



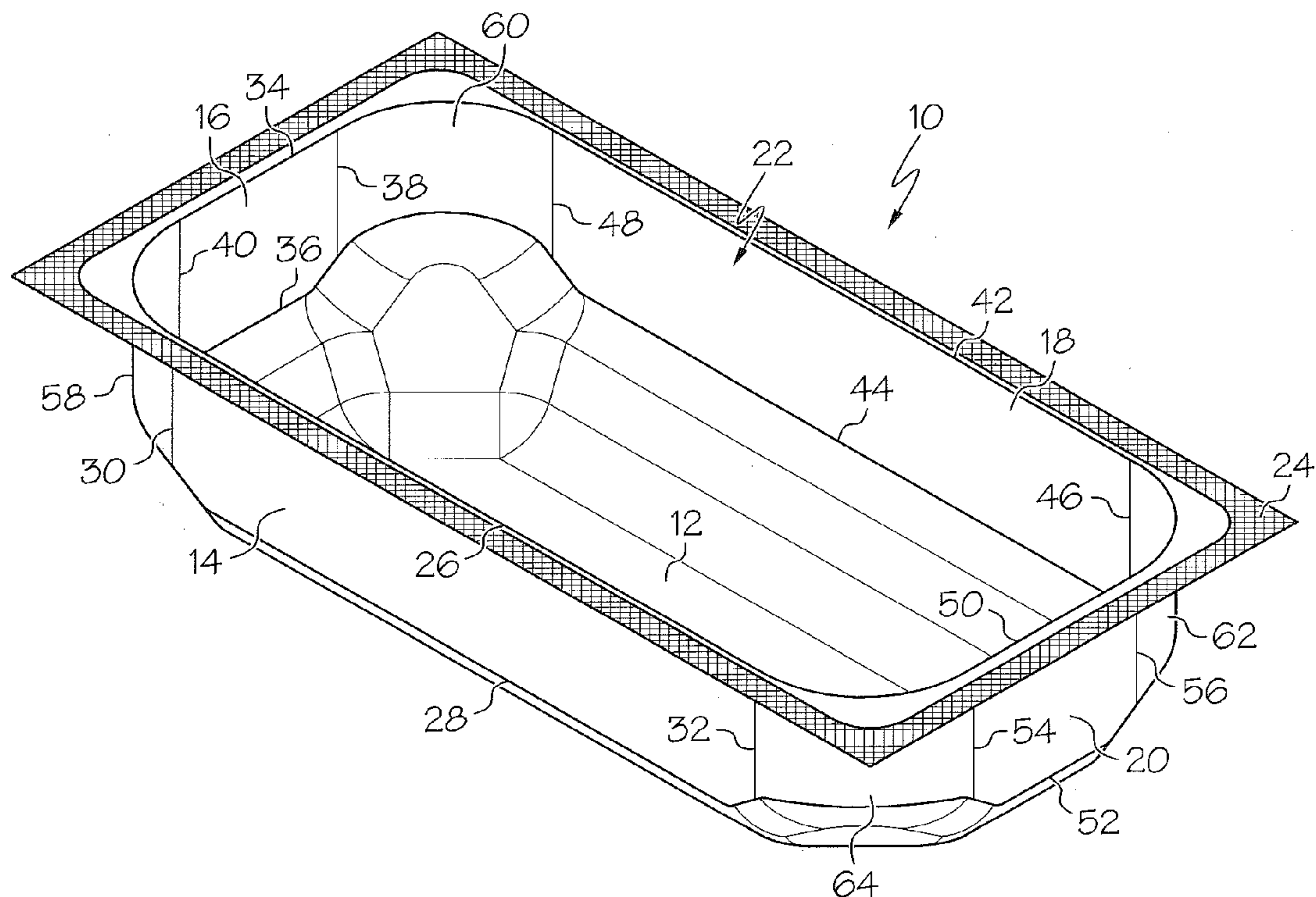
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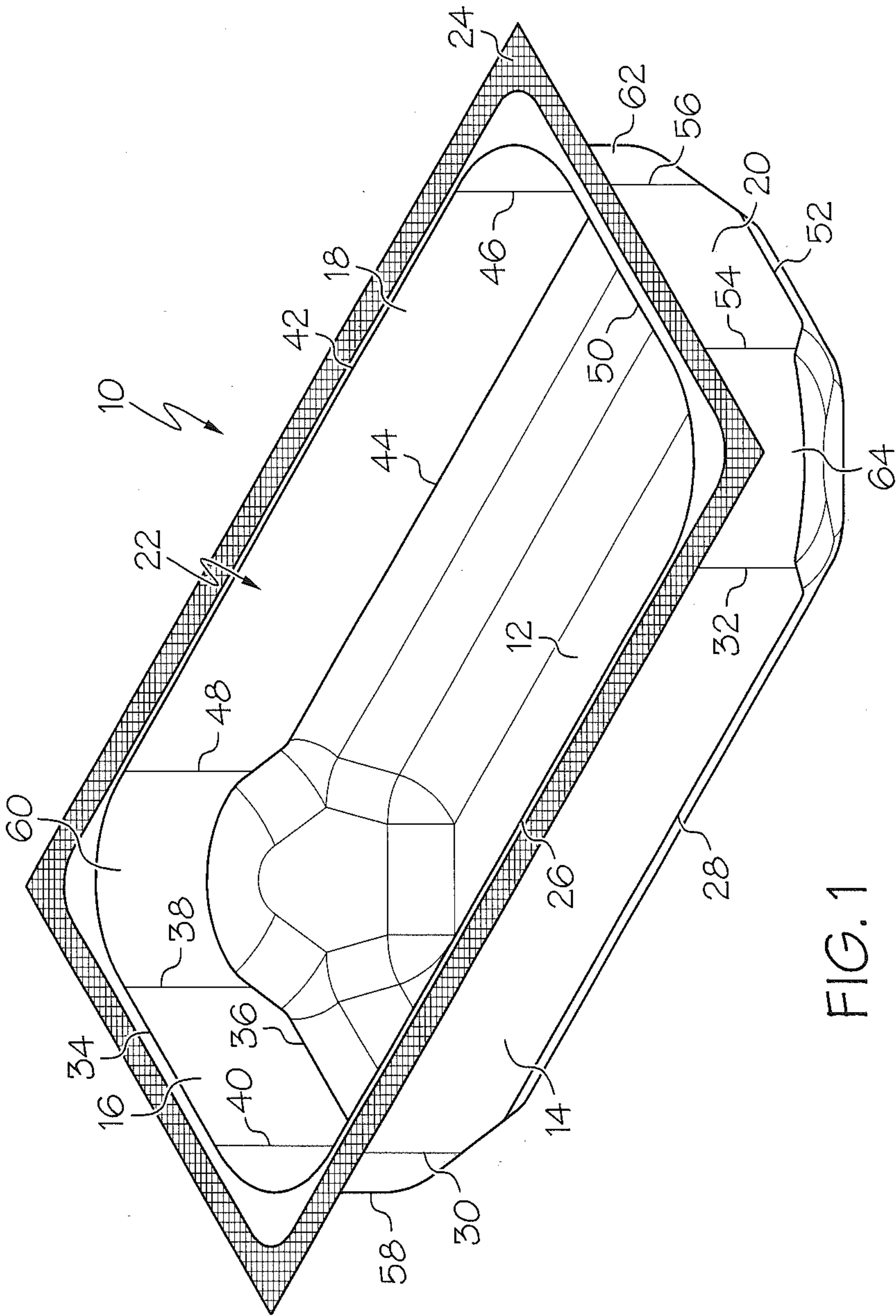
(19) **United States**(12) **Patent Application Publication**
Uebele(10) **Pub. No.: US 2014/0312045 A1**(43) **Pub. Date: Oct. 23, 2014**(54) **MYLAR BLENDED PLATE AND PACKAGE**(71) Applicant: **Multivac, Inc.**, Kansas City, MO (US)(72) Inventor: **Christian Uebele**, Kansas City, MO (US)(73) Assignee: **Multivac, Inc.**, Kansas City, MO (US)(21) Appl. No.: **14/213,022**(22) Filed: **Mar. 14, 2014****Related U.S. Application Data**

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B65D 1/34 (2006.01)(52) **U.S. Cl.**CPC ... **B65D 1/26** (2013.01); **B65D 1/34** (2013.01)USPC **220/604**(57) **ABSTRACT**

A package that comprises a bottom, a plurality of sidewalls extending away from the bottom defining an open top, each sidewall coupled to the bottom with a bottom-to-sidewall transition. The package may include a plurality of curved corner sidewalls disposed between the sidewalls and coupled to the bottom with a bottom-to-corner transition. The bottom-to-sidewall transition may comprise three sections, wherein a second section is substantially planar or slightly arced and the first and third sections being curved as necessary. The package may also include the bottom-to-corner transition comprising at least three sections, the second section being substantially planar wherein the first and third sections are curved as necessary. The second sections of both transitions may be angularly orientated to the bottom and sidewalls. The package may further include a plurality of transition elements between to couple the bottom-to-corner and bottom-to-side transitions.





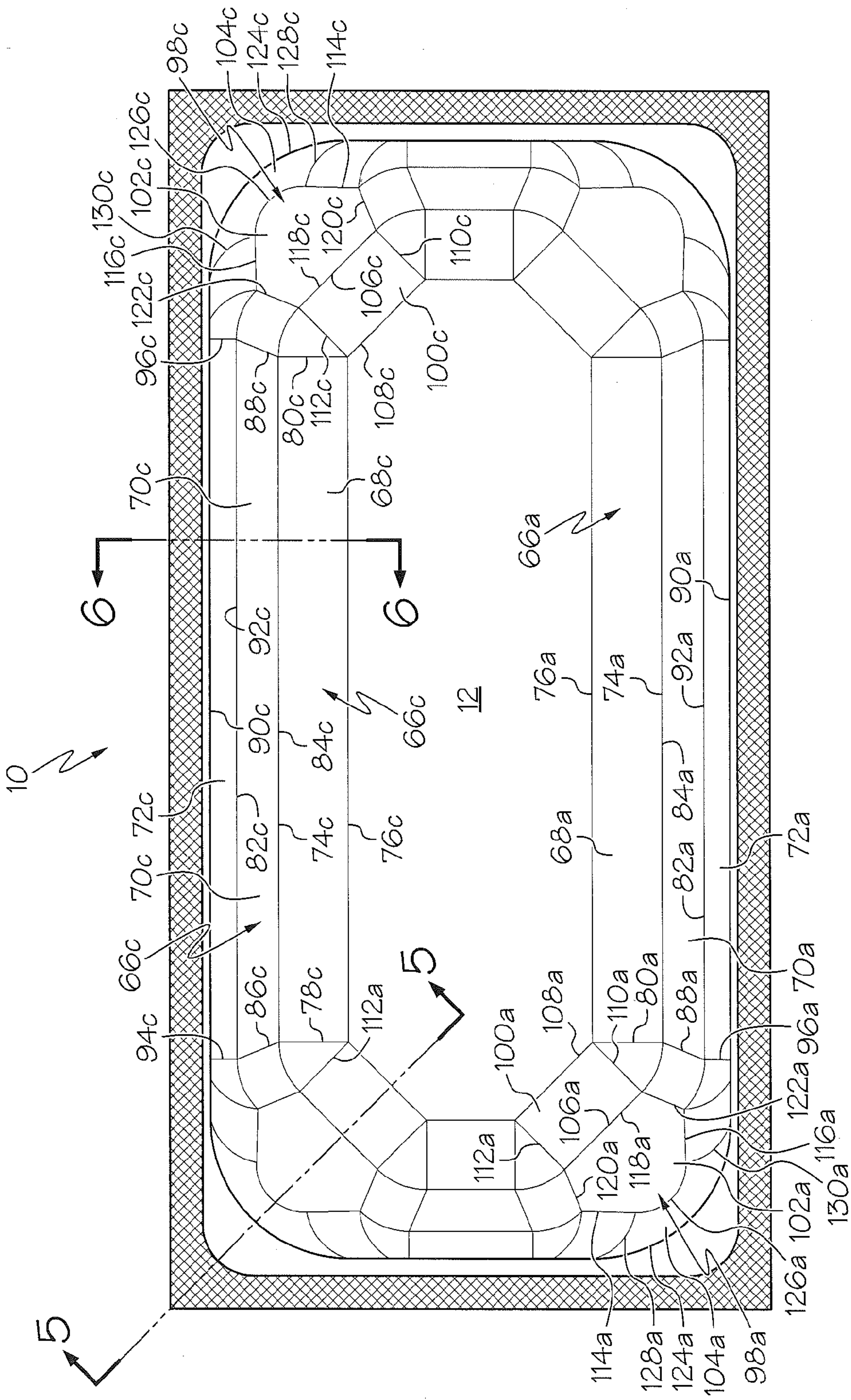


FIG. 2A

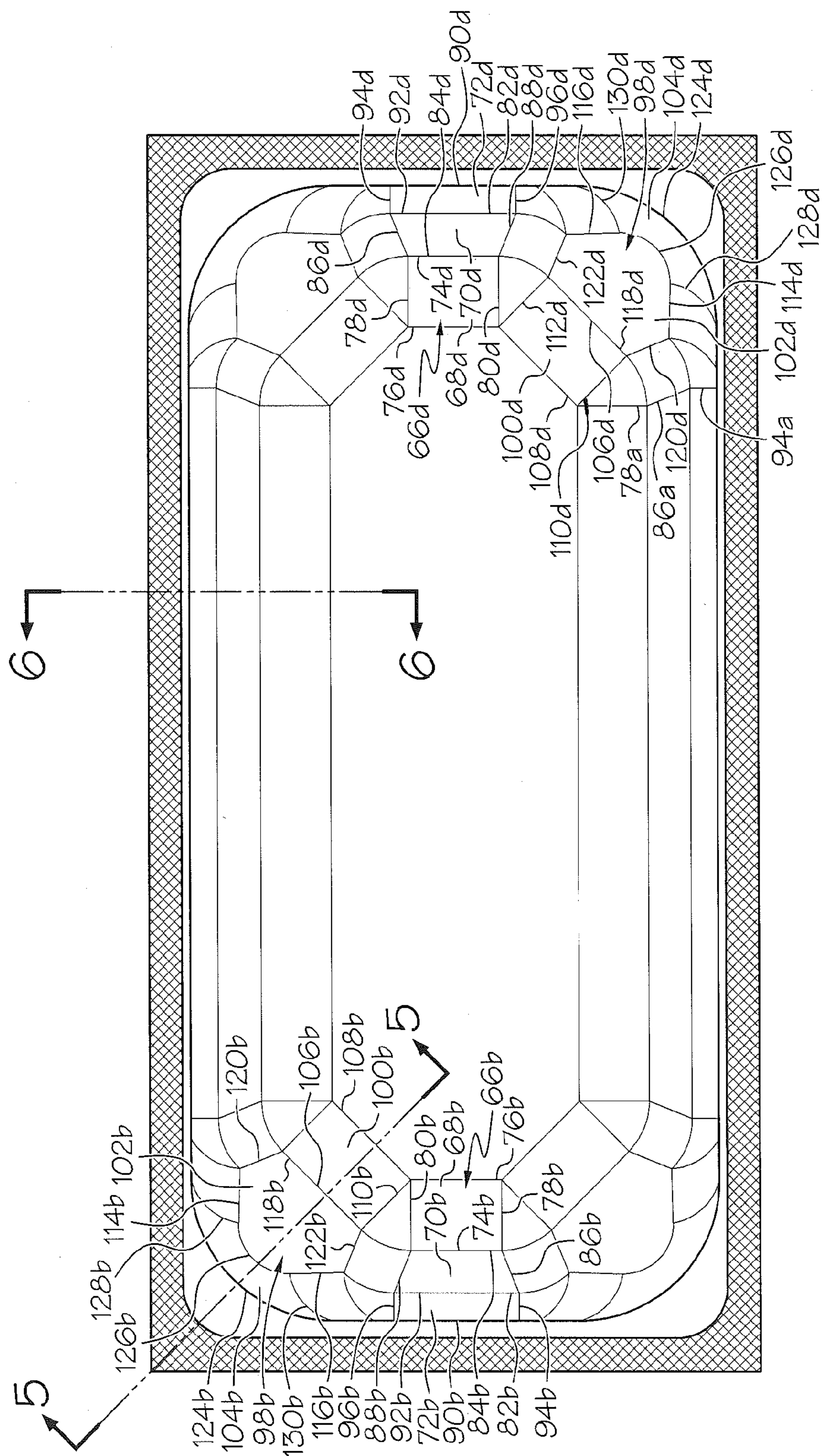
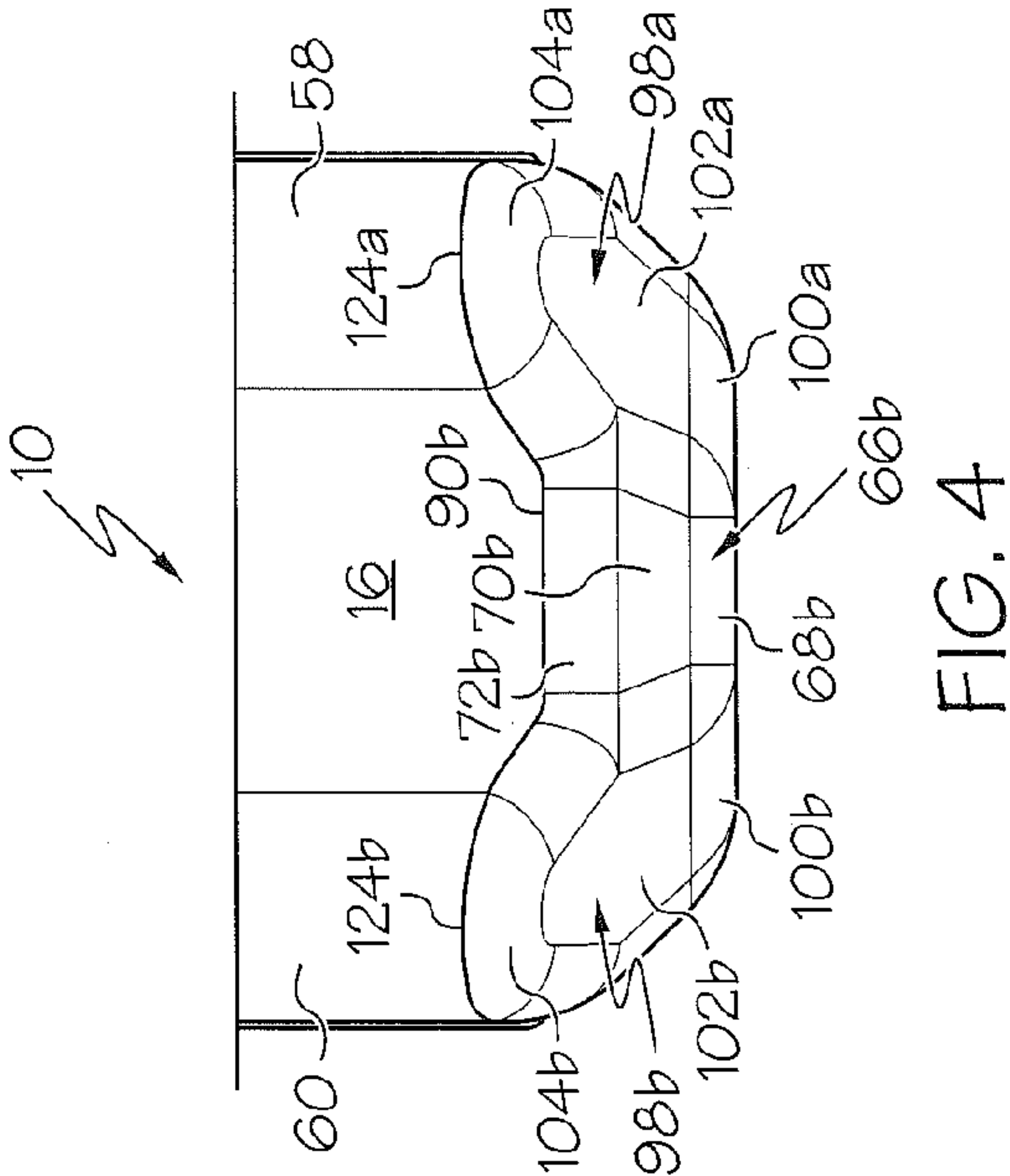
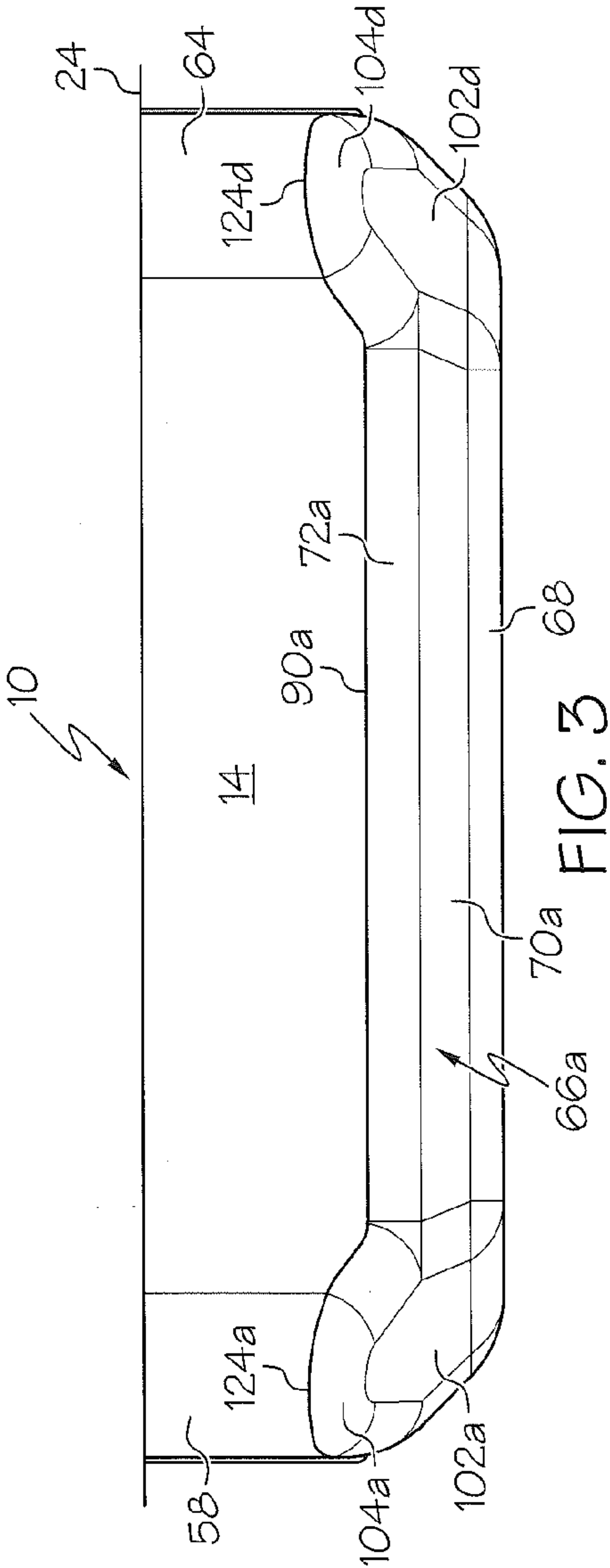
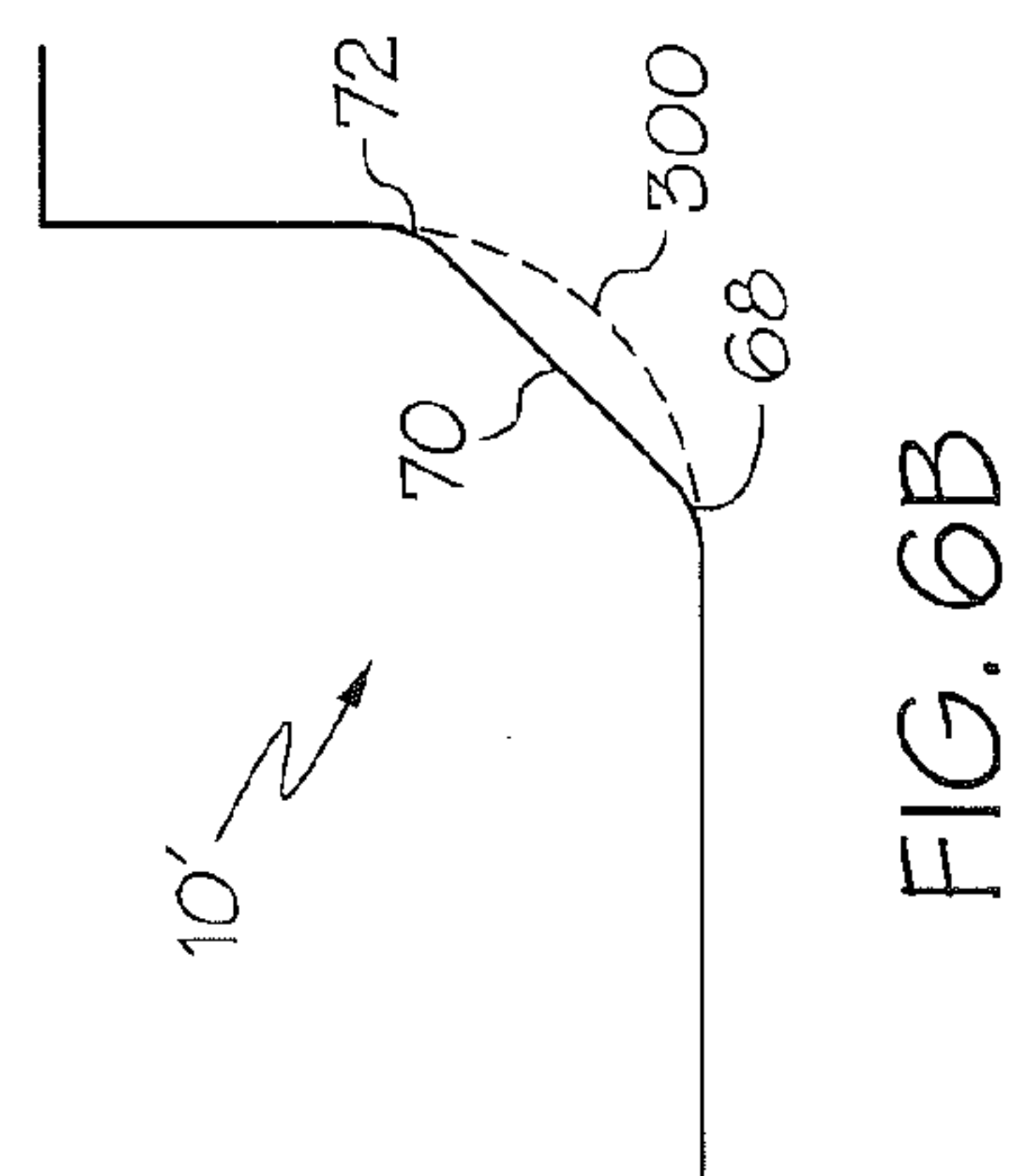
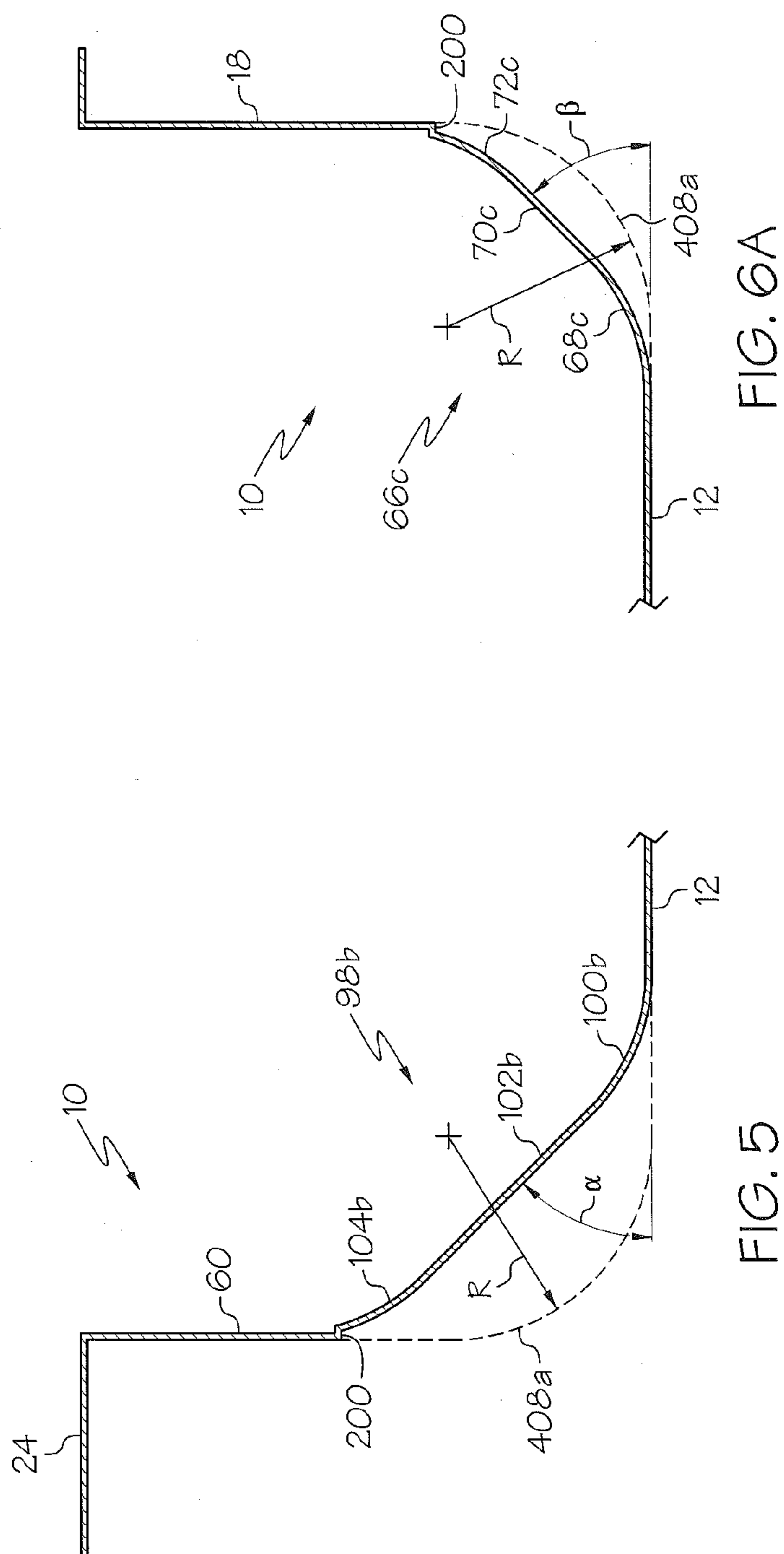
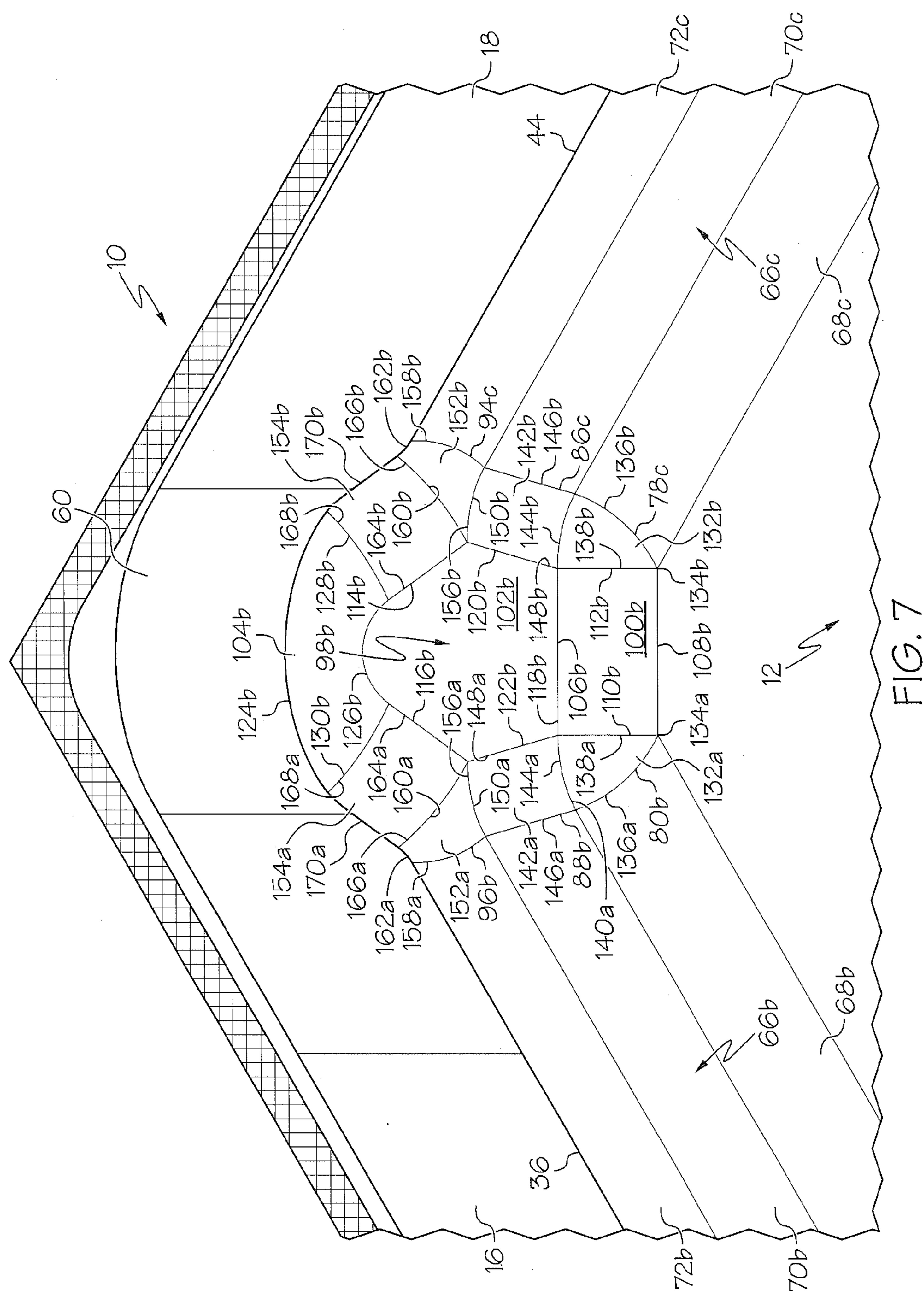


FIG. 2B







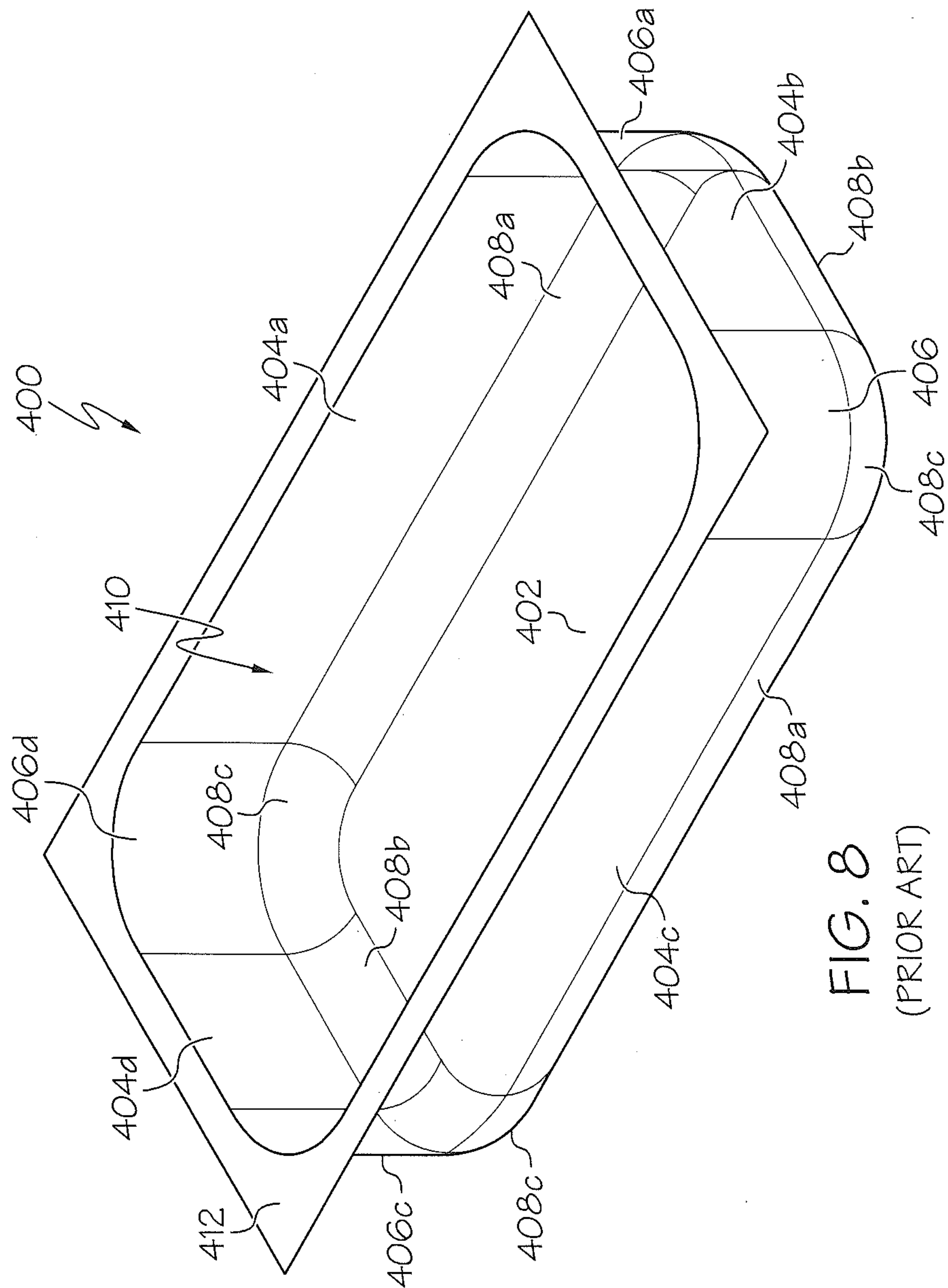


FIG. 8
(PRIOR ART)

MYLAR BLENDED PLATE AND PACKAGE**CROSS-REFERENCE TO RELATED APPLICATION**

[0001] This application claims the benefit of U.S. Provisional Patent Application No. 61/792,090, filed Mar. 15, 2013, the entire disclosure of which is hereby incorporated by reference.

FIELD OF THE INVENTION

[0002] This present invention relates to a shape of a deep drawn thermoplastic package and a plate for deep drawing the same which improves on the prior art by equalizing the film distribution during the formation process to improve the draw ratio.

BACKGROUND OF THE INVENTION

[0003] Deep drawn packaging has become very prevalent throughout the food packaging industries. As shown in FIG. 8, existing deep-drawn thermoplastic containers **400** have a substantially horizontal base **402**, four substantially vertical sidewalls **404a**, **404b**, **404c** and **404d**; four curved corner transitions **406a**, **406b**, **406c**, and **406d**; and three different curved transition sections **408a**, **408b** and **408c** which comprise the transition between the base **402**, the sides **404a-d** and the corners **406a-d**. The four sidewalls define an open top **410** and a flange **412** that extends around the perimeter of open top **410**. The curved transitions **408a-c** are incorporated into such packages due to limitations of the films materials to be formed such that walls intersect at corners. The curved transitions **408a-c** also makes the package easier to remove from the mold. However, to maximize the volume of the packaging, the radius of curvature remains relatively small to provide a minimum reduction in the area of the bottom of the package resulting in a desired stress distribution in the packaging materials.

[0004] The existing configuration performs well for shallow packaging. However, as the sidewalls are drawn deeper, the currently existing bottom-to-side curved transitions result in a non-uniform distribution of material throughout the package as the sidewalls bear a disproportionate thinning when compared to the bottom or the transition sections. Thus, there is a need in the art for a revised package shape and mold or plate particularly for deep-drawing packages which improve the material distribution throughout the package and thereby increases the overall strength of the package and lessens the risk of tears or ruptures of the packaging at the thinner portions of the packaging.

SUMMARY OF THE INVENTION

[0005] The present application is directed toward a package, primarily for foodstuffs, that comprises a bottom and a plurality of sidewalls extending away from the bottom. The sidewalls may be connected using a plurality of curved corner sidewalls. The sidewalls and corner sidewalls may define an open top. Each sidewall may be coupled to the bottom with a bottom-to-sidewall transition. The plurality of curved corner sidewalls may be disposed between the sidewalls. One embodiment of the present package may include four sidewalls extending away from and substantially perpendicular to the bottom and four curved corner sidewalls disposed between the four sidewalls. The package may be thermo-

formed and/or deep-drawn and incorporated into a food packaging machine. The package may be of unitary construction.

[0006] The transitions between the bottom and the sidewalls may be a bottom-to-sidewall transition that includes at least three sections. The second section may be substantially planar, wherein the first section is a curved transition between the bottom and the second section and a third section may be a curved transition between the second section and one of the sidewalls. The second section of the bottom-to-sidewall transition lies at an angle with respect to the bottom. The angle may be in a range between thirty and sixty degrees and, may more specifically be around forty-five degrees.

[0007] The package may also include a bottom-to-corner transition that includes at least three sections. Similarly, the second section may be substantially planar, and the first section may be curved and provides a transition between bottom and second section. The third section may include a surface having at least two curves and provides a transition between second section and one of the curved corner sidewalls.

[0008] Embodiments of the present package may further include transition elements to transition between bottom-to-sidewall transition and the bottom-to-corner transition so that the package may be leak-proof or air-proof and of a unitary construction. A first transition element provides a transition between the first section of the bottom-to-sidewall transition and the first section of the bottom-to-corner transition. A second transition element to transition between the second section of the bottom-to-sidewall transition and the second section of the bottom-to-corner transition. The package may also include a segmented transition between the third section of the bottom-to-sidewall transition and the third section of the bottom-to-corner transition. A portion of the segmented transition may be coupled to the second section of the bottom-to-corner transition.

[0009] In an alternative embodiment, the package of the present invention may alternatively include the bottom-to-sidewall transition having three sections, wherein the second section is an arc of a first radius. The first section may be a curved transition between the bottom and the second section, and the first section may have a second radius. The third section may be a curved transition between the second section and one of the sidewalls wherein the third section may have a third radius. In one embodiment, the first radius is greater than both the second radius and the third radius.

[0010] The present invention may also be directed toward a plate for forming the above package and/or a packaging machine that includes a plate for forming the above package.

[0011] Other aspects and advantages of the present invention will be apparent from the following detailed description of the preferred embodiments and the accompanying drawing figures.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

[0012] The accompanying drawings form a part of the specification and are to be read in conjunction therewith, in which like reference numerals are employed to indicate like or similar parts in the various views.

[0013] FIG. 1 is a perspective view of a package formed in accordance with the teachings of the present disclosure;

[0014] FIG. 2 is a top view of the package of FIG. 1;

[0015] FIG. 3 is a front view of the package of FIG. 1;

[0016] FIG. 4 is an end view of package of FIG. 1;

[0017] FIG. 5 is a section view of the package of FIG. 2 cut along the line 5-5;

[0018] FIG. 6A is a section view of the package of FIG. 2 cut along the line 6-6;

[0019] FIG. 6B is a section view of an alternative embodiment of the section of FIG. 6A in accordance with the teachings of the present disclosure;

[0020] FIG. 7 is a close up perspective view of a corner of the package of FIG. 1; and

[0021] FIG. 8 is a perspective view of a prior art package which is improved by the present package.

DETAILED DESCRIPTION OF THE INVENTION

[0022] The following detailed description of the present invention references the accompanying drawing figures that illustrate specific embodiments in which the invention can be practiced. The embodiments are intended to describe aspects of the present invention in sufficient detail to enable those skilled in the art to practice the invention. Other embodiments can be utilized and changes can be made without departing from the spirit and scope of the present invention. The present invention is defined by the appended claims and, therefore, the description is not to be taken in a limiting sense and shall not limit the scope of equivalents to which such claims are entitled.

[0023] As shown in FIG. 1, the present packaging 10 includes a bottom 12, a first sidewall 14, a second sidewall 16, a third sidewall 18, a fourth sidewall 20, an open top 22 defined by the sidewalls 14, 16, 18, and 20, and a flange 24 disposed around the perimeter of the open top 22.

[0024] First sidewall 14 includes a top 26, a bottom 28, a first end 30 and a second end 32. Second sidewall 16 includes a top 34, a bottom 36, a first end 38 and a second end 40. Third sidewall 18 includes a top 42, a bottom 44, a first end 46 and a second end 48. Fourth sidewall 20 includes a top 50, a bottom 52, a first end 54 and a second end 56. Package 10 may be any material used in the art for deep-drawing including plastic materials commonly used in the art including, known polymers, polypropylene, polyvinyl, polyester, PET, plastics, and Mylar.

[0025] As further shown in FIG. 1, a first corner sidewall 58 joins first end 30 of first sidewall 14 and second end 40 of second sidewall 16. The package 10 further includes a second corner sidewall 60 joining first end 38 of second sidewall 16 and second end 48 of third sidewall 18; a third corner sidewall 62 joining first end 46 of third sidewall 18 and second end 56 of fourth sidewall 20; and a fourth corner sidewall 64 joining first end 54 of fourth sidewall 20 and second end 32 of first sidewall 14.

[0026] Package 10 of the present invention also includes a multiple step transition from the base to the sidewalls that lowers the draw-ratio of the packages thereby resulting in a more uniform distribution of the packaging material. In essence, one embodiment of package 10 combines a chamfer with two fillet radius transitions to transition from bottom 12 of the package to the sidewalls 14, 16, 18, and 20. Similar transition structure is provided in the corners and by reducing the surface area, it subsequently reduces the amount the film must stretch in the corners and, thereby results in a thicker film. This configuration, however, reduces the total surface area of package 10 when compared to the simple fillet radius transition of the package 400 illustrated in FIG. 8.

[0027] As shown in FIG. 2, a bottom-to-sidewall transition 66a, 66b, 66c, and 66d comprises at least a first section 68a-d,

a second section 70a-d, and a third section 72a-d. Second sections 70a-d are one of a chord member having a linear profile or an arc length having a very large diameter and may result in a member that may appear straight or substantially planar. First sections 68a-d are curved transition sections that provide the transition from bottom 12 to second sections 70a-d. Third sections 72a-d may also be curved transition sections that transition from second section 70a-d to an adjacent sidewall 14, 16, 18, or 20. As shown in FIG. 2, each first section 68a-d respectively includes a top side 74a-d, a bottom side 76a-d, a first side 78a-d and a second side 80a-d. Each second section 70a-d respectively includes a top side 82a-d, a bottom side 84a-d, a first side 86a-d and a second side 88a-d. In general, top side 74 of first section 68 will intersect with bottom side 84 of second section 70 and bottom side 76 of first section 68 intersects with bottom 12 at each transition. Second section 70 may be substantially planar or may include a slight arc due to a large radius.

[0028] Further, each third section 72a-d respectively includes a top side 90a-d, a bottom side 92a-d, a first side 94a-d and a second side 96a-d. As shown in FIG. 2, in general top side 82 of second section 70 intersects with bottom side 92 of third section 72 and, as shown in FIG. 3, top side of 90a of third section 72a intersects with the adjacent sidewall 14 for each transition. As shown in FIG. 4, top side 90b of third section 72b intersects with sidewall 16. Similarly, top sides 90c-d of third sections 72c-d will intersect with sidewalls 18, and 20 respectively.

[0029] Now turning back to FIG. 2, the bottom-to-corner transitions 98a, 98b, 98c, and 98d respectfully comprise at least a first section 100a-d, a second section 102a-d, and a third section 104a-d. Each first section 100a-d respectively includes a top side 106a-d, a bottom side 108a-d, a first side 110a-d and a second side 112a-d. Each second section 102a-d respectively includes a first inclined top side 114a-d, a second inclined top side 116a-d, a bottom side 118a-d, a first side 120a-d and a second side 122a-d. Generally, top side 106 of first section 100 intersects bottom side 118 of second section 102 at each respective transition as shown. Second section 102 may be substantially planar or may include a slight arc due to a large radius.

[0030] Further, each third section 104a-d respectively includes a curved top side 124a-d, a curved bottom side 126a-d, a first side 128a-d, and a second side 130a-d. As shown in FIG. 2, the curved intersection of first and second inclined top sides 114 and 116 of second section 102 intersects with the curved bottom side 126 of third section 104 and, as shown in FIG. 3, top sides 124a and 124d of third section 104a and 104d intersect with the adjacent corner sidewalls 58 and 64 as shown. Similarly (although not shown in FIG. 3), top sides 124b and 124c of third sections 104b and 104c will intersect with corner sidewalls 60 and 62 respectively.

[0031] FIG. 7 demonstrates that there are a number of transition elements which are required to transition from bottom to side transitions 66b and 66c to bottom-to-corner transition 98b. The other corners of package 10 may be identically configured and are preferably configured as such. As shown in FIG. 7, a first transition element 132a and 132b transitions between first portions 68b and 68c of transitions 66b and 66c with first section 100b of corner transition 98b. First transition elements 132a and 132b respectively include a first side 136a and 136b and a second side 138a and 138b that respectively share a common intersection point 134a and 134b. First transition elements 132a and 132b have a respective top side

140a and **140b**. Transition elements **132** will generally have a curved profile that varies and may transition gradually from side **136a** proximate side **80b** of first section **68b** to side **138a** proximate side **110b** of first corner section **100b**, and also transitions gradually from side **136b** proximate side **78c** of first section **68c** to side **138b** proximate side **112b** of first corner section **100b**.

[0032] Second transition elements **142a** and **142b** respectively include a bottom side **144a** and **144b**, a first side **146a** and **146b**, and a second side **148a** and **148b**, and a top side **150a** and **150b**. Transition element **142** will generally have a linearly appearing profile, but the element itself will curve from second section **70b** to side **122b** of second corner section **102b** and from second section **70c** to side **120b** of second corner section **102b**. Bottom side **144a** and **144b** intersect respectively with top side **140a** and **140b** of first section **132a** and **132b** as shown in FIG. 7.

[0033] Package **10** also includes two transition elements to transition from third sections **72b** and **72c** to third corner section **104b** as shown in FIG. 7. As such transition elements **152a** and **154a**, and **152b** and **154b** create a segmented transition respectively between sections **72b**, **72c** and third corner section **104b**. As shown, sections **152a** and **152b** include respectively a bottom side **156a** and **156b**, a first side **158a** and **158b**, a second side **160a** and **160b**, and a top side **162a** and **162b**. Generally for transition element **152**, bottom side **156** intersects with top side **150** of transition element **142**. First side **158a** intersects with side **96b** of third transition section **72b**, and first side **158b** intersects with side **94c** of third transition section **72c**. Top side **162a** intersects with bottom **36** of sidewall **16** and top side **162b** intersects with bottom **44** of sidewall **18**.

[0034] Transition element **154a** and **154b** include a bottom side **164a** and **164b**, a first side **166a** and **166b**, a second side **168a** and **168b**, and a top side **170a** and **170b**. Bottom side **164a** of transition element **154a** intersects second top inclined side **116b** of second corner section **102b**. Bottom side **164b** of transition element **154b** intersects first inclined side **114b** of second corner section **102b**. First side **166a** and **166b** respectively intersect with second sides **160a** and **160b** of transition elements **142a** and **142b**. Second side **168a** of transition element **154a** intersects with side **130b** of third corner section **104b**. Second side **168b** of transition element **154b** intersects with side **128b** of third corner section **104b**. Top side **170a** of transition element **154a** intersects with a portion of bottom **36** of sidewall **16** and a portion bottom **124b** of corner sidewall **60**. Similarly, top side **170b** of transition element **154b** intersects with a portion of bottom **44** of sidewall **18** and a portion of bottom **124b** of corner sidewall **60**. The profile of transition elements **154a** and **154b** have a curved profile and transition elements **152a** and **152b** have a wedge-like shape to accommodate the differences in the surface planes between the sidewall transitions **66** and the corner transitions **98**.

[0035] Now turning to FIG. 5, corner transition **98b** includes second corner section **102b** being orientated at an angle α with respect to bottom **12**. Angle α may be in a range between thirty (30) and sixty (60) degrees, but is preferably around forty-five (45) degrees. First corner section **100b** is curved to transition between bottom **12** and second corner section **102b**. Third corner section **104b** also curves to transition between corner sidewall **60** and second corner section **102b**. In one embodiment, second corner section **102b** is substantially linear and constitutes a chord member that is tangential to both first corner section **100b** and third corner

section **104b**. The profile of bottom-to-corner transition **98b** compared with a typical single-element radius transition **408c** (shown in broken lines) having a radius R is shown. In another embodiment, second corner section may be non-tangential similar to the embodiment described below and shown in FIG. 6B. The transition **104b** from corner section **102b** to corner **60** may further include a shelf **200** which may provide some lateral stability to the package **10** or may serve other utilitarian or aesthetic purpose.

[0036] Now turning to FIG. 6A, bottom-to-side transition **66c** includes second section **70c** being orientated at an angle β with respect to bottom **12**. Angle β may be in a range between thirty (30) and sixty (60) degrees, but is preferably around forty-five (45) degrees. First section **68c** is curved to transition between bottom **12** and second section **70c**. Third corner section **72c** also curves to transition between sidewall **18** and second section **70c**. In one embodiment, second section **70c** is substantially linear and constitutes a chord member that is tangential to one or both of first section **68c** and third section **72c**. The profile of bottom-to-side transition **66c** compared with a typical single-element radius transition **408a** (shown in broken lines) having a radius R is shown. The transition **72c** from corner section **70c** to side **18** may further include shelf **200** which may provide some lateral stability to the package **10** or may serve other utilitarian or aesthetic purpose.

[0037] FIG. 6B illustrates an alternative embodiment packaging **10'**, which includes an alternative transition configuration than that shown in FIG. 6A and described above. FIG. 6B illustrates a non-tangential configuration of a bottom-to-side transition. In this embodiment, second section **70** is an arc length of a circle having a very large radius, and first section **68** and third section **72** may be curved at a lesser radius. As such, second section **70** will have a more abrupt transition with first section **68** and third section **72** in which a slight corner is formed, rather than a smooth curve associated with the tangential configuration shown in FIG. 6A. Similarly, the proposed three-stage non-tangential bottom-to-side transition is shown in comparison to a typical prior art single element curved transition **408a** formed at a radius R .

[0038] Now that the shape of the package formed by a packaging mold or plate has been described, a person in the art will appreciate forming a mold or a plate which results in a package of the above configuration. The angled and/or substantially planar second sections **70** and **102** of the package of the present disclosure provide an advantage when deep drawing the packaging to distribute material more uniformly throughout the package and, thus, avoiding weak or thin portions of the sidewall.

[0039] As is evident from the foregoing description, certain aspects of the present invention are not limited to the particular details of the examples illustrated herein. It is therefore contemplated that other modifications and applications using other similar or related features or techniques will occur to those skilled in the art. It is accordingly intended that all such modifications, variations, and other uses and applications which do not depart from the spirit and scope of the present invention are deemed to be covered by the present invention.

[0040] Other aspects, objects, and advantages of the present invention can be obtained from a study of the drawings, the disclosures, and the appended claims.

We claim:

1. A package that comprises:
a bottom;
a plurality of sidewalls extending away from said bottom defining an open top, each sidewall coupled to said bottom with a bottom-to-sidewall transition;
a plurality of curved corner sidewalls disposed between said plurality of sidewalls;
wherein a bottom-to-sidewall transition comprises at least three sections, wherein a second section is substantially planar and a first section is a curved transition between the bottom and the second section and a third section that is a curved transition between the second section and one of the plurality of sidewalls.
2. The package of claim 1 comprising four sidewalls extending substantially perpendicular to said bottom, and four curved corner sidewalls disposed between said four sidewalls.
3. The package of claim 1 wherein said second section of said bottom-to-sidewall transition lies at an angle with respect to said bottom.
4. The package of claim 3 wherein said angle is in a range between thirty and sixty degrees.
5. The package of claim 4 wherein said angle is around forty-five degrees.
6. The package of claim 1 further comprising a bottom-to-corner transition comprising at least three sections, said second section being substantially planar wherein said first section is curved and transitions between bottom and second section, and third section has at least two curves and transitions between second section and curved sidewall.
7. The package of claim 6 further comprising a first transition element to transition between said first section of said bottom-to-sidewall transition and said first section of said bottom-to-corner transition; a second transition element to transition between said second section of said bottom-to-sidewall transition and said second section of said bottom-to-corner transition;

and an segmented transition between said third section of said bottom-to-sidewall transition and said third section of said bottom-to-corner transition.

8. The package of claim 7 wherein a portion of said segmented transition is coupled to said second section of said bottom-to-corner transition.
9. A plate for forming a package, the package comprising:
a bottom;
a plurality of sidewalls extending away from said bottom defining an open top, each sidewall coupled to said bottom with a bottom-to-sidewall transition;
a plurality of curved corner sidewalls disposed between said plurality of sidewalls;
wherein a bottom-to-sidewall transition comprises at least three sections, wherein a second section is substantially planar and a first section is a curved transition between the bottom and the second section and a third section that is a curved transition between the second section and one of the plurality of sidewalls.
10. A packaging machine including the plate of claim 9.
11. A package wherein the package comprises:
a bottom;
a plurality of sidewalls defining an open top, each sidewall coupled to said bottom with a bottom-to-sidewall transition;
a plurality of curved corner sidewalls between said plurality of sidewalls;
wherein the bottom-to-sidewall transition comprises three sections, wherein a second section is an arc of a first radius, wherein a first section is a curved transition between the bottom and the second section, the first section having a second radius, wherein a third section is a curved transition between the second section and one of the plurality of sidewalls, the first section having a third radius, and wherein said first radius is greater than both said second radius and said third radius.

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