US 20140312045A1

(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

(60) Provisional application No. 61/792,090, filed on Mar. 15, 2013.

Publication Classification

(51) **Int. Cl.**

B65D 1/26	(2006.01)
B65D 1/34	(2006.01)

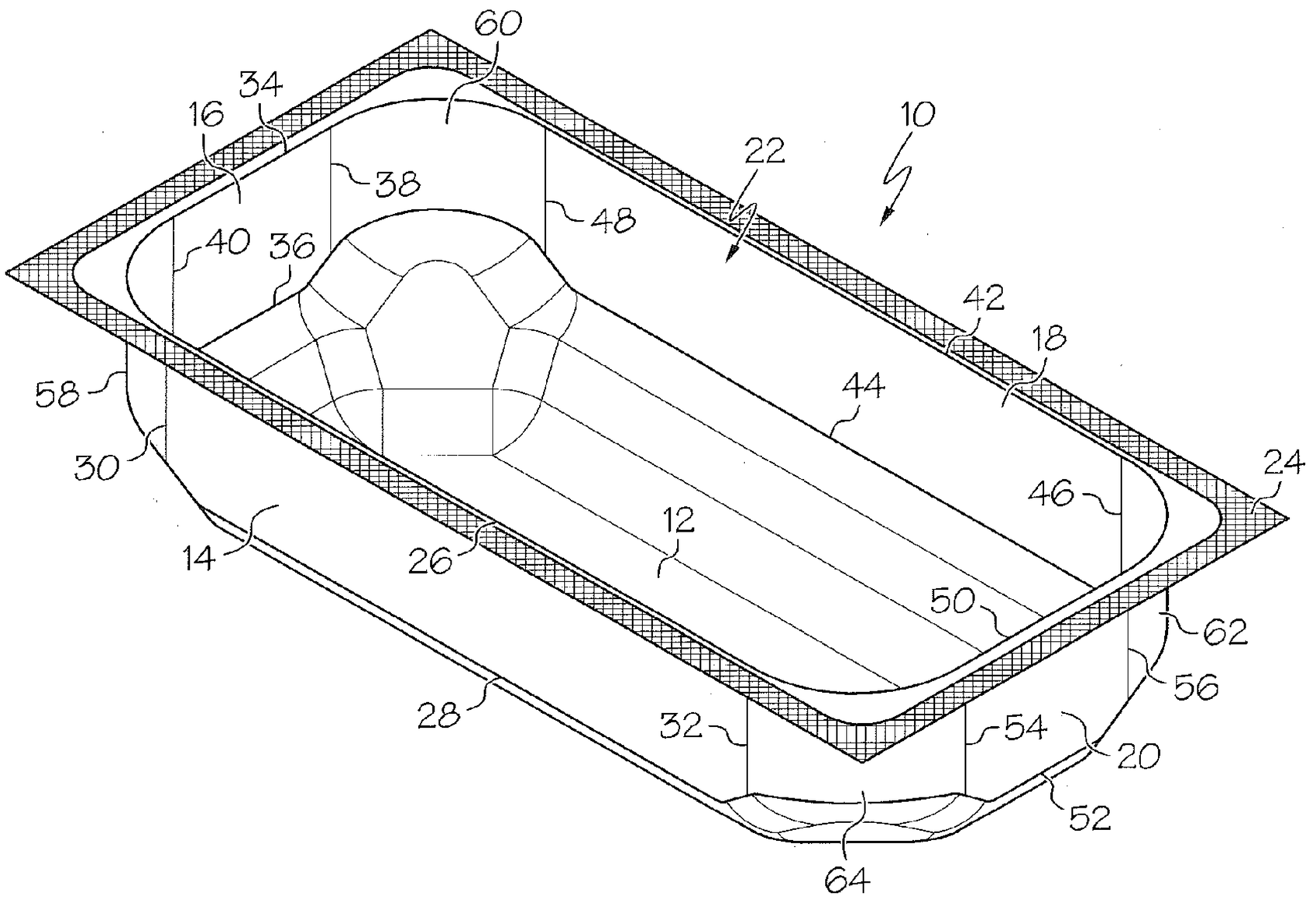
(52) **U.S. Cl.**

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.



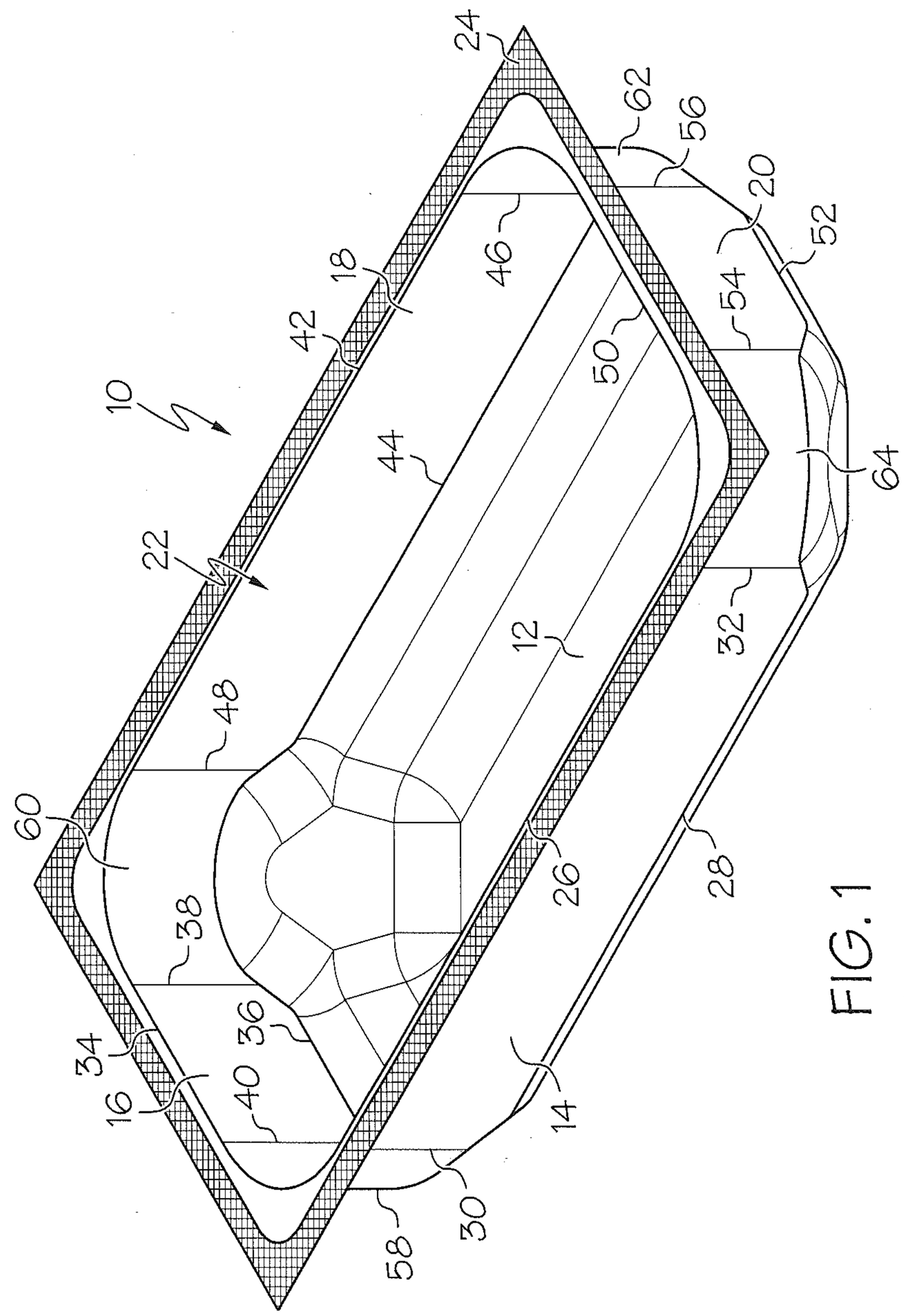

24
62
56
20
52
54
50
46
18
42
10
44
22
12
48
32
64
60
38
26
28
36
34
40
16
14
58
30

FIG. 1

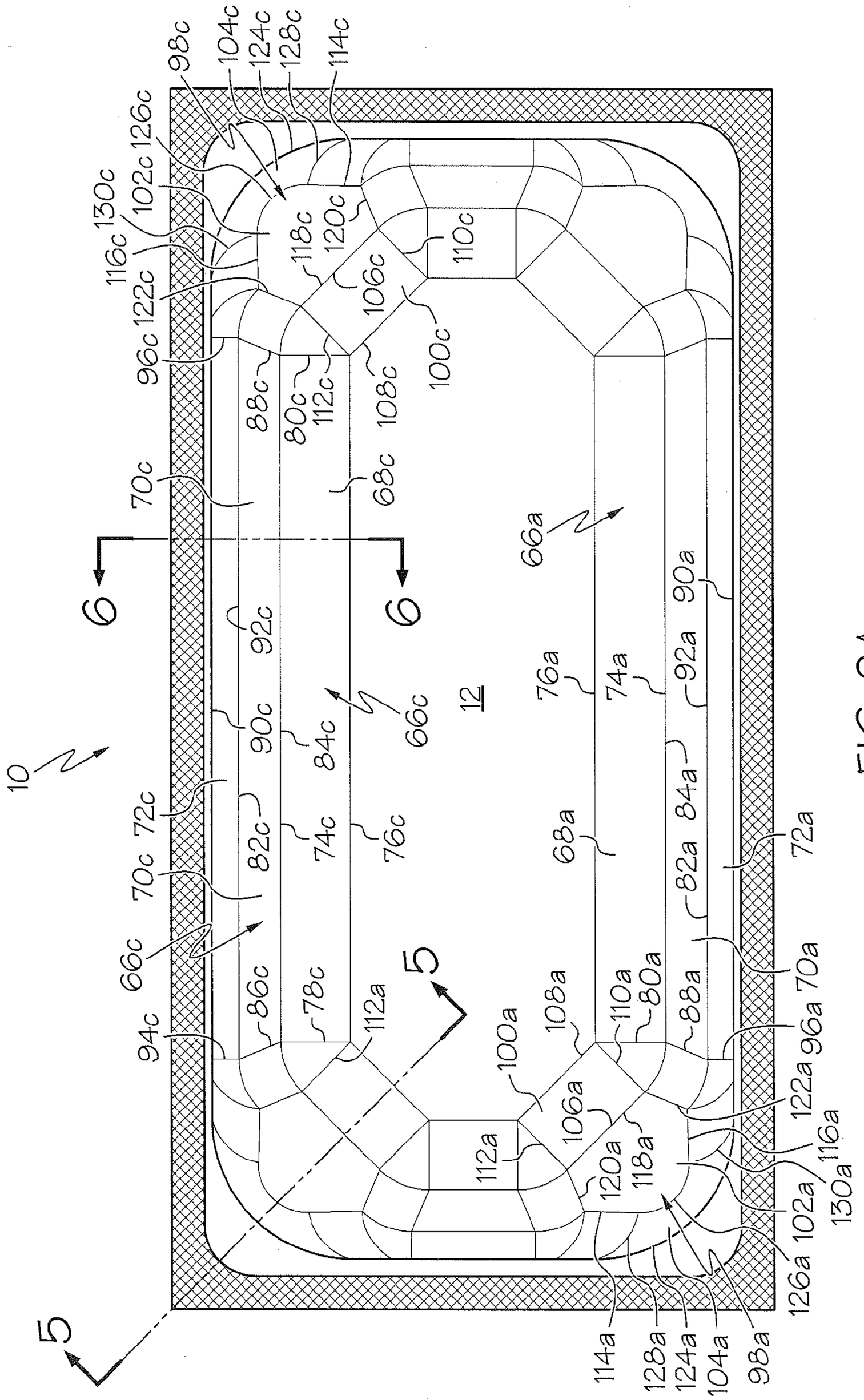

10
12
6
6
5
5
98c
104c
124c
128c
114c
126c
102c
130c
116c
122c
96c
118c
120c
110c
106c
100c
88c
80c
112c
108c
70c
68c
92c
90c
84c
66c
72c
82c
74c
76c
86c
78c
94c
112a
100a
108a
106a
110a
80a
88a
66a
76a
74a
92a
90a
84a
68a
82a
72a
96a
70a
122a
102a
130a
116a
120a
118a
126a
114a
128a
124a
104a
98a

FIG. 2A

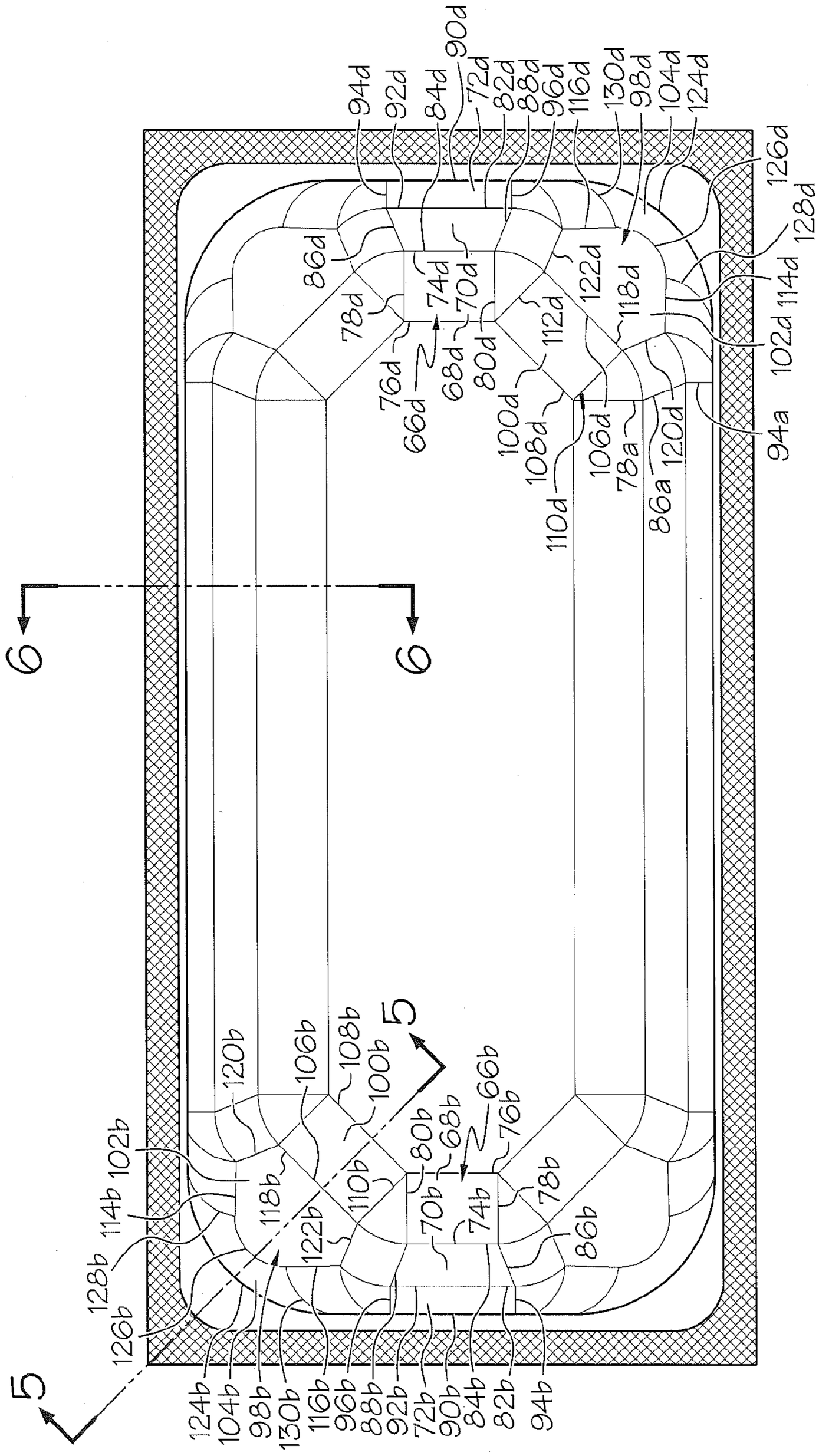

94d
92d
84d
90d
72d
82d
88d
96d
116d
130d
98d
104d
124d
126d
128d
86d
74d
70d
78d
76d
66d
68d
80d
112d
122d
118d
114d
102d
100d
108d
110d
106d
78a
86a
120d
94a
6
6
5
5
120b
106b
108b
100b
66b
76b
68b
80b
70b
74b
78b
86b
102b
114b
118b
122b
110b
128b
126b
124b
104b
98b
130b
116b
96b
88b
92b
72b
90b
84b
82b
94b

FIG. 2B

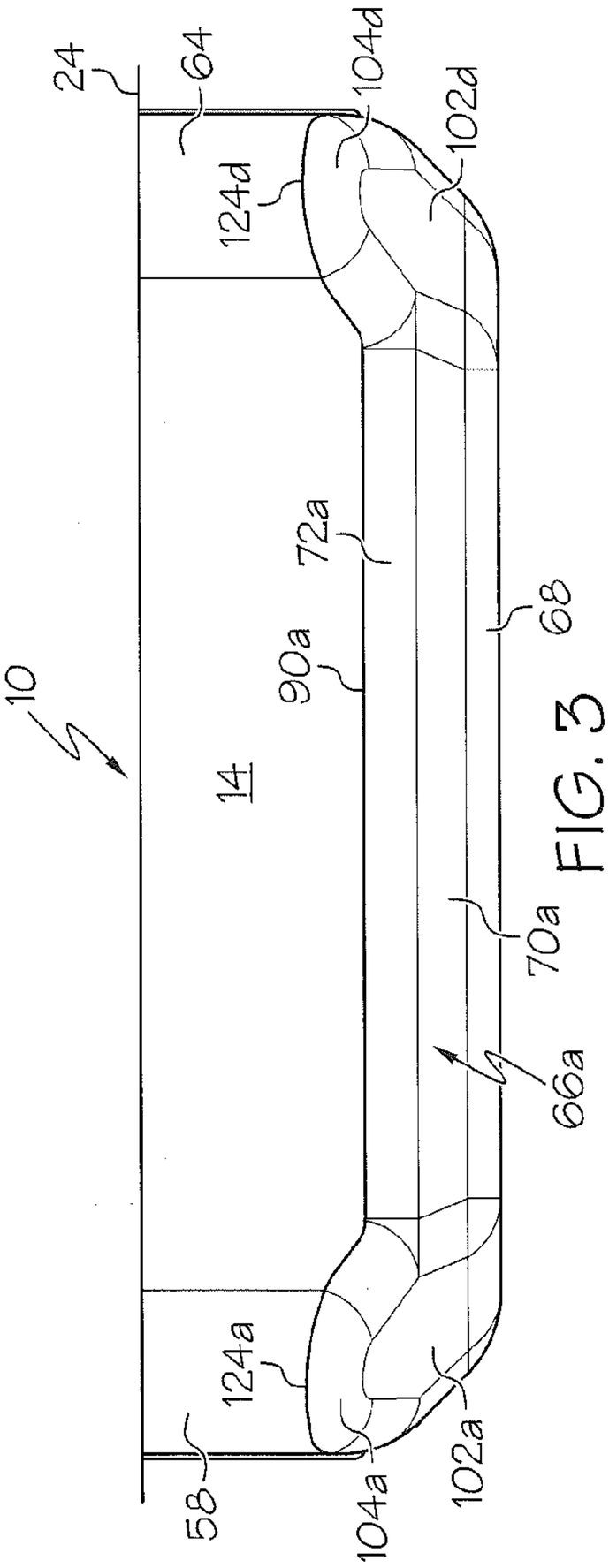

10
14
24
64
104d
102d
124d
72a
90a
68
70a
66a
58
124a
104a
102a

FIG. 3

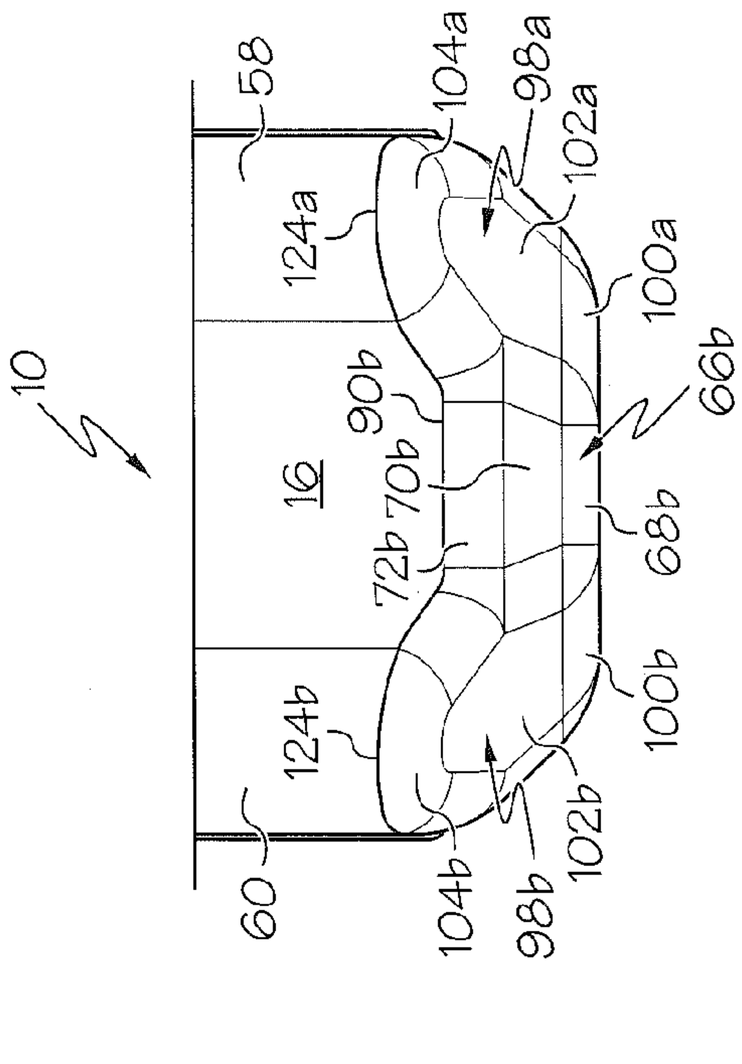

10
16
58
104a
98a
102a
124a
100a
90b
66b
72b
70b
68b
124b
100b
60
104b
98b
102b

FIG. 4

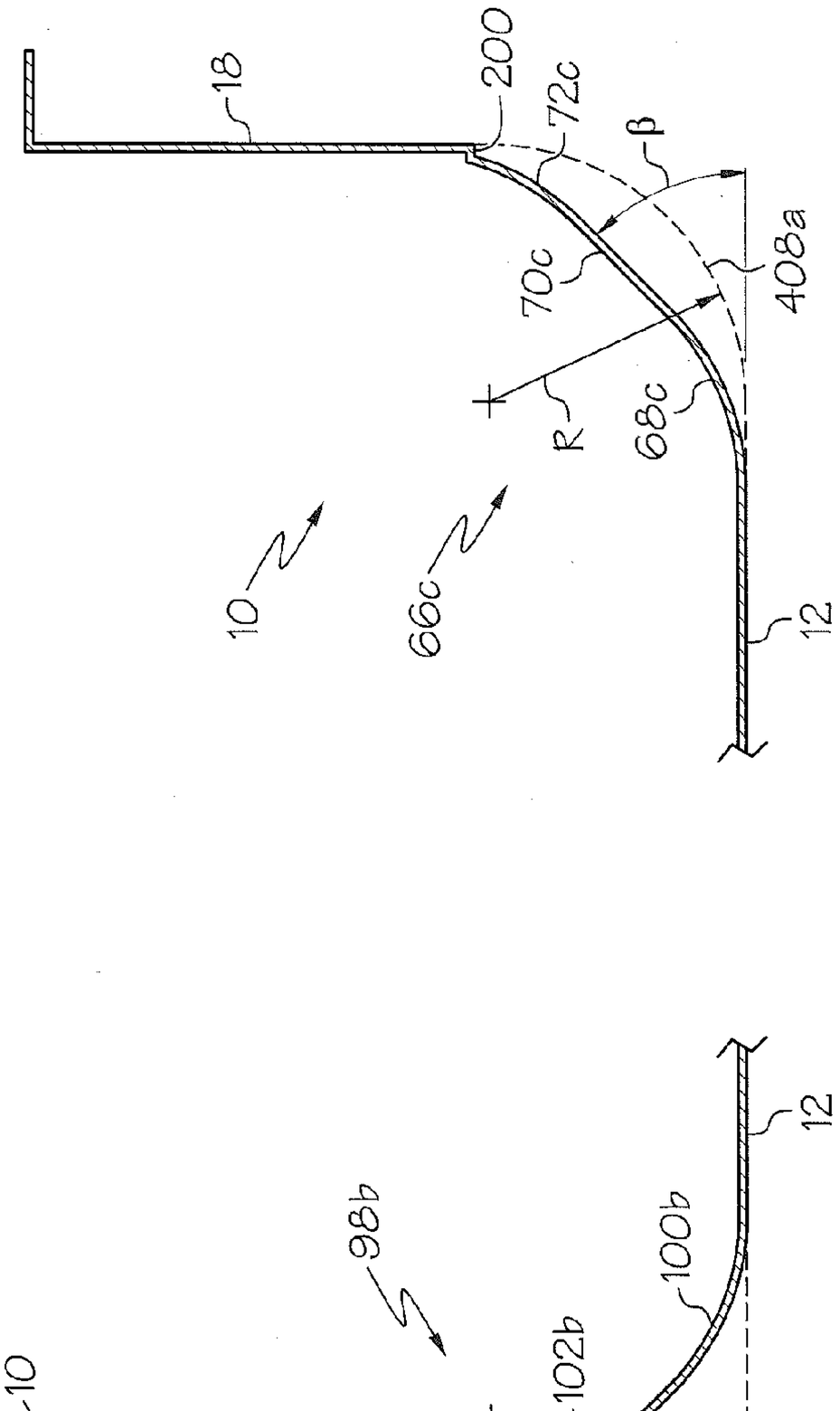


FIG. 6A

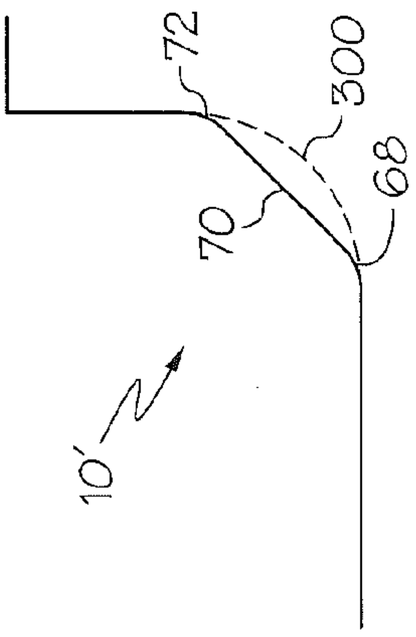


FIG. 6B

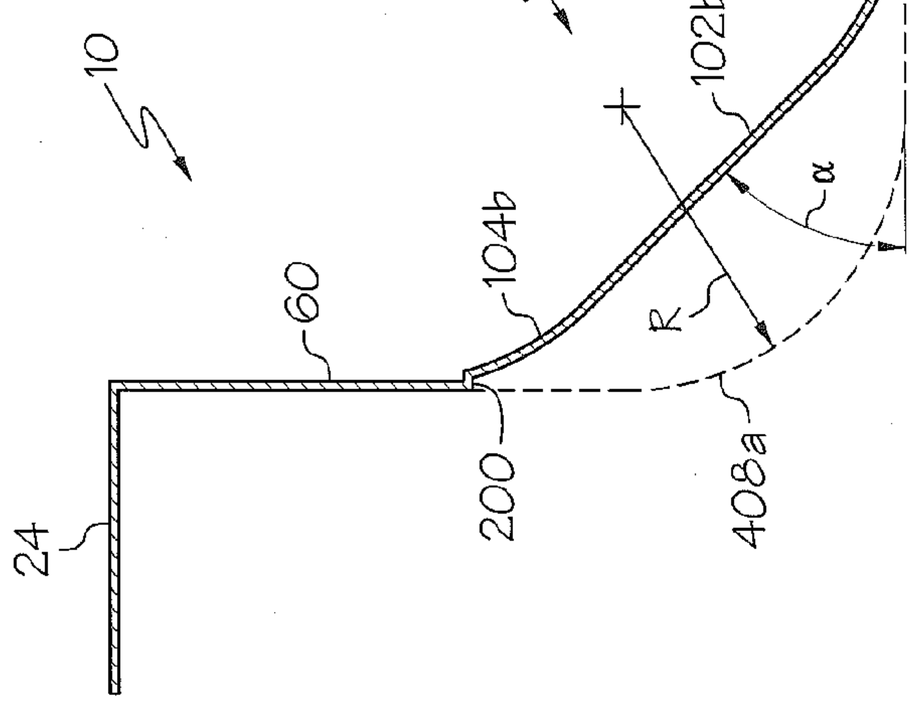


FIG. 5

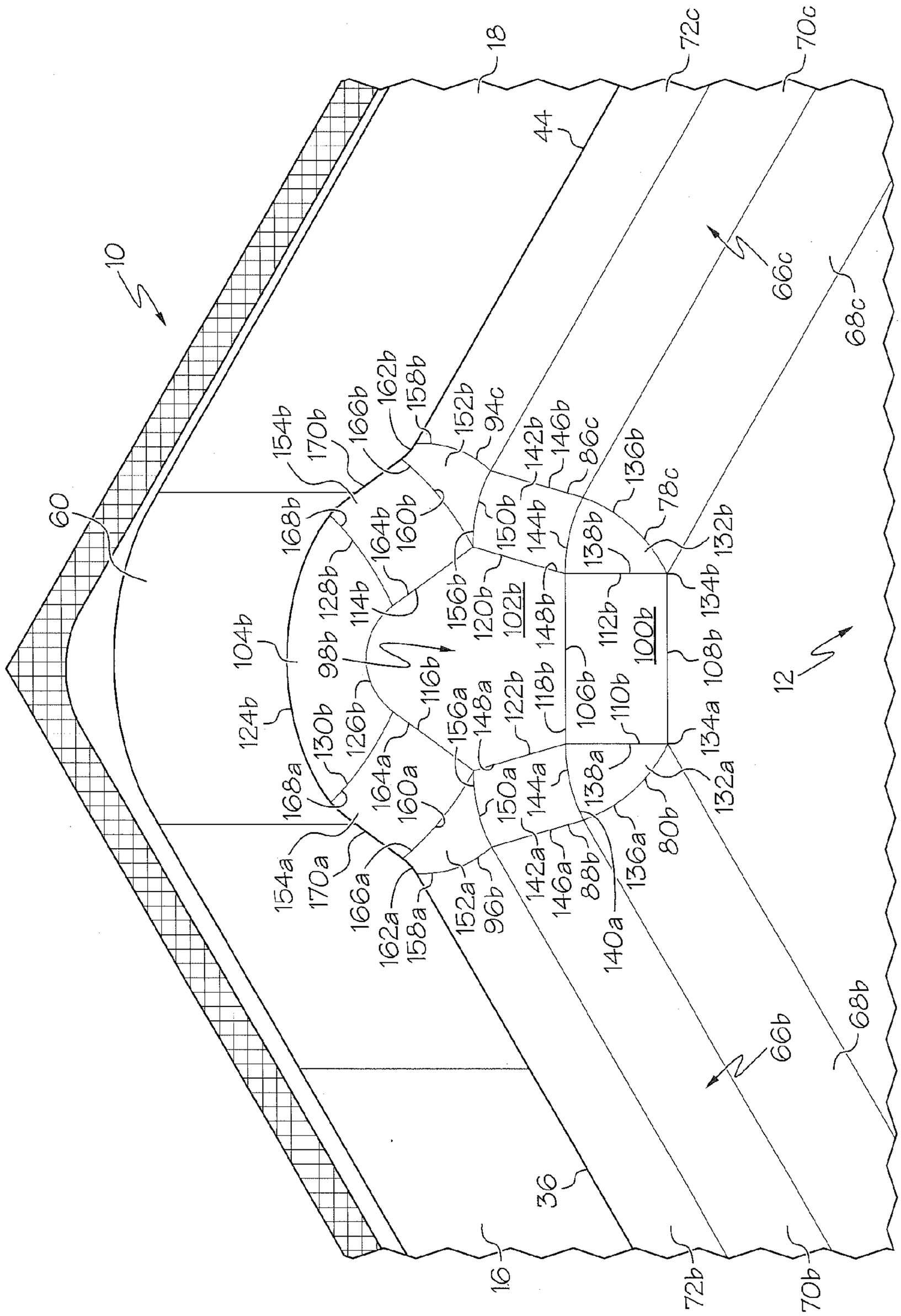

10
18
72c
70c
44
66c
68c
60
104b
124b
168b
154b
170b
166b
162b
158b
152b
94c
142b
146b
86c
136b
78c
128b
98b
114b
164b
160b
156b
150b
144b
138b
132b
120b
102b
148b
112b
134b
108b
100b
116b
130b
126b
156a
148a
122b
118b
106b
110b
134a
168a
164a
160a
150a
144a
138a
132a
154a
170a
166a
162a
158a
152a
96b
142a
146a
88b
140a
136a
80b
12
66b
68b
36
16
72b
70b

FIG. 7

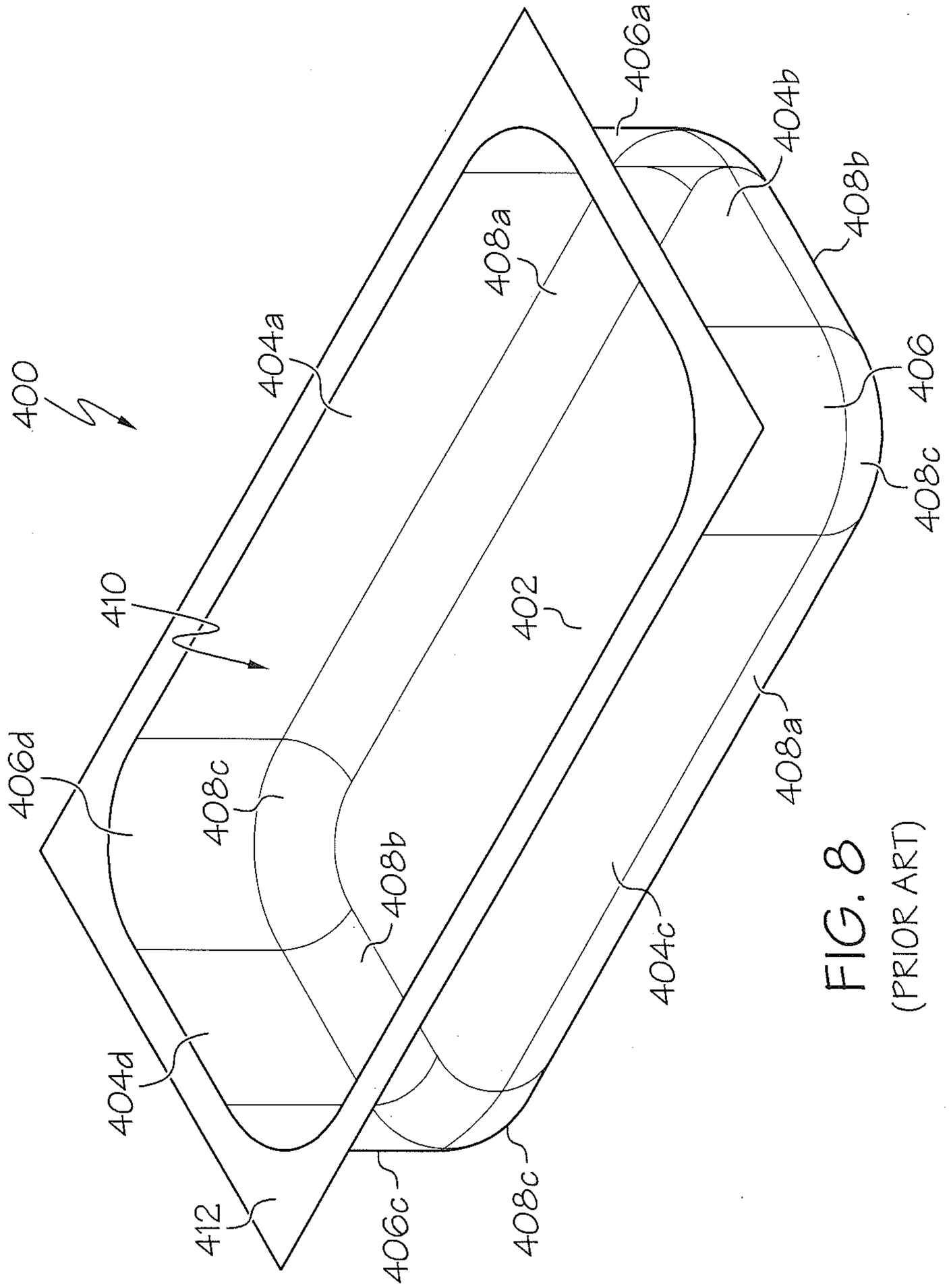


FIG. 8
(PRIOR ART)

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 **404***a*, **404***b*, **404***c* and **404***d*; four curved corner transitions **406***a*, **406***b*, **406***c*, and **406***d*; and three different curved transition sections **408***a*, **408***b* and **408***c* which comprise the transition between the base **402**, the sides **404***a-d* and the corners **406***a-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 **408***a-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 **408***a-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 way from and substantially perpendicular to the bottom and four curved corner sidewalls disposed between the four sidewalls. The package may be thermoformed 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. **6**A is a section view of the package of FIG. **2** cut along the line **6-6**;

[0019] FIG. **6**B is a section view of an alternative embodiment of the section of FIG. **6**A 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 **66***a*, **66***b*, **66***c*, and **66***d* comprises at least a first section **68***a-d*, a second section **70***a-d*, and a third section **72***a-d*. Second sections **70***a-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 **68***a-d* are curved transition sections that provide the transition from bottom **12** to second sections **70***a-d*. Third sections **72***a-d* may also be curved transition sections that transition from second section **70***a-d* to an adjacent sidewall **14**, **16**, **18**, or **20**. As shown in FIG. **2**, each first section **68***a-d* respectively includes a top side **74***a-d*, a bottom side **76***a-d*, a first side **78***a-d* and a second side **80***a-d*. Each second section **70***a-d* respectively includes a top side **82***a-d*, a bottom side **84***a-d*, a first side **86***a-d* and a second side **88***a-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 **72***a-d* respectively includes a top side **90***a-d*, a bottom side **92***a-d*, a first side **94***a-d* and a second side **96***a-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 **90***a* of third section **72***a* intersects with the adjacent sidewall **14** for each transition. As shown in FIG. **4**, top side **90***b* of third section **72***b* intersects with sidewall **16**. Similarly, top sides **90***c-d* of third sections **72***c-d* will intersect with sidewalls **18**, and **20** respectively.

[0029] Now turning back to FIG. **2**, the bottom-to-corner transitions **98***a*, **98***b*, **98***c*, and **98***d* respectfully comprise at least a first section **100***a-d*, a second section **102***a-d*, and a third section **104***a-d*. Each first section **100***a-d* respectively includes a top side **106***a-d*, a bottom side **108***a-d*, a first side **110***a-d* and a second side **112***a-d*. Each second section **102***a-d* respectively includes a first inclined top side **114***a-d*, a second inclined top side **116***a-d*, a bottom side **118***a-d*, a first side **120***a-d* and a second side **122***a-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 **104***a-d* respectively includes a curved top side **124***a-d*, a curved bottom side **126***a-d*, a first side **128***a-d*, and a second side **130***a-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 **124***a* and **124***d* of third section **104***a* and **104***d* intersect with the adjacent corner sidewalls **58** and **64** as shown. Similarly (although not shown in FIG. **3**), top sides **124***b* and **124***c* of third sections **104***b* and **104***c* 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 **66***b* and **66***c* to bottom-to-corner transition **98***b*. 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 **132***a* and **132***b* transitions between first portions **68***b* and **68***c* of transitions **66***b* and **66***c* with first section **100***b* of corner transition **98***b*. First transition elements **132***a* and **132***b* respectively include a first side **136***a* and **136***b* and a second side **138***a* and **138***b* that respectively share a common intersection point **134***a* and **134***b*. First transition elements **132***a* and **132***b* have a respective top side

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

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

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

[0034] Transition element **154***a* and **154***b* include a bottom side **164***a* and **164***b*, a first side **166***a* and **166***b*, a second side **168***a* and *b*, and a top side **170***a* and **170***b*. Bottom side **164***a* of transition element **154***a* intersects second top inclined side **116***b* of second corner section **102***b*. Bottom side **164***b* of transition element **154***b* intersects first inclined side **114***b* of second corner section **102***b*. First side **166***a* and **166***b* respectively intersect with second sides **160***a* and **160***b* of transition elements **142***a* and **142***b*. Second side **168***a* of transition element **154***a* intersects with side **130***b* of third corner section **104***b*. Second side **168***b* of transition element **154***b* intersects with side **128***b* of third corner section **104***b*. Top side **170***a* of transition element **154***a* intersects with a portion of bottom **36** of sidewall **16** and a portion bottom **124***b* of corner sidewall **60**. Similarly, top side **170***b* of transition element **154***b* intersects with a portion of bottom **44** of sidewall **18** and a portion of bottom **124***b* of corner sidewall **60**. The profile of transition elements **154***a* and **154***b* have a curved profile and transition elements **152***a* and **152***b* 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 **98***b* includes second corner section **102***b* 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 **100***b* is curved to transition between bottom **12** and second corner section **102***b*. Third corner section **104***b* also curves to transition between corner sidewall **60** and second corner section **102***b*. In one embodiment, second corner section **102***b* is substantially linear and constitutes a chord member that is tangential to both first corner section **100***b* and third corner section **104***b*. The profile of bottom-to-corner transition **98***b* compared with a typical single-element radius transition **408***c* (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. **6**B. The transition **104***b* from corner section **102***b* 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. **6**A, bottom-to-side transition **66***c* includes second section **70***c* 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 **68***c* is curved to transition between bottom **12** and second section **70***c*. Third corner section **72***c* also curves to transition between sidewall **18** and second section **70***c*. In one embodiment, second section **70***c* is substantially linear and constitutes a chord member that is tangential to one or both of first section **68***c* and third section **72***c*. The profile of bottom-to-side transition **66***c* compared with a typical single-element radius transition **408***a* (shown in broken lines) having a radius R is shown. The transition **72***c* from corner section **70***c* 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. **6**B illustrates an alternative embodiment packaging **10'**, which includes an alternative transition configuration than that shown in FIG. **6**A and described above. FIG. **6**B 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. **6**A. Similarly, the proposed three-stage non-tangential bottom-to-side transition is shown in comparison to a typical prior art single element curved transition **408***a* 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.

* * * * *