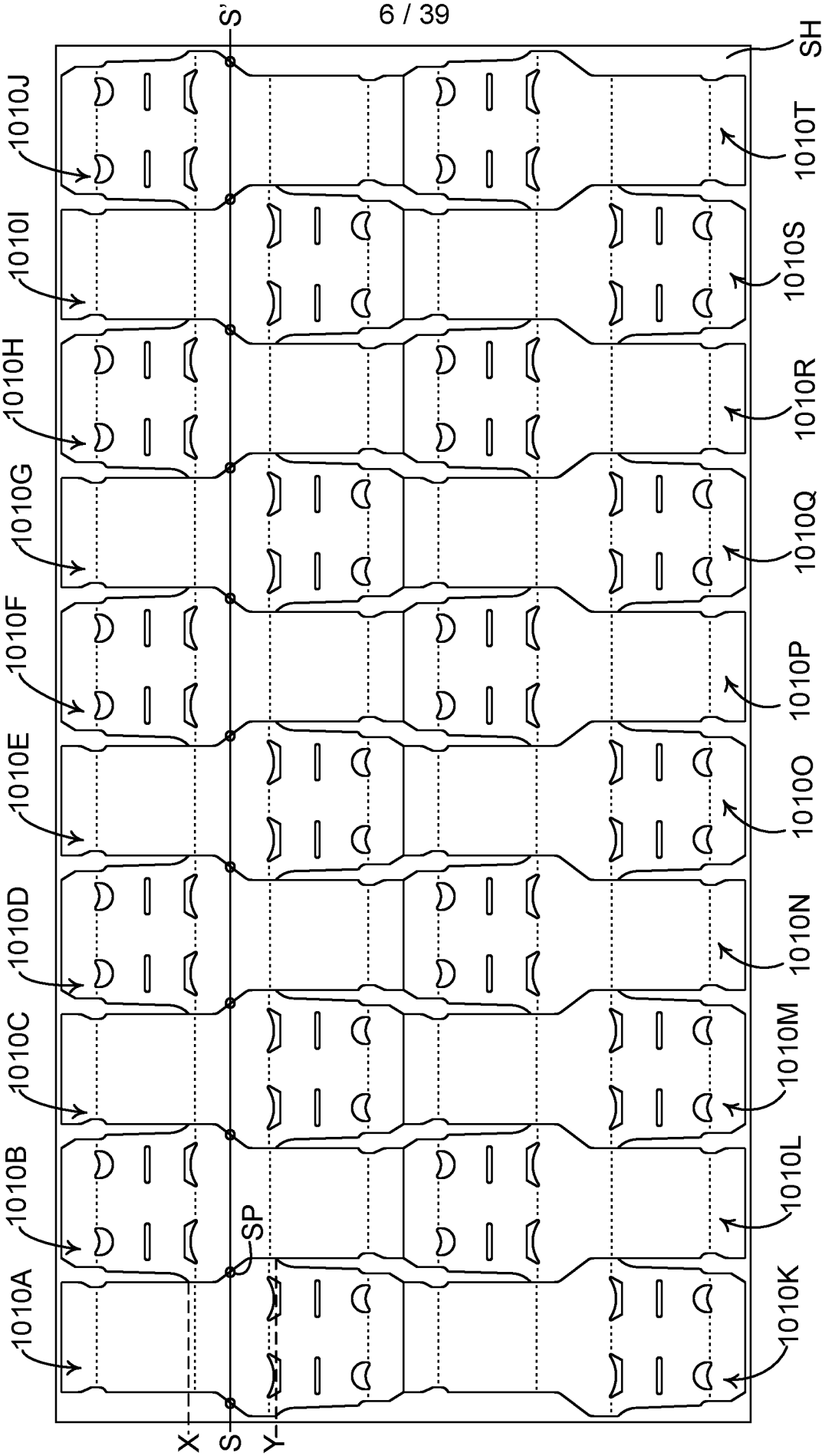
S
SH
1010J
1010I
1010H
1010G
1010F
1010E
1010D
1010C
1010B
1010A
1010T
1010S
1010R
1010Q
1010P
1010O
1010N
1010M
1010L
1010K
SP
X
S
Y

FIG. 6

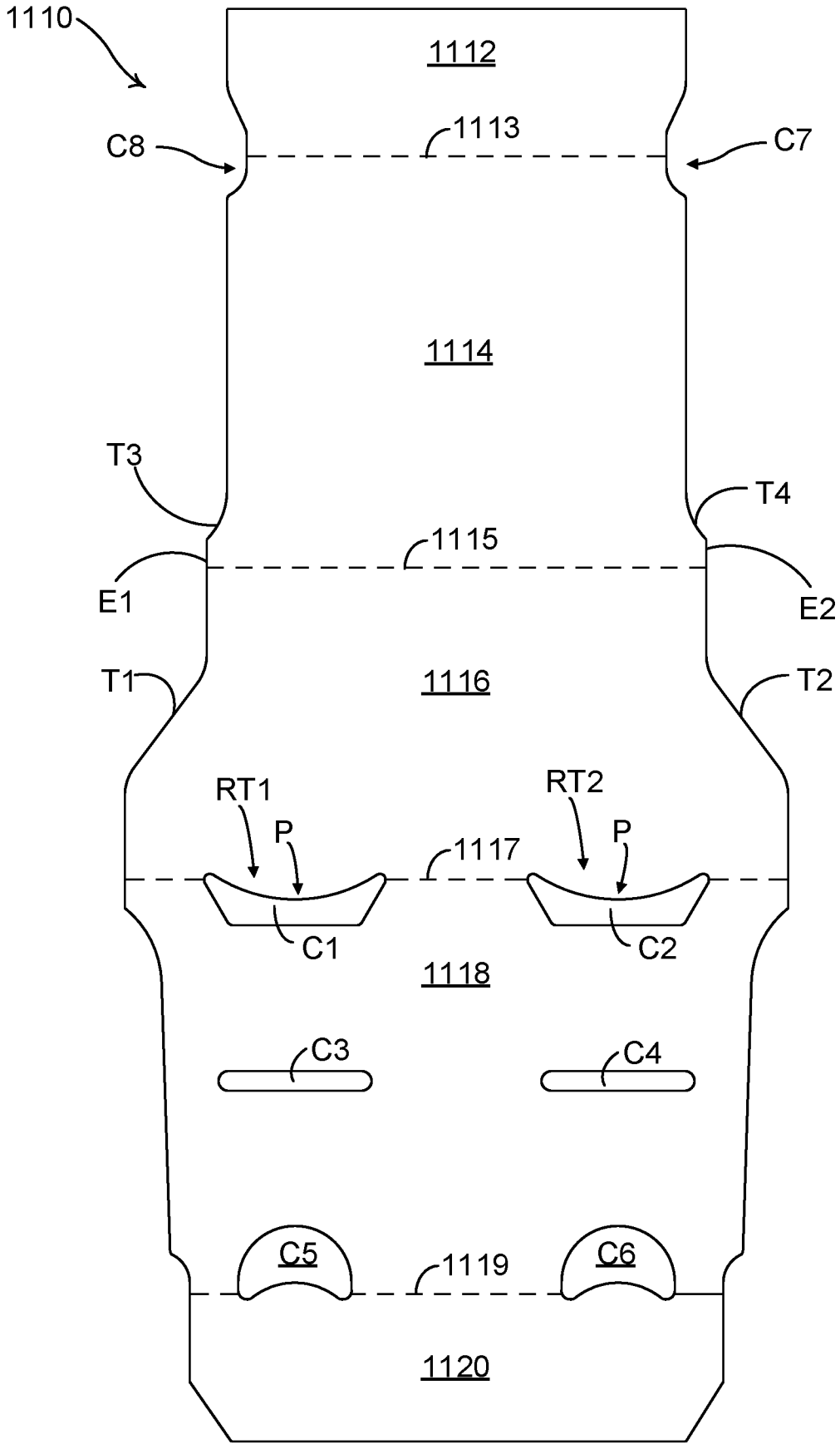
1110
1112
1113
C8
C7
1114
T3
T4
1115
E1
E2
T1
1116
T2
RT1
P
RT2
P
1117
C1
C2
1118
C3
C4
C5
1119
C6
1120

FIG. 7

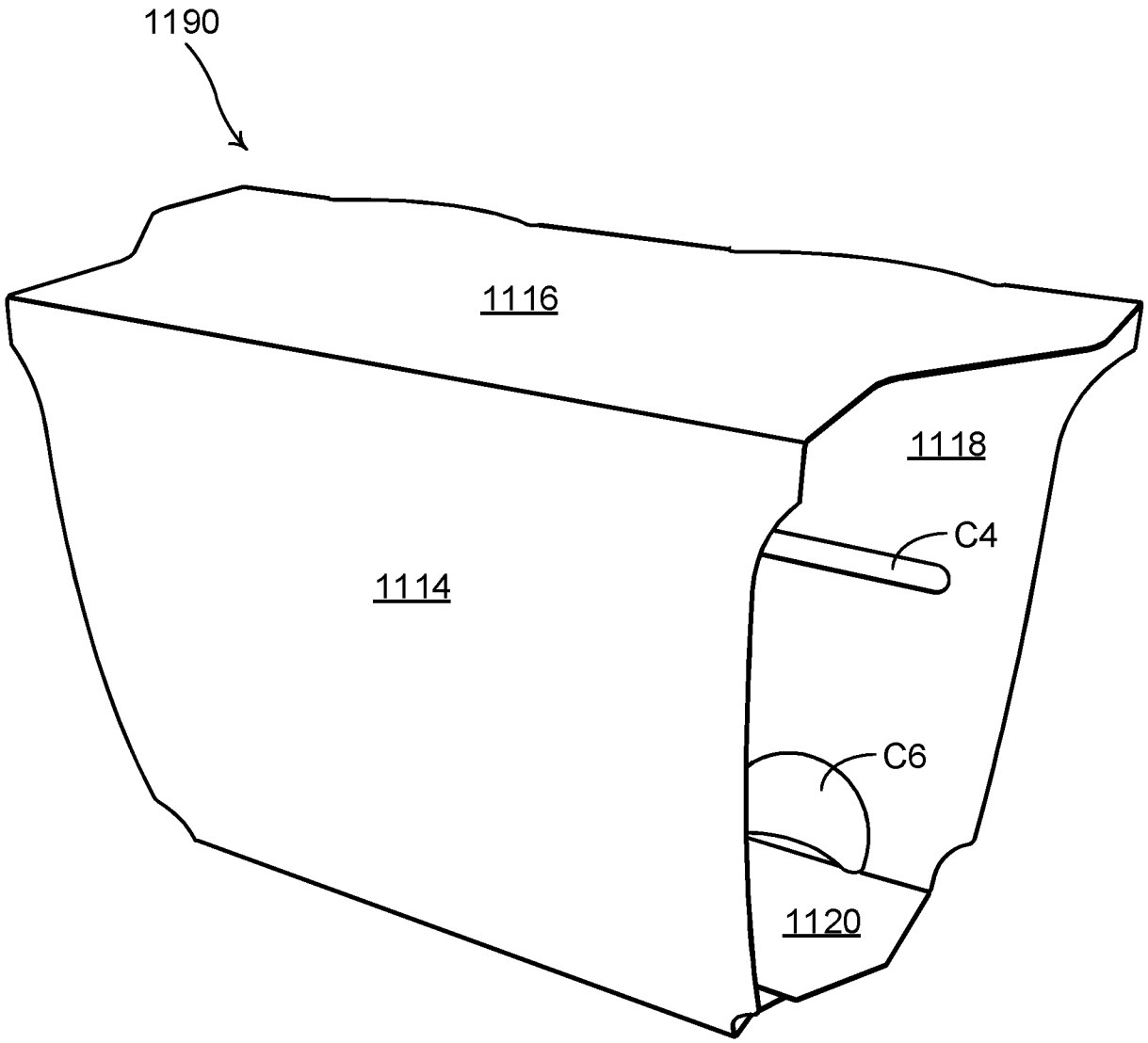

FIG. 8

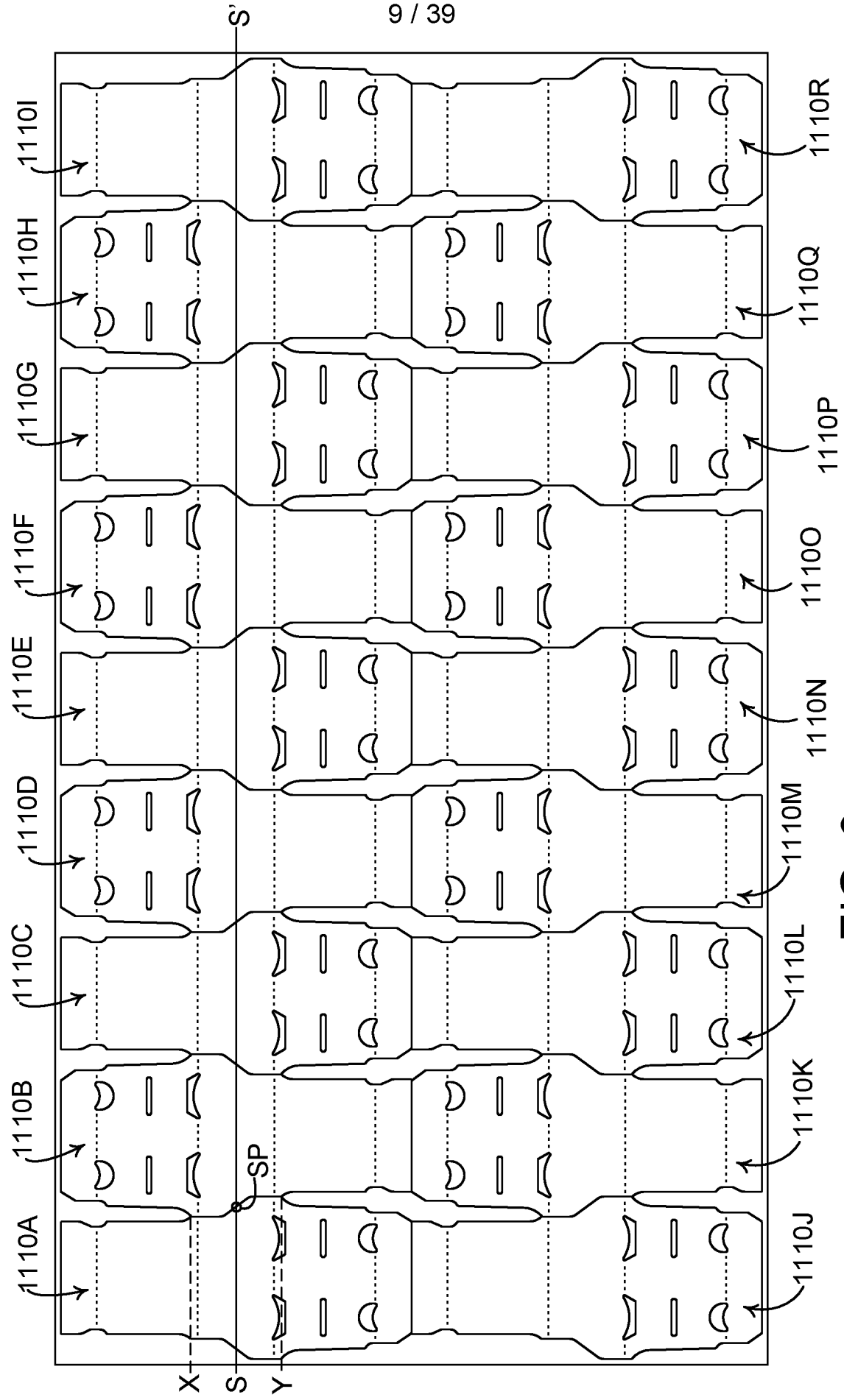
S
1110I
1110H
1110G
1110F
1110E
1110D
1110C
1110B
1110A
SP
X
S
Y
1110R
1110Q
1110P
1110O
1110N
1110M
1110L
1110K
1110J

FIG. 9

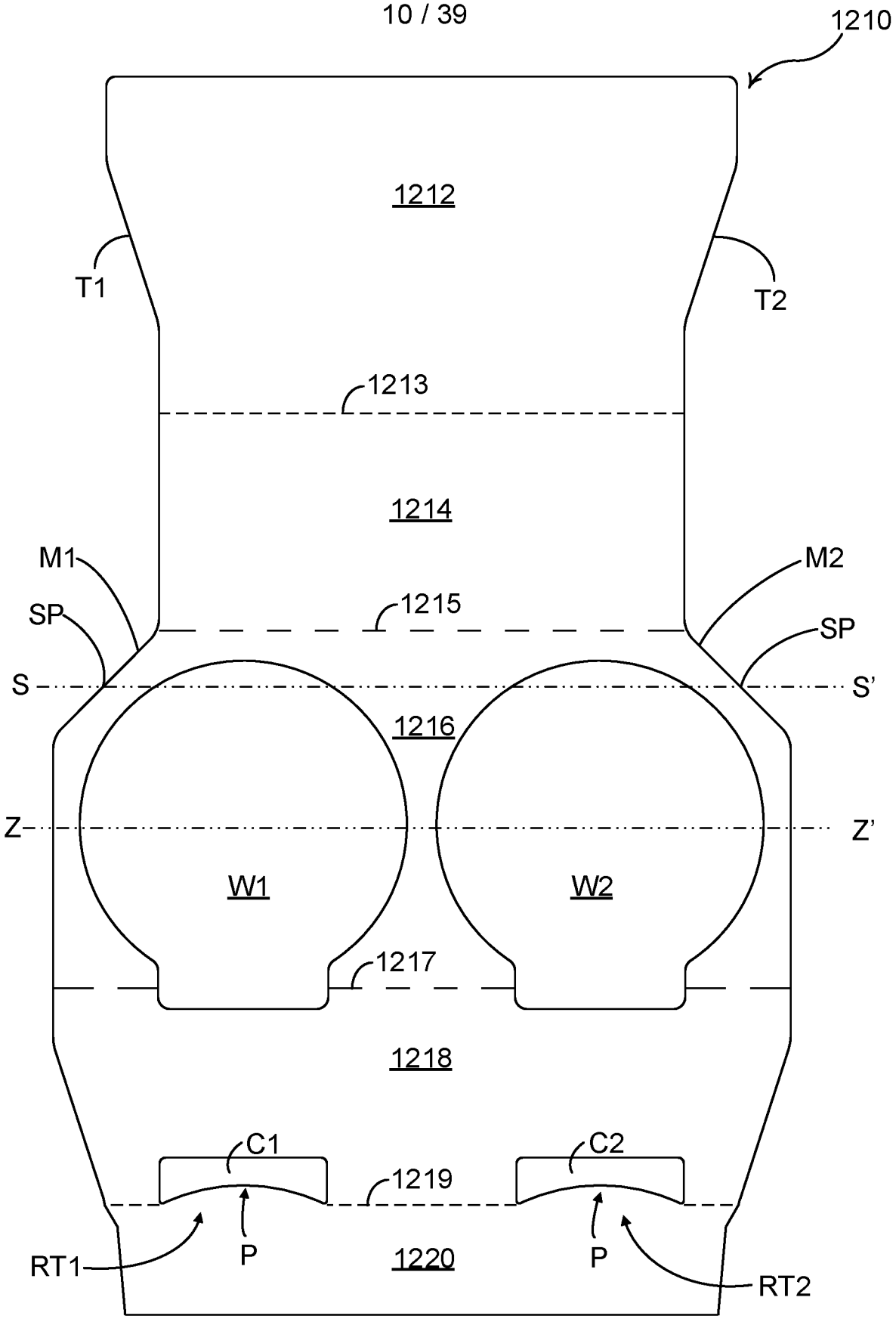
1210
1212
T1
T2
1213
1214
M1
M2
SP
1215
SP
S
S'
1216
Z
Z'
W1
W2
1217
1218
C1
C2
1219
RT1
P
1220
P
RT2

FIG. 10

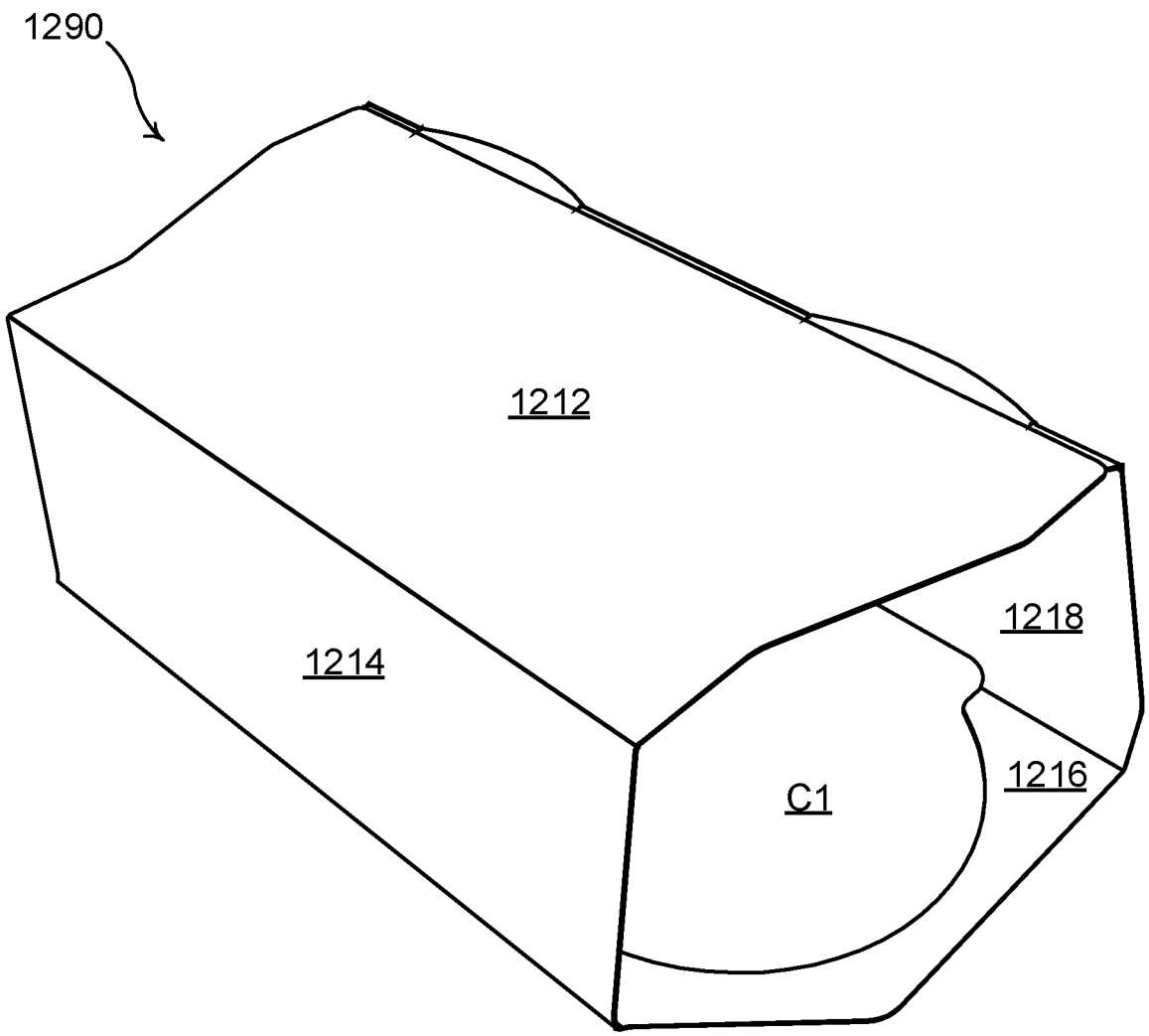

FIG. 11

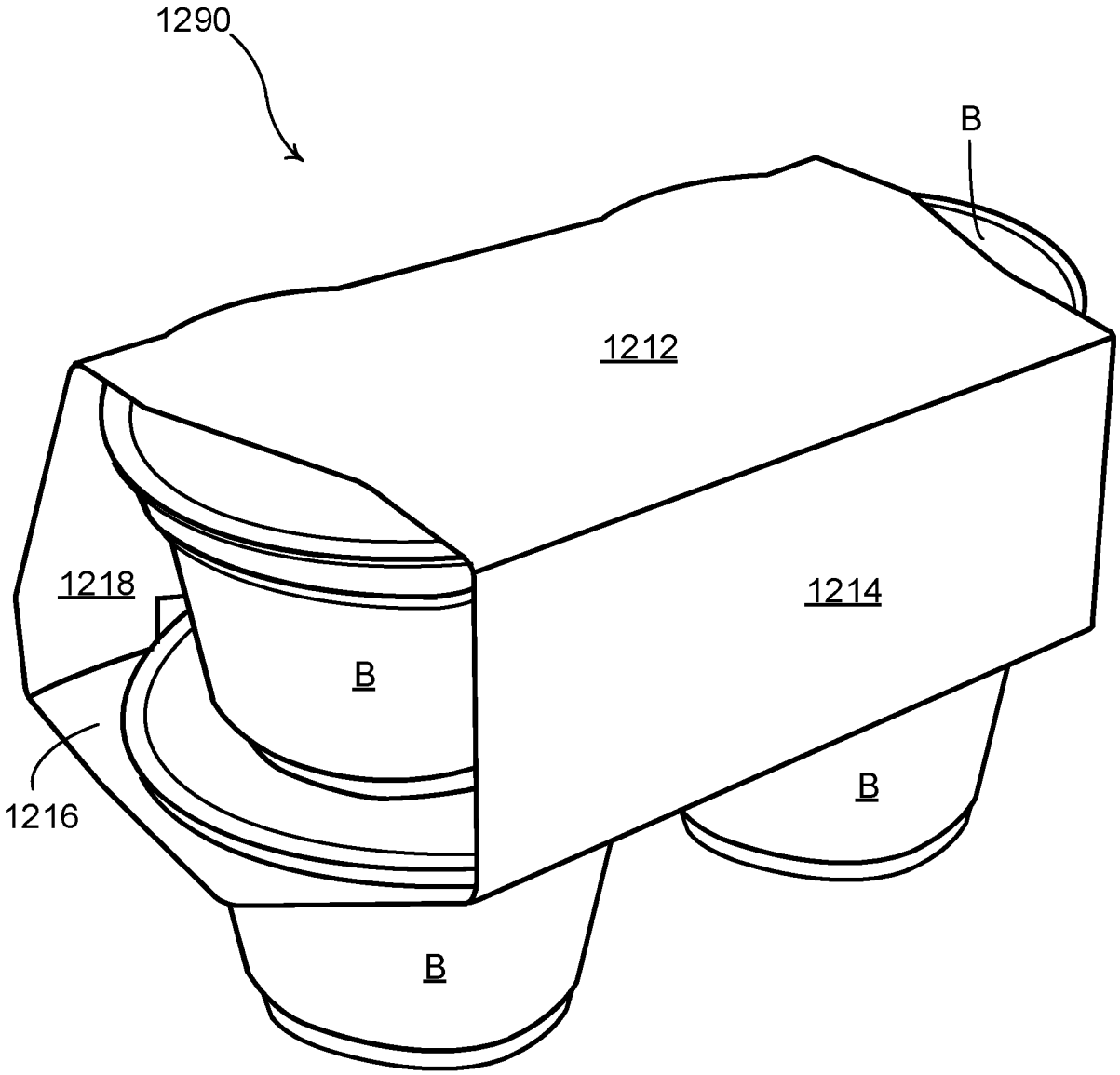

FIG. 12

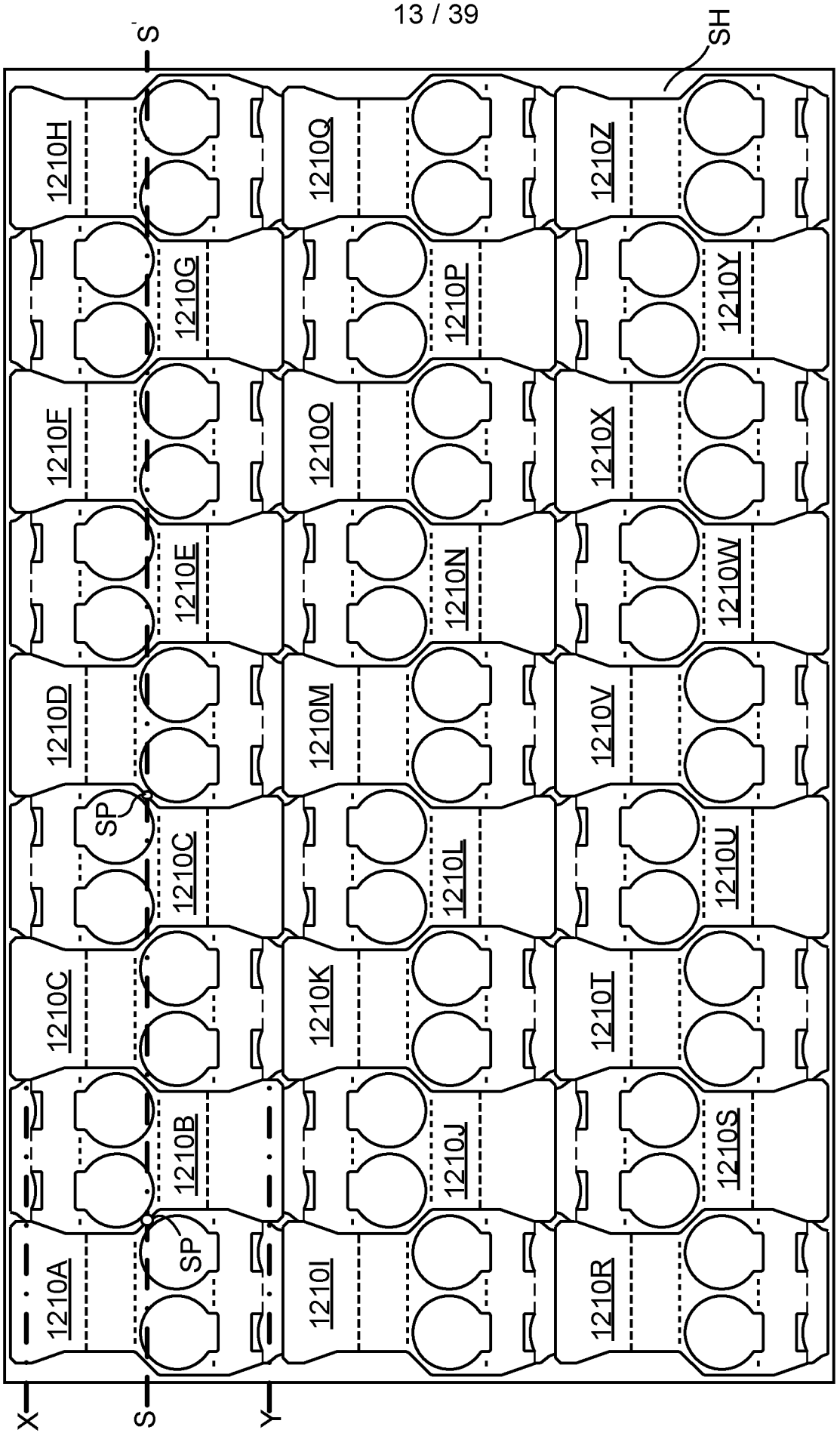
X
S
Y
S
SH
1210A
1210B
1210C
1210D
1210E
1210F
1210G
1210H
1210I
1210J
1210K
1210L
1210M
1210N
1210O
1210P
1210Q
1210R
1210S
1210T
1210U
1210V
1210W
1210X
1210Y
1210Z
SP
SP

FIG. 13

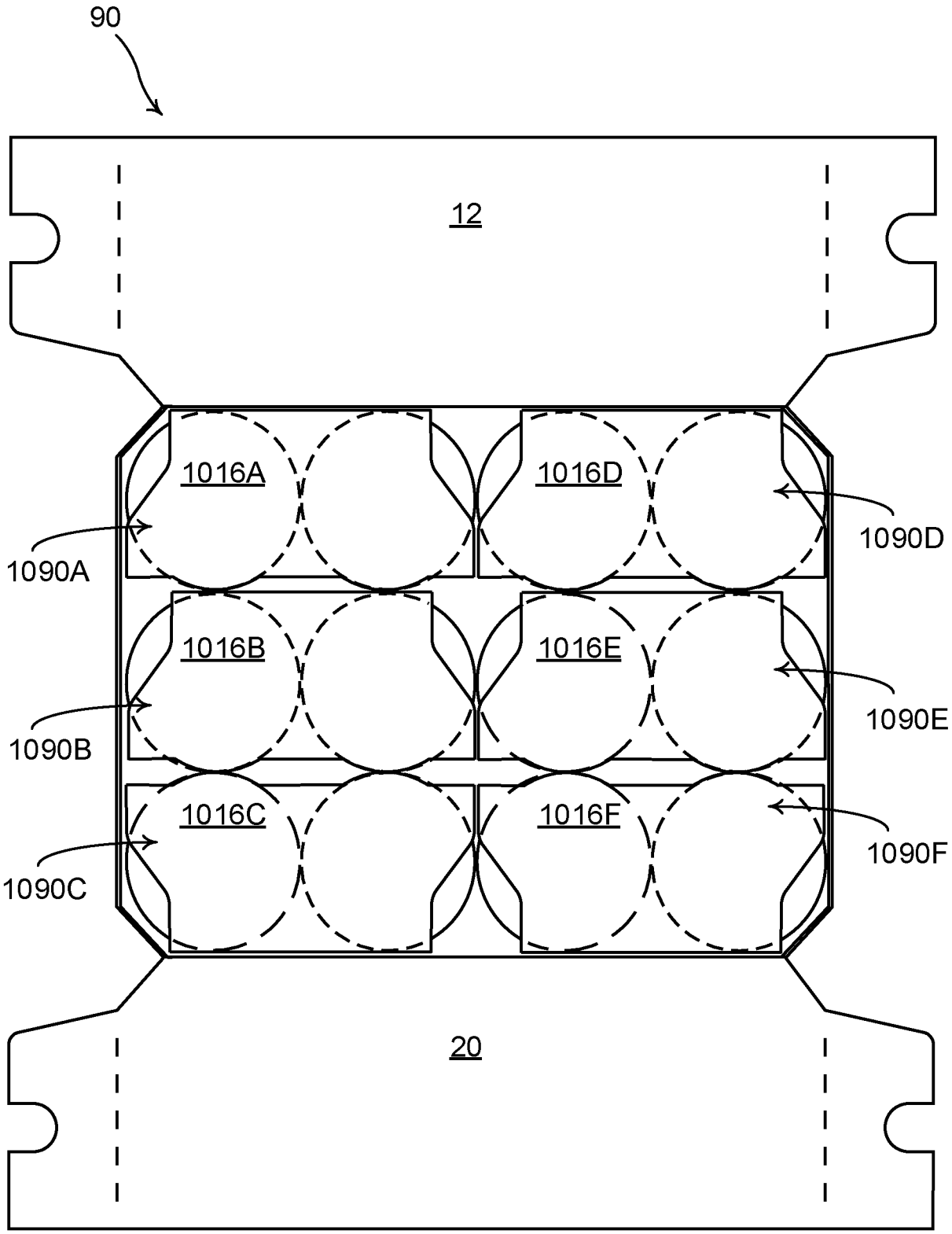
90
12
1016A
1016D
1090A
1090D
1016B
1016E
1090B
1090E
1016C
1016F
1090C
1090F
20

FIG. 14

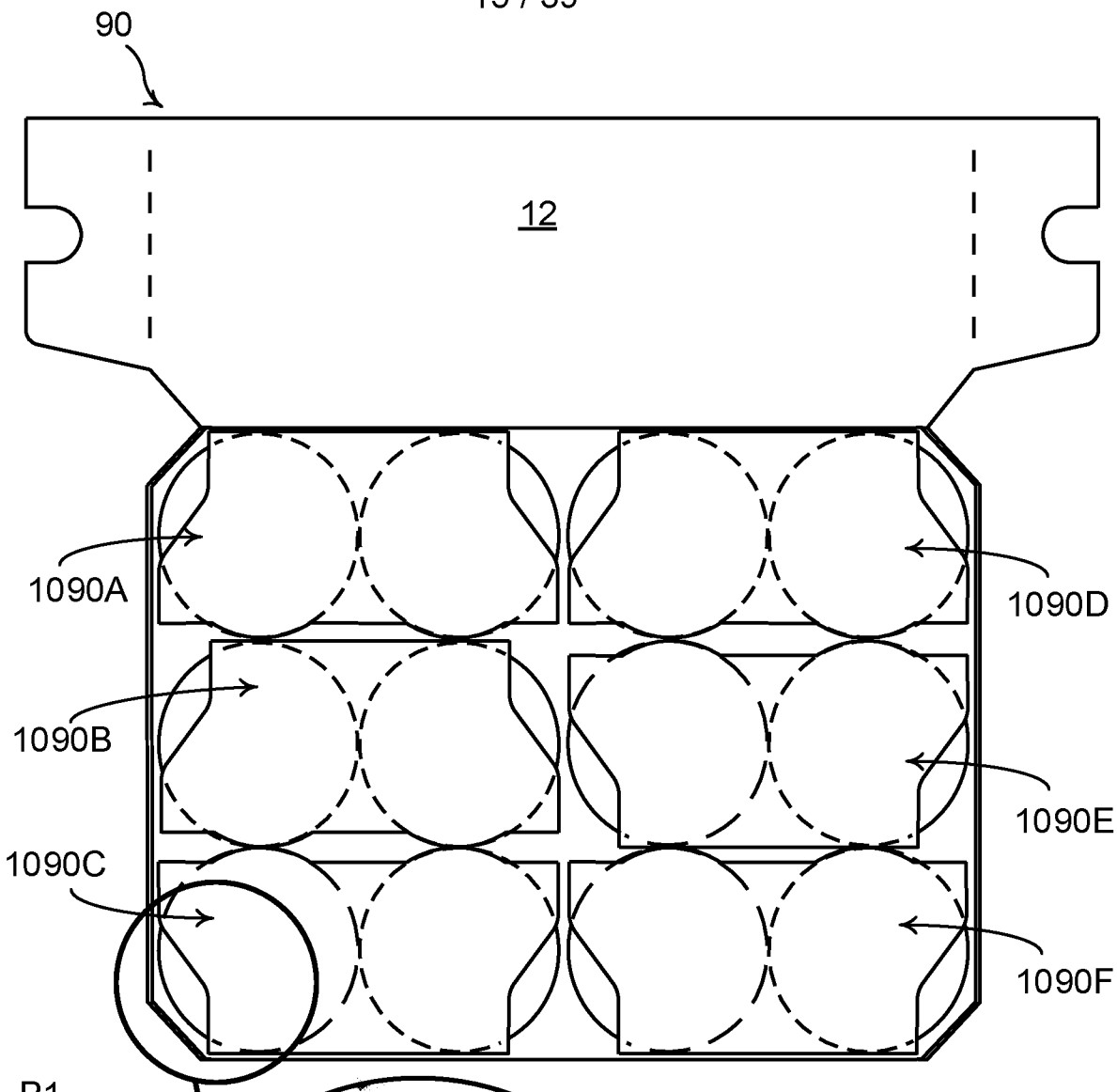

FIG. 15

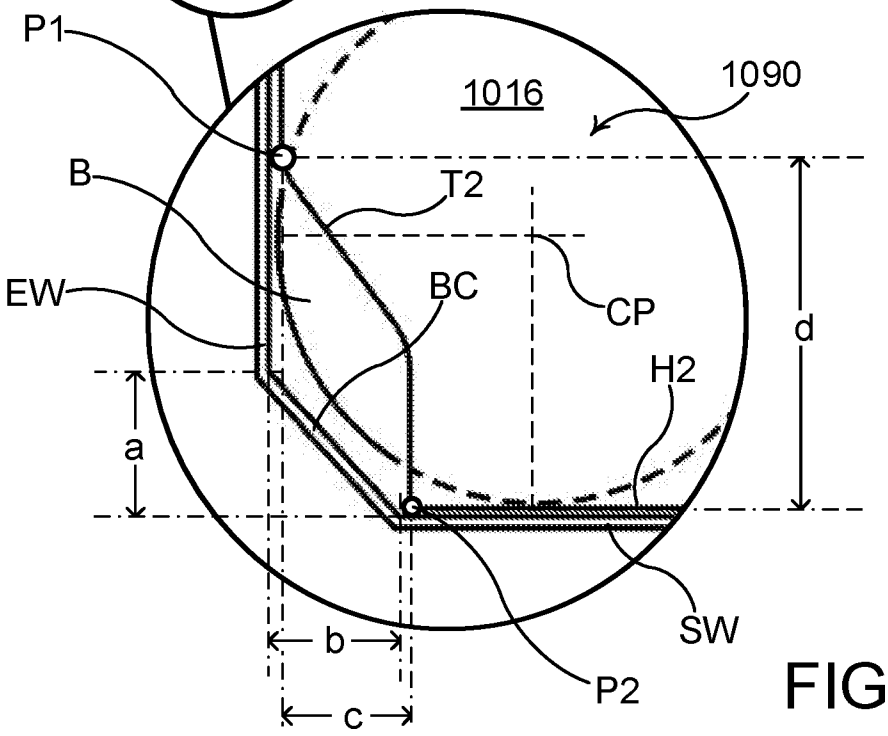

FIG. 15A

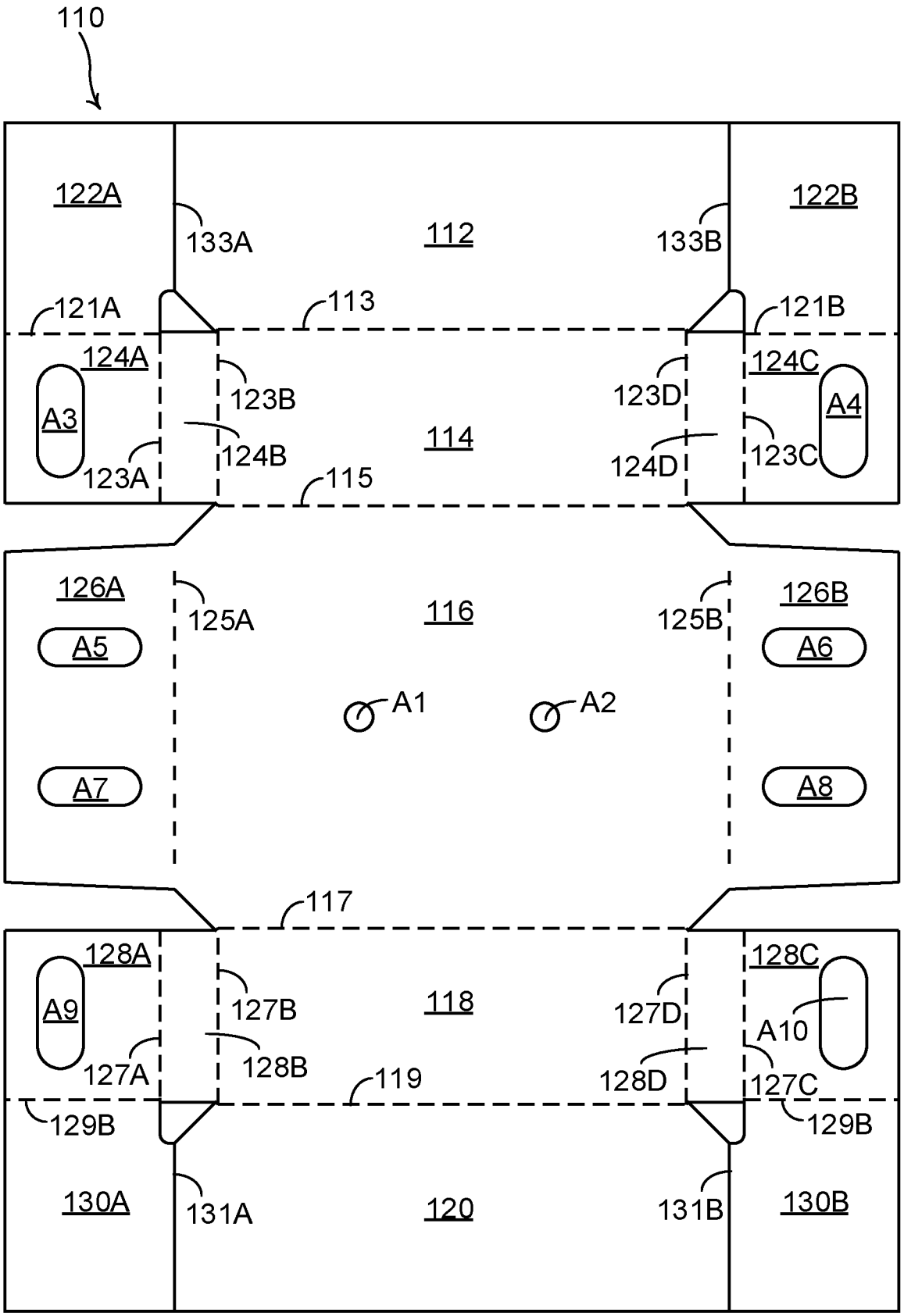
110
122A
133A
112
133B
122B
121A
113
121B
124A
123B
123D
124C
A3
A4
124B
114
123A
124D
123C
115
126A
125A
116
125B
126B
A5
A6
A1
A2
A7
A8
117
128A
128C
A9
127B
118
127D
A10
127A
128B
119
128D
127C
129B
129B
130A
131A
120
131B
130B

FIG. 16

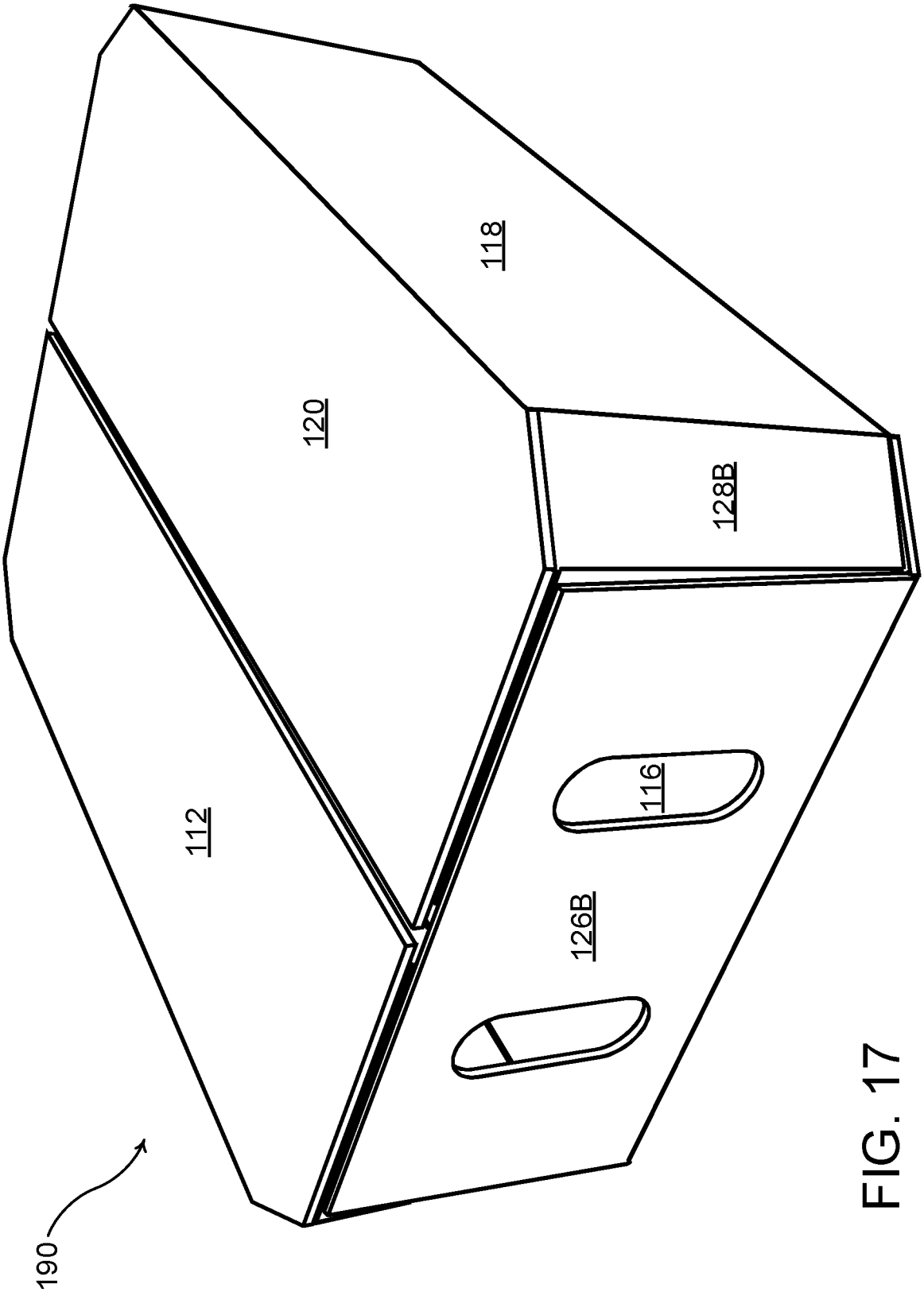

FIG. 17

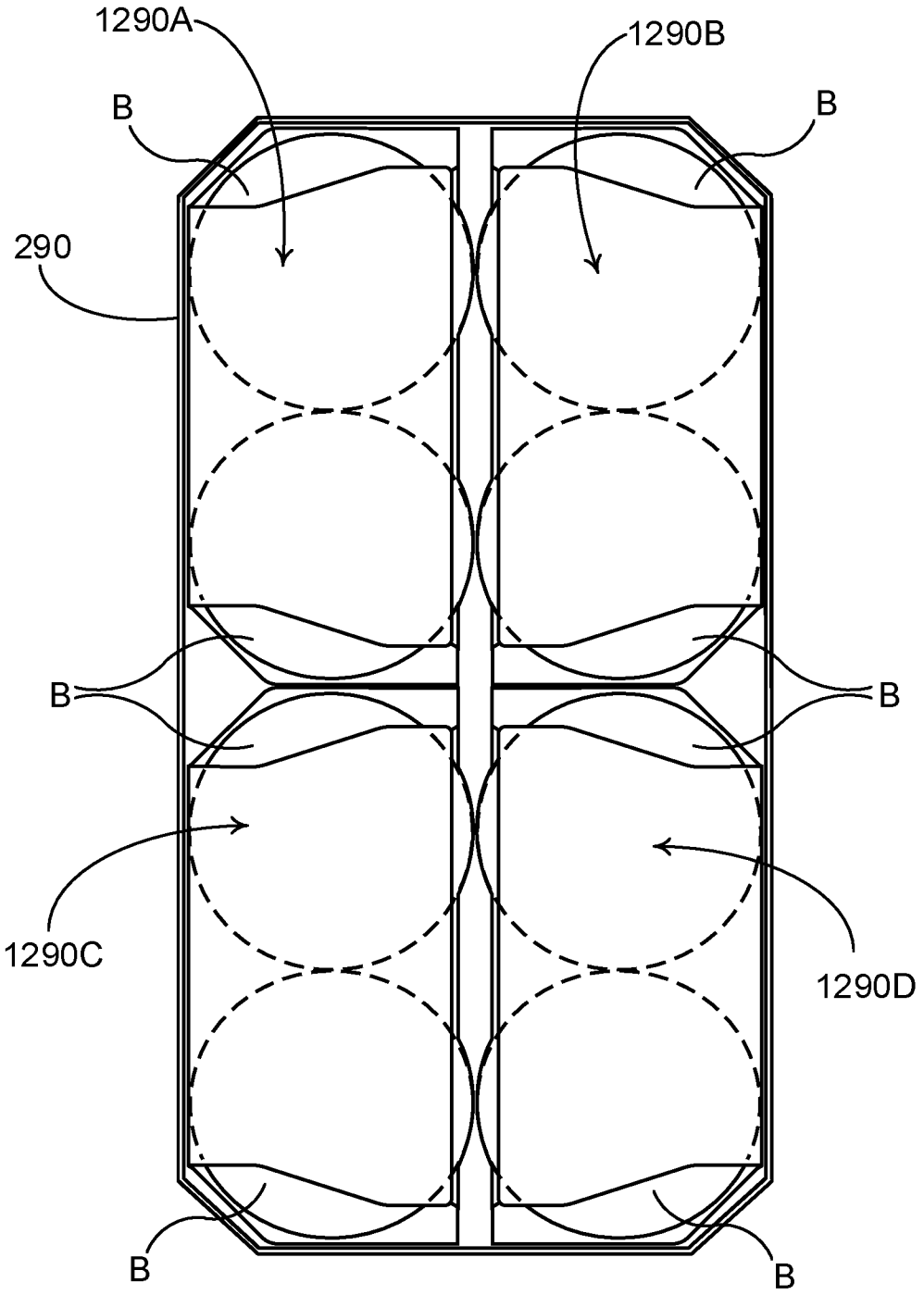

FIG. 18

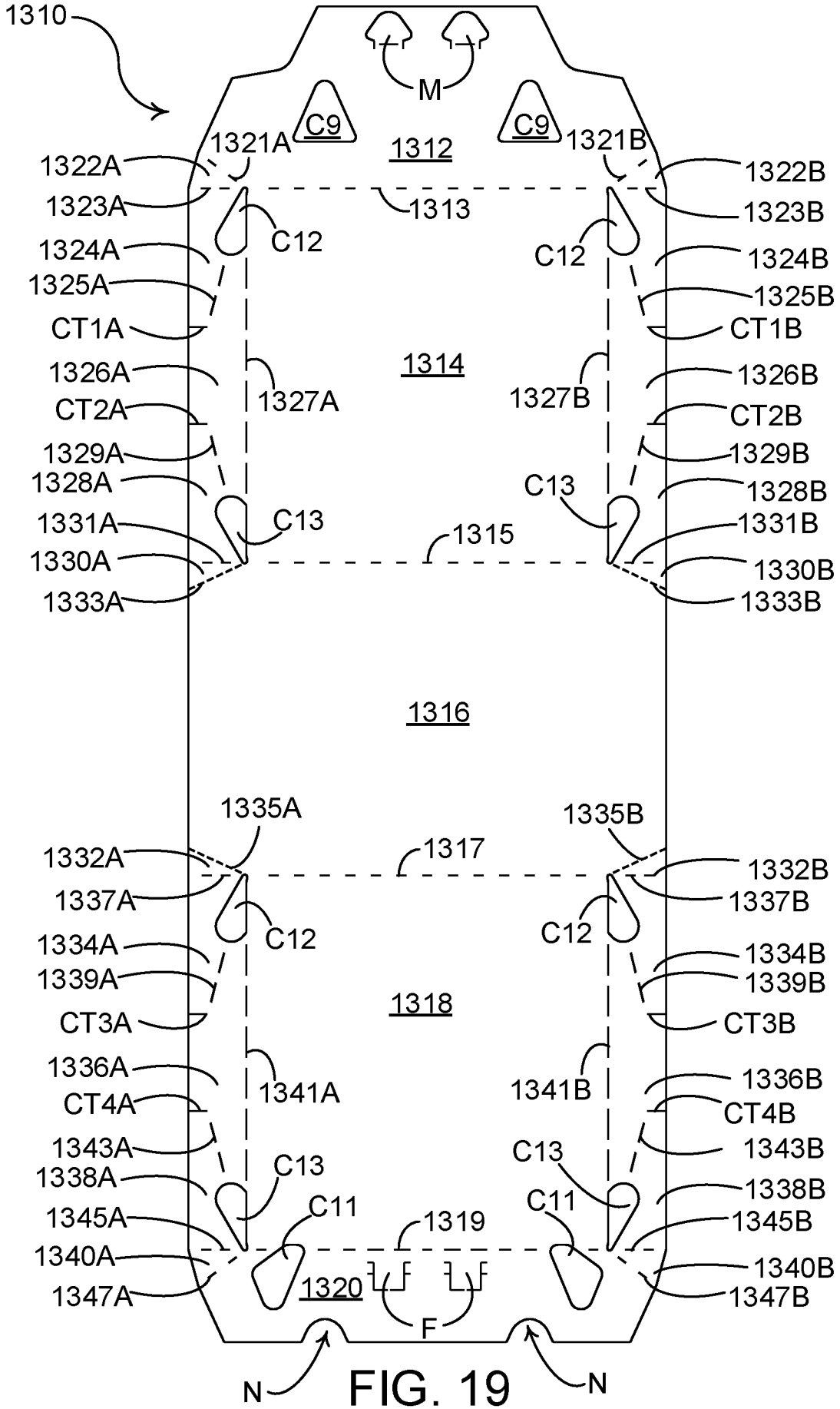
1310
M
C9
C9
1321A
1312
1321B
1322A
1322B
1323A
1313
1323B
C12
C12
1324A
1324B
1325A
1325B
CT1A
CT1B
1314
1326A
1326B
1327A
1327B
CT2A
CT2B
1329A
1329B
1328A
C13
C13
1328B
1331A
1331B
1315
1330A
1330B
1333A
1333B
1316
1335A
1335B
1317
1332A
1332B
1337A
1337B
C12
C12
1334A
1334B
1339A
1339B
1318
CT3A
CT3B
1336A
1336B
1341A
1341B
CT4A
CT4B
1343A
1343B
C13
C13
1338A
1338B
C11
C11
1345A
1319
1345B
1340A
1340B
1320
1347A
1347B
F
N
N

FIG. 19

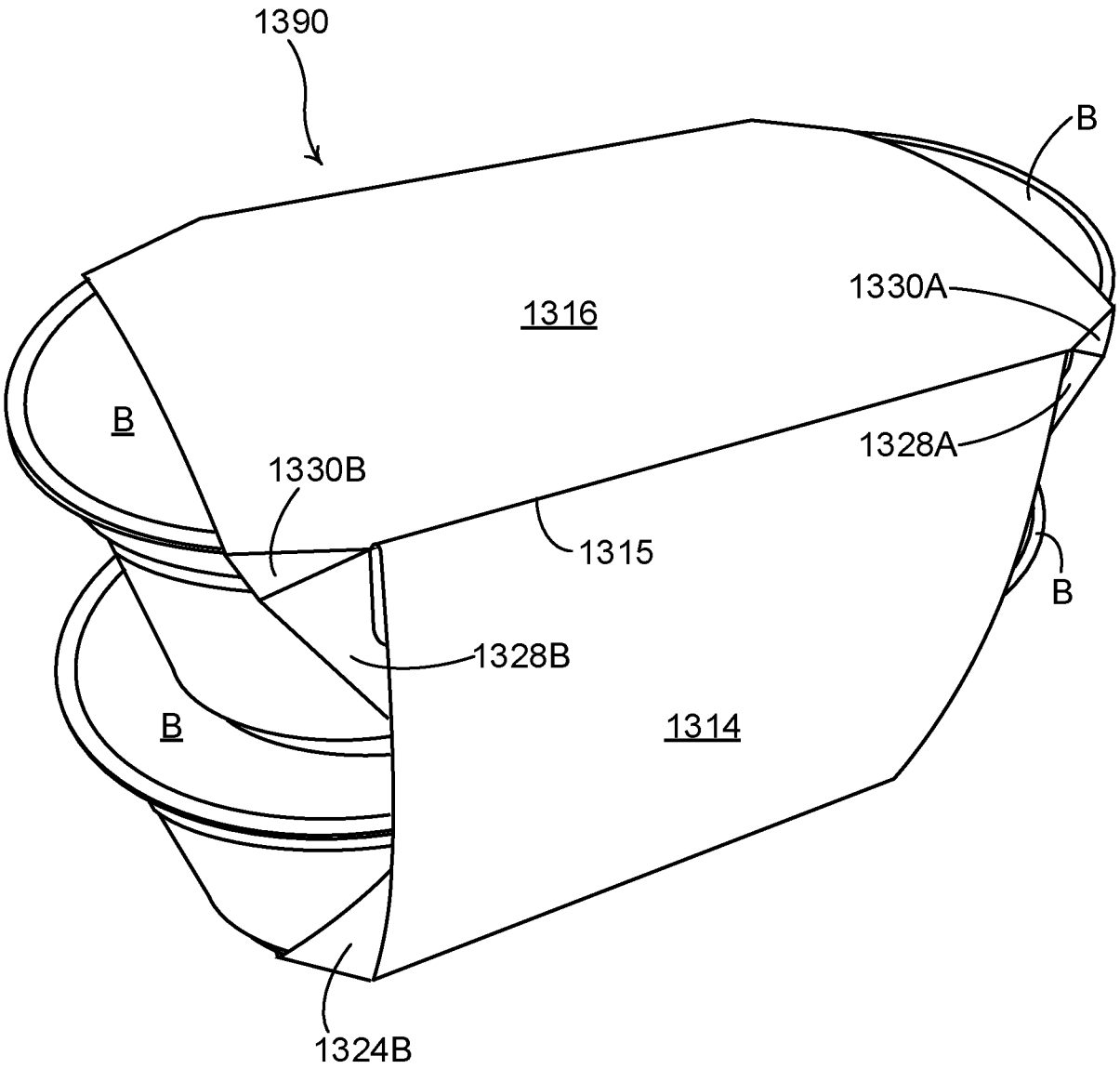

FIG. 20

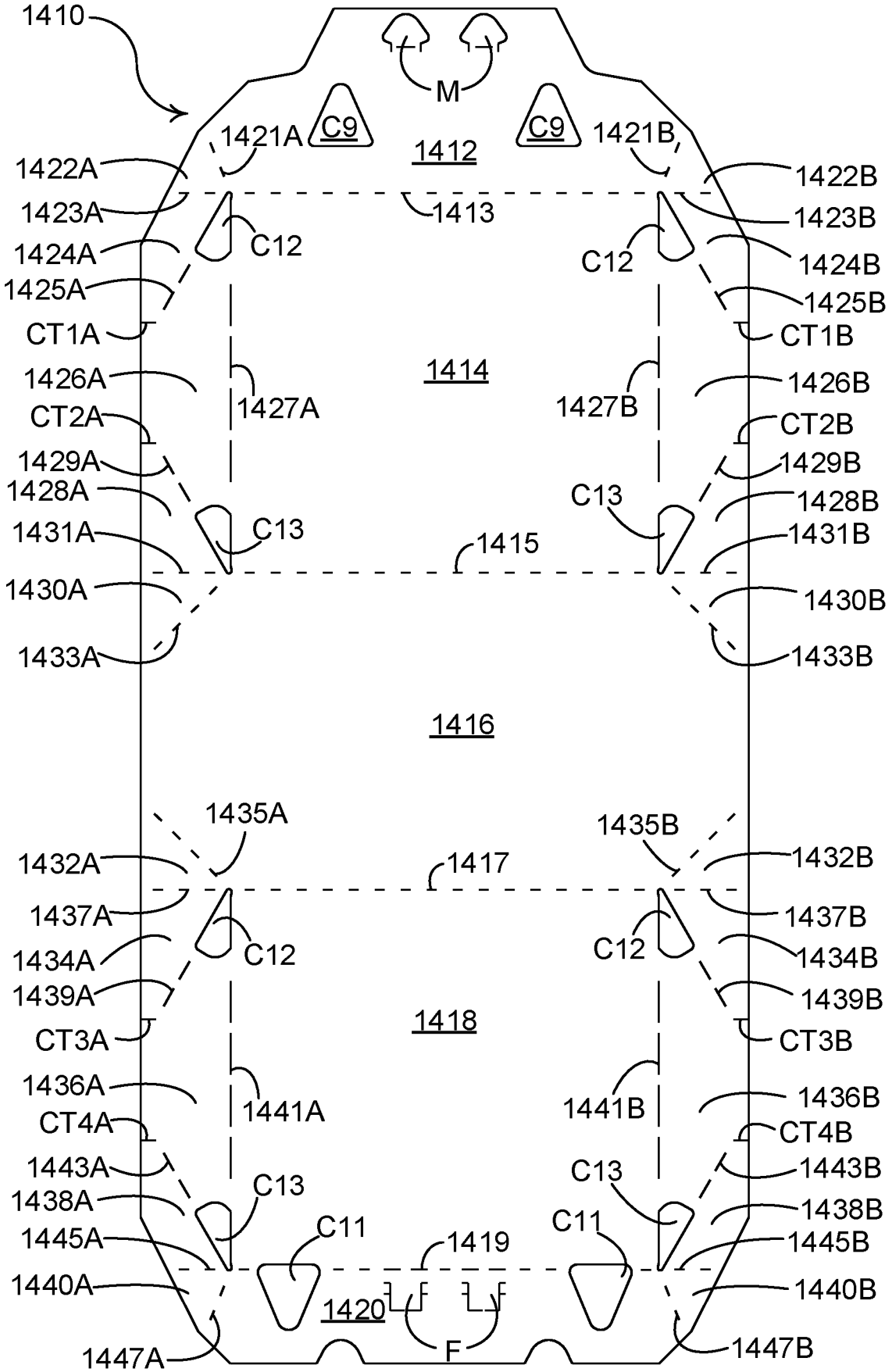
1410
M
C9
C9
1421A
1421B
1412
1422A
1422B
1423A
1413
1423B
1424A
C12
C12
1424B
1425A
1425B
CT1A
CT1B
1426A
1414
1426B
1427A
1427B
CT2A
CT2B
1429A
1429B
1428A
C13
C13
1428B
1431A
1415
1431B
1430A
1430B
1433A
1433B
1416
1435A
1435B
1432A
1417
1432B
1437A
1437B
1434A
C12
C12
1434B
1439A
1439B
1418
CT3A
CT3B
1436A
1441A
1441B
1436B
CT4A
CT4B
1443A
C13
C13
1443B
1438A
1438B
1445A
C11
C11
1419
1445B
1440A
1440B
1420
F
1447A
1447B

FIG. 21

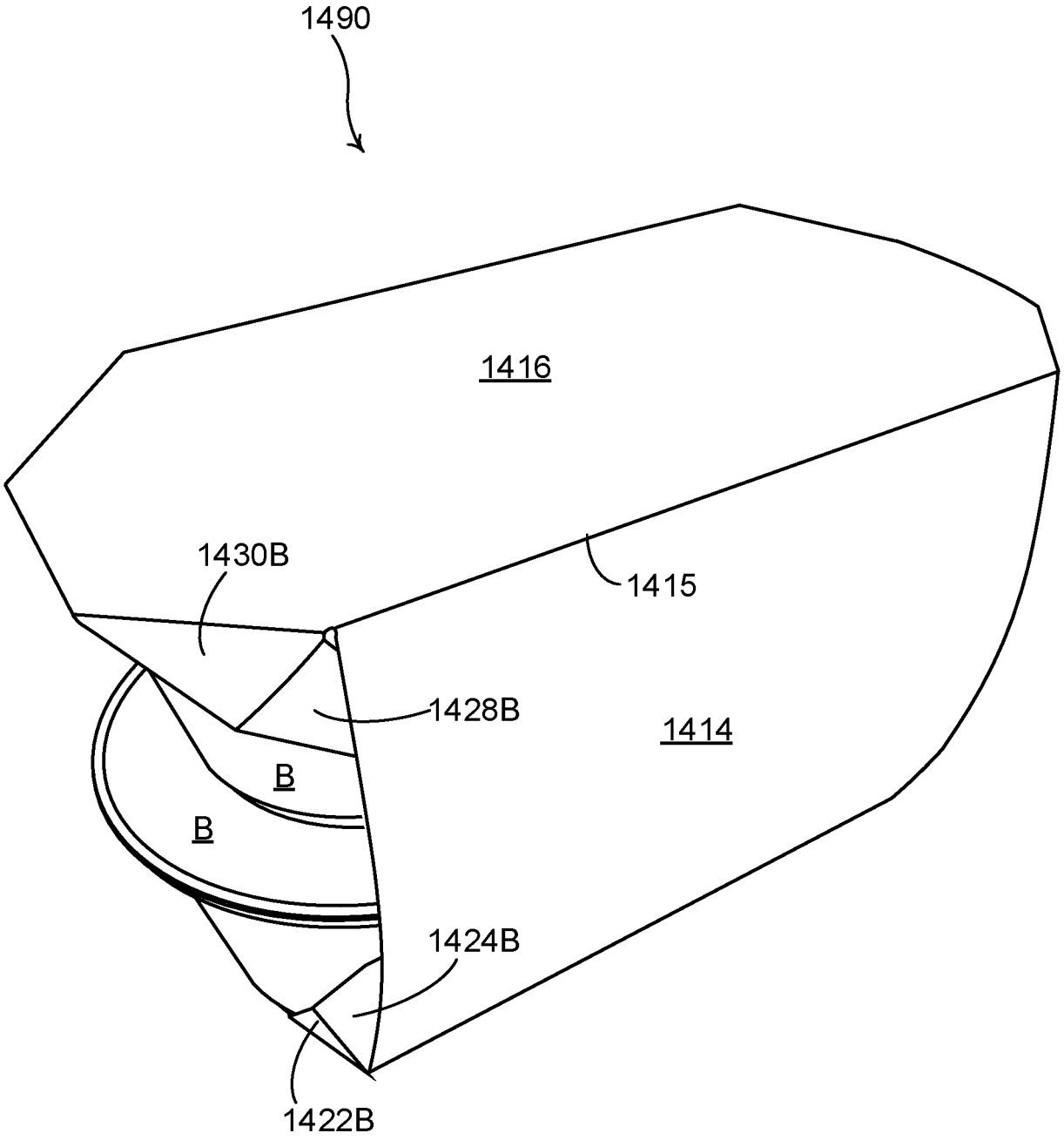

FIG. 22

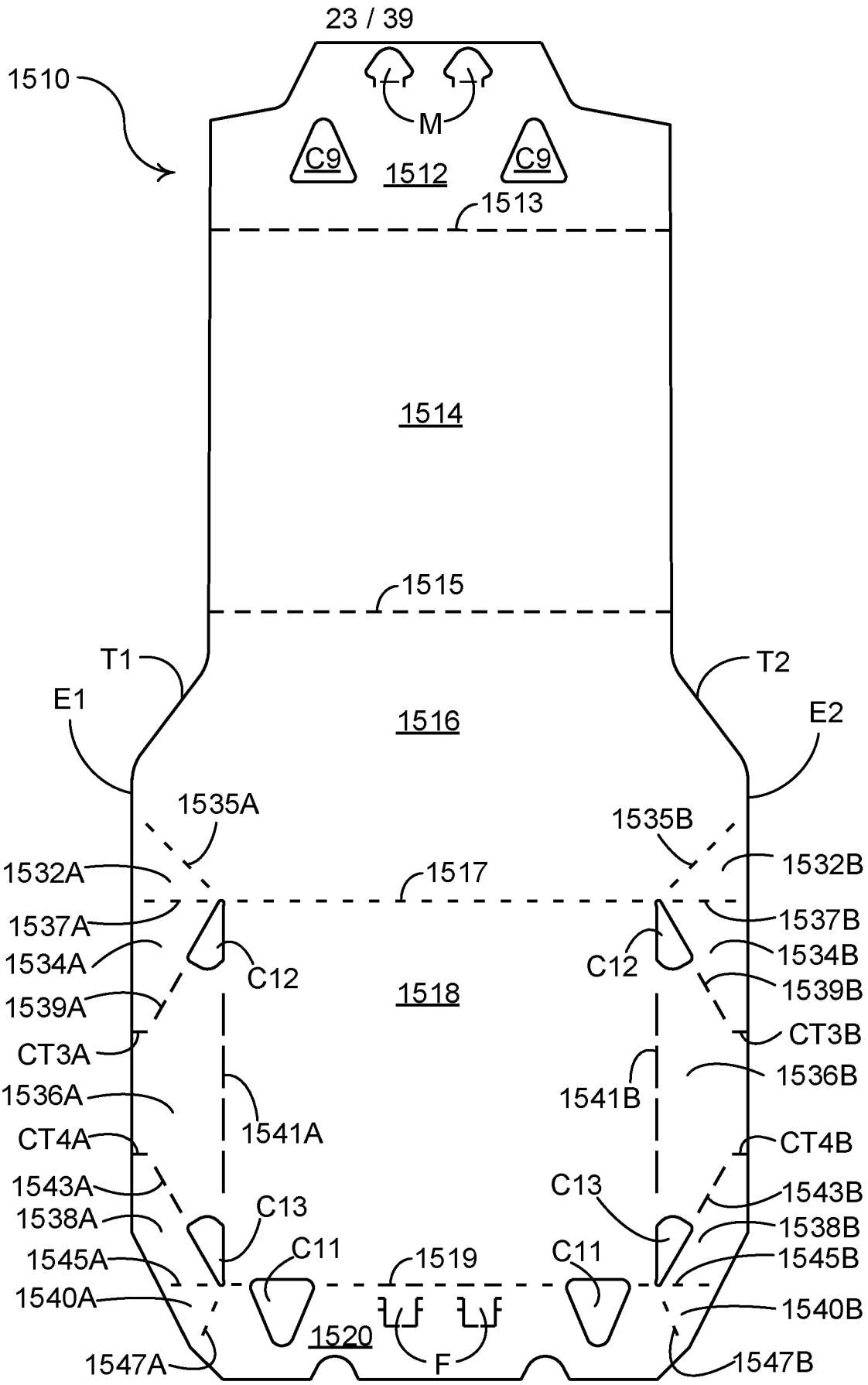
1510
M
C9
C9
1512
1513
1514
1515
T1
T2
E1
E2
1516
1535A
1535B
1532A
1532B
1517
1537A
1537B
1534A
1534B
C12
C12
1518
1539A
1539B
CT3A
CT3B
1536A
1536B
1541B
1541A
CT4A
CT4B
1543A
1543B
C13
C13
1538A
1538B
C11
C11
1519
1545A
1545B
1540A
1540B
1520
F
1547A
1547B

FIG. 23

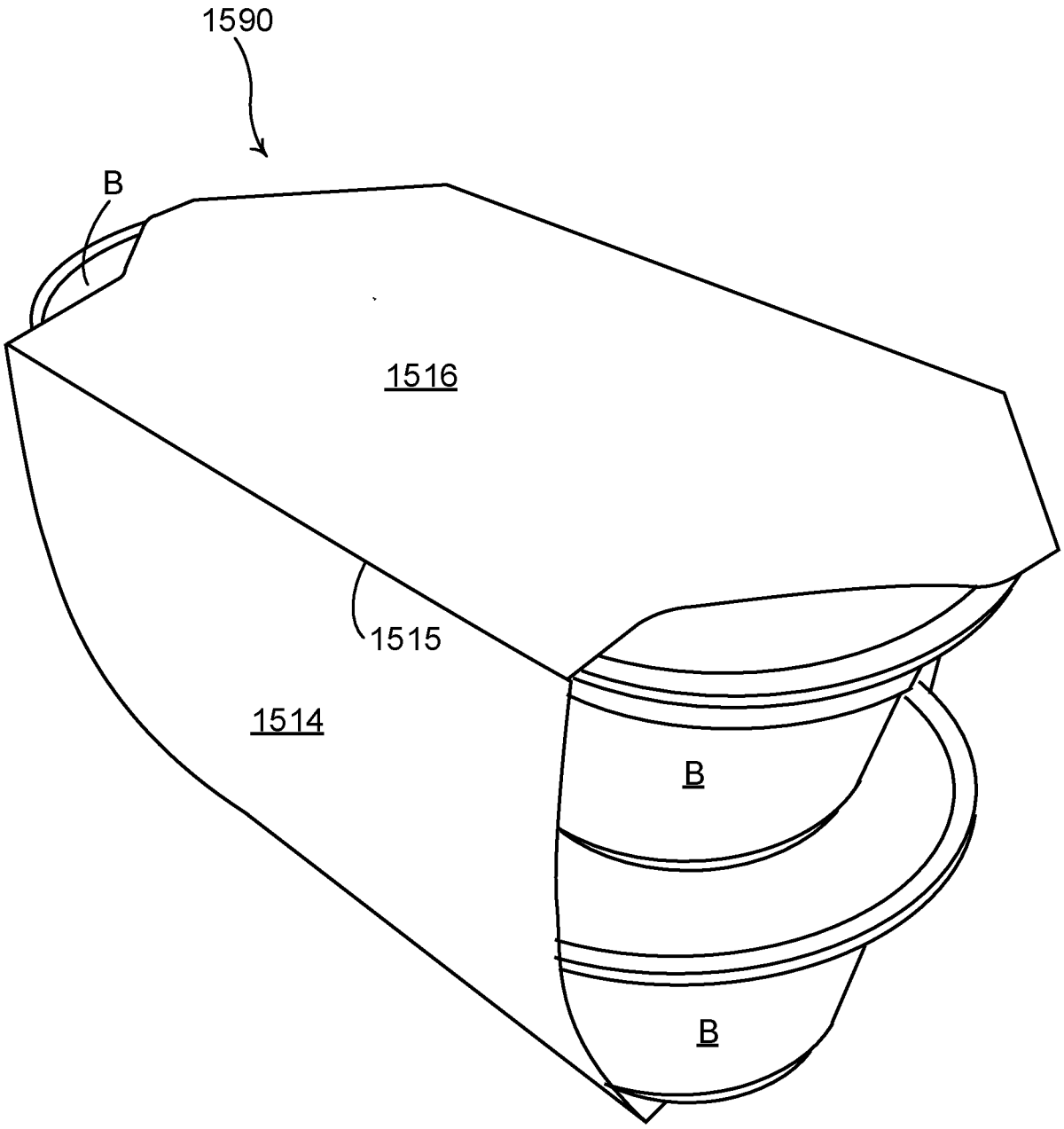

FIG. 24

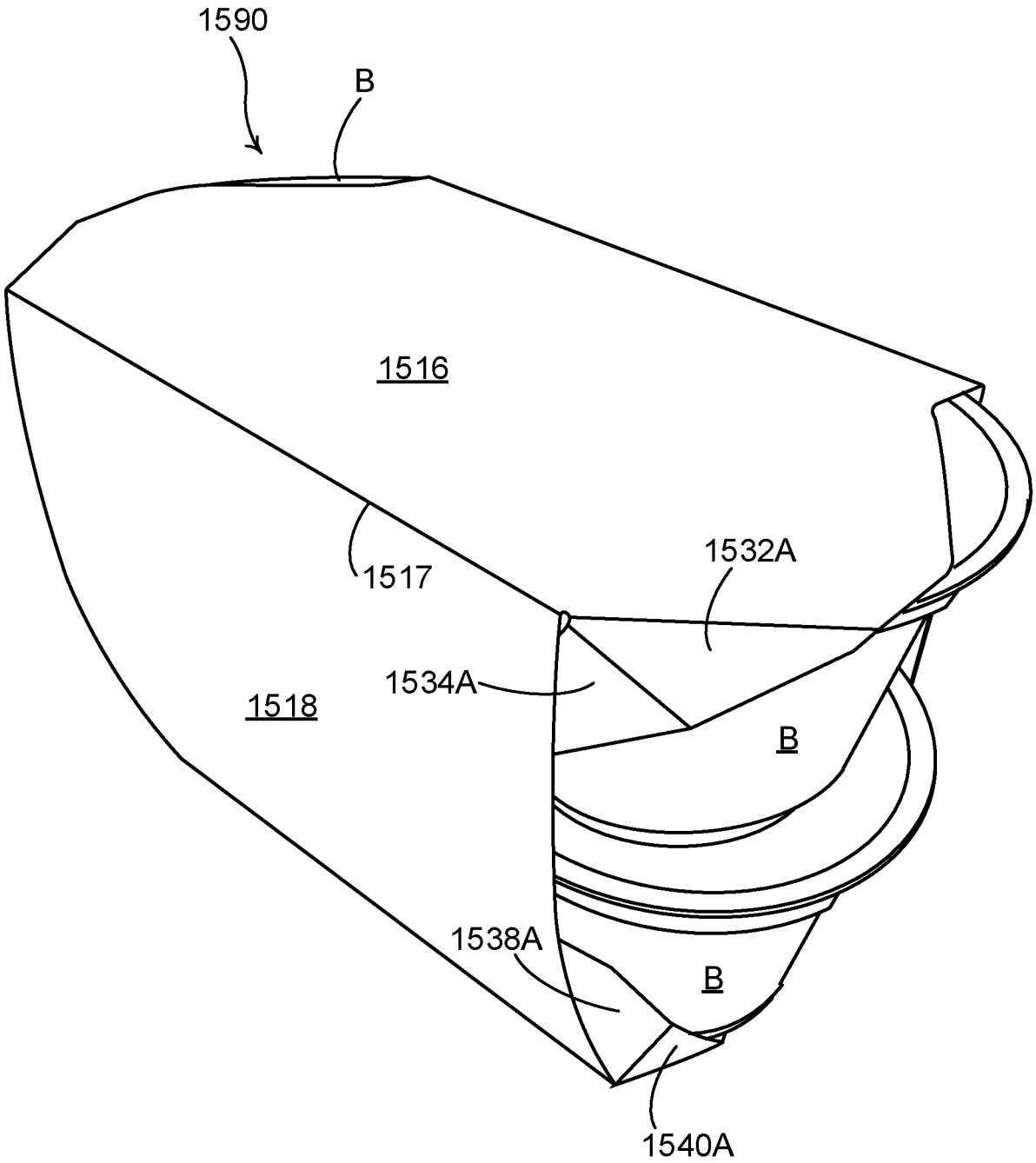

FIG. 25

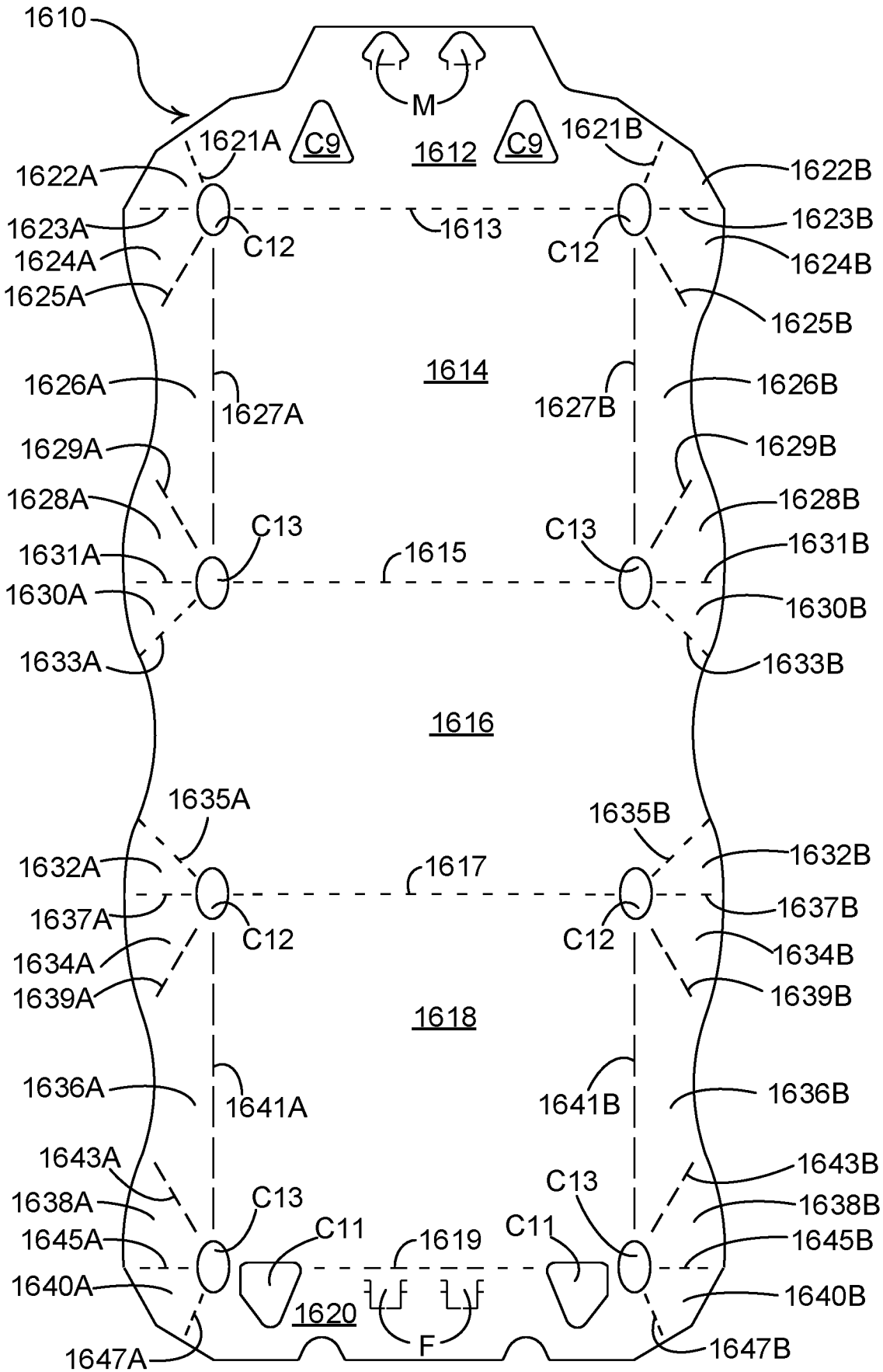
1610
M
1621A
C9
1612
C9
1621B
1622A
1622B
1623A
C12
1613
C12
1623B
1624A
1624B
1625A
1625B
1614
1626A
1627A
1627B
1626B
1629A
1629B
1628A
1628B
C13
C13
1631A
1615
1631B
1630A
1630B
1633A
1633B
1616
1635A
1635B
1632A
1617
1632B
1637A
C12
C12
1637B
1634A
1634B
1639A
1639B
1618
1636A
1641A
1641B
1636B
1643A
1643B
1638A
C13
C13
1638B
1645A
C11
1619
C11
1645B
1640A
1620
1640B
F
1647A
1647B

FIG. 26

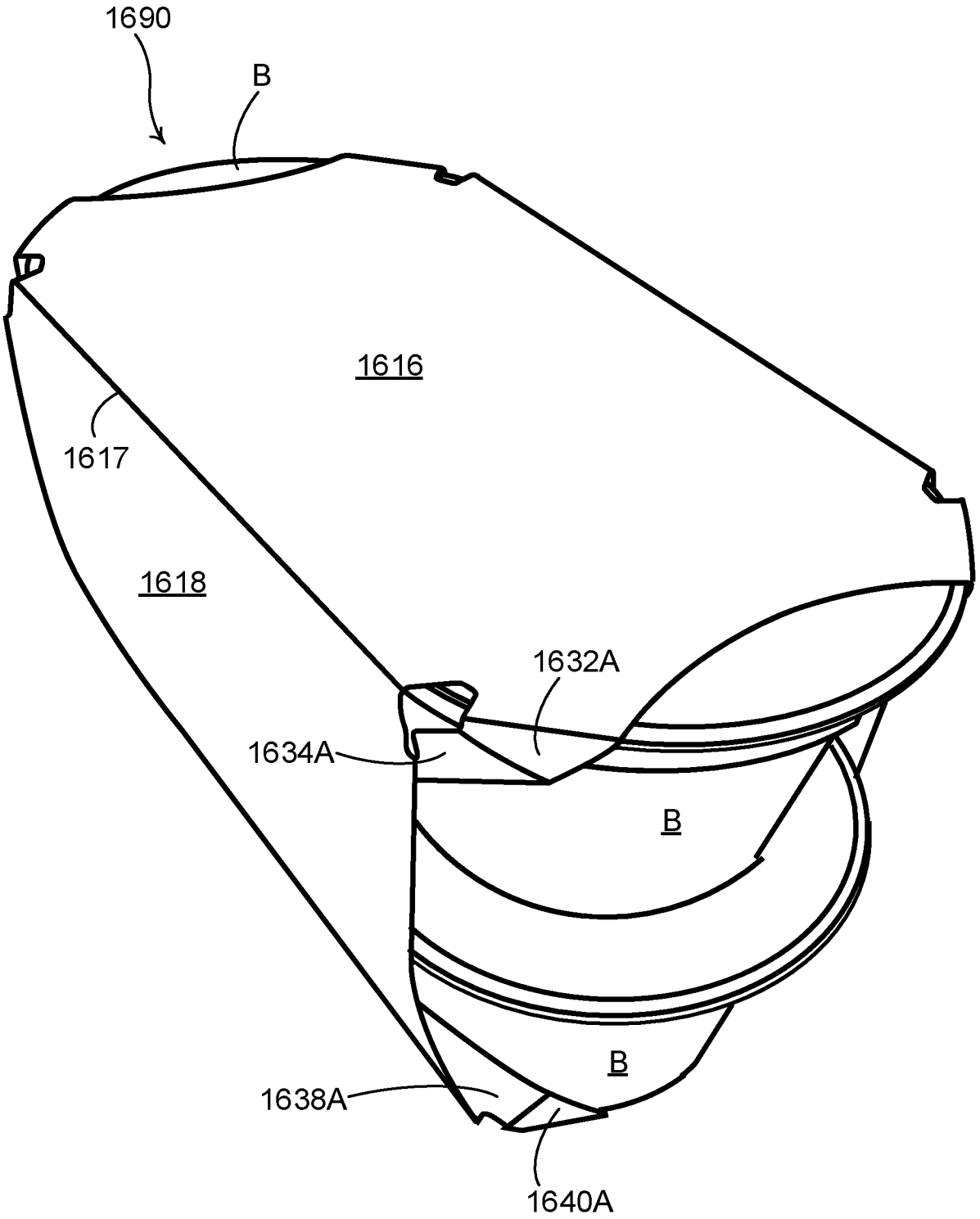

FIG. 27

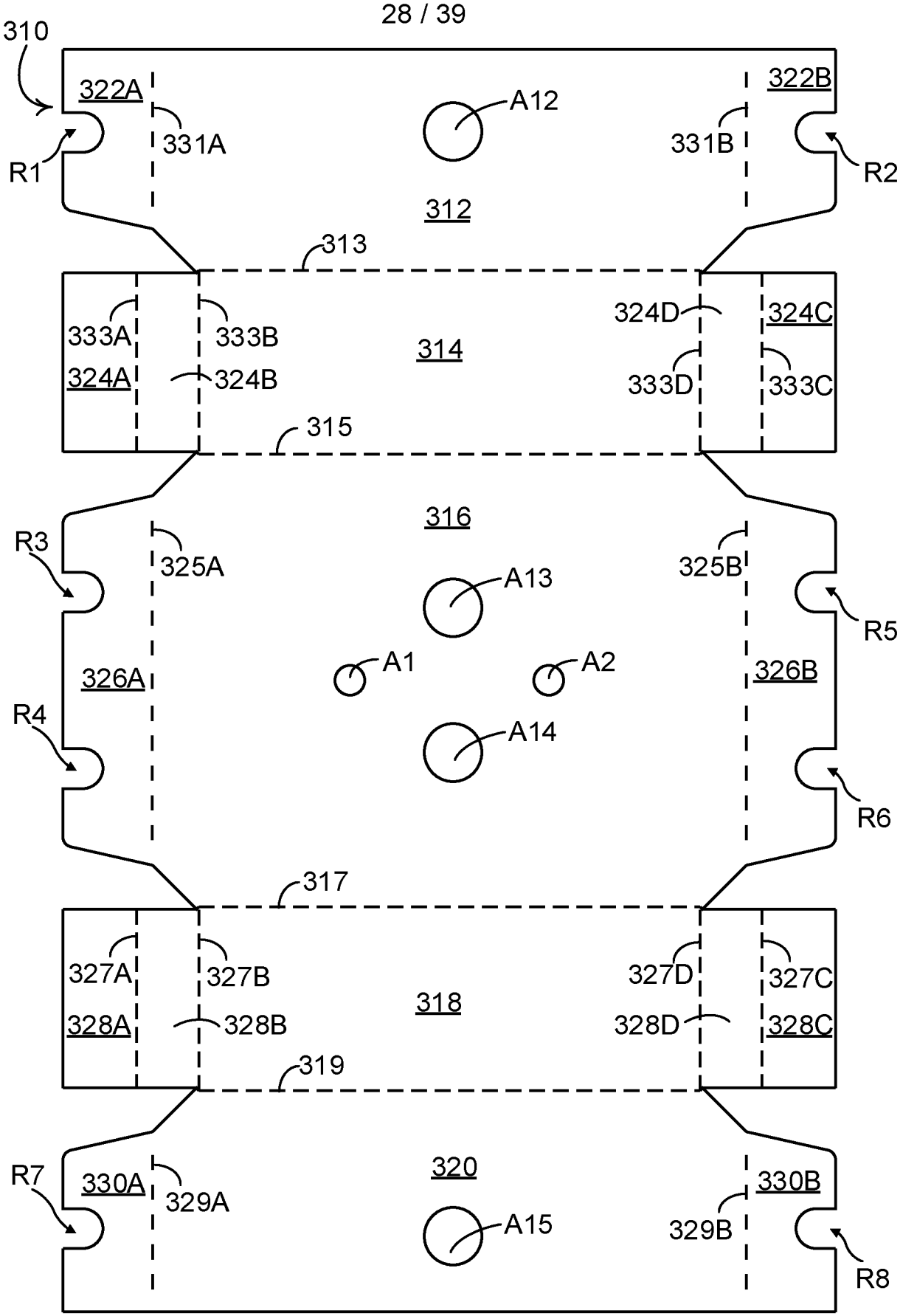
310
322A
331A
A12
322B
331B
R1
R2
312
313
333A
333B
324A
324B
314
324D
324C
333D
333C
315
316
R3
325A
A13
325B
R5
A1
A2
326A
326B
R4
A14
R6
317
327A
327B
328A
328B
318
327D
327C
328D
328C
319
R7
330A
329A
320
A15
330B
329B
R8

FIG. 28

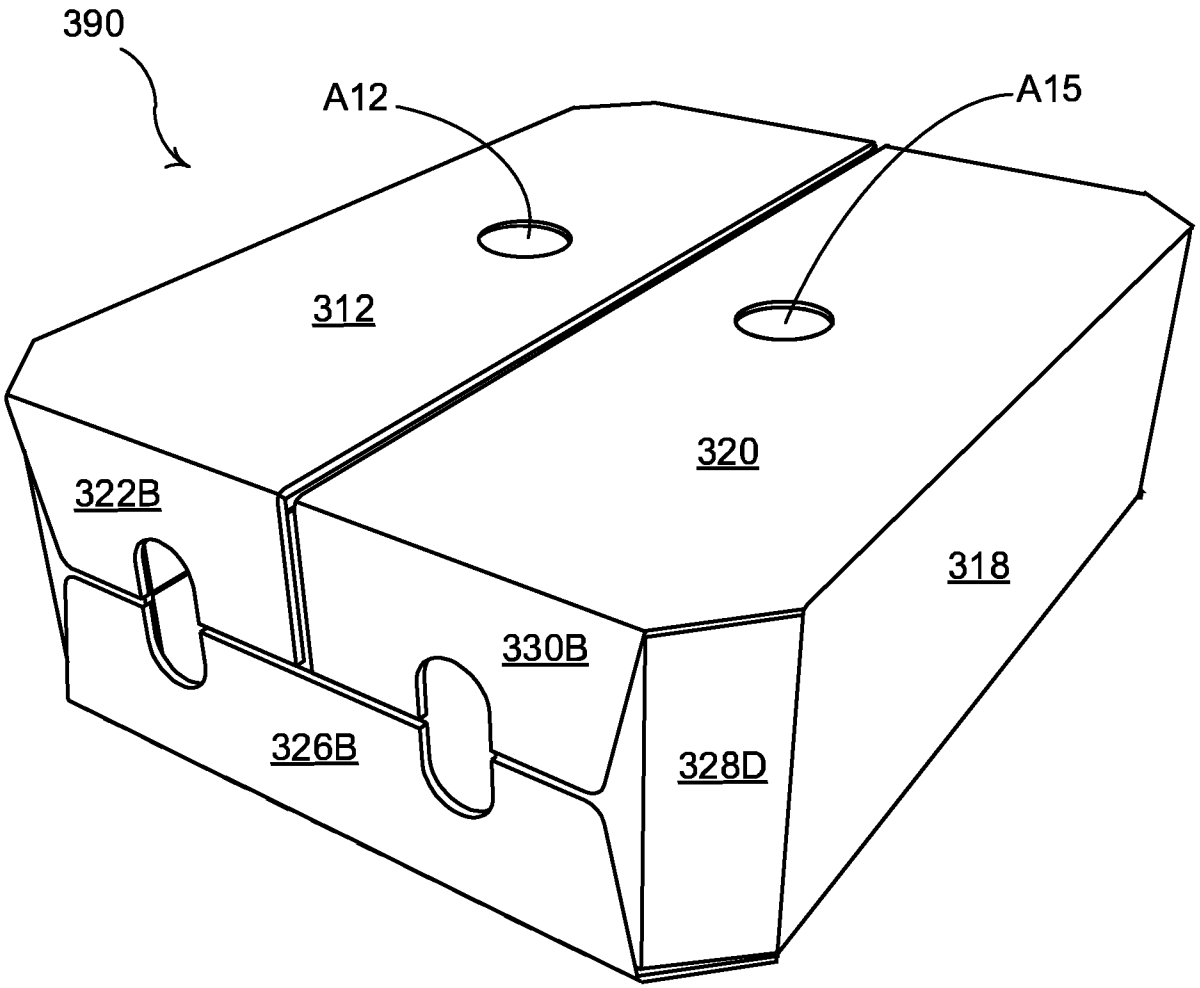

FIG. 29

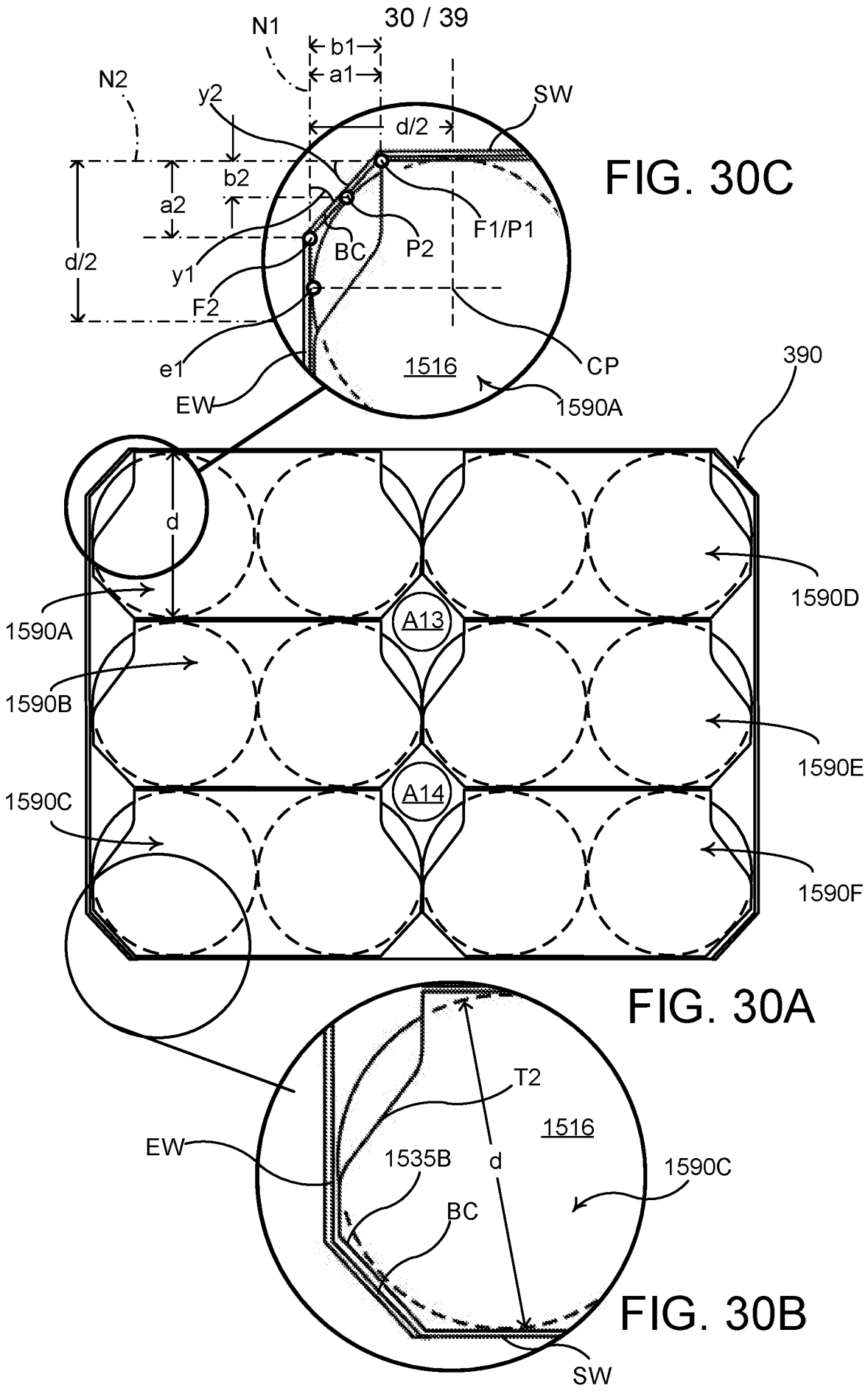

FIG. 30C

FIG. 30A

FIG. 30B

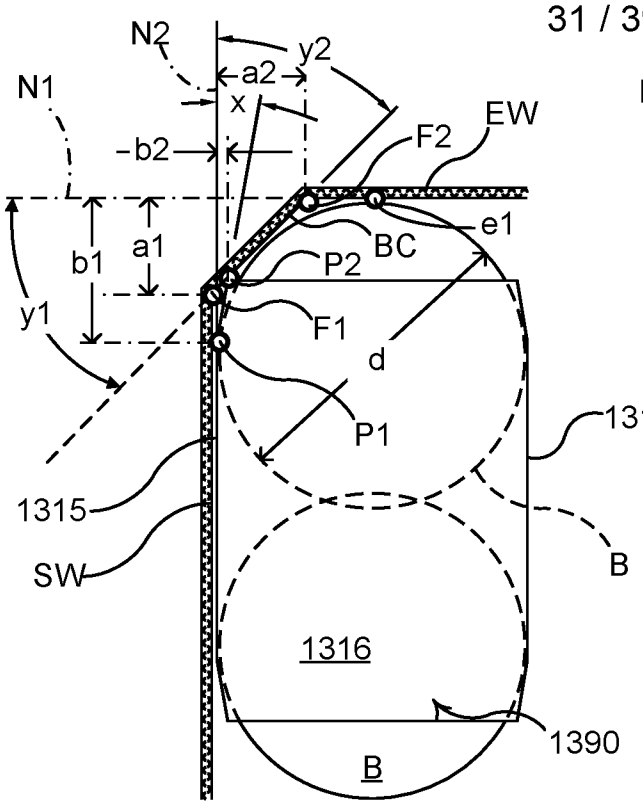

FIG. 31A

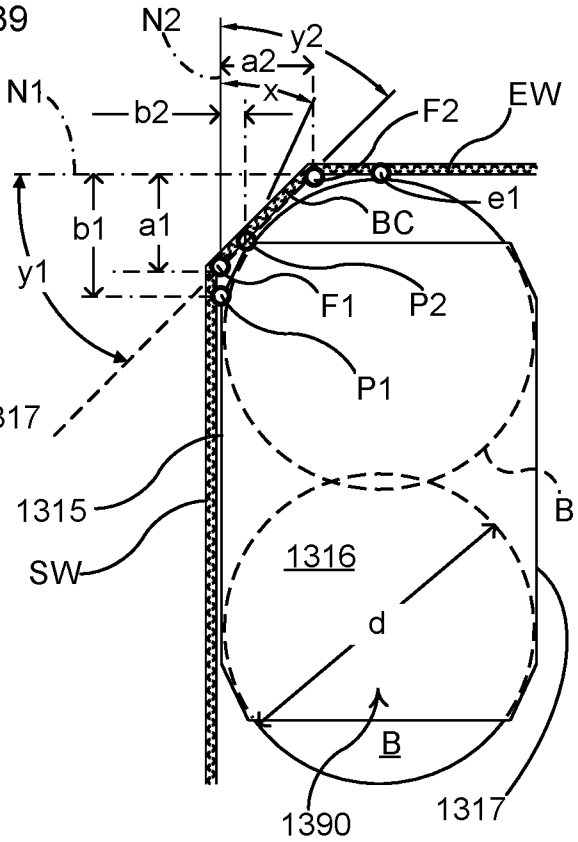

FIG. 31B

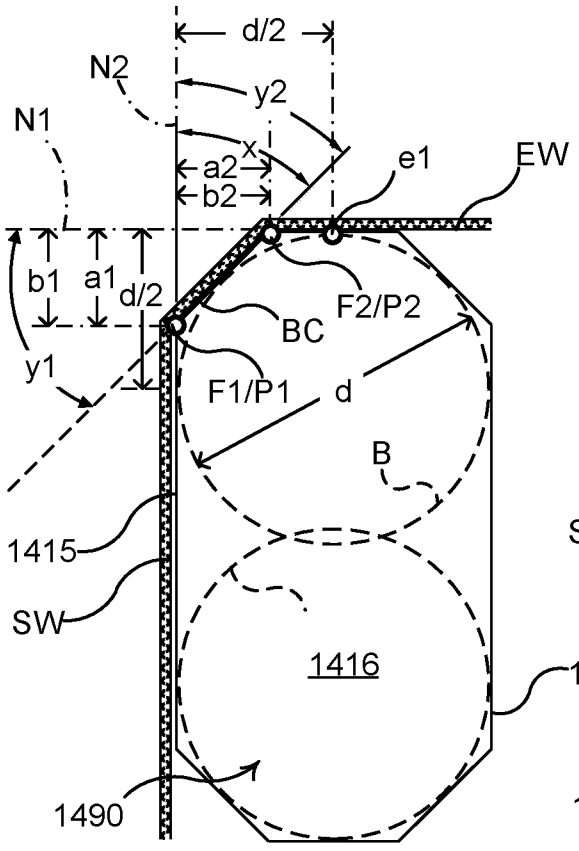

FIG. 31C

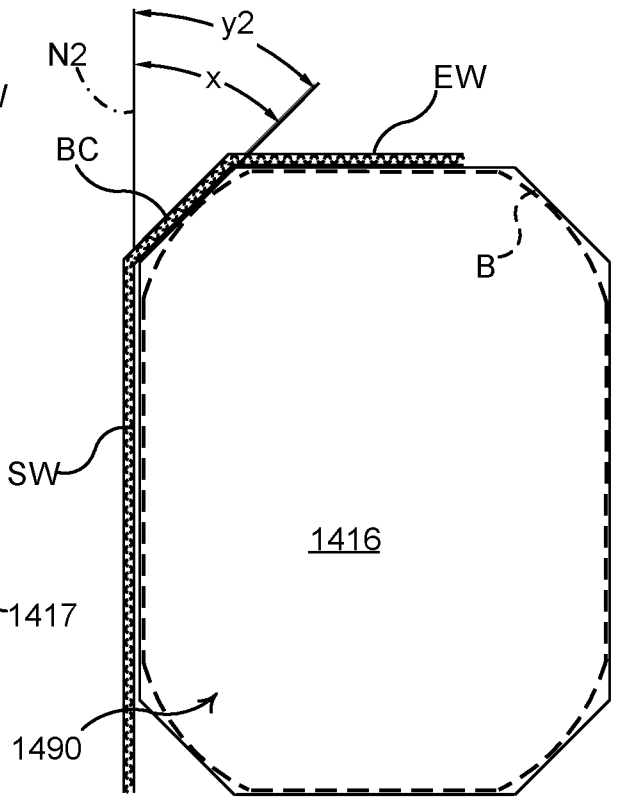

FIG. 31D

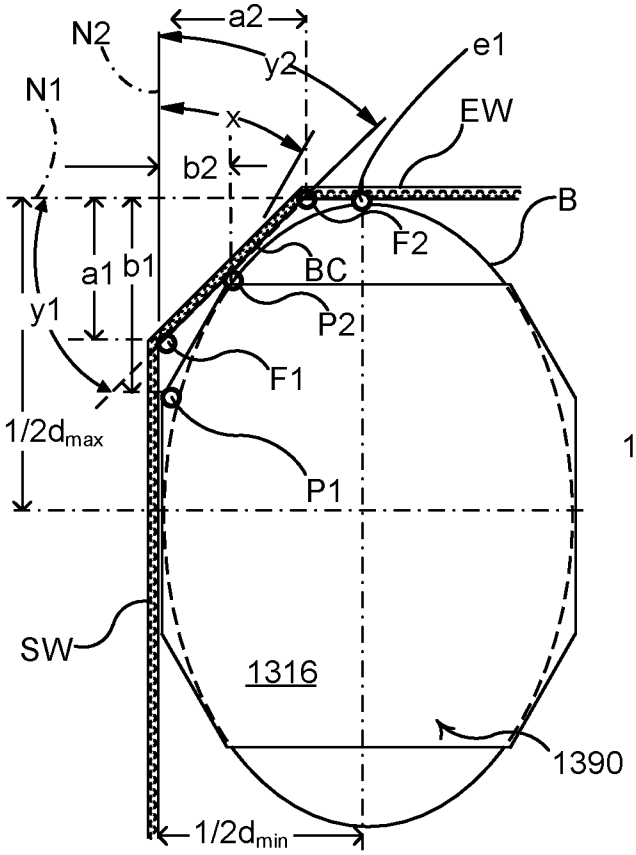

FIG. 32A

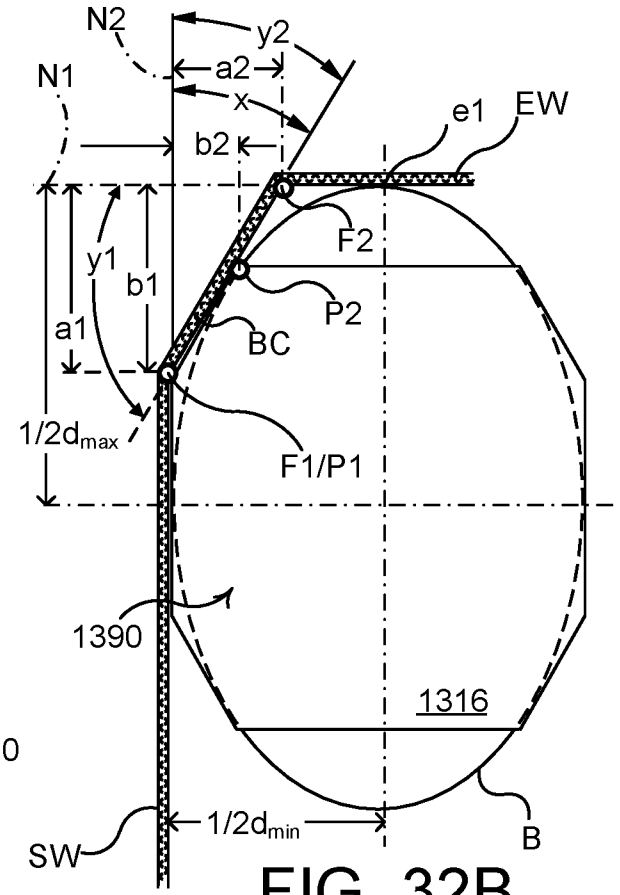

FIG. 32B

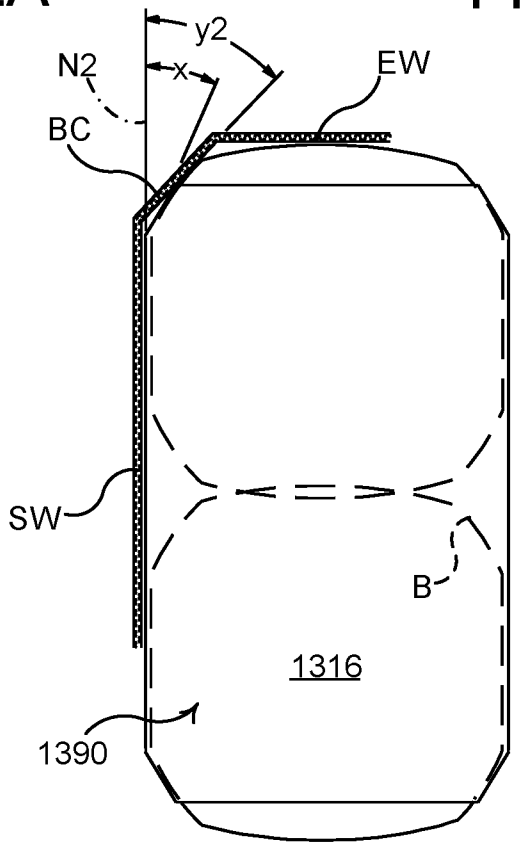

FIG. 32C

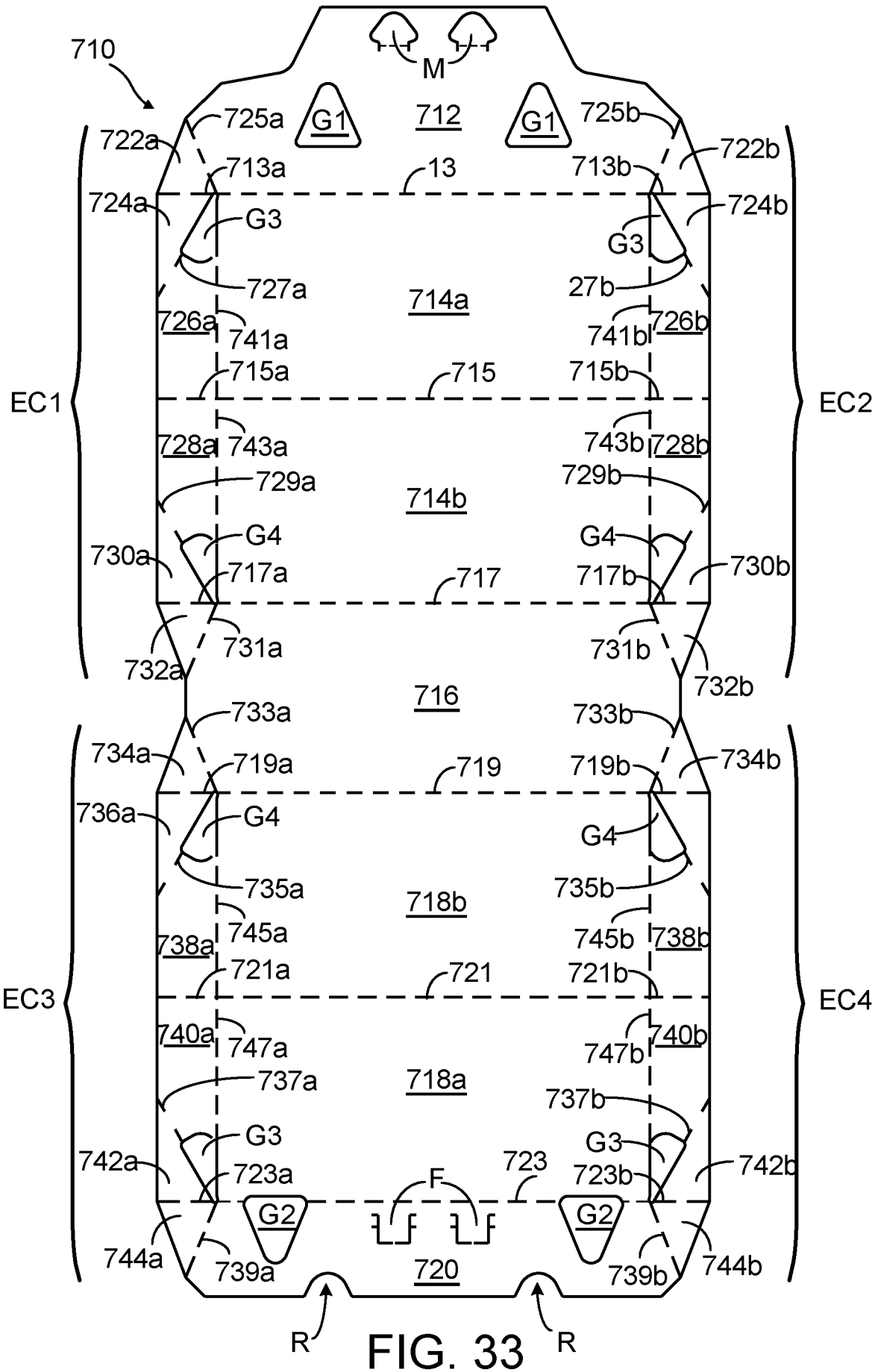
710
M
725a
G1
712
G1
725b
722a
722b
713a
13
713b
724a
724b
G3
G3
727a
27b
714a
726a
741a
741b
726b
715a
715
715b
EC1
EC2
728a
743a
743b
728b
729a
729b
714b
G4
G4
730a
717a
717
717b
730b
731a
731b
732a
732b
716
733a
733b
734a
719a
719
719b
734b
736a
G4
G4
735a
735b
718b
745a
745b
738a
738b
721a
721
721b
EC3
EC4
740a
747a
747b
740b
737a
718a
737b
G3
G3
742a
723a
F
723
723b
742b
G2
G2
744a
739a
720
739b
744b
R
R

FIG. 33

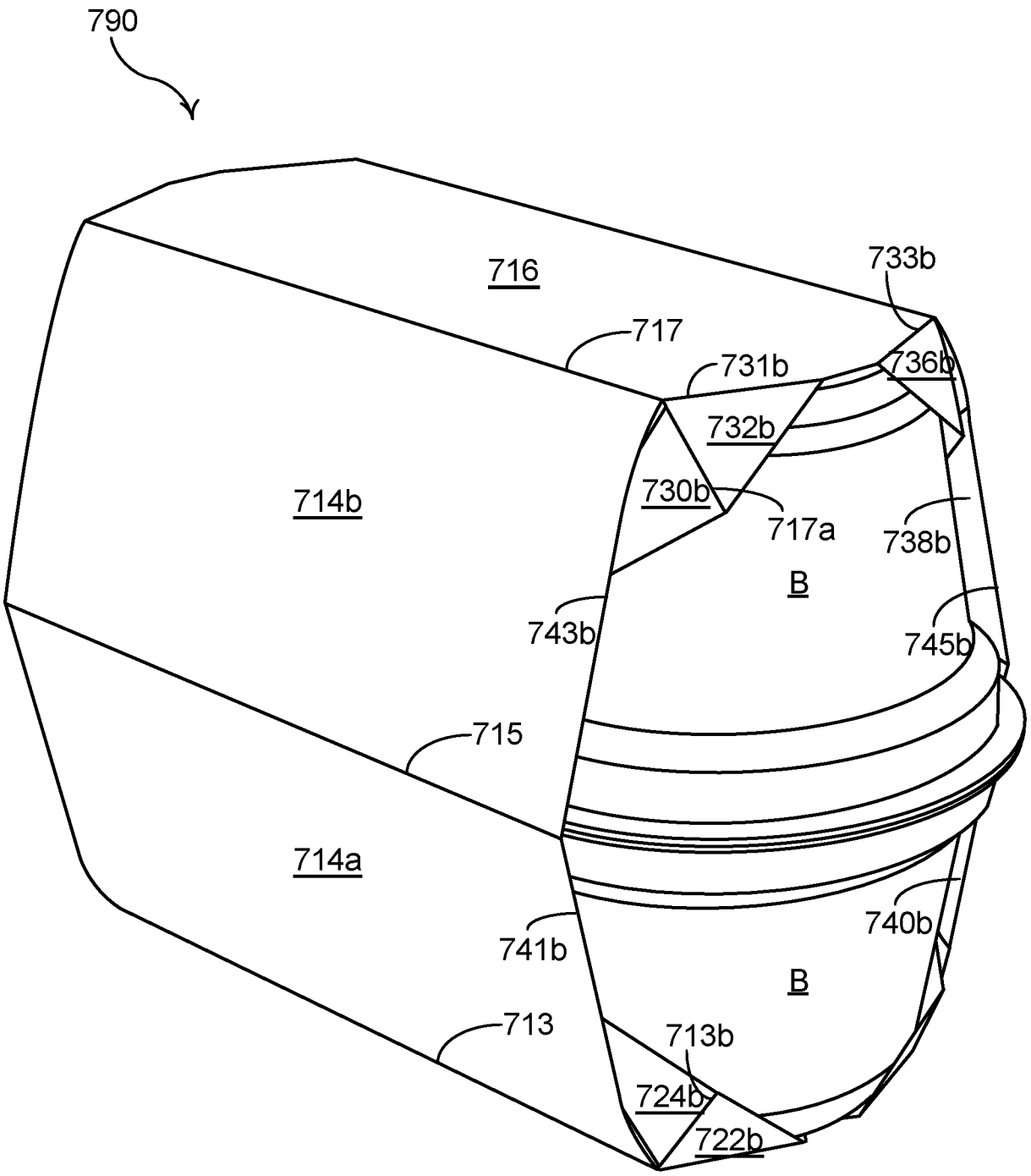
790
716
733b
717
731b
736b
732b
714b
730b
717a
738b
B
743b
745b
715
714a
740b
741b
B
713
713b
724b
722b

FIG. 34

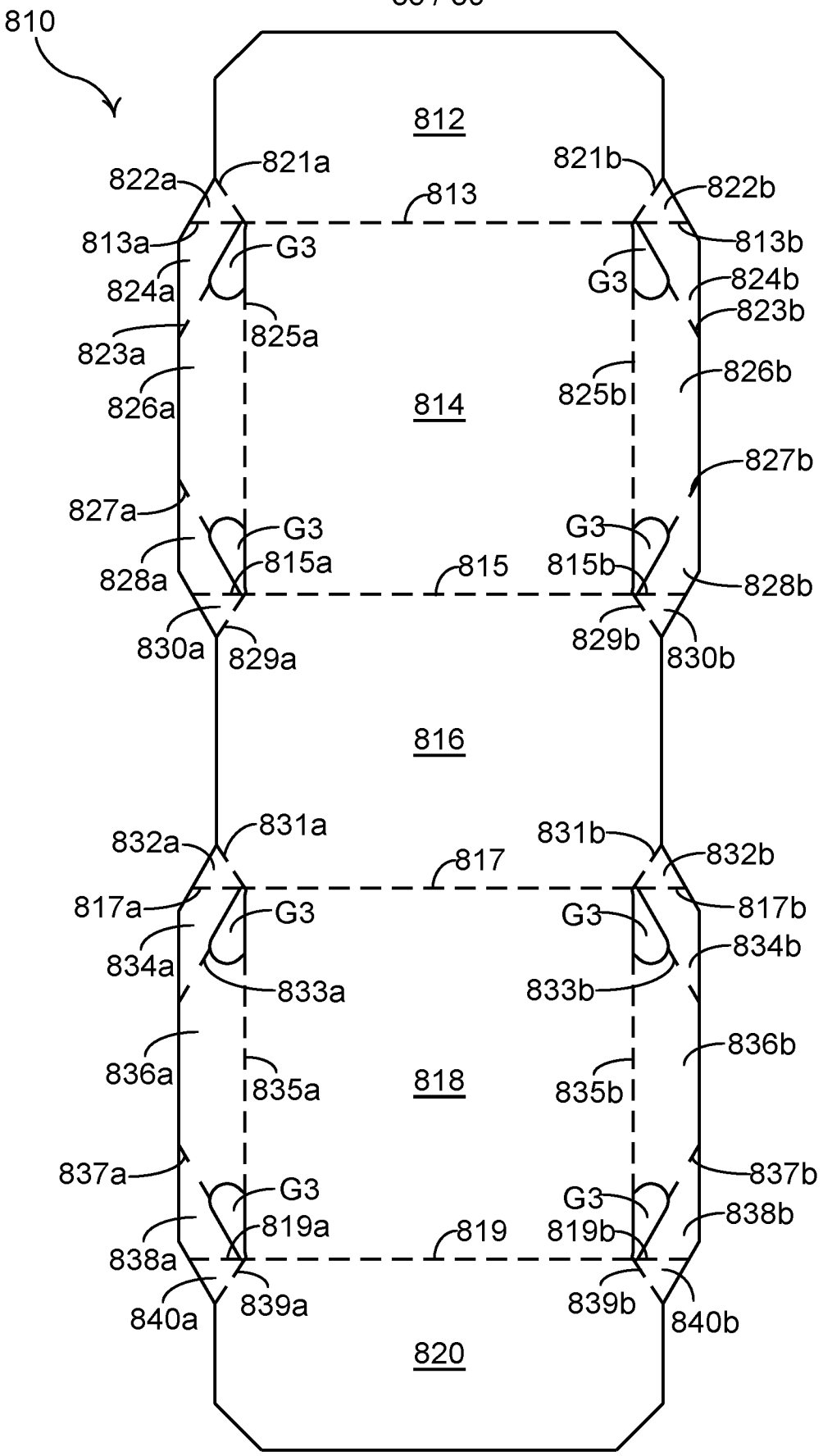
810
812
821a
822a
821b
822b
813
813a
813b
G3
824a
824b
823b
825a
823a
826b
825b
826a
814
827b
827a
G3
G3
828a
815a
815
815b
828b
830a
829a
829b
830b
816
831a
832a
831b
832b
817
817a
817b
G3
G3
834a
834b
833a
833b
836b
836a
835a
818
835b
837a
837b
G3
G3
819a
838b
819
819b
838a
839a
839b
840a
840b
820

FIG. 35

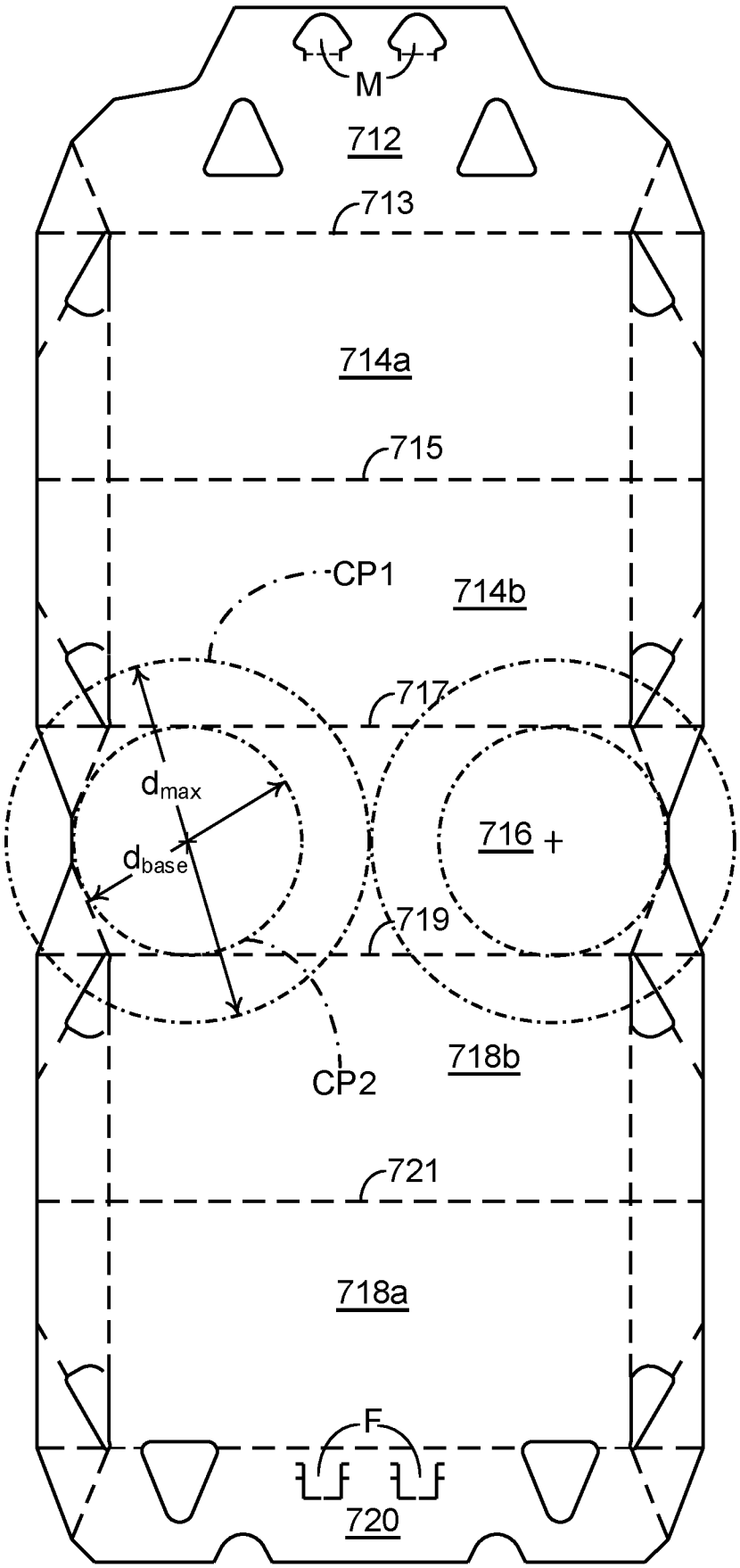
M
712
713
714a
715
CP1
714b
717
d_{max}
d_{base}
716
719
718b
CP2
721
718a
F
720

FIG. 36

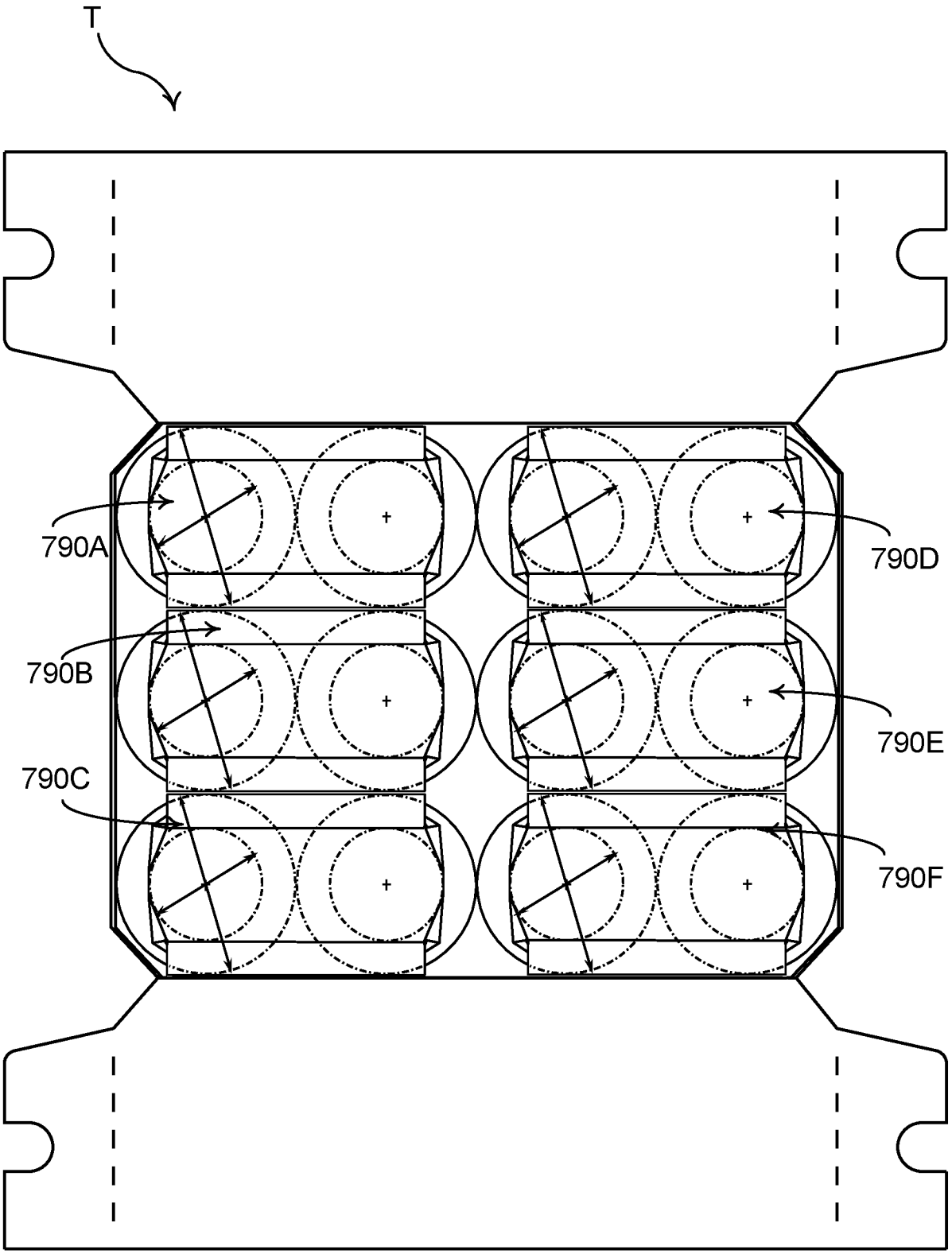

FIG. 37

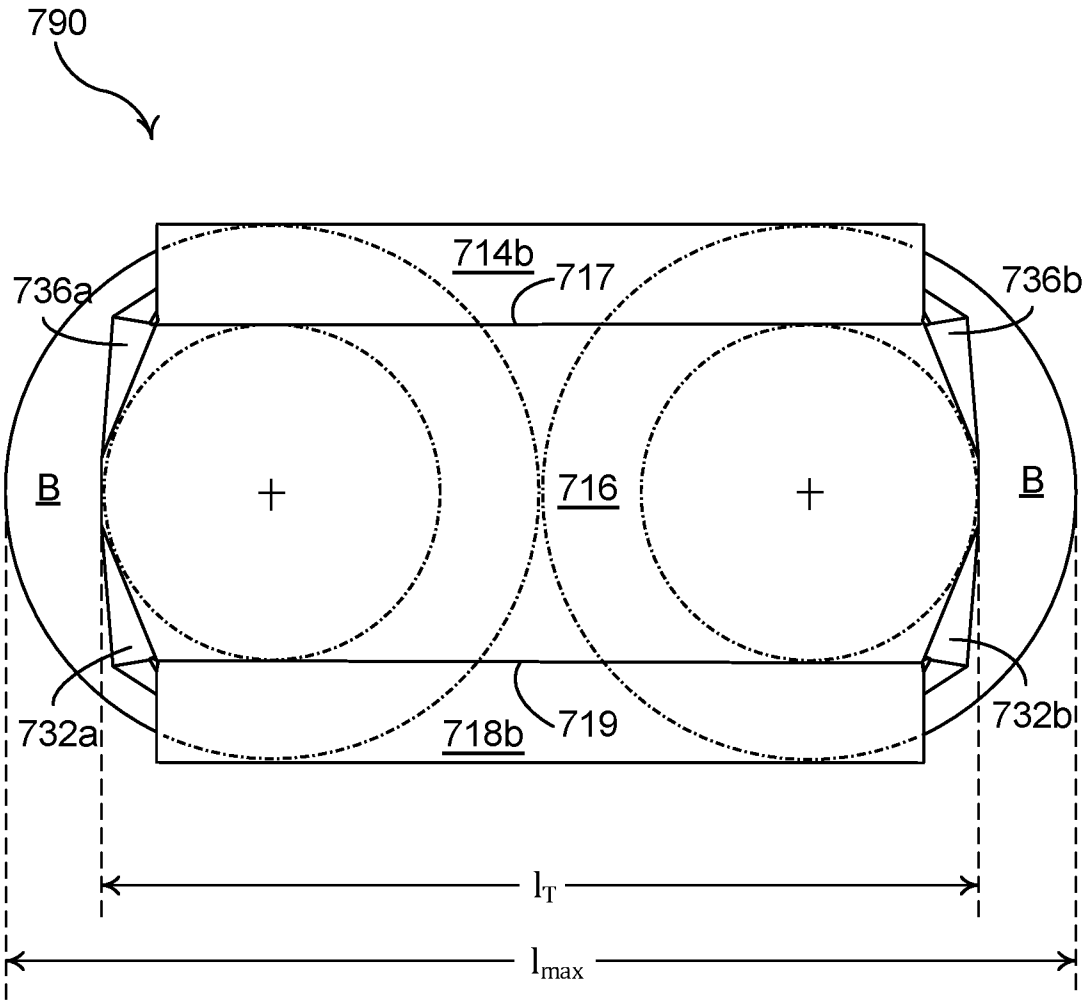

FIG. 38

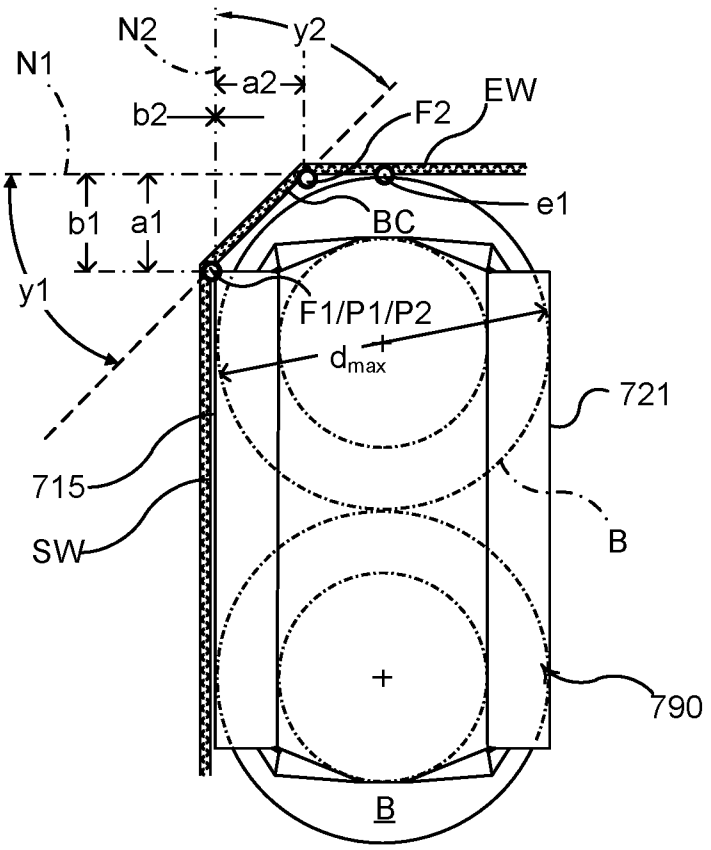

FIG. 39

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2019/013161

A. CLASSIFICATION OF SUBJECT MATTER
INV. B65D71/14 B65D71/36
ADD.

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
B65D

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

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	FR 2 082 413 A6 (MEAD EMBALLAGE SA) 10 December 1971 (1971-12-10) figures 19, 21 -----	19-22
A	Reynolds Matt: "Devils Backbone keeps it local, familiar", PMMI Media Group Packaging world - Packaging for craft brewing, March 2017 (2017-03), pages 12-16, XP002790637, Chicago, IL Retrieved from the Internet: URL:https://www.multi-conveyor.com/Portals/0/documents/literature/PW-Craft-Brew-2017-COMPRESSED.pdf [retrieved on 2019-04-15] page 13 - page 14 ----- -/--	1,23,24

[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
16 April 2019	10/05/2019

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	Bridault, Alain

3

Form PCT/ISA/210 (second sheet) (April 2005)

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	Anonymous: "CES25 beverage system", PMMI Media Group Packaging world - Packaging for craft brewing, March 2017 (2017-03), page 29, XP002790638, Chicago, IL. Retrieved from the Internet: URL:https://www.multi-conveyor.com/Portals/0/documents/literature/PW-Craft-Brew-2017-COMPRESSED.pdf [retrieved on 2019-04-15]	1,23,24
A	GB 1 558 306 A (MEAD CORP) 19 December 1979 (1979-12-19) figure 3	25
A	US 2013/112581 A1 (DOMINSKI DANIEL [US] ET AL) 9 May 2013 (2013-05-09) paragraph [0009]; figures 2a-2c	26
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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/US2019/013161

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