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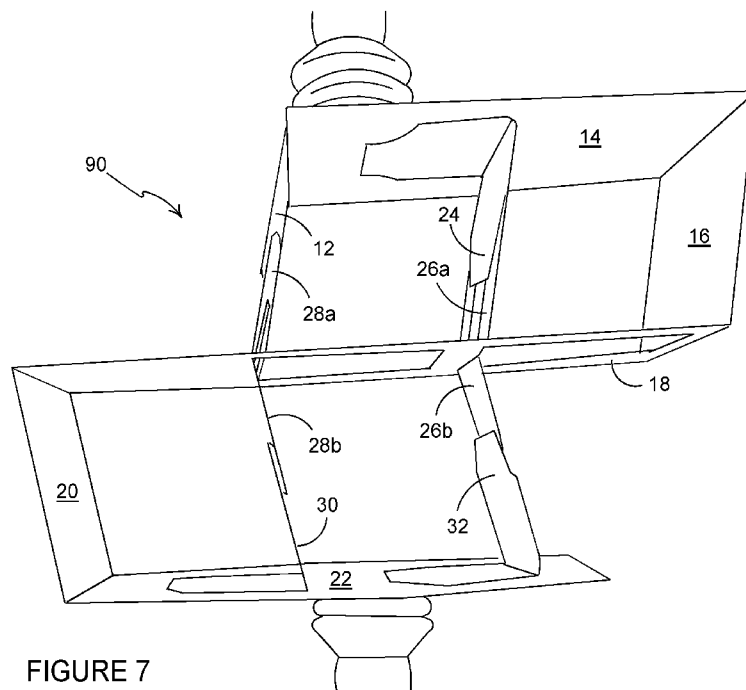


FIGURE 7

(57) Abstract: An insert for a carton includes a first side panel hinged to an intermediate panel by a first end panel and a second side panel hinged to the intermediate panel by a second end panel. The first side panel includes at least one first tab hinged thereto. The intermediate panel includes at least one second major tab and at least one second minor tab. The at least one second major tab and at least one second minor tab are hinged to the intermediate panel. The second side panel includes at least one third tab hinged thereto. The at least one first tab is secured to one of the at least one second major tab or the at least one second minor tab.

CARTON AND CARTON BLANK

TECHNICAL FIELD

The present invention relates to a carton and to a blank for forming the carton more specifically, but not exclusively, to a carton insert for separating a plurality of articles from one another.

BACKGROUND

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

It is desirable to provide an insert which can be placed inside a carton so as to separate one article from another in order to prevent, or at least reduce, the likelihood of articles making direct contact with each other. It is desirable that the insert can be readily assembled.

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

SUMMARY

According to a first aspect of the present invention there is provided an insert for a carton, comprising a first side panel hinged to an intermediate panel by a first end panel and a second side panel hinged to the intermediate panel by a second end panel, the first side panel comprising at least one first tab hinged thereto, the intermediate panel comprising at least one second major tab and at least one second minor tab, the at least one second major tab and at least one second minor tab being hinged to the intermediate panel, the second side panel comprising at least one third tab hinged thereto, wherein the at least one first tab is secured to one of the at least one second major tab and the at least one second minor tab, and wherein the at least one third tab is secured to the other one of the at least one second major tab and the at least one second minor tab wherein the at least one first tab and the one of the at least one second major tab and the at least one second minor tab form at least one first divider between the first side panel and the intermediate panel, and the at least one third tab and the other one of the at least one second major tab and the at least

one second minor tab form at least one second divider between the second side panel and the intermediate panel.

5 Optionally, the insert is foldable into a flat collapsed structure, and wherein the first and second dividers are automatically deployed when the flat collapsed structure is erected.

Optionally, the at least one second minor tab is struck from the at least one second major tab.

10 Optionally, the at least one second major tab is hinged to the intermediate panel by a first hinged connection.

Optionally, the at least one second minor tab is hinged to the intermediate panel by a second hinged connection.

15 Optionally, the second hinged connection is collinear with the first hinged connection.

20 In some embodiments, the at least one second major tab is folded out of the plane of a first side of the intermediate panel and the at least one second minor tab is folded out of the plane of a second side of the intermediate panel.

In some embodiments, the second side opposes the first side, such that the at least one second major tab and the at least one second minor tab extend in opposing directions from the intermediate panel.

25 In some embodiments, the first end panel is disposed on a first side of the intermediate panel and the second end panel is disposed on a second side of the intermediate panel, the second side opposing the first side.

30 Optionally, the at least one second major tab comprises two or more second major tabs, and wherein a first one of the two or more second major tabs is spaced apart from a second one of the two or more second major tabs.

35 Optionally, the at least one first tab comprises two or more first tabs, and wherein a first one of the two or more first tabs is spaced apart from a second one of the two or more first tabs.

Optionally, the at least one third tab comprises two or more third tabs and wherein a first one of the two or more third tabs is spaced apart from a second one of the two or more third tabs.

5 Optionally, the insert comprises an aperture struck at least in part from the intermediate panel for providing access to a surface of one of the first and second end panels.

Optionally, the aperture is configured and arranged to accommodate a machine tool such that a machine tool can pass through the aperture to engage the surface of said one of the first and second panels.

10 Optionally, the first tab is defined in part by at least one cutaway and wherein the first tab is struck from the first side panel.

Optionally, the insert further comprises a second aperture defined in part in the first side panel and in part in the first end panel, the second aperture comprising a first edge and a second opposing edge, the second edge being configured to be in registry with the first edge so as to form a reference edge when the first side panel is folded into face contacting
15 relationship with the first end panel.

Optionally, the at least one second major tab is defined in part by a first elongate aperture and a second elongate aperture, the first and second apertures arranged to be divergent with respect to each other, the first and second apertures arranged so as to diverge towards a first end of the intermediate panel.

20 Optionally, the insert comprises a pair of second major tabs struck from the intermediate panel and a second minor tab struck from each of the second major tabs, wherein first side edges of each of the pair of second major tabs are defined by a first and second cutaway respectively; the first cutaway being divergently arranged with respect to the second cutaway, the first and second cutaways arranged so as to diverge towards a first edge of the
25 insert.

Optionally, second side edges of each of the pairs of second major tabs are defined by third and fourth cutaways respectively; the third and fourth cutaways being divergently arranged with respect to each other; the third and fourth cutaways arranged so as to diverge towards a second edge of the insert, the second edge opposing the first edge.

Optionally, the first tab comprises a minor tab struck therefrom and integrally formed with the first side panel, the minor tab providing at least a portion of an engagement region for being engaged by a machine tool.

According to a second aspect of the present invention there is provided a blank for forming an insert for a carton, the blank comprising a first side panel hinged to an intermediate panel by a first end panel and a second side panel hinged to the intermediate panel by a second end panel, the first side panel comprising at least one first tab hinged thereto, the intermediate panel comprising at least one second major tab and at least one second minor tab, the at least one second major tab and at least one second minor tab being hinged to the intermediate panel, the second side panel comprising at least one third tab hinged thereto, wherein the at least one first tab is secured to one of the at least one second major tab and the at least one second minor tab, and wherein the at least one third tab is secured to the other one of the at least one second major tab and the at least one second minor tab, wherein in a setup condition the at least one first tab and the one of the at least one second major tab and the at least one second minor tab form at least one first divider between the first side panel and the intermediate panel, and the at least one third tab and the other one of the at least one second major tab and the at least one second minor tab form at least one second divider between the second side panel and the intermediate panel.

According to a third aspect of the present invention there is provided an insert for a carton, comprising a first side panel hinged to an intermediate panel by a first end panel and a second side panel hinged to the intermediate panel by a second end panel, the first side panel comprising a first tab hinged thereto, the intermediate panel comprising a second major tab and a third major tab; the second major tab and third major tab being hinged to the intermediate panel, the second side panel comprising a fourth tab hinged thereto, wherein the first tab is secured to the second major tab and the third major tab is secured to the fourth tab, the first tab and the second major tab form a first divider between the first side panel and the intermediate panel, and the fourth tab and the third major tab form a second divider between the second side panel and the intermediate panel, the second major tab being defined in part by a first cutaway, and the third major tab being defined in part by a second cutaway, wherein the first cutaway and the second cutaway each define first edges of a first opening and a second opening respectively, the first and second edges being divergently arranged with respect to each other.

According to a fourth aspect of the present invention there is provided a blank for forming an
5 insert for a carton, the blank comprising a first side panel hinged to an intermediate panel by

a first end panel and a second side panel hinged to the intermediate panel by a second end panel, the first side panel comprising a first tab hinged thereto, the intermediate panel comprising a second major tab and a third major tab; the second major tab and third major tab being hinged to the intermediate panel, the second side panel comprising a fourth tab hinged thereto, wherein the first tab is configured to be secured to the second major tab and the third major tab is configured to be secured to the fourth tab, and wherein in a setup condition the first tab and the second major tab form a first divider between the first side panel and the intermediate panel, and the fourth tab and the third major tab form a second divider between the second side panel and the intermediate panel, the second major tab being defined in part by a first cutaway, and the third major tab being defined in part by a second cutaway, wherein the first cutaway and the second cutaway each define first edges of a first opening and a second opening respectively, the first and second edges being divergently arranged with respect to each other.

Within the scope of this application it is intended that the various aspects, embodiments, examples, features and alternatives set out in the preceding paragraphs, in the claims and/or in the following description and drawings may be taken independently or in any combination thereof. For example, features described in connection with one embodiment are applicable to all embodiments unless there is incompatibility of features.

BRIEF DESCRIPTION OF THE DRAWINGS

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

Figure 1 is a plan view from above of a blank for forming an insert according to a first embodiment;

Figures 2 to 5 are plan views from above of stages of assembly of the blank of Figure 1 into a flat collapsed insert structure;

Figures 6 and 7 are perspective views from above of erection of the flat collapsed insert structure of Figure 5 into an insert for a carton;

Figure 8 is a perspective view from above of a pair of the flat collapsed insert structures of Figure 5 in a first exemplary arrangement;

Figure 9 is a perspective view from above of a pair of the flat collapsed insert structures of Figure 5 in a second exemplary arrangement;

Figure 10 is a plan view from above of a blank for forming an insert according to a second embodiment;

Figure 11 is a plan view from above of a blank for forming an insert according to a third embodiment;

Figures 12 to 15 are plan views from above of stages of assembly of the blank of Figure 11 into a flat collapsed insert structure;

5 Figures 16 to 18 are perspective views from above of stages of erection of the flat collapsed insert structure;

Figure 19 is a side view of a flat collapsed insert structure showing tool engagement positions for handling the blank;

10 Figures 20 and 21 are schematic illustrations of tools of a packaging machine engaging with the flat collapsed insert structure; and

Figure 22 is a plan view from above of a blank for forming an insert according to a fourth embodiment.

DETAILED DESCRIPTION OF EMBODIMENTS

15 Detailed descriptions of specific embodiments of an insert, a blank and arrangements of inserts are disclosed herein. It will be understood that the disclosed embodiments are merely examples of the way in which certain aspects of the invention can be implemented and do not represent an exhaustive list of all of the ways the invention may be embodied. As used herein, the word “exemplary” is used expansively to refer to embodiments that serve as
20 illustrations, specimens, models, or patterns. Indeed, it will be understood that the insert, the blank and the arrangements of inserts 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
25 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.

30 Figure 1 shows a plan view of a blank 10 capable of forming an insert 90, as shown in Figure 7, for primary products such as, but not limited to, bottles, hereinafter referred to as articles.

In the embodiments detailed herein, the terms “carton” and “carrier” refer, for the non-limiting purpose of illustrating the various features of the invention, to a container for engaging,
35 carrying, and/or dispensing articles, such as product containers. It is contemplated that the teachings of the invention can be applied to various product containers, which may or may not be tapered and/or cylindrical. Exemplary containers include bottles (for example metallic,

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

5 The blank is formed from a sheet of suitable substrate. It is to be understood that, as used herein, the term "suitable substrate" includes all manner of foldable sheet material such as paperboard, corrugated board, cardboard, plastic, combinations thereof, and the like. It should be recognised that one or other numbers of blanks may be employed where suitable, for example, to provide the insert structure described in more detail below.

10 In the exemplary embodiment, the blank is configured to form an insert for a carton or carrier for packaging an exemplary arrangement of exemplary articles. In one of the illustrated exemplary embodiments, the arrangement is a 2 x 3 matrix or array of six articles. In another of the illustrated exemplary embodiments, the arrangement is a 3 x 4 matrix or array of twelve articles; in yet another of the illustrated exemplary embodiments, the arrangement is
15 a 2 x 6 matrix or array of twelve articles. The blank can be alternatively configured to form an insert for packaging other types, number and size of article and/or for packaging articles in a different arrangement or configuration.

The blank 10 comprises a plurality of main panels 12, 14, 16, 18, 20, 22 hinged one to the
20 next in a linear series. The blank 10 comprises a glue tab or glue panel 12 hinged to a first side panel 14 by a hinged connection such as a fold line 13. The first side panel 14 is hinged to a first end panel 16 by a hinged connection such as a fold line 15. The first end panel 16 is hinged to an intermediate panel 18 by a hinged connection such as a fold line 17. The intermediate panel 18 is hinged to a second end panel 20 by a hinged connection such as a
25 fold line 19. The second end panel 20 is hinged to a second side panel 22 by a hinged connection such as a fold line 21. The intermediate panel 18 forms a spine of the insert 90 shown in Figure 7.

The plurality of main panels 12, 14, 16, 18, 20, 22 of the blank 10 form the insert 90 having a
30 plurality of voids or chambers each for receiving an article.

The blank 10 comprises a plurality of tabs 24, 26a, 26b, 28a, 28b, 30, 32.

A first flap or tab 24 is struck from the first side panel 14. The first tab 24 is hingedly
35 connected to the first side panel 14 by a hinged connection such as a fold line 25b. The first tab 24 is defined in part by a severance line such as a cut line 25a and in part by the fold line 25b.

A second flap or tab 26a is struck from the intermediate panel 18. The second tab 26a is hingedly connected to the intermediate panel 18 by a hinged connection such as a fold line 27b. The second tab 26a is defined in part by a pair of severance lines such as cut lines 27a, 27D, an aperture A1 and in part by the fold line 27b. The aperture A1 is struck from the intermediate panel 18 and interrupts the fold line 17. The aperture A1 separates the second tab 26a from the first end panel 16 and facilitates assembly of the insert 90.

A first minor flap or tab 26b is struck from the second tab 26a; the first minor tab 26b is defined in part by a severance line such as a cut line 27c and in part by the fold line 27b.

A third flap or tab 28a is struck from the intermediate panel 18. The third tab 28a is hingedly connected to the intermediate panel 18 by a hinged connection such as a fold line 29b. The third tab 28a is defined in part by a severance line such as a cut line 29a and in part by the fold line 29b.

A second minor flap or tab 28b is struck from the third tab 28a; the second minor tab 28b is defined in part by a severance line such as a cut line 29c and in part by the fold line 29b.

A fourth flap or tab 30 is struck from the second side panel 22. The fourth tab 30 is hingedly connected to the second side panel 22 by a hinged connection such as a fold line 31b. The fourth tab 30 is defined in part by a severance line such as a cut line 31a and in part by the fold line 31b.

A fifth flap or tab 32 is struck from the second side panel 22. The fifth tab 32 is hingedly connected to the second side panel 22 by a hinged connection such as a fold line 33b. The fifth tab 32 is defined in part by a severance line such as a cut line 33a and in part by the fold line 33b.

The first tab 24 is spaced apart from the glue panel 12. In the set up insert 90 this provides that a portion of the blank 10 extends continuously from a lower edge to an upper edge.

Turning to the construction of the insert 90 as illustrated in Figures 2 to 7, the insert 90 can be formed by a series of sequential folding operations. The folding process is not limited to that described below and may be altered according to particular manufacturing requirements.

Glue G or other adhesive treatment is applied to the first minor tab 26b or, in alternative embodiments, to a corresponding portion of the fifth tab 32, as shown in Figure 2.

5 Glue G or other adhesive treatment is applied to the second minor tab 28b or, in alternative embodiments, to a corresponding portion of the fourth tab 30, as shown in Figure 2.

10 The blank 10 is folded about fold line 19, as indicated by direction arrow D1 in Figure 2, such that the second side panel 22 and the second end panel 20 are folded thereabouts. The second side panel 22 is brought into face contacting relationship with the intermediate panel 18; the second end panel 20 is brought into face contacting relationship with the intermediate panel 18, as shown in Figure 3.

15 The first minor tab 26b is secured to the fifth tab 32 and the second minor tab 28b is secured to the fourth tab 30.

The blank 10 is then turned over as shown in Figure 4 so as to be processed from the reverse side.

20 Glue G or other adhesive treatment is applied to the second tab 26a or, in alternative embodiments, to a corresponding portion of the first tab 24, as shown in Figure 4.

Glue G or other adhesive treatment is applied to the third tab 28a or, in alternative embodiments, to a corresponding portion of the glue panel 12, as shown in Figure 4.

25 The blank 10 is folded about fold line 15, as indicated by direction arrow D2 in Figure 4, such that the first side panel 14 and the glue panel 12 are folded thereabouts. The first side panel 14 is brought into face contacting relationship with the first end panel 16 and the second side panel 22. The glue panel 12 is brought into face contacting relationship with the second side panel 22, as shown in Figure 5.

30 The first tab 24 is secured to the second tab 26a and the glue panel 12 is secured to the third tab 28a.

35 In this way a flat collapsed insert structure 11 is formed as shown in Figure 5. The insert 90 may be shipped or distributed in this flat collapsed form.

The flat collapsed insert structure 11 may be erected into a tubular structure by separating the first side panel 14 from the second side panel 22, as shown in Figures 6 and 7. The first side panel 14 is engaged by a first tool C1 and the second side panel 22 is engaged by a second tool C2. Preferably, the first and second tools C1, C2 are suction devices which each
5 comprise a cup, the lips of each cup being brought into contact with a respective portion of the first side panel 14 or the second side panel 22. The first tool C1 is then moved in first direction D3. The second tool C2 is moved in a second direction D4. The second direction D4 substantially opposes the first direction D3. The glue panel 12, the first tab 24, the second tab 26a, and the third tab 28a form dividers between the first side panel 14 and the
10 intermediate panel 18. The fourth tab 30, the fifth tab 32, the first minor tab 26b and the second minor tab 28b form dividers between the second side panel 22 and the intermediate panel 18.

The insert 90, shown in Figure 7, comprises four chambers arranged in two rows. A first
15 chamber is defined in part by the glue panel 12, the third tab 28a, a portion of the first side panel 14, the first tab 24, the second tab 26a and a portion of the intermediate panel 18. A second chamber is defined in part by the first tab 24, the second tab 26a, a portion of the first side panel 14, the first end panel 16 and a portion of the intermediate panel 18. A third chamber is defined in part by the first minor tab 26b, the fifth tab 32, a portion of the second
20 side panel 22, the second minor tab 28b, the fourth tab 30 and a portion of the intermediate panel 18. A fourth chamber is defined in part by the second minor tab 28b, the fourth tab 30, a portion of the second side panel 22, the second end panel 20 and a portion of the intermediate panel 18.

25 The first and third chambers share a common portion of the intermediate panel 18 and are disposed upon opposing sides thereof.

When the insert 90 is placed into a carton (not shown) a first end portion of the intermediate panel 18, the adjacently disposed glue panel 12, and the third tab 28a define in part a fifth
30 chamber along with the side and end walls of the carton.

When the insert 90 is placed into a carton (not shown) a second end portion of the intermediate panel 18, the adjacently disposed first minor tab 26b, and the fifth tab 32 and an end portion of the second side panel 22 define in part a sixth chamber along with the side
35 and end walls of the carton.

The insert 90 defines at least two walls of each of the six chambers. The insert 90 defines the entirety of the chambers; that is to say, the insert 90 defines the longitudinal and transverse dimensions of each of the six chambers.

5 In the blank 10 the first tab 24 is spaced apart from the glue panel 12. In the set up insert 90 this provides that a portion of the blank 10 extends continuously from a lower edge to an upper edge in the first chamber.

10 In the blank 10 the third tab 28a is spaced apart from the second tab 26a. In the set up insert 90 this provides that a portion of the blank 10 extends continuously from a lower edge to an upper edge in the first chamber and in the third chamber.

15 In the blank 10 the fifth tab 32 is spaced apart from the fourth tab 30. In the set up insert 90 this provides that a portion of the blank 10 extends continuously from a lower edge to an upper edge in the third chamber.

The first and second end walls 16, 20 extend continuously, in the set up insert 90, from a lower edge to an upper edge of the second and fourth chamber respectively.

20 In this way each of the first, second, third and fourth chambers comprise at least a portion of a wall which extends continuously from a lower edge to an upper edge of the insert 90. This aids in providing additional stacking strength to a carton, in which the insert 90 is placed, in embodiments where the insert 90 is dimensioned to extend between the top panel and the base panel of the carton.

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Preferably, the portion of the blank 10 disposed between the first tab 24 and the glue panel 12 is arranged to be disposed in vertical registry with the portion of the blank 10 disposed between the fifth tab 32 and the fourth tab 30. In this way, the first and second tools T1, T2 can be moved linearly apart in opposite directions thereby pulling the first and second side panels 14, 22 apart. This has the effect of ensuring the insert 90 is readily erected such that the glue panel 12, the first, second, third, fourth and fifth tabs 24, 26a, 28a, 30, 32 and the first and second minor tabs 26b, 28b are orientated perpendicularly with respect to the respective one of the first side panel 14, second side panel 22 or intermediate panel 18 to which they are hinged. Additionally the first and second end panels 16, 20 are brought into a perpendicular relationship with the first side panel 14, second side panel 22 or intermediate panel 18.

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The insert 90 can be employed to accommodate six articles arranged in a 2 x 6 matrix or array. Each article in the 2 x 6 matrix or array is separated from its adjacent neighbours by a portion of the insert 90. In this way, each of the articles is prevented from contacting the other articles. This helps to reduce the likelihood of damage to the articles as a result of collisions between articles during loading and/or transportation; it also suppresses or prevents noise from such collisions.

Figure 8 illustrates a first arrangement of two inserts 90 as shown in Figure 7; a first insert 90A is arranged end to end with a second insert 90B to form a 2 x 6 matrix or array of twelve chambers. The first and second inserts 90A, 90B are arranged to define a pair of chambers therebetween. In alternative embodiments, the first and second inserts 90A, 90B may be arranged in an overlapping relationship so as to define a 2 x 5 matrix or array of ten chambers.

Figure 9 illustrates a second arrangement of two inserts 90 as shown in Figure 7 in a carton C. A first insert 90A is arranged side by side with a second insert 90B to form a 3 x 4 matrix or array of twelve chambers. The first and second inserts 90A, 90B are arranged to define a pair of chambers therebetween. In another embodiment, the inserts 90A, 90B may be partially nested or interposed in juxtaposition to form an alternative 3 x 4 matrix or array of twelve chambers, wherein a chamber at each corner of the 3 x 4 matrix or array is defined in part by the side and end walls of the carton C in which the insert 90 is placed. In this way the inserts 90A, 90B are tessellated.

In yet other embodiments, the arrangements of Figures 8 and 9 may be combined such that four inserts 90, as shown in Figure 7, may be combined together to form a 4 x 6 matrix or array of twenty-four chambers. In yet another embodiment four inserts 90, as shown in Figure 7, may be combined together to form a 4 x 5 matrix or array of twenty chambers. It will be appreciated that in still further embodiments, multiple inserts 90 may be employed in combination to provide a plurality of chambers for accommodating a plurality of articles.

Referring now to Figure 10, there is shown an alternative embodiment of the present invention. In the second illustrated embodiment like numerals have, where possible, been used to denote like parts, albeit with the addition of the prefix "100" to indicate that these features belong to the second embodiment. The alternative embodiments share many common features with the first embodiment and therefore only the differences from the embodiment illustrated in Figures 1 to 9 will be described in any greater detail.

The blank 110 comprises a plurality of main panels 112, 114, 116, 118, 120, 122 hinged one to the next in a linear series. The blank 110 comprises a glue panel 112 hinged to a first side panel 114 by a hinged connection such as a fold line 113. The first side panel 114 is hinged to a first end panel 116 by a hinged connection such as a fold line 115. The first end panel 116 is hinged to an intermediate panel 118 by a hinged connection such as a fold line 117. The intermediate panel 118 is hinged to a second end panel 120 by a hinged connection such as a fold line 119. The second end panel 120 is hinged to a second side panel 122 by a hinged connection such as a fold line 121. The intermediate panel 118 forms a spine of an insert.

The intermediate panel 118 comprises an aperture A2 struck therefrom. The aperture A2 interrupts the fold line 119.

Referring now to Figures 11 to 21, there is shown an alternative embodiment of the present invention. In the third illustrated embodiment like numerals have, where possible, been used to denote like parts, albeit with the addition of the prefix "200" to indicate that these features belong to the third embodiment. The alternative embodiments share many common features with the previous embodiments and therefore only the differences from the embodiments illustrated in Figures 1 to 10 will be described in any greater detail.

The blank 210 comprises a plurality of main panels 212, 214, 216, 218, 220, 222 hinged one to the next in a linear series. The blank 210 comprises a glue tab or glue panel 212 hinged to a first side panel 214 by a hinged connection such as a fold line 213. Fold line 213 is interrupted by a first aperture A1. The glue panel 212 is defined in part by a first recess R1 and a second recess R2, and is arranged such that portions 214a, 214b of the first side panel 214 extend beyond fold line 213 so as to dispose along opposing sides the glue panel 212. The first side panel 214 is hinged to a first end panel 216 by a hinged connection such as a fold line 215. The first end panel 216 is hinged to an intermediate panel 218 by a hinged connection such as a fold line 217. The intermediate panel 218 is hinged to a second end panel 220 by a hinged connection such as a fold line 219. The second end panel 220 is hinged to a second side panel 222 by a hinged connection such as a fold line 221. The intermediate panel 218 forms a spine of the insert 290 shown in Figure 18.

The plurality of main panels 212, 214, 216, 218, 220, 222 of the blank 210 form an insert 290 having a plurality of voids or chambers each for receiving an article.

The blank 210 comprises a plurality of flaps 224, 226a, 226b, 228a, 228b, 230, 232.

A first flap 224 is struck from the first side panel 214. The first flap 224 is hingedly connected to the first side panel 214 by a hinged connection such as a fold line 225b. The first flap 224 is defined in part by a severance line such as a cut line 225a and in part by the fold line 225b. The first flap 224 is defined in part by a second aperture A2 struck from the first side panel 214. The fold line 225b is interrupted by a third aperture A3. A tab T1 is struck from the first flap 224 and defines a recess or cutaway in the first flap 224. The tab T1 is integral with the first side panel 214. The tab T1 provides an area of engagement for a tool of a packaging machine, for example but not limited to, the tool may be a suction cup or device, finger or guide rod.

The first end panel 216 comprises a hinged connection such as a fold line 241 extending thereacross. A fourth aperture A4 interrupts the fold line 215 between the first side panel 214 and the first end panel 216. The fourth aperture A4 comprises a first edge E1. The fourth aperture A4 comprises a second edge E2 opposing the first edge E1; the second edge is arranged to be collinear with a fold line 241 so as to effectively interrupt the fold line 241. The second edge E2 is configured such that when the blank 210 is folded about the fold line 215 the first edge E1 and second edge E2 are in vertical registry.

A second flap 226a is struck from the intermediate panel 218. The second flap 226a is hingedly connected to the intermediate panel 218 by a hinged connection such as a fold line 227b. The second flap 226a is defined in part by a sixth aperture A6, a seventh aperture A7, a severance line such as a cut line 243, a fifth aperture A5 and in part by the fold line 227b. The fifth aperture A5 is struck from the intermediate panel 218 and is offset from the fold line 217. The fifth aperture A5 interrupts the severance line 243; the severance line 243 extends between the sixth aperture A6 and the seventh aperture A7. The severance line 243 is offset from the fold line 217.

A first minor flap 226b is struck from the second flap 226a; the first minor flap 226b is defined in part by a severance line such as a cut line 227c, in part by the fold line 227b and in part by an eighth aperture A8.

A third flap 228a is struck from the intermediate panel 218. The third flap 228a is hingedly connected to the intermediate panel 218 by a hinged connection such as a fold line 229b. The third flap 228a is defined in part by a severance line such as a cut line 229a, a ninth aperture A9, a tenth aperture A10, and by the fold line 229b.

The sixth aperture A6 and the seventh aperture A7 are elongate or slot like in shape. The sixth aperture A6 and the seventh aperture A7 are arranged to be divergent with respect to each other. The sixth aperture A6 and the seventh aperture A7 diverge towards the fold line 217.

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The ninth aperture A9 and the tenth aperture A10 are elongate or slot like in shape. The ninth aperture A9 and the tenth aperture A10 are arranged to be divergent with respect to each other. The ninth aperture A9 and the tenth aperture A10 diverge towards the fold line 229b.

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The sixth aperture A6 and the ninth aperture A9 are arranged divergently with respect to each other. The sixth aperture A6 and the ninth aperture A9 diverge towards a first side edge of the blank 210.

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The seventh aperture A7 and the tenth aperture A10 are arranged divergently with respect to each other. The seventh aperture A7 and the tenth aperture A10 diverge towards a second side edge of the blank 210. The second side edge opposes the first side edge.

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The sixth aperture A6 and the ninth aperture A9 create at least a portion of a first opening 01 and second opening 02 respectively. The sixth aperture A6 defines a first edge in the intermediate panel 218 of the first opening 01. The ninth aperture A9 defines a first edge, in the intermediate panel 218, of the second opening 02. The arrangement of the sixth aperture A6 with respect to the ninth aperture A9 is such the first edge of the first opening 01 defines a first portion of a first "V" shape and the first edge of the second opening 02 defines a second portion of the first "V" shape. The seventh aperture A7 defines a second edge in the intermediate panel 218 of the first opening 01. The tenth aperture A10 defines a second edge in the intermediate panel 218 of the second opening 02. The arrangement of the seventh aperture A7 with respect to the tenth aperture A10 is such that the second edge of the first opening 01 defines a first portion of a second "V" shape and the second edge of the second opening 02 defines a second portion of the second "V" shape. The second "V" shape is inverted with respect to the first "V" shape. The arrangement of the sixth, seventh, ninth and tenth apertures A6, A7, A9, A10 strengthens the regions of the intermediate panel 218 above, below and between the first and second openings 01, 02.

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The first edge of the first opening 01 defining the first portion of a first "V" shape is arranged to define an angle Y with respect to the fold line 241, as indicated by in Figure 12 by notional (dashed) line N2. The notional line N2 is collinear with the first edge of the first opening 01.

Since fold line 241 is perpendicular to the side edge of the blank 210 the notional line N2 and the side edge of the blank 210 define an angle equal to $180^\circ - (90^\circ + Y)$. The fold line 227b and the severance line 229a are arranged to be perpendicular with the side edge of the blank 210. The first edge of the first opening 01 and the fold line 227b define an angle therebetween equal to $180^\circ - Y$. The first edge of the second opening 02 and severance line 229a define an angle therebetween equal to $180^\circ - X$.

The angles X and Y as shown in Figure 12 are substantially equal to one another. However, in alternative embodiments they may be different; the angles X and Y are greater than 0° and less than 90° . Optionally, the angles X and Y are between about 80° and about 85° .

The first edge of the second opening 02 defining the second portion of a first "V" shape is arranged to define an angle X with respect to the fold line 245, as indicated in Figure 12 by notional (dashed) line N1. The notional line N1 is collinear with the first edge of the second opening 02.

The first opening 01 is defined in part by each of: the sixth aperture A6, the ninth aperture A9, the second flap 226a, and the first minor flap 226b. The second opening 02 is defined in part by each of: the seventh aperture A7, the tenth aperture A10, the third flap 228a, and the second minor flap 228b.

A second minor flap 228b is struck from the third flap 228A; the second minor flap 228b is defined in part by a severance line such as a cut line 229c, an eleventh aperture A11 and in part by the fold line 229b. The eleventh aperture A11 interrupts the fold line 229b.

A twelfth aperture A12 is struck from the intermediate panel 218. The twelfth aperture A12 comprises a first edge E3; the first edge is coincident with the fold line 219 such that the twelfth aperture A12 effectively interrupts the fold line 219.

The twelfth aperture A12 provides an access opening such that a portion of the second end panel 220 is accessible through the intermediate panel 218. This allows a tool of a packaging machine to engage the second end panel 220 such as when removing the blank 210, in a flat collapsed form 211, from a hopper.

The second end panel 220 comprises a hinged connection such as a fold line 245 extending thereacross. A thirteenth aperture A13 interrupts the fold line 221 between the second end

panel 220 and the second side panel 222. The thirteenth aperture A13 comprises an edge E4 which is arranged to be collinear with the fold line 221, so as to effectively interrupt the fold line 221.

- 5 A fourth flap 230 is struck from the second side panel 222. The fourth flap 230 is hingedly connected to the second side panel 222 by a hinged connection such as a fold line 231b. The fourth flap 230 is defined in part by a severance line such as a cut line 231a, a fourteenth aperture A14, a fifteenth aperture A15 and in part by the fold line 231b.
- 10 A fifth flap 232 is struck from the second side panel 222. The fifth flap 232 is hingedly connected to the second side panel 222 by a hinged connection such as a fold line 233b. The fifth flap 232 is defined in part by a severance line such as a cut line 233a, a sixteenth aperture A16, a seventeenth aperture A17 and in part by the fold line 233b.
- 15 The first flap 224 is spaced apart from the glue panel 212. When the insert 90 is set up a portion of the blank 210 is provided between the first flap 224 and the glue panel 212 that extends continuously from a lower edge to an upper edge.

Turning to the construction of the insert 290 as illustrated in Figures 11 to 21, the insert 290
20 can be formed by a series of sequential folding operations. The folding process is not limited to that described below and may be altered according to particular manufacturing requirements.

Glue G1 or other adhesive treatment is applied to the second flap 226a, as shown in Figure
25 12 or, in alternative embodiments, to a corresponding portion of the first flap 224.

Glue G2 or other adhesive treatment is applied to the third flap 228a, as shown in Figure 12 or, in alternative embodiments, to a corresponding portion of the glue panel 212.

30 The blank 210 is folded about fold line 215, as indicated by direction arrow D1 in Figure 13, such that the first side panel 214 and the glue panel 212 are folded thereabouts. The first side panel 214 is brought into face contacting relationship with the first end panel 216 and a portion of the intermediate panel 218, as shown in Figure 13.

35 The glue panel 212 is secured to the third flap 228a and the first flap 224 is secured to the second flap 226a.

The blank 210 is processed from the opposing side; this is illustrated in Figure 14. In order to process the blank 210 from the side illustrated in Figure 14 it may be necessary to turn or flip the blank over by rotating the blank through 180 degrees. In other embodiments the blanks 210 may simply be processed by apparatus disposed upon the opposing side of the blank 210, irrespective of the orientation of the blank 210 with respect to a conveyor.

Glue G3 or other adhesive treatment is applied to the first minor flap 226b, as shown in Figure 14 or, in alternative embodiments, to a corresponding portion of the fifth flap 232.

Glue G4 or other adhesive treatment is applied to the second minor flap 228b, as shown in Figure 14 or, in alternative embodiments, to a corresponding portion of the fourth flap 230.

The blank 210 is folded about fold line 219, as indicated by direction arrow D2 in Figure 15, such that the second end panel 220 and the second side panel 222 are folded thereabouts.

The second end panel 220 is brought into face contacting relationship with the intermediate panel 218. The second side panel 222 is brought into face contacting relationship with the intermediate panel 218, as shown in Figure 15.

The first minor flap 226b is secured to the fifth tab 232 and the second minor flap 228b is secured to the fourth tab 230.

In this way a flat collapsed insert structure 211 is formed as shown in Figures 15 and 16. The insert 290 may be shipped or distributed in this flat collapsed form.

The flat collapsed insert structure 211 may be erected into a tubular structure by separating the first side panel 214 from the second side panel 222, as shown in Figures 17 to 20. The second side panel 222 is engaged by first and second tools C1, C2 and the first side panel 214 is engaged by third and fourth tools C3, C4. Preferably the first, second, third and fourth tools C1, C2, C3, C4 are suction devices which each comprise a cup, the lips of each cup being brought into contact with a respective portion of the first side panel 214 or the second side panel 222. The first and second tools C1, C2 are then moved in a first direction D3. The third and fourth tools C3, C4 are moved in a second direction D4. The second direction D4 substantially opposes the first direction D3. The glue panel 212, the first flap 224, the second flap 226a, and the third flap 228a form dividers between the first side panel 214 and the intermediate panel 218. The fourth flap 230, the fifth flap 232, the first minor flap 226b and the second minor flap 228b form dividers between the second side panel 222 and the

intermediate panel 218. The dividers are automatically erected when the insert 290 is erected.

Figure 19 illustrates engagement locations S5, S6, S7, S8, P1, S9, S10 for the machine tools to engage a first side of the flat collapsed insert structure 211. The engagement locations S5, S6, S7, S8, P1 are used when erecting the flat collapsed insert structure 211 into the insert 290. The first flap 224 is shaped so as to accommodate the machine tools. The tab T1 provides an area for an upper tool C3 to engage the first side panel 214. A lower portion of the first flap 224 is shaped so as to accommodate a lower tool C5, see Figure 20. The aperture A2 is shaped such that sufficient area is provided between the first flap 224 and the glue panel 212 for additional machine tools to engage the first side panel 214.

Aperture A3 is configured to allow a machine tool M1 to pass through the first side panel 214 such that the machine tool M1 can engage with and press against the first end panel 216. In this way the upper and lower tools C3, C5 can pull the first side panel 214 in the direction indicated by direction arrows D5, D6 whilst the machine tool M1 can push against the first end panel 216 in the opposite direction as indicated by direction arrow D7, as illustrated in Figure 20.

Figure 16 shows engagement locations S1, S2, S3, S4 for the machine tools to engage a second side of the flat collapsed insert structure 211.

The engagement locations S9, S10 can be used to engage the entire flat collapsed insert structure 211 without unintentionally unfolding it. For example, when removing the flat collapsed insert structure 211 from a hopper (not shown), as illustrated schematically in Figure 21. A pair of pick up tools C6, C7 are inserted into the aperture A12 so as to pass through the intermediate panel 218 and are in engagement with the second end panel 220. The flat collapsed insert structure 211 can be removed from the hopper by moving each of the pick-up tools C6, C7 in the direction indicated by direction arrow D8 so as to enable the flat collapsed insert structure 211 to be retracted from the hopper.

Once the flat collapsed insert structure 211 has been removed from the hopper it can be placed upon a conveyor device (not shown). The aperture A4 creates a recess at a first end of the flat collapsed blank 211. The first and second edges E1, E2 of the aperture A4 are in registry with one another so as to provide a reference edge E5 for a lug L1 to engage with so as to convey the flat collapsed insert structure 211 in a downstream direction on the conveyor as indicated by direction arrow F1.

The insert 290, shown in Figure 18, comprises a plurality of chambers arranged in two rows. The insert comprises four completely defined chambers and two partially defined chambers. A first chamber is defined in part by the glue panel 212, the third flap 228a, a portion of the first side panel 214, the first flap 224, the second flap 226a and a portion of the intermediate panel 218. A second chamber is defined in part by the first flap 224, the second flap 226a, a portion of the first side panel 214, the first end panel 216 and a first end portion of the intermediate panel 218. The fold line 241 allows the first end panel 216 to be folded thereabout. This allows the insert to have a first beveled corner; this allows the insert 290 to be tightened around an article (not shown) disposed in the second chamber. It may also facilitate insertion of the insert 290 into a carton (not shown). A third chamber is defined in part by the first minor flap 226b, the fifth flap 232, a portion of the second side panel 222, the second minor flap 228b, the fourth flap 230 and a portion of the intermediate panel 218. A fourth chamber is defined in part by the second minor flap 228b, the fourth flap 230, a portion of the second side panel 222, the second end panel 220 and a second end portion of the intermediate panel 218. The fold line 245 allows the second end panel 220 to be folded thereabout. This allows the insert 290 to have a second beveled corner; this allows the insert to be tightened around an article (not shown) disposed in the fourth chamber. It may also facilitate insertion of the insert 290 into a carton (not shown).

A first partial chamber is defined by an end portion of the first side panel 214, the glue panel 212, the third flap 228a and the second end portion of the intermediate panel 218. A second partial chamber is defined by the first end portion of the intermediate panel 218, the first minor flap 226a, the fifth flap 232 and an end portion of the second side panel 222.

The first and third chambers share a common portion of the intermediate panel 218 and are disposed upon opposing sides thereof.

When the insert 290 is placed into a carton (not shown) the second end portion of the intermediate panel 218, the adjacently disposed glue panel 212, the third flap 228a and the end portion of the first side panel 214 together with end and side walls of the carton define the fifth chamber. That is to say the side and end walls of the carton complete the fifth chamber.

When the insert 290 is placed into a carton (not shown) the first end portion of the intermediate panel 218, the adjacently disposed first minor flap 226b, and the fifth flap 232 and the end portion of the second side panel 222 together with opposing side and end walls

of the carton define the sixth chamber. That is to say the side and end walls of the carton complete the sixth chamber.

5 The insert 290 defines at least in part three walls of each of the six chambers. The insert 290 defines the footprint of each of the chambers; that is to say, the insert 290 defines the longitudinal and transverse dimensions of each of the six chambers.

10 The first, second, third, fourth, fifth and sixth chambers each comprise at least a portion of a wall which extends continuously from a lower edge to an upper edge of the insert 290. This aids in providing additional stacking strength to a carton, in which the insert 290 is placed, in embodiments where the insert 290 is dimensioned to extend between the top panel and the base panel of the carton.

15 The insert 290 can be employed to accommodate six articles arranged in a 2 x 6 matrix or array. Each article in the 2 x 6 matrix or array is separated from its adjacent neighbours by a portion of the insert 290. In this way, each of the articles is prevented from contacting the other articles. This helps to reduce the likelihood of damage to the articles as a result of collisions between articles during loading and/or transportation; it also suppresses or prevents noise from such collisions.

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Referring now to Figure 22, there is shown an alternative embodiment of the present invention. In the fourth illustrated embodiment like numerals have, where possible, been used to denote like parts, albeit with the addition of the prefix "300" to indicate that these features belong to the fourth embodiment. The alternative embodiments share many
25 common features with the previous embodiments and therefore only the differences from the embodiments illustrated in Figures 1 to 21 will be described in any greater detail.

The blank 310 comprises a plurality of main panels 312, 314, 316, 318, 320, 322 hinged one to the next in a linear series. The blank 310 comprises a glue tab or glue panel 312 hinged to
30 a first side panel 314 by a hinged connection such as a fold line 313. Fold line 313 is interrupted by a first aperture A1. The glue panel 312 is defined in part by a first recess R1 and a second recess R2, and is arranged such that portions 314a, 314b of the first side panel 314 extend beyond fold line 313 so as to dispose along opposing sides of the glue panel 312. The first side panel 314 is hinged to a first end panel 316 by a hinged connection
35 such as a fold line 315. The first end panel 316 is hinged to an intermediate panel 318 by a hinged connection such as a fold line 317. The intermediate panel 318 is hinged to a second end panel 320 by a hinged connection such as a fold line 319. The second end panel 320 is

hinged to a second side panel 322 by a hinged connection such as a fold line 321. The intermediate panel 318 forms a spine of an insert (not shown).

The plurality of main panels 312, 314, 316, 318, 320, 322 of the blank 310 form an insert
5 (not shown) having a plurality of voids or chambers each for receiving an article.

The blank 310 comprises a plurality of flaps 324, 326a, 326b, 328a, 328b, 330, 332.

10 A first flap 324 is struck from the first side panel 314. The first flap 324 is hingedly connected to the first side panel 314 by a hinged connection such as a fold line 325B. The first flap 324 is defined in part by a severance line such as a cut line 325A and in part by the fold line 325B. The first flap 324 is defined in part by a second aperture A2 struck from the first side panel 314. The fold line 325B is interrupted by a third aperture A3.

15 The first end panel 316 comprises a hinged connection such as a fold line 341 extending thereacross. A fourth aperture A4 interrupts the fold line 315 between the first side panel 314 and the first end panel 316. The fourth aperture A4 comprises a first edge E1 which is arranged to be collinear with the fold line 341, so as to effectively interrupt the fold line 341. The fourth aperture A4 comprises a second edge E2 opposing the first edge E1. The second
20 edge E2 is configured such that when the blank 310 is folded about the fold line 315 the first edge E1 and the second edge E2 are in vertical registry.

A second flap 326a is struck from the intermediate panel 318. The second flap 326a is hingedly connected to the intermediate panel 318 by a hinged connection such as a fold line
25 327B. The second flap 326a is defined in part by a sixth aperture A6, a seventh aperture A7, a severance line such as a cut line 343, a fifth aperture A5 and in part by the fold line 327B. The fifth aperture A5 is struck from the intermediate panel 318 and is offset from the fold line 317. The fifth aperture A5 interrupts the severance line 343; the severance line 343 extends between the sixth aperture A6 and the seventh aperture A7. The severance line 343 is offset
30 from the fold line 317.

A first minor flap 326b is struck from the second flap 326a; the first minor flap 326b is defined in part by a severance line such as a cut line 327C and in part by the fold line 327B.

35 A third flap 328a is struck from the intermediate panel 318. The third flap 328a is hingedly connected to the intermediate panel 318 by a hinged connection such as a fold line 329b.

The third flap 328a is defined in part by a severance line such as a cut line 329c, a ninth aperture A9, a tenth aperture A10, and by the fold line 329b.

5 The sixth aperture A6 and the seventh aperture A7 are elongate or slot like in shape. The sixth aperture A6 and the seventh aperture A7 are arranged to be divergent with respect to each other. The sixth aperture A6 and the seventh aperture A7 diverge towards the fold line 317.

10 The ninth aperture A9 and the tenth aperture A10 are elongate or slot like in shape. The ninth aperture A9 and the tenth aperture A10 are arranged to be divergent with respect to each other. The ninth aperture A9 and the tenth aperture A10 diverge towards the fold line 329b.

15 The sixth aperture A6 and the ninth aperture A9 are arranged divergently with respect to each other. The sixth aperture A6 and the ninth aperture A9 diverge towards a first side edge of the blank 310.

20 The seventh aperture A7 and the tenth aperture A10 are arranged divergently with respect to each other. The seventh aperture A7 and the tenth aperture A10 diverge towards a second side edge of the blank 310. The second side edge opposes the first side edge.

25 A second minor flap 328b is struck from the third flap 328a; the second minor flap 328b is defined in part by a severance line such as a cut line 329c, an eleventh aperture A11 and in part by the fold line 329b. The eleventh aperture A11 interrupts the fold line 329b.

30 A twelfth aperture A12 is struck from the intermediate panel 318 and provides an access opening such that a portion of the second end panel 320 is accessible through the intermediate panel 318. This allows a tool of a packaging machine to engage the second end panel 320 such as when removing the blank 310 in a flat collapsed form from a hopper. The twelfth aperture A12 comprises a first edge E3 which is arranged to be collinear with the fold line 319, so as to effectively interrupt the fold line 319. An opposing second side edge of the twelfth aperture A12 is shaped so as to accommodate a pair of suction cups disposed in close proximity to each other; the opposing second side edge is curvilinear in shape and has a substantially inverted "W" shape when viewed from the first edge E3.

35 The second end panel 320 comprises a hinged connection such as a fold line 345 extending thereacross. A thirteenth aperture A13 interrupts the fold line 321 between the second end

panel 320 and the second side panel 322. The thirteenth aperture A13 comprises a first edge E4 which is arranged to be collinear with the fold line 321, so as to effectively interrupt the fold line 321. An opposing second edge of the thirteenth aperture A13 is curved or arcuate in shape. The opposing second edge is arranged to be convex when viewed from the first edge E4. The curved shape of the thirteenth aperture A13 increases the area T2 of the second end panel 320 which can be engaged with a machine tool such as a suction cup. It also offsets the second opposing edge of the thirteenth aperture A13 from the inverted "W" shaped opposing side edge of the twelfth aperture A12 when the blank 310 is folded about fold line 319 so as to place the second end panel 320 in face contacting relationship with the intermediate panel 318. This offset may reduce the likelihood of tears propagating in the intermediate panel 318 in the region between the twelfth aperture A12 and the sides of the blank 310 and/or between the twelfth aperture A12 and the opening defined by the apertures A9, A10 and the third flap 328a and second minor tab 328b. It may also reduce the likelihood of tears propagating in the second end panel 320 in the region of the fold line 345 and the thirteenth aperture A13.

The arrangement of the blank 310 may be advantageous when employing the insert to segregate articles having smaller dimensions, for example articles having a smaller diameter. In this way the blank 310 may be processed in the same or similar packaging machine as those of the foregoing embodiments and may avoid the need to alter the dimensions of the machine tools which handle the blank, in particular the suction cups which engage with the second end panel 320 when removing the blank 310 from a hopper.

A fourth flap 330 is struck from the second side panel 322. The fourth flap 330 is hingedly connected to the second side panel 322 by a hinged connection such as a fold line 331b. The fourth flap 330 is defined in part by a severance line such as a cut line 331a, a fourteenth aperture A14, a fifteenth aperture A15 and in part by the fold line 331b.

A fifth flap 332 is struck from the second side panel 322. The fifth flap 332 is hingedly connected to the second side panel 322 by a hinged connection such as a fold line 333b. The fifth flap 332 is defined in part by a severance line such as a cut line 333a, a sixteenth aperture A16, a seventeenth aperture A17 and in part by the fold line 333b.

It can be appreciated that various changes may be made within the scope of the present invention. For example, the size and shape of the panels and apertures may be adjusted to accommodate articles of differing size or shape. Whereas in the foregoing embodiments the inserts are secured using adhesive, in some embodiments the inserts may be secured using

alternative securing means such as a mechanical fixing device including, but not limited to, a staple, a clip, or a complementary locking device formed from the material of the insert itself. The complementary locking device has a male tab receivable in a female slot, slit or aperture.

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It will be recognised that as used herein, directional references such as "top", "base", "front", "back", "end", "side", "inner", "outer", "upper" and "lower" do not necessarily limit the respective panels to such orientation, but may merely serve to distinguish these panels from one another.

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As used herein, the terms "hinged connection" and "fold line" each refers to all manner of lines that define hinge features of the blank or substrate of sheet material, facilitate folding portions of the blank or substrate of sheet material with respect to one another, or otherwise indicate optimal panel folding locations for the blank or substrate of sheet material. Any reference to "hinged connection" should not be construed as necessarily referring to a single fold line only; indeed a hinged connection can be formed from one or more fold lines.

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As used herein, the term "fold line" may refer to one of the following: a scored line, an embossed line, a debossed line, a line of perforations, a line of short slits, a line of half-cuts, a single half-cut, an interrupted cut line, aligned slits, a line of short scores and any combination of the aforesaid options, without departing from the scope of the invention.

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

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It should be understood that hinged connections, fold lines and severance lines can each includes elements that are formed in the blank or substrate of sheet material, including perforations, a line of perforations, a line of short slits, a line of half-cuts, a single half-cut, a cut line, an interrupted cut line, slits, scores, any combination thereof, and the like. The

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elements can be dimensioned and arranged to provide the desired functionality. For example, a line of perforations can be dimensioned or designed with degrees of weakness to define a fold line and/or a severance line. The line of perforations can be designed to facilitate folding and resist breaking to provide a fold line, to facilitate folding and facilitate
5 breaking with more effort to provide a frangible fold line, or to facilitate breaking with little effort to provide a severance line.

The phrase "in registry" or "in registry with" as used herein refers to alignment of two or more elements in an erected carton, such as an aperture formed in a first of two overlapping panels
10 and a second aperture formed in a second of two overlapping panels. Those elements in registry with each other may be aligned with each other in the direction of the thickness of the overlapping panels. For example, when an aperture in a first panel is "in registry with" a second aperture in a second panel that is placed in an overlapping arrangement with the first
15 panel, and 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. An insert for a carton, comprising a first side panel hinged to an intermediate panel by a first end panel and a second side panel hinged to the intermediate panel by a second end panel, the first side panel comprising at least one first tab hinged thereto, the intermediate panel comprising at least one second major tab and at least one second minor tab, the at least one second major tab and at least one second minor tab being hinged to the intermediate panel, the second side panel comprising at least one third tab hinged thereto, wherein the at least one first tab is secured to one of the at least one second major tab and the at least one second minor tab, and wherein the at least one third tab is secured to the other one of the at least one second major tab and the at least one second minor tab wherein the at least one first tab and the one of the at least one second major tab and the at least one second minor tab form at least one first divider between the first side panel and the intermediate panel, and the at least one third tab and the other one of the at least one second major tab and the at least one second minor tab form at least one second divider between the second side panel and the intermediate panel.
2. An insert according to claim 1 wherein the insert is foldable into a flat collapsed structure, and wherein the first and second dividers are automatically deployed when the flat collapsed structure is erected.
3. An insert according to claim 1 wherein the at least one second minor tab is struck from the at least one second major tab.
4. An insert according to claim 3 wherein the at least one second major tab is hinged to the intermediate panel by a first hinged connection.
5. An insert according to claim 4 wherein the at least one second minor tab is hinged to the intermediate panel by a second hinged connection.
6. An insert according to claim 5 wherein the second hinged connection is collinear with the first hinged connection.
7. An insert according to claim 1 wherein the at least one second major tab is folded out of the plane of a first side of the intermediate panel and the at least one second minor tab is folded out of the plane of a second side of the intermediate panel.

8. An insert according to claim 7 wherein the second side opposes the first side, such that the at least one second major tab and the at least one second minor tab extend in opposing direction from the intermediate panel.
9. An insert according to claim 1 wherein the first end panel is disposed on a first side of the intermediate panel and the second end panel is disposed on a second side of the intermediate panel, the second side opposing the first side.
10. An insert according to claim 1 wherein the at least one second major tab comprises two or more second major tabs, and wherein a first one of the two or more second major tabs is spaced apart from a second one of the two or more second major tabs.
11. An insert according to claim 1 wherein the at least one first tab comprises two or more first tabs, and wherein a first one of the two or more first tabs is spaced apart from a second one of the two or more first tabs.
12. An insert according to claim 1 wherein the at least one third tab comprises two or more third tabs and wherein a first one of the two or more third tabs is spaced apart from a second one of the two or more third tabs.
13. An insert according to claim 1 wherein the insert comprises an aperture struck at least in part from the intermediate panel for providing access to a surface of one of the first and second end panels.
14. An insert according to claim 13 wherein the aperture is configured and arranged to accommodate a machine tool such that a machine tool can pass through the aperture to engage the surface of said one of the first and second panels.
15. An insert according to claim 1 wherein the first tab is defined in part by at least one cutaway and wherein the first tab is struck from the first side panel.
16. An insert according to claim 1 further comprising a second aperture defined in part in the first side panel and in part in the first end panel, the second aperture comprising a first edge and a second opposing edge, the second edge being configured to be in registry with the first edge so as to form a reference edge when the first side panel is folded into face contacting relationship with the first end panel.

17. An insert according to claim 1 wherein the at least one second major tab is defined in part by a first elongate aperture and a second elongate aperture, the first and second apertures arranged to be divergent with respect to each other, the first and second apertures arranged so as to diverge towards a first end of the intermediate panel.
18. An insert according to claim 1 wherein the insert comprises a pair of second major tabs struck from the intermediate panel and a second minor tab struck from each of the second major tabs, wherein first side edges of each of the pair of second major tabs are defined by a first and second cutaway respectively; the first cutaway being divergently arranged with respect to the second cutaway, the first and second cutaways arranged so as to diverge towards a first edge of the insert.
19. An insert according to claim 18 wherein second side edges of each of the pairs of second major tabs are defined by third and fourth cutaways respectively; the third and fourth cutaways being divergently arranged with respect to each other; the third and fourth cutaways arranged so as to diverge towards a second edge of the insert, the second edge opposing the first edge.
20. An insert according to claim 1 wherein the first tab comprises a minor tab struck therefrom and integrally formed with the first side panel, the minor tab providing at least a portion of an engagement region for being engaged by a machine tool.
21. A blank for forming an insert for a carton, the blank comprising a first side panel hinged to an intermediate panel by a first end panel and a second side panel hinged to the intermediate panel by a second end panel, the first side panel comprising at least one first tab hinged thereto, the intermediate panel comprising at least one second major tab and at least one second minor tab, the at least one second major tab and at least one second minor tab being hinged to the intermediate panel, the second side panel comprising at least one third tab hinged thereto, wherein the at least one first tab is secured to one of the at least one second major tab and the at least one second minor tab, and wherein the at least one third tab is secured to the other one of the at least one second major tab and the at least one second minor tab, wherein in a set up condition the at least one first tab and the one of the at least one second major tab and the at least one second minor tab form at least one first divider between the first side panel and the intermediate panel, and the at least one third tab and the other one of the at least one second major tab and the at least one second minor tab form at least one second divider between the second side panel and the intermediate panel.

23. An insert for a carton, comprising a first side panel hinged to an intermediate panel by a first end panel and a second side panel hinged to the intermediate panel by a second end panel, the first side panel comprising a first tab hinged thereto, the intermediate panel comprising a second major tab and a third major tab; the second major tab and third major tab being hinged to the intermediate panel, the second side panel comprising a fourth tab hinged thereto, wherein the first tab is secured to the second major tab and the third major tab is secured to the fourth tab, the first tab and the second major tab form a first divider between the first side panel and the intermediate panel, and the fourth tab and the third major tab form a second divider between the second side panel and the intermediate panel, the second major tab being defined in part by a first cutaway, and the third major tab being defined in part by a second cutaway, wherein the first cutaway and the second cutaway each define first edges of a first opening and a second opening respectively, the first and second edges being divergently arranged with respect to each other.
24. A blank for forming an insert for a carton, the blank comprising a first side panel hinged to an intermediate panel by a first end panel and a second side panel hinged to the intermediate panel by a second end panel, the first side panel comprising a first tab hinged thereto, the intermediate panel comprising a second major tab and a third major tab; the second major tab and third major tab being hinged to the intermediate panel, the second side panel comprising a fourth tab hinged thereto, wherein the first tab is configured to be secured to the second major tab and the third major tab is configured to be secured to the fourth tab, and wherein in a setup condition the first tab and the second major tab form a first divider between the first side panel and the intermediate panel, and the fourth tab and the third major tab form a second divider between the second side panel and the intermediate panel, the second major tab being defined in part by a first cutaway, and the third major tab being defined in part by a second cutaway, wherein the first cutaway and the second cutaway each define first edges of a first opening and a second opening respectively, the first and second edges being divergently arranged with respect to each other.

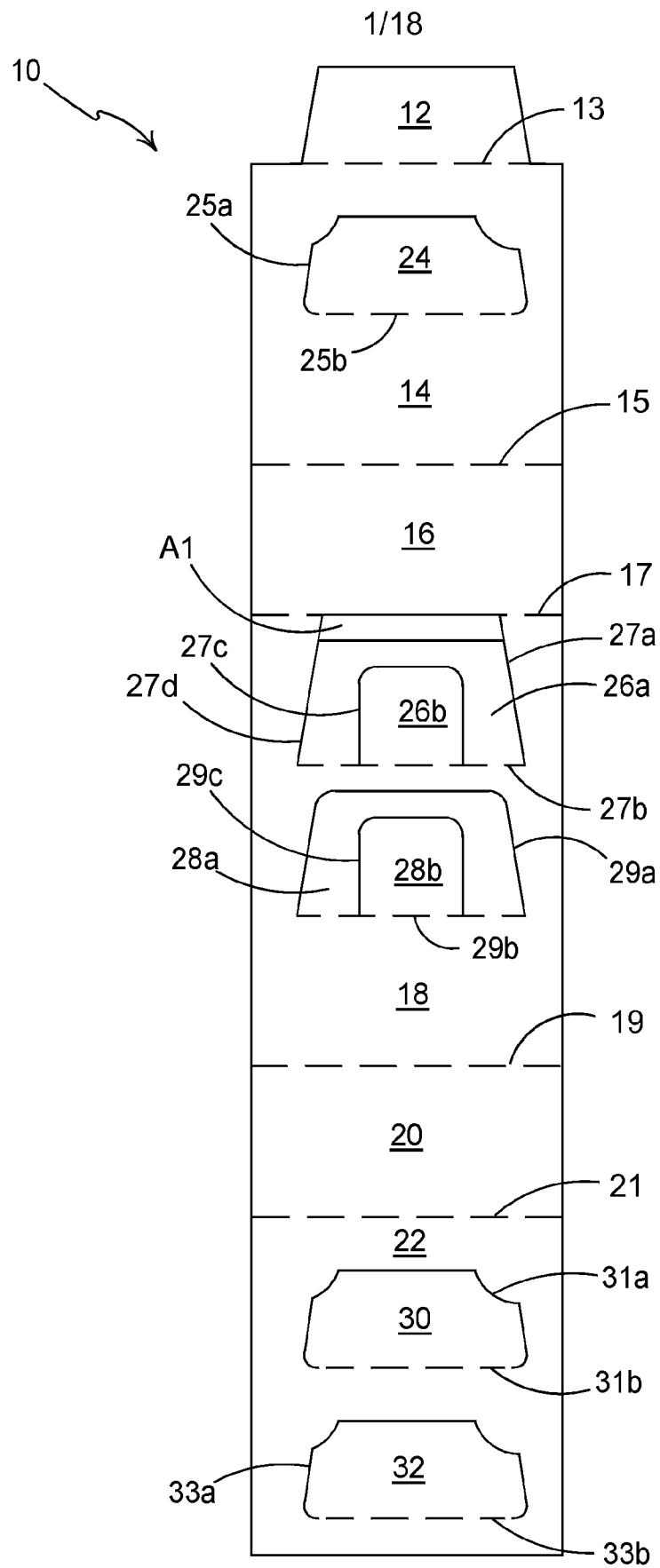


FIGURE 1

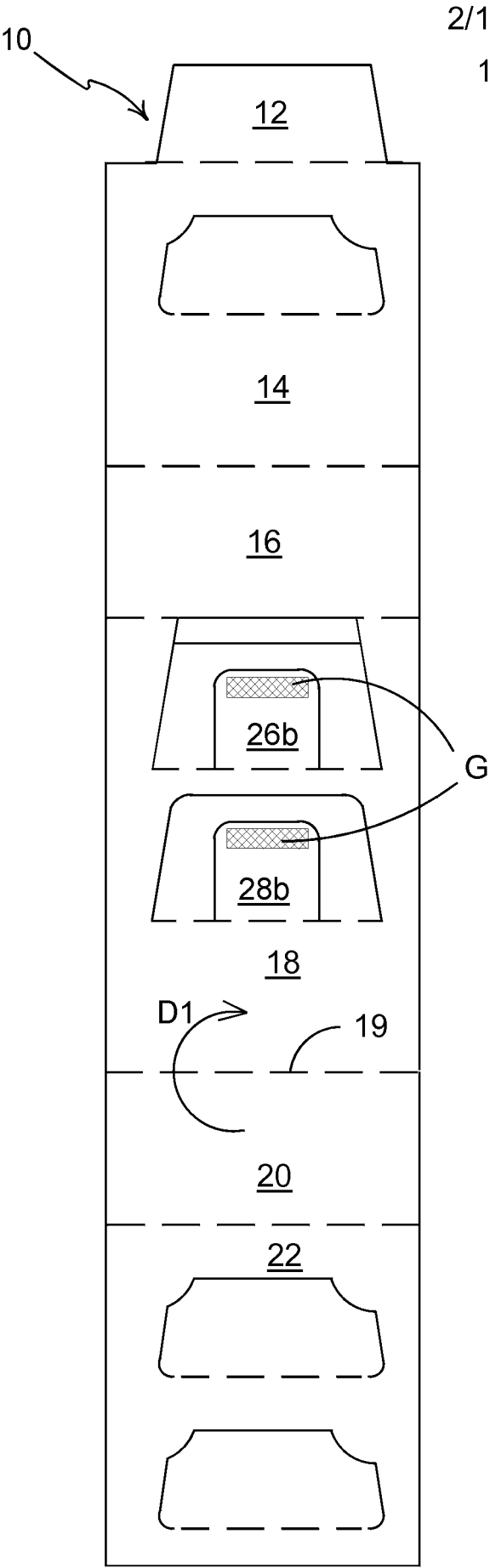


FIGURE 2

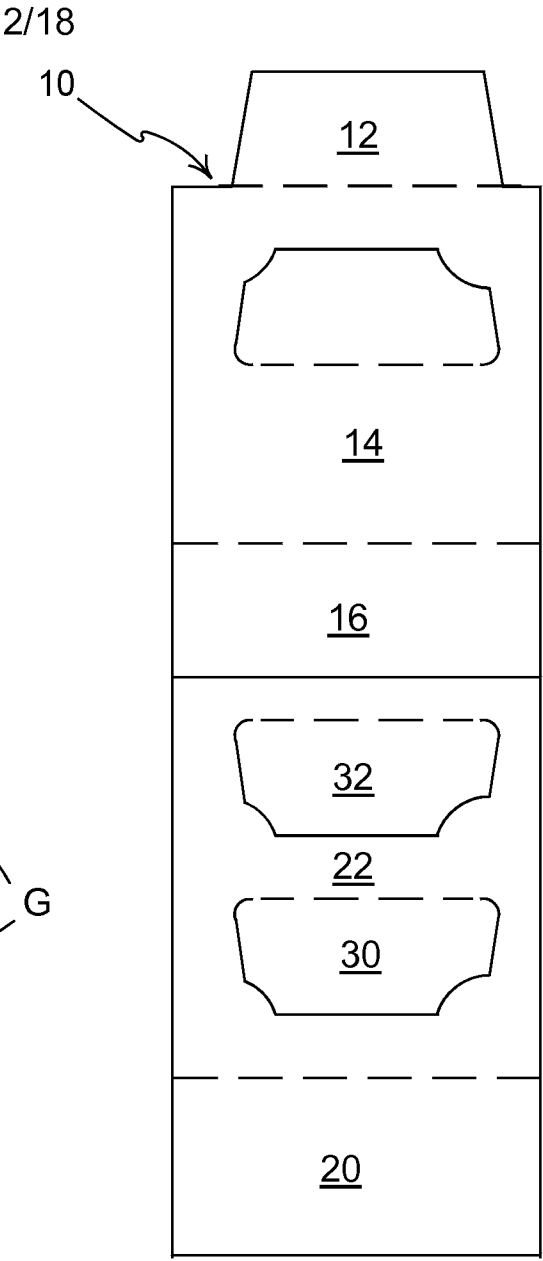


FIGURE 3

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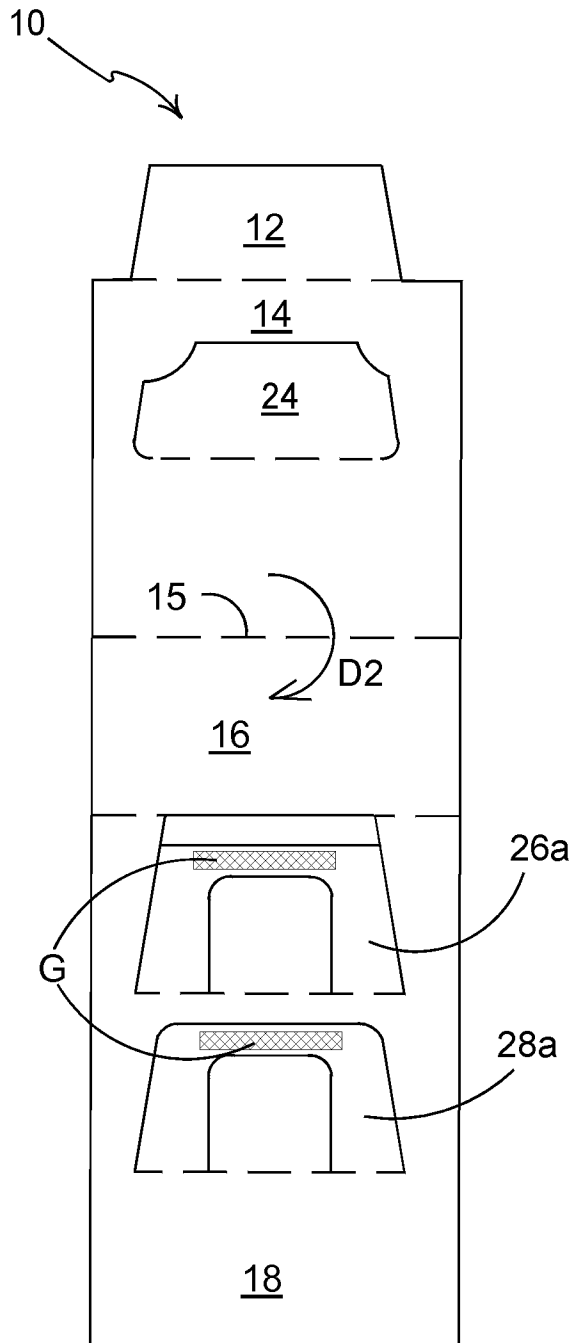


FIGURE 4

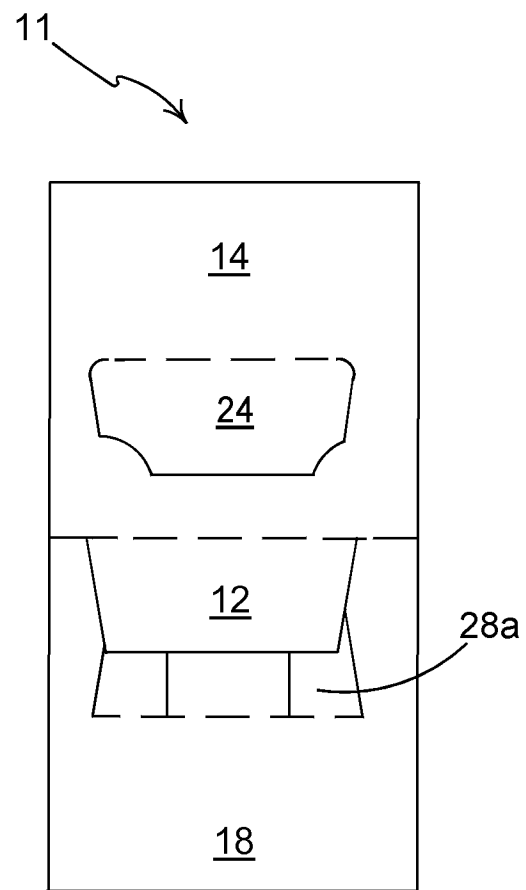


FIGURE 5

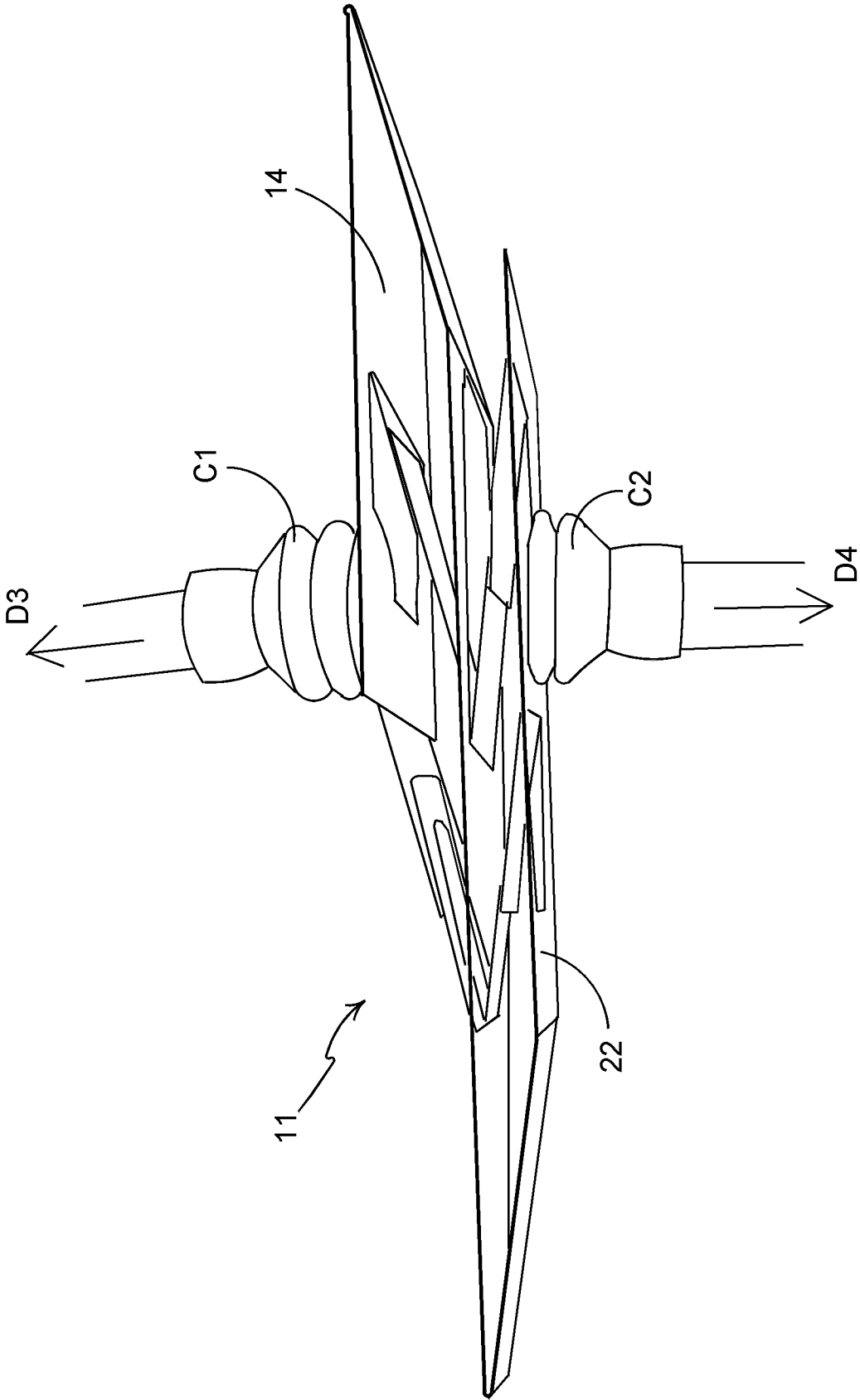


FIGURE 6

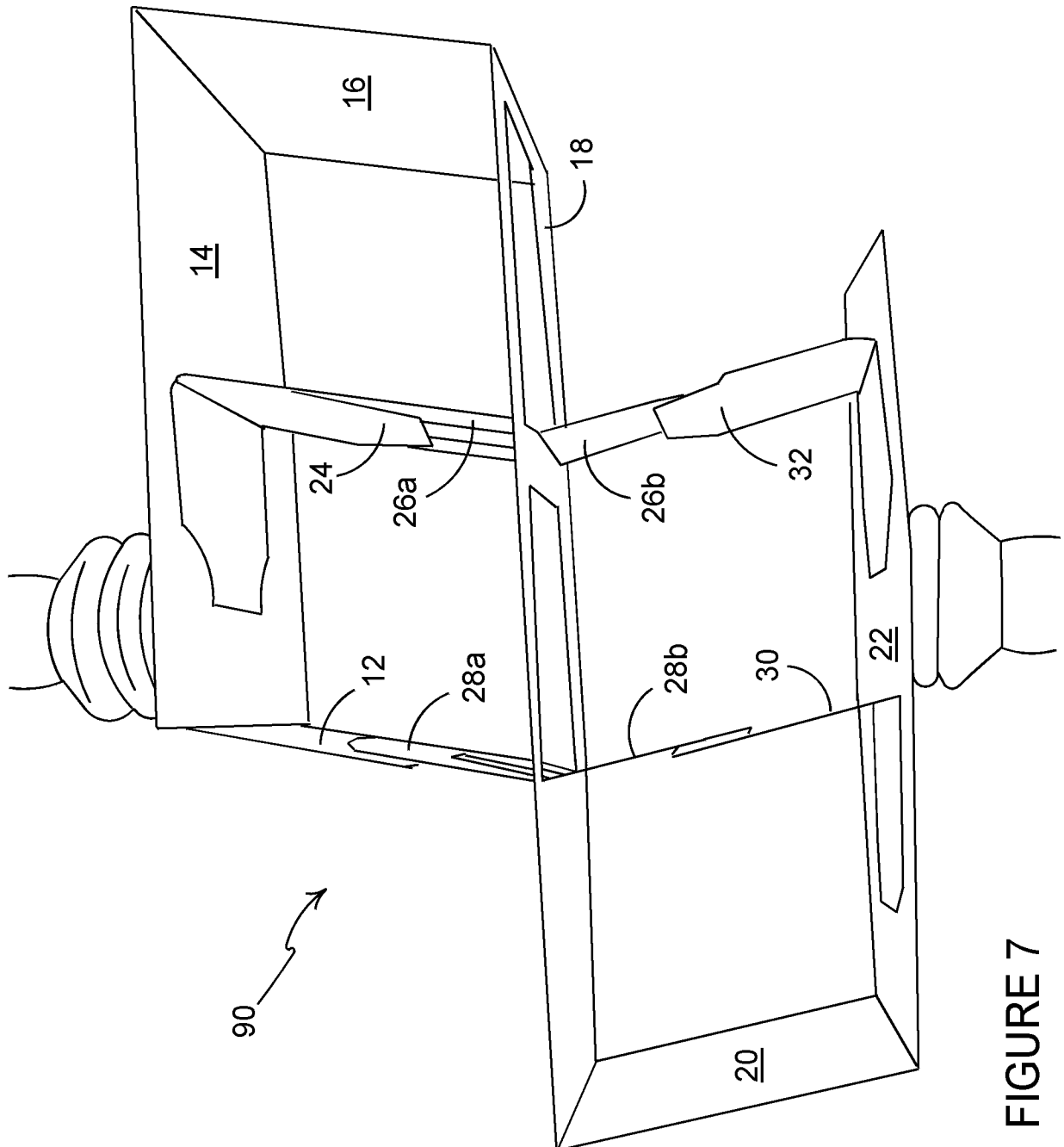


FIGURE 7

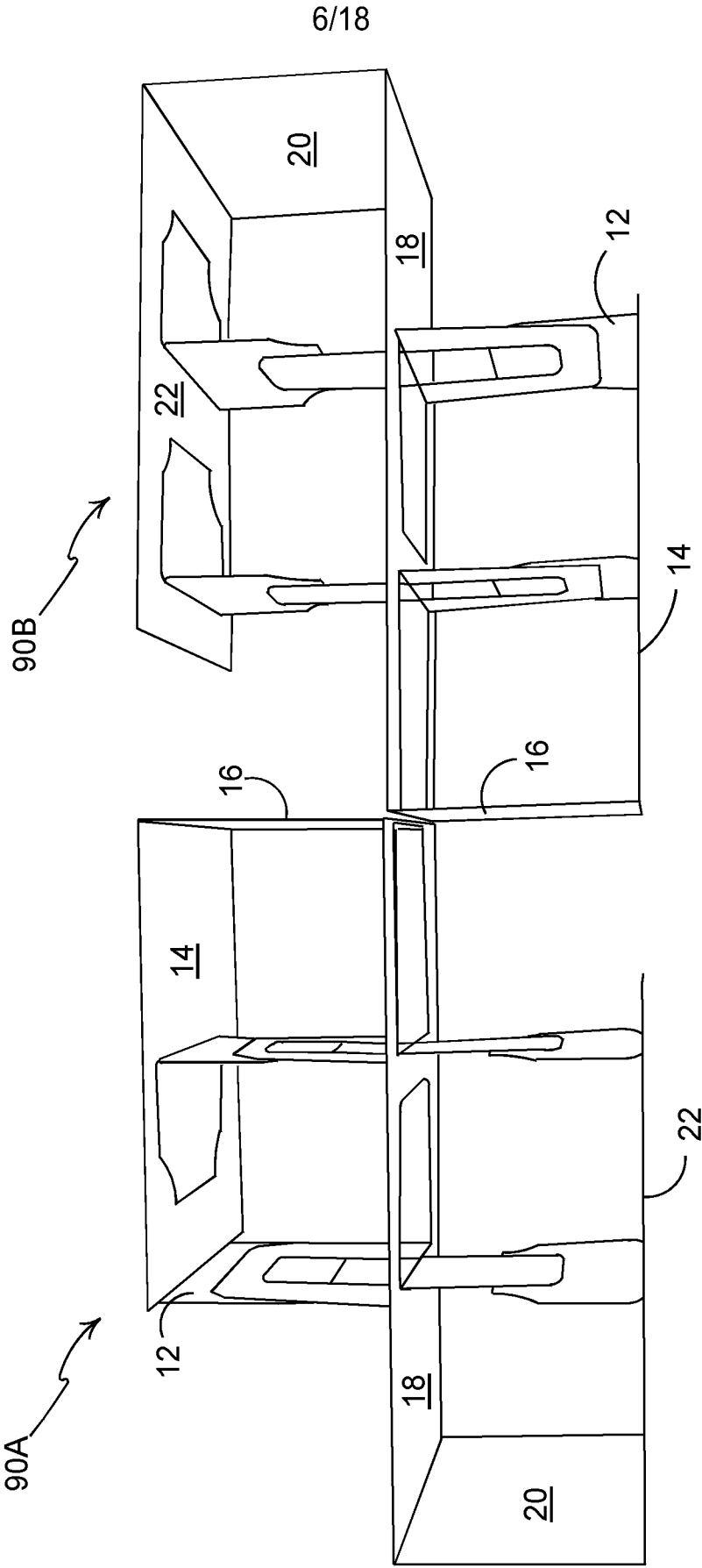


FIGURE 8

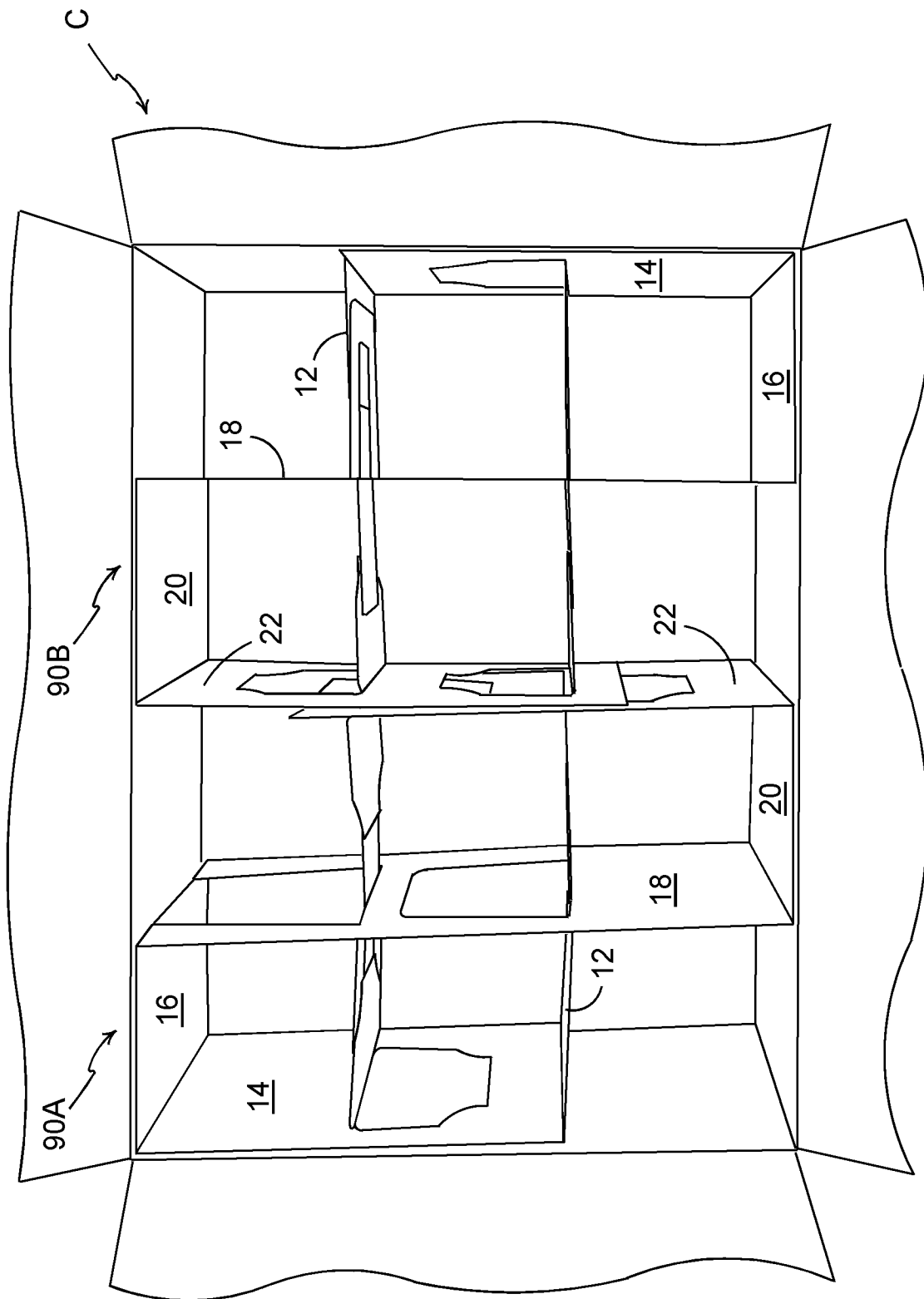


FIGURE 9

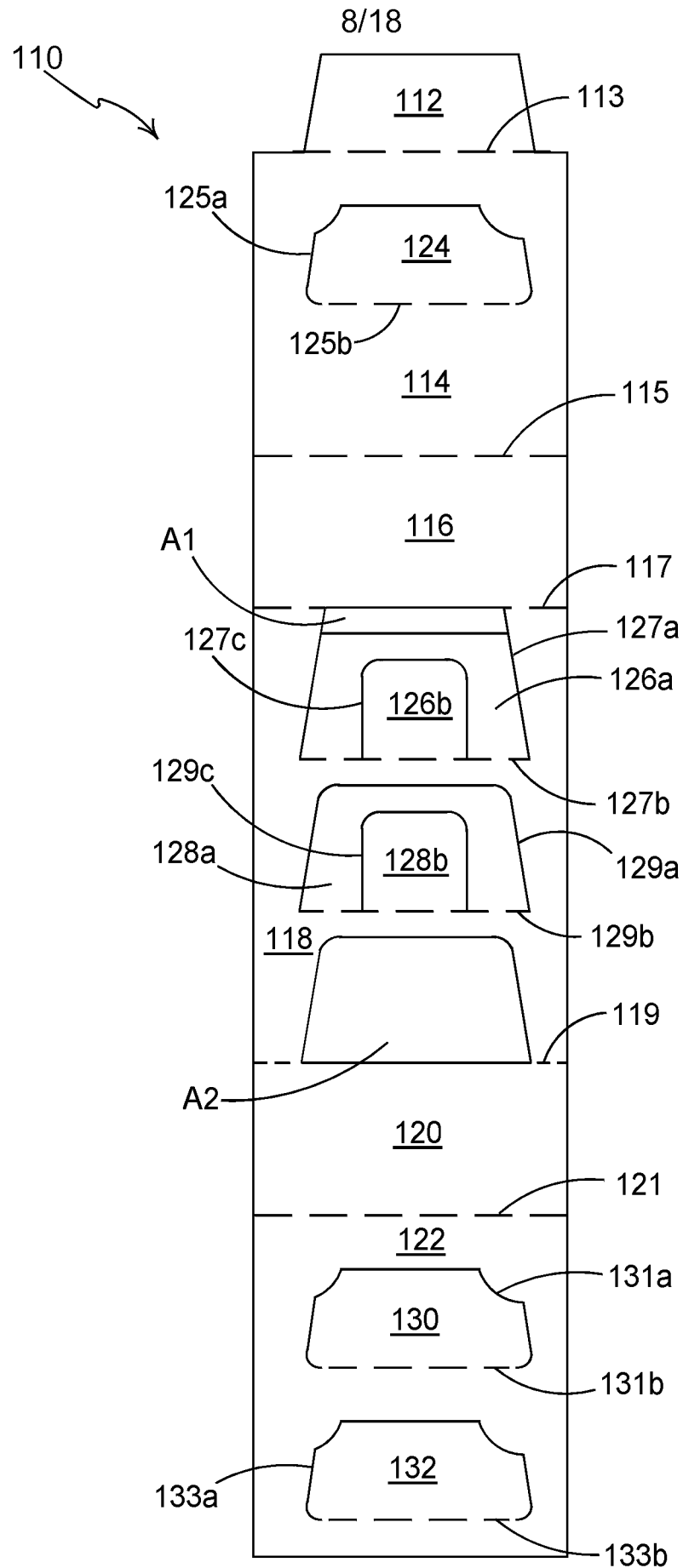


FIGURE 10

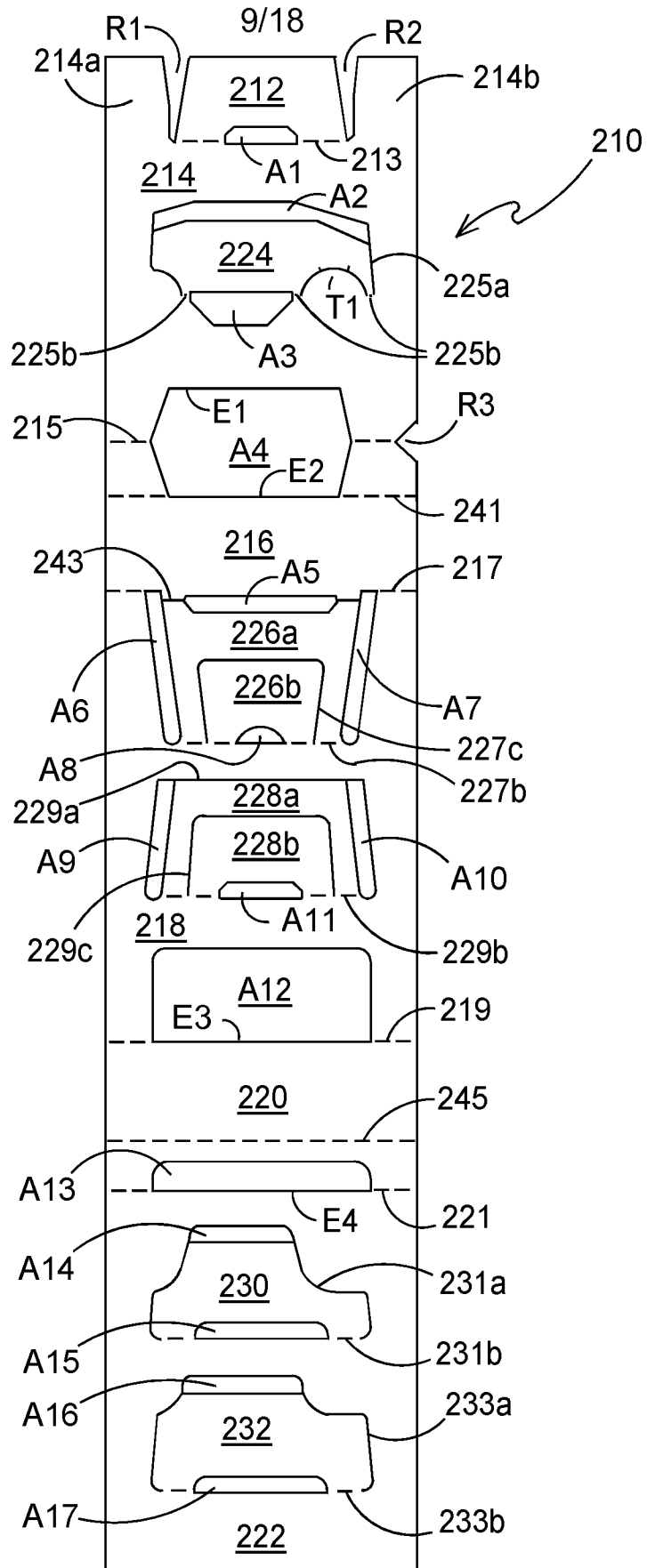
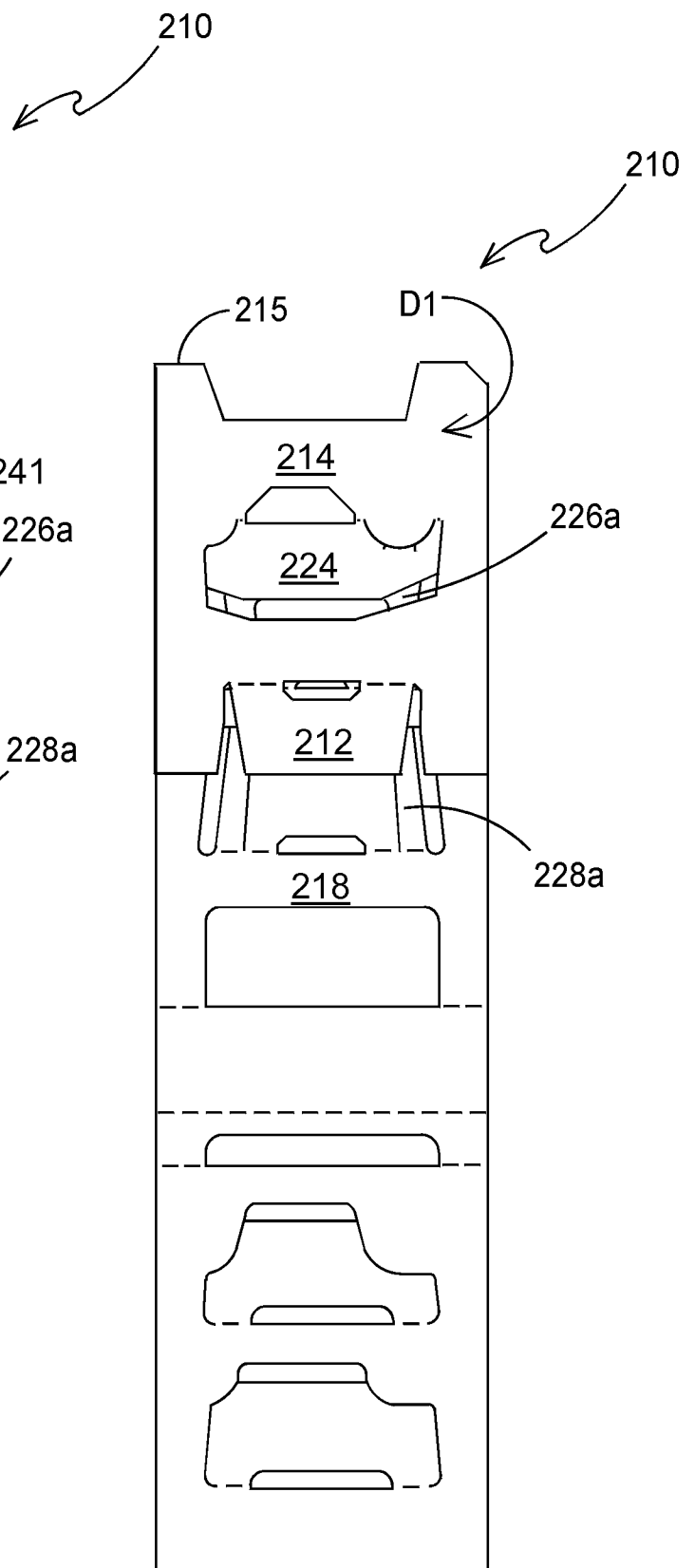
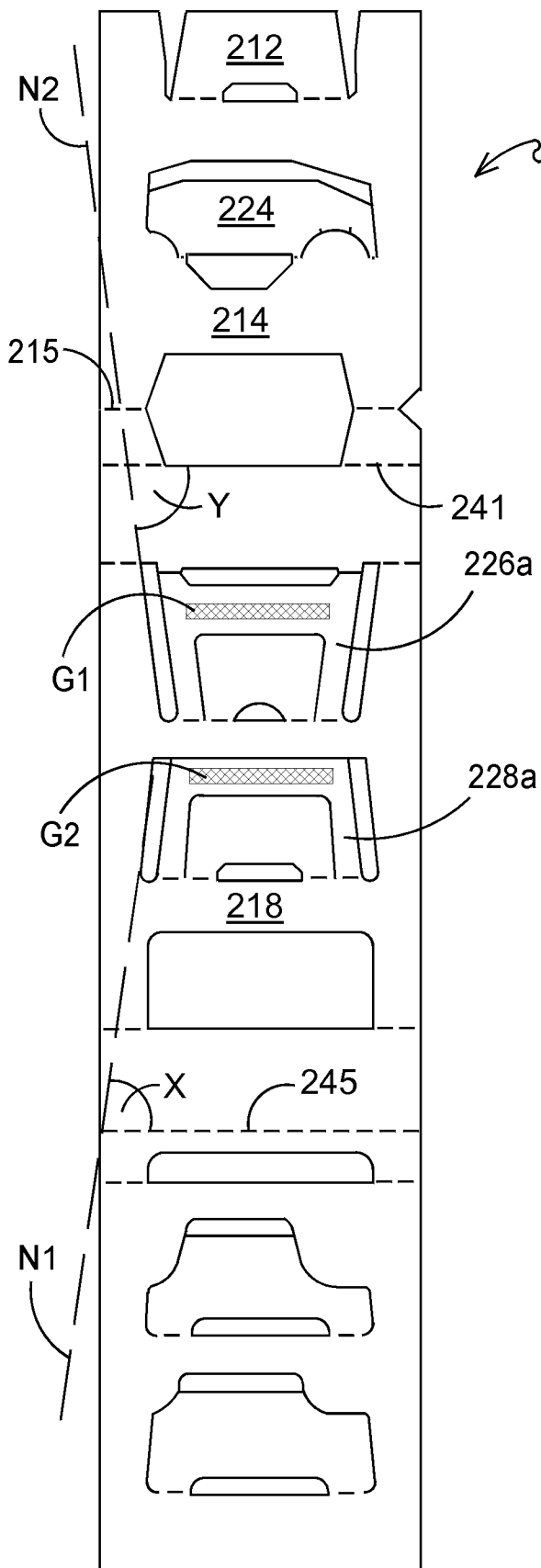


FIGURE 11

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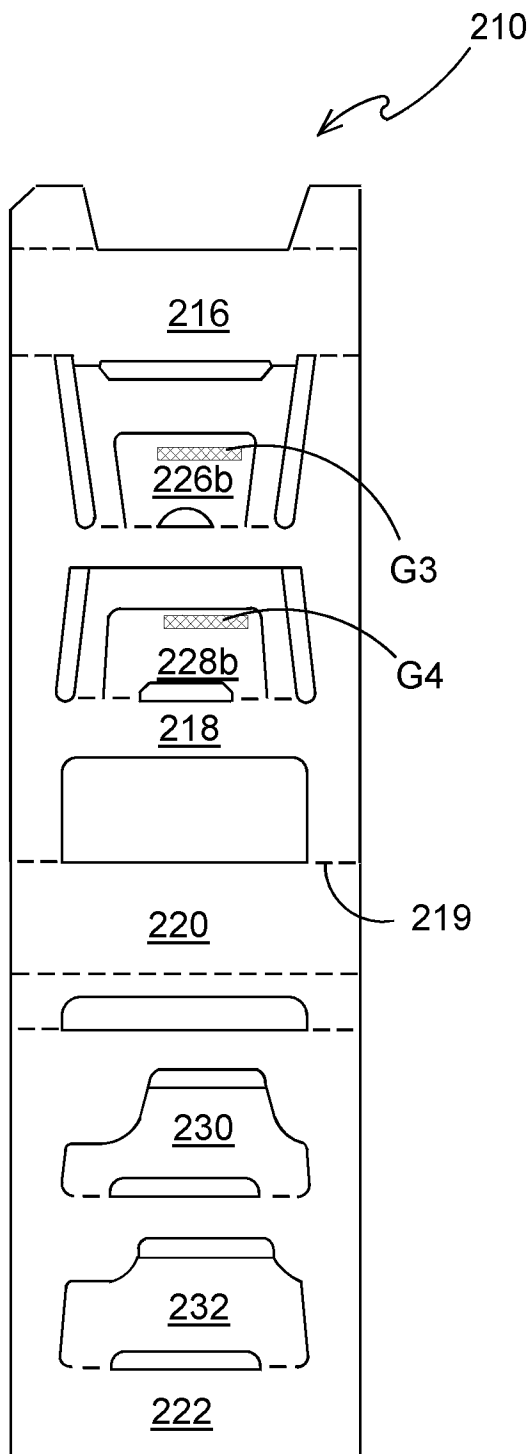


FIGURE 14

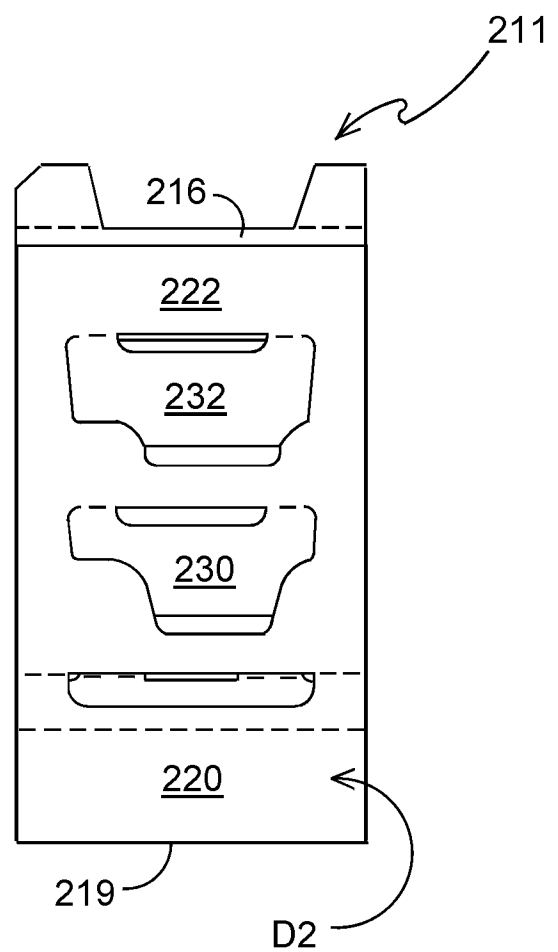


FIGURE 15

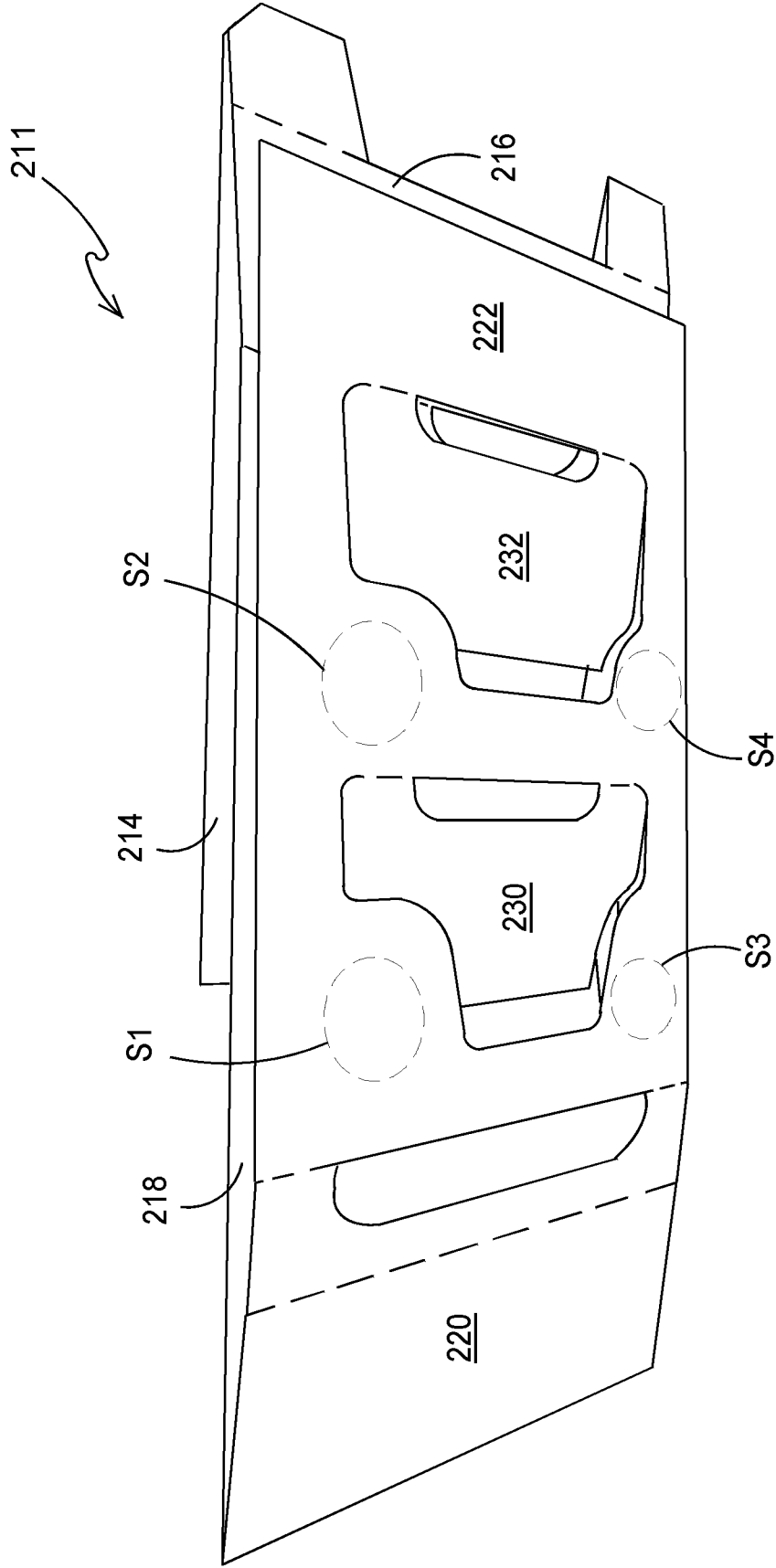


FIGURE 16

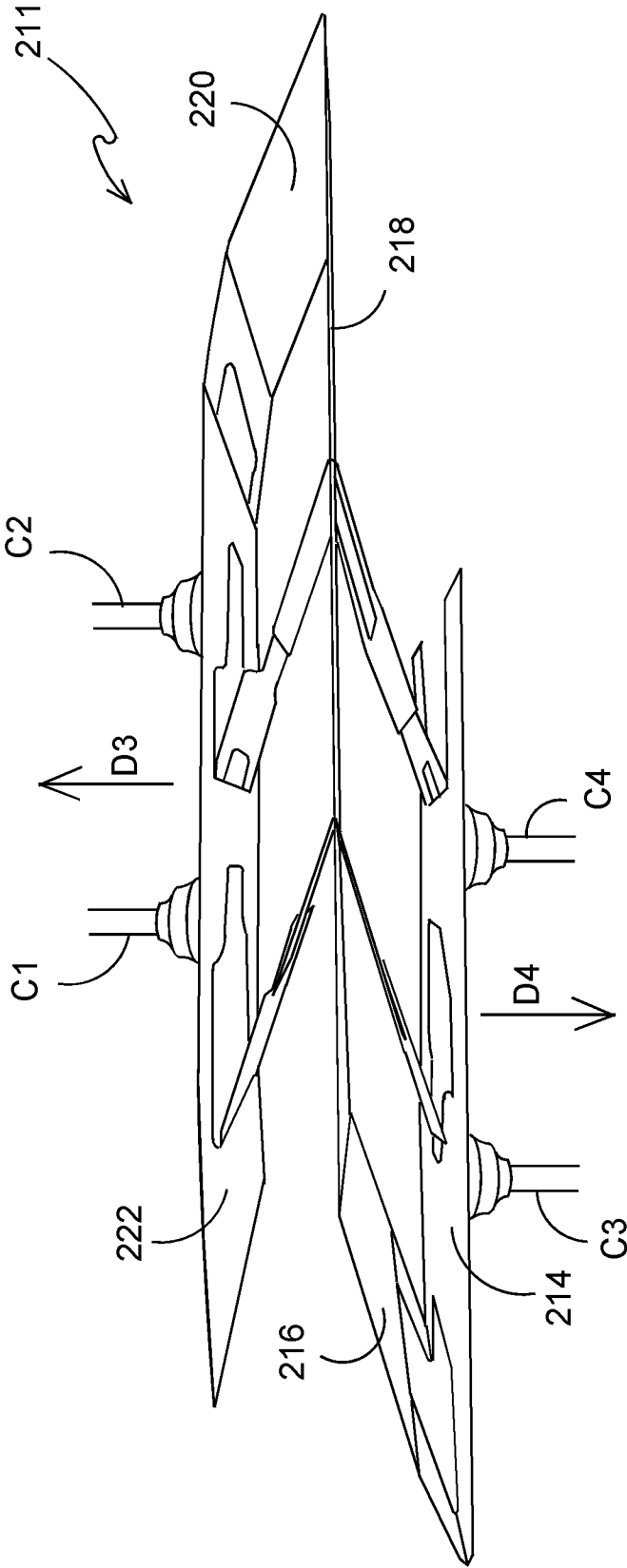


FIGURE 17

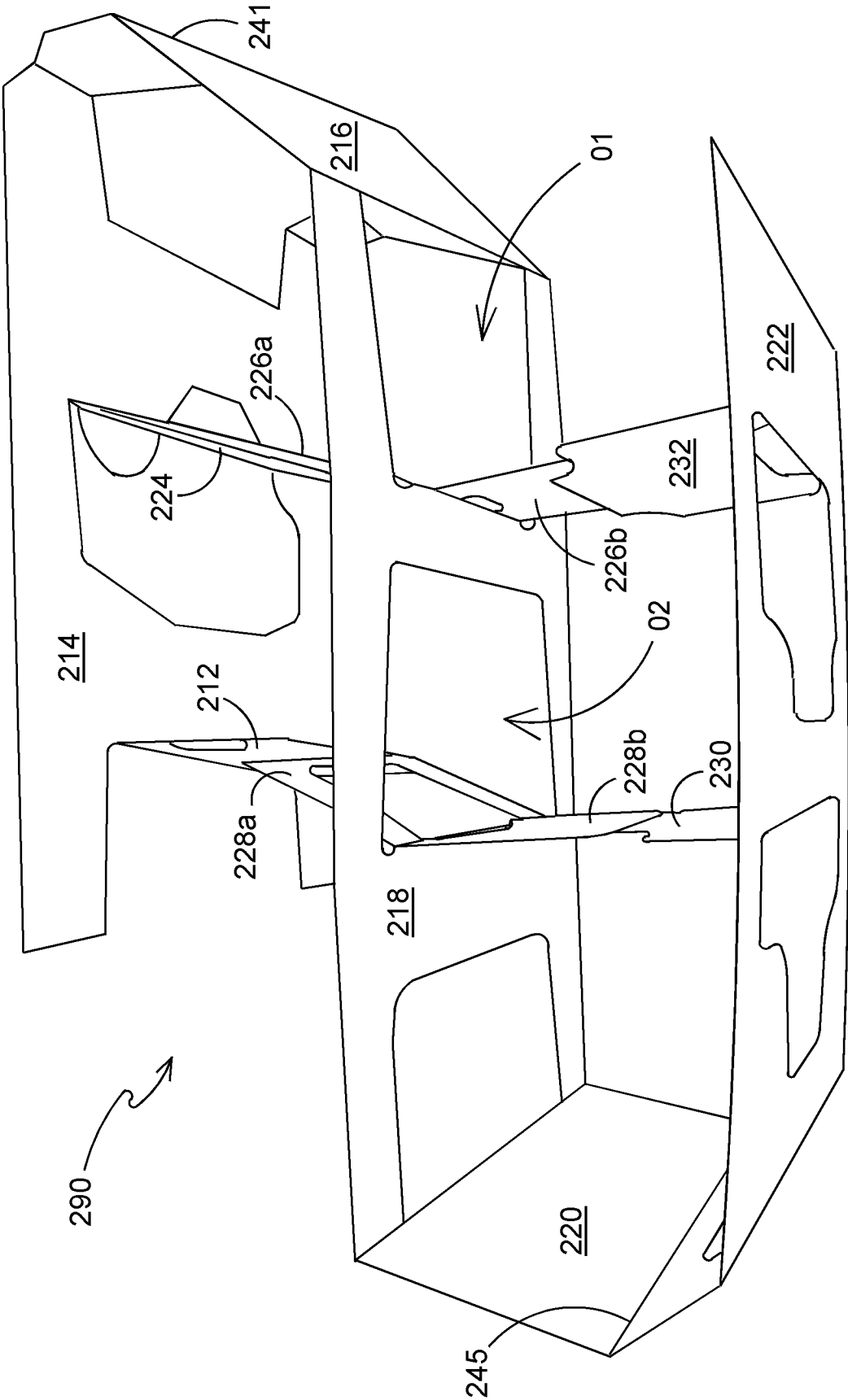
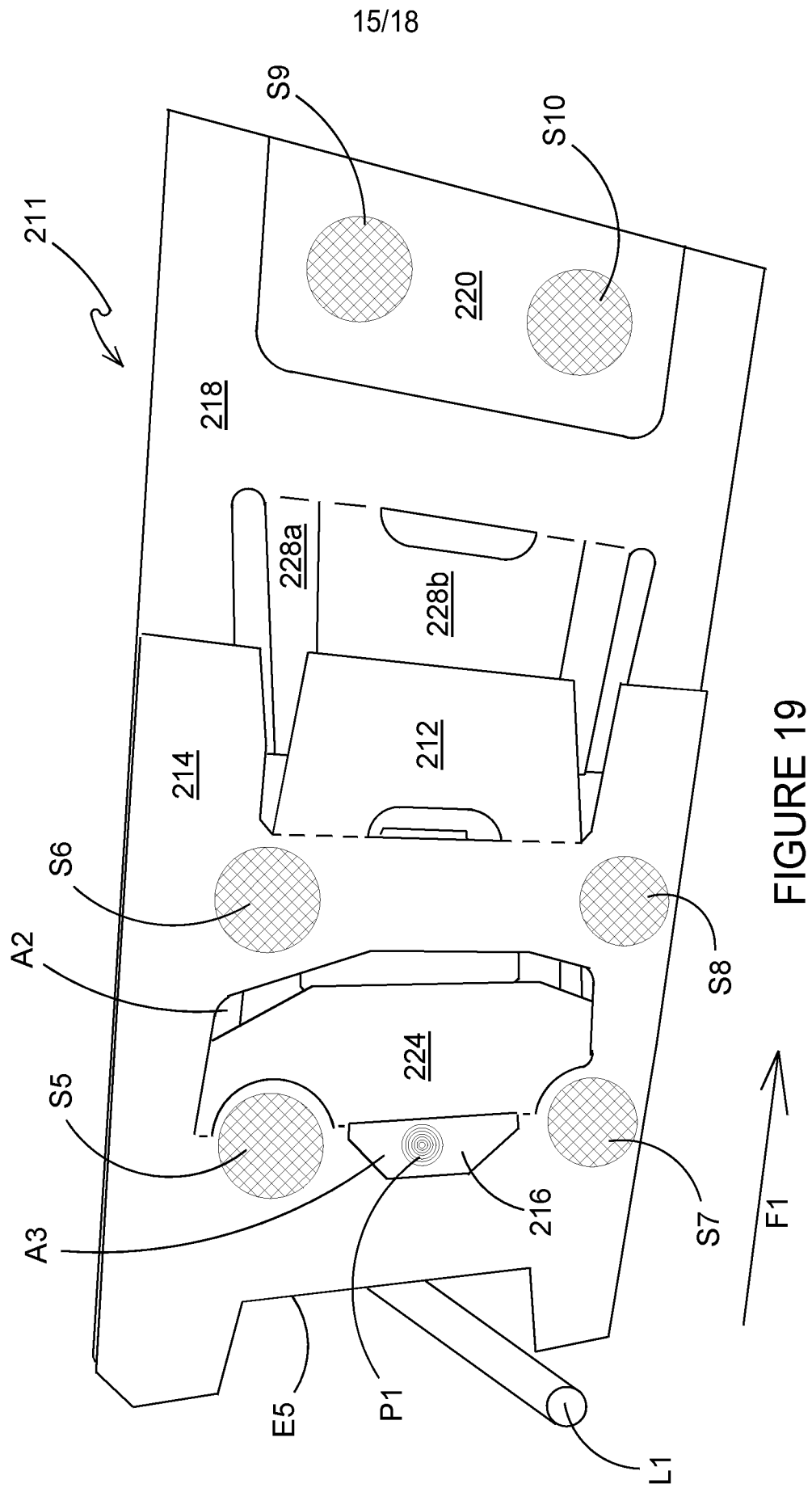
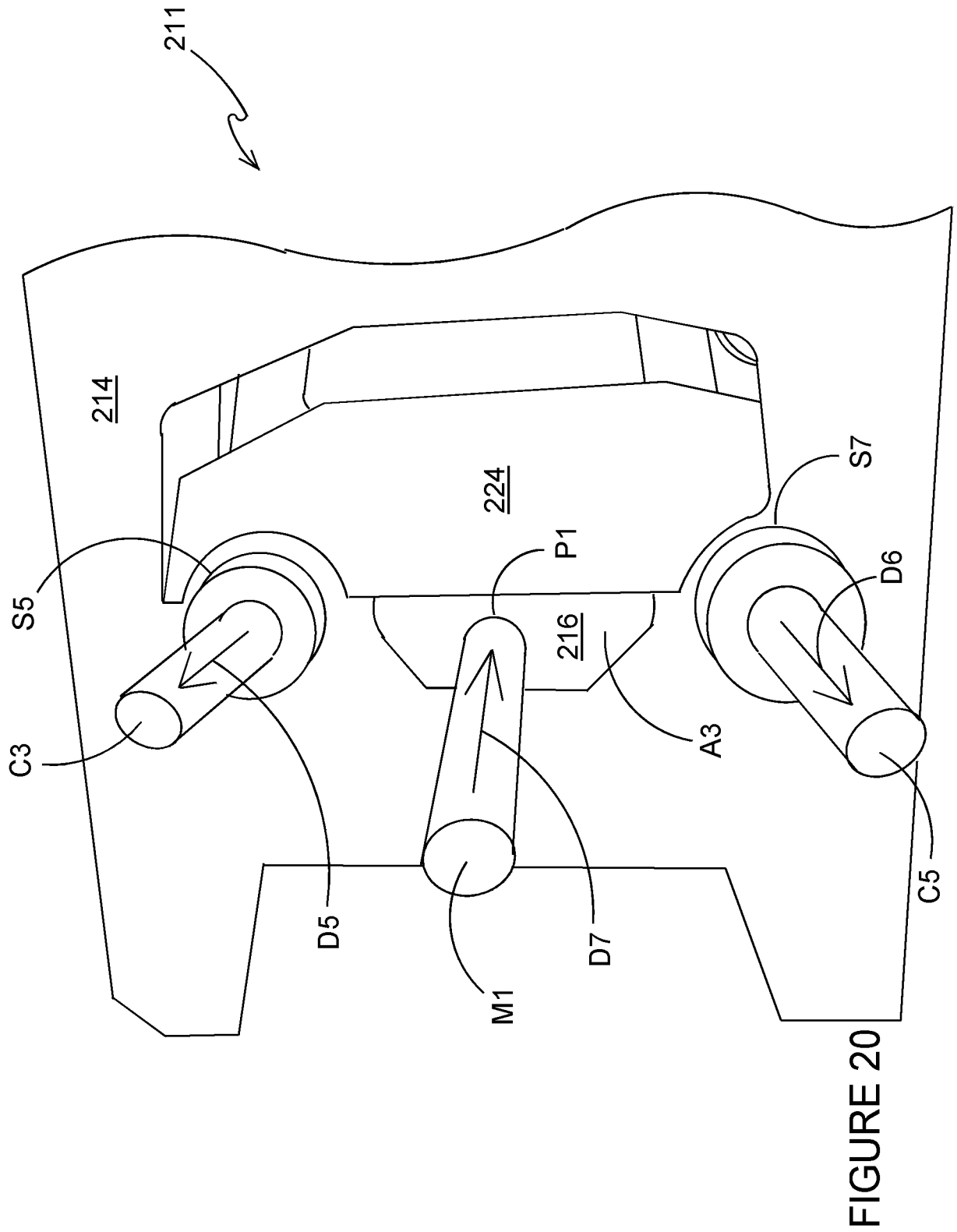


FIGURE 18





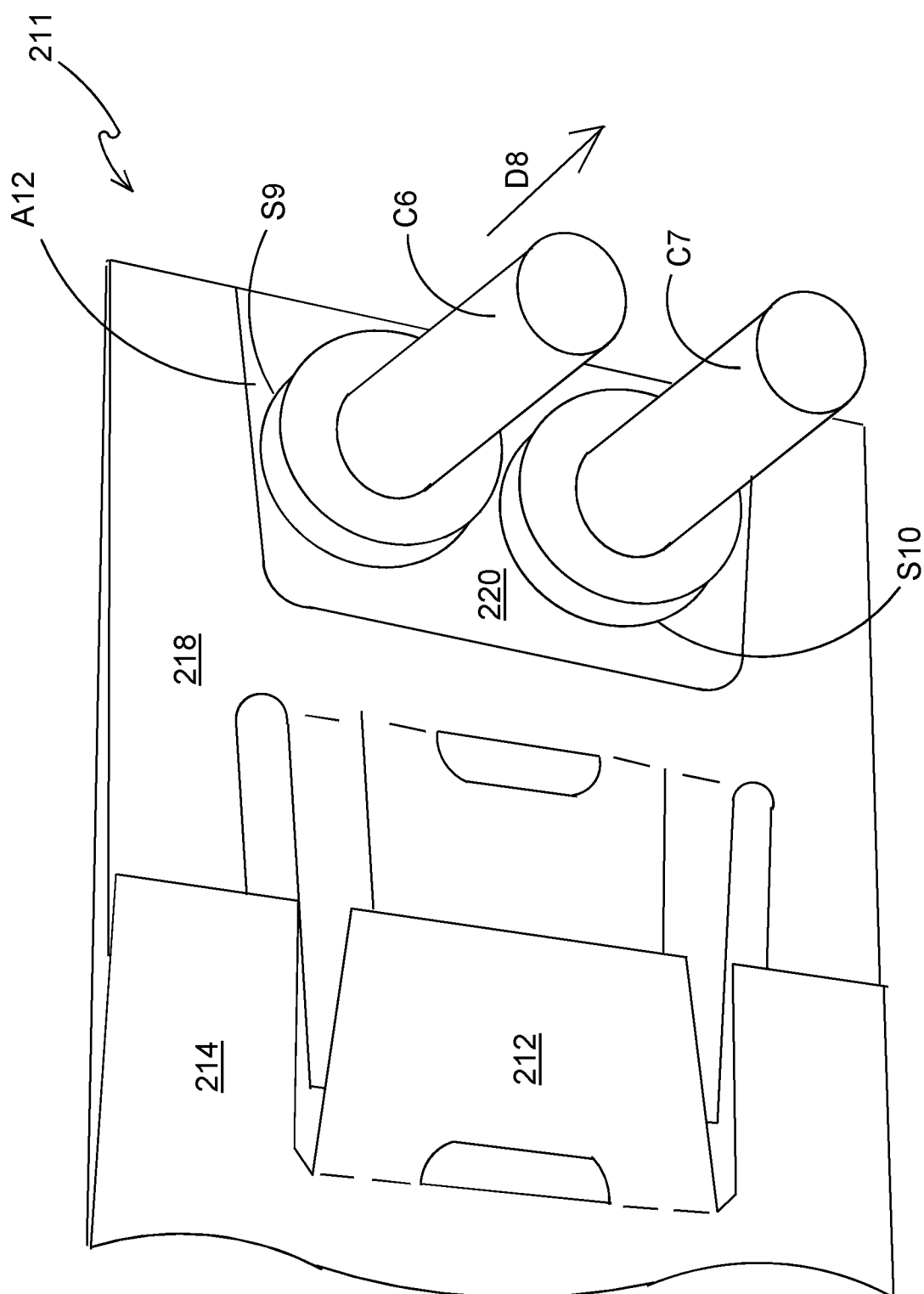


FIGURE 21

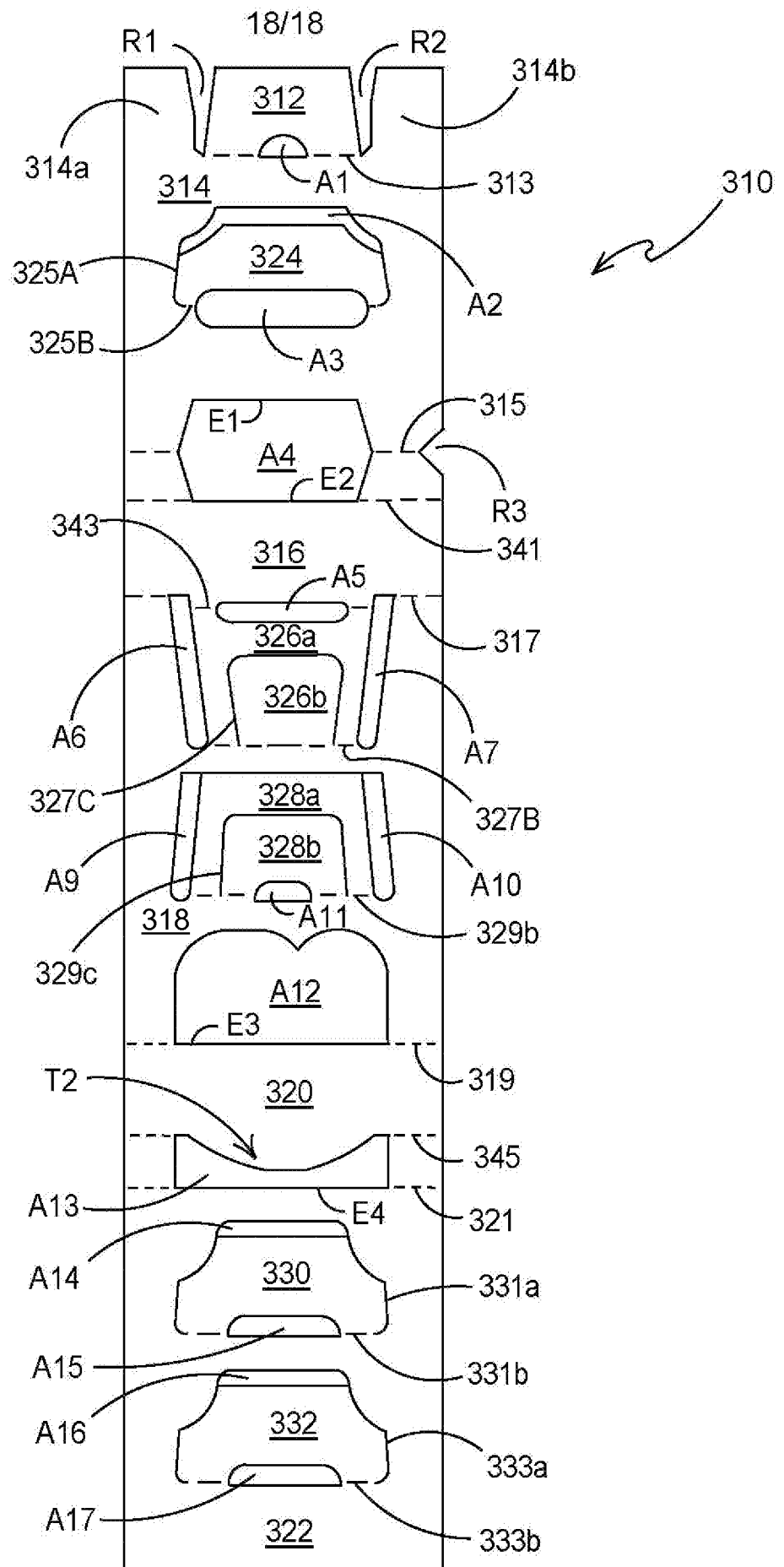


FIGURE 22

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2015/013409

A. CLASSIFICATION OF SUBJECT MATTER
INV. B65D5/49
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)

EP0-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	GB 2 043 597 A (MAC MILLAN BLOEDEL LTD) 8 October 1980 (1980-10-08) page 3, line 46 - page 4, line 86; figures 1-10	1,21-23
A	DE 20 2006 000457 U1 (A & R CARTON GMBH [DE]) 16 March 2006 (2006-03-16) paragraph [0052] - paragraph [0063]; figures 1-8	1,21-23
A	CA 1 167 808 A1 (SOMERVILLE IND LTD) 22 May 1984 (1984-05-22) page 3, line 23 - page 5, line 18; figures 1-7	1,21-23
A	KR 2012 0051138 A (GPP CO LTD [KR]) 22 May 2012 (2012-05-22) figures 1-5	1,21-23

☐

Further documents are listed in the continuation of Box C.

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See patent family annex.

* Special categories of cited documents :

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

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

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

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

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

"&" document member of the same patent family

Date of the actual completion of the international search

5 May 2015

Date of mailing of the international search report

13/05/2015

Name and mailing address of the ISA/

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Fax: (+31-70) 340-3016

Authorized officer

Grondin, David

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2015/013409

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
GB 2043597	A	08-10-1980	CA 1088031 A1 21-10-1980
			GB 2043597 A 08-10-1980
			US 4226357 A 07-10-1980
			US 4309175 A 05-01-1982
			US 4330979 A 25-05-1982

DE 202006000457 U1	16-03-2006	AT 501044 T	15-03-2011
		BR PI0706501 A2	05-04-2011
		DE 202006000457 U1	16-03-2006
		EP 1971526 A1	24-09-2008
		US 2008290147 A1	27-11-2008
		WO 2007080099 A1	19-07-2007

CA 1167808	A1	22-05-1984	NONE

KR 20120051138	A	22-05-2012	NONE
