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(54) **STACKABLE END FOR A CONTAINER AND STACKABLE CONTAINER WITH THE END**

STAPELBARES ENDSTÜCK FÜR EINEN BEHÄLTER UND STAPELBARER BEHÄLTER MIT DEM
ENDSTÜCK

EXTRÉMITÉ EMPILABLE POUR RÉCIPIENT ET RÉCIPIENT EMPILABLE AVEC L'EXTRÉMITÉ

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(73) Proprietor: **Trivium Packaging Group Netherlands
B.V.**
7418 AH Deventer (NL)

(72) Inventors:
• **LEBOUCHER, Fabrice**
49100 Angers (FR)

• **SIREAU, Lucas**
49100 Angers (FR)
• **BOLIDIN, Philippe**
72230 Guécélard (FR)

(74) Representative: **Leonhard, Frank Reimund**
Leonhard @ Friends Patentanwälte
Maximilianstrasse 2
Palais an der Oper
80539 München (DE)

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Description

[0001] The inventions relate to an end (a lid) for a container, specifically to an easy open end for a container, a stack of at least two ends, a container and a stack of at least two containers. All those inventions include claim 1.

[0002] Containers with easy open ends are e.g. used for CLUB cans. These containers, including the ends, are typically made of sheet metal. Foodstuff, e.g. seafood, is commonly housed in these containers.

[0003] Typically the containers and the corresponding ends are provided to a customer, i.e. food manufacturer, separately in large quantities. The customer can fill the container with foodstuff, e.g. seafood, and close the opening of the container with the end (the lid), e.g. by a double seam.

[0004] As shipping costs for containers and ends also depend on the volume, a tight packaging of these parts is desired. A tight and stable packaging also contributes to an easy and safe handling of the mentioned parts. For example, if a cardboard filled with container ends is delivered to a customer, the customer usually takes the ends out of the cardboard manually or a machine, e.g. a robot, is used for handling of the container ends. To reduce volume, the shipped ends are stacked in the cardboard or another transport box. A stable stack of ends is much less likely to collapse while being transported manually or by the machine.

[0005] Ends that are known in the art are designed such that two consecutive ends in a stack are not parallel to each other if the ends comprise a depression below the tab for facilitating access to the tab (pull-tab). Thus, a stack of such known ends is not fully stable. Additionally, a significant amount of empty room is present between two consecutive ends in the stack of ends. Thus, the density of the packaging is relatively low and the shipped volume is relatively large.

[0006] Further, a stack of at least two containers comprising such ends is not parallel, resulting in an unstable stack of such containers, e.g. at a point of sale.

[0007] Prior art considered are EP 2 149 502 A1 (Impress), CA 967 898 A (American Can) and WO 2010/130820 A1 (Crown Packaging). Thereof EP 2 149 502 A1 reads on the preamble part of claim 1. This reference may be the most comparable prior art and discloses an end for a container, comprising the features of the preamble part. CA 967 898 A shows another kind of end having a crown-preventing effect.

[0008] A problem to be solved by the invention is to provide an end for a container that allows stacking of a plurality of such ends with increased stability of the stack end that allows packaging of such ends with high density (a further stabilizing effect is to be obtained). A further problem to be solved is to provide a container with such an end that allows a stacking of a plurality of such containers with increased stability.

[0009] This problem is solved by an end (or a lid) for a

container according to claim 1, by a stack of at least two ends according to claim 12, by a container according to claim 13 or by a stack of at least two containers according to claim 14.

[0010] An end, e.g. an easy-open-end, for a container may comprise a central panel that defines an x-y-plane. A z-direction is perpendicular to the x-y-plane. A tab is attached to the end and the tab comprises a front portion and a rear portion. The tab may be attached via a rivet. The tab extends in a positive z-direction. It is preferred that the tab is attached to the central panel and extends in the positive z-direction from the x-y-plane of the central panel.

[0011] At least one stabilizing bead is shaped in the end and the stabilizing bead extends in the positive z-direction. A depression is formed in the end and the depression extends in a negative z-direction. The depression is shaped and positioned to allow a human finger to reach at least in part below the rear portion. Preferably the stabilizing bead and/or the depression are formed in the central panel of the end.

[0012] The tab, the stabilizing bead and the depression are shaped and positioned such that the end as a first end can be stacked with a second end and the x-y-planes of the central panels of the ends are parallel $\pm 2.0^\circ$ when the ends are stacked. The first end and the second end are same ends.

[0013] The x-y-plane is a reference plane for claimed and described extensions of elements. An extension is measured as a distance in z-direction between the x-y-plane and a second plane that is defined by the respective element itself.

[0014] Preferably, the ends are rotated relative to each other by 180° in the x-y-plane when the ends are stacked.

[0015] Same ends are to be understood as ends that are configured equally.

[0016] An end for a container may comprise a central panel, a tab, a stabilizing bead and a depression as described above. The depression may be formed in a first area of the end. An imagined second area possesses point symmetry to the first area in the x-y-plane, or in a plane parallel to the x-y-plane, about the center of the end in the respective plane and the imagined second area covers substantially no portion of the bead.

[0017] An end for a container may also comprise a central panel, a tab, a stabilizing bead and a depression as described above. The depression may be formed in a first area of the end. An imagined second area of the first area is obtained by an imagined rotation of the end in the x-y-plane by 180° . The imagined second area covers substantially no portion of the bead.

[0018] The end may be an easy-open-end comprising a tab, preferably a pull-tab, and a score line as a mechanically weakened portion in the end. For example, the tab of the end can be attached to the central panel of the end such that a lifting movement of a rear portion of the tab forces a front portion (nose portion) of the tab towards the score line of the end in order to break a por-

tion of the end. A consumer may then pull the tab away from the container in order to remove a large portion of the end. Thereby, the container can be opened and the filling of the container can be accessed.

[0019] The central panel of the end may be the largest portion (by area) of the end extending in the same plane, e.g. an x-y-plane.

[0020] The tab may be a pull-tab comprising a finger hole for allowing a human finger to reach through the tab. The tab may be attached to the central panel or to another portion of the end e.g. via rivet.

[0021] Preferably, the tab extends between 1.4 mm and 2.5 mm, preferably between 1.7 mm and 2.2 mm, more preferably between 1.8 mm and 2.0 mm, in a positive z-direction that is perpendicular to the x-y-plane of the central panel. It is especially preferred that the tab extends about 1.95 mm in the positive z-direction.

[0022] Generally, when an extension of an element, e.g. extension of the tab, stabilizing bead, (at least one) bulge, depression or second bead, is described, the extension is measured as the distance in z-direction between the x-y-plane that is defined by the central panel and a second plane that is defined by the respective element. The second plane is parallel to the x-y-plane and is defined by a portion of the respective element that has the greatest distance from the x-y-plane in the z-direction.

[0023] The extension of an element may be the actual/physical height of the respective element in z-direction. In this case, the respective element is attached to the central panel (e.g. the tab) or may be formed in the central panel (e.g. the stabilizing bead, the bulge, the depression, the second bead). This applies the general rule of the preceding paragraph to the specific case in which the respective element is associated with the central panel.

[0024] The stabilizing bead may be substantially c-shaped, substantially circular shaped, substantially oval shaped or substantially straight shaped in the end, preferably in the central plane of the end.

[0025] The stabilizing bead may have an elongated shape. For example, the stabilizing bead may not be dome-shaped, especially may not be dome-shaped with a circular basic shape.

[0026] The stabilizing bead may extend over a length of at least 5 mm, at least 10 mm, at least 15 mm, at least 20 mm, or at least 30 mm, when the stabilizing bead has an elongated shape.

[0027] The stabilizing bead may fully surround a portion of the end or may not fully surround a portion of the end.

[0028] A plurality of (same) ends, e.g. at least ten, may be stacked for transportation of the ends. The central panels of two ends in the stack of ends may be parallel $\pm 2.0^\circ$, preferably when one of the ends is rotated relative to the other end by 180° in the x-y-plane.

[0029] It is preferred that the central panels of the two ends are parallel $\pm 1.5^\circ$, more preferably $\pm 1.0^\circ$, most preferably $\pm 0.5^\circ$, when the ends are stacked as described above.

[0030] It is preferred that the stabilizing bead extends between 0.4 mm and 2.5 mm, preferably between 0.5 mm and 1.5 mm, more preferably between 0.6 mm and 1.0 mm, in a positive z-direction that is perpendicular to the x-y-plane of the central panel. Specifically, the stabilizing bead extends about 0.8 mm in the positive z-direction.

[0031] The end comprises a depression that is formed in the end. The depression extends in a negative z-direction. The depression is shaped and positioned to allow a human finger to reach at least partially below the rear portion of the tab. Thereby, a consumer can easily reach the rear portion of the tab for lifting the rear portion and opening the container.

[0032] The depression can be of substantially circular shape. The depression can have an area between 80 mm^2 and 500 mm^2 , preferably between 90 mm^2 and 300 mm^2 .

[0033] A portion of the depression may overlap with a portion of the tab, specifically the rear portion of the tab.

[0034] Preferably, the depression extends between 0.5 mm and 4.0 mm, preferably between 1.0 mm and 2.5 mm, more preferably between 1.2 mm and 1.5 mm, in the negative z-direction that is perpendicular to the x-y-plane of the central panel. It is especially preferred that the depression extends about 1.25 mm in the negative z-direction.

[0035] The extension of the tab in the positive z-direction can be equal to the extension of the stabilizing bead in the positive z-direction $\pm 1.5 \text{ mm}$. Preferably the extension of the tab in the positive z-direction is equal to the extension of the bead in the positive z-direction $\pm 0.75 \text{ mm}$ or $\pm 0.3 \text{ mm}$.

[0036] The extension of the stabilizing bead may be lower or equal to the extension of the tab in the positive z-direction. Preferably, the extension of the stabilizing bead is at most 1.5 mm, more preferably at most 0.75 mm, even more preferably at most 0.3 mm, smaller than the extension of the tab in the positive z-direction. It is especially preferred that the extension of the stabilizing bead is substantially equal to the extension of the tab in the positive z-direction.

[0037] The extension of the depression in the negative z-direction may be equal to the extension of the tab in the positive z-direction $\pm 1.0 \text{ mm}$, preferably $\pm 0.5 \text{ mm}$. It is especially preferred that the extension of the depression in the negative z-direction is equal to the extension of the tab in the positive z-direction $\pm 0.2 \text{ mm}$.

[0038] It is preferred that the extension of the depression in the negative z-direction is equal to the extension of the stabilizing bead in the positive z-direction $\pm 2.0 \text{ mm}$, preferably $\pm 1.2 \text{ mm}$. Specifically, the extension of the depression in the negative z-direction is equal to the extension of the stabilizing bead in the positive z-direction $\pm 0.8 \text{ mm}$.

[0039] The end may comprise at least one bulge, preferably at least two bulges. The bulge may be shaped in the end and may extend in the positive z-direction. The

at least one bulge may be positioned in the proximity of the tab and associated with the tab.

[0040] Preferably, the at least one bulge is located in the proximity of an outer side of the tab that extends between the front portion and the rear portion of the tab. Specifically, a first bulge is located in the proximity of a first outer side of the tab that extends between the front portion and the rear portion of the tab and a second bulge is located in the proximity of a second outer side of the tab that extends between the front portion and the rear portion of the tab.

[0041] The extension of the at least one bulge in the positive z-direction may be equal to the extension of the tab in the positive z-direction ± 2.0 mm, preferably ± 1.5 mm. Specifically, the extension of the bulge in the positive z-direction is equal to the extension of the tab in the positive z-direction ± 1.0 mm.

[0042] The bulge may extend between 0.4 mm and 2.5 mm, preferably between 0.7 mm and 2.0 mm, more preferably between 1.0 mm and 1.5 mm, in the positive z-direction that is perpendicular to the x-y-plane of the central panel. It is preferred that the bulge extends about 1.2 mm in the positive z-direction.

[0043] The extension of the at least one bulge may be lower or equal to the extension of the tab in the positive z-direction. Preferably, the extension of the bulge is at most 1.5 mm, more preferably at most 1.2 mm, even more preferably at most 0.9 mm, smaller than the extension of the tab in the positive z-direction. It is especially preferred that the extension of the at least one bulge is substantially equal to the extension of the tab in the positive z-direction.

[0044] The extension of the at least one bulge may be equal to the extension of the stabilizing bead ± 2.0 mm, preferably ± 1.2 mm, more preferably ± 0.6 mm, in the positive z-direction.

[0045] The extension of the at least one bulge in the positive z-direction may also be equal to the extension of the depression in the negative z-direction ± 2.0 mm, preferably ± 1.2 mm, more preferably ± 0.6 mm, even more preferably ± 0.2 mm.

[0046] The at least one bulge (or at least two bulges) may have a non-round basic shape.

[0047] The at least one bulge (or at least two bulges) may be positioned and may be configured to prevent a possible rotation of the tab (about the rivet), especially prior to actuating the tab or prior to open the end.

[0048] The at least one bulge (or at least two bulges) may be positioned and may be configured to reduce a rotation of the tab (about the rivet), especially prior to actuating the tab or prior to open the end.

[0049] According to the claimed invention, the end for the container comprises a second bead that extends in the negative z-direction of the x-y-plane of the central panel.

[0050] According to the claimed invention, the second bead is at least partially surrounded by the (first) stabilizing bead or fully surrounded by the (first) stabilizing,

preferably in a plane.

[0051] It is preferred that the second bead extends between 0.5 mm and 4.0 mm, preferably between 1.0 mm and 2.5 mm, more preferably between 1.2 mm and 1.5 mm, in the negative z-direction that is perpendicular to the x-y-plane of the central panel.

[0052] The second bead and the depression may be positioned and shaped such that the x-y-plane of the central panel of the end is parallel to a flat surface $\pm 2.0^\circ$, preferably $\pm 1.5^\circ$, more preferably $\pm 1.0^\circ$, most preferred $\pm 0.5^\circ$, when the end is positioned on the flat surface.

[0053] Preferably, the second bead and the depression may be positioned and shaped such that the x-y-plane of the central panel of the end is parallel to a flat surface $\pm 2.0^\circ$, preferably $\pm 1.5^\circ$, more preferably $\pm 1.0^\circ$, most preferred $\pm 0.5^\circ$, when the second bead and/or the depression contacts the flat surface.

[0054] The flat surface may be a transport surface, e.g. a conveyor belt.

[0055] The extension of the second bead may be equal to the extension of the depression in the negative z-direction ± 1.5 mm, preferably ± 1.0 mm, more preferably ± 0.5 mm, most preferably ± 0.2 mm. It is especially preferred that the extension of the second bead is substantially equal to the extension of the depression in the negative z-direction.

[0056] The second bead may be positioned or may be formed in the end such that no portion of the second bead overlaps with a portion of the tab.

[0057] The second bead may be positioned or may be formed in the end such that a distance between the tab and the second bead is at least 5 mm, at least 10 mm, at least 15 mm, or at least 20 mm. The distance between the tab and the second bead may be the shortest distance between portions of the tab and the second bead.

[0058] The depression may not be surrounded by the stabilizing bead in the x-y-plane or a plane parallel to the x-y-plane.

[0059] A container may comprise the end and a container body. The container body of the container may be a one piece container body. The end may be seamed to the container body, specifically via a double seam. The container body may also be a two-piece container body that may comprise a container wall and a container bottom, wherein the bottom may be seamed to container wall and the end may be seamed to the container wall.

[0060] For example, two containers may be stacked for transportation of filled containers or presentation of the containers at a point of sale. The containers may be same containers comprising same elements, specifically same container bodies and same ends. These stacked containers may be parallel $\pm 2.0^\circ$, specifically the central panels of the containers may be parallel $\pm 2.0^\circ$.

[0061] It is especially preferred that (the central panels of) the two containers are parallel $\pm 1.5^\circ$, $\pm 1.0^\circ$, or even $\pm 0.5^\circ$. Thereby, an increased stability of the stack is achieved.

[0062] Alternatively or additionally, the lower surfaces

of the containers may be parallel $\pm 2.0^\circ$, preferably $\pm 1.0^\circ$, more preferably $\pm 0.5^\circ$.

[0063] The end may comprise metal, preferably steel or aluminum. The end may also be made of metal, preferably steel or aluminum.

[0064] The container body may comprise metal, preferably steel or aluminum. The container body may also be made of metal, preferably steel or aluminum.

[0065] Preferably, the container comprises food, such as seafood or vegetables.

[0066] The container, preferably the container body, may have a non-round basic shape in a plane parallel to the plane of the central panel.

[0067] A stack of at least containers can comprise at least two of any of the herein disclosed containers. The at least two containers may be same containers.

[0068] Embodiments of the invention are described in more detail with regard to the drawings. The description of the embodiments is not to be construed as to limit the scope defined by the claims. Same reference signs of the figures describe same elements. A remark is put in front of the Figures listing.

[0069] The second bead 880 is disclosed herein with reference to Figures 8a to 8d (please refer thereto). This second bead as described is comprised in any one of the ends 100, 200, 300, 400, 500, 600, 700 described in the following Figures.

Figure 1 depicts an end 100 in a perspective view.
 Figure 2a depicts an end 200 in a top view, indicating further ends beneath the end 200.
 Figure 2b depicts several stacked ends 200a to 200e in a sectional view A-A as indicated in figure 2a.
 Figure 2c depicts two stacked ends 200a, 200b in a sectional view A-A as indicated in figure 2a.
 Figure 3a depicts a stack of two containers 350a, 350b comprising ends 300a, 300b in a top view.
 Figure 3b depicts two stacked containers 350a, 350b comprising ends 300a, 300b in a sectional view B-B as indicated in figure 3a.
 Figure 3c depicts two stacked containers 350a, 350b comprising ends 300a, 300b of figure 3b in a sectional view B-B as indicated in figure 3a.
 Figure 4a depicts a container 450 comprising an end 400 in a top view.
 Figure 4b depicts an end 400 in a top view, indicating further ends beneath the end 400.
 Figure 4c depicts several stacked ends 400a to 400e in a sectional view C-C as indicated in figure 4b.
 Figure 4d depicts three stacked ends 400a to 400c in a sectional view C-C as indicated in figure 4b.
 Figure 5a depicts a container 550 comprising an end 500 in a top view.

Figure 5b depicts an end 500 in a top view, indicating further ends beneath the end 500.
 Figure 5c depicts several stacked ends 500a to 500e in a sectional view D-D as indicated in figure 5b.
 Figure 5d depicts two stacked ends 500a, 500b in a sectional view D-D as indicated in figure 5b.
 Figure 6a depicts a stack of two containers 650a, 650b comprising ends 600a, 600b in a top view.
 Figure 6b depicts an end 600 in a top view, indicating further ends beneath the end 600.
 Figure 6c depicts several stacked ends 600a to 600e in a sectional view F-F as indicated in figure 6b.
 Figure 6d depicts two stacked containers 650a, 650b comprising ends 600a, 600b in a sectional view E-E as indicated in figure 6a.
 Figure 6e depicts two stacked ends 600a, 600b in a sectional view F-F as indicated in figure 6b.
 Figure 6f depicts two stacked containers 650a, 650b comprising ends 600a, 600b in a sectional view E-E as indicated in figure 6a.
 Figure 7a depicts a container 750 comprising an end 700 in a top view.
 Figure 7b depicts an end 700 in a top view, indicating further ends beneath the end 700.
 Figure 7c depicts several stacked ends 700a to 700e in a sectional view G-G as indicated in figure 7b.
 Figure 7d depicts two stacked ends 700a, 700b in a sectional view G-G as indicated in figure 7b.
 Figure 8a depicts an end 800 in a top view.
 Figure 8b depicts the end 800 in a sectional view H-H as indicated in figure 8a.
 Figure 8c depicts an end 800a in a top view (disclaimed).
 Figure 8d depicts an end 800b in a top view (disclaimed).

[0070] Fig. 1 shows an end 100 for a container. The end 100 comprises central panel 112 and a tab 140. The tab 140 is attached to the end 100, especially to the central panel 112, via a rivet 116 and the tab 140 comprises a front portion 141 and a rear portion 142.

[0071] The central panel 112 of the end 100 defines an x-y-plane. A z-direction is perpendicular to the x-y-plane. A bead 113 is formed in the end 100, preferably in the central panel 112, and extends in the positive z-direction from the x-y-plane of the central panel 112. The bead 113 is substantially c-shaped and not fully surrounds a portion of the central panel 112. Beads such as bead 113 are formed to enhance mechanical stability of an end.

[0072] As an example, bead 113 as shown in Fig. 1 has an elongated shape.

[0073] Further, the end 100 comprises a depression 114 that is formed in the end 100, preferably in the central

panel 112, and extends in the negative z-direction from the x-y-plane. The depression 114 has a basic circular shape and is positioned such that a portion of the tab 140, i.e. the rear portion 142 of the tab 140, overlaps the depression 114. The depression allows a consumer to reach the rear portion 142 in a more convenient manner, when the consumer intends to lift the rear portion 142 of the tab 140 in order to open the end 100.

[0074] A first bulge 120 and a second bulge 121 are formed in the end 100, preferably in the central panel 112 of the end 100. The bulges 120, 121 extend from the x-y-plane in the positive z-direction. The first bulge 120 is located close to a first side of the tab 140 that extends from the front portion 141 to the rear portion 142. The second bulge 121 is located close to a second side of the tab 140 that extends from the front portion 141 to the rear portion 142. The first side of the tab 140 and the second side of the tab 140 are opposite sides.

[0075] The bulges 120, 121 are provided to prevent a rotation of the tab 140 about the rivet 116 in a plane parallel to the x-y-plane. Such a rotation of the tab 140 prior to lifting the rear portion 142 of the tab 140 might cause the tab 140 to break since the front portion 141 of the tab 140 can attack the central panel 112 at a position that is too far away from the score line 118 as mechanically weakened portion of the end 100, preferably of the central panel 112.

[0076] The score line 118 as mechanically weakened portion is located in the end 100, preferably in the central panel 112, close to the outer edge of the end 100. The score line 118 surrounds a portion of the end 100, specifically the central panel 112. The tab 140 is positioned and shaped such that the front portion 141 of the tab 140 contacts (a portion of the end close to) the score line 118 in order to break a portion of the end 100, e.g. the central panel 112, when the tab 140 is pivoted about the rivet 116 by lifting the rear portion 142 of the tab 140. By pulling the tab 140 away from the end 100, a large portion of the central panel 112 that is surrounded by the score line 118 is removed from the end 100 and the end 100 is open.

[0077] At the outer edge of the end 100, a curl 130 (implied in Fig. 1) is positioned. The curl 130 of the end 100 can be used to attach the end 100 to a container body in order to produce a closed container. For example, the end 100 can be seamed to a container body via the curl 130.

[0078] Fig. 2a shows a first end 200 in a top view, wherein a further end 200 is indicated below the first end 200 that is rotated by 180 ° in a x-y-plane as will be discussed in more detail below.

[0079] The end 200 may be equal to the end 100. The end 200 comprises a central panel 212 that defines an x-y-plane. In the end 200, specifically in the central panel 212, a stabilizing bead 213 is formed and the bead 213 extends in a positive z-direction, wherein the z-direction is perpendicular to the x-y-plane. Further, a depression 214 is formed, preferably in the central panel 212, and the depression 214 extends in the negative z-direction.

[0080] End 200 comprises a tab 240 with a front portion 241 and a rear portion 242. The tab 240 is attached to the end 200, e.g. to the central panel 212, via a rivet 216. The depression 214 is partially overlapped by a portion of the tab 240, specifically by the rear portion 242 of the tab 240. The front portion 241 of the tab 240 may break a score line 218 that is located close to the outer edge of the end 200, when the tab 240 is pivoted about the rivet 216 by lifting the rear portion 242 of the tab 240.

[0081] Optionally, in the proximity of the tab 240, a first bulge 220 and a second bulge 221 are formed in the end 200, preferably in the central plane 212. The bulges 220, 221 extend in the positive z-direction from the x-y-plane.

[0082] A curl 230 is located at the outer edge of the end 200.

[0083] In Fig. 2a a cross section A-A is indicated that is shown in Fig. 2b and 2c.

[0084] Fig. 2b depicts a stack of ends 200a-e comprising several ends 200 as ends 200a, 200b, 200c, 200d and 200e. The ends 200a through 200e are same ends 200.

[0085] In the stack of ends 200a-e, the ends 200a-e are each rotated by 180 ° in the x-y-plane relative to the next end 200 in the stack 200a-e. For example, end 200a has the same orientation as end 200 as shown in Fig. 2a. Compared to end 200a, end 200b is rotated by 180 ° in the x-y-plane and positioned below end 200a. Compared to end 200b, end 200c is rotated by 180 ° in the x-y-plane and positioned below end 200b. Other ends of the stack 200a-e are positioned similarly.

[0086] Each of the ends 200a through 200e comprises a tab 240, wherein the tab 240 of end 200a is denoted as tab 240a and so on. Each of the ends 200a through 200e further comprises a central panel 212, a stabilizing bead 213, at least one bulge 220 and a depression 214.

[0087] With reference to Fig 2b, the depression 214a of the first end 200a in the stack of ends 200a-e may contact the central panel 212b of the second end 200b in the stack of ends 200a-e. Alternatively or additionally, the tab 240b of the second end 200b may contact the (lower side of the) central panel 212a of the first end 200a. Alternatively or additionally, the bead 213b of the second end 200b may contact the (lower side of the) central panel 212a of the first end 200a. Alternatively or additionally, the at least one bulge 220b may contact the (lower side of the) central panel 212a of the first end 200a.

[0088] It is preferred that the tab 240b of the second end 200b contacts the (lower side of the) central panel 212a of the first end 200a and the bead 213b of the second end 200b contacts the (lower side of the) central panel 212a of the first end 200a.

[0089] The central planes 212a-e of the stack of ends 200a-e are parallel and the stack of ends 200a-e shows a high stability.

[0090] In Fig. 2c a stack of ends 200a and 200b only is depicted. The at least one bulge 220a, 220b of ends 200a, 200b may have an extension sTB in the positive z-direction between 0.4 mm and 2.5 mm, preferably be-

tween 0.7 mm and 2.0 mm, more preferably between 1.0 mm and 1.5 mm. Specifically, the at least one bulge 220a, 220b has an extension sTB of about 1.2 mm in the positive z-direction.

[0091] The at least one bulge 220a, 220b of ends 200a, 200b may have an extension sTB lower or equal to an extension sT in the positive z-direction of the tab 240a, 240b.

[0092] The tab 240a, 240b of ends 200a, 200b may have an extension sT in the positive z-direction between 1.4 mm and 2.5 mm, preferably between 1.7 mm and 2.2 mm, more preferably between 1.8 mm and 2.0 mm. Specifically, the tab 240a, 240b has an extension sT of about 1.95 mm in the positive z-direction.

[0093] The depression 214a, 214b of ends 200a, 200b may have an extension sFH from the respective central panel 212a, 212b in the negative z-direction between 0.5 mm and 4.0 mm, preferably between 1.0 mm and 2.5 mm, more preferably between 1.2 mm and 1.5 mm. Specifically, the depression 214a, 214b has an extension sFH of about 1.25 mm in the negative z-direction.

[0094] The stabilizing bead 213a, 213b of ends 200a, 200b may have an extension sPB in the positive z-direction between 0.4 mm and 2.5 mm, preferably between 0.5 mm and 1.5 mm, more preferably between 0.6 mm and 1.0 mm. Specifically, the stabilizing bead 213a, 213b has an extension sPB of about 0.8 mm in the positive z-direction.

[0095] The extension sPB of the stabilizing bead 213a, 213b may be lower or equal to the extension sT of the tab 240a, 240b in the positive z-direction.

[0096] As can best be seen in Fig. 2a and 2b, when two ends 200a, 200b are stacked while the ends 200a, 200b are rotated by 180° in the x-y-plane, the depression 214a, 214b of one of the ends 200a, 200b is not overlapped by the stabilizing bead 213b, 213a of the other one of the ends 200b, 200a such that the central panels 212a, 212b of the ends 200a, 200b are substantially parallel ($\pm 2.0^\circ$).

[0097] Preferably, the depression 214a, 214b of an end 200a, 200b does not contact the stabilizing bead 213a, 213b of another end 200b, 200a, specifically when the ends 200a, 200b are stacked while the ends 200a, 200b are rotated relative to another by 180° in the x-y-plane.

[0098] The depression 214a, 214b of an end 200a, 200b may be spaced from the stabilizing bead 213a, 213b of another end 200b, 200a, specifically when the ends 200a, 200b are stacked while the ends 200a, 200b are rotated relative to another by 180° in the x-y-plane.

[0099] It is preferred, that the depression 214a, 214b of an end 200a, 200b is at least partially surrounded by the stabilizing bead 213a, 213b of another end 200b, 200a (in a plane parallel to the x-y-plane), specifically when the ends 200a, 200b are stacked while the ends 200a, 200b are rotated relative to another by 180° in the x-y-plane.

[0100] Fig. 3a shows a container 350 comprising an end 300. The end 300 is the same as the ends 100, 200.

[0101] The end 300 comprises a stabilizing bead 313, that is formed in the end 300, e.g. in a central panel 312 of the end 300, and extends in a positive z-direction. The end 300 comprises a tab 340 having a front portion 341 and a rear portion 342. The tab 340 is attached to the end 300, specifically to the central panel 312 of the end 300, via a rivet 316.

[0102] Two bulges 320, 321 are formed in the end 300, preferably in the central panel 312 of the end 300, and extend in the positive z-direction from the x-y-plane. The bulges 320, 321 are positioned close to the tab 340 as described above with reference to ends 100, 200.

[0103] A depression 314 is formed in the end 300, specifically in the central panel 312, and extends in the negative z-direction from the x-y-plane of the central panel 312 as also described above with reference to ends 100, 200.

[0104] A score line 318 surrounds a large portion of the central panel 312 and is positioned and functions as described above with reference to ends 100, 200.

[0105] A curl 330 is seamed to a container body 360a, b (see Fig. 3b) for attaching the end 300 to the container body 360a, b and to form a closed container 350.

[0106] The cross section B-B indicated in Fig. 3a is shown in Fig. 3b and 3c.

[0107] Fig. 3b depicts a stack of containers 350a, 350b wherein each container 350a, 350b is equal to container 350. Each container 350a, 350b comprises an end 300a, 300b having a stabilizing bead 313a, 313b, a central panel 312a, 312b, a depression 314a, 314b, a tab 340a, 340b and at least one bulge 320a, 320b. The end 300a, 300b is attached to a container body 360a, 360b that comprises a lower surface 385a, 385b.

[0108] The containers 350a, 350b are stacked and the central panels 312a, 312b of the respective ends 300a, 300b are substantially parallel ($\pm 2.0^\circ$).

[0109] The lower surfaces 385a, 385b of the containers 350a, 350b may be substantially parallel ($\pm 2.0^\circ$).

[0110] The stabilizing bead 312b of an end 300b of a container 350b may contact the lower surface 385a of another container 350a, when the containers 350a, 350b are stacked. Alternatively or additionally, the tab 340b of an end 300b of a container 350b may contact the lower surface 385a of another container 350a, when the containers 350a, 350b are stacked. Alternatively or additionally, the at least one bulge 320b of an end 300b of a container 350b may contact the lower surface 385a of another container 350a, when the containers 350a, 350b are stacked.

[0111] The extension sT of the tab 340a, 340b of ends 300a, 300b of containers 350a, 350b in the positive z-direction may be between 1.4 mm and 2.5 mm, preferably between 1.7 mm and 2.2 mm, more preferably between 1.8 mm and 2.0 mm. Specifically, the tab 340a, 340b has an extension sT of about 1.95 mm in the positive z-direction.

[0112] The at least one bulge 320a, 320b of ends 300a, 300b of containers 350a, 350b may have an extension

sTB in the positive z-direction between 0.4 mm and 2.5 mm, preferably between 0.7 mm and 2.0 mm, more preferably between 1.0 mm and 1.5 mm. Specifically, the at least one bulge 320a, 320b has an extension sTB of about 1.2 mm in the positive z-direction.

[0113] The at least one bulge 320a, 320b of ends 300a, 300b of containers 350a, 350b may have an extension sTB lower or equal to the extension sT in the positive z-direction of the tab 340a, 340b.

[0114] The extension sPB of the stabilizing bead 313a, 313b of ends 300a, 300b of containers 350a, 350b in the positive z-direction may be between 0.4 mm and 2.5 mm, preferably between 0.5 mm and 1.5 mm, more preferably between 0.6 mm and 1.0 mm. Specifically, the stabilizing bead 313a, 313b has an extension sPB of about 0.8 mm in the positive z-direction.

[0115] The extension sPB of the stabilizing bead 313a, 313b may be lower or equal to the extension sT of the tab 340a, 340b in the positive z-direction.

[0116] Fig. 4a depicts a container 450 that comprises an end 400 and a container body (not shown in Fig. 4a) analogous to e.g. container body 360a comprised by container 350a.

[0117] The end 400 comprises a central panel 412 that defines an x-y-plane. A stabilizing bead 413 is formed in the end 400, e.g. in the central panel 412. Further, a depression 414 is formed in the end 400, preferably in the central panel 412. The stabilizing bead 413 may have a basic c-shape. The stabilizing bead 413 may not fully surround a portion of the central panel in the x-y-plane.

[0118] A tab 440 comprising a front portion 441 and a rear portion 442 is attached to the end 400, specifically to the central panel 412, via a rivet 416.

[0119] The rear portion 442 of the tab 440 partially covers the depression 414 such that a consumer may reach the rear portion 442 of the tab 440 by moving a portion of the finger into the depression 414 and at least partially below the rear portion 442 of the tab 440.

[0120] Preferably, the depression 414 is not (fully) surrounded by the stabilizing bead 413.

[0121] A score line 418 is formed in an outer portion of the end 400, e.g. in the central plane 412, and surrounds a (large) portion of the end 400, e.g. the central plane 412.

[0122] The end 400 is seamed to the container body via curl 430 of the end 400.

[0123] The end 400 has a basic triangular shape in the x-y-plane.

[0124] Fig. 4b shows the end 400 in a top view. Further ends 400 are indicated below the shown end 400, wherein the ends 400 below the shown end 400 are rotated by 120 ° in the x-y-plane relative to the next end 400 as will be more detailed described with reference to Fig. 4c. A cross section C-C is indicated in Fig. 4b.

[0125] In Fig. 4c a stack of ends 400a-e is shown in the cross sectional view C-C indicated in Fig. 4b. Five ends 400 as ends 400a, 400b, 400c, 400d, and 400e are stacked. The end 400a has the same orientation in the

x-y-plane as the end 400 shown in Fig. 4b.

[0126] Each end 400a-e is rotated by 120 ° in the x-y-plane relative to the preceding end 400a-e in the stack. E.g. end 400b is rotated by 120 ° in the x-y-plane relative to the end 400a and end 400c is rotated by 120 ° in the x-y-plane relative to the end 400b in the x-y-plane. Other ends 400d-e are orientated in the x-y-plane analogously. Thus, end 400c is rotated by 240 ° in the x-y-plane relative to the end 400a and e.g. end 400d has the same orientation in the x-y-plane as end 400a.

[0127] Each of the ends 400a-e comprises a central panel 412a-e, a stabilizing bead 413a-e, a depression 414a-e and a tab 440a-e. The central panels 412a-e of the stack of ends 400a-e are (substantially) parallel. Thereby, the stack of ends 400a-e shows an enhanced stability.

[0128] Fig. 4d depicts three stacked ends 400a-c, wherein each of the ends 400a-c is an end 400 as described above.

[0129] The tab 440a-c of the ends 400a-c may have an extension sT in the positive z-direction between 1.4 mm and 2.5 mm, preferably between 1.7 mm and 2.2 mm, more preferably between 1.8 mm and 2.0 mm. Specifically, the tab 240a, 240b has an extension sT of about 1.95 mm in the positive z-direction.

[0130] The stabilizing bead 413a-c of ends 400a-c may have an extension sPB in the positive z-direction between 0.4 mm and 2.5 mm, preferably between 0.5 mm and 1.5 mm, more preferably between 0.6 mm and 1.0 mm. Specifically, the stabilizing bead 413a-c has an extension sPB of about 0.8 mm in the positive z-direction.

[0131] The depression 414a-c of ends 400a-c may have an extension sFH in the negative z-direction between 0.5 mm and 4.0 mm, preferably between 1.0 mm and 2.5 mm, more preferably between 1.2 mm and 1.5 mm. Specifically, the depression 414a-c has an extension sFH of about 1.25 mm in the negative z-direction.

[0132] The extension sPB of the stabilizing bead 413a-c in the positive z-direction may be lower or equal to the extension sT of the tab 413a-c in the positive z-direction.

[0133] In the stack 400a-c, the stabilizing bead 413b of the end 400b may contact the end 400a, specifically the central panel 412a. The tab 440b of the end 400b may contact the end 400a, specifically the central panel 412a. The tab 440c of the end 400c may contact the end 400b, preferably the central panel 412b. The tab 440c of the End 400c may contact the end 400b, e.g. the central panel 412b.

[0134] Fig. 5a depicts a container 550 comprising an end 500 and a container body (not shown in Fig. 5a). The end 500 is seamed to the container body for closing the container 550 via a curl 530 of the end 500.

[0135] The end 500 comprises a central panel 512 that defines an x-y-plane. In the end 500, e.g. in the central panel 512, a stabilizing bead 513 is formed and the bead 513 extends in a positive z-direction, wherein the z-direction is perpendicular to the x-y-plane. Further, a depression 514 is formed in the end 500, preferably in the

central panel 512, that extends in the negative z-direction.

[0136] End 500 comprises a tab 540 with a front portion 541 and a rear portion 542. The tab 540 is attached to the end 500, specifically to the central plane 512, via a rivet 516. The Depression 514 is partially overlapped by a portion of the tab 540, specifically by the rear portion 542 of the tab 540. The front portion 541 of the tab 540 may break a score line 518 that is located close to the outer edge of the end 500, when the tab 540 is pivoted about the rivet 516 by lifting the rear portion 542 of the tab 540.

[0137] The stabilizing bead 513 (fully) surrounds a portion of the central panel 512. The depression 514 may be positioned outside the surrounded portion of the central panel 512. The depression 514 may not be surrounded by the stabilizing bead 513.

[0138] The stabilizing bead 513 may have a basic oval shape.

[0139] The end 500 may have a basic oval shape.

[0140] Fig. 5b shows the end 500 in a top view, wherein a further end 500 is indicated below the end 500. Further, a cross section D-D is indicated in Fig. 5b.

[0141] Fig. 5c depicts a stack of ends 500a-e comprising several ends 500 as ends 500a, 500b, 500c, 500d and 500e.

[0142] In the stack of ends 500a-e, the ends 500a-e are each rotated by 180 ° in the x-y-plane relative to the next end 500 in the stack 500a-e. For example, end 500a has the same orientation as end 500 as shown in Fig. 5b. Compared to end 500a, end 500b is rotated by 180 ° in the x-y-plane and positioned below end 500a. Other ends of the stack 500a-e are positioned and orientated similarly.

[0143] Each of the ends 500a-e comprises a tab 540a-e. Each of the ends 500a-e further comprises a central panel 512a-e, a stabilizing bead 513a-e and a depression 514a-e.

[0144] In Fig. 5d a stack of ends 500a and 500b is depicted.

[0145] The tab 540a-b of ends 500a-b may have an extension sT in the positive z-direction between 1.4 mm and 2.5 mm, preferably between 1.7 mm and 2.2 mm, more preferably between 1.8 mm and 2.0 mm. Specifically, the tab 540a-b has an extension sT of about 1.95 mm in the positive z-direction.

[0146] The depression 514a-b of ends 500a-b may have an extension sFH in the negative z-direction between 0.5 mm and 4.0 mm, preferably between 1.0 mm and 2.5 mm, more preferably between 1.2 mm and 1.5 mm. Specifically, the depression 514a-b has an extension sFH of about 1.25 mm in the negative z-direction.

[0147] The stabilizing bead 513a-b of ends 500a-b may have an extension sPB in the positive z-direction between 0.4 mm and 2.5 mm, preferably between 0.5 mm and 1.5 mm, more preferably between 0.6 mm and 1.0 mm. Specifically, the stabilizing bead 513a-b has an extension sPB of about 0.8 mm in the positive z-direction.

[0148] The extension sPB of the stabilizing bead 513a-b may be lower or equal to the extension sT of the tab 540a-b in the positive z-direction.

[0149] As can best be seen in Fig. 5c and 5d, when two ends 500a-b are stacked while the ends 500a-b are rotated by 180 ° in the x-y-plane, the depression 514a-b of one of the ends 500a-b is not overlapped by the stabilizing bead 513b-a of the other one of the ends 500b-a such that the central panels 512a-b of the ends 500a-b are substantially parallel ($\pm 2.0^\circ$).

[0150] With reference to Fig 5d, the depression 514a of the first end 500a in the stack of ends 500a-b may contact the second end 500b, preferably the central panel 512b, in the stack of ends 500a-b. Alternatively or additionally, the tab 540b of the second end 500b may contact the first end 500a, preferably the central panel 512a. Alternatively or additionally, the stabilizing bead 513b of the second end 500b may contact the first end 500a, specifically the central panel 512a.

[0151] It is preferred that the tab 540b of the second end 500b contacts the first end 500a, e.g. the central panel 512a of the first end 500a, and the stabilizing bead 513b of the second end 500b contacts the first end 500a, e.g. the central panel 512a.

[0152] Fig. 6a shows a stack of two containers 650a-b, wherein each of the containers 650a-b comprises an end 600a-b and a container body 660a-b (also see Fig. 6c and 6d). In Fig. 6a only the end 600a is visible due to the perspective view on the stack of containers 650a-b. Further, a cross section E-E is indicated in Fig. 6a that is shown in Fig. 6d.

[0153] The end 600a comprises a stabilizing bead 613a, that is formed in the end 600a, preferably in a central panel 612a of the end 600a, and extends in a positive z-direction from a x-y-plane defined by the central panel 612a. The end 600a comprises a tab 640a having a front portion 641a and a rear portion 642a. The tab 640a is attached to the end 600a, specifically to the central panel 612a of the end 600a, via a rivet 616a.

[0154] A depression 614a is formed in the end 600a, preferably in the central panel 612a, and extends in the negative z-direction from the x-y-plane of the central panel 612a.

[0155] A score line 618a surrounds a (large) portion of the end 600a, preferably the central panel 612a, as a mechanically weakened portion described above.

[0156] A curl 630a is seamed to the container body 660a (see Fig. 6d) for attaching the end 600a to the container body 660a and to form a closed container 650a.

[0157] The end 600a has a basic oblonged rectangular shape. Two sides of the basic rectangular shape are longer, preferably at least two or three times longer, than the other two sides of the basic rectangular shape.

[0158] Fig. 6b shows an end 600, e.g. end 650. Further ends 600 are indicated below end 600. Additionally, a cross section F-F is indicated in Fig. 6b that is shown in Fig. 6c.

[0159] Fig. 6c depicts a stack of ends 600a-e compris-

ing ends 600a, 600b, 600c, 600d and 600e.

[0160] In the stack of ends 600a-e, the ends 600a-e are each rotated by 180 ° in the x-y-plane relative to the next end 600 in the stack 600a-e. For example, end 600a has the same orientation as end 600 as shown in Fig. 6b. Compared to end 600a, end 600b is rotated by 180 ° in the x-y-plane and positioned below end 600a. Other ends of the stack 600a-e are positioned and orientated similarly.

[0161] Each of the ends 600a-e comprises a tab 640a-e. Each of the ends 600a-e further comprises a central panel 612a-e, a stabilizing bead 613a-e and a depression 614a-e.

[0162] Fig. 6d shows a stack of containers 650a-b as indicated in Fig. 6a. Each container 650a-b comprises an end 600a-b and a container body 660a-b.

[0163] Each end 600a-b comprises a stabilizing bead 613a-b, a central panel 612a-b, a depression 614a-b and a tab 640a-b. The container bodies 660a-b comprise a lower surface 685a-b.

[0164] The containers 650a-b are stacked and the central panels 612a-b of the respective ends 600a-b are substantially parallel ($\pm 2.0^\circ$).

[0165] The tab 640b of end 600b may contact the lower surface 685a of end 600a. The stabilizing bead 613b of end 600b may contact the lower surface 685a of end 600a.

[0166] In Fig. 6e a stack of ends 600a and 600b is depicted. The ends 600a and 600b as shown in Fig. 6e and described with reference to Fig. 6e are not attached to a container body.

[0167] The tab 640a-b of ends 600a-b may have an extension sT in the positive z-direction between 1.4 mm and 2.5 mm, preferably between 1.7 mm and 2.2 mm, more preferably between 1.8 mm and 2.0 mm. Specifically, the tab 640a-b has an extension sT of about 1.95 mm in the positive z-direction.

[0168] The depression 614a-b of ends 600a-b may have an extension sFH in the negative z-direction between 0.5 mm and 4.0 mm, preferably between 1.0 mm and 2.5 mm, more preferably between 1.2 mm and 1.5 mm. Specifically, the depression 614a-b has an extension sFH of about 1.25 mm in the negative z-direction.

[0169] The stabilizing bead 613a-b of ends 600a-b may have an extension sPB in the positive z-direction between 0.4 mm and 2.5 mm, preferably between 0.5 mm and 1.5 mm, more preferably between 0.6 mm and 1.0 mm. Specifically, the stabilizing bead 613a-b has an extension sPB of about 0.8 mm in the positive z-direction.

[0170] The extension sPB of the stabilizing bead 613a-b may be lower or equal to the extension sT of the tab 640a-b in the positive z-direction.

[0171] The central panels 612a-b of ends 600a-b are (substantially) parallel. Thus, a stack of ends 600a, 600b with a high stability is provided.

[0172] In Fig. 6f, a stack of containers 650a-b is shown, wherein each of the containers 650a-b comprises an end 600a-b as described above.

[0173] The central panels 612a-b of the ends 600a-b of the containers 650a-b are (substantially) parallel.

[0174] Alternatively or additionally, the lower surfaces 685a-b of containers 650a-b may be (substantially) parallel.

[0175] Fig. 7a depicts a container 750 comprising an end 700 and a container body. The container body is not shown in Fig. 7a. The end 700 is seamed to the container body for closing the container 750 via a curl 730 of the end 700.

[0176] The end 700 comprises a central panel 712 that defines an x-y-plane. In the end 700, specifically in the central panel 712, a stabilizing bead 713 is formed and the bead 713 extends in a positive z-direction, wherein the z-direction is perpendicular to the x-y-plane. Further, a depression 714 is formed in the end 700, e.g. in the central panel 712, that extends in the negative z-direction.

[0177] End 700 comprises a tab 740 with a front portion 741 and a rear portion 742. The tab 740 is attached to the end 700, e.g. to the central panel 712, via a rivet 716. The Depression 714 is partially overlapped by a portion of the tab 740, specifically by the rear portion 742 of the tab 740. The front portion 741 of the tab 740 may break a score line 718 as described above.

[0178] The stabilizing bead 713 (fully) surrounds a portion of the central panel 712. The depression 714 may be positioned outside the surrounded portion of the central panel 712. The depression 714 may not be surrounded by the stabilizing bead 713.

[0179] The stabilizing bead 713 may have a basic oval shape with two elongated sides that may be parallel over a distance of at least 10 mm.

[0180] The end 700 may have a basic oval shape with two elongated sides that may be parallel over a distance of at least 10 mm.

[0181] Fig. 7b shows the end 700 in a top view. A further end 700 is indicated below the end 700. A cross section G-G is indicated in Fig. 7b.

[0182] Fig. 7c depicts a stack of ends 700a-e. Each of the ends 700a-e may be an end 700 as described above.

[0183] In the stack of ends 700a-e, the ends 700a-e are each rotated by 180 ° in the x-y-plane relative to the next end 700 in the stack 700a-e. For example, end 700a has the same orientation as end 700 as shown in Fig. 7b. End 700b is rotated by 180 ° in the x-y-plane relative to end 700a and positioned below end 700a. Other ends of the stack 700a-e are positioned and orientated similarly.

[0184] Each of the ends 700a-e comprises a tab 740a-e, a central panel 712a-e, a stabilizing bead 713a-e and a depression 714a-e.

[0185] In Fig. 7d ends 500a and 500b are stacked.

[0186] The tab 740a-b of ends 700a-b may have an extension sT in the positive z-direction between 1.4 mm and 2.5 mm, preferably between 1.7 mm and 2.2 mm, more preferably between 1.8 mm and 2.0 mm. Specifically, the tab 740a-b has an extension sT of about 1.95

mm in the positive z-direction.

[0187] The depression 714a-b of ends 700a-b may have an extension sFH in the negative z-direction between 0.5 mm and 4.0 mm, preferably between 1.0 mm and 2.5 mm, more preferably between 1.2 mm and 1.5 mm. Specifically, the depression 714a-b has an extension sFH of about 1.25 mm in the negative z-direction.

[0188] The stabilizing bead 713a-b of ends 700a-b may have an extension sPB in the positive z-direction between 0.4 mm and 2.5 mm, preferably between 0.5 mm and 1.5 mm, more preferably between 0.6 mm and 1.0 mm. Specifically, the stabilizing bead 713a-b has an extension sPB of about 0.8 mm in the positive z-direction.

[0189] The extension sPB of the stabilizing bead 713a-b may be lower or equal to the extension sT of the tab 740a-b in the positive z-direction.

[0190] As can best be seen in Fig. 7c and 7d, when two ends 700a-b are stacked while the ends 700a-b are rotated by 180 ° in the x-y-plane, the depression 714a-b of one of the ends 700a-b is not overlapped by the stabilizing bead 713b-a of the other one of the ends 700b-a such that the central panels 712a-b of the ends 700a-b are substantially parallel ($\pm 2.0^\circ$).

[0191] With reference to Fig 7d, the depression 714a of the first end 700a in the stack of ends 700a-b may contact the end 700b, specifically the central panel 712b, in the stack of ends 700a-b. Alternatively or additionally, the tab 740b of the second end 700b may contact the first end 700a, e.g. the central panel 712a. Alternatively or additionally, the stabilizing bead 713b of the second end 700b may contact the first end 700a, preferably the central panel 712a.

[0192] It is preferred that the tab 740b of the second end 700b contacts the first end 700a, preferably the central panel 712a, and the stabilizing bead 713b of the second end 700b contacts the first end 700a, specifically the central panel 712a.

[0193] Fig. 8a shows an end 800 that can be similar to any of the ends 100, 200, 300, 400, 500, 600, 700.

[0194] The end 800 comprises a central panel 812 that defines an x-y-plane, wherein a z-direction is perpendicular to the x-y-plane. A stabilizing bead 813 is formed in the end 800, e.g. in the central panel 812 of the end 800, and the stabilizing bead 813 extends in the positive z-direction.

[0195] Further, a depression 814 is formed in the end 800, specifically in the central panel of the end 800. The depression 814 is positioned such that a rear portion 842 of a tab 840, attached to the end 800, e.g. to the central panel 812, via a rivet 816, covers the depression 814 at least partially. A front portion 841 of the tab 840 may break a score line 818 in the end 800, preferably in the central panel 812, when a consumer uses the tab as described above in order to remove a (large) portion of the end 800, e.g. of the central panel 812, surrounded by the score line 818.

[0196] The end 800 may be attached to a container body (not shown in Fig. 8a) via a curl 830.

[0197] In the end 800, specifically in the central panel 812 of the end 800, a (second) bead 880 is formed that extends in the negative z-direction.

[0198] The second bead 880 may be formed such that a surface 881, preferably with an area of at least 100 mm², is formed. The surface 881 may be substantially parallel to the central panel 812. The surface 881 may extend in the negative z-direction.

[0199] The second bead 880 is partially surrounded by the stabilizing bead 813.

[0200] The second bead 880 may be fully surrounded by the stabilizing bead 813.

[0201] With reference to Fig. 8b, the second bead 880 and/or the surface 881 may extend sNB between 0.5 mm and 4.0 mm, preferably between 1.0 mm and 2.5 mm, more preferably between 1.2 mm and 1.5 mm, in the negative z-direction that is perpendicular to the x-y-plane of the central panel.

[0202] The second bead 880 and the depression 814 may be positioned and shaped such that the x-y-plane of the central panel of the end is parallel to a flat surface $\pm 2.0^\circ$, preferably $\pm 1.5^\circ$, more preferably $\pm 1.0^\circ$, most preferred $\pm 0.5^\circ$, when the end is positioned on the flat surface.

[0203] Preferably, the second bead 880 and the depression 814 may be positioned and shaped sFH, sNB such that the x-y-plane of the central panel of the end is parallel to a flat surface $\pm 2.0^\circ$, preferably $\pm 1.5^\circ$, more preferably $\pm 1.0^\circ$, most preferred $\pm 0.5^\circ$, when the second bead and/or the depression contacts the flat surface.

[0204] The extension sNB of the second bead 880 may be equal to the extension of the depression 814 in the negative z-direction ± 1.5 mm, preferably ± 1.0 mm, more preferably ± 0.5 mm, most preferably ± 0.2 mm. It is especially preferred that the extension sNB of the second bead is substantially equal to the extension of the depression in the negative z-direction.

[0205] The tab 840 of end 800 may have an extension sT in the positive z-direction between 1.4 mm and 2.5 mm, preferably between 1.7 mm and 2.2 mm, more preferably between 1.8 mm and 2.0 mm. Specifically, the tab 800 has an extension sT of about 1.95 mm in the positive z-direction.

[0206] The depression 814 of end 800 may have an extension sFH in the negative z-direction between 0.5 mm and 4.0 mm, preferably between 1.0 mm and 2.5 mm, more preferably between 1.2 mm and 1.5 mm. Specifically, the depression 814 has an extension sFH of about 1.25 mm in the negative z-direction.

[0207] The stabilizing bead 813 of end 800 may have an extension sPB in the positive z-direction between 0.4 mm and 2.5 mm, preferably between 0.5 mm and 1.5 mm, more preferably between 0.6 mm and 1.0 mm. Specifically, the stabilizing bead 813 has an extension sPB of about 0.8 mm in the positive z-direction.

[0208] A disclaimed variant is an end 800a comprising a second bead 880a', 880a" that extends in the negative z-direction, as shown in Fig. 8c and not surrounded by

the stabilizing bead 813.

[0209] The second bead 880a',880a" comprises a first portion 880a' and a second portion 880a". The first and second portions of the second bead 880a',880a" are located in the end 800a, preferably in the central panel 812a, such that the bead 813a does not surround a portion of the second bead 880a',880a".

[0210] Each of the portions 880a',880a" may have an elongated shape in the x-y-plane. The portions 880a',880a" may extend in the x-y-plane from a portion of the tab 840a to a portion of the stabilizing bead 813a. Preferably the stabilizing bead 813a is at least partially surrounded by the portions 880a',880a" of the second bead.

[0211] Extension dimensions and relations of the stabilizing bead 813, the second bead 880, the depression 814 and the tab 840 described with reference to Fig. 8a and 8b are as well disclosed for the stabilizing bead 813a, the second bead 880a',880a", the depression 814a and the tab 840a with reference to Fig. 8c.

[0212] Fig. 8d shows another disclaimed variant of an end 800b comprising a second bead 880b',880b" that extends in the negative z-direction. The second bead 880b',880b" comprises a first portion 880b' and a second portion 880b", wherein each of the portions 880b',880b" comprises more than one, preferably at least three, independent beads that extend in the negative z-direction.

[0213] The independent beads of the portions 880b',880b" may have a substantially circular shape in the x-y-plane, an oval shape in the x-y-plane and/or an elongated shape in the x-y-plane. The portions 880b',880b" may be located in the end 800b, e.g. in the central panel 812b, such that the stabilizing bead 813b does not surround a portion of the second bead 880b',880b". The stabilizing bead 813b may be at least partially surrounded by the portions 880b',880b" of the second bead.

[0214] Extension dimensions and relations of the stabilizing bead 813, the second bead 880, the depression 814 and the tab 840 described with reference to Fig. 8a and 8b are as well disclosed for the stabilizing bead 813b, the second bead 880b',880b", the depression 814b and the tab 840b with reference to Fig. 8d.

[0215] Although, the second bead is described herein with reference to Fig. 8a to 8d, the second bead as described may be comprised by any one of the ends 100, 200, 300, 400, 500, 600, 700 described herein.

[0216] Each of the herein described ends 100, 200, 300, 400, 500, 600, 700, 800 may comprise at least one bulge 120,121;220,221 as described with reference to Fig. 1, 2a-2c and 3a-3c.

Claims

1. End for a container, the end (200a) comprising:

(a) a central panel (212a), that defines an x-y-

plane, a z-direction being perpendicular to the x-y-plane;

(b) a tab (240a) attached to the end (200a), wherein the tab (240a) comprises a front portion (241a) and a rear portion (242a), and wherein the tab (240a) extends (sT) in a positive z-direction;

(c) at least one stabilizing bead (213a), that is shaped in the end (200a) and wherein the bead (213a) extends in the positive z-direction;

(d) a depression (214a), that is formed in the end (200a) and wherein the depression (214a) extends (sFH) in a negative z-direction, the depression (214a) being shaped and positioned to allow a human finger to reach at least in part below the rear portion (242a) of the tab (240a);

(e) wherein the tab (240a), the bead (213a) and the depression (214a) are shaped and positioned such that the end (200a) as a first end (200a) is configured to be stacked with a second end (200b), wherein the x-y-planes of the central panels (212a,212b) of the first end and second end (200a,200b) are parallel $\pm 2.0^\circ$ when being stacked, and wherein the first end (200a,) and the second end (200b) are same ends (200a,200b);

characterized in that

(f) the end (200a) comprises a second bead (880), extending in the negative z-direction and being at least partially surrounded by the stabilizing bead (213a).

2. End according to claim 1, wherein the extension (sT) of the tab (240a) in the positive z-direction is equal to an extension (sPB) of the bead (213a) in the positive z-direction ± 1.5 mm, preferably ± 0.75 mm, more preferably ± 0.3 mm.
3. End according to any one of the preceding claims, wherein the extension (sFH) of the depression (214a) in the negative z-direction is equal to the extension (sT) of the tab (240a) in the positive z-direction ± 1.0 mm, preferably ± 0.5 mm, more preferably ± 0.2 mm.
4. End according to the preceding claim 3, wherein the extension (sFH) of the depression (214a) in the negative z-direction is equal to the extension (sPB) of the bead (213a) in the positive z-direction ± 2.0 mm, preferably ± 1.2 mm, more preferably ± 0.8 mm.
5. End according to any one of the preceding claims, comprising at least one bulge (220a), wherein the bulge (220a) is shaped in the end (200a), extends in the positive z-direction, and is in the proximity of the tab (240a).
6. End according to claim 5, wherein the extension

(sTB) of the bulge (220a) in the positive z-direction is equal to the extension (sT) of the tab (240a) in the positive z-direction ± 2.0 mm, preferably ± 1.5 mm, more preferably ± 1.0 mm,

and/or the extension (sTB) of the bulge (220a) in the positive z-direction is equal to the extension (sPB) of the bead (213a) in the positive z-direction ± 2.0 mm, preferably ± 1.2 mm, more preferably ± 0.6 mm,
and/or the extension (sTB) of the bulge (220a) in the positive z-direction is equal to the extension (sFH) of the depression (214a) in the negative z-direction ± 1.0 mm, preferably ± 0.5 mm, more preferably ± 0.2 mm.

7. End according to any one of the preceding claims, wherein the second bead (880) and the depression (214a) are shaped and positioned such that the x-y-plane of the central panel (212a) is parallel $\pm 2.0^\circ$ to a flat surface, when the end (200a) is positioned on the flat surface.
8. End according to any one of the preceding claims, wherein the second bead (880) and the depression (214a) are shaped and positioned such that the x-y-plane of the central panel (212a) is parallel $\pm 2.0^\circ$ to a flat surface, when the second bead (880) and/or the depression (214a) contacts the flat surface.
9. End according to any one of the preceding claims beginning from claim 2, wherein the extension (sT) of the tab (240a) is between 1.4 mm and 2.5 mm, preferably between 1.7 mm and 2.2 mm, more preferably between 1.8 mm and 2.0 mm.
10. End according to any one of the preceding claims, wherein the end comprises metal preferably steel or aluminum, or is made of metal, preferably steel or aluminum.
11. End according to any one of the preceding claims, wherein the depression (214a) is not surrounded by the bead (213a) in the x-y-plane.
12. **Stack of at least two ends** (200a,200b) according to any one of the preceding claims.
13. **Container**, comprising an end (200a) according to any one of claims 1 to 11.
14. **Stack of at least two containers** (350a,350b) according to claim 13.
15. Stack according to claim 14, wherein a first container (350a) comprises a first end (300a) and a lower surface (385a) opposite to the first end (300a), and a second container (350b) comprises a second end

(300b), wherein the first container (350a) is stacked with the second container (350b) such that a portion of the lower surface (385a) of the first container (350a) contacts a portion of the second end (300b) of the second container (350b), and wherein x-y-planes of the central panels (312a,312b) of the first and second end (300a,300b) are parallel $\pm 2.0^\circ$.

10 Patentansprüche

1. **Deckel (Ende)** für einen Behälter, wobei der Deckel (200a) als Ende umfasst:

(a) eine zentrale Platte (212a), die eine x-y-Ebene definiert, wobei eine z-Richtung senkrecht zur x-y-Ebene verläuft;
(b) eine Lasche (240a), die an dem Ende (200a) angebracht ist, wobei die Lasche (240a) einen vorderen Abschnitt (241a) und einen hinteren Abschnitt (242a) aufweist und wobei sich die Lasche (240a) in einer positiven z-Richtung erstreckt (sT);
(c) mindestens einen Stabilisierungswulst (213a), der in das Ende (200a) geformt ist und wobei sich der Wulst (213a) in der positiven z-Richtung erstreckt;
(d) eine Vertiefung (214a), die in dem Ende (200a) ausgebildet ist und wobei sich die Vertiefung (214a) in einer negativen z-Richtung erstreckt (sFH), wobei die Vertiefung (214a) so geformt und positioniert ist, dass ein menschlicher Finger zumindest teilweise unter den hinteren Abschnitt (242a) der Lasche (240a) reichen kann;
(e) wobei die Lasche (240a), der Wulst (213a) und die Vertiefung (214a) so geformt und positioniert sind, dass das Ende (200a) als ein erstes Ende (200a) konfiguriert ist, um mit einem zweiten Ende (200b) gestapelt zu werden, wobei die x-y-Ebenen der zentralen Platten (212a, 212b) des ersten Endes und des zweiten Endes (200a, 200b) parallel $\pm 2.0^\circ$ parallel sind, wenn sie gestapelt werden, und wobei das erste Ende (200a) und das zweite Ende (200b) die gleichen Enden (200a, 200b) sind;
dadurch gekennzeichnet, dass
(f) das Ende (200a) eine zweite Wulst (880) aufweist, die sich in negativer -z-Richtung erstreckt und zumindest teilweise von der Stabilisierungswulst (213a) umgeben ist.

2. Ende nach Anspruch 1, wobei die Ausdehnung (sT) der Lasche (240a) in positiver z-Richtung gleich einer Ausdehnung (sPB) des Wulstes (213a) in positiver z-Richtung ist mit einer (erlaubten) Abweichung von $\pm 1,5$ mm, vorzugsweise $\pm 0,75$ mm, besonders bevorzugt $\pm 0,3$ mm.

3. Ende nach einem der vorhergehenden Ansprüche, wobei die Ausdehnung (sFH) der Vertiefung (214a) in der negativen z-Richtung gleich ist der Ausdehnung (sT) der Lasche (240a) in der positiven z-Richtung, mit einer (erlaubten) Abweichung von $\pm 1,0$ mm, vorzugsweise $\pm 0,5$ mm, besonders bevorzugt $\pm 0,2$ mm.
4. Ende nach dem vorhergehenden Anspruch 3, wobei die Ausdehnung (sFH) der Vertiefung (214a) in der negativen z-Richtung gleich ist der Ausdehnung (sPB) des Wulstes (213a) in der positiven z-Richtung, mit einer (erlaubten) Abweichung von $\pm 2,0$ mm, vorzugsweise $\pm 1,2$ mm, besonders bevorzugt $\pm 0,8$ mm.
5. Ende nach einem der vorhergehenden Ansprüche, das mindestens eine Ausbuchtung (220a) aufweist, wobei die Ausbuchtung (220a) im Ende (200a) geformt ist, sich in positiver z-Richtung erstreckt und in der Nähe der Lasche (240a) liegt.
6. Ende nach Anspruch 5, wobei die Ausdehnung (sTB) des Wulstes (220a) in positiver z-Richtung gleich ist der Ausdehnung (sT) der Lasche (240a) in positiver z-Richtung, mit einer Abweichung von $\pm 2,0$ mm, vorzugsweise $\pm 1,5$ mm, noch bevorzugter $\pm 1,0$ mm, und/oder die Ausdehnung (sTB) des Wulstes (220a) in positiver z-Richtung gleich ist der Ausdehnung (sPB) des Wulstes (213a) in positiver z-Richtung mit einer Abweichung von $\pm 2,0$ mm, vorzugsweise $\pm 1,2$ mm, besonders bevorzugt $\pm 0,6$ mm, und/oder die Ausdehnung (sTB) der Ausbuchtung (220a) in positiver z-Richtung gleich ist der Ausdehnung (sFH) der Vertiefung (214a) in negativer z-Richtung mit einer (erlaubten) Abweichung von $\pm 1,0$ mm, vorzugsweise $\pm 0,5$ mm, besonders bevorzugt $\pm 0,2$ mm.
7. Ende nach einem der vorhergehenden Ansprüche, wobei der zweite Wulst (880) und die Vertiefung (214a) so geformt und positioniert sind, dass die x-y-Ebene der mittleren Platte (212a) parallel $\pm 2,0^\circ$ zu einer ebenen Fläche ist, wenn das Endstück (200a) auf der ebenen Fläche positioniert ist.
8. Ende nach einem der vorhergehenden Ansprüche, wobei der zweite Wulst (880) und die Vertiefung (214a) so geformt und positioniert sind, dass die x-y-Ebene der mittleren Platte (212a) parallel $\pm 2,0^\circ$ zu einer ebenen Fläche ist, wenn der zweite Wulst (880) und/oder die Vertiefung (214a) die ebene Fläche berührt.
9. Ende nach einem der vorangehenden Ansprüche, beginnend mit Anspruch 2, wobei die Ausdehnung

(sT) der Lasche (240a) zwischen 1,4 mm und 2,5 mm, vorzugsweise zwischen 1,7 mm und 2,2 mm, besonders bevorzugt zwischen 1,8 mm und 2,0 mm liegt.

10. Ende nach einem der vorhergehenden Ansprüche, wobei das Ende aus Metall, vorzugsweise Stahl oder Aluminium, besteht oder aus Metall, vorzugsweise Stahl oder Aluminium, hergestellt ist.

11. Ende nach einem der vorhergehenden Ansprüche, wobei die Vertiefung (214a) in der x-y-Ebene nicht von dem Wulst (213a) umgeben ist.

12. **Stapel aus mindestens zwei Deckeln (Enden)** (200a, 200b) nach einem der vorhergehenden Ansprüche.

13. **Behälter**, bestehend aus einem Deckel als Ende (200a) nach einem der Ansprüche 1 bis 11.

14. **Stapel aus mindestens zwei Behältern** (350a, 350b) nach Anspruch 13.

15. Stapel nach Anspruch 14, wobei ein erster Behälter (350a) ein erstes Ende als Deckel (300a) und eine untere Fläche (385a) gegenüber dem ersten Ende (300a) aufweist und ein zweiter Behälter (350b) ein zweites Ende als Deckel (300b) aufweist, wobei der erste Behälter (350a) mit dem zweiten Behälter (350b) so gestapelt ist, dass ein Teil der unteren Fläche (385a) des ersten Behälters (350a) einen Teil des zweiten Endes (300b) des zweiten Behälters (350b) berührt, und wobei die x-y-Ebenen der zentralen Platten (312a, 312b) des ersten und zweiten Endes (300a, 300b) parallel sind mit einer (erlaubten) Abweichung von $\pm 2,0^\circ$.

Revendications

1. **Extrémité (Lid)** pour un conteneur, l'extrémité (200a) comprenant :

(a) un panneau central (212a), qui définit un plan x-y, une direction z étant perpendiculaire au plan x-y ;

(b) une languette (240a) fixée à l'extrémité (200a), dans laquelle la languette (240a) comprend une partie avant (241a) et une partie arrière (242a), et dans laquelle la languette (240a) s'étend (sT) dans une direction z positive ;

(c) au moins un bourrelet de stabilisation (213a), qui est façonné dans l'extrémité (200a) et dans lequel le bourrelet (213a) s'étend dans la direction z positive ;

(d) une dépression (214a), qui est formée dans l'extrémité (200a) et dans laquelle la dépression

- (214a) s'étend (sFH) dans une direction z négative, la dépression (214a) étant formée et positionnée de manière à permettre à un doigt humain d'atteindre au moins en partie la partie arrière (242a) de la languette (240a) ;
- (e) dans lequel la languette (240a), le bourrelet (213a) et la dépression (214a) sont façonnés et positionnés de telle sorte que l'extrémité (200a) en tant que première extrémité (200a) est configurée pour être empilée avec une deuxième extrémité (200b), dans lequel les plans x-y des panneaux centraux (212a, 212b) de la première extrémité et de la deuxième extrémité (200a, 200b) sont parallèles à $\pm 2,0^\circ$ lorsqu'ils sont empilés, et dans lequel la première extrémité (200a,) et la deuxième extrémité (200b) sont les mêmes extrémités (200a, 200b) ;
- caractérisé par le fait que**
- (f) l'extrémité (200a) comprend un second bourrelet (880) qui s'étend dans la direction -z négative et qui est au moins partiellement entouré par le bourrelet de stabilisation (213a).
2. Extrémité selon la revendication 1, dans laquelle l'extension (sT) de la languette (240a) dans la direction z positive est égale à une extension (sPB) du bourrelet (213a) dans la direction z positive avec une variation de $\pm 1,5$ mm, de préférence $\pm 0,75$ mm, plus préférentiellement $\pm 0,3$ mm.
 3. Extrémité selon l'une quelconque des revendications précédentes, dans laquelle l'extension (sFH) de la dépression (214a) dans la direction z négative est égale à l'extension (sT) de la languette (240a) dans la direction z positive avec une variation de $\pm 1,0$ mm, de préférence $\pm 0,5$ mm, plus préférentiellement $\pm 0,2$ mm.
 4. Extrémité selon la revendication 3 précédente, dans laquelle l'extension (sFH) de la dépression (214a) dans la direction z négative est égale à l'extension (sPB) du bourrelet (213a) dans la direction z positive avec une variation de $\pm 2,0$ mm, de préférence $\pm 1,2$ mm, plus préférentiellement $\pm 0,8$ mm.
 5. Extrémité selon l'une quelconque des revendications précédentes, comprenant au moins un renflement (220a), dans laquelle le renflement (220a) est façonné dans l'extrémité (200a), s'étend dans la direction z positive et se trouve à proximité de la languette (240a).
 6. Extrémité selon la revendication 5, dans laquelle l'extension (sTB) du renflement (220a) dans la direction z positive est égale à l'extension (sT) de la languette (240a) dans la direction z positive avec une variation de $\pm 2,0$ mm, de préférence $\pm 1,5$ mm, plus préférentiellement $\pm 1,0$ mm;
- et/ou l'extension (sTB) du renflement (220a) dans la direction z positive est égale à l'extension (sPB) du bourrelet (213a) dans la direction z positive avec une variation de $\pm 2,0$ mm, de préférence $\pm 1,2$ mm, plus préférentiellement $\pm 0,6$ mm,
- et/ou l'extension (sTB) du renflement (220a) dans la direction z positive est égale à l'extension (sFH) de la dépression (214a) dans la direction z négative avec une variation de $\pm 1,0$ mm, de préférence $\pm 0,5$ mm, plus préférentiellement $\pm 0,2$ mm.
7. Extrémité selon l'une quelconque des revendications précédentes, dans laquelle le second bourrelet (880) et la dépression (214a) sont formés et positionnés de manière à ce que le plan x-y du panneau central (212a) soit parallèle à $\pm 2,0^\circ$ à une surface plane, lorsque l'extrémité (200a) est positionnée sur la surface plane.
 8. Extrémité selon l'une quelconque des revendications précédentes, dans laquelle le second bourrelet (880) et la dépression (214a) sont formés et positionnés de telle sorte que le plan x-y du panneau central (212a) est parallèle à $\pm 2,0^\circ$ à une surface plane, lorsque le second bourrelet (880) et/ou la dépression (214a) sont en contact avec la surface plane.
 9. Extrémité selon l'une quelconque des revendications précédentes à partir de la revendication 2, dans laquelle l'extension (sT) de la languette (240a) est comprise entre 1,4 mm et 2,5 mm, de préférence entre 1,7 mm et 2,2 mm, plus préférentiellement entre 1,8 mm et 2,0 mm.
 10. Extrémité selon l'une quelconque des revendications précédentes, dans laquelle l'extrémité comprend du métal, de préférence de l'acier ou de l'aluminium, ou est faite de métal, de préférence d'acier ou d'aluminium.
 11. Extrémité selon l'une quelconque des revendications précédentes, dans laquelle la dépression (214a) n'est pas entourée par le bourrelet (213a) dans le plan x-y.
 12. **Empilement d'au moins deux extrémités** (200a,200b) selon l'une quelconque des revendications précédentes.
 13. **Récipient** comprenant une extrémité (200a) selon l'une quelconque des revendications 1 à 11.
 14. **Empilement d'au moins deux conteneurs** (350a,350b) selon la revendication 13.

15. Empilement selon la revendication 14, dans lequel un premier récipient (350a) comprend une première extrémité (couvercle) (300a) et une surface inférieure (385a) opposée à la première extrémité (300a), et un second récipient (350b) comprend une seconde extrémité (couvercle) (300b), dans lequel le premier conteneur (350a) est empilé avec le second conteneur (350b) de sorte qu'une partie de la surface inférieure (385a) du premier conteneur (350a) entre en contact avec une partie de la seconde extrémité (300b) du second conteneur (350b), et dans lequel les plans x-y des panneaux centraux (312a, 312b) de la première et de la seconde extrémité (300a, 300b) sont parallèles à $\pm 2.0^\circ$.

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FIG. 1

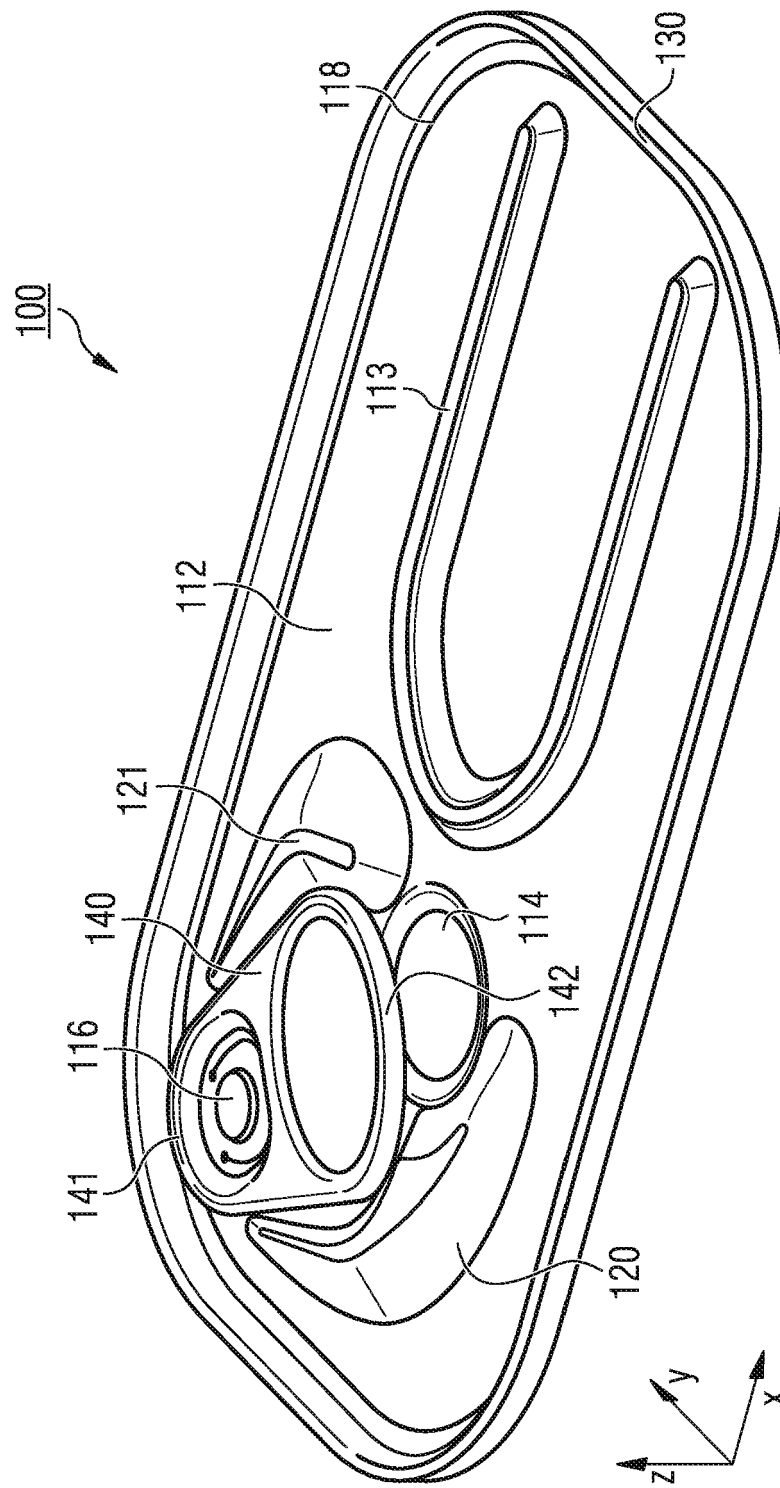


FIG. 2a

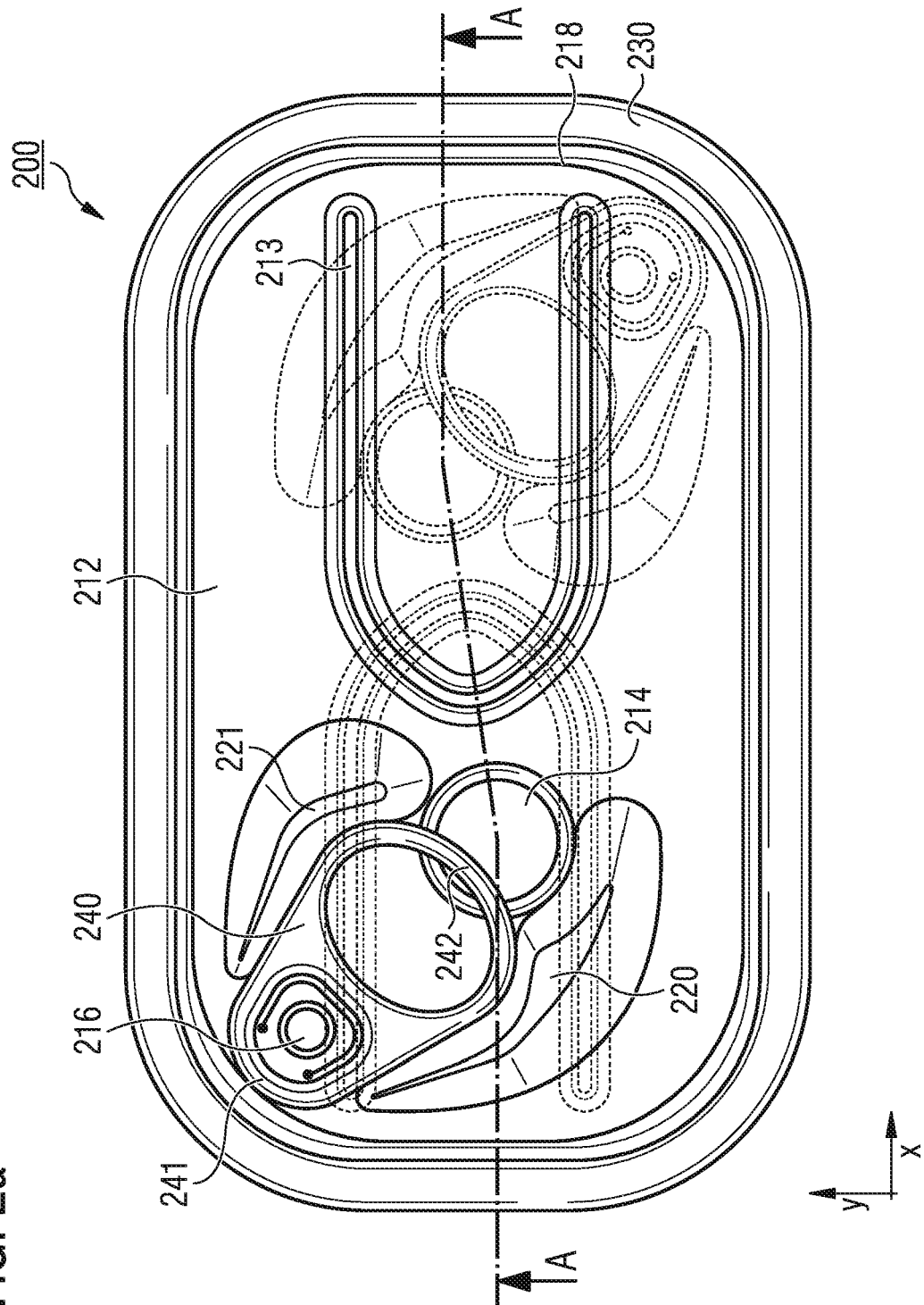


FIG. 2b A-A

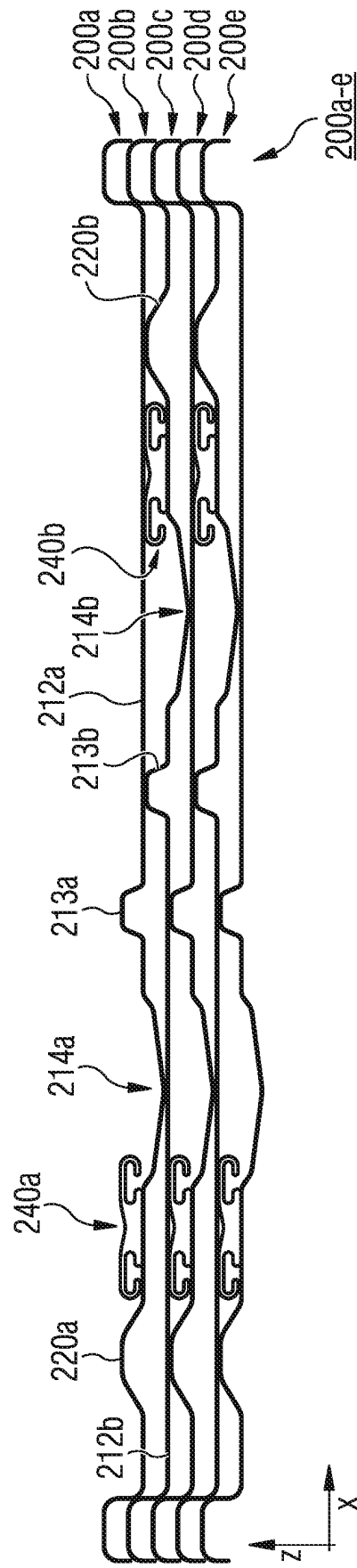


FIG. 2c A-A

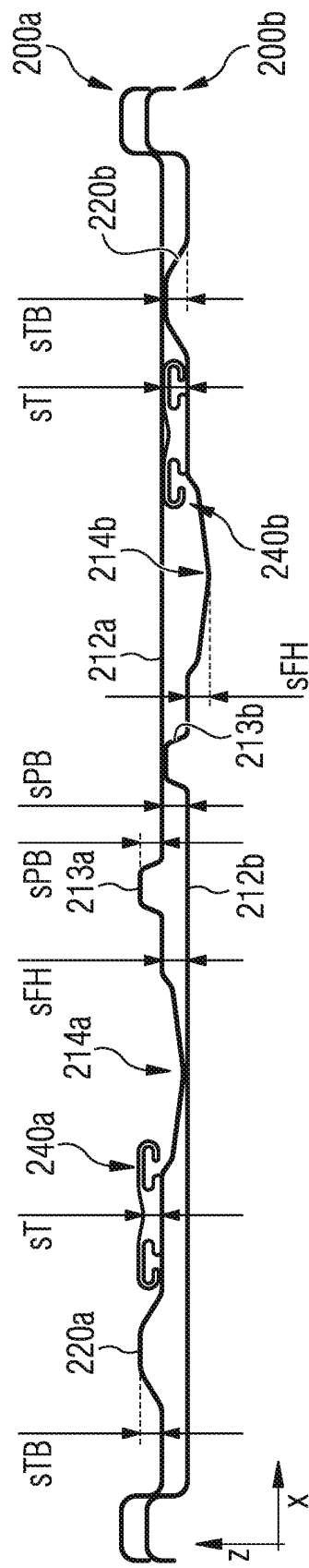


FIG. 3a

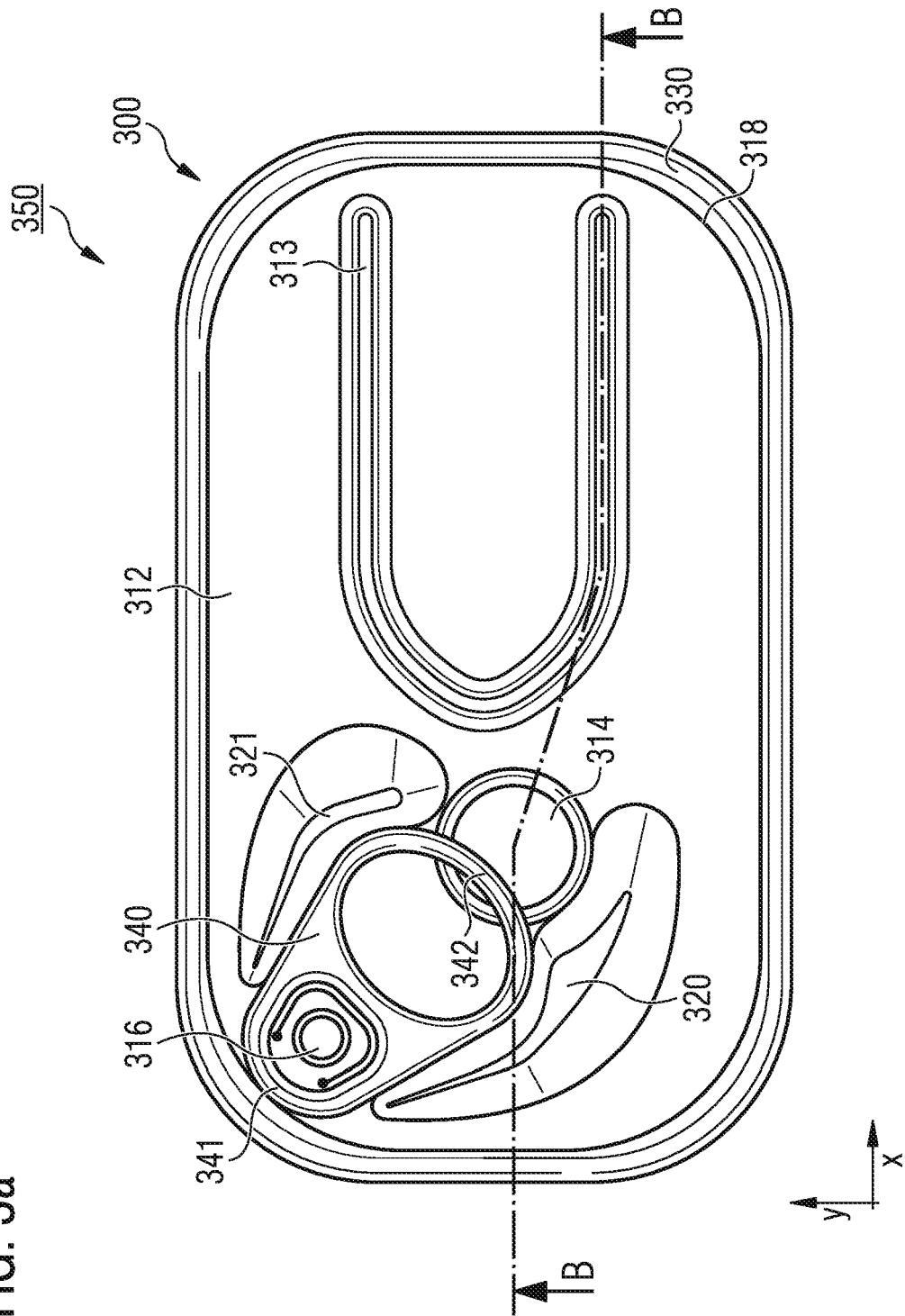


FIG. 3b B-B

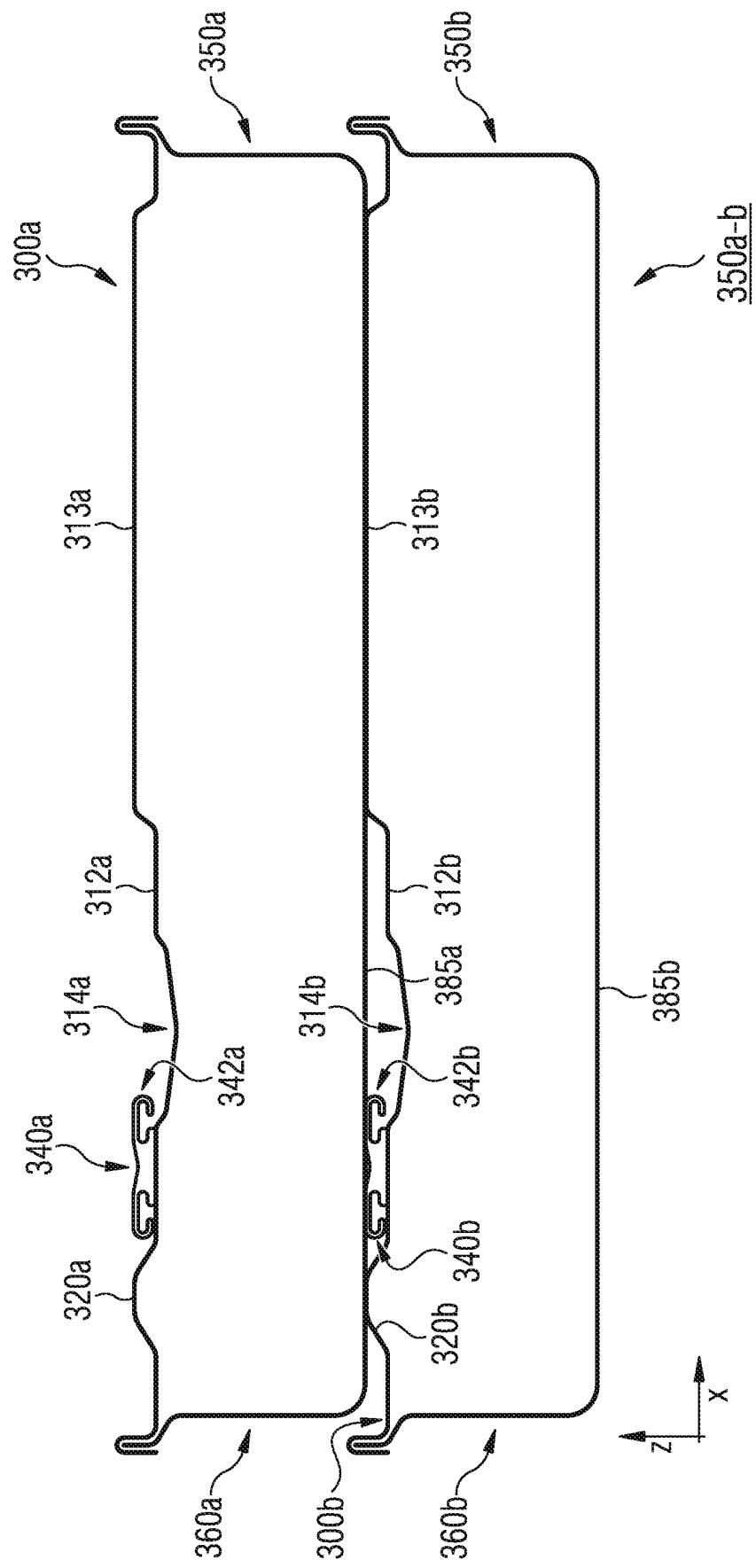


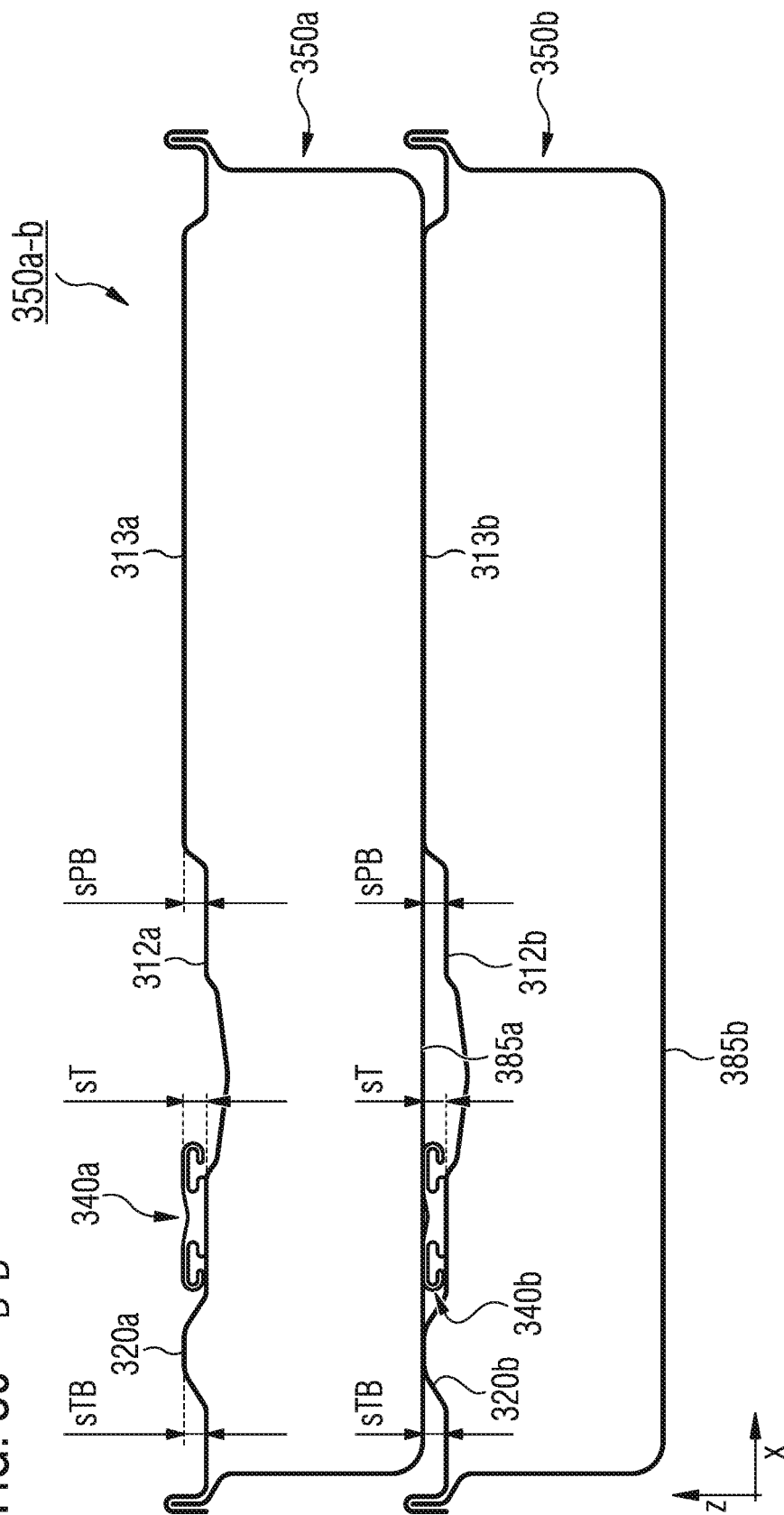
FIG. 3C
B-B

FIG. 4a

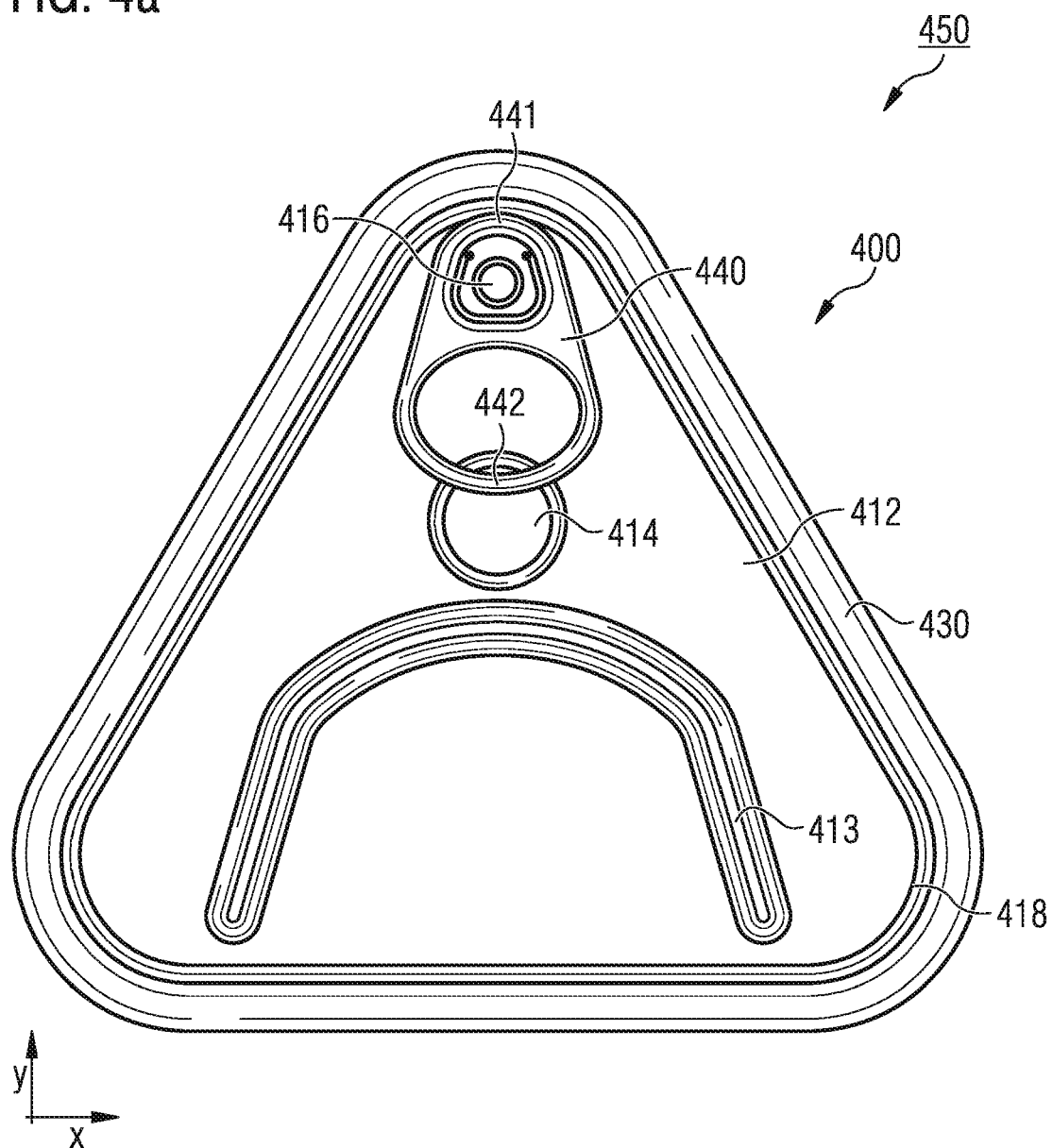


FIG. 4b

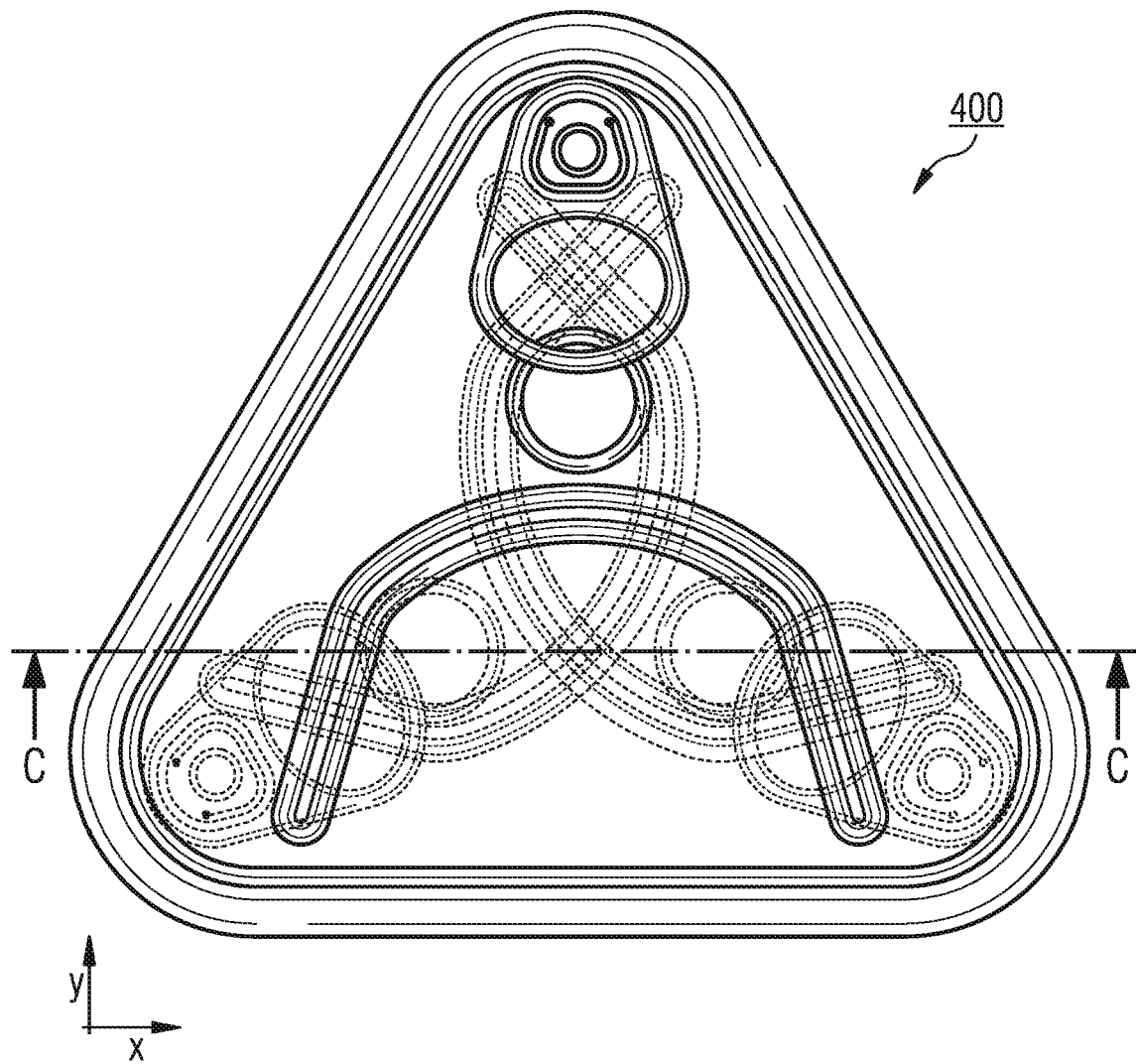


FIG. 4c C-C

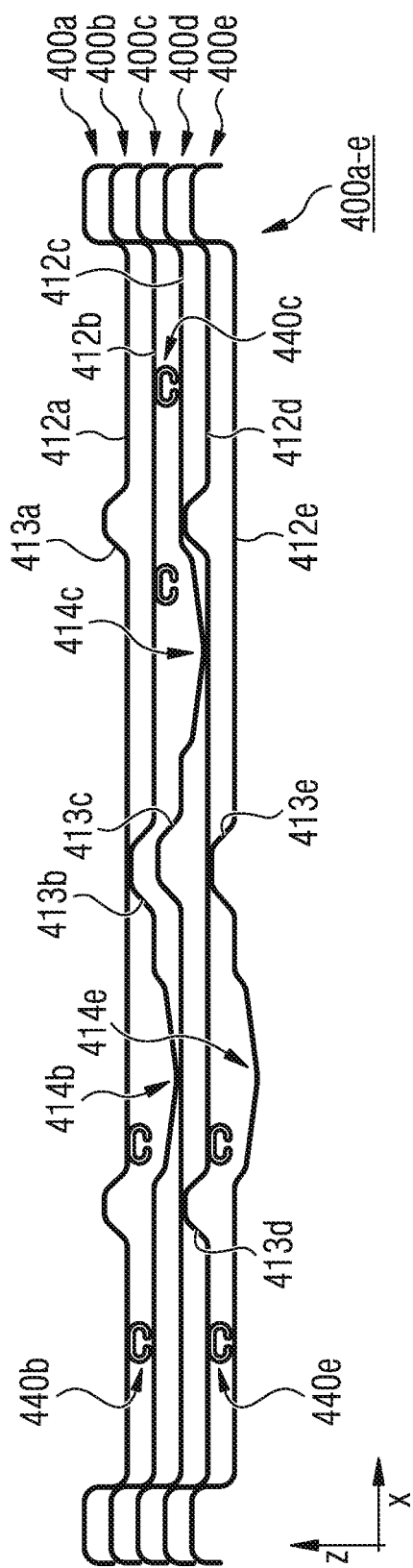
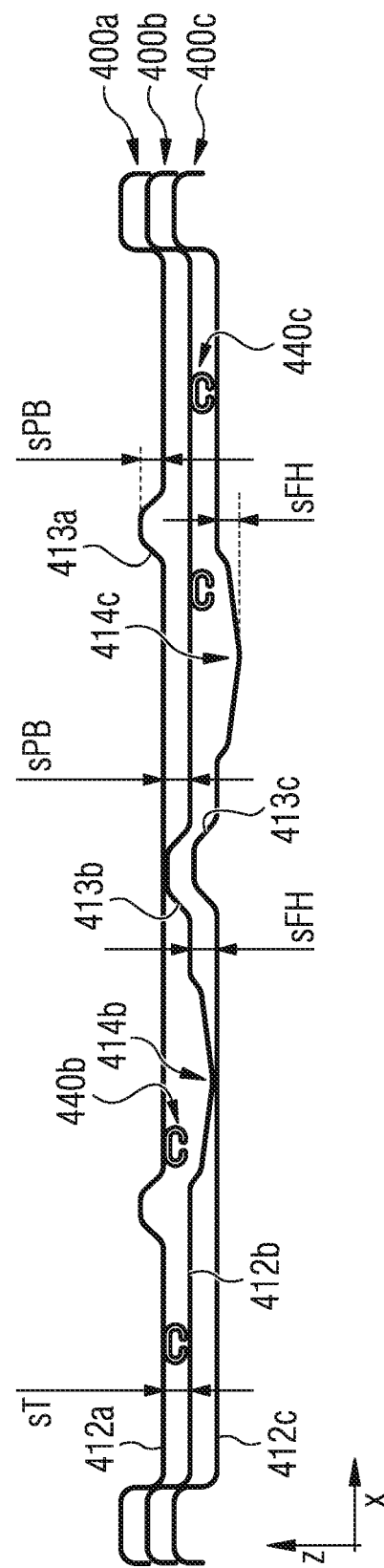
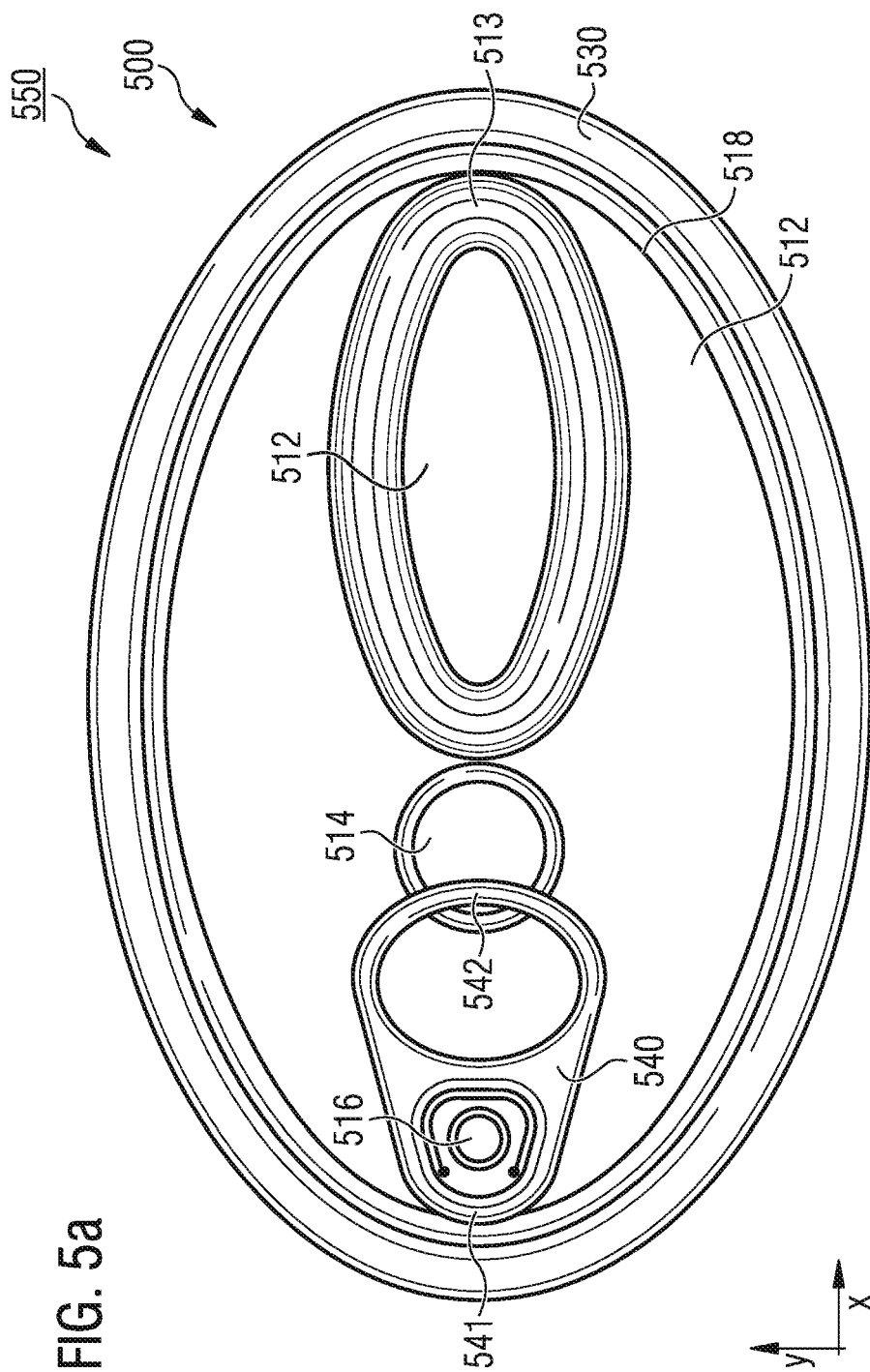


FIG. 4d C-C





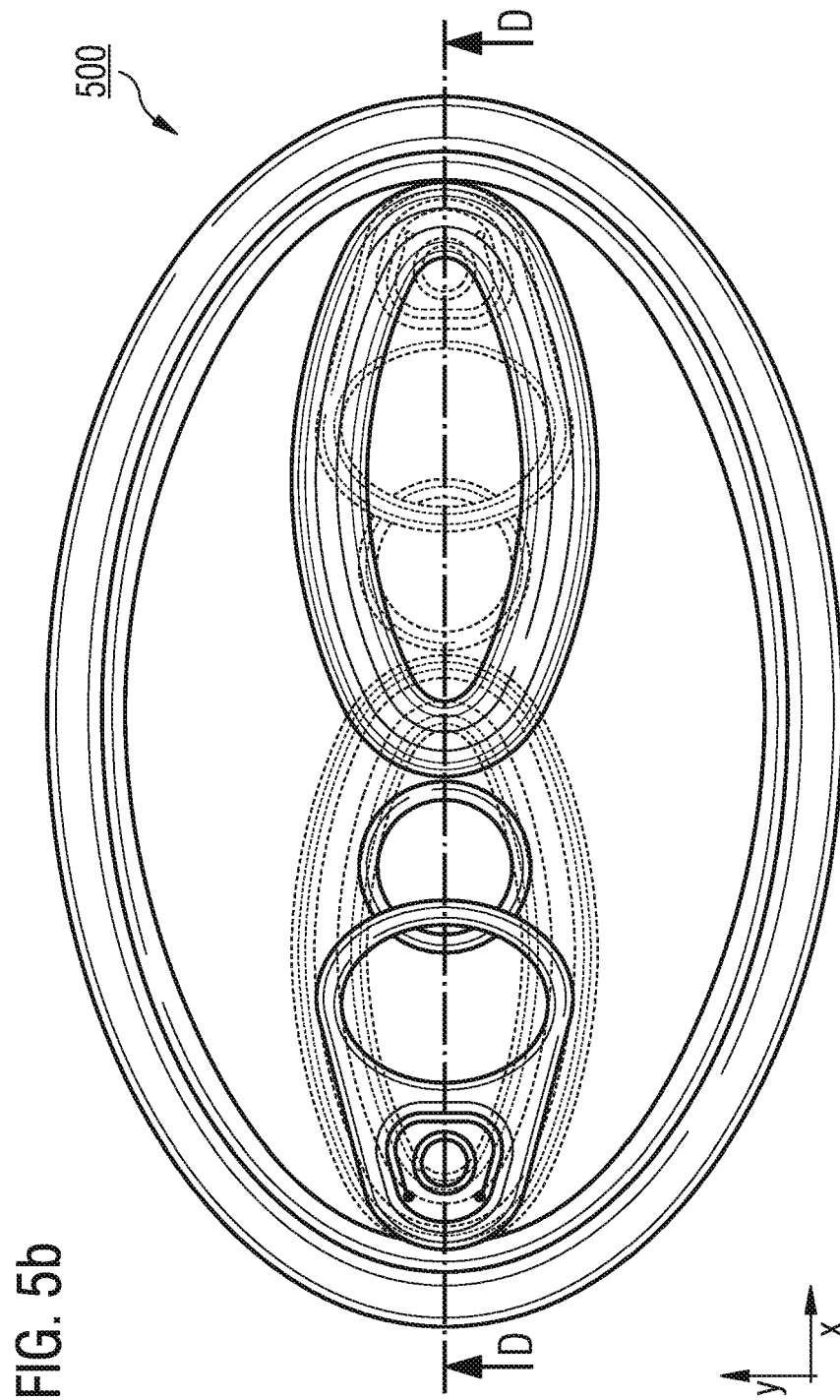


FIG. 5b

FIG. 5c D-D

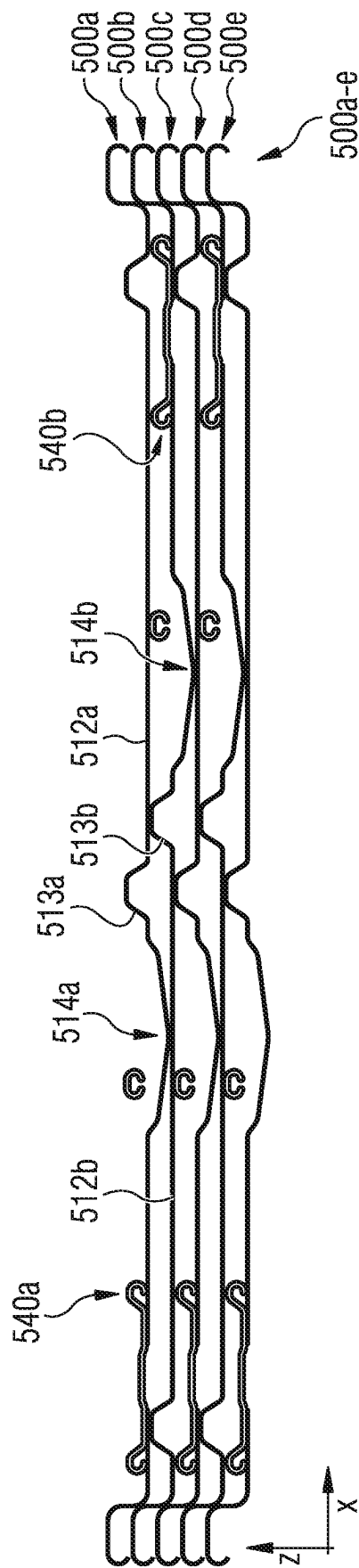


FIG. 5d D-D

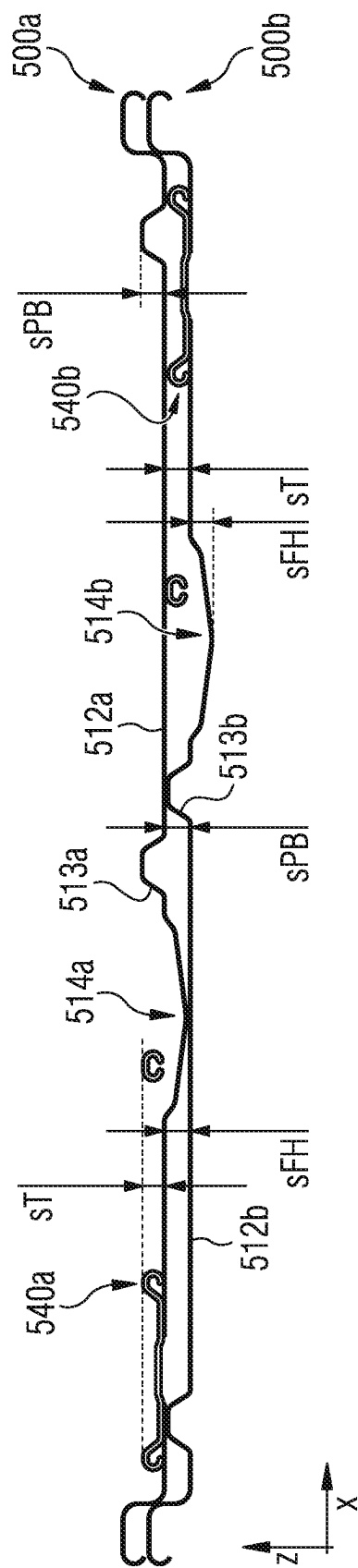


FIG. 6a

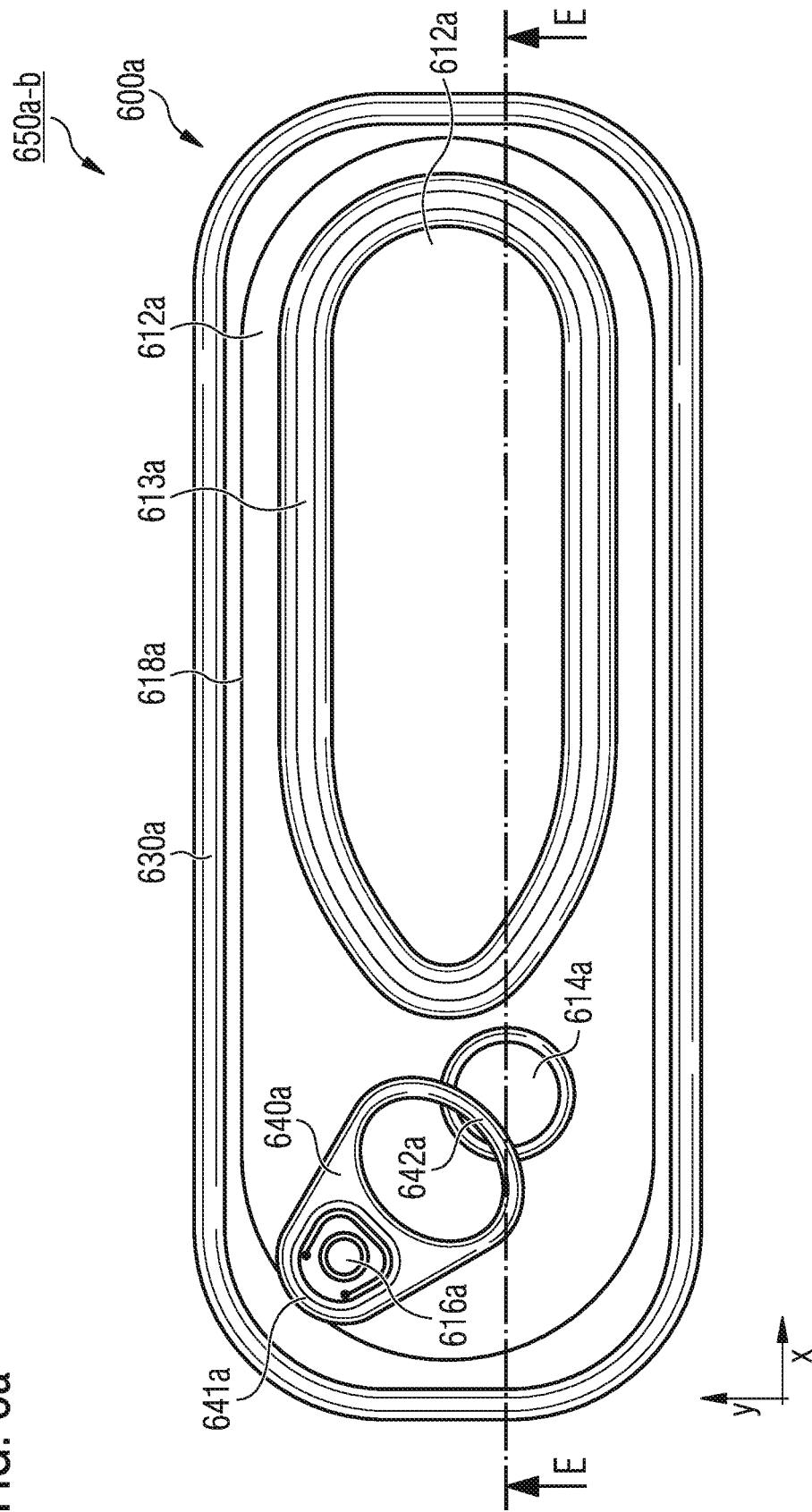


FIG. 6b

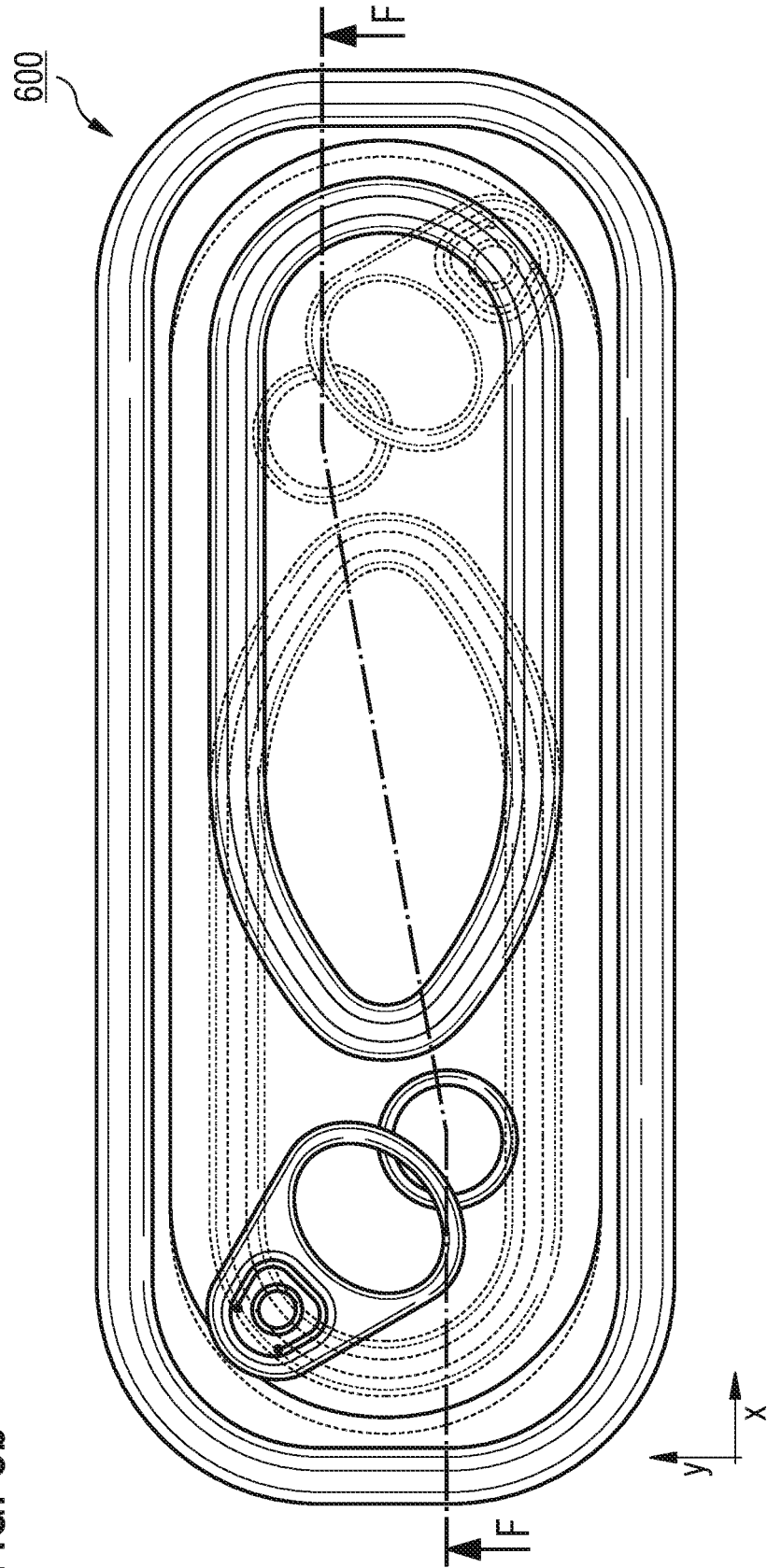


FIG. 6c F-F

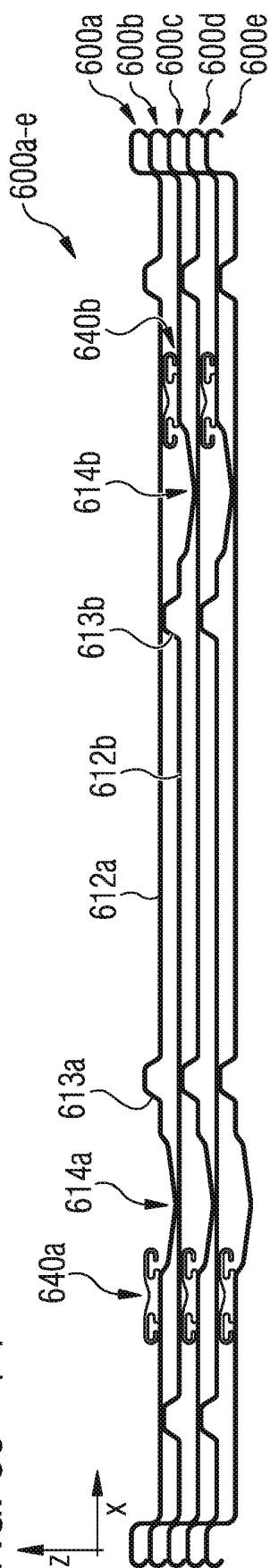


FIG. 6d E-E

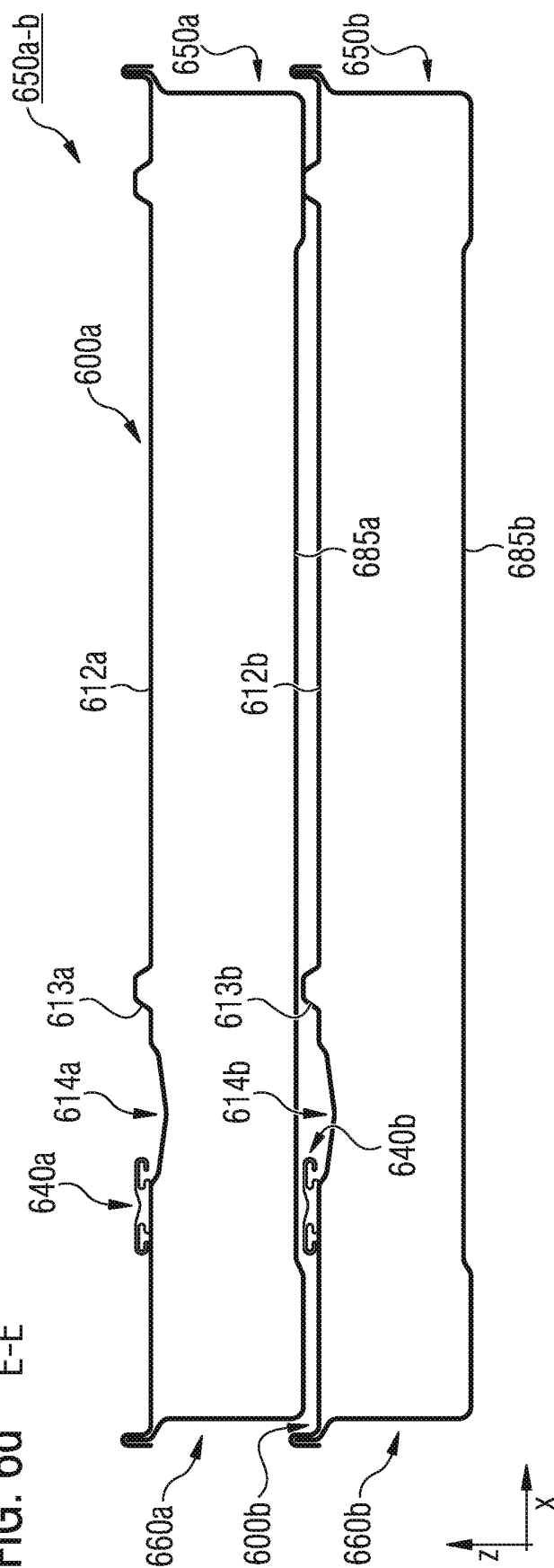


FIG. 6e F-F

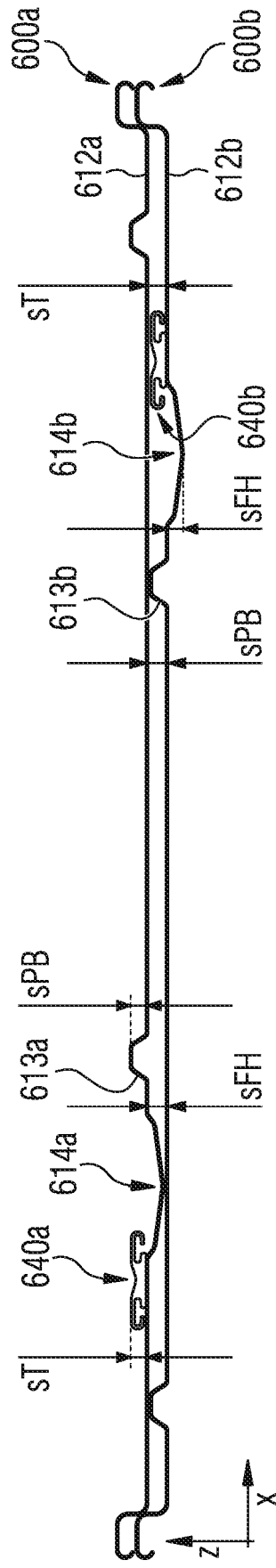
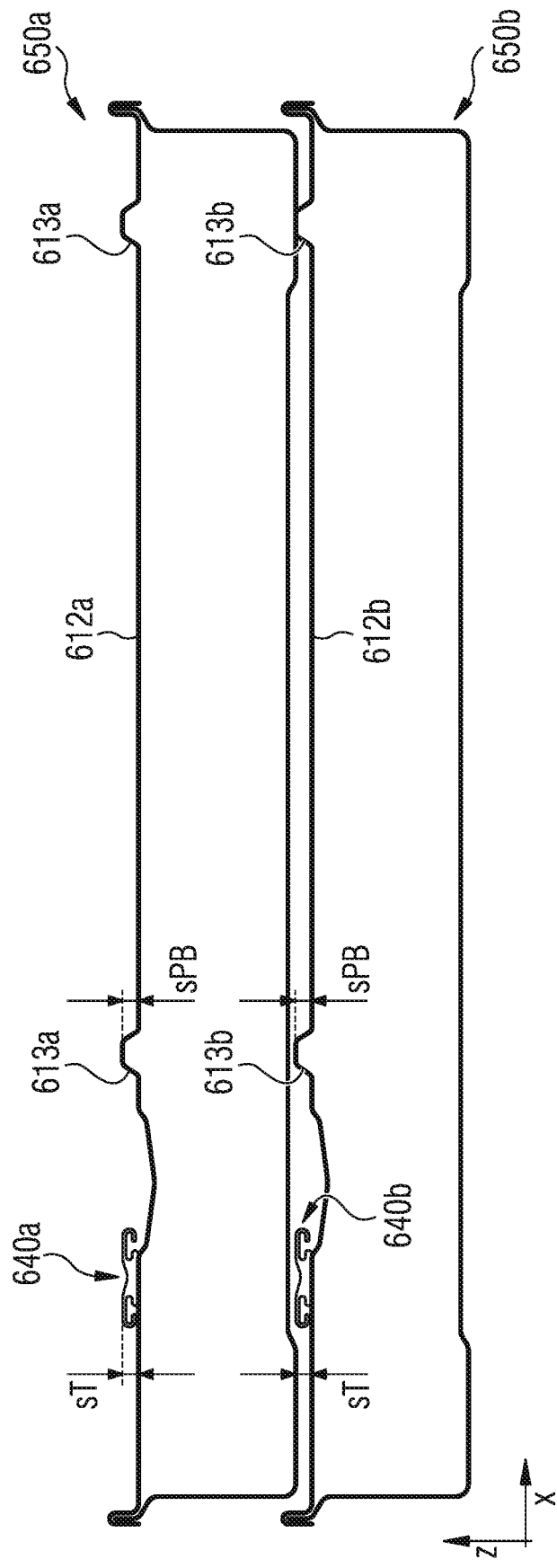
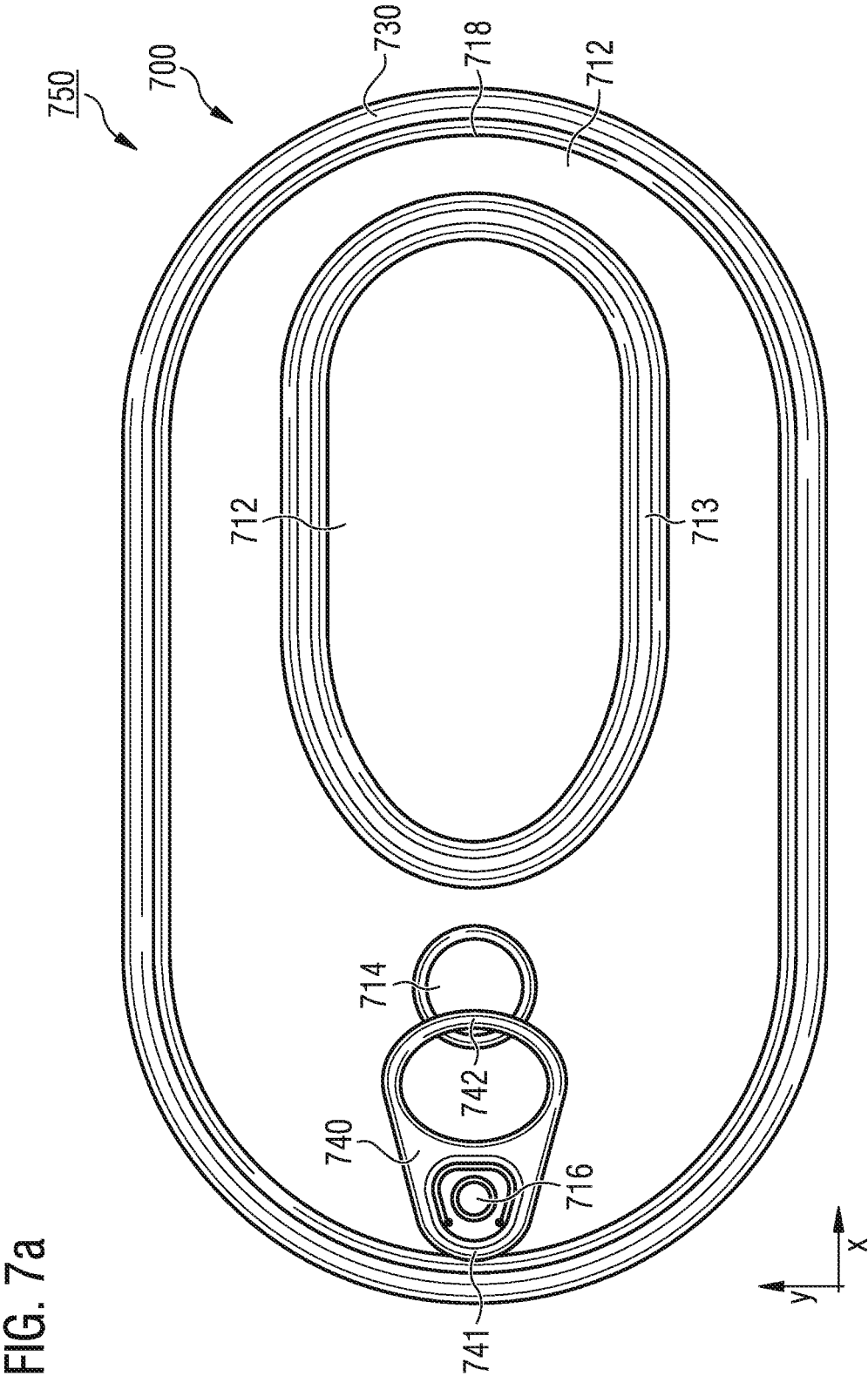


FIG. 6f E-E





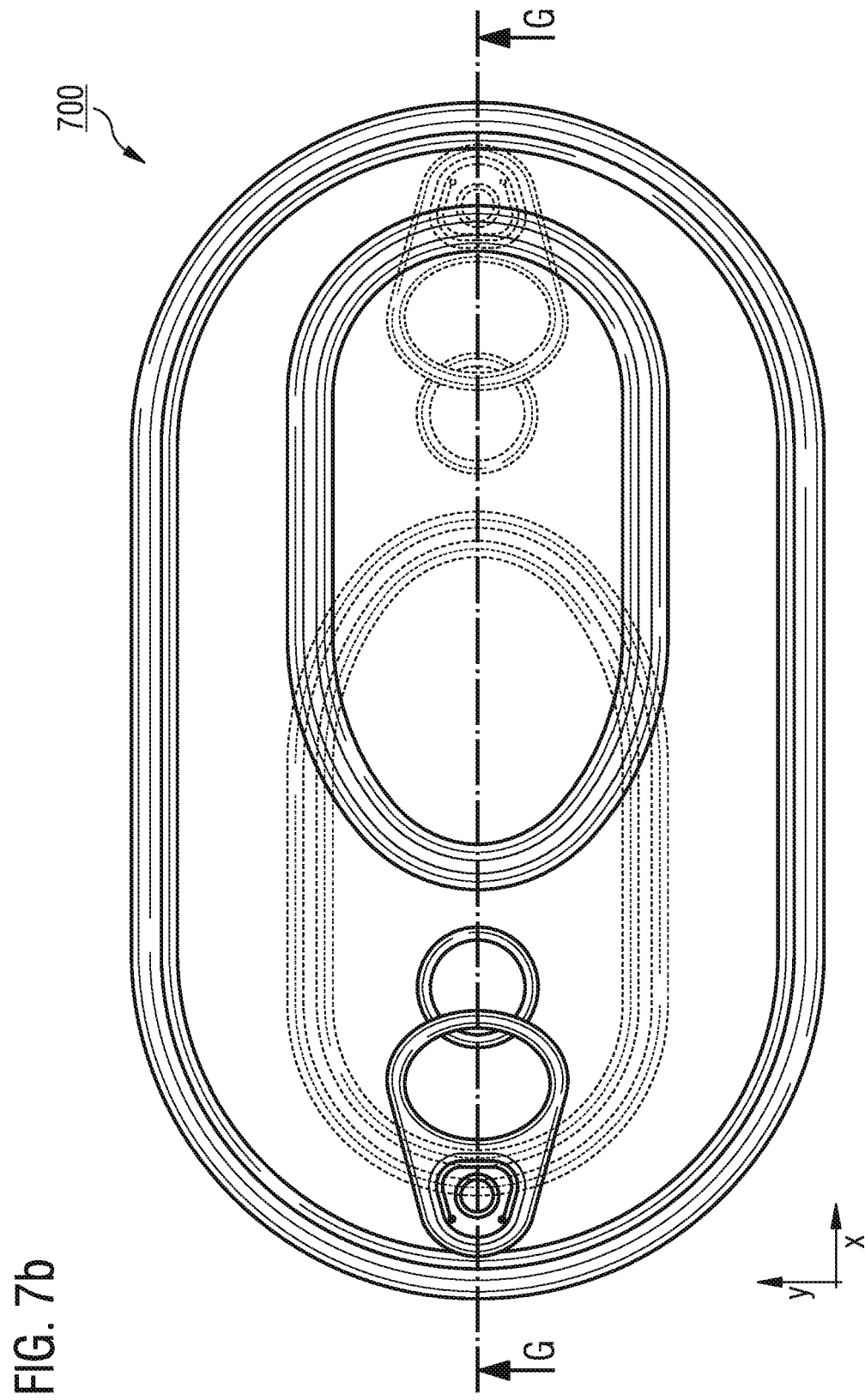


FIG. 7c G-G

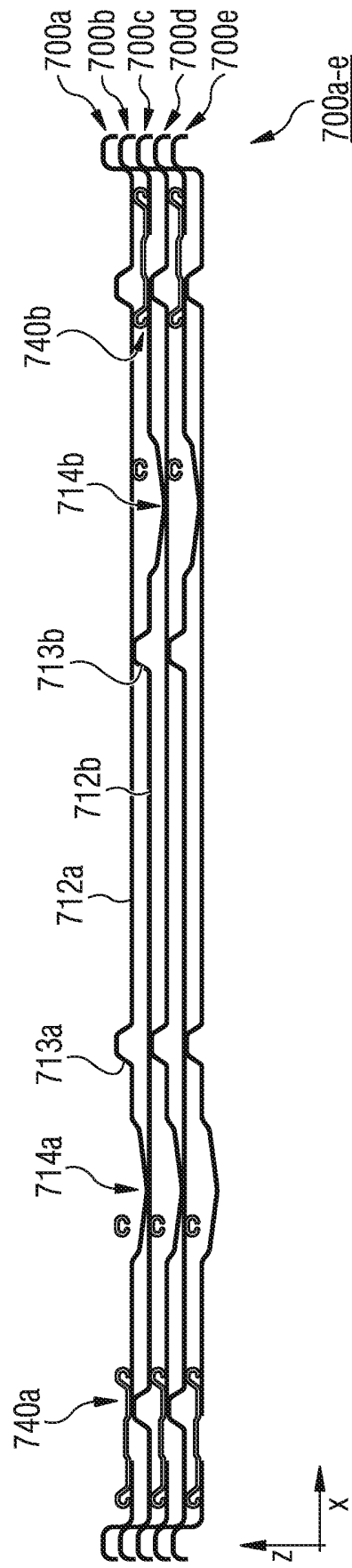


FIG. 7d G-G

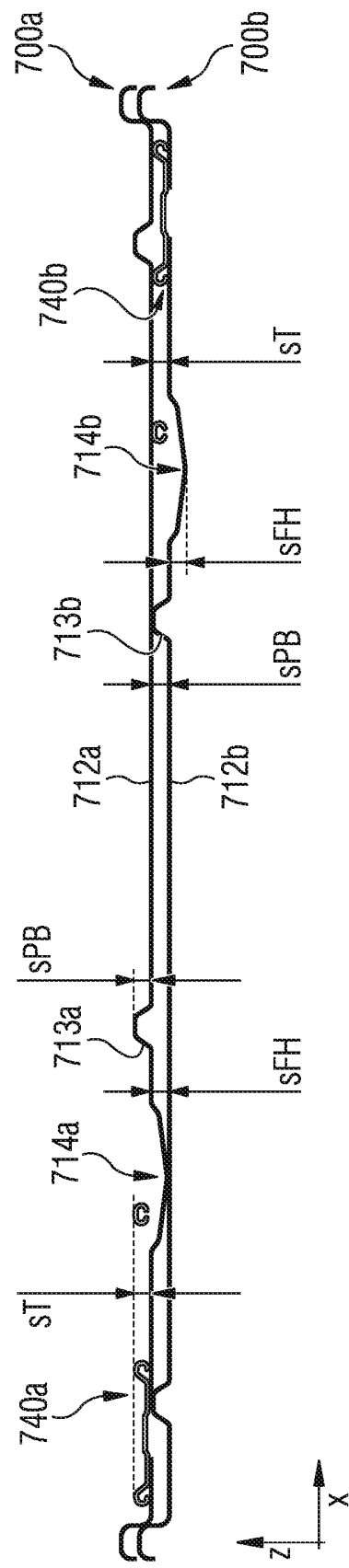


FIG. 8a

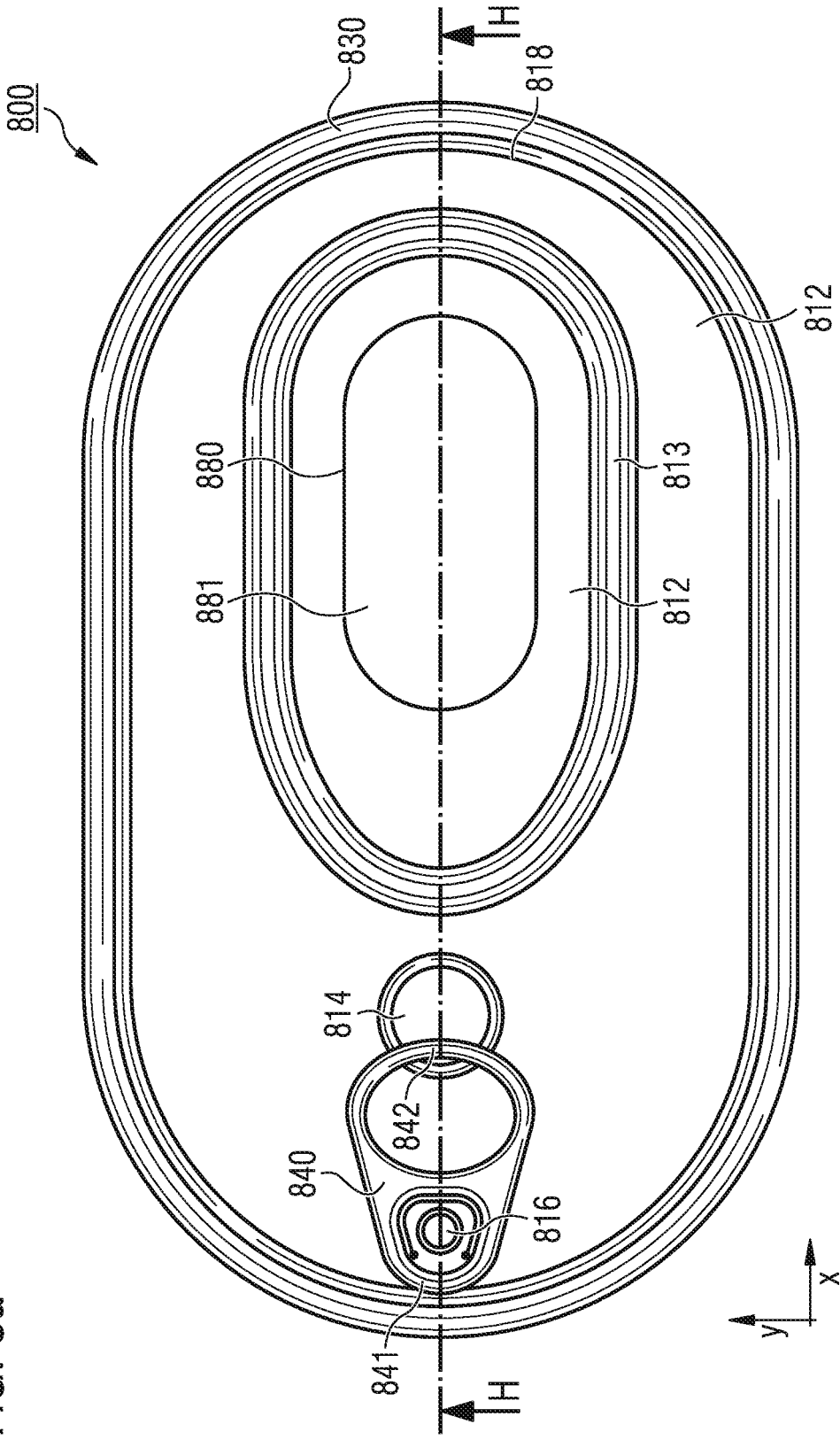
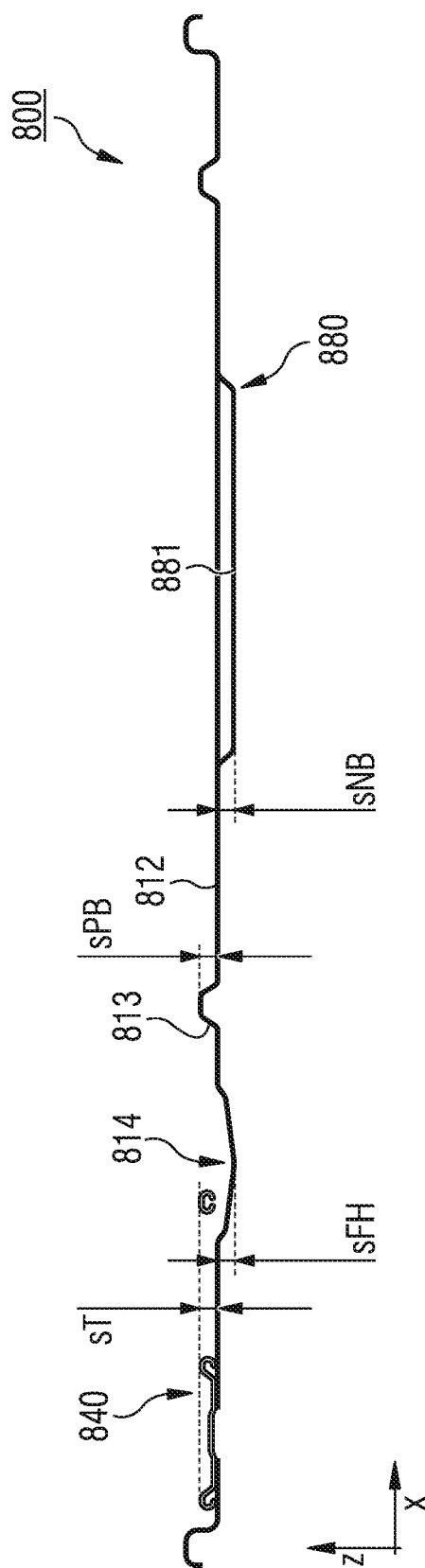


FIG. 8b



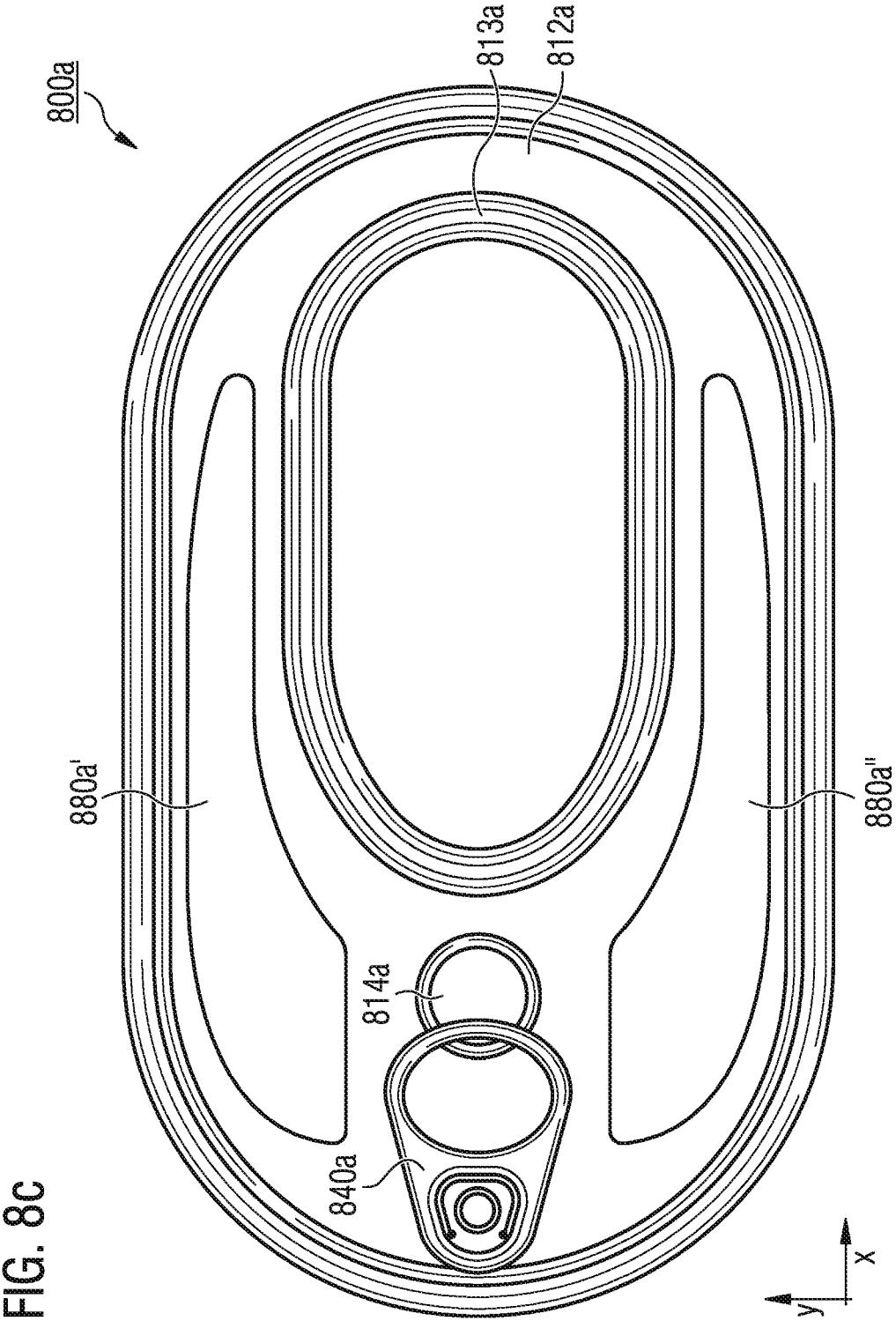
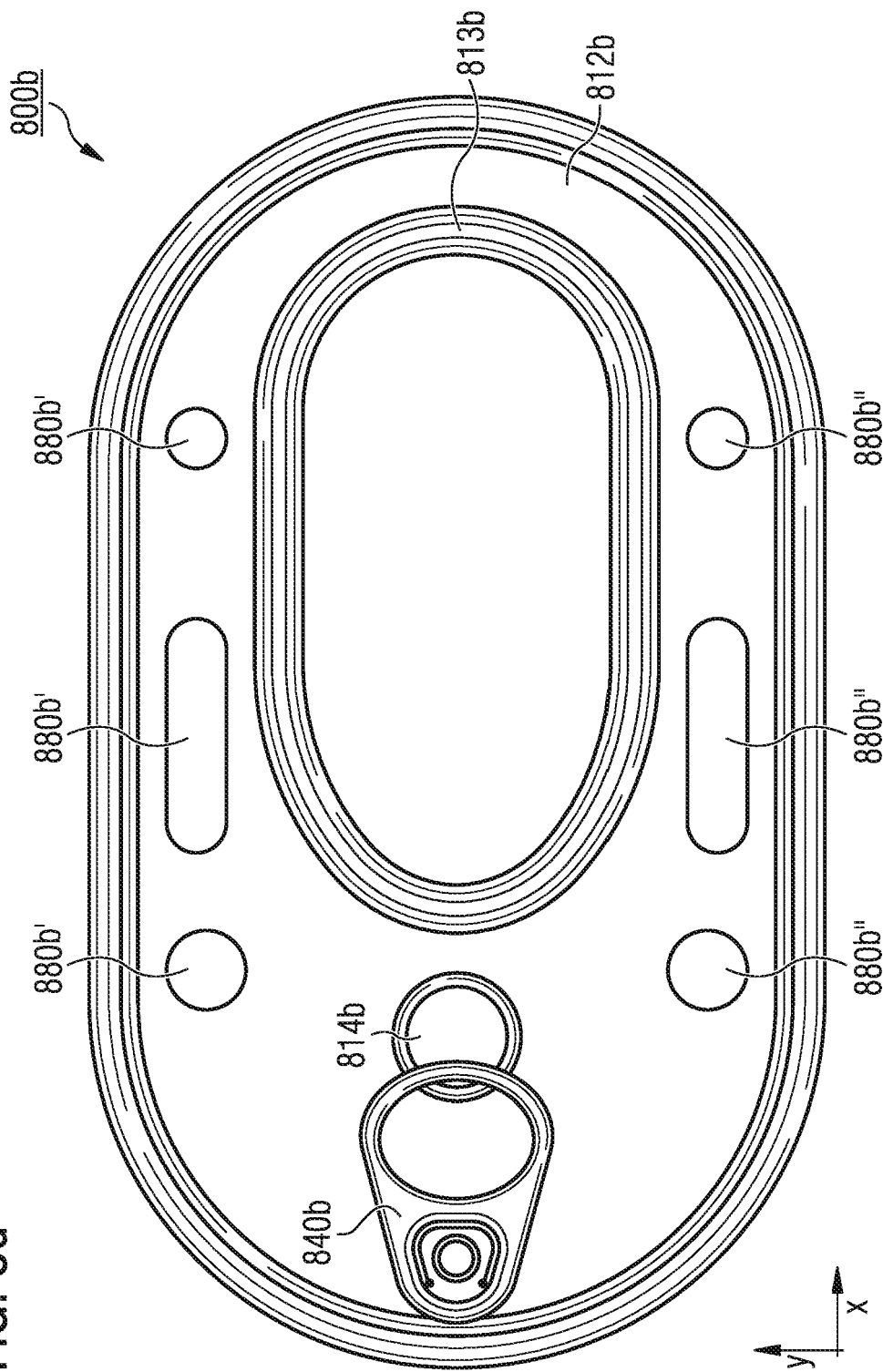


FIG. 8d



REFERENCES CITED IN THE DESCRIPTION

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