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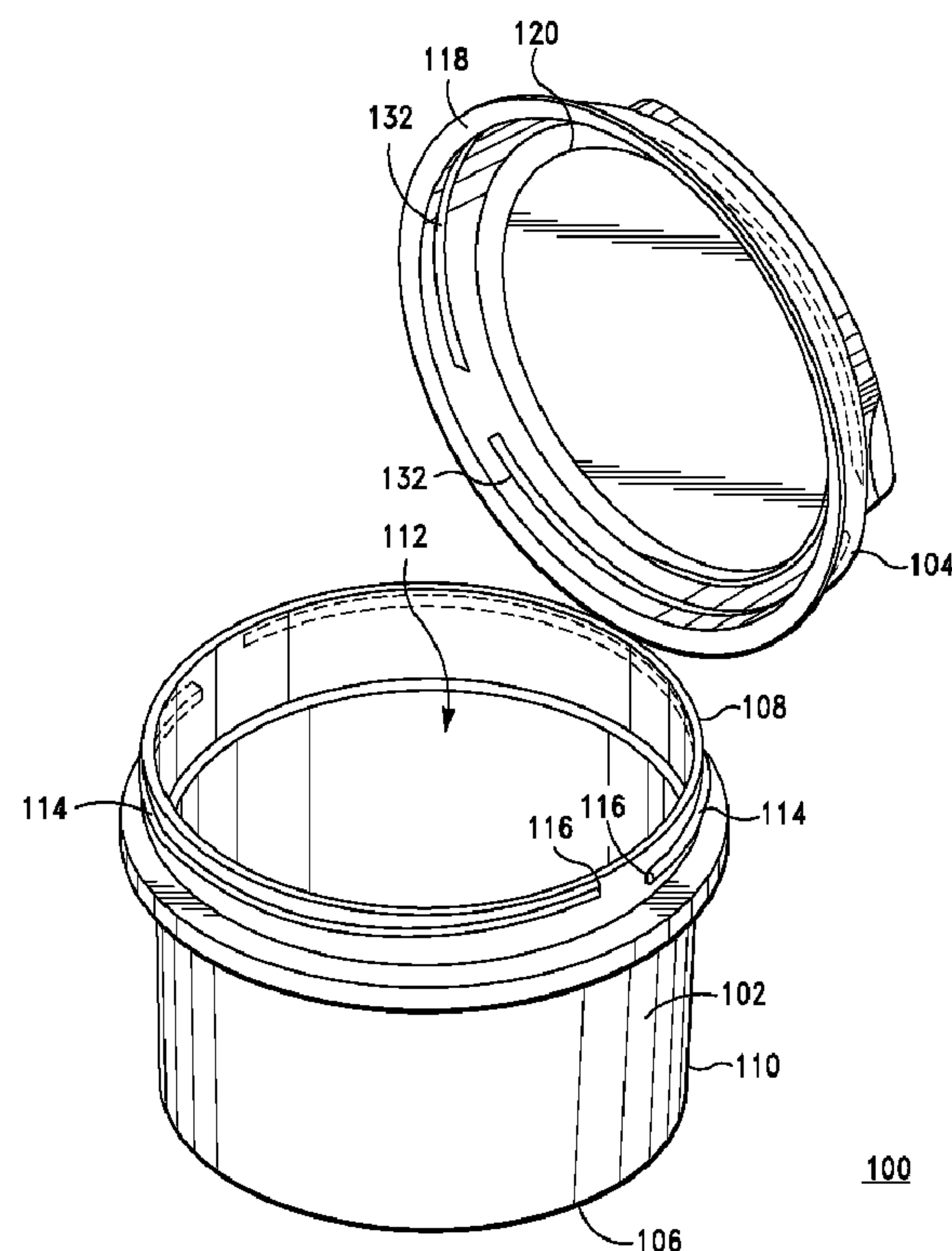


FIG. 1

(57) Abrégé/Abstract:

A spin lock container comprising a container member having a bottom, an upper annular rim and a substantially continuous side wall extending from the bottom and terminating at the rim, the bottom and side wall defining a first member cavity, the rim including

(57) **Abrégé(suite)/Abstract(continued):**

a first member skirt having a plurality of first threads, the plurality of first threads having substantially equidistant engagement points; and a closure member having a peripheral sealing portion, the sealing portion including a sealing liner and a skirt having a plurality of second threads adapted and positioned to cooperate with the first threads, wherein sealable engagement of the container member and closure member is effectuated when the first and second threads are fully aligned.

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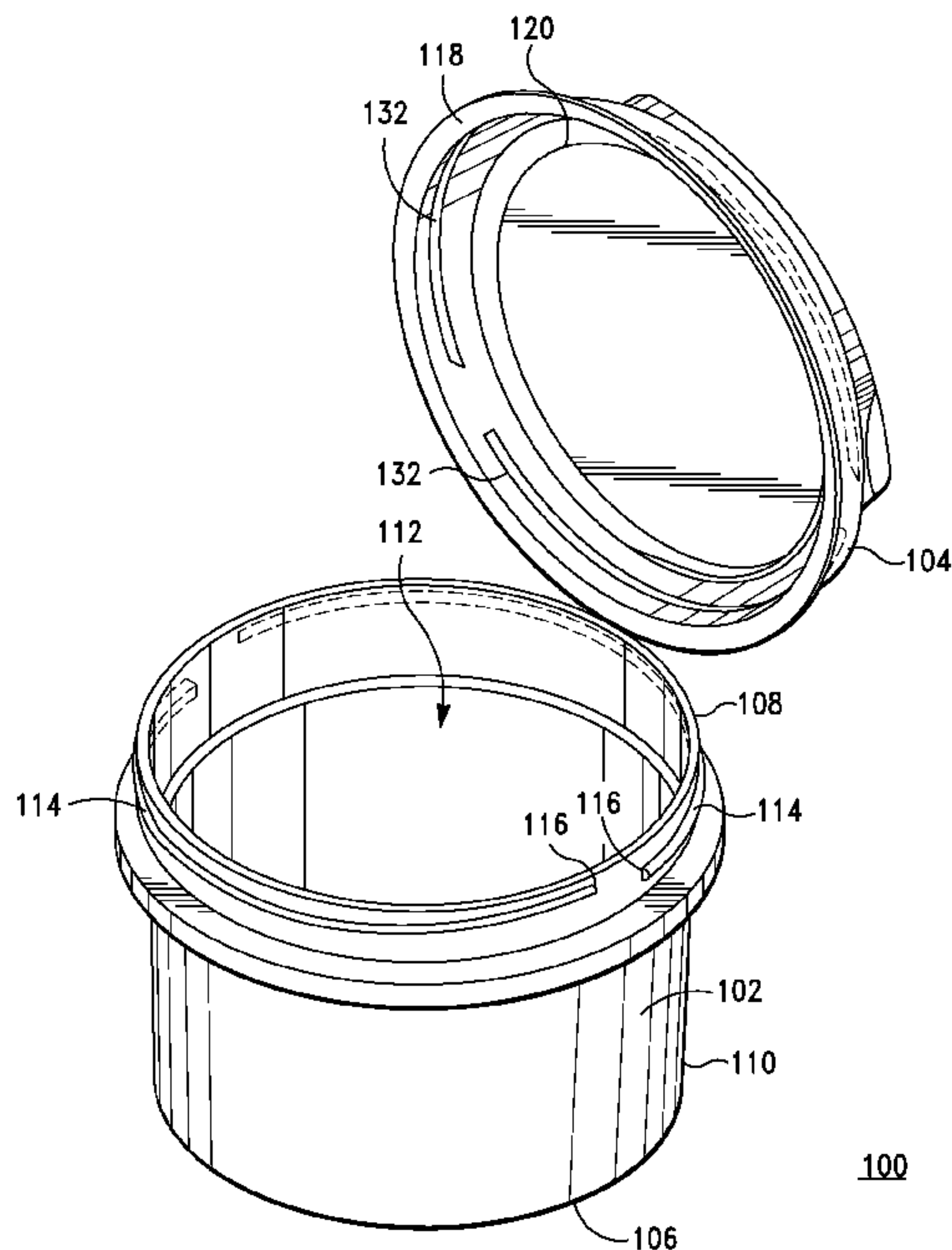
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[Continued on next page]

(54) Title: A SPIN LOCK CONTAINER HAVING AN INNER SEAL

**FIG. 1**

(57) Abstract: A spin lock container comprising a container member having a bottom, an upper annular rim and a substantially continuous side wall extending from the bottom and terminating at the rim, the bottom and side wall defining a first member cavity, the rim including a first member skirt having a plurality of first threads, the plurality of first threads having substantially equidistant engagement points; and a closure member having a peripheral sealing portion, the sealing portion including a sealing liner and a skirt having a plurality of second threads adapted and positioned to cooperate with the first threads, wherein sealable engagement of the container member and closure member is effectuated when the first and second threads are fully aligned.

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A SPIN LOCK CONTAINER HAVING AN INNER SEAL

FIELD OF THE INVENTION

[0001] The present invention relates generally to a plastic reclosable containers, and to plastic reclosable containers having a cover and a base, where the cover and base are rotationally sealingly engaged together form a sealed storage area.

BACKGROUND OF THE INVENTION

[0002] Rigid, thermoplastic food containers are generally known. These containers are substantially airtight when fully closed. Numerous types of bowl and lid assemblies and means for effecting sealable engagement of a lid on a bowl have been devised. Illustrative are the containers and engagement means disclosed in U.S. Pat. 6,170,696. One type of container is a spin lock container as described in U.S. Pat. 7,523,839, where the cover is secured to the base with a rotational threaded mechanism.

[0003] The present invention has as a general aim to provide containers that solve the problems of the current food containers, which lack the ability to controllably ensure complete sealing of the container. The present invention substantially reduces or eliminates the disadvantages and drawbacks associated with prior art thermoformed container bowl and lid assemblies. As discussed in detail herein, the spin lock container of the invention generally includes engagement means comprising a bowl having a plurality of threads disposed proximate the rim of the container bowl and a lid having a matching, but inverted, plurality of cooperating threads formed on the lid inner skirt. The noted engagement means also includes sealing liner that allows a consumer to confirm that the container is fully sealed.

SUMMARY OF THE INVENTION

[0004] The spin lock container in accordance with one embodiment of the invention comprises a container member having a bottom, an upper annular rim and a substantially continuous side wall extending from the bottom and terminating at the rim, the bottom and the side wall defining a first member cavity, the rim having a

plurality of first threads, wherein the plurality of first threads are discontinuous around the container member, the plurality of first threads comprises at least two threads and the plurality of first threads has substantially equidistant engagement points, and a closure member having a peripheral sealing portion with a circumference, said sealing portion including an inner skirt portion having a substantially vertical outer wall, a connecting connecting bead, and an outer skirt portion having a substantially vertical inner wall and connecting to the inner skirt portion at the connecting bead, and a sealing liner of different material than the inner skirt portion and the outer skirt portion wherein the sealing liner is situated between the inner skirt portion outer wall and the outer skirt portion inner wall, the outer skirt portion inner wall having a plurality of second threads adapted and positioned to cooperate with the first threads, wherein the plurality of second threads are discontinuous around the closure member and the plurality of second threads comprises at least two threads, wherein sealable engagement of the container member and the closure member is effectuated when the sealing liner is in contact with the rim over a substantial length thereof.

[0005] The spin lock container in accordance with one embodiment of the invention comprises a container member having a bottom, an upper annular rim and a substantially continuous side wall extending from the bottom and terminating at the rim, the bottom and the side wall defining a first member cavity, the rim having a threaded closure means, and a closure member having a peripheral sealing portion with a circumference, said sealing portion including an inner skirt portion having a substantially vertical outer wall, a connecting connecting bead, and an outer skirt portion having a substantially vertical inner wall and connecting to the inner skirt portion at the connecting bead, and a sealing liner of different material than the inner skirt portion and the outer skirt portion wherein the sealing liner is situated between the inner skirt portion outer wall and the outer skirt portion inner wall, the outer skirt portion inner wall having a threaded closure means, wherein sealable engagement of the container member and the closure member is effectuated when the sealing liner is in contact with the rim over a substantial length thereof.

[0006] The spin lock container in accordance with one embodiment of the invention comprises a container member having a bottom, an upper annular rim and a

substantially continuous side wall extending from the bottom and terminating at the rim, the bottom and the side wall defining a first member cavity, the rim having a plurality of first threads and a sealing liner of different material than the rim, wherein the plurality of first threads are discontinuous around the container member, the plurality of first threads comprises at least two threads and the plurality of first threads has substantially equidistant engagement points, and a closure member having a peripheral sealing portion with a circumference, said sealing portion including an inner skirt portion having a substantially vertical outer wall, a connecting connecting bead, and an outer skirt portion having a substantially vertical inner wall and connecting to the inner skirt portion at the connecting bead, the outer skirt portion inner wall having a plurality of second threads adapted and positioned to cooperate with the first threads, wherein the plurality of second threads are discontinuous around the closure member and the plurality of second threads comprises at least two threads, wherein sealable engagement of the container member and the closure member is effectuated when the sealing liner is in contact with the rim over a substantial length thereof.

[0007] The spin lock container in accordance with one embodiment of the invention comprises a container member as described in U.S. Pat. 7,523,839, and incorporated in its entirety herein. The container has a bottom, an upper annular rim and a substantially continuous side wall extending from the bottom and terminating at the rim, the bottom and side wall defining a first member cavity, the rim including a first member skirt having a plurality of first threads, the plurality of first threads having substantially equidistant engagement points; and a closure member having a peripheral sealing portion, the sealing portion including a sealing liner and a skirt having a plurality of second threads adapted and positioned to cooperate with the first threads and including a seal liner, wherein sealable engagement of the container member and closure member is effectuated when the first and second threads are fully aligned.

[0008] In an alternative embodiment, each of the plurality of first threads comprises a raised projection that projects outwardly from the container member skirt and each of the plurality of second threads comprises a guide adapted to receive one of the plurality of threads. In another embodiment of the invention, a closure system for

closing an opening in a container is provided, the closure system comprising a substantially U-shaped circumferentially extending guiding channel defined by an inner wall and an outer wall that are located and configured to receive between them the sealing member of the container, the sealing member having a corresponding configuration as the guiding channel and including an inner wall and an outer wall and a sealing liner, the guiding channel outer wall including a plurality of first threads having substantially equidistant engagement points, the sealing member outer wall having a plurality of second threads adapted and positioned to cooperate with the first threads. In another embodiment of the invention, the closure system comprises a substantially U-shaped circumferentially extending guiding channel having a sealing liner attached to the interior of the guiding channel, wherein the interior of the guiding channel is defined by an inner wall and an outer wall that are located and configured to receive between them the sealing member of a container, the sealing member having a corresponding configuration as the guiding channel and including an inner wall and an outer wall, the guiding channel inner wall including a plurality of first threads having substantially equidistant engagement points, the sealing member inner wall having a plurality of second threads adapted and positioned to cooperate with the first threads and the sealing liner.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009] Further features and advantages will become apparent from the following and more particular description of the preferred embodiments of the invention, as illustrated in the accompanying drawings, and in which like referenced characters generally refer to the same parts or elements throughout the views, and in which:

[0010] FIG. 1 is an exploded view of a container, according to the invention;

[0011] FIG. 2 is a cross-sectional view of the container shown in FIG. 1;

[0012] FIG. 3 is a cross-sectional view of a container of the invention;

[0013] FIG. 4 is a cross-sectional view of a container of the invention;

[0014] FIG. 5 is a cross-sectional view of a container of the invention;

[0015] FIG. 6 is a cross-sectional view of a container of the invention;

[0016] FIG. 7 is a cross-sectional view of a container of the invention;

[0017] FIG. 8 is a cross-sectional view of a container of the invention;

[0018] FIG. 9 is a exploded view of a container of the invention;

[0019] FIG. 10 is a partial front plane, sectioned view of the container shown in FIG. 9;

[0020] FIG. 11 is a cross-sectional view of a container of the invention;

[0021] FIG. 12 is a cross-sectional view of a container of the invention;

[0022] FIG. 13 is a cross-sectional view of a container of the invention; and

[0023] FIG. 14 is a cross-sectional view of a container of the invention.

DETAILED DESCRIPTION OF THE INVENTION

[0024] Reference will now be made to the drawings wherein like numerals refer to like parts throughout. For ease of description, the components of this invention are described in the normal (upright) operating position, and terms such as upper, lower, horizontal, etc., are used with reference to this position. It will be understood, however, that the components embodying this invention may be manufactured, stored, transported, used, and sold in an orientation other than the position described.

[0025] Figures illustrating the components of this invention show some conventional mechanical elements that are known and that will be recognized by one skilled in the art. The detailed descriptions of such elements are not necessary to an understanding of the invention, and accordingly, are herein presented only to the degree necessary to facilitate an understanding of the novel features of the present invention.

[0026] All publications, patents and patent applications cited herein, whether *supra* or *infra*, are hereby incorporated by reference in their entirety to the same extent as if each individual publication, patent or patent application was specifically and individually indicated to be incorporated by reference.

[0027] As used herein and in the claims, the term "comprising" is inclusive or open-ended and does not exclude additional unrecited elements, compositional components, or method steps. Accordingly, the term "comprising" encompasses the more restrictive terms "consisting essentially of" and "consisting of".

[0028] It must be noted that, as used in this specification and the appended claims, the singular forms "a," "an" and "the" include plural referents unless the content clearly dictates otherwise. Thus, for example, reference to a "surfactant" includes two or more such surfactants.

[0029] Unless defined otherwise, all technical and scientific terms used herein have the same meaning as commonly understood by one of ordinary skill in the art to which the invention pertains. Although a number of methods and materials similar or equivalent to those described herein can be used in the practice of the present invention, the preferred materials and methods are described herein. Recitation of ranges of values herein are merely intended to serve as a shorthand method of referring individually to each separate value falling within the range, unless otherwise indicated herein, and each separate value is incorporated into the specification as if it were individually recited herein. All methods described herein can be performed in any suitable order unless otherwise indicated herein or otherwise clearly contradicted by context. The use of any and all examples, or exemplary language (e.g., “such as”) provided herein, is intended merely to better illuminate the invention and does not pose a limitation on the scope of the invention unless otherwise indicated.

[0030] The term “container”, as used herein, is meant to mean and include any storage container for storing food in a refrigerator. A container may be made of any suitable material, depending upon the product therein. For example, a container may be made of plastic.

[0031] Referring now to Fig. 1, there is shown one embodiment of the spin lock container, designated generally 100. As illustrated in Fig. 1, the container 100 includes a container member 102 and a selectively detachable, cylindrical closure member 104. The container 100 has a bottom 106, an upper annular rim 108 and a substantially continuous side wall 110 extending from the bottom 106 and terminating at the rim 108. The bottom 106 and the side wall 110 define a cavity 112. The rim 108 has a plurality of threads 114 that have substantially equidistant engagement points 116. As shown in Figs. 1 and 2, the closure member 104 has a peripheral and circumferential sealing member 118 where the sealing member 118 has an inner skirt portion 120 having a substantially vertical outer wall 122. The sealing member 118 has a connecting bead 124 and an outer skirt portion 126 having a substantially vertical inner wall 128 and connecting to the inner skirt portion 120 at the connecting bead 124. A sealing liner 130 is situated between the inner skirt portion outer wall 122 and the outer skirt portion inner wall 128 along the connecting bead 124 and the sealing liner 130 is attached around the entire circumference of the peripheral sealing

member 118. The outer skirt portion inner wall 128 has a plurality of threads 132 that are positioned to cooperate with the plurality of threads 114 of the rim 108. When the container member 102 and the closure member 104 are engaged with the treads 132 and 114, the sealing liner 130 is in contact with the rim 108 over a substantial length of the rim 108.

[0032] Referring now to the spin lock container 300 of Fig. 3, the closure member 104 has a peripheral and circumferential sealing member 118 where the sealing member 118 has an inner skirt portion 120 having a substantially vertical outer wall 122. The sealing member 118 has a connecting bead 124 and an outer skirt portion 126 having a substantially vertical inner wall 128 and connecting to the inner skirt portion 120 at the connecting bead 124. A sealing liner 130 is situated on the inner skirt portion outer wall 122. The outer skirt portion inner wall 128 has a plurality of threads 132 that are positioned to cooperate with the plurality of threads 114 of the rim 108. When the container member 102 and the closure member 104 are engaged with the treads 132 and 114, the sealing liner 130 is in contact with the rim 108 over a substantial length of the rim 108.

[0033] Referring now to spin lock container 400 of Fig. 4, the closure member 104 has a peripheral and circumferential sealing member 118 where the sealing member 118 has an inner skirt portion 120 having a substantially vertical outer wall 122. The sealing member 118 has a connecting bead 124 and an outer skirt portion 126 having a substantially vertical inner wall 128 and connecting to the inner skirt portion 120 at the connecting bead 124. A sealing liner 130 is situated on the inner skirt portion outer wall 122 and attached to the connecting bead 124. The outer skirt portion inner wall 128 has a plurality of threads 132 that are positioned to cooperate with the plurality of threads 114 of the rim 108. When the container member 102 and the closure member 104 are engaged with the treads 132 and 114, the sealing liner 130 is in contact with the rim 108 over a substantial length of the rim 108.

[0034] Referring now to spin lock container 500 of Fig. 5, the closure member 104 has a peripheral and circumferential sealing member 118 where the sealing member 118 has an inner skirt portion 120 having a substantially vertical outer wall 122. The sealing member 118 has a connecting bead 124 and an outer skirt portion 126 having a substantially vertical inner wall 128 and connecting to the inner skirt portion 120 at

the connecting bead 124. A sealing liner 130 is attached to the connecting bead 124 only. The outer skirt portion inner wall 128 has a plurality of threads 132 that are positioned to cooperate with the plurality of threads 114 of the rim 108. When the container member 102 and the closure member 104 are engaged with the treads 132 and 114, the sealing liner 130 is in contact with the rim 108 over a substantial length of the rim 108.

[0035] Referring now to spin lock container 600 of Fig. 6, the closure member 104 has a peripheral and circumferential sealing member 118 where the sealing member 118 has an inner skirt portion 120 having a substantially vertical outer wall 122. The sealing member 118 has a connecting bead 124 and an outer skirt portion 126 having a substantially vertical inner wall 128 and connecting to the inner skirt portion 120 at the connecting bead 124. A sealing liner 130 is situated on the outer skirt portion inner wall 128 and attached to the connecting bead 124. The outer skirt portion inner wall 128 has a plurality of threads 132 that are positioned to cooperate with the plurality of threads 114 of the rim 108. When the container member 102 and the closure member 104 are engaged with the treads 132 and 114, the sealing liner 130 is in contact with the rim 108 over a substantial length of the rim 108.

[0036] Referring now to spin lock container 700 of Fig. 7, the closure member 104 has a peripheral and circumferential sealing member 118 where the sealing member 118 has an inner skirt portion 120 having a substantially vertical outer wall 122. The sealing member 118 has a connecting bead 124 and an outer skirt portion 126 having a substantially vertical inner wall 128 and connecting to the inner skirt portion 120 at the connecting bead 124. A sealing liner 130 is situated on the outer skirt portion inner wall 128 only. The outer skirt portion inner wall 128 has a plurality of threads 132 that are positioned to cooperate with the plurality of threads 114 of the rim 108. When the container member 102 and the closure member 104 are engaged with the treads 132 and 114, the sealing liner 130 is in contact with the rim 108 over a substantial length of the rim 108.

[0037] Referring now to spin lock container 800 of Fig. 8, the closure member 104 has a peripheral and circumferential sealing member 118 where the sealing member 118 has an inner skirt portion 120 having a substantially vertical outer wall 122. The sealing member 118 has a connecting bead 124 and an outer skirt portion 126 having

a substantially vertical inner wall 128 and connecting to the inner skirt portion 120 at the connecting bead 124. A sealing liner 130 is situated on the top of the rim 108. The outer skirt portion inner wall 128 has a plurality of threads 132 that are positioned to cooperate with the plurality of threads 114 of the rim 108. When the container member 102 and the closure member 104 are engaged with the treads 132 and 114, the sealing liner 130 is in contact with the rim 108 over a substantial length of the rim 108.

[0038] Fig. 9 shows a container 1000 of the invention comprising a container member 1002 having a bottom 1006, an upper annular rim 1008 and a substantially continuous side wall 1010 extending from said bottom 1006 and terminating at said rim 1008, said bottom 1006 and side wall 1010 defining a first member cavity 1012, said rim 1008 including an inner wall 1030 and an outer skirt 1032, said skirt 1032 having a plurality of first threads 1034, wherein said plurality of first threads 1034 are discontinuous around the container member 1002, said plurality of first threads 1034 comprises at least two threads and said plurality of first threads has substantially equidistant engagement points 1036, said inner wall 1030 of said container member 1002 having a length extending in a substantially vertically downward direction sufficient to define a first sealing surface 1038, and a closure member 1040 having a peripheral sealing portion 1042, said sealing portion 1042 including an inner wall 1044 and an outer skirt 1046, said skirt 1046 having a plurality of second threads 1048 adapted and positioned to cooperate with said first threads 1034, wherein said plurality of second threads 1048 are discontinuous around the closure member 1040 and said plurality of second threads 1048 comprises at least two threads, said inner wall 1044 of said closure member 1040 having a length extending in a substantially vertically downward direction sufficient to define a second sealing surface 1050, wherein a sealing liner 1052 (shown in Fig. 10) is attached between said closure inner wall 1044 and said closure skirt 1046, wherein sealable engagement of said container member 1002 and closure member 1040 is effectuated when said first threads 1034 and second threads 1048 are in a sealing position with said first sealing surface 1038 in contact with said second sealing surface 1050 over a substantial length thereof, and said rim 1008 is sealingly engaged with said sealing liner 1052.

[0039] Fig. 10 shows a partial cross-sectional view of the container 1000 comprising a container member 1002 having an upper annular rim 1008 and a substantially continuous side wall 1010 terminating at said rim, said rim 1008 including an inner wall 1030 and an outer skirt 1032, said skirt 1032 having a plurality of first threads 1034, said inner wall 1030 of said container member 1002 having a length extending in a substantially vertically downward direction sufficient to define a first sealing surface 1038, and a closure member 1040 having a peripheral sealing portion 1042, said sealing portion 1042 including an inner wall 1044 and an outer skirt 1046, said skirt 1046 having a plurality of second threads 1048 adapted and positioned to cooperate with said first threads 1034, said inner wall 1044 of said closure member having a length extending in a substantially vertically downward direction sufficient to define a second sealing surface 1050, wherein a sealing liner 1052 is attached between said closure inner wall 1044 and said closure skirt 1046, wherein sealable engagement of said container member 1002 and closure member 1040 is effectuated when said first threads 1034 and second threads 1048 are in a sealing position with said first sealing surface 1038 in contact with said second sealing surface 1050 over a substantial length thereof, and said rim 1008 is sealingly engaged with said sealing liner 1052.

[0040] Fig. 11 shows a container 1100 comprising a container member 1002 having an upper annular rim 1008 and a substantially continuous side wall 1010 terminating at said rim 1008, said rim 1008 including an inner wall 1030 and an outer skirt 1032, said skirt 1032 having a plurality of first threads 1034, said inner wall 1030 of said container member 1002 having a length extending in a substantially vertically downward direction sufficient to define a first sealing surface 1038, and a closure member 1040 having a peripheral sealing portion 1042, said sealing portion 1042 including an inner wall 1044 and an outer skirt 1046, said skirt 1046 having a plurality of second threads 1048 adapted and positioned to cooperate with said first threads 1034, said inner wall 1044 of said closure member 1040 having a length extending in a substantially vertically downward direction sufficient to define a second sealing surface 1050, wherein a sealing liner 1054 is attached to said closure inner wall 1044, wherein sealable engagement of said container member 1002 and closure member 1040 is effectuated when said first threads 1034 and second threads

1048 are in a sealing position with said first sealing surface 1038 in contact with said second sealing surface 1050 over a substantial length thereof, and said rim 1008 is sealingly engaged with said sealing liner 1054.

[0041] Fig. 12 shows a container 1200 comprising a container member 1002 having an upper annular rim 1008 and a substantially continuous side wall 1010 terminating at said rim 1008, said rim 1008 including an inner wall 1030 and an outer skirt 1032, said skirt 1032 having a plurality of first threads 1034 said inner wall 1030 of said container member 1002 having a length extending in a substantially vertically downward direction sufficient to define a first sealing surface 1038, and a closure member 1040 having a peripheral sealing portion 1042, said sealing portion 1042 including an inner wall 1044 and an outer skirt 1046, said skirt 1046 having a plurality of second threads 1048 adapted and positioned to cooperate with said first threads 1034, said inner wall 1044 of said closure member 1040 having a length extending in a substantially vertically downward direction sufficient to define a second sealing surface 1050, wherein a sealing liner 1056 is attached to said closure skirt 1046, wherein sealable engagement of said container member 1002 and closure member 1040 is effectuated when said first threads 1034 and second threads 1048 are in a sealing position with said first sealing surface 1038 in contact with said second sealing surface 1050 over a substantial length thereof, and said rim 1008 is sealingly engaged with said sealing liner 1056.

[0042] Fig. 13 shows the container 1300 comprising a container member 1002 having an upper annular rim 1008 and a substantially continuous side wall 1010 terminating at said rim 1008, said rim 1008 including an inner wall 1030 and an outer skirt 1032, said skirt 1032 having a plurality of first threads 1034, said inner wall 1030 of said container member 1002 having a length extending in a substantially vertically downward direction sufficient to define a first sealing surface 1038, and a closure member 1040 having a peripheral sealing portion 1042, said sealing portion 1042 including an inner wall 1044 and an outer skirt 1046, said skirt 1046 having a plurality of second threads 1048 adapted and positioned to cooperate with said first threads 1034, said inner wall 1044 of said closure member 1040 having a length extending in a substantially vertically downward direction sufficient to define a second sealing surface 1050, wherein a sealing liner 1058 is between said closure

inner wall 1044 and said closure skirt 1046 but not attached to either, wherein sealable engagement of said container member 1002 and closure member 1040 is effectuated when said first threads 1034 and second threads 1048 are in a sealing position with said first sealing surface 1038 in contact with said second sealing surface 1050 over a substantial length thereof, and said rim 1008 is sealingly engaged with said sealing liner 1058.

[0043] Fig. 14 shows the container 1400 comprising a container member 1002 having an upper annular rim 1008 and a substantially continuous side wall 1010 terminating at said rim 1008, said rim 1008 including an inner wall 1030 and an outer skirt 1032, said skirt 1032 having a plurality of first threads 1034, said inner wall 1030 of said container member 1002 having a length extending in a substantially vertically downward direction sufficient to define a first sealing surface 1038, and a closure member 1040 having a peripheral sealing portion 1042, said sealing portion 1042 including an inner wall 1044 and an outer skirt 1046, said skirt 1046 having a plurality of second threads 1048 adapted and positioned to cooperate with said first threads 1034, said inner wall 1044 of said closure member 1040 having a length extending in a substantially vertically downward direction sufficient to define a second sealing surface 1050, wherein a sealing liner 1060 is attached to the rim 1008, wherein sealable engagement of said container member 1002 and closure member 1040 is effectuated when said first threads 1034 and second threads 1048 are in a sealing position with said first sealing surface 1038 in contact with said second sealing surface 1050 over a substantial length thereof, and said sealing portion 1042 is sealingly engaged with said sealing liner 1060.

[0044] As stated, although the invention is described with respect to a cylindrical bowl and lid assembly, the engagement means of the spin lock container can be employed on various containers having cylindrical openings. Such containers include, by way of example, soda bottles, milk containers, bleach bottles, etc.

[0045] As will be appreciated by one having ordinary skill in the art, numerous suitable materials may be chosen to fabricate the spin lock container of the invention. Preferably, the container comprises polyolefin or like material. The noted material is sufficiently resiliently deformable to facilitate cooperation between the container threads and the closure threads. The noted material also readily accommodates the

preferred thermoforming process. The container can be made from any suitable plastic and can be made by any suitable technique, such as co-extrusion, lamination, injection molding, vacuum thermoforming, or overmolding. Vacuum thermoforming is typically the most economical means for forming the container. As is well known in the art, vacuum thermoforming involves heating a suitable plastic sheet of material to a temperature at which the sheet becomes formable into a shape that is set as the plastic sheet cools. As used herein, a suitable plastic sheet is a plastic sheet that may be readily used by the vacuum thermoforming process. The heated plastic sheet is made to conform to the surface features of a single surface "male" tool by drawing the heated sheet of plastic to the surface of the tool by the force of a vacuum applied to the tool. In vacuum thermoforming, the sealed air space between the heated plastic and mold is evacuated to draw the heated plastic to contact the single male surface of the mold. Injection molding of a plastic article involves heating suitable plastic material in the form of pellets or granules until a melt is obtained. The melt is next forced into a split-die mold, sometimes referred to as a split-die tool, where it is allowed to "cool" into the desired shape. Both the bottom surface and the top surface of the plastic article are formable by the split-die mold. Thus, articles may be formed by the injection molding process that have side cross-sectional profiles of varying non-uniform thickness. After the plastic melt cools, the split-die mold is opened and the article is ejected. Since, the mold is separable, undercut surface on the plastic article may be relieved from the split-die mold when it is opened. Injection molding, well known in the art, is typically used to form plastic articles that have large undercuts and substantially varying thicknesses in side cross-sectional profile. As used herein undercuts are said to be large if a molded plastic article having undercut features is difficult or impossible to remove from a single-surface vacuum thermoforming mold after it is formed and cooled.

[0046] The container can be fabricated by vacuum thermoforming a clarified polypropylene homopolymer material. In another embodiment, the container may be fabricated by vacuum thermoforming a clarified random copolymer polypropylene material. Other plastic materials which would be suitable for fabricating the container by vacuum thermoforming include PS (polystyrene), CPET (crystalline polyethylene terephthalate), APET (amorphous polyethylene terephthalate), HDPE (high density

polyethylene), PVC (polyvinyl chloride), PC (polycarbonate), and foamed polypropylene. The material used can be generally transparent to allow a user to view the contents of the container.

[0047] The sealing liner is of a different softer material from the container or the rim of the container member. One measure of the properties of the different materials is Shore hardness. The sealing liner preferably has a lower Shore hardness than the container or rim of the container member. The Shore hardness is measured with an apparatus known as a Durometer and consequently is also known as 'Durometer hardness'. The hardness value is determined by the penetration of the Durometer indenter foot into the sample. Because of the resilience of rubbers and plastics, the indentation reading may change over time - so the indentation time is sometimes reported along with the hardness number. The ASTM test method designation is ASTM D2240 00 and is generally used in North America. The results obtained from this test are a useful measure of relative resistance to indentation of various grades of polymers. However, the Shore Durometer hardness test does not serve well as a predictor of other properties such as strength or resistance to scratches, abrasion, or wear, and should not be used alone for product design specifications. Shore hardness is often used as a proxy for flexibility (flexural modulus) for the specification of elastomers. The correlation between Shore hardness and flexibility holds for similar materials, especially within a series of grades from the same product line, but this is an empirical and not a fundamental relationship. For example, polypropylene homopolymer has a Shore D hardness of 78. Typical olefin copolymers of polypropylene can have a Shore D hardness of about 73. Low density polyethylene has a Shore D hardness of about 55. Elastomers are in the range of Shore A hardness below the hardness level measured by Shore A hardness.

[0048] The sealing liner can be hollow, for example a tubular structure. The sealing liner can be foamed, for example a foamed elastomer, or can be solid, for example a polypropylene copolymer overmolded film. The sealing liner can be attached to the container by insertion, welding including adhesive welding, or overmolding.

[0049] Without departing from the spirit and scope of this invention, one of ordinary skill can make various changes and modifications to the invention to adapt it to various usages and conditions. As such, these changes and modifications are

properly, equitably, and intended to be, within the full range of equivalence of the following claims. Any combination of the above described elements in all possible variations thereof is encompassed by the invention unless otherwise indicated herein or otherwise clearly contradicted by context. While the invention is described herein in connection with certain preferred embodiments, there is no intent to limit the present invention to those embodiments.

CLAIMS

What is claimed is:

1. A container, comprising:

a container member having a bottom, an upper annular rim and a substantially continuous side wall extending from the bottom and terminating at the rim, the bottom and the side wall defining a first member cavity, the rim having a plurality of first threads, wherein the plurality of first threads are discontinuous around the container member, the plurality of first threads comprises at least two threads and the plurality of first threads has substantially equidistant engagement points, and

a closure member having a peripheral sealing member with a circumference, said sealing member including an inner skirt portion having a substantially vertical outer wall, a connecting bead, and an outer skirt portion having a substantially vertical inner wall and connecting to the inner skirt portion at the connecting bead, and a sealing liner of different material than the inner skirt portion and the outer skirt portion wherein the sealing liner is situated between the inner skirt portion outer wall and the outer skirt portion inner wall, the outer skirt portion inner wall having a plurality of second threads adapted and positioned to cooperate with the first threads, wherein the plurality of second threads are discontinuous around the closure member and the plurality of second threads comprises at least two threads,

wherein sealable engagement of the container member and the closure member is effectuated when the sealing liner is in contact with the rim over a substantial length thereof.

2. The container of claim 1, wherein said sealing liner is attached around the entire circumference of the peripheral sealing member.

3. The container of claim 2, wherein said sealing liner is attached to the closure outer skirt portion inner wall.

4. The container of claim 2, wherein said sealing liner is attached to the closure inner skirt portion outer wall.

5. The container of claim 2, wherein said sealing liner is attached to the connecting bead.

6. The container of claim 2, wherein said sealing liner is attached to the closure outer skirt portion inner wall and the connecting bead.

7. The container of claim 2, wherein said sealing liner is attached to the closure inner skirt portion outer wall and the connecting bead.

8. A container, comprising:

a container member having a bottom, an upper annular rim and a substantially continuous side wall extending from the bottom and terminating at the rim, the bottom and the side wall defining a first member cavity, the rim having a threaded closure means, and

a closure member having a peripheral sealing member with a circumference, said sealing member including an inner skirt portion having a substantially vertical outer wall, a connecting bead, and an outer skirt portion having a substantially vertical inner wall and connecting to the inner skirt portion at the connecting bead, and a sealing liner of different material than the inner skirt portion and the outer skirt portion wherein the sealing liner is situated between the inner skirt portion outer wall and the outer skirt portion inner wall, the outer skirt portion inner wall having a threaded closure means,

wherein sealable engagement of the container member and the closure member is effectuated when the sealing liner is in contact with the rim over a substantial length thereof.

9. The container of claim 8, wherein the sealing liner is of lower durometer hardness than the closure member.

10. The container of claim 8, wherein the sealing liner is of lower density than the closure member.

11. The container of claim 8, wherein the sealing liner is attached to the closure member by a method from the group consisting of insertion, welding, and overmolding.

12. The container of claim 8, wherein the sealing liner is in a form from the group consisting of a hollow form, a foamed form, and a solid form.

13. A container, comprising:

a container member having a bottom, an upper annular rim and a substantially continuous side wall extending from the bottom and terminating at the rim, the bottom and the side wall defining a first member cavity, the rim having a plurality of first threads and a sealing liner of different material than the rim, wherein the plurality of first threads are discontinuous around the container member, the plurality of first threads comprises at least two threads and the plurality of first threads has substantially equidistant engagement points, and

a closure member having a peripheral sealing member with a circumference, said sealing member including an inner skirt portion having a substantially vertical outer wall, a connecting bead, and an outer skirt portion having a substantially vertical inner wall and connecting to the inner skirt portion at the connecting bead, the outer skirt portion inner wall having a plurality of second threads adapted and positioned to cooperate with the first threads, wherein the plurality of second threads are discontinuous around the closure member and the plurality of second threads comprises at least two threads,

wherein sealable engagement of the container member and the closure member is effectuated when the sealing liner is in contact with the rim over a substantial length thereof.

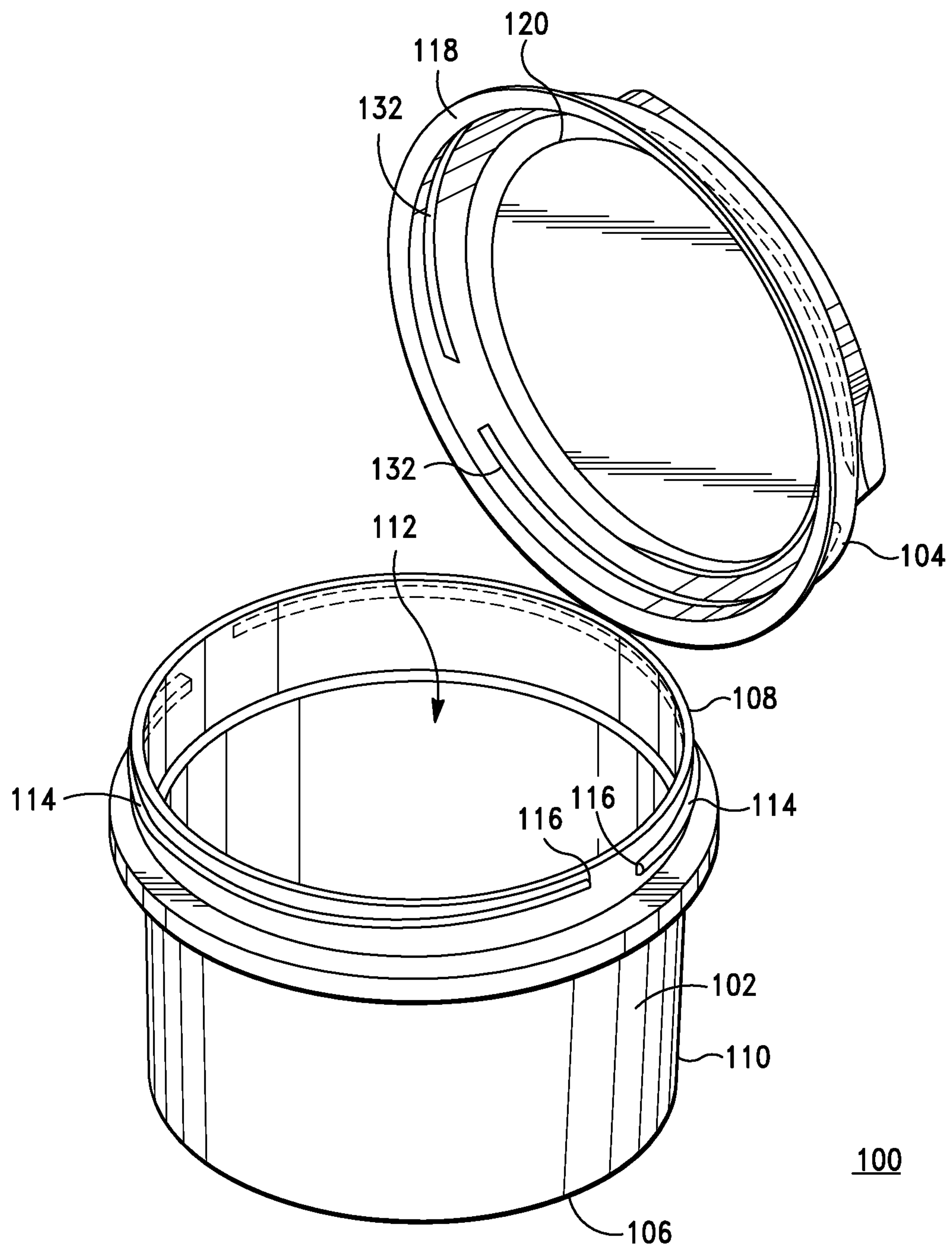
14. The container of claim 13, wherein said sealing liner is attached around the entire circumference of the rim.

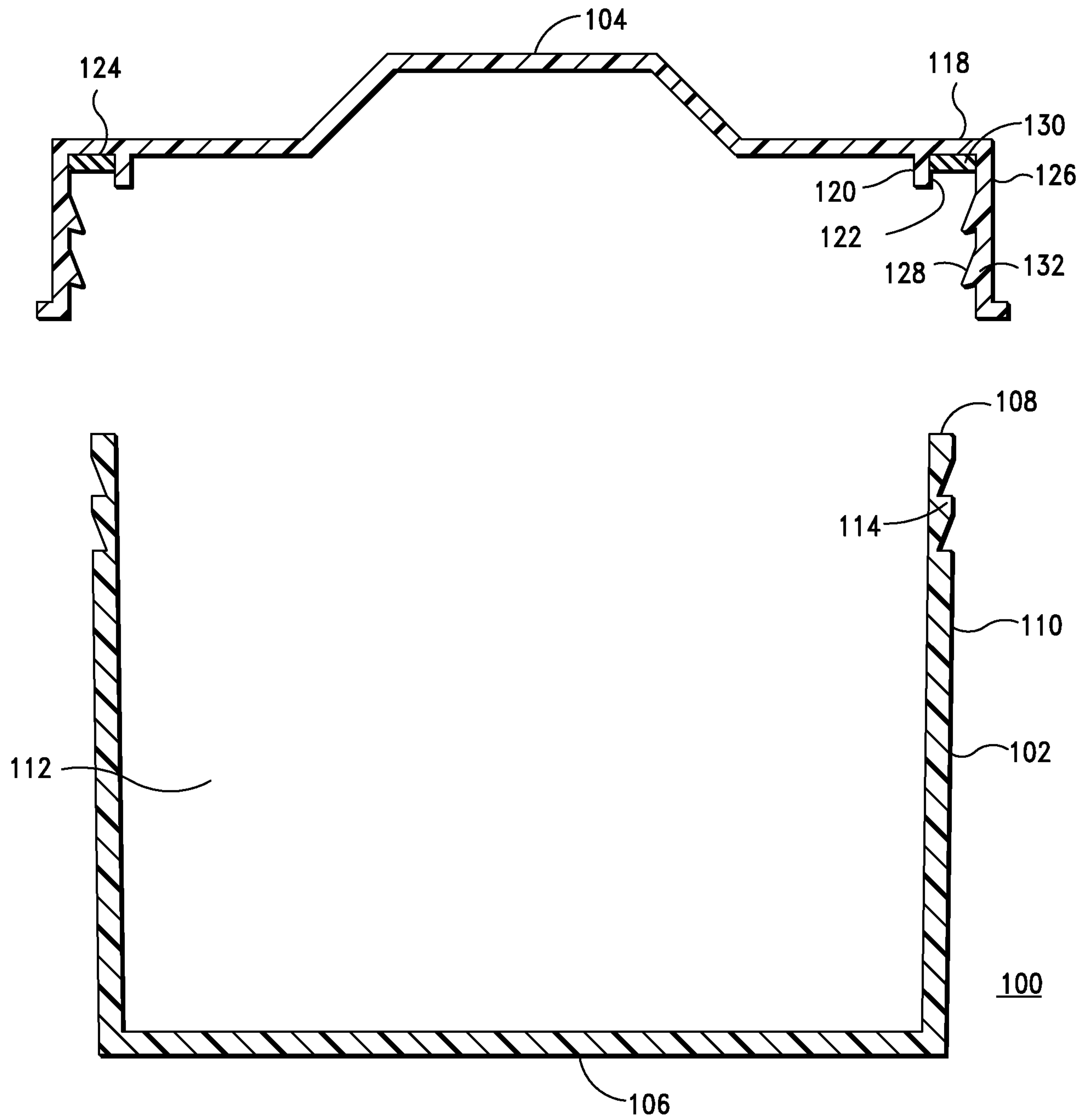
15. The container of claim 13, wherein the sealing liner is of lower durometer hardness than the rim.

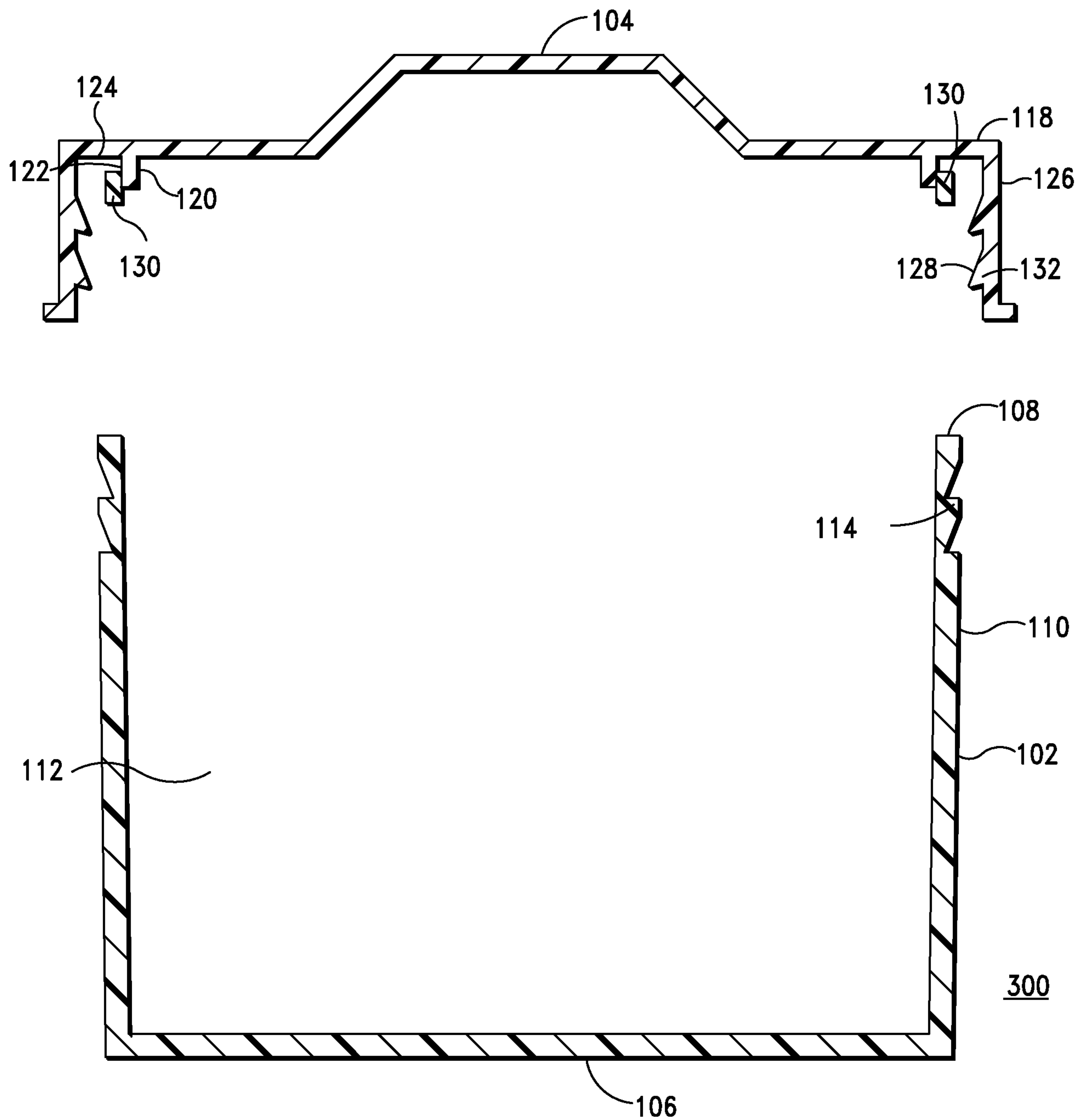
16. The container of claim 13, wherein the sealing liner is of lower density than the rim.

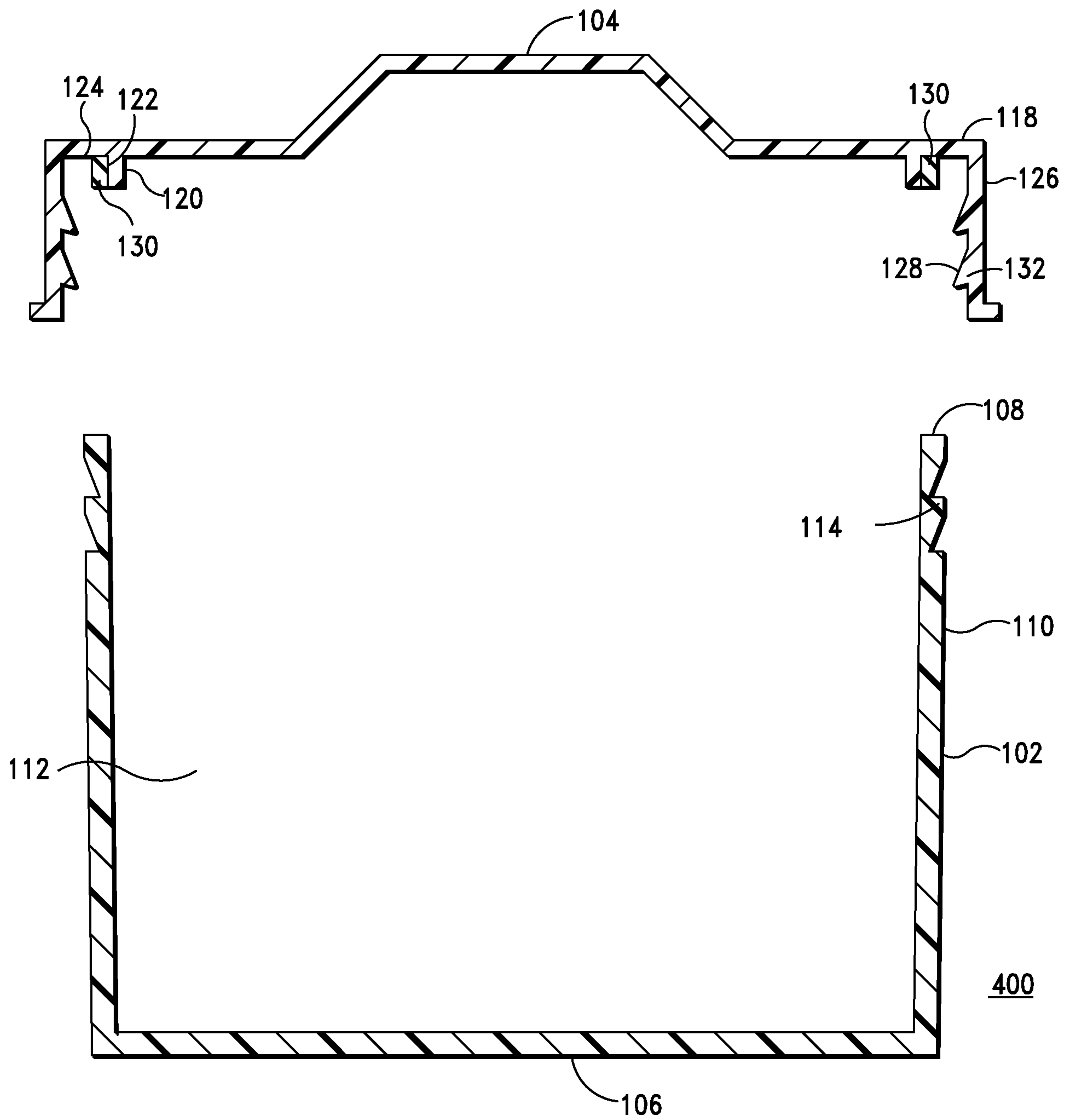
17. The container of claim 13, wherein the sealing liner is attached to the rim by a method from the group consisting of insertion, welding, and overmolding.

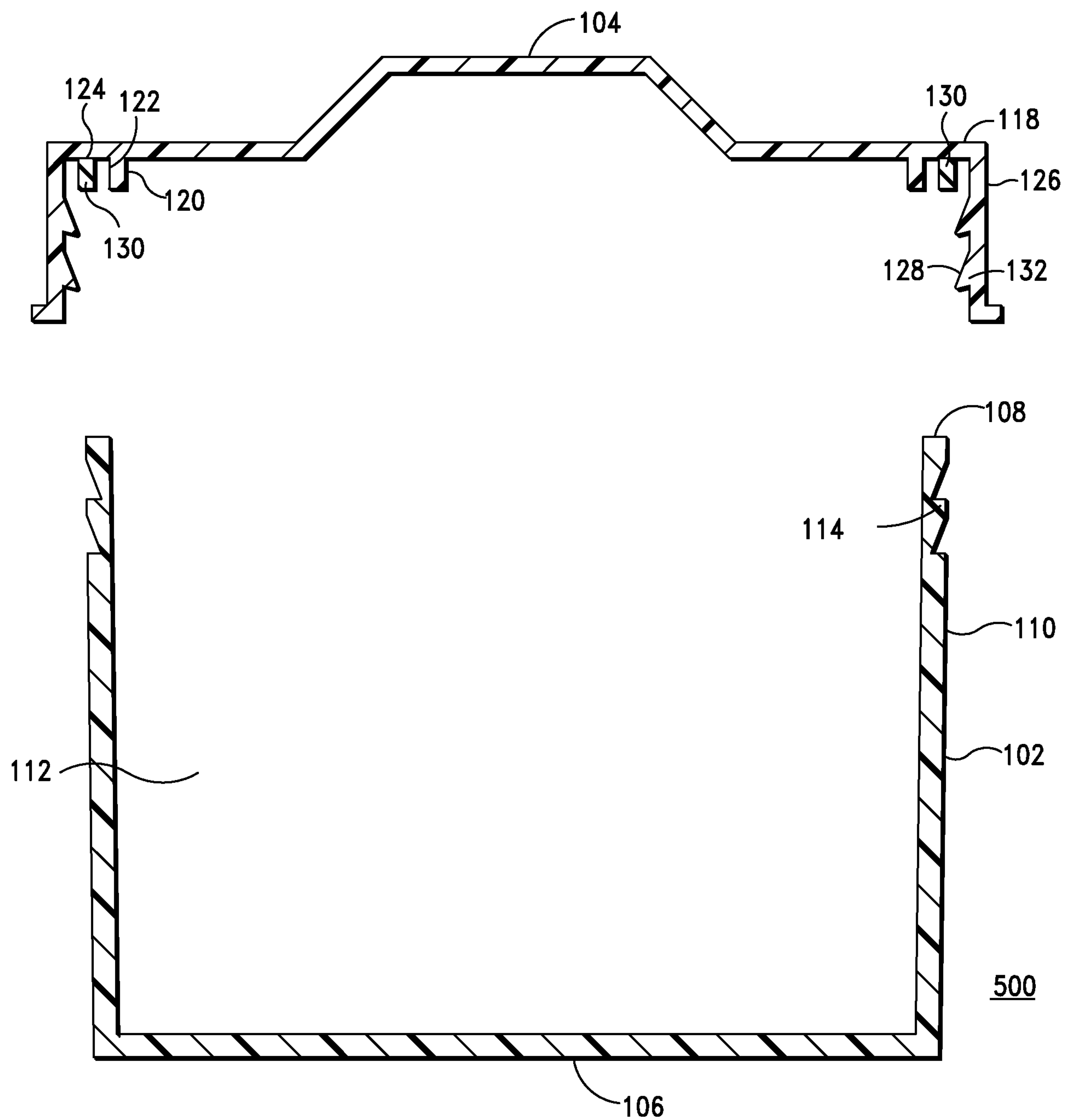
18. The container of claim 13, wherein the sealing liner is in a form from the group consisting of a hollow form, a foamed form, and a solid form.

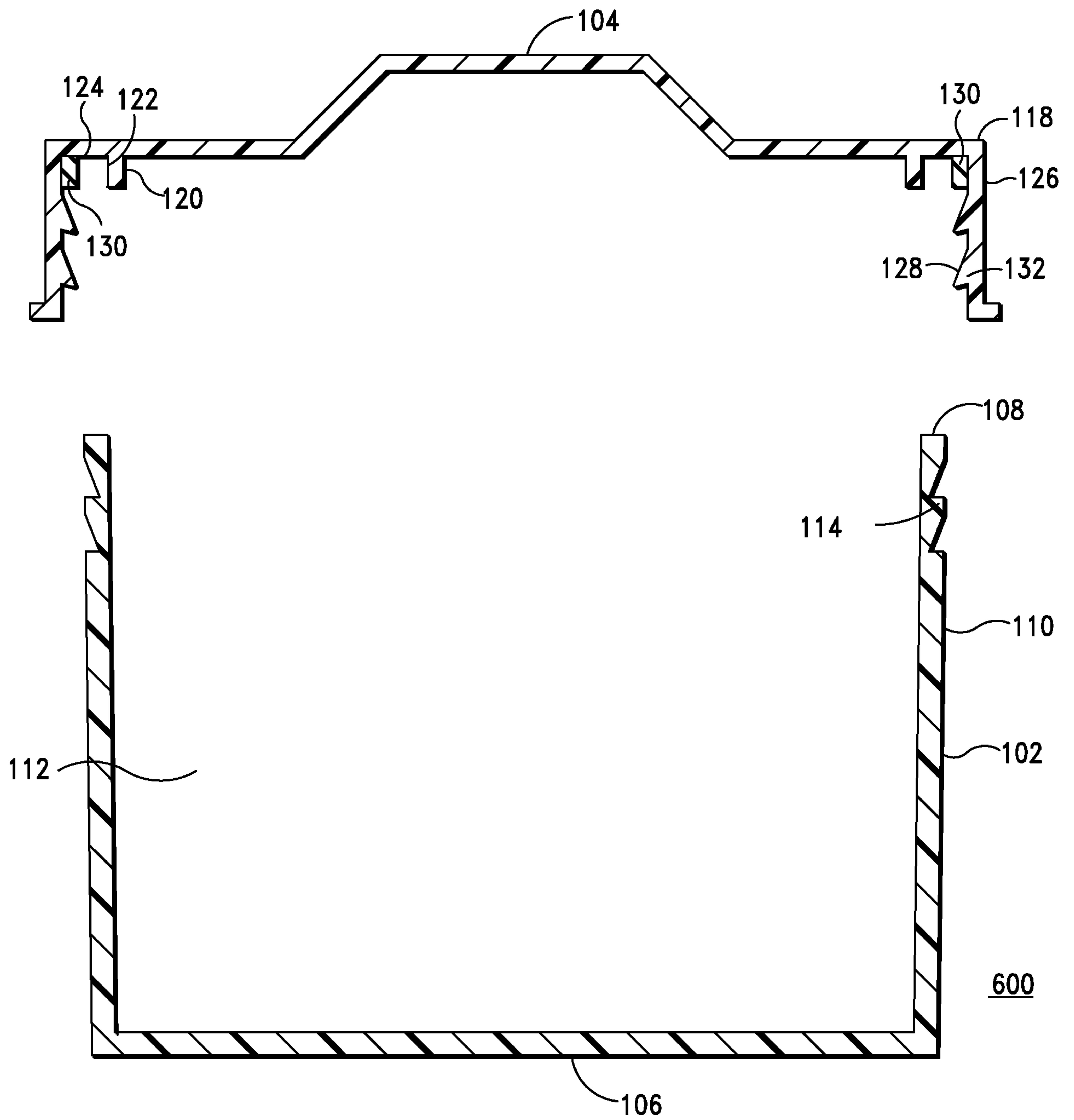
**FIG. 1**

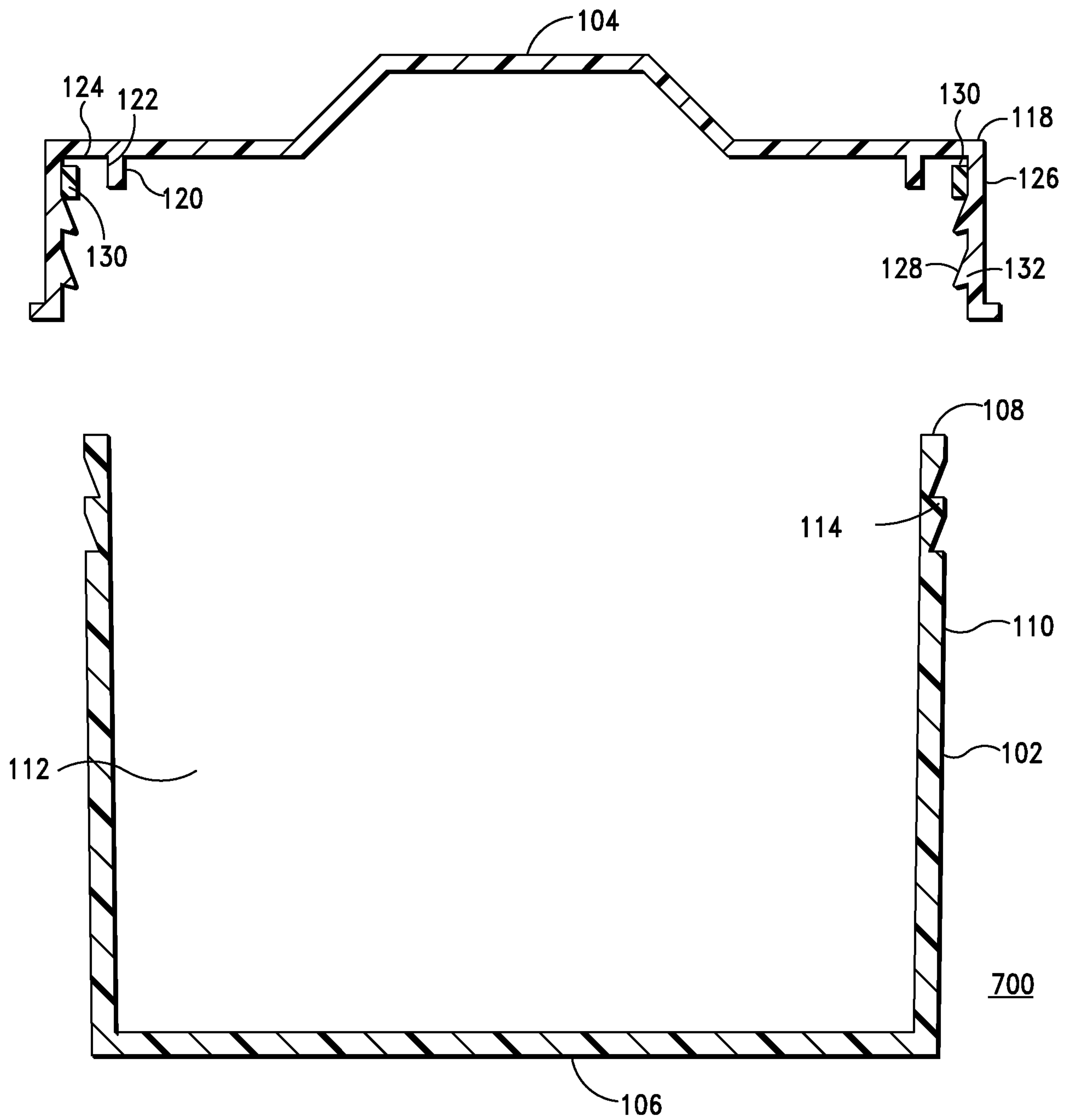
**FIG. 2**

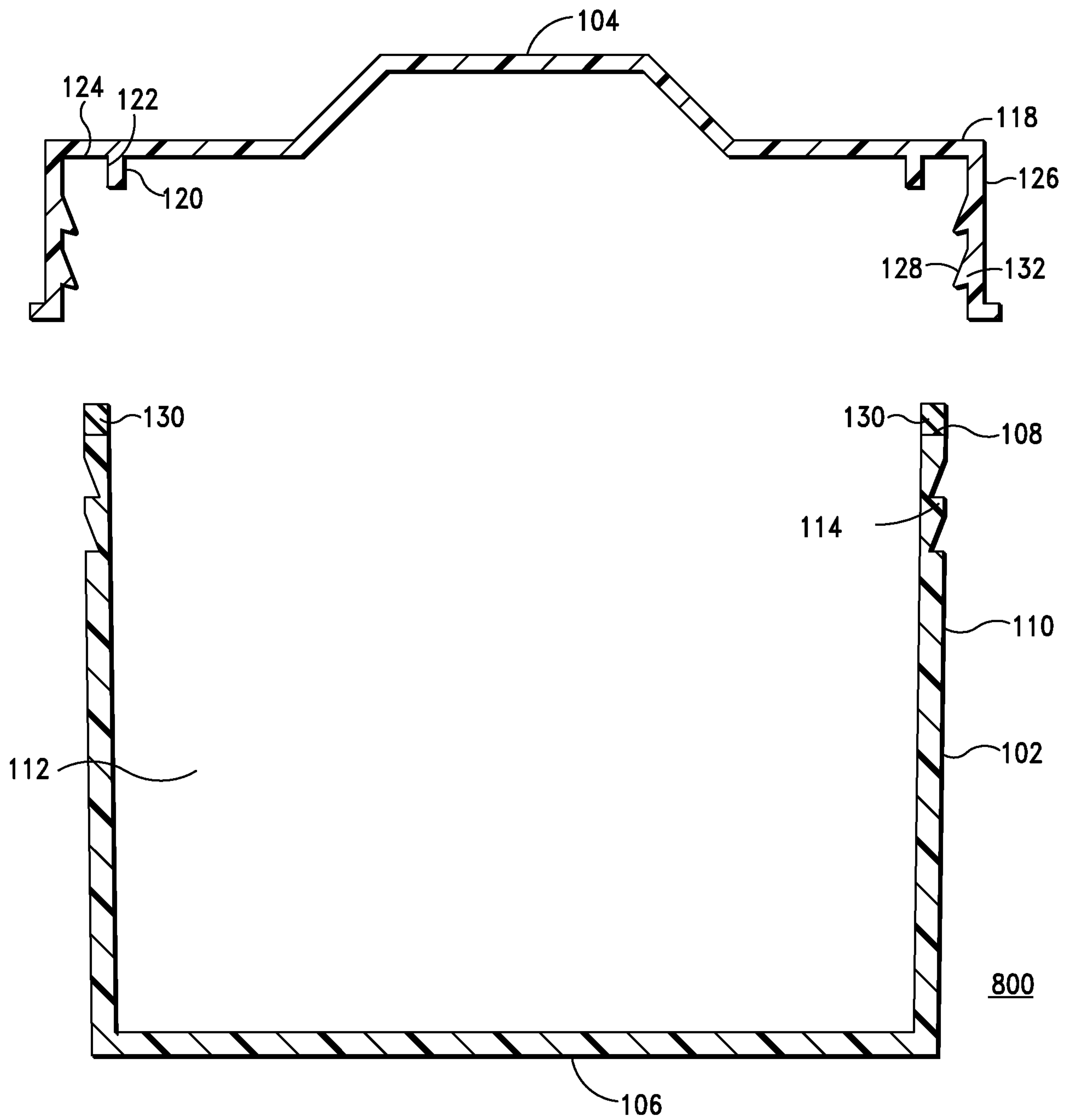
**FIG. 3**

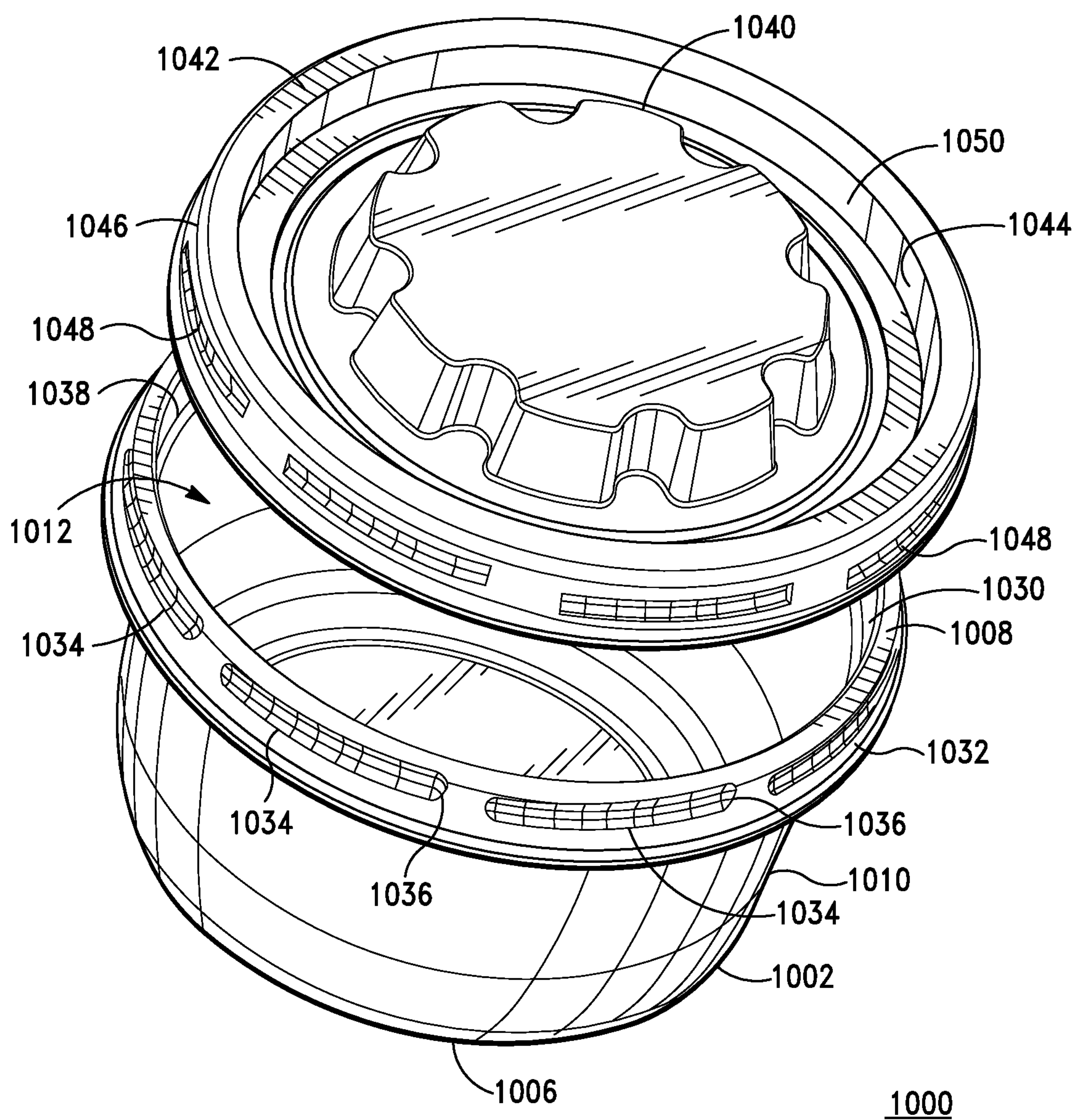
**FIG. 4**

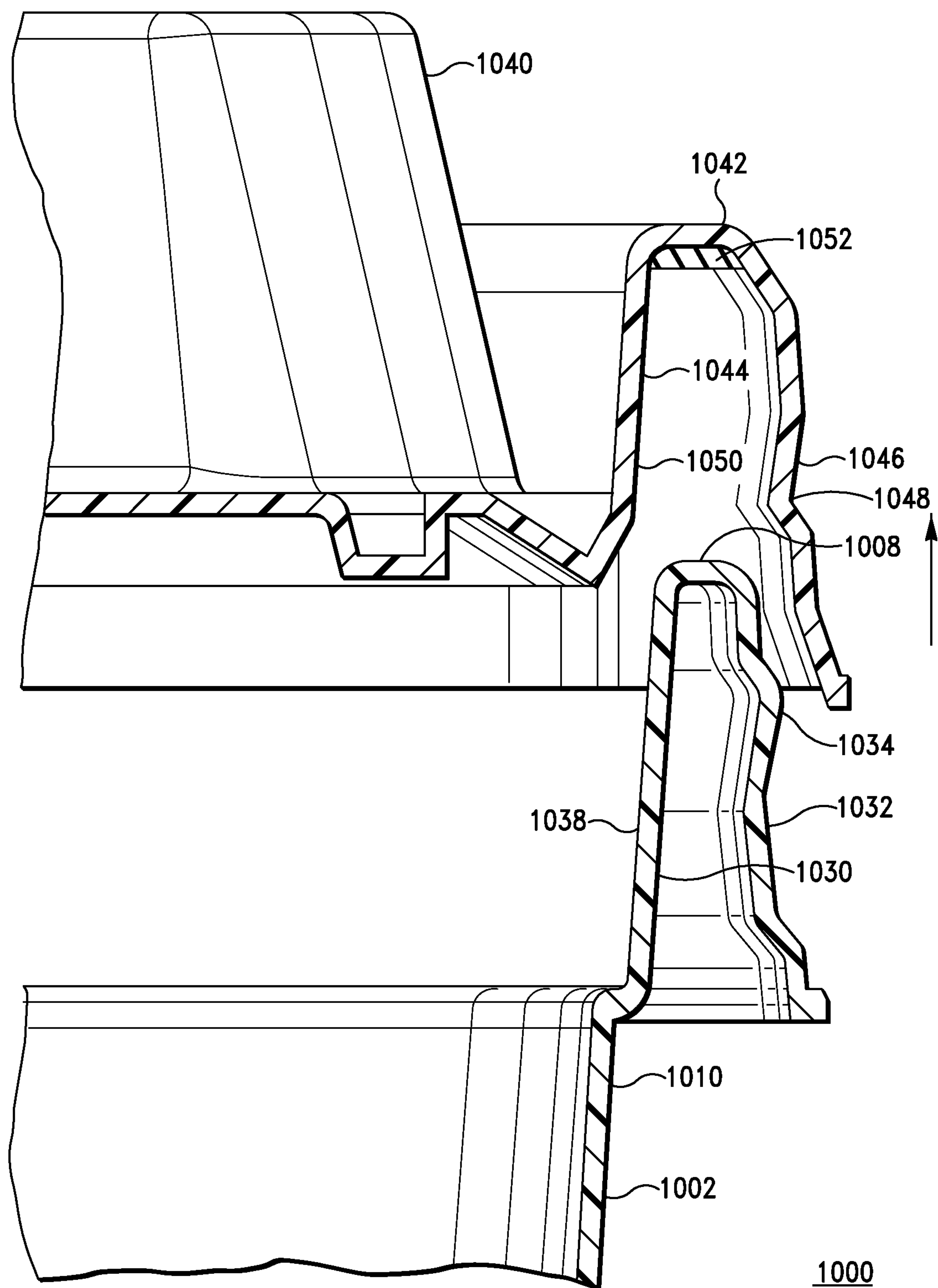
**FIG. 5**

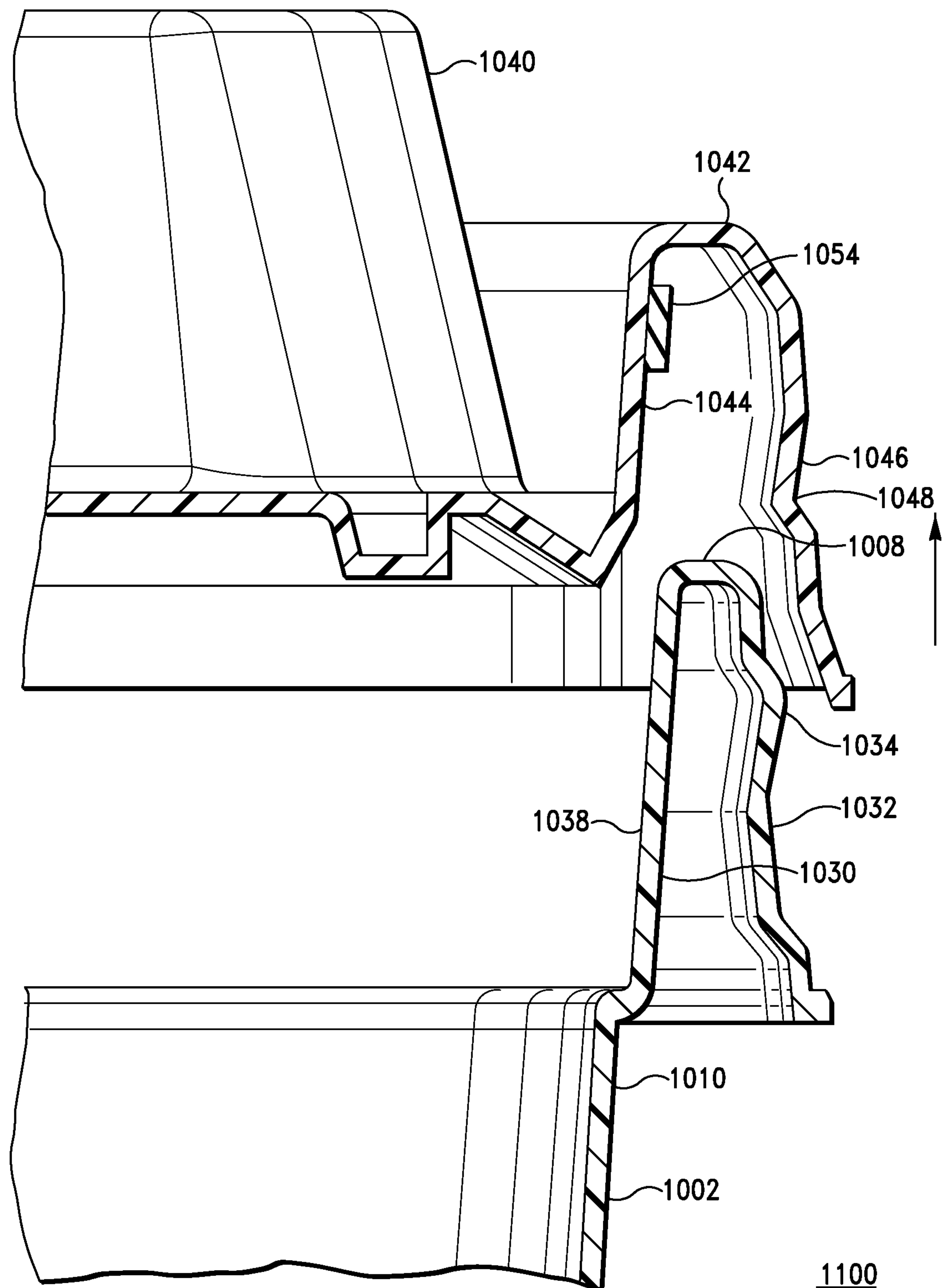
**FIG. 6**

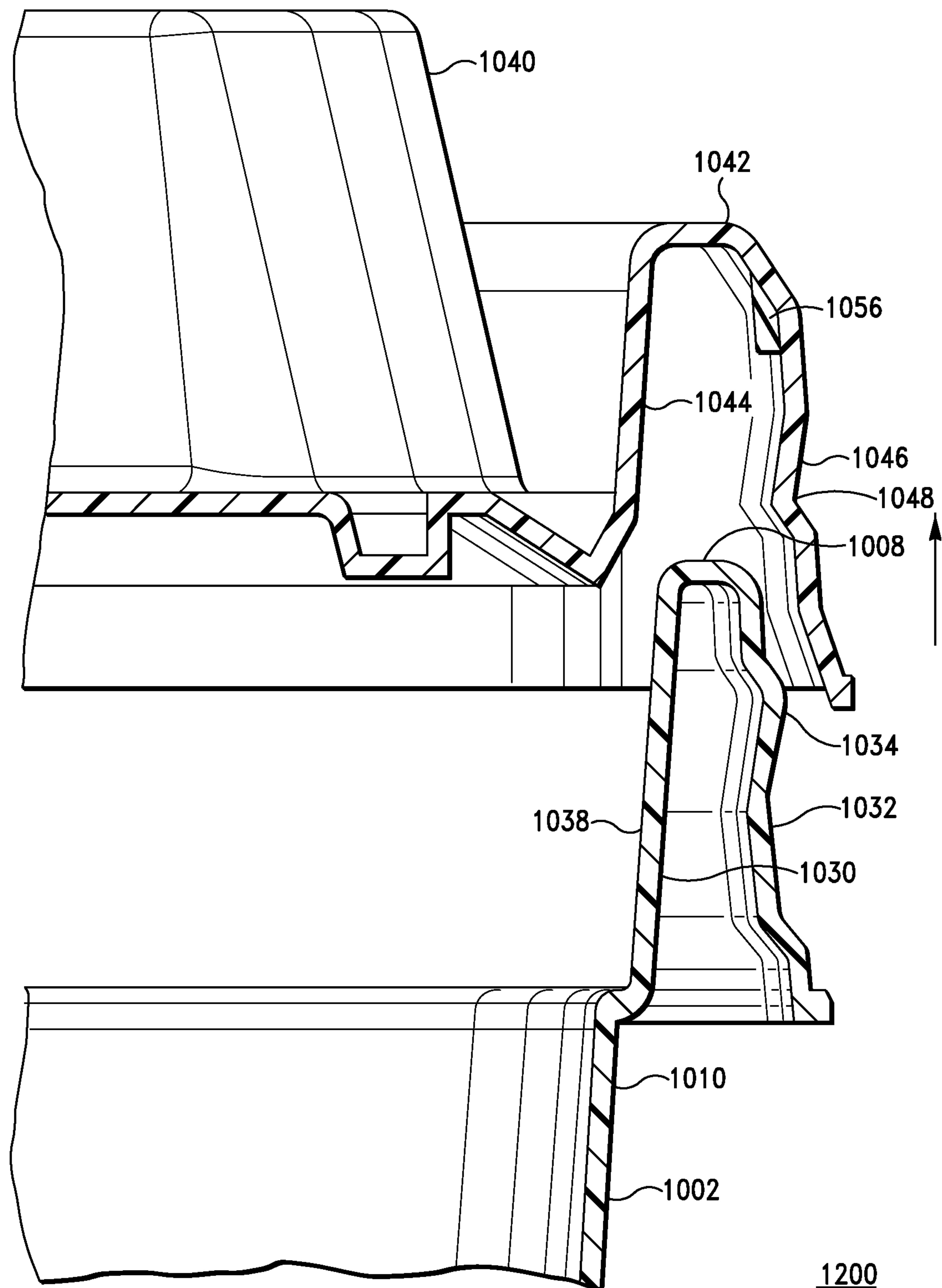
**FIG. 7**

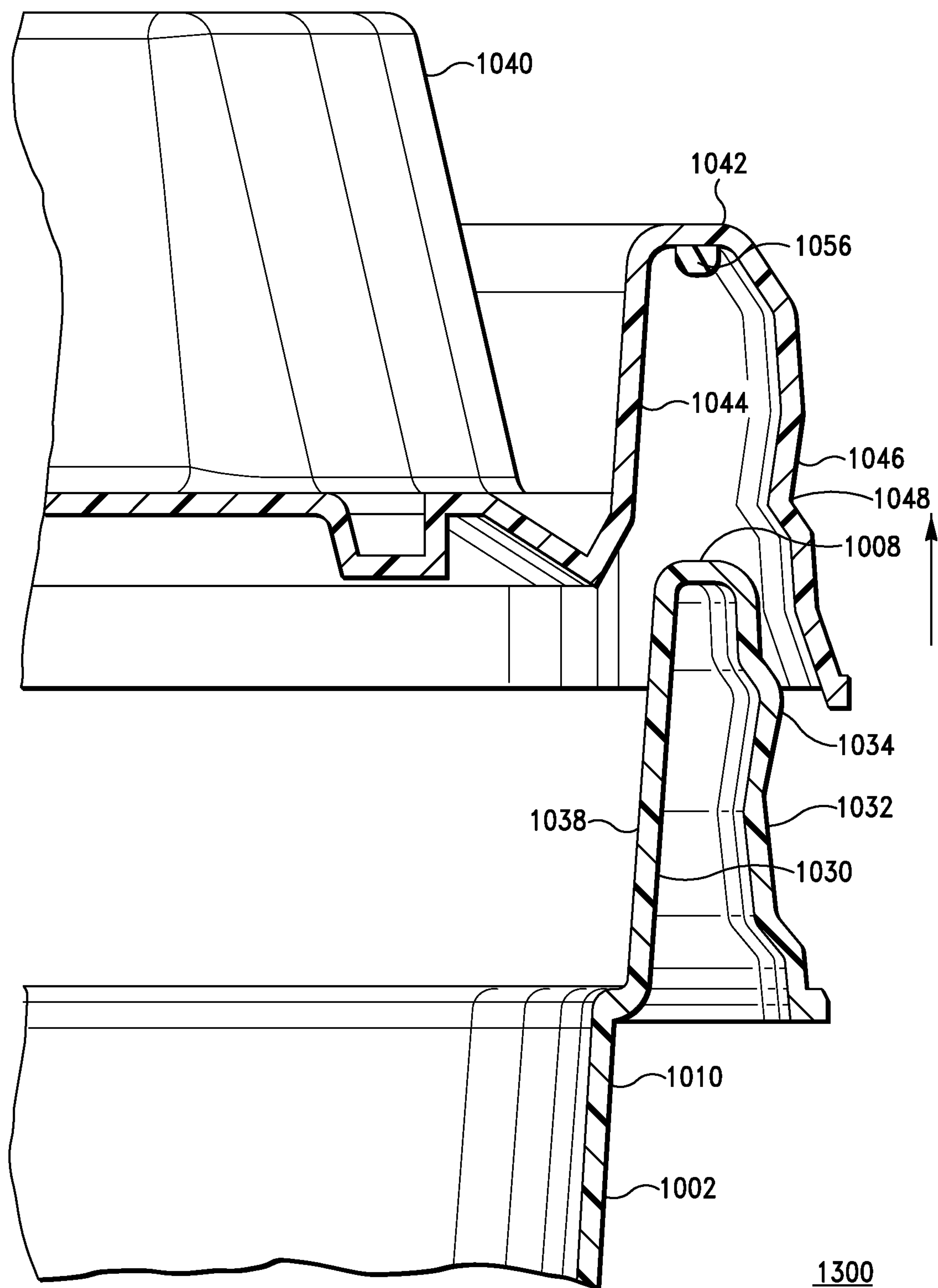
**FIG. 8**

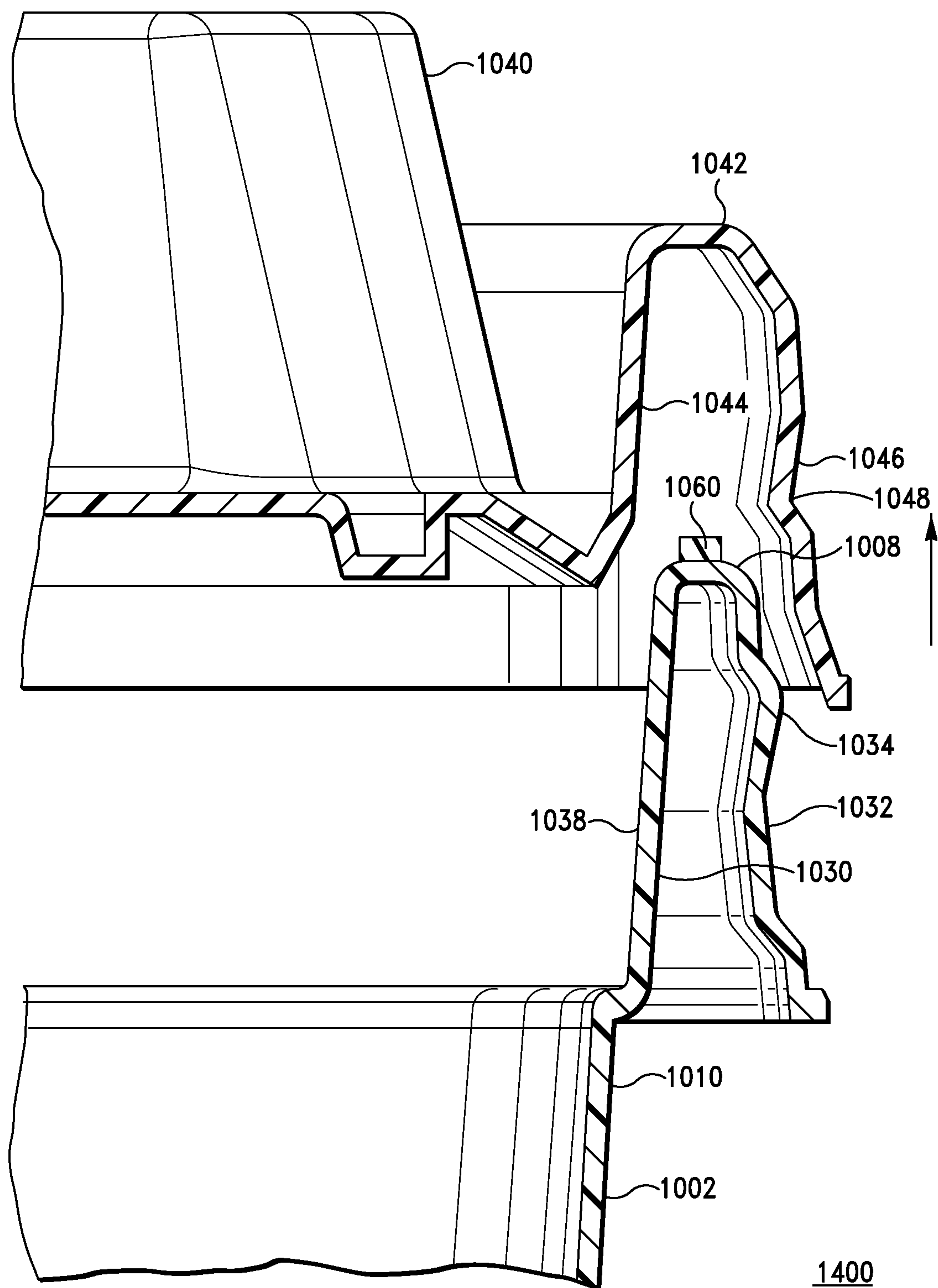
**FIG. 9**

**FIG. 10**

**FIG. 11**

**FIG. 12**

**FIG. 13**

**FIG. 14**

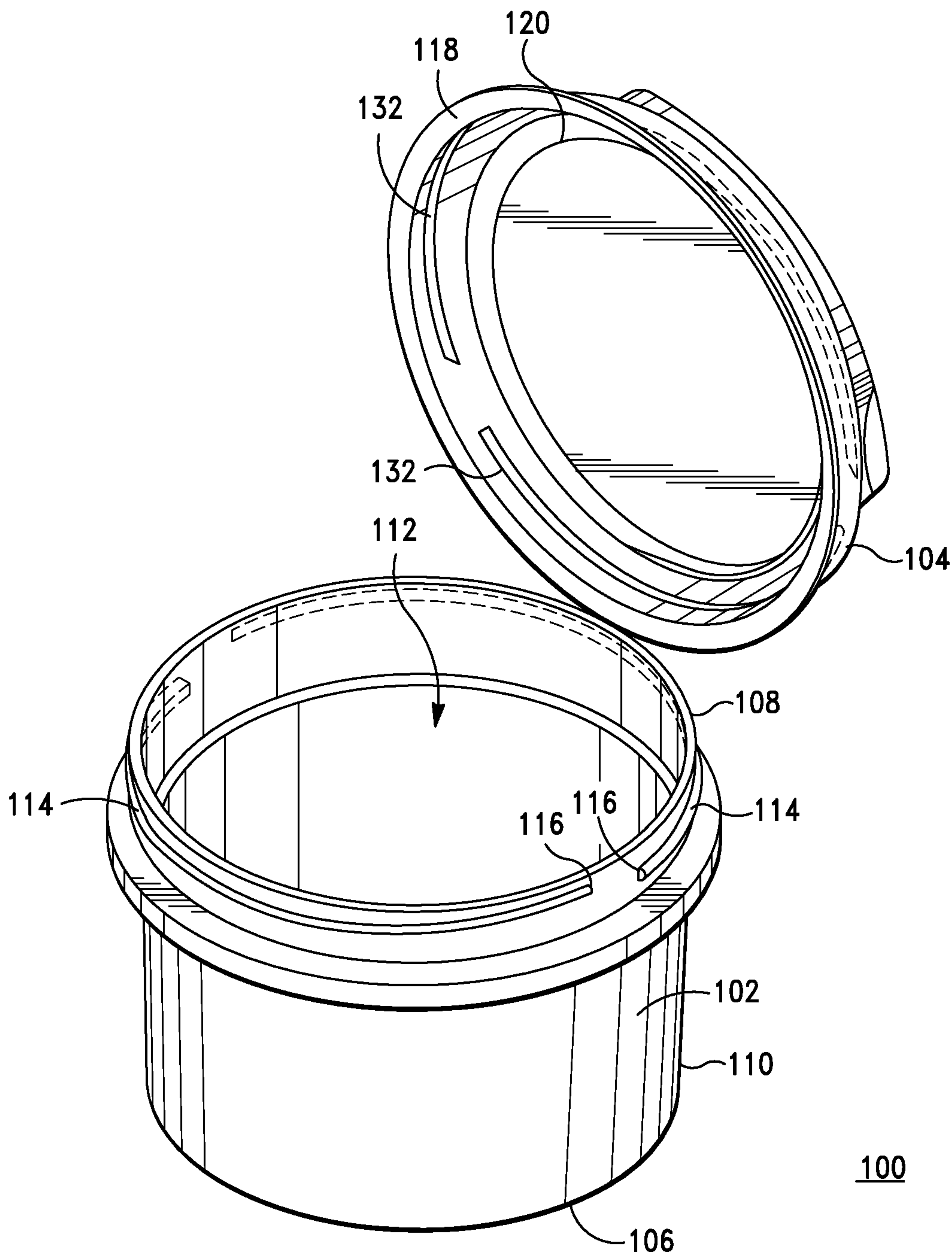


FIG. 1