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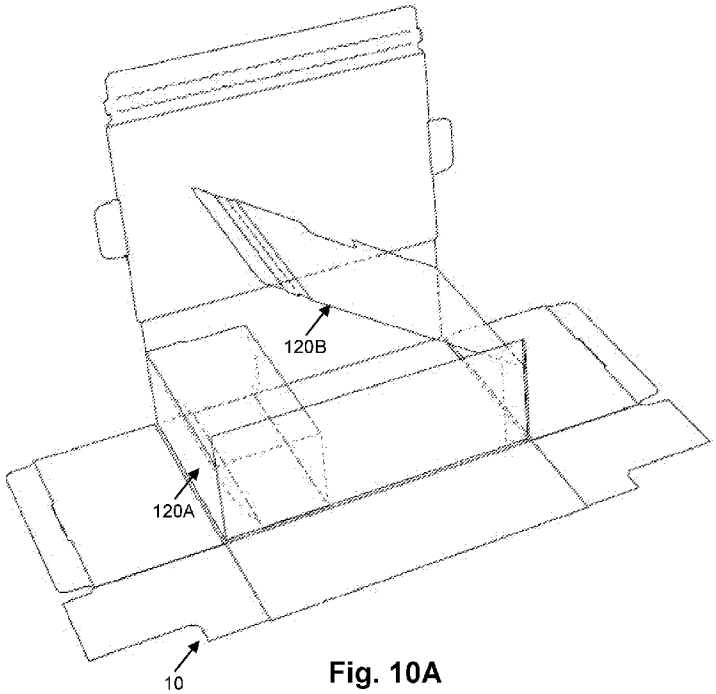

Fig. 10A

(57) Abstract: A shipping container 100 comprises: a unitary sheet 101, providing a set of external wall portions 110 and a set of internal wall portions 120 including a first internal wall portion 120A, folded to enclose a volume V; wherein the set of external wall portions 110 surrounds the set of internal wall portions 120; and wherein the first internal wall portion 120A is arrangeable in: a first arrangement, wherein the first internal wall portion 120A bounds, at least in part, the volume; and a second arrangement, wherein the first internal wall portion 120A partitions the volume to define, at least in part, a set of sub-volumes, including a first sub-volume and optionally a second sub-volume; wherein the first internal wall portion 120A is arranged to move from the first arrangement to the second arrangement by folding the first internal wall portion 120A.

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SHIPPING CONTAINER

Field

The present invention relates to shipping containers, for example for shipping of articles by parcel delivery services.

Background to the invention

Generally, shipping containers are containers having properties, for example strength, crush resistance, atmospheric protection, suitable to withstand shipment, storage, and handling (referred to collectively herein as shipping). Corrugated fibreboard cartons (also known as corrugated fibreboard boxes and colloquially as cardboard boxes) are a type of shipping container and account for around 90% of shipping containers in use. Corrugated fibreboard cartons are formed from corrugated fibreboard, typically comprising a fluted corrugated sheet and one or two flat linerboards. Corrugated fibreboard is lightweight, recyclable, and of sufficient strength for corrugated fibreboard cartons for shipping a variety of articles.

The United Kingdom parcels market is valued at nearly £10 billion annually, with growth driven particularly by ecommerce sales of articles to consumers and returns of at least some of the articles from consumers. Typically, shipping and return shipping of the articles is by parcel delivery services. Furthermore, a diversity of the articles continues to increase, including fragile and/or high value articles and/or articles of differing sizes, for example having a relatively large range of dimensions. To reduce likelihood of damage during shipping, void fill is typically used to surround and hence protect articles in shipping containers. Void fill may include loose fill chips, vermiculite loose fill, wood wool, shredded paper and/or crumpled paper, for example. Void fill may also be used when relatively smaller articles are packed in relatively larger (i.e. oversized) shipping containers. For example, a packer may select an oversized shipping container from a relatively limited number of standard sizes for a particular article and voids filled with void fill. While holding a relatively limited number of standard sizes decreases inventory requirements, use of oversized shipping containers increases use of void fill. While some void fill is biodegradable, disposable of void fill, for example by customers, may be problematic since void fill is relatively bulky.

Hence, there is a need to improve shipping containers.

Summary of the Invention

It is one aim of the present invention, amongst others, to provide a shipping container which at least partially obviates or mitigates at least some of the disadvantages of the prior art, whether identified herein or elsewhere.

A first aspect provides a shipping container comprising:
a unitary sheet, providing a set of external wall portions and a set of internal wall portions including a first internal wall portion, folded to enclose a volume;
wherein the set of external wall portions surrounds the set of internal wall portions; and
wherein the first internal wall portion is arrangeable in:
a first arrangement, wherein the first internal wall portion bounds, at least in part, the volume; and
a second arrangement, wherein the first internal wall portion partitions the volume to define, at least in part, a set of sub-volumes, including a first sub-volume and optionally a second sub-volume;
wherein the first internal wall portion is arranged to move from the first arrangement to the second arrangement by folding the first internal wall portion.

A second aspect provides a precursor for a shipping container according to the first aspect:
wherein the set of external wall portions is foldable to enclose the volume; and
wherein the set of internal wall portions are mutually coupled.

A third aspect provides a blank for a shipping container according to the first aspect.

A fourth aspect provides a method of arranging a shipping container according to the first aspect, the method comprising:
moving the first internal wall portion, by folding the first internal wall portion, from the first arrangement to the second arrangement.

A fifth aspect provides a method of providing a shipping container according to the first aspect, the method comprising:
folding the set of internal wall portions to bound, at least in part, the volume;
optionally moving the first internal wall portion, by folding the first internal wall portion, from the first arrangement to the second arrangement; and
folding the set of external wall portions to surround the set of internal wall portions and to enclose the volume.

A sixth aspect provides a method of manufacturing a blank according to the third aspect or a precursor for a shipping container according the second aspect.

Detailed Description of the Invention

According to the present invention there is provided a shipping container, as set forth in the appended claims. Also provided is a precursor for a shipping container, a blank for a shipping container, a method of arranging a shipping container, a method of providing a shipping container and a method of manufacturing a blank for a shipping container. Other features of the invention will be apparent from the dependent claims, and the description that follows.

Shipping container

The first aspect provides a shipping container comprising:
a unitary sheet, providing a set of external wall portions and a set of internal wall portions including a first internal wall portion, folded to enclose a volume;
wherein the set of external wall portions surrounds the set of internal wall portions; and
wherein the first internal wall portion is arrangeable in:
a first arrangement, wherein the first internal wall portion bounds, at least in part, the volume; and
a second arrangement, wherein the first internal wall portion partitions the volume to define, at least in part, a set of sub-volumes, including a first sub-volume and optionally a second sub-volume;
wherein the first internal wall portion is arranged to move from the first arrangement to the second arrangement by folding the first internal wall portion.

In this way, the shipping container may be arranged selectively according to whether void fill is required. For example, if dimensions of a relatively larger article correspond with that of the volume, the first internal wall portion is arranged in the first arrangement, in which the first internal wall portion does not partition the volume, and the relatively larger article is received in the volume. Conversely, if dimensions of a relatively smaller article do not correspond with that of the volume, such that the shipping container is oversized, the first internal wall portion is arranged in the second arrangement, in which the first internal wall portion partitions the volume, and the relatively smaller article is received in the first sub-volume or in the second sub-volume. That is, the first internal wall portion selectively provides a partition or divider, thereby providing void fill and thereby eliminating or reducing a requirement for conventional void fill, such as loose fill chips, vermiculite loose fill, wood wool, shredded paper and/or crumpled paper, for example. Since the first internal wall portion is provided by the unitary sheet, the first internal wall portion is integral with the shipping container, thereby improving packing efficiency since additional packing materials are not required. Additionally and/or alternatively, since the first internal wall portion partitions the volume in the second arrangement, the first internal wall portion is spaced apart from an external wall portion, thereby improving protection for a fragile and/or high value

article received in the first sub-volume or the second sub-volume. Additionally and/or alternatively, since the first internal wall portion partitions the volume in the second arrangement, a first article may be received in the first sub-volume and a second article may be received in the second sub-volume, mutually separated by the first internal wall portion.

Shipping container

The first aspect provides the shipping container (also known as a carton). In one example, the shipping container comprises and/or is a corrugated fibreboard carton. In one example, the shipping container comprises and/or is a folder, having a continuous (i.e. unbroken, uniform, having no joints therein) lower wall portion.

It should be understood that the shipping container is configurable in an open configuration (i.e. an open shipping container), for example for receiving articles in the volume via an opening, and a closed configuration (i.e. a closed shipping container), for example for shipping or storage, wherein the shipping container is closed, for example using a closure.

In one example, the shipping container is cuboidal, having a length L, a width W and a depth D. Generally, the length L is the relatively longer dimension and the width W is the relatively shorter dimension, measured along the opening of the shipping container. Generally, the depth D is the dimension between the opening and the opposite panel. It should be understood that the dimensions are generally measured internally (i.e. inner dimensions; c.f. externally i.e. outer dimensions), with the dimensions referring to the opening of an assembled shipping container. Generally, the dimensions are measure between or from centres of scores (i.e. crushed fold lines), as understood by the skilled person.

Sheet

The shipping container comprises the unitary sheet, folded to enclose the volume. It should be understood that the sheet is unitary i.e. one-piece and hence the shipping container is a one-piece shipping container. In one example, the sheet is formed from two or more mutually joined pieces and one or more corresponding joints, thereby forming the unitary sheet. In one example, the sheet comprises and/or is a single sheet, for example having no joints therein.

It should be understood the sheet has a first surface and a reverse, second surface, for example an outer surface (i.e. disposed outwardly or outwardly facing) and an inner surface (i.e. disposed inwardly or inwardly facing) respectively.

The sheet provides the set of external wall portions and the set of internal wall portions including the first internal wall portion. It should be understood that the external wall portions and the set of internal wall portions is thus formed from typically a roll of sheet, for example by cutting, scoring and slotting to permit folding.

In one example, the sheet comprises and/or is a board, for example corrugated fibreboard. Corrugated fibreboard typically comprises at least one fluted corrugated sheet and at least one linerboard. Corrugated fibreboard is lightweight, recyclable, and of sufficient strength for corrugated fibreboard cartons for shipping a variety of articles. In one example, the corrugated fibreboard is single face, single wall (also known as double face), double wall or triple wall, preferably single wall. In one example, the corrugated fibreboard comprises A-flute, B-flute, C-flute, D-flute, E-flute, F-flute or a combination thereof, preferably C-flute. Corrugated fibreboard may folded by folding and/or crash folding, for example. In one example, the flute direction is aligned with (for example, parallel to) a majority (i.e. more than 50% by number and/or length) of fold lines, for example aligned with a length of the container.

The sheet is folded to enclose the volume. It should be understood that the volume is a gross volume, including the set of internal wall portions and optional flaps, for example. A net volume may thus be defined as excluding the sheet.

External wall portions

The sheet provides the set of external wall portions (also known as panels). It should be understood that the set of external wall portions thus provides the outer, preferably outermost panels, of the shipping container i.e. exposed in use. Generally, the set of external wall portions, optionally together with a set of flaps as required, provides a conventional shipping container, in the absence of the set of internal wall portions.

In one example, the shipping container is polyhedral or substantially polyhedral i.e. a three-dimensional shape having flat polygonal faces, straight edges and sharp corners or vertices, for example a convex polyhedron such as a regular polyhedron including a tetrahedron, cube, octahedron, dodecahedron and icosahedron.

In one example, the shipping container is cuboidal (for example a rectangular cuboid) or cubic (i.e. a square cuboid), having a length L, a width W and a depth D, wherein the set of external wall portions includes six external wall portions (i.e. providing the six rectangular or square faces of a cube or cuboid), for example: a first (or lower) external wall portion and an opposed second (or upper) external wall portion respectively having a length L and a width W; a third (or left) external wall portion and an opposed fourth (or right) external wall portion therebetween and

transverse (preferably orthogonal) thereto, respectively having a width W and a depth D; and a fifth (or front) external wall portion and an opposed sixth (or rear) external wall portion therebetween and transverse (preferably orthogonal) thereto, respectively having a length L and a depth D. In one example, the first external wall portion is contiguous (i.e. adjacent, sharing a boundary, delimited by a fold line such as a score) with the third external wall portion, the fourth external wall portion, the fifth external wall portion and the sixth external wall portion, for example only contiguous with the third external wall portion, the fourth external wall portion, the fifth external wall portion and the sixth external wall portion. In one example, the second external wall portion is contiguous with the sixth external wall portion, for example only contiguous with the sixth external wall portion.

The set of external wall portions surrounds the set of internal wall portions. It should be understood that the set of internal wall portions is thus contained within the set of external wall portions and included in the volume enclosed by the sheet up.

Flaps

In one example, the sheet provides a set of flaps, for example for reinforcement, for jointing and/or for closure of the shipping container. When formed from a blank into the closed shipping container, a first (or outer) surface of flap of the set thereof confronts or contacts a second (or inner) surface of an external wall portion of a set thereof and/or of an internal wall portion of the set thereof, or vice versa. In one example, the set of flaps includes a first (or front-left) flap and an opposed second (or front-right) flap, for example wherein the fifth (or front) external wall portion is contiguous therewith. In one example, when formed from a blank into the closed shipping container, a first (or outer) surface of the first flap (or front-left) confronts or contacts a second (or inner) surface of the third (or left) external wall portion and a first (or outer) surface of the second flap (or front-right) confronts or contacts a second (or inner) surface of the third (or left) external wall portion. In one example, the set of flaps includes a third (or left-upper) flap and a fourth (or right-upper) flap, for example wherein the third (or left) external wall portion and the opposed fourth (or right) external wall portion are respectively contiguous therewith. In one example, when formed from a blank into the closed shipping container, a first (or outer) surface of the third (or left-upper) flap confronts or contacts a second (or inner) surface of the second (or upper) external wall portion and a first (or outer) surface of the fourth flap (or right-upper) confronts or contacts the second (or inner) surface of the second (or upper) external wall portion. In one example, the set of flaps includes a fifth (or upper-front) flap, for example wherein the second (or upper) external wall portion is contiguous with the fifth flap. In one example, when formed from a blank into the closed shipping container, a second (or inner) surface of the fifth (or upper-front) flap confronts or contacts (for example adhesively coupled to) a first (or outer) surface of the fifth (or front) external wall portion.

Fold lines

In one example, the sheet has a set of fold lines (for example scores i.e. crushed fold lines), wherein respective fold lines of the set thereof delimit contiguous external wall portions and/or internal wall portions and/or flaps, of the respective sets thereof. Generally, fold lines are linear.

Tabs and slots

In one example, the sheet provides a set of tabs and comprises a corresponding set of slots, for mechanically coupling the sheet in the second arrangement. Generally, tabs and slots are disposed centrally, for example along an edge or fold line. Generally, slots are linear.

Internal wall portions

The sheet provides the set of internal wall portions including the first internal wall portion (also known as partitions or dividers). It should be understood that the set of internal wall portions is surrounded by the set of external wall portions and are thus contained thereby and within (i.e. inner or innermost) the shipping container i.e. not exposed in use. It should be understood that the set of internal wall portions is provided by the same sheet as the set of external wall portions.

As described above, the first internal wall portion selectively provides a partition or divider. Generally, the set of internal wall portions selectively provides respective partitions or dividers.

In one example, the first internal wall portion and an external wall portion of the set thereof are mutually contiguous (i.e. the first internal wall portion is contiguous with an external wall portion of the set thereof). That is, the first internal wall portion is adjacent to, shares a boundary with and/or is delimited by a fold line such as a score between an external wall portion of the set thereof. In one example, the first internal wall portion and an external wall portion of the set thereof are mutually delimited by a fold. In other words, the first internal wall portion is provided by the sheet similarly to the set of external wall portions and/or the set of flaps and continuous therewith.

In one example, the shipping container is cuboidal or cubic, the first internal wall portion is contiguous with the fifth (or front) external wall portion or the sixth (or rear) external wall portion and the first internal wall portion corresponds, in the first arrangement, with: the third (or left) external wall portion and the first (or lower) external wall portion or the second (or upper) external wall portion and optionally the fourth (or right) external wall portion; or the fourth (or right)

external wall portion and the first (or lower) external wall portion or the second (or upper) external wall portion and optionally the third (or left) external wall portion.

In one example, the shipping container is cuboidal or cubic, the first internal wall portion is contiguous with the third (or left) external wall portion or the fourth (or right) external wall portion and the first internal wall portion corresponds, in the first arrangement, with: the fifth (or front) external wall portion and the first (or lower) external wall portion or the second (or upper) external wall portion and optionally the sixth (or rear) external wall portion; or the sixth (or rear) external wall portion and the first (or lower) external wall portion or the second (or upper) external wall portion and optionally the fifth (or front) external wall portion.

In one example, the shipping container is cuboidal or cubic, having a length L, a width W and a depth D, and the first internal wall portion is rectangular, having a width w and a length l, wherein the width $w \leq W$, preferably $w = W$, and the length $L \leq l \leq D + L + D$, preferably $D + L \leq l \leq D + L + D$, more preferably $l \sim D + L$. In one example, the shipping container is cuboidal or cubic, having a length L, a width W and a depth D, and the first internal wall portion is rectangular, having a width w and a length l, wherein the width $w \leq L$, preferably $w = L$, and the length $W \leq l \leq D + W + D$, preferably $D + W \leq l \leq D + W + D$, more preferably $l \sim D + W$.

In one example, a sheet edge (for example, a cut edge) of the first internal wall portion is coincident (i.e. is aligned) with a fold between adjacent external wall portions of the set thereof, for example in the first arrangement and/or in the second arrangement. In this way, the first internal wall portion reinforces the corresponding edge of the shipping container and/or facilitates assembly of the shipping carton, for example from a blank or precursor.

In one example, the first internal wall portion includes a set of fold lines (for example formed therein and/or thereon. In this way, the first internal wall portion may be folded at a predetermined position (i.e. a fold line of the set thereof), thereby facilitating assembly of the shipping container and/or moving the first internal wall portion from the first arrangement to the second arrangement. In one example, the shipping container is cuboidal or cubic, having a length L, a width W and a depth D, and the first internal wall portion is rectangular, having a width w and a length l, wherein the width $w \leq W$, preferably $w = W$, and the length $L \leq l \leq D + L + D$, preferably $D + L \leq l \leq D + L + D$, more preferably $l \sim D + L$, wherein the set of fold lines includes a first fold line spaced apart from a sheet edge of the first internal wall portion by a spacing $s_1 \leq D$, optionally a second fold line spaced apart from the first fold line by a spacing $s_2 \leq L/2$, preferably $s_2 \leq L/3$, more preferably $s_2 \leq 4$ and optionally a third fold line spaced apart from the second fold line by a spacing $s_3 = s_1$. In this way, the first internal wall portion may be folded to form a cuboid at or proximal a left or right external wall portion, for example. In one example, the shipping container is cuboidal or cubic, having a length L, a width W and a depth

D, and the first internal wall portion is rectangular, having a width w and a length l, wherein the width $w \leq L$, preferably $w = L$, and the length $W \leq l \leq D + W + D$, preferably $D + W \leq l \leq D + W + D$, more preferably $l \sim D + W$, wherein the set of fold lines includes a first fold line spaced apart from a sheet edge of the first internal wall portion by a spacing $s_1 \leq D$, optionally a second fold line spaced apart from the first fold line by a spacing $s_2 \leq L/2$, preferably $s_2 \leq L/3$, more preferably $s_2 \leq 4$ and optionally a third fold line spaced apart from the second fold line by a spacing $s_3 = s_1$. In this way, the first internal wall portion may be folded to form a cuboid at or proximal a front or rear external wall portion, for example. In one example, the set of fold lines is aligned, for example parallel with, a flute direction of the sheet. In this way, folding and/or rolling of the first internal wall portion, for example to a desired size and/or shape of the void fill, is facilitated.

In one example, the first internal wall portion includes a set of apertures, including a first aperture, therethrough. In this way, flexibility of the first internal wall portion may be controlled and/or protection afforded thereby modified.

In one example, the set of internal wall portions includes a second internal wall portion. In this way, additional void filled may be selectively provided, for example, as described with respect to the first internal wall portion. The second internal wall portion may be as described with respect to the first internal portion mutatis mutandis.

In one example, the first internal wall portion and the second internal wall portion are mutually opposed. In this way, an article may be received between the first internal wall portion and the second internal wall portion in the second configuration, thereby improving protection of an article received therebetween. Additionally and/or alternatively, an article may be received between the first internal wall portion and the second internal wall portion in the first configuration, for example enclosed therebetween.

In one example, the first internal wall portion and the second internal wall portion are mutually coupled, for example adhesively and/or mechanically (e.g. using staples). In this way, the first internal portion and the second internal wall portion may be arranged mutually orthogonally in the respective second arrangements, for example.

In one example, the first internal wall portion and the second internal wall portion are mutually coupled via a flap, for example adhesively and/or mechanically (e.g. using staples), for example of a set thereof, as described herein. In this way, the first internal portion and the second internal wall portion may be arranged mutually opposed in the respective second arrangements, for example. In one example, the flap corresponds with an external side wall portion of the set thereof. In one example, the shipping container is cuboidal or cubic, the first internal wall portion

and the second internal wall portion are respectively contiguous with the sixth (or rear) external wall portion and the first internal wall portion corresponds, in the first arrangement, with the third (or left) external wall portion and the first (or lower) external wall portion or the second (or upper) external wall portion and optionally the fourth (or right) external wall portion; the flap corresponds with the fifth (or front) external wall portion or the sixth (or rear) external wall portion in the first arrangement and the second arrangement; and the second internal wall portion, coupled to the flap, corresponds, in the first arrangement, with the fourth (or right) external wall portion and the first (or lower) external wall portion or the second (or upper) external wall portion and optionally the third (or left) external wall portion. In this way, the sixth (or rear) external wall portion, the first internal wall portion, the flap and the second internal wall portion define a perimeter of the volume, for example four sides thereof. In this way, the shipping container may be partially assembled, for example from a precursor thereof, on the first (or lower wall portion), the first internal wall portion and/or the second internal wall portion selectively arranged in the second arrangement, an article received in the volume or in the first or second sub-volume respectively, and assembly of the shipping container completed around the thus-defined perimeter. The first internal wall portion and the second internal wall portion may be respectively contiguous with the third (or left) external wall portion, the fourth (or right) external wall portion or the fifth (or front) external wall portion, mutatis mutandis.

In one example, the set of flaps includes a first (or front-left) flap and an opposed second (or front-right) flap, wherein the fifth (or front) external wall portion is contiguous therewith and wherein the third (or left) external wall portion and the opposed fourth (or right) external wall portion are respectively contiguous therewith. In one example, the first (or front-left) flap and the opposed second (or front-right) flap respectively comprise diagonal fold lines and. In this way, the flaps and, when folded, support these external wall portions of the partially assembled precursor, facilitating filling of the container. In this way, the flaps and these external wall portions define a perimeter of the volume, for example four sides thereof, as described above mutatis mutandis.

First arrangement

The first internal wall portion is arrangeable in the first arrangement, wherein the first internal wall portion bounds, at least in part, the volume. That is, in the first arrangement, the first internal wall portion does not partition or substantially partition the volume, such that a three-dimensional shape of the volume is substantially similar to that of the shipping container. It should be understood that by bounding, at least in part, the volume, the first internal wall portion defines, for example, one or more faces of the volume. In other words, in the first arrangement, the volume has the largest possible dimensions in which to receive an article. Additionally and/or

alternatively, in the first arrangement, the first internal wall portion may reinforce an external wall portion.

In one example, the first internal wall portion extends between mutually opposed external wall portions of the set thereof, in the first arrangement. For example, if the shipping container is cuboidal or cubic, the first internal wall portion may extend, for example partially or fully, between the third (or left) external wall portion and the opposed fourth (or right) external wall portion and/or between the fifth (or front) external wall portion and the opposed sixth (or rear) external wall portion, for example across and above the first (or lower) external wall portion or across and below the second (or upper) external wall portion. In this way, dimensions of the first internal wall portion may be relatively increased, thereby providing a relatively larger partition.

In one example, the first internal wall portion confronts an external wall portion of the set thereof, in the first arrangement. For example, if the shipping container is cuboidal or cubic, the first internal wall portion may confront the first (or lower) external wall portion or the second (or upper) external wall portion. That is, the first internal wall portion lies, for example flat, against an external wall portion, thereby providing a double wall. In this way, dimensions of the volume are maximised.

In one example, the first internal wall portion corresponds (i.e. have a similar shape and/or dimensions) with one or more external wall portions, in the first arrangement, for example one or more serially or sequentially adjacent external wall portions. In this way, the first internal wall portion lies, for example flat, against and/or parallel to these external wall portions. In one example, the shipping container is cuboidal or cubic and the first internal wall portion corresponds, in the first arrangement, with: the third (or left) external wall portion and the first (or lower) external wall portion or the second (or upper) external wall portion and optionally the fourth (or right) external wall portion; the fourth (or right) external wall portion and the first (or lower) external wall portion or the second (or upper) external wall portion and optionally the third (or left) external wall portion; the fifth (or front) external wall portion and the first (or lower) external wall portion or the second (or upper) external wall portion and optionally the sixth (or rear) external wall portion; or the sixth (or rear) external wall portion and the first (or lower) external wall portion or the second (or upper) external wall portion and optionally the fifth (or front) external wall portion. Preferably, the first internal wall portion corresponds with at least the second (or upper) external wall portion. In this way, the first internal wall portion may be moved, for example to the second arrangement, via an opening provided before the second (or upper) external wall portion is closed.

Second arrangement

The first internal wall portion is arrangeable in the second arrangement, wherein the first internal wall portion partitions the volume to define, at least in part, the set of sub-volumes, including the first sub-volume and the second sub-volume. That is, the first internal wall portion selectively sub-divides the volume, thereby defining relatively smaller sub-volumes, in the second arrangement.

In one example, the first sub-volume and the second sub-volume are complementary polyhedral sub-volumes, in the second arrangement. For example, the first sub-volume and the second sub-volume may be complementary wedges or cuboids, for example, depending on how the first internal wall portion is folded.

In one example, the complementary polyhedral sub-volumes are cuboidal or substantially cuboidal, for example formed by folding the first internal wall portion perpendicularly, wherein two, three or four successive faces of the first sub-volume are provided by the first internal wall portion and remaining faces are provided by the set of external wall portions. Other shapes may be provided.

In one example, sub-portions of the first internal wall portion are mutually opposed, in the second arrangement, for example formed by multiply folding the first internal wall portion perpendicularly, wherein two, three or four successive faces of the first sub-volume are provided by the first internal wall portion and remaining faces are provided by the set of external wall portions.

In one example, the first internal wall portion comprises and/or is a cylinder or a spiral, in the second arrangement, for example formed by rolling (i.e. progressively folding) the first internal wall portion. Rolling, for example by hand, is relatively quick and provides a robust (semi-solid) void fill.

Moving

The first internal wall portion is arranged to move from the first arrangement to the second arrangement by folding the first internal wall portion. In this way, the volume may be selectively partitioned, for example according to a particular article to be received in the shipping container. Folding, for example by hand, is relatively quick while it provides customisation for the particular article in terms of how and/or where the partition is to be disposed.

In one example, the first internal wall portion is arranged to move from the second arrangement to the first arrangement by unfolding the first internal wall portion. In this way, the shipping container may be reused for another article, for example. In one example, the first internal wall

portion is arranged to move between the first arrangement and the second arrangement, for example repeatedly. In this way, the shipping container may be reused repeatedly, for different articles, for example.

In one example, the shipping container is arrangeable in:
a third arrangement, wherein the first internal wall portion partitions the volume;
wherein the first wall portion is arranged to move from the first arrangement to the second arrangement or from the second arrangement to the third arrangement by folding the sheet.

It should be understood that the first internal wall portion partitions the volume differently in the third arrangement compared with the second arrangement

In one example, the first internal wall portion spans between mutually opposed external wall portions of the set thereof, in the first arrangement and in the second arrangement.

In one example, the shipping container comprises a coupling member (for example, adhesive strip) for mutually coupling the first internal wall portion and an external wall portion of the set thereof, in the second arrangement. In this way, the first internal wall portion may be secured in the second arrangement, thereby better limiting movement of an article in the shipping container.

In one example, the set of external wall portions and the set of internal wall portions provide double wall portions, for example in the first arrangement and/or in the second arrangement. In this way, reinforcement and/or further protection may be provided.

Precursor

The second aspect provides a precursor for a shipping container according to the first aspect:
wherein the set of external wall portions is foldable to enclose the volume; and
wherein the set of internal wall portions are mutually coupled.

It should be understood that the precursor is thus a partially assembled shipping container, for example provided by partially assembling a blank according to the third aspect, wherein the shipping container is partially assembled by mutually coupling the set of internal wall portions, as described with respect to the first aspect. Typically, precursors are supplied by a manufacturer of shipping containers, to facilitate assembly by packers, for example.

In one example, the precursor is configurable in:
a first configuration, wherein the precursor is planar or substantially planar, for example for shipping and storing thereof; and

a second configuration, wherein the set of internal wall portions and optionally the set of external wall portions define a perimeter of the volume, for example three, four or five sides thereof.

In this way, during packing of an article, a shipping container may be partially assembled from the precursor, by moving the precursor from the first configuration to the second configuration, the article received within the defined perimeter of the volume, and assembly and closure of the shipping container completed around the article received therein.

In one example, the set of internal wall portions upstands from an external wall portion of the set thereof, for example a first (or lower) external wall portion, in the second configuration. In this way, the shipping container may be partially assembled from the precursor on a packing bench, for example, wherein the first (or lower) external wall portion lays thereon.

In one example, the first internal wall portion and a second internal wall portion are mutually coupled via a flap, for example adhesively and/or mechanically (e.g. using staples), for example of a set thereof, as described herein. In this way, the first internal portion and the second internal wall portion may be arranged mutually opposed in the respective second arrangements, for example. In one example, the flap corresponds with an external side wall portion of the set thereof. In one example, the shipping container is cuboidal or cubic, the first internal wall portion and the second internal wall portion are respectively contiguous with the sixth (or rear) external wall portion and the first internal wall portion corresponds, in the first arrangement, with the third (or left) external wall portion and the first (or lower) external wall portion or the second (or upper) external wall portion and optionally the fourth (or right) external wall portion; the flap corresponds with the fifth (or front) external wall portion or the sixth (or rear) external wall portion in the first arrangement and the second arrangement; and the second internal wall portion, coupled to the flap, corresponds, in the first arrangement, with the fourth (or right) external wall portion and the first (or lower) external wall portion or the second (or upper) external wall portion and optionally the third (or left) external wall portion. In this way, the sixth (or rear) external wall portion, the first internal wall portion, the flap and the second internal wall portion define a perimeter of the volume, for example four sides thereof. In this way, the shipping container may be partially assembled, for example from a precursor thereof, on the first (or lower wall portion), the first internal wall portion and/or the second internal wall portion selectively arranged in the second arrangement, an article received in the volume or in the first or second sub-volume respectively, and assembly of the shipping container completed around the thus-defined perimeter. The first internal wall portion and the second internal wall portion may be respectively contiguous with the third (or left) external wall portion, the fourth (or right) external wall portion or the fifth (or front) external wall portion, mutatis mutandis.

Blank

The third aspect provides a blank for a shipping container according to the first aspect.

The blank may be as described with respect to the first aspect.

In one example, the blank comprises and/or is unitary sheet, providing a set of external wall portions and a set of internal wall portions including a first internal wall portion, foldable to enclose a volume, as described with respect to the first aspect.

In one example, the shipping container is cuboidal (for example a rectangular cuboid) or cubic (i.e. a square cuboid), having a length L, a width W and a depth D, wherein the set of external wall portions includes six external wall portions (i.e. providing the six rectangular or square faces of a cube or cuboid), for example: a first (or lower) external wall portion and an opposed second (or upper) external wall portion respectively having a length L and a width W; a third (or left) external wall portion and an opposed fourth (or right) external wall portion therebetween and transverse (preferably orthogonal) thereto, respectively having a width W and a depth D; and a fifth (or front) external wall portion and an opposed sixth (or rear) external wall portion therebetween and transverse (preferably orthogonal) thereto, respectively having a length L and a depth D. In one example, the first external wall portion is contiguous (i.e. adjacent, sharing a boundary, delimited by a fold line such as a score) with the third external wall portion, the fourth external wall portion, the fifth external wall portion and the sixth external wall portion, for example only contiguous with the third external wall portion, the fourth external wall portion, the fifth external wall portion and the sixth external wall portion. In one example, the second external wall portion is contiguous with the sixth external wall portion, for example only contiguous with the sixth external wall portion.

In one example, the shipping container is cuboidal or cubic, the first internal wall portion is contiguous with the fifth (or front) external wall portion or the sixth (or rear) external wall portion. In one example, the shipping container is cuboidal or cubic, the first internal wall portion is contiguous with the third (or left) external wall portion or the fourth (or right) external wall portion.

In one example, the shipping container is cuboidal or cubic, having a length L, a width W and a depth D, and the first internal wall portion is rectangular, having a width w and a length l, wherein the width $w \leq W$, preferably $w = W$, and the length $L \leq l \leq D + L + D$, preferably $D + L \leq l \leq D + L + D$, more preferably $l \sim D + L$. In one example, the shipping container is cuboidal or cubic, having a length L, a width W and a depth D, and the first internal wall portion is rectangular, having a width w and a length l, wherein the width $w \leq L$, preferably $w = L$, and the length $W \leq l \leq D + W + D$, preferably $D + W \leq l \leq D + W + D$, more preferably $l \sim D + W$.

In one example, the sheet provides a set of flaps, for example for reinforcement, for jointing and/or for closure of the shipping container. In one example, the set of flaps includes a first (or front-left) flap and an opposed second (or front-right) flap, for example wherein the fifth (or front) external wall portion is contiguous therewith. In one example, the set of flaps includes a third (or left-upper) flap and a fourth (or right-upper) flap, for example wherein the third (or left) external wall portion and the opposed fourth (or right) external wall portion are respectively contiguous therewith. In one example, the set of flaps includes a fifth (or upper-front) flap, for example wherein the second (or upper) external wall portion is contiguous with the fifth flap.

In one example, the sheet has a set of fold lines (for example scores i.e. crushed fold lines), wherein respective fold lines of the set thereof delimit contiguous external wall portions and/or internal wall portions and/or flaps, of the respective sets thereof.

Method of arranging a shipping container

The fourth aspect provides a method of arranging a shipping container according to the first aspect, the method comprising:
moving the first internal wall portion, by folding the first internal wall portion, from the first arrangement to the second arrangement.

The method may include any steps as described with respect to the first aspect.

Method of providing a shipping container

The fifth aspect provides a method of providing a shipping container according to the first aspect, the method comprising:
folding the set of internal wall portions to bound, at least in part, the volume;
optionally moving the first internal wall portion, by folding the first internal wall portion, from the first arrangement to the second arrangement; and
folding the set of external wall portions to surround the set of internal wall portions and to enclose the volume.

Method of manufacturing a blank

The sixth aspect provides a method of manufacturing a blank according to the third aspect or a precursor for a shipping container according the second aspect.

Definitions

Throughout this specification, the term “comprising” or “comprises” means including the component(s) specified but not to the exclusion of the presence of other components. The term “consisting essentially of” or “consists essentially of” means including the components specified but excluding other components except for materials present as impurities, unavoidable materials present as a result of processes used to provide the components, and components added for a purpose other than achieving the technical effect of the invention, such as colourants, and the like.

The term “consisting of” or “consists of” means including the components specified but excluding other components.

Whenever appropriate, depending upon the context, the use of the term “comprises” or “comprising” may also be taken to include the meaning “consists essentially of” or “consisting essentially of”, and also may also be taken to include the meaning “consists of” or “consisting of”.

The optional features set out herein may be used either individually or in combination with each other where appropriate and particularly in the combinations as set out in the accompanying claims. The optional features for each aspect or exemplary embodiment of the invention, as set out herein are also applicable to all other aspects or exemplary embodiments of the invention, where appropriate. In other words, the skilled person reading this specification should consider the optional features for each aspect or exemplary embodiment of the invention as interchangeable and combinable between different aspects and exemplary embodiments.

Brief description of the drawings

For a better understanding of the invention, and to show how exemplary embodiments of the same may be brought into effect, reference will be made, by way of example only, to the accompanying diagrammatic Figures, in which:

Figures 1 and 2 are perspective views of a CAD model of a blank for a shipping container according to an exemplary embodiment;

Figures 3 and 4 are perspective views of the CAD model of a precursor for a shipping container according to an exemplary embodiment, formed from the blank of Figures 1 and 2;

Figures 5 to 7 are perspective views of the CAD model of partially-assembling a shipping container according to an exemplary embodiment from the precursor of Figures 3 and 4;

Figures 8A and 8B are perspective views of the CAD model of arranging a first internal wall portion of the partially-assembled shipping container of Figures 5 to 7 in a second configuration;

Figures 9A and 8B are perspective views of the CAD model of the shipping container of Figures 8A and 8B, wherein the first internal wall portion is arranged in the second configuration;

Figures 10A and 10B are perspective views of the CAD model of arranging a second internal wall portion of the shipping container of Figures 9A and 9B in a first configuration;

Figures 11A and 11B are perspective views of the CAD model of the shipping container of Figures 10A and 10B, wherein the second internal wall portion is arranged in the first configuration;

Figures 12A to 16B are perspective views of the CAD model of fully-assembling the shipping container of Figures 11A and 11B;

Figure 17 is a CAD drawing of a blank for a shipping container according to an exemplary embodiment; and

Figure 18 is a perspective view of a CAD model of a blank for a shipping container according to an exemplary embodiment.

Detailed Description of the Drawings

Generally, like reference signs indicate like features.

Figures 1 and 2 are perspective views of a CAD model of a blank 1 for a shipping container 100 according to an exemplary embodiment. Fold lines are shown in red. Hidden lines are shown dashed. Edges are shown in black.

In this example, the blank 1 is unitary sheet 101, providing a set of external wall portions 110 and a set of internal wall portions 120 including a first internal wall portion 120A, foldable to enclose a volume V , as described with respect to the first aspect.

In this example, the shipping container 100 is cuboidal, having a length L, a width W and a depth D, wherein the set of external wall portions 110 includes six external wall portions: a first (or lower) external wall portion 110A and an opposed second (or upper) external wall portion 110B respectively having a length L and a width W; a third (or left) external wall portion 110C and an opposed fourth (or right) external wall portion 110D therebetween and transverse (preferably

orthogonal) thereto, respectively having a width W and a depth D; and a fifth (or front) external wall portion 110E and an opposed sixth (or rear) external wall portion 110F therebetween and transverse (preferably orthogonal) thereto, respectively having a length L and a depth D. In this example, the first external wall portion 110A is contiguous (i.e. adjacent, sharing a boundary, delimited by a fold line such as a score) with the third external wall portion 110C, the fourth external wall portion 110D, the fifth external wall portion 110E and the sixth external wall portion 110F, for example only contiguous with the third external wall portion 110C, the fourth external wall portion 110D, the fifth external wall portion 110E and the sixth external wall portion 110F. In this example, the second external wall portion 110B is contiguous with the sixth external wall portion 110F.

In this example, the first internal wall portion 120A is contiguous with the sixth (or rear) external wall portion 110F.

In this example, the first internal wall portion 120A is rectangular, having a width w and a length l, wherein the width $w = W$, and the length $l \sim D + L$.

In this example, the sheet 101 provides a set of flaps 140. In this example, the set of flaps 140 includes a first (or front-left) flap 140A and an opposed second (or front-right) flap 140B, wherein the fifth (or front) external wall portion 110E is contiguous therewith. In this example, the set of flaps 140 includes a third (or left-upper) flap 140C and a fourth (or right-upper) flap 140D, wherein the third (or left) external wall portion 110C and the opposed fourth (or right) external wall portion 110D are respectively contiguous therewith. In this example, the set of flaps 140 includes a fifth (or upper-front) flap 140E for sealing the shipping container 100 closed, wherein the second (or upper) external wall portion 110B is contiguous with the fifth flap 140E. In this example, the set of flaps 140 includes a sixth flap 140F contiguous with the first internal wall portion 120A and a seventh flap 140G contiguous with the second internal wall portion 120B.

In this example, the sheet 101 has a set of fold lines 130 (for example scores i.e. crushed fold lines), wherein respective fold lines of the set thereof delimit contiguous external wall portions and/or internal wall portions and/or flaps, of the respective sets thereof.

Figures 3 and 4 are perspective views of the CAD model of a precursor 10 for a shipping container 100 according to an exemplary embodiment, formed from the blank 1 of Figures 1 and 2.

Figures 5 to 7 are perspective views of the CAD model of partially-assembling a shipping container 100 according to an exemplary embodiment from the precursor 10 of Figures 3 and 4.

The shipping container 100 comprises:
a unitary sheet 101, providing a set of external wall portions 110 and a set of internal wall portions 120 including a first internal wall portion 120A, folded to enclose a volume V ;
wherein the set of external wall portions 110 surrounds the set of internal wall portions 120; and
wherein the first internal wall portion 120A is arrangeable in:
a first arrangement, wherein the first internal wall portion 120A bounds, at least in part, the volume; and
a second arrangement, wherein the first internal wall portion 120A partitions the volume to define, at least in part, a set of sub-volumes, including a first sub-volume and optionally a second sub-volume;
wherein the first internal wall portion 120A is arranged to move from the first arrangement to the second arrangement by folding the first internal wall portion 120A.

In this example, the shipping container 100 is a corrugated fibreboard carton. In this example, the shipping container 100 is a folder, having a continuous lower wall portion.

In this example, the shipping container 100 is cuboidal, having a length L, a width W and a depth D.

The shipping container 100 comprises the unitary sheet 101, folded to enclose the volume V . In this example, the sheet 101 is a single sheet 101, having no joints therein.

The sheet 101 has a first surface 101A and a reverse, second surface 101B, for example an outer surface (i.e. disposed outwardly or outwardly facing) and an inner surface (i.e. disposed inwardly or inwardly facing) respectively.

In this example, the sheet 101 is a corrugated fibreboard. In this example, the corrugated fibreboard is single wall. In this example, the corrugated fibreboard is C-flute.

In this example, the shipping container 100 is cuboidal, having a length L, a width W and a depth D, wherein the set of external wall portions 110 includes six external wall portions (i.e. providing the six rectangular or square faces of a cube or cuboid), for example: a first (or lower) external wall portion 110A and an opposed second (or upper) external wall portion 110B respectively having a length L and a width W; a third (or left) external wall portion 110C and an opposed fourth (or right) external wall portion 110D therebetween and transverse (preferably orthogonal) thereto, respectively having a width W and a depth D; and a fifth (or front) external wall portion 110E and an opposed sixth (or rear) external wall portion 110F therebetween and transverse (preferably orthogonal) thereto, respectively having a length L and a depth D. In this example, the first external wall portion 110A is contiguous (i.e. adjacent, sharing a boundary, delimited by

a fold line such as a score) with the third external wall portion 110C, the fourth external wall portion 110D, the fifth external wall portion 110E and the sixth external wall portion 110F, for example only contiguous with the third external wall portion 110C, the fourth external wall portion 110D, the fifth external wall portion 110E and the sixth external wall portion 110F. In this example, the second external wall portion 110B is contiguous with the sixth external wall portion 110F.

In this example, the sheet 101 provides a set of flaps 140, for example for reinforcement, for jointing and/or for closure of the shipping container 100. When formed from a blank 1 into the closed shipping container 100, a first (or outer) surface of flap 140A of the set thereof confronts or contacts a second (or inner) surface of an external wall portion of a set thereof and/or of an internal wall portion of the set thereof, or vice versa. In this example, the set of flaps 140 includes a first (or front-left) flap 140A and an opposed second (or front-right) flap 140B, wherein the fifth (or front) external wall portion 110E is contiguous therewith. In this example, when formed from the blank 1 into the closed shipping container 100, a first (or outer) surface of the first (or front-left) flap 140A confronts or contacts a second (or inner) surface of the third (or left) external wall portion 110C and a first (or outer) surface of the second (or front-right) flap 140B confronts or contacts a second (or inner) surface of the third (or left) external wall portion 110C. In this example, the set of flaps 140 includes a third (or left-upper) flap 140C and a fourth (or right-upper) flap 140D, wherein the third (or left) external wall portion 110C and the opposed fourth (or right) external wall portion 110D are respectively contiguous therewith. In this example, when formed from the blank 1 into the closed shipping container 100, a first (or outer) surface of the third (or left-upper) flap 140C confronts or contacts a second (or inner) surface of the second (or upper) external wall portion 110B and a first (or outer) surface of the fourth (or right-upper) flap 140D confronts or contacts the second (or inner) surface of the second (or upper) external wall portion 110B. In this example, the set of flaps 140 includes a fifth (or upper-front) flap 140E, wherein the second (or upper) external wall portion 110B is contiguous with the fifth (or upper-front) flap 140E. In this example, when formed from the blank 1 into the closed shipping container 100, a second (or inner) surface of the fifth (or upper-front) flap 140E confronts or contacts (for example adhesively coupled to) a first (or outer) surface of the fifth (or front) external wall portion 110E.

In this example, the sheet 101 has a set of fold lines 130 (for example scores i.e. crushed fold lines), wherein respective fold lines of the set thereof delimit contiguous external wall portions and/or internal wall portions and/or flaps, of the respective sets thereof, as summarised in Table 1.

Fold line	Portion, flap or tab	Portion, flap or tab
130AC	110A	110C

130AD	110A	110D
130AE	110A	110E
130AF	110A	110F
130FB	110F	110B
130EA	110E	140A
130EB	110E	140B
130CC	110C	140C
130DD	110D	140D
130BE	110B	140E
130BF	120A	140F
130BG	120B	140G
130AH	125A	140H
130FC	110F	120A
130FD	110F	120B
130AA	120A	125A
130BB	120B	125B

Table 1: Fold lines.

In this example, the first internal wall portion 120A and an external wall portion of the set thereof are mutually contiguous (i.e. the first internal wall portion 120A is contiguous with an external wall portion of the set thereof). In this example, the first internal wall portion 120A and an external wall portion of the set thereof are mutually delimited by a fold.

In this example, the sheet 101 provides a set of tabs 150 (150A, 150B, 150C) and comprises a corresponding set of slots 160 (160A, 160B, 160C), for mechanically coupling the sheet 101 in the second arrangement. The tabs 150A and 150B are contiguous with the second (or upper) external wall portion 110B and the corresponding slots 160A and 160B, respectively, are coincident with the fold lines 130CC and 130DD, respectively. The tab 150C is contiguous with the first (or lower) external wall portion 110A and the corresponding slot 160C is coincident with fold line 130AH.

In this example, the shipping container 100 is cuboidal, the first internal wall portion 120A is contiguous with the sixth (or rear) external wall portion 110F and the first internal wall portion 120A corresponds, in the first arrangement, with: the third (or left) external wall portion 110C and the first (or lower) external wall portion 110A.

In this example, the shipping container 100 is cuboidal, having a length L, a width W and a depth D, and the first internal wall portion 120A is rectangular, having a width w and a length l, wherein the width $w = W$, and the length $l \sim D + L$.

In this example, a sheet 101 edge (for example, a cut edge) of the first internal wall portion 120A is coincident (i.e. is aligned) with a fold between adjacent external wall portions of the set thereof, for example in the first arrangement and/or in the second arrangement.

In this example, the first internal wall portion 120A includes a set of fold lines 123, for example formed therein and/or thereon. In this example, the shipping container 100 is cuboidal, having a length L, a width W and a depth D, and the first internal wall portion 120A is rectangular, having a width w and a length l, wherein the width $w = W$, and the length $l \sim D + L$, wherein the set of fold lines 123 includes a first fold line 123AA spaced apart from a sheet 101 edge of the first internal wall portion 120A by a spacing $s_1 < D$. The set of fold lines 123 includes a second fold line 123AB spaced apart from the first fold line 123AA by a spacing $s_2 < D$ and a third fold line 123AC spaced apart from the second fold line 123AB by a spacing $s_3 < D$.

In this example, the set of internal wall portions 120 includes a second internal wall portion 120B.

In this example, the first internal wall portion 120A and the second internal wall portion 120B are mutually opposed.

In this example, the first internal wall portion 120A and the second internal wall portion 120B are mutually coupled via a flap 125A, for example adhesively and/or mechanically (e.g. using staples), for example of a set thereof, as described herein, to a tab 125B. In this example, the flap 125A is contiguous with the first internal wall portion 120A and the tab 125B is contiguous with the second internal wall portion 120B. In this example, the flap 125A corresponds with an external side wall portion of the set thereof. In this example, the shipping container 100 is cuboidal, the first internal wall portion 120A and the second internal wall portion 120B are respectively contiguous with the sixth (or rear) external wall portion 110F and the first internal wall portion 120A corresponds, in the first arrangement, with the third (or left) external wall portion 110C and the second (or upper) external wall portion 110B; the flap 125 corresponds with the fifth (or front) external wall portion 110E in the first arrangement and the second arrangement; and the second internal wall portion 120B, coupled to the flap 125, corresponds, in the first arrangement, with the fourth (or right) external wall portion 110D and the second (or upper) external wall portion 110B. In this way, the sixth (or rear) external wall portion 110F, the first internal wall portion 120A, the flap and the second internal wall portion 120B define a perimeter of the volume V , for example four sides thereof.

In this example, the first internal wall portion 120A extends between mutually opposed external wall portions of the set thereof, in the first arrangement. In this example, the first internal wall portion 120A extends, fully, between the third (or left) external wall portion 110C and the opposed fourth (or right) external wall portion 110D and between the fifth (or front) external wall portion 110E and the opposed sixth (or rear) external wall portion 110F, across and below the second (or upper) external wall portion 110B.

In this example, the first internal wall portion 120A confronts an external wall portion of the set thereof, in the first arrangement. In this example, the first internal wall portion 120A confronts the second (or upper) external wall portion 110B.

In this example, the first sub-volume V_1 and the second sub-volume V_2 are complementary polyhedral sub-volumes, in the second arrangement.

In this example, the complementary polyhedral sub-volumes (i.e. the first sub-volume V_1 and the second sub-volume V_2) are cuboidal, for example formed by folding the first internal wall portion 120A perpendicularly, wherein two, three or four successive faces of the first sub-volume are provided by the first internal wall portion 120A and remaining faces are provided by the set of external wall portions 110.

In this example, sub-portions of the first internal wall portion 120A are mutually opposed, in the second arrangement, for example formed by multiply folding the first internal wall portion 120A perpendicularly, wherein two, three or four successive faces of the first sub-volume are provided by the first internal wall portion 120A and remaining faces are provided by the set of external wall portions 110.

In this example, the first internal wall portion 120A is arranged to move from the second arrangement to the first arrangement by unfolding the first internal wall portion 120A. In this example, the first internal wall portion 120A is arranged to move between the first arrangement and the second arrangement, for example repeatedly.

In this example, the shipping container 100 is arrangeable in:
a third arrangement, wherein the first internal wall portion 120A partitions the volume;
wherein the first wall portion is arranged to move from the first arrangement to the second arrangement or from the second arrangement to the third arrangement by folding the sheet 101.

In this example, the first internal wall portion 120A spans between mutually opposed external wall portions of the set thereof, in the first arrangement and in the second arrangement.

In this example, the shipping container 100 comprises a coupling member 170B (for example, adhesive strip), provided on the surface 101B of the sixth flap 140F, for mutually coupling the first internal wall portion 120A and an external wall portion of the set thereof, in the second arrangement. In this example, the shipping container 100 comprises a coupling member 170C (for example, adhesive strip), provided on the surface 101B of the seventh flap 140G, for mutually coupling the second internal wall portion 120B and an external wall portion of the set thereof, in the second arrangement. In this example, the shipping container 100 comprises a coupling member 170C (for example, adhesive strip), provided on the surface 101B of the fifth (or upper-front) flap 140E, for mutually coupling the fifth (or upper-front) flap 140E and the fifth (or front) external wall portion 110E, in the second arrangement.

In this example, the set of external wall portions 110 and the set of internal wall portions 120 provide double wall portions, for example in the first arrangement and/or in the second arrangement.

Figures 8A and 8B are perspective views of the CAD model of arranging a first internal wall portion 120A of the partially-assembled shipping container 100 of Figures 5 to 7 in a second configuration, to provide void fill.

Figures 9A and 8B are perspective views of the CAD model of the shipping container 100 of Figures 8A and 8B, wherein the first internal wall portion 120A is arranged in the second configuration. In this example, the first internal wall portion 120A provides a partition or divider, thereby providing void fill.

Figures 10A and 10B are perspective views of the CAD model of arranging a second internal wall portion 120B of the shipping container 100 of Figures 9A and 9B in a first configuration. In this example, the second internal wall portion 120B extends over the folded first internal wall portion 120A.

Figures 11A and 11B are perspective views of the CAD model of the shipping container 100 of Figures 10A and 10B, wherein the second internal wall portion 120B is arranged in the first configuration. In this example, the second internal wall portion 120B is adhesively coupled to the folded first internal wall portion 120A.

Figures 12A to 16B are perspective views of the CAD model of fully-assembling the shipping container 100 of Figures 11A and 11B, as understood by the skilled person.

Figure 17 is a CAD drawing of a blank 2 for a shipping container 200 according to an exemplary embodiment. The blank 2 is a mirror-image of the blank 1 for the shipping container 100 and is as described with respect to the blank 1 for the shipping container 100 mutatis mutandis,

description of which is not repeated, for brevity. Dimensions in mm. Fold lines are shown in red. Hidden lines are shown dashed. Edges are shown in black. Dimensions are shown in blue.

Figure 18 is a perspective view of a CAD model of a blank 3 for a shipping container 300 according to an exemplary embodiment. The blank 3 is generally as described with respect to the blank 1 for the shipping container 100, description of which is not repeated, for brevity. Fold lines are shown in red. Edges are shown in black.

In contrast to the blank 1, in this example, the set of internal wall portions 320 of the blank 3 includes only the first internal wall portion 320A (i.e. does not include a second internal wall portion), thereby reducing a relative area of the blank 4 with respect to the blank 1 for a given size of shipping container. Furthermore, in contrast to the blank 1, in this example, the blank 3 does not include a flap or tab corresponding to the flap 125A and the tab 125B of the blank 1, thereby reducing a relative area of the blank 4 with respect to the blank 1 for a given size of shipping container.

In this example, the sheet 301 has a set of fold lines 330 (for example scores i.e. crushed fold lines), wherein respective fold lines of the set thereof delimit contiguous external wall portions and/or internal wall portions and/or flaps, of the respective sets thereof, as summarised in Table 2.

Fold line	Portion, flap or tab	Portion, flap or tab
330AC	310A	310C
330AD	310A	310D
330AE	310A	310E
330AF	310A	310F
330FB	310F	310B
330EA	310E	340A
330EB	310E	340B
330CC	310C	340C
330DD	310D	340D
330BE	310B	340E
330BF	320A	340F
330FC	310F	320A
330AA	320A	325A

Table 2: Fold lines.

Figure 19 is a CAD drawing of a blank 4 for a shipping container 400 according to an exemplary embodiment. The blank 4 is generally as described with respect to the blank 1 for the shipping container 100, description of which is not repeated, for brevity. Fold lines are shown in green. Edges are shown in red.

In contrast to the blank 1, in this example, the blank 4 does not include a flap or tab corresponding to the flap 125A and the tab 125B of the blank 1, thereby reducing a relative area of the blank 4 with respect to the blank 1 for a given size of shipping container.

In contrast to the blank 1, in this example, the set of flaps 440 includes a first (or front-left) flap 440A and an opposed second (or front-right) flap 440B, wherein the fifth (or front) external wall portion 410E is contiguous therewith and wherein the third (or left) external wall portion 410C and the opposed fourth (or right) external wall portion 410D are respectively contiguous therewith. In this example, the first (or front-left) flap 440A and the opposed second (or front-right) flap 440B respectively comprise diagonal fold lines 430A and 430B. In this way, the flaps 440A and 440B, when folded, support the external wall portions 410C, 410E and 410D of the partially assembled precursor, facilitating filling of the container.

In contrast to the blank 1, in this example, the sheet 401 provides a set of tabs 450 (450A, 450B, 450D, 450E) and comprises a corresponding set of slots 460 (460A, 460B, 460D, 460E), for mechanically coupling the sheet 401 in the second arrangement. The tabs 450A and 450B are contiguous with the second (or upper) external wall portion 410B and the corresponding slots 460A and 460B, respectively, are coincident with the fold lines 430CC and 430DD, respectively. The tab 450D is contiguous with the first internal wall portion 420A and the corresponding slot 460D (460D1, 460D2, 460D3) is coincident with fold lines 430EA, 430A and 430DC, respectively. The tab 450E is contiguous with the second internal wall portion 420B and the corresponding slot 460E (460E1, 460E2, 460E3) is coincident with fold lines 430EB, 430B and 430DB, respectively.

In this example, the sheet 401 has a set of fold lines 430 (for example scores i.e. crushed fold lines), wherein respective fold lines of the set thereof delimit contiguous external wall portions and/or internal wall portions and/or flaps, of the respective sets thereof, as summarised in Table 1.

Fold line	Portion, flap or tab	Portion, flap or tab
430AC	410A	410C
430AD	410A	410D
430AE	410A	410E
430AF	410A	410F

430FB	410F	410B
430EA	410E	440A
430DC	410C	440A
430A	440A	440A
430EB	410E	440B
430DB	410D	440B
430B	440B	440B
430CC	410C	440C
430DD	410D	440D
430BE	410B	440E
430BF	420A	440F
430BG	420B	440G
430FC	410F	420A
430FD	410F	420B

Table 3: Fold lines.

Although a preferred embodiment has been shown and described, it will be appreciated by those skilled in the art that various changes and modifications might be made without departing from the scope of the invention, as defined in the appended claims and as described above.

Attention is directed to all papers and documents which are filed concurrently with or previous to this specification in connection with this application and which are open to public inspection with this specification, and the contents of all such papers and documents are incorporated herein by reference.

All of the features disclosed in this specification (including any accompanying claims and drawings), and/or all of the steps of any method or process so disclosed, may be combined in any combination, except combinations where at most some of such features and/or steps are mutually exclusive.

Each feature disclosed in this specification (including any accompanying claims, and drawings) may be replaced by alternative features serving the same, equivalent or similar purpose, unless expressly stated otherwise. Thus, unless expressly stated otherwise, each feature disclosed is one example only of a generic series of equivalent or similar features.

The invention is not restricted to the details of the foregoing embodiment(s). The invention extends to any novel one, or any novel combination, of the features disclosed in this specification

(including any accompanying claims and drawings), or to any novel one, or any novel combination, of the steps of any method or process so disclosed.

CLAIMS

1. A shipping container comprising:

a unitary sheet, providing a set of external wall portions and a set of internal wall portions including a first internal wall portion, folded to enclose a volume;

wherein the set of external wall portions surrounds the set of internal wall portions; and

wherein the first internal wall portion is arrangeable in:

a first arrangement, wherein the first internal wall portion bounds, at least in part, the volume; and

a second arrangement, wherein the first internal wall portion partitions the volume to define, at least in part, a set of sub-volumes, including a first sub-volume and optionally a second sub-volume;

wherein the first internal wall portion is arranged to move from the first arrangement to the second arrangement by folding the first internal wall portion.

2. The shipping container according to claim 1, wherein the first internal wall portion extends between mutually opposed external wall portions of the set thereof, in the first arrangement.

3. The shipping container according to any previous claim, wherein the first internal wall portion confronts an external wall portion of the set thereof, in the first arrangement.

4. The shipping container according to any previous claim, wherein the first sub-volume and the second sub-volume are complementary polyhedral sub-volumes, in the second arrangement.

5. The shipping container according to claim 4, wherein the complementary polyhedral sub-volumes are cuboidal.

6. The shipping container according to any previous claim, wherein sub-portions of the first internal wall portion are mutually opposed, in the second arrangement.

7. The shipping container according to any previous claim, wherein the first internal wall portion and an external wall portion of the set thereof are mutually contiguous.

8. The shipping container according to any previous claim, wherein the first internal wall portion and an external wall portion of the set thereof are mutually delimited by a fold. Flute aligned

9. The shipping container according to any previous claim, wherein a sheet edge of the first internal wall portion is coincident with a fold between adjacent external wall portions of the set thereof.

10. The shipping container according to any previous claim, wherein the shipping container is arrangeable in:

a third arrangement, wherein the first internal wall portion partitions the volume;

wherein the first wall portion is arranged to move from the first arrangement to the second arrangement or from the second arrangement to the third arrangement by folding the sheet.

11. The shipping container according to any previous claim, wherein the first internal wall portion spans between mutually opposed external wall portions of the set thereof, in the first arrangement and in the second arrangement.

12. The shipping container according to any previous claim, comprising a coupling member (for example, adhesive strip) for mutually coupling the first internal wall portion and an external wall portion of the set thereof, in the second arrangement.

13. The shipping container according to any previous claim, wherein the first internal wall portion includes a set of fold lines formed therein and/or thereon.

14. The shipping container according to any previous claim, wherein the first internal wall portion includes a set of apertures, including a first aperture, therethrough.

15. The shipping container according to any previous claim, wherein the set of internal wall portions includes a second internal wall portion.

16. The shipping container according to claim 15, wherein the first internal wall portion and the second external wall portion are mutually opposed.

17. The shipping container according to any of claims 15 to 16, wherein the first internal wall portion and the second internal wall portion are mutually coupled.

18. The shipping container according to claim 17, wherein the first internal wall portion and the second internal wall portion are mutually coupled via a flap.

19. The shipping container according to any previous claim, wherein the set of external wall portions and the set of internal wall portions provide double wall portions.

20. The shipping container according to any previous claim, wherein the set of external wall portions surrounds the set of internal wall portions.

21. A blank for a shipping container according to any of claims 1 to 20.

22. A precursor for a shipping container according to any of claims 1 to 20:
wherein the set of external wall portions is foldable to enclose the volume; and
wherein the set of internal wall portions are mutually coupled.

23. A method of arranging a shipping container according to any of claims 1 to 20, the method comprising:
moving the first internal wall portion, by folding the first internal wall portion, from the first arrangement to the second arrangement.

24. A method of providing a shipping container according to any of claims 1 to 20, the method comprising:
folding the set of internal wall portions to bound, at least in part, the volume;
optionally moving the first internal wall portion, by folding the first internal wall portion, from the first arrangement to the second arrangement; and
folding the set of external wall portions to surround the set of internal wall portions and to enclose the volume.

25. A method of manufacturing a blank according to claim 21 or a precursor for a shipping container according to claim 22.

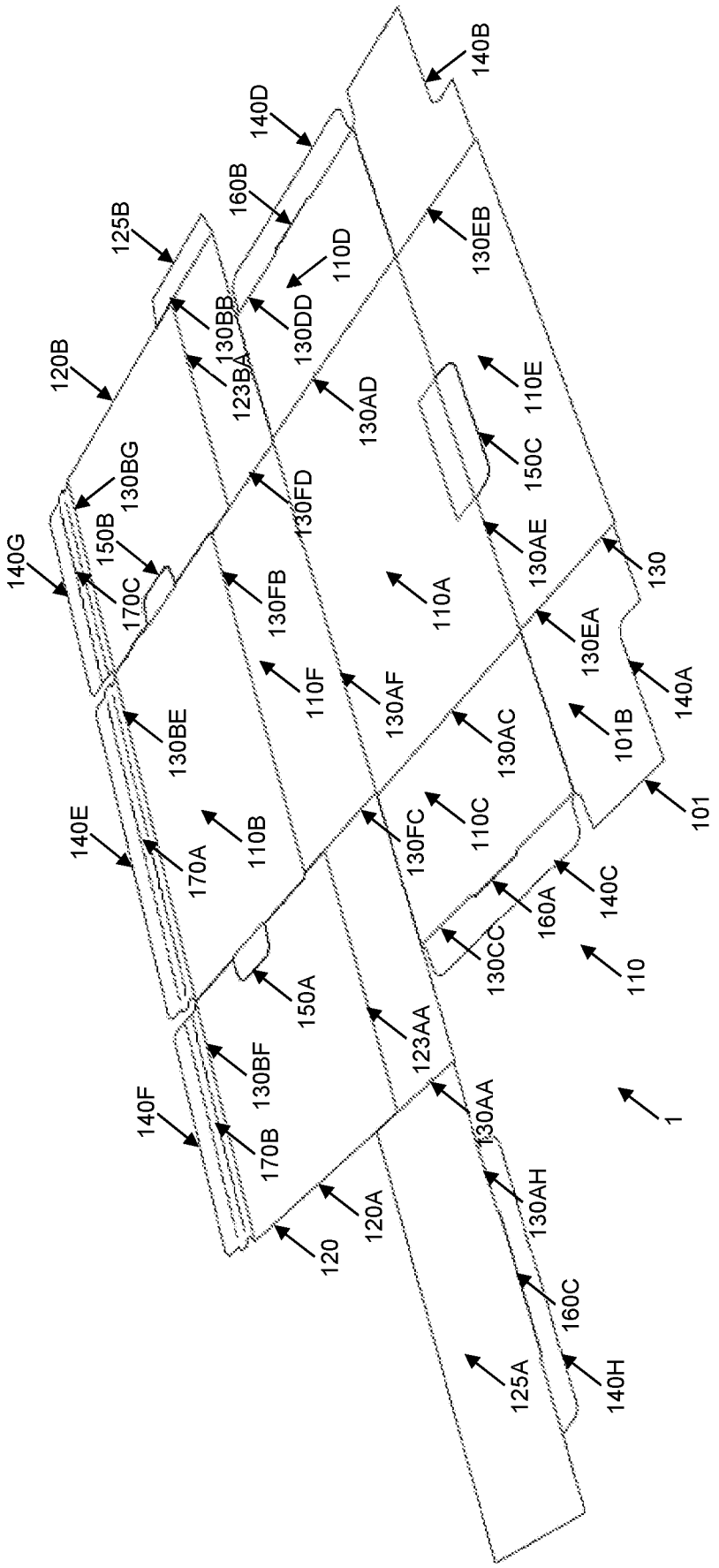
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Fig. 1

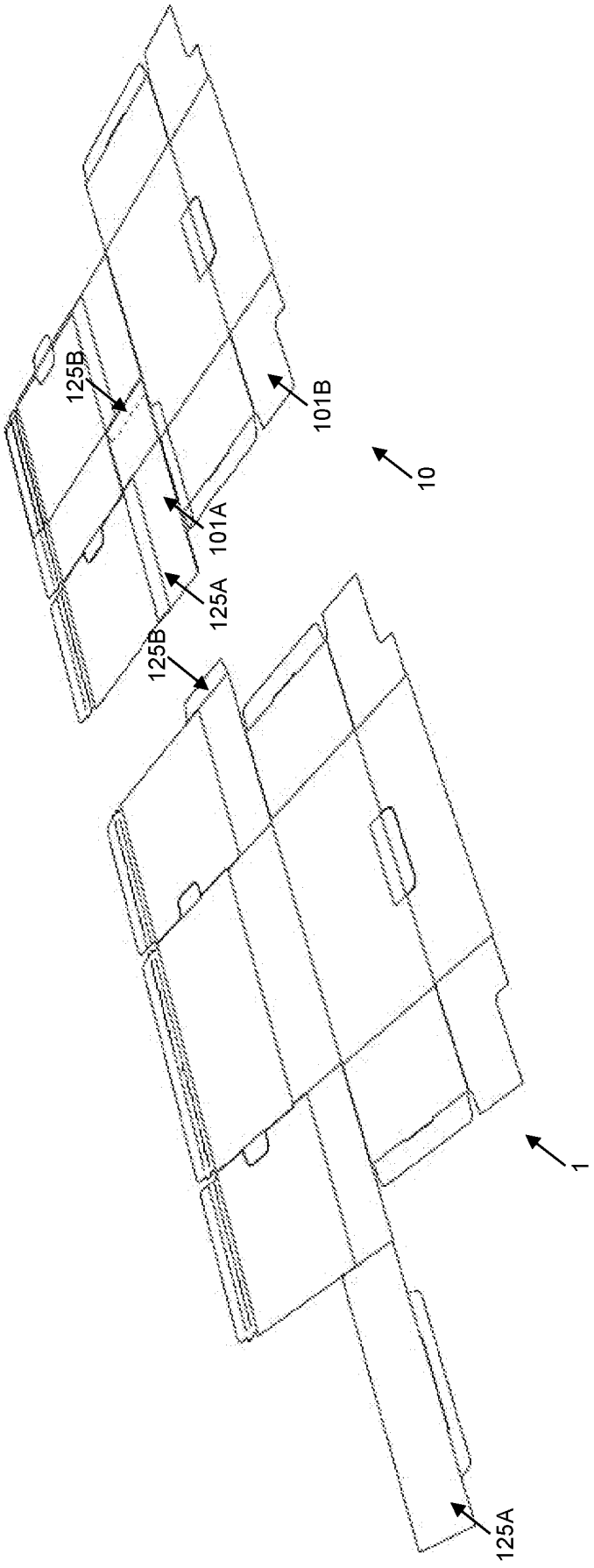

Fig. 2

Fig. 3

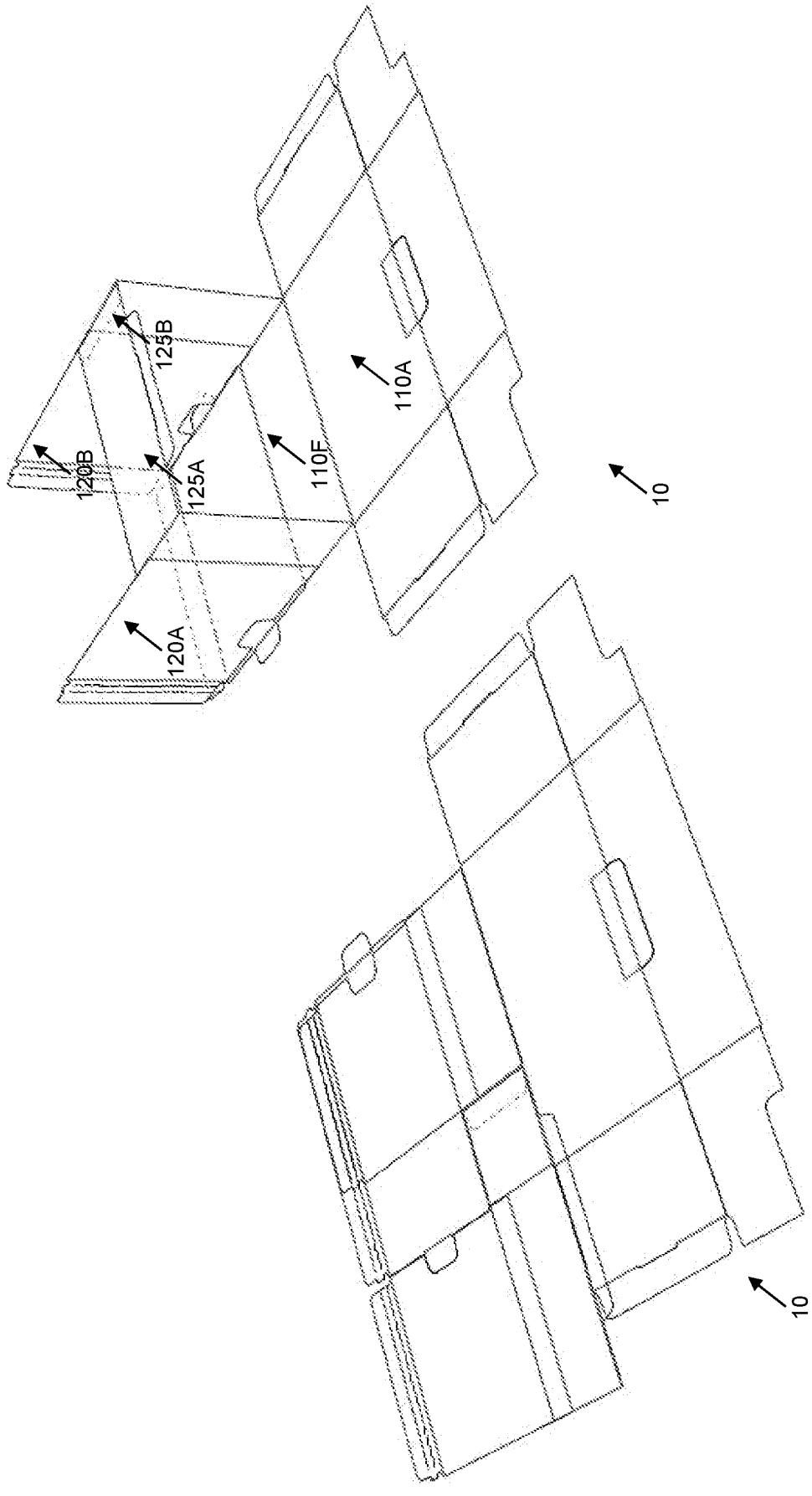

Fig. 4

Fig. 5

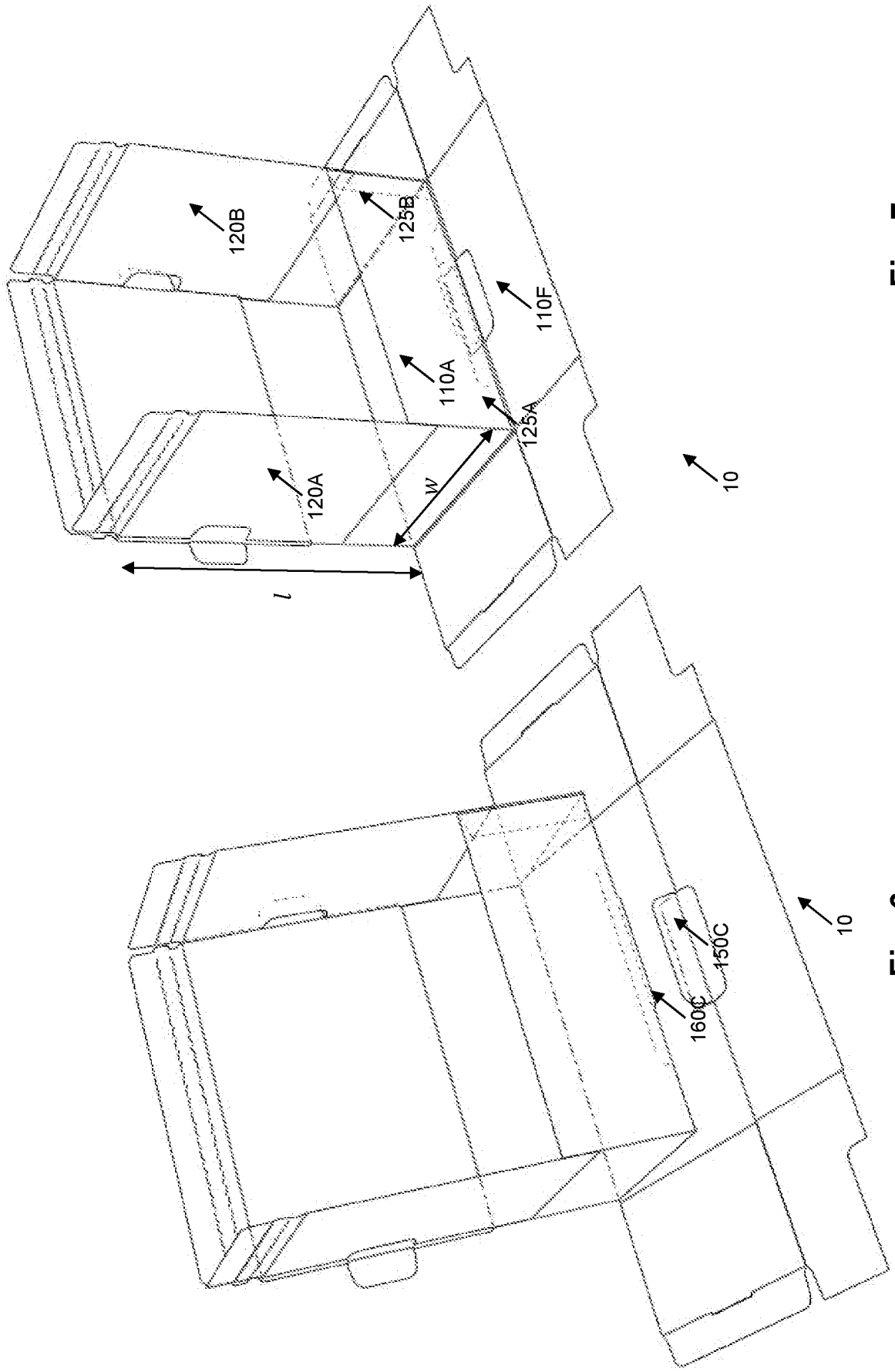

Fig. 7

Fig. 6

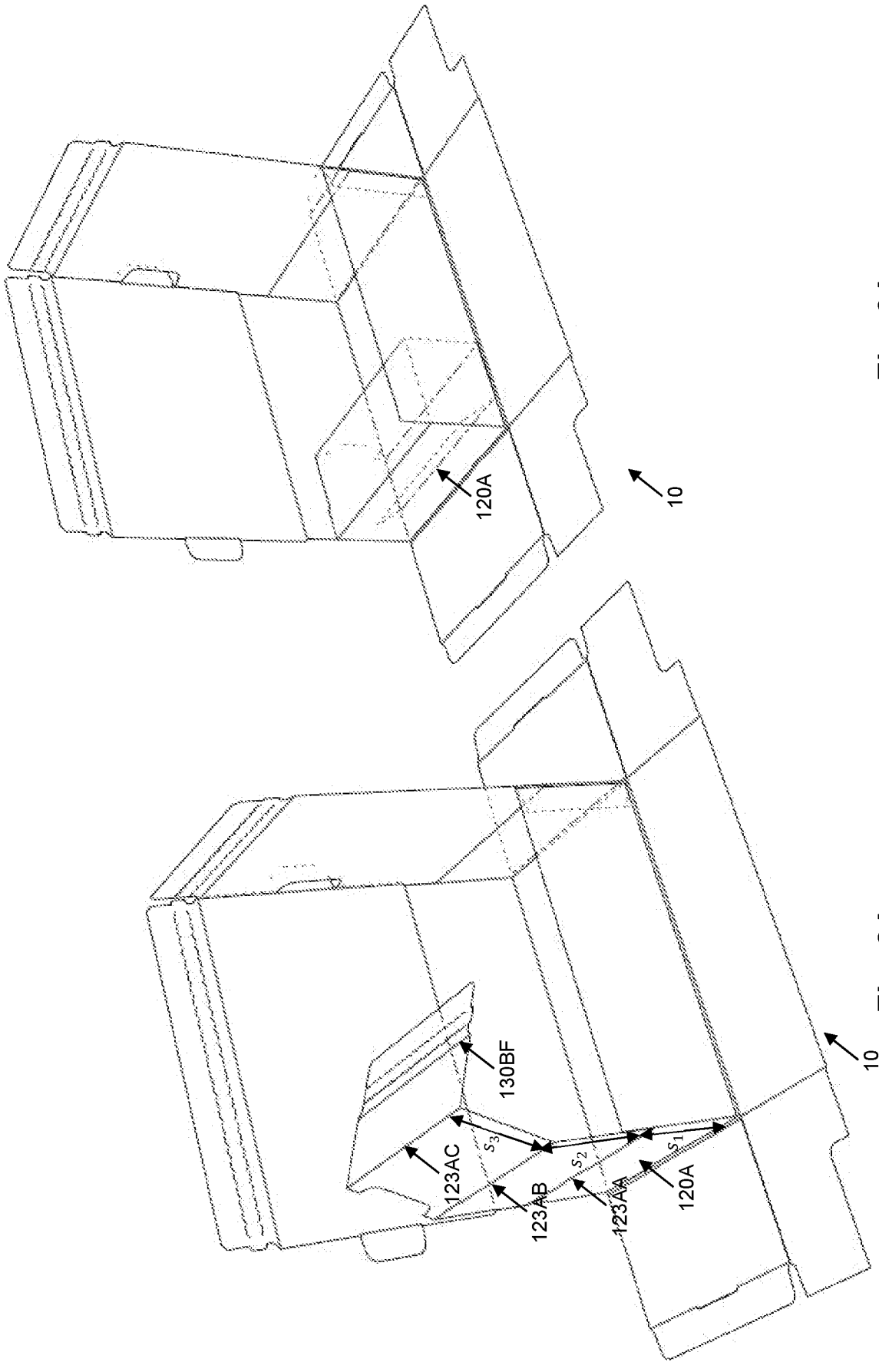

Fig. 9A

Fig. 8A

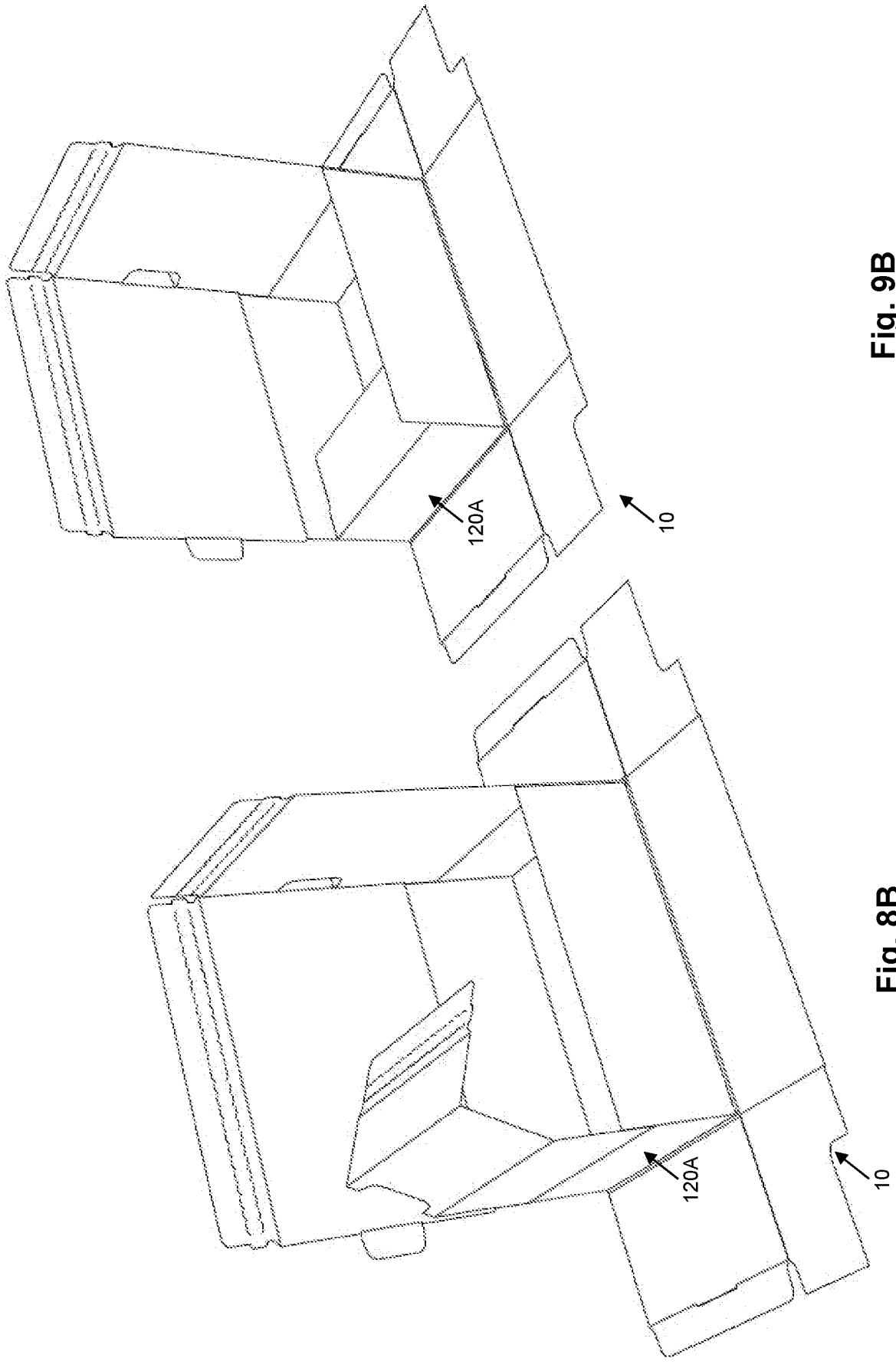

Fig. 9B

Fig. 8B

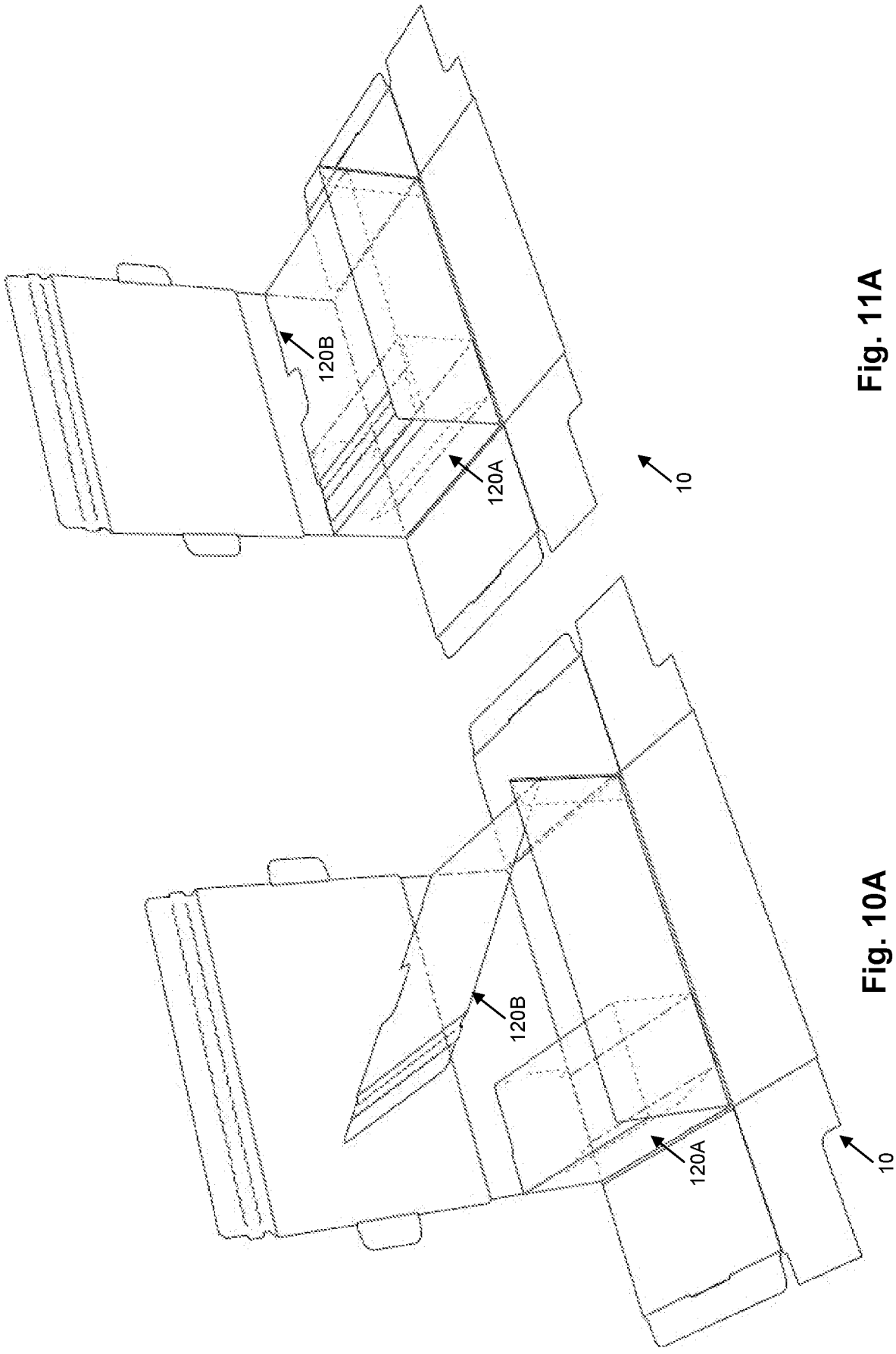

Fig. 11A

Fig. 10A

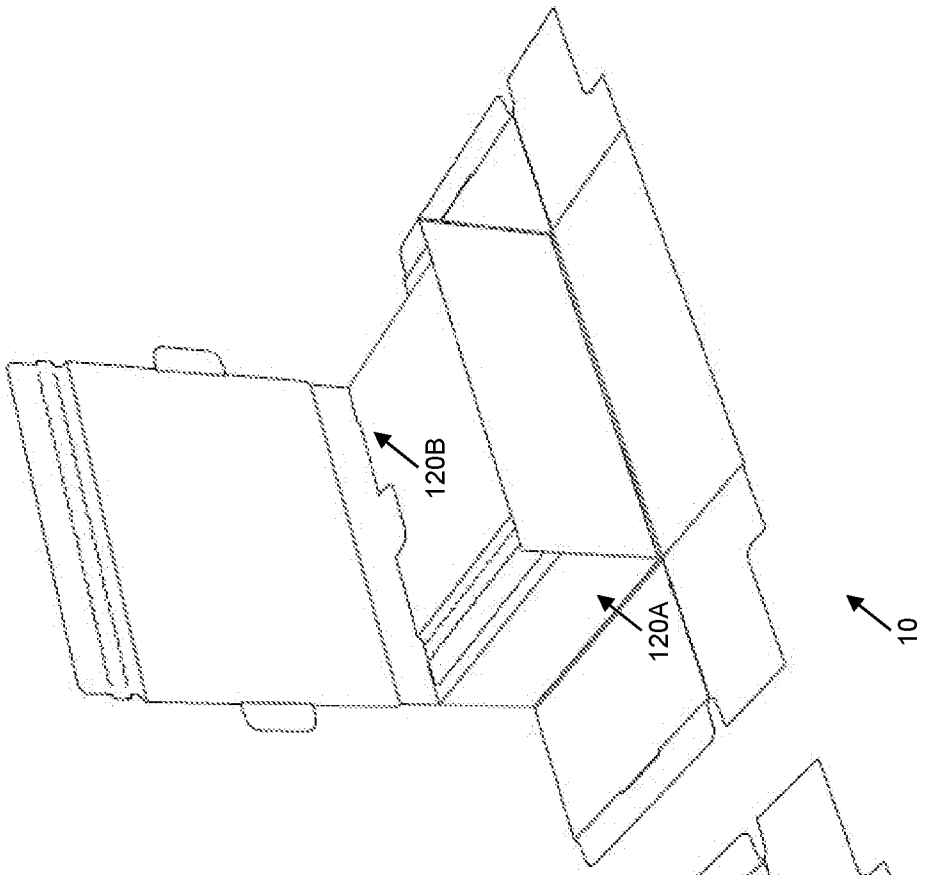

Fig. 11B

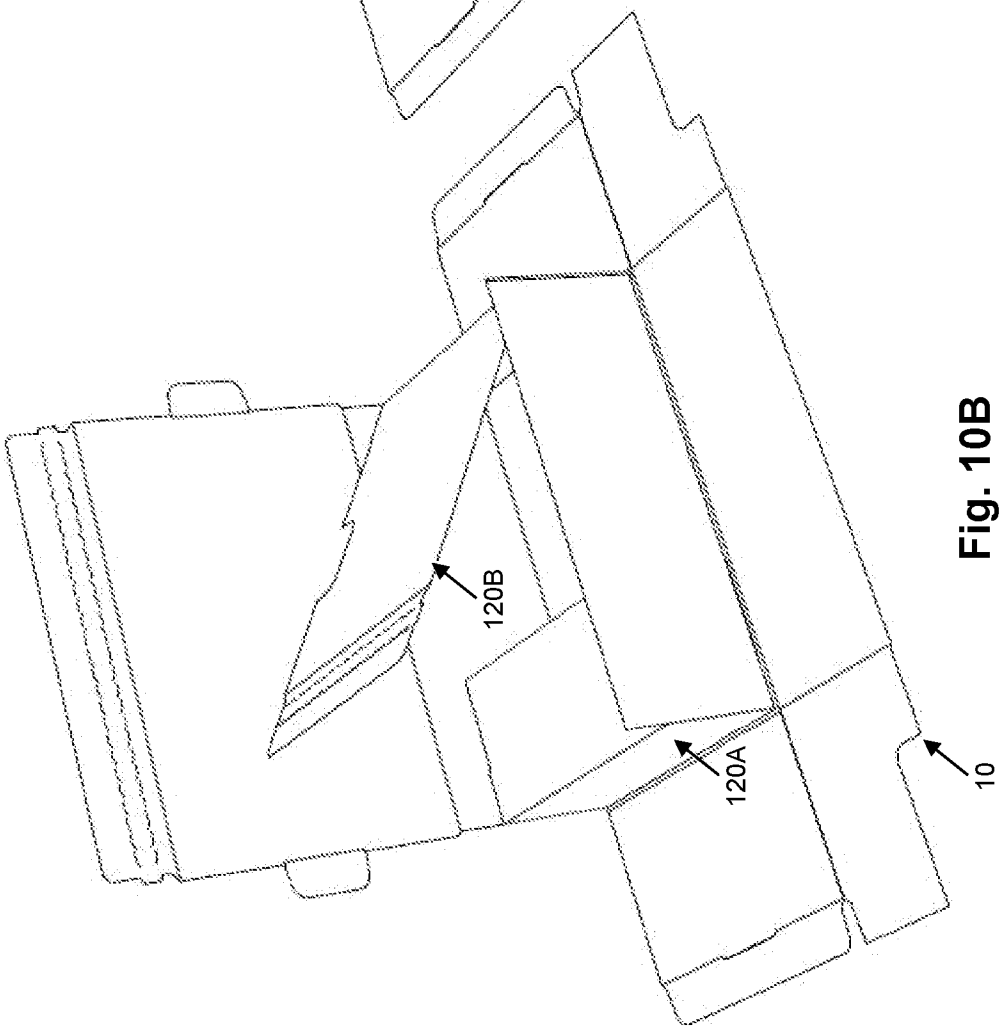

Fig. 10B

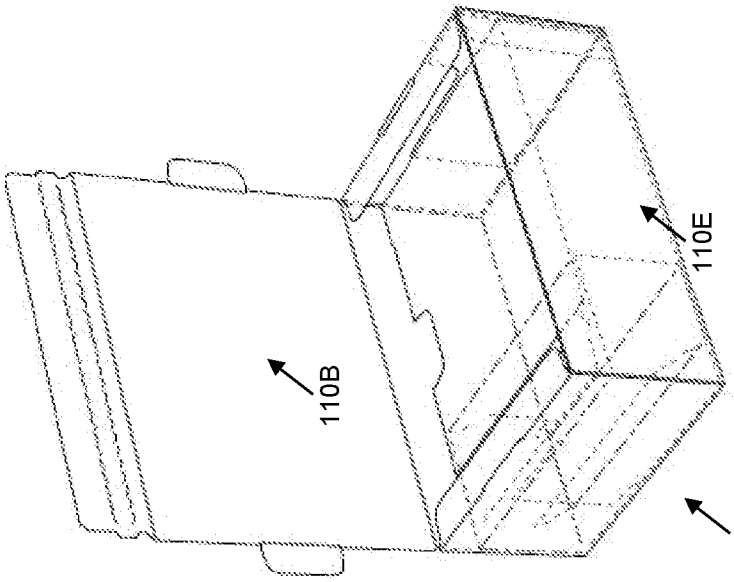

Fig. 13A

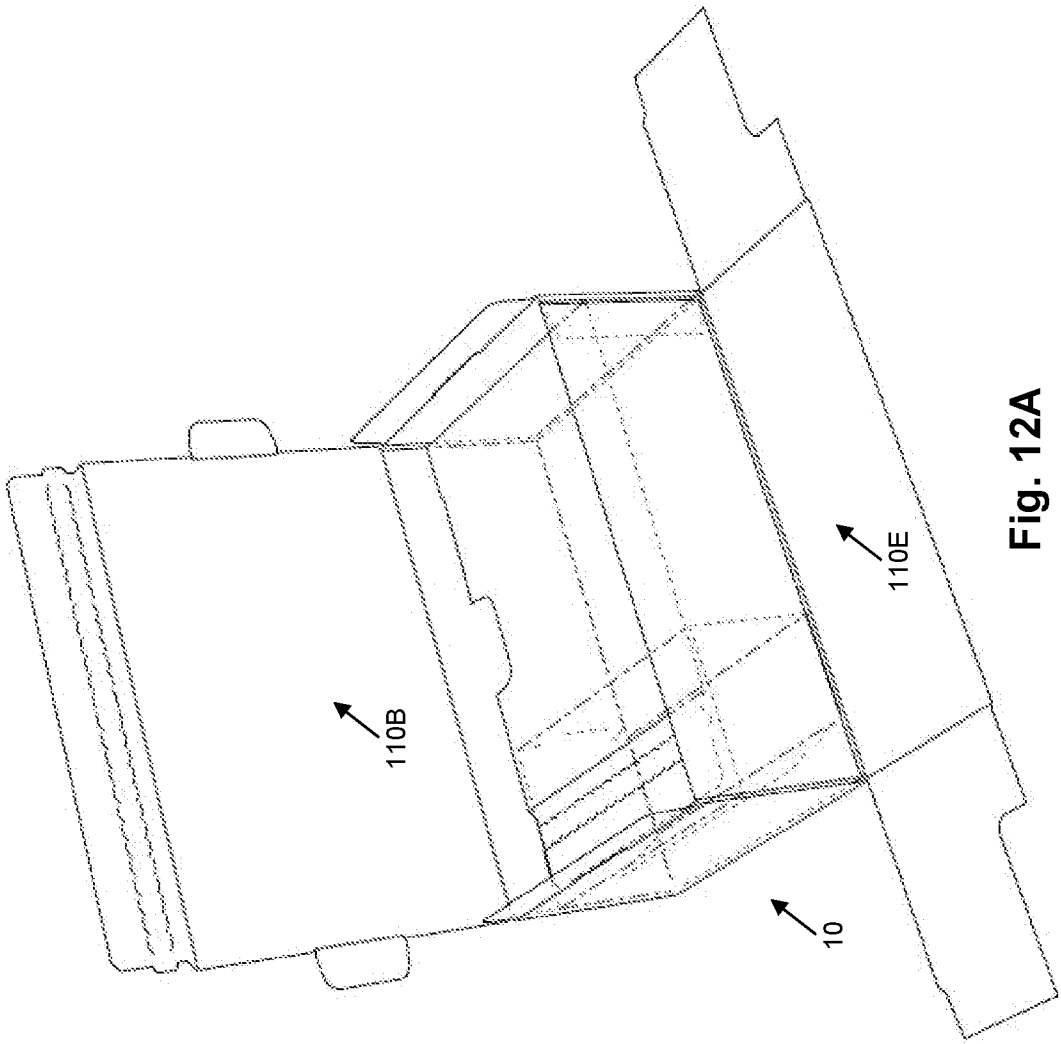

Fig. 12A

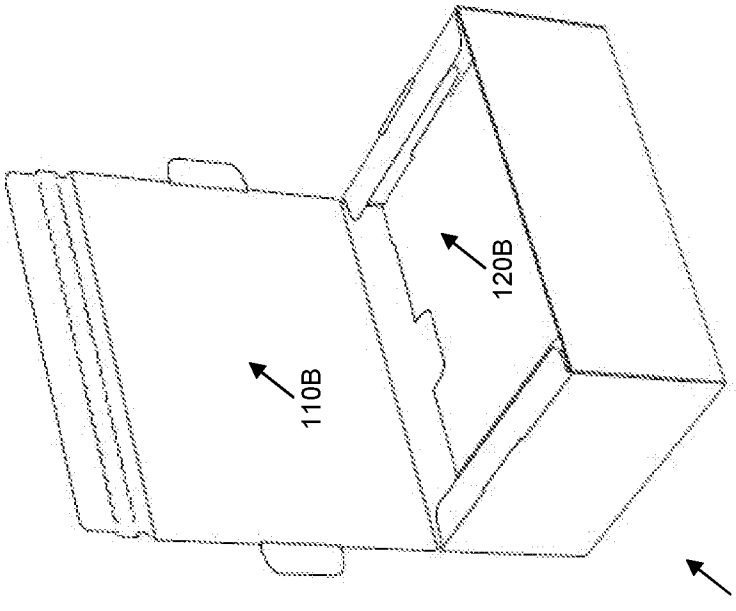

Fig. 13B

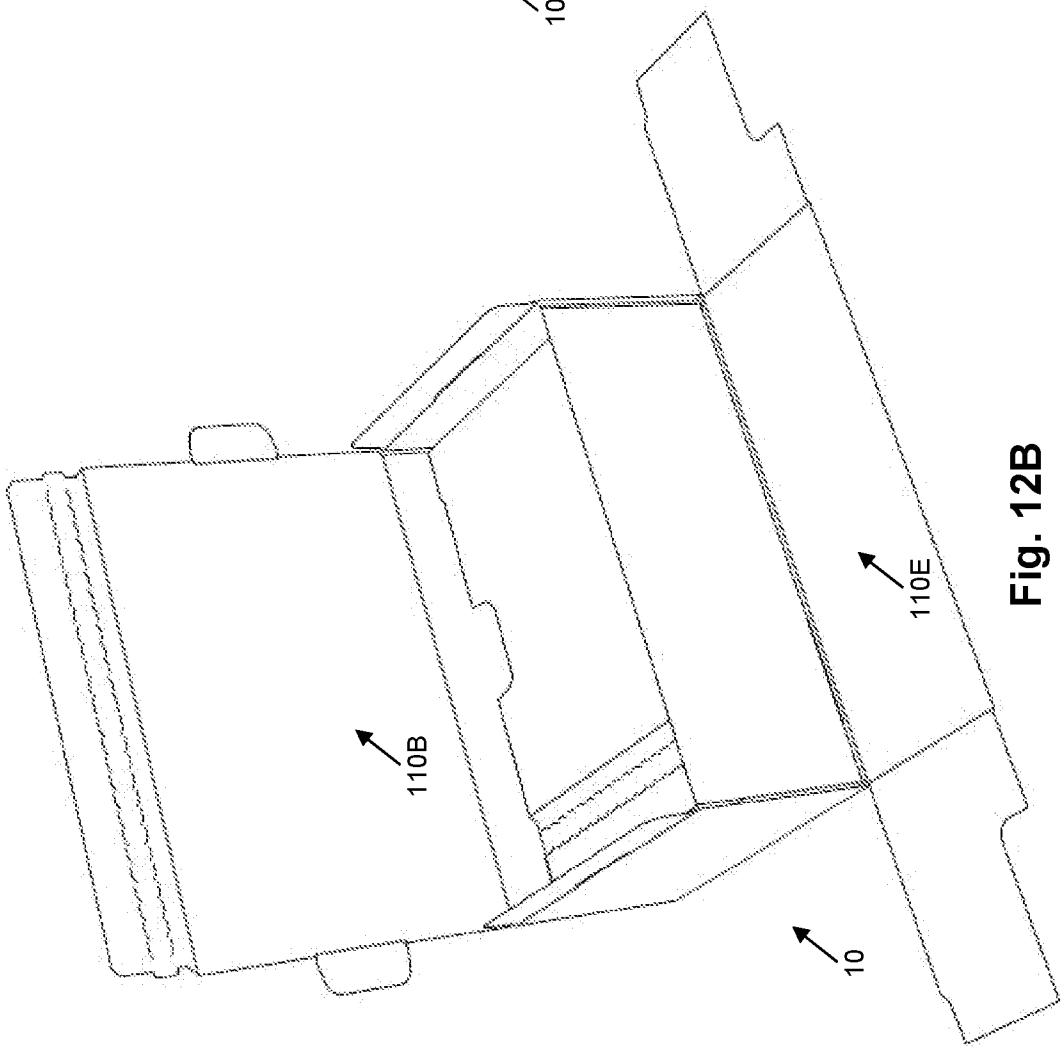

Fig. 12B

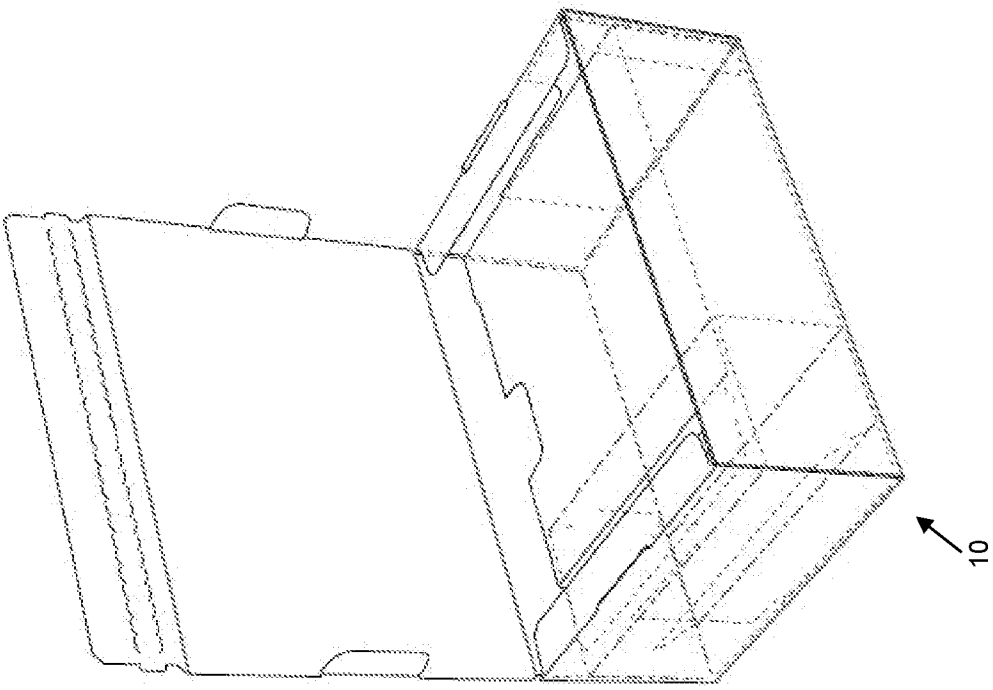

Fig. 15A

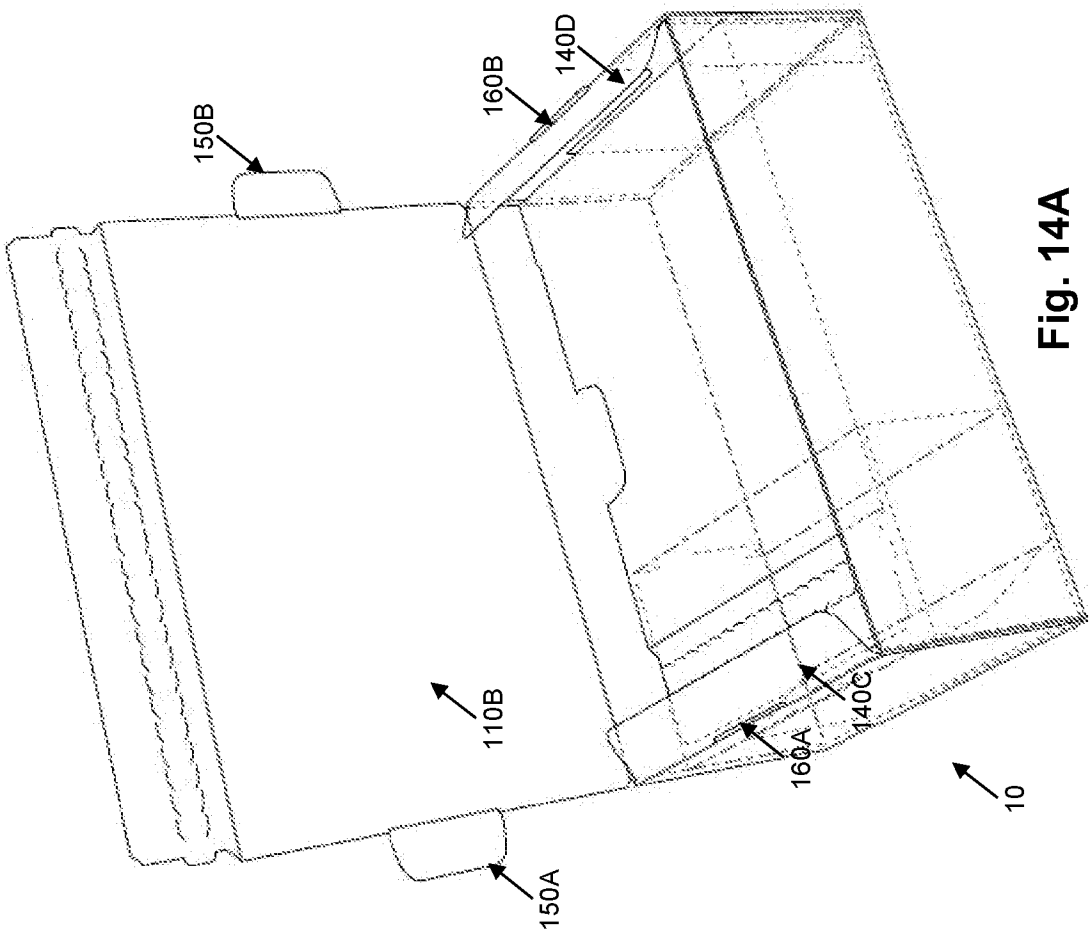

Fig. 14A

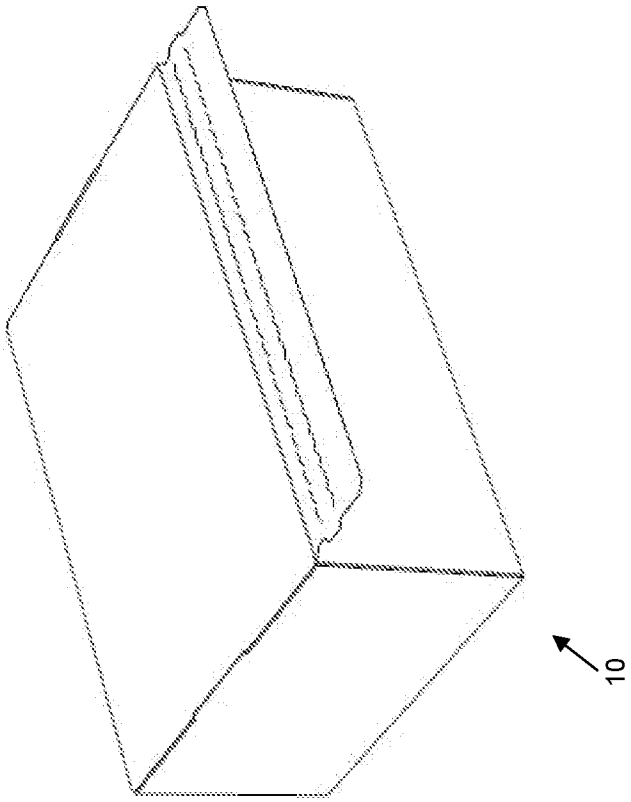

Fig. 15B

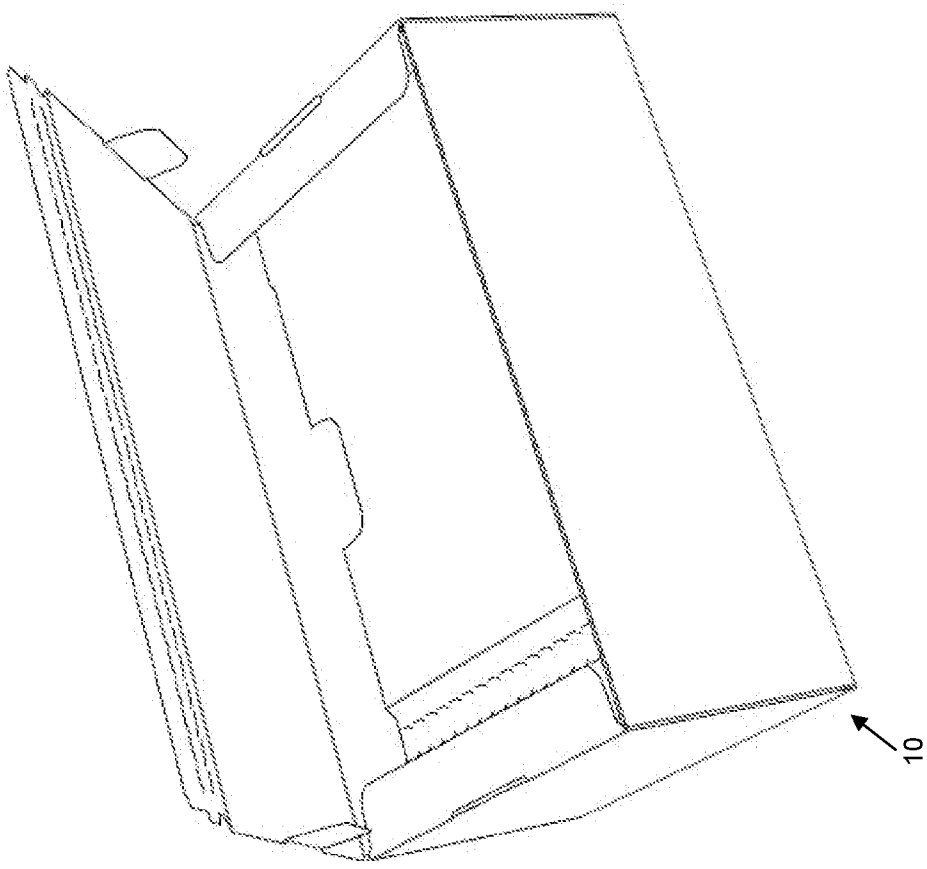

Fig. 14B

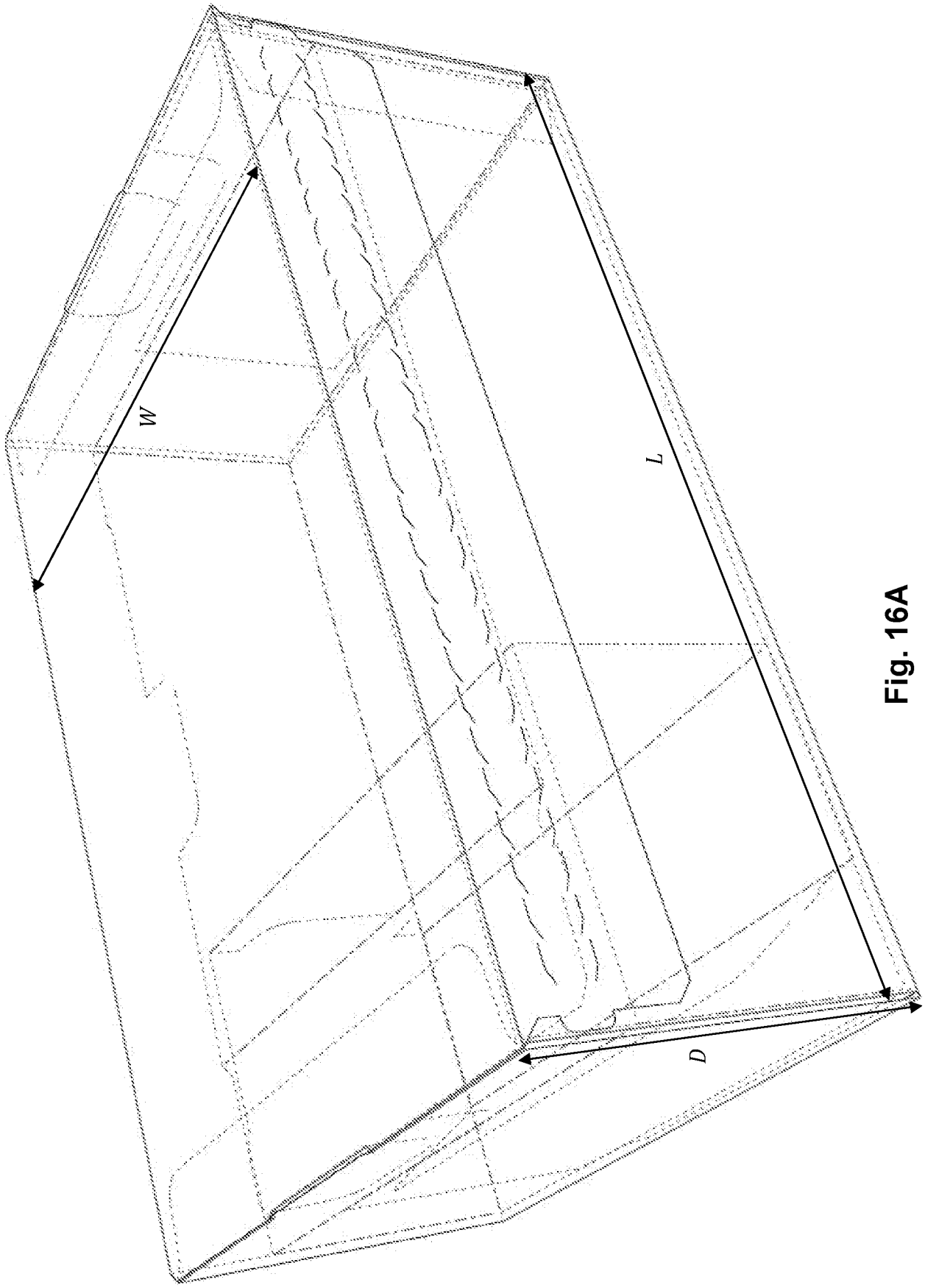

Fig. 16A

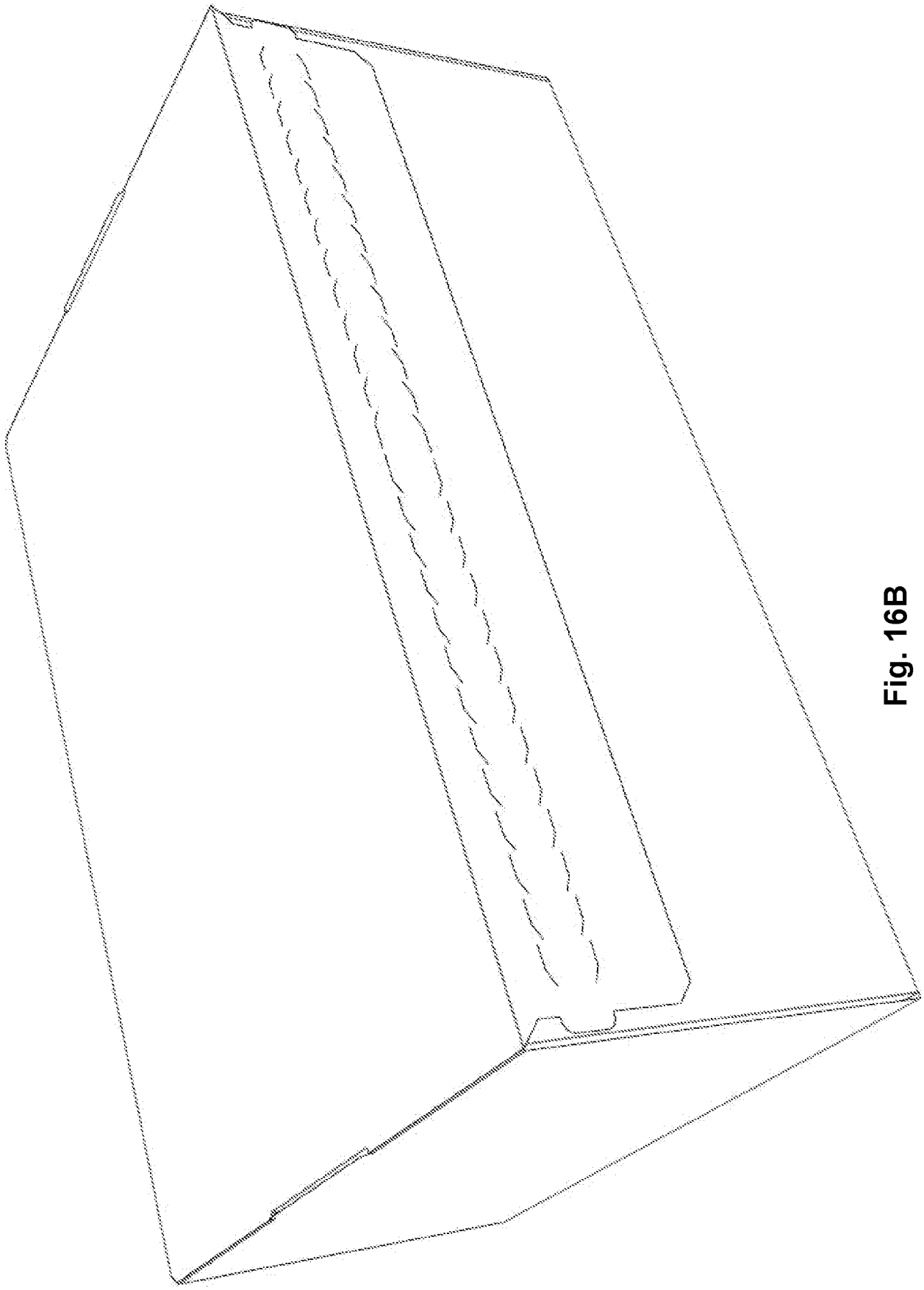

Fig. 16B

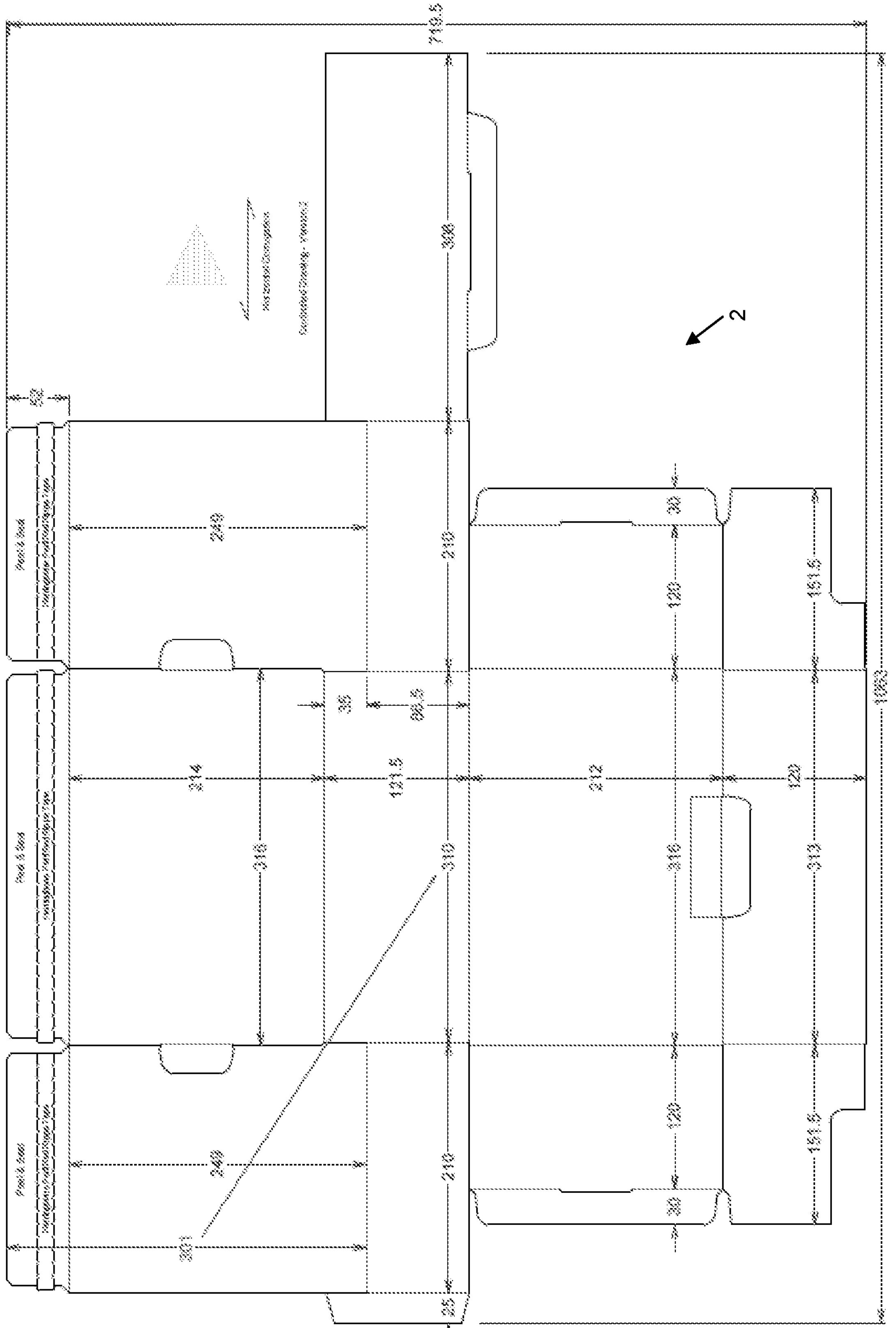
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Fig. 17

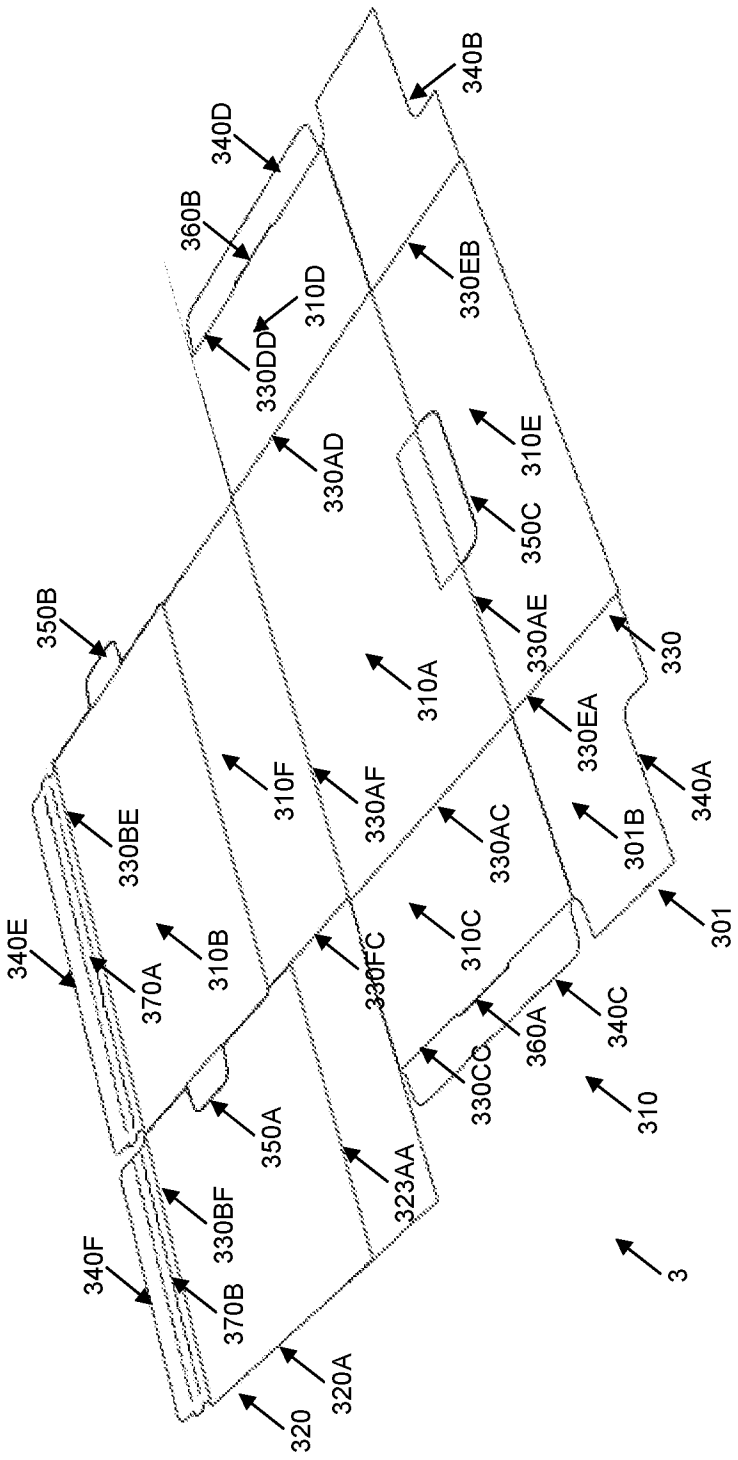
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Fig. 18

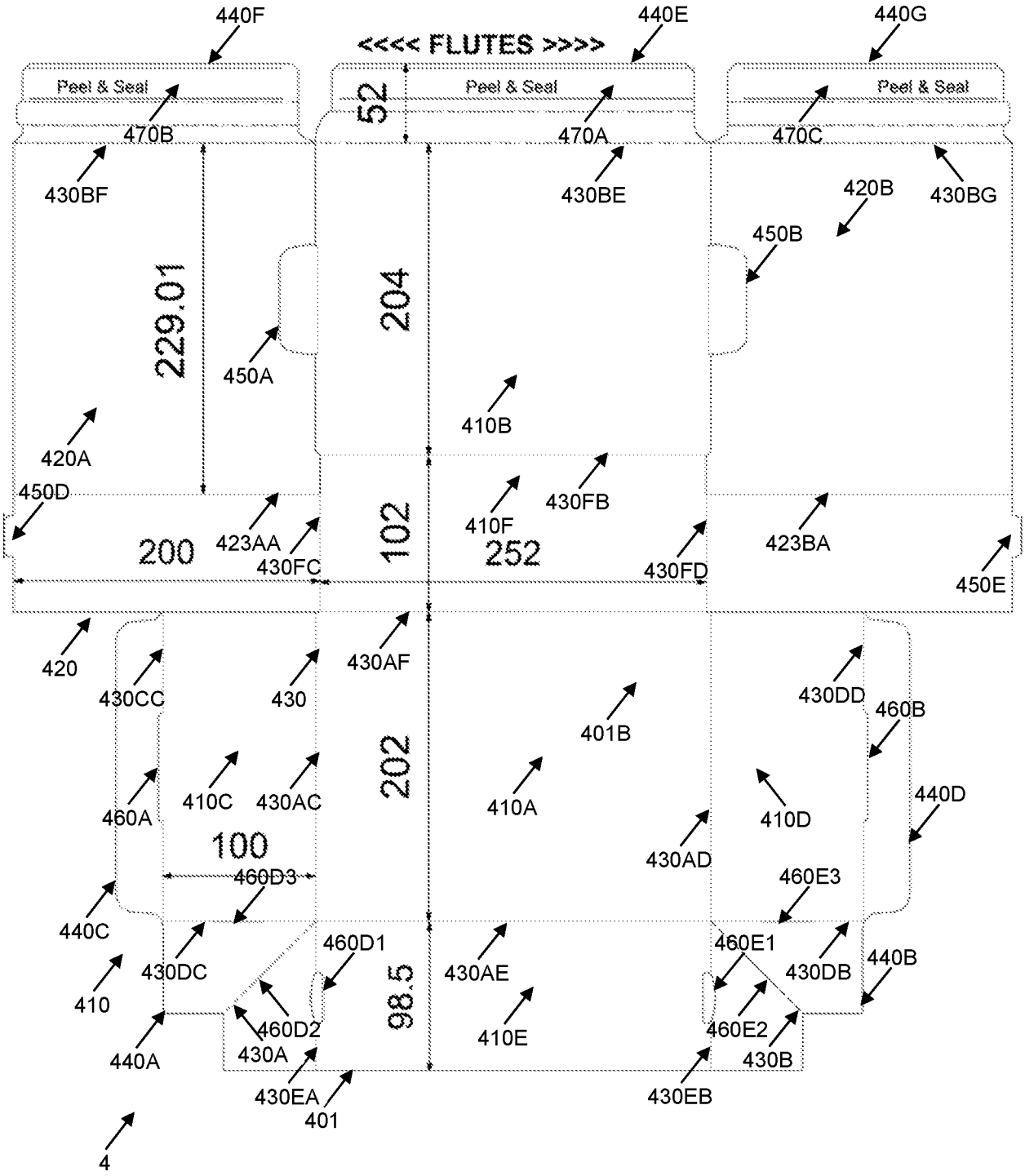
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Fig. 19

INTERNATIONAL SEARCH REPORT

International application No
PCT/GB2022/050551

A. CLASSIFICATION OF SUBJECT MATTER
INV. B65D5/50 B65D5/355
ADD.

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

B. FIELDS SEARCHED

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

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

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	US 5 909 840 A (SCHULTHEISS KARL F [US]) 8 June 1999 (1999-06-08) column 3, line 18 - column 4, line 12 -----	1-9,11, 13,19-25 14
X	EP 0 279 485 A1 (KONINKL SMEETS OFFSET B V [NL]) 24 August 1988 (1988-08-24) column 1, lines 35-48; figures 4a-4h column 2, line 32 - column 3, line 14 column 7, line 19 - column 8, line 26 -----	1,4, 6-13, 15-25
Y	US 4 101 052 A (DOVE DOUGLAS J A) 18 July 1978 (1978-07-18) column 4, lines 28-57; figures -----	14
A	US 2 090 200 A (JOHN HEKMAN) 17 August 1937 (1937-08-17) figures -----	1-25

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

☒ See patent family annex.

* Special categories of cited documents :

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"E" earlier application or patent but published on or after the international filing date

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

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

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

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

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

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

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
24 May 2022	07/06/2022

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

1

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/GB2022/050551

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5909840 A	08-06-1999	NONE	
EP 0279485 A1	24-08-1988	EP 0279485 A1	24-08-1988
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US 4101052 A	18-07-1978	NONE	
US 2090200 A	17-08-1937	NONE	