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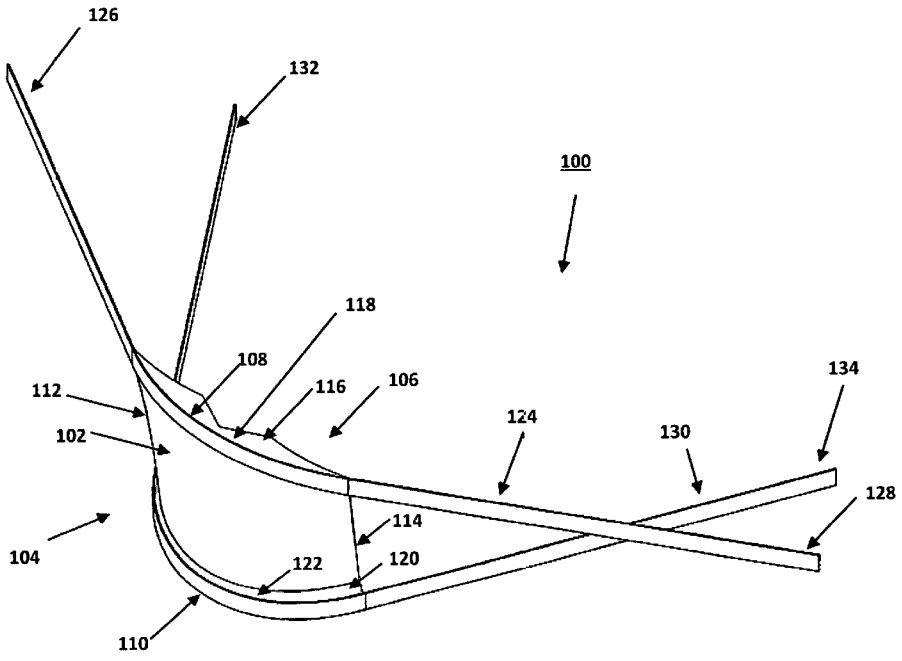
(54) Title: FACE MASK HAVING TRANSPARENT PLASTIC PIECE

FIG. 1A



(57) Abstract: Implementations of the disclosed subject matter provide a face mask that may include a transparent plastic piece having a front side, a back side, a top side, a bottom side, a left side, and a right side. A first conformable member may be affixed to a first portion of the back side and disposed parallel to the top side. A second conformable member may be affixed to a second portion of the back side and disposed parallel to the bottom side. The face mask may include straps, ear loops, and/or head bands so that it may be secured to a user.

[Continued on next page]

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FACE MASK HAVING TRANSPARENT PLASTIC PIECE

BACKGROUND

[1] A face mask is commonly worn by health professionals during events such as surgeries and other medical procedures, dental procedures, and the like to protect both the wearer and the surrounding parties from contamination. The masks are designed to catch liquid droplets and aerosolized particles from the wearer's mouth and nose, and to stop bodily fluids and other splashes from reaching the covered portions of the wearer's face. Face masks are typically made from paper or other non-woven material, and often have three layers (i.e., 3-ply). Typically, these layers consist of a melt-blown material that is placed between non-woven fabrics. The melt-blown material acts as a filter that prevents contaminants from entering or exiting the mask. Most face masks include pleats or folds that enable the expansion of the mask's surface area, so that it covers the area of the wearer's face from the nose to the chin. Face masks used for surgical procedures typically have four straps that are tied behind the head. Other variations include those that are affixed to the wearer's face via ear loops, where a string-like material is attached to the mask and placed behind the ears, and masks that have an elastic headband strap that is placed behind the head.

BRIEF SUMMARY

[2] According to an implementation of the disclosed subject matter, a face mask may include a transparent plastic piece having a front side, a back side, a top side, a bottom side, a left side, and a right side. A first conformable member may be affixed to a first portion of the back side and disposed parallel to the top side. A second conformable member may be affixed to a second portion of the back side and disposed parallel to the bottom side. At least one first strap may have a first strap portion including a first end and a second strap portion including a second end, where portions of the first strap portion and the second strap portion are affixed parallel to the top side of the plastic piece. At least one second strap may have a first strap portion

including a first end and a second strap portion including a second end, where portions of the first strap portion and the second strap portion are affixed parallel to the bottom side of the plastic piece.

[3] According to an implementation of the disclosed subject matter, a face mask may include a transparent plastic piece having a front side, a back side, a top side, a bottom side, a left side, and a right side. A conformable member may be affixed to a second portion of the back side and disposed parallel to the bottom side. The face mask may include an elastic band, where a portion of the elastic band is affixed parallel to the top side of the plastic piece. A first strap portion may have a first end and a second strap portion may have a second end, where portions of the first strap portion and the second strap portion are affixed parallel to the bottom side of the plastic piece.

[4] According to an implementation of the disclosed subject matter, a transparent plastic piece having a front side, a back side, a top side, a bottom side, a left side, and a right side. A first conformable member may be affixed to a first portion of the back side and disposed parallel to the top side. A second conformable member may be affixed to a second portion of the back side and disposed parallel to the bottom side. A first elastic strap may have a first end and a second end, where the first end and the second end are affixed to different portions of the left side to form a first loop. A second elastic strap having a first end and a second end, wherein the first end and the second end are affixed to different portions of the right side to form a second loop.

[5] Additional features, advantages, and implementations of the disclosed subject matter may be set forth or apparent from consideration of the following detailed description, drawings, and claims. Moreover, it is to be understood that both the foregoing summary and the following detailed description are illustrative and are intended to provide further explanation without limiting the scope of the claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[6] The accompanying drawings, which are included to provide a further understanding of the disclosed subject matter, are incorporated in and constitute a part of this specification. The drawings also illustrate implementations of the disclosed subject matter and together with the detailed description serve to explain the principles of implementations of the disclosed subject matter. No attempt is made to show structural details in more detail than may be necessary for a fundamental understanding of the disclosed subject matter and various ways in which it may be practiced.

[7] FIG. 1A shows a view of a face mask according to an implementation of the disclosed subject matter.

[8] FIG. 1B shows a view of back side of the face mask of FIG. 1A, including conformable members affixed to portions of the back side, according to an implementation of the disclosed subject matter.

[9] FIG. 1C shows a side view of the face mask of FIG. 1A according to an implementation of the disclosed subject matter.

[10] FIG. 1D shows a top view of the face mask of FIG. 1A according to an implementation of the disclosed subject matter.

[11] FIG. 1E shows another view of back side of the face mask of FIG. 1B, including a first conformable member and a second conformable member affixed to portions of the back side, according to an implementation of the disclosed subject matter.

[12] FIG. 1F shows a view of the front side of the face mask of FIG. 1A according to an implementation of the disclosed subject matter.

[13] FIGS. 1G-1H show views of an extension of a plastic piece of the face mask according to implementations of the disclosed subject matter.

[14] FIG. 1I shows an extension of a plastic piece, where portions of the extension angle outwards away from the left and right sides of the plastic piece according to an implementation of the disclosed subject matter.

[15] FIGS. 1J-1K show face masks with extension of a plastic piece, where the face masks include a headband according to implementations of the disclosed subject matter.

[16] FIG. 1L shows a face mask having a single conformable member according to an implementation of the disclosed subject matter.

[17] FIG. 1M shows a face mask having straps that form first and second loops according to an implementation of the disclosed subject matter.

[18] FIG. 2A shows a view of portion of the first conformable member that is towards the face of a wearer according to an implementation of the disclosed subject matter.

[19] FIG. 2B shows another view of the first confirmable member according to an implementation of the disclosed subject matter.

[20] FIG. 2C shows a top view of the first confirmable member according to an implementation of the disclosed subject matter.

[21] FIG. 3A shows a view of the second conformable member according to an implementation of the disclosed subject matter.

[22] FIG. 3B shows a view of portion of the second conformable member that is not affixed to the back side of the face mask of FIG. 1A according to an implementation of the disclosed subject matter.

[23] FIG. 3C shows a top view of the second conformable member according to an implementation of the disclosed subject matter.

[24] FIG. 4 shows a view of a plastic piece of the face mask of FIG. 1A according to an implementation of the disclosed subject matter.

[25] FIG. 5A shows a face mask having angled side edges and top edges according to an implementation of the disclosed subject matter.

[26] FIG. 5B shows a face mask having straight side edges and angled top edges according to an implementation of the disclosed subject matter.

[27] FIG. 6A shows a plastic piece of the face mask of FIG. 5A according to an implementation of the disclosed subject matter.

[28] FIG. 6B shows a plastic piece of the face mask of FIG. 5B according to an implementation of the disclosed subject matter.

DETAILED DESCRIPTION

[29] Miscommunication is a leading cause of medical errors. The potential for miscommunication may be especially compounded in deaf and hard of hearing medical patients when standard face masks, such as a surgical mask, are used. It is estimated that approximately 55% of communication is nonverbal. Standard surgical masks block the wearer's face and prevent the ability of others to see facial expressions and read lips of the mask wearer. Implementations of the disclosed subject matter may provide a mask with full-face visibility. The mask may provide protection, and may provide comfort and breathability to the wearer. The face mask of the disclosed subject matter may allow patients and other individuals to see more of the wearer's face and facial expressions, while the mask may provide safety, comfort, and breathability to the wearer.

[30] Although many people may benefit from whole face communication, it may be especially important for: deaf and hard of hearing patients, medical staff, medical students, laboratory technicians, and scientists; limited English Proficiency patients; sign language interpreters and agencies; dentists, dental hygienists, and other dental health professionals; patients prone to or experiencing stress and anxiety; pediatric patients; immunosuppressed patients; cancer patients; HIV/AIDS patients; organ transplant recipients; medical staff who cannot receive seasonal flu vaccinations and must wear masks; and all medical staff so that they can see their colleagues' faces and better understand dialogue in dental and/or medical

environments, such as an operating room, and/or in noisy environments. People in non-medical settings that use face masks may also benefit from whole face communication.

[31] Implementations of the disclosed subject matter may include a mask having a transparent viewing area. In some implementations, the viewing area may be translucent, opaque, or the like. The transparent viewing area may be coated with an anti-fog or fog-resistant coating to provide full-face visibility. The mask may include features that provide for comfort and breathability.

[32] Implementations of the disclosed subject matter may provide a face mask having a transparent plastic piece and/or extended plastic piece, and conformable members affixed to a back side of the plastic piece. The plastic piece may provide improved visibility to whole face of the user of the face mask, such that others may observe the full facial expressions and/or lip movements of the user. The plastic piece may act as an impermeable barrier for air and/or other particulates and may provide increased protection compared to conventional face masks made from cloth-like materials. The conformable members of the face mask may provide better fit, less slipping, increased stability, and/or increased breathability for a user of the face mask, compared to conventional face masks. The conformable member may push the transparent plastic piece away from the user's face and/or lips to prevent them from touching the transparent plastic piece and/or to increase comfort and breathability by allowing for air to flow in and/or out from the sides of the face mask, and/or the back of the face mask. That is, the conformable members may seal the top and bottom of the mask and/or create a "pocket" for air flow along with the plastic piece by preventing air flow from going forward and/or out of the top and/or bottom of the face mask.

[33] FIGS. 1A-1M show views of a face mask 100 according to implementations of the disclosed subject matter. In particular, FIG. 1B shows a view of back side of the face mask 100 of FIG. 1A, including conformable members affixed to portions of the back side. FIG. 1C shows a side view of the face mask 100, and FIG. 1D shows a top view of the face mask 100. FIG. 1E shows another view of back side of the face mask 100 of FIG. 1B, including a first conformable member and a second conformable member affixed to portions of the back side. FIG. 1F shows a view of the front side of the face mask 100. FIGS. 1G-1K show difference views and

implementations of the face mask 100 that includes an extension of a plastic piece above a conformable member. FIG. 1L shows the face mask 100 having a single conformable member, and FIG. 1M shows an implementation of the face mask 100 having straps that form first and second loops.

[34] The face mask 100 of FIGS. 1A-1M may include a transparent plastic piece 102 having a front side 104, a back side 106, a top side 108, a bottom side 110, a left side 112, and a right side 114. The transparent plastic piece 102 of FIGS. 1A-1M is shown in greater detail and discussed below in connection with FIG. 4. The transparent plastic piece 102 may, in some implementations, include extension 102a as shown in FIGS. 1G-1K as described below. The extension 102a may cover the eyes and/or upper head region of a user. In some implementations, the viewing area of the transparent plastic piece 102 and/or extension 102a may be translucent, opaque, or the like. The transparent viewing area of the transparent plastic piece 102 and/or extension 102a may be coated with an anti-fog or fog-resistant coating to provide full-face visibility, where the coating may prevent the condensation of water in the form of small droplets on a surface of the mask which resemble fog. That is, the anti-fog or fog-resistant coating may minimize moisture collection (e.g., from the breath of a wearer of the face mask 100) on the back side 106 of the transparent plastic piece 102 and/or extension 102a.

[35] A first conformable member 116 may be affixed to a first portion 118 of the back side 106 of the transparent plastic piece 102 and disposed parallel to the top side 108 of the transparent plastic piece 102. The first conformable member may be formed, molded, and/or constructed from foam or any other suitable material. The first conformable member 116 may be shown in greater detail in FIGS. 2A-2C and described below.

[36] A second conformable member 120 may be affixed to a second portion 122 of the back side 106 of the transparent plastic piece 102 and disposed parallel to the bottom side 110 of the transparent plastic piece 102. The second conformable member 120 may be formed from foam or any other suitable material that may conform to a portion of the face of the wearer of the face mask 100.

[37] At least one first strap 124 may have a first end 126 and a second end 128. As used throughout, the at least one first strap 124 may be a single strap, or may include two or more

straps. When the at least one first strap 124 is a single strap, a portion of the at least one first strap 124 may be affixed parallel to the top side 108 of the transparent plastic piece 102 between the first end 126 and the second end 128 on either the front side 104 or the back side 106 of the plastic piece 102. In implementations where the at least one first strap 124 is two or more straps, a portion of one of the straps may be affixed to the plastic piece 102 opposite the first end 126, and a portion of another one of the straps may be affixed to the plastic piece 102 opposite the second end 128. The two or more straps of the at least one first strap 124 may be affixed to the front side 104 or the back side 106 of the plastic piece 102. The portion of the at least one first strap 124 may be affixed parallel to the top side 108 using an adhesive, by bonding, by using ultrasonic welding, stitching, or any other suitable method of affixing the at least one first strap 124 to the plastic piece 102. At least one second strap 130 may have a first end 132 and a second end 134. As used throughout, the at least one second strap 130 may be a single strap, or may include two or more straps. When the at least one second strap 130 is a single strap, a portion of the second strap 130 is affixed to the bottom side 110 of the plastic piece between the first end 132 and the second end 134 on either the front side 104 or the back side 106 of the plastic piece 102. In implementations where the at least one second strap 130 is two or more straps, a portion of one of the straps may be affixed to the plastic piece 102 opposite the first end 132, and a portion of another one of the straps may be affixed to the plastic piece 102 opposite the second end 134. The two or more straps of the at least one second strap 130 may be affixed to the front side 104 or the back side 106 of the plastic piece 102. The portion of the at least one second strap 130 may be affixed to the bottom side 108 using an adhesive, by bonding, by using ultrasonic welding, stitching, or any other suitable method of affixing the at least one second strap 130 to the plastic piece 102. The portions of the at least one first strap 124 and the at least one second strap 130 may be affixed to the transparent plastic piece 102 so that a portion, such as 50%-95%, of the front side 104 and/or the back side 106 of the transparent plastic piece 102 is uncovered. The first strap 124 and the second strap 130 may be formed of a fabric, such as a woven fabric or a knitted fabric, and/or any other suitable material. In some implementations, the fabric may include elastic material, or may be elastic.

[38] In some implementations where the at least one strap 124 and/or the at least one strap 130 are affixed to the back side 106 of the plastic piece 102, the at least one first strap 124 may be disposed between the transparent plastic piece 102 and the first conformable member 116, and

the at least one second strap 130 may be disposed between the transparent plastic piece 102 and the second conformable member 120. In this implementation, the at least one first strap 124 may be affixed to the transparent plastic piece 102 and the first conformable member 116, and may be affixed the at least one second strap 130 to the transparent plastic piece 102 and the second conformable member 120.

[39] In some implementations where the at least one strap 124 and/or the at least one strap 130 are affixed to the front side 104 of the plastic piece 102, the at least one first strap 124 may be affixed to the front side 104 of the plastic piece 102 so as to be parallel to the top side 108, and the at least one second strap 130 may be affixed to the front side 104 of the plastic piece 102 so as to be parallel to the bottom side 110.

[40] The left side 112 and the right side 114 of the transparent plastic piece 102 may be unsealed, and/or may not have any parts attached to them, except at the points where they meet the top side 108 and the bottom side 110 of the transparent plastic piece 102 (e.g., where the first strap 124 and he second strap 130 are attached). Alternatively, the left side 112 and right side 114 of the transparent plastic piece 102 may have cloth-like materials attached to them in a manner sufficient to protect the wearer from particulates or bacteria from entering the face mask 100.

[41] The at least one first strap 124 and the at least one second strap 130 may have a width of 0.2 inches to 2 inches. In some implementations, the width may be between 0.3 inches to 1 inch, or between 0.3 inches to 0.5 inches. The at least one first strap 124 and the at least one second strap 130 may have a thickness of 0.004 to 0.3 inches, or any suitable thickness. The ends 126 and 128 of the at least one first strap 124 may each be 12-16 inches (e.g., as measured from the left side 112 or the right side 114 of the transparent plastic piece 102). The ends 132 and 134 of the at least one second strap 130 may each be 12-16 inches (e.g., as measured from the left side 112 or the right side 114 of the transparent plastic piece 102). That is, the at least one first strap 124 and the at least one second strap 130 may have a length that allows a wearer to tie them to each other around the back of the head of the wearer. For example, ends 126 and 128 of the at least one first strap 124 may be tied together, and ends 132 and 134 of the at least one second strap 130 may be tied together. In some implementations, such as those discussed below

in connection with FIG. 1M, the at least one first strap 124 and the at least on second strap 130 may be connected to form first loop 124a and second loop 130a, or the first loop 124a and the second loop 130a may be formed from an elastic material. The first loop 124a and the second loop 130a may be of a sufficient length (e.g., 6 inches to 12 inches) so that they may be fitted behind a user's ears so as to affix the face mask 100 to the user's face.

[42] FIGS. 2A-2C show more detailed views of the first conformable member 116 shown in, for example, FIGS. 1A, 1B, 1D, and 1E. FIG. 2A shows that the first conformable member 116 may have a width 201, which may be 0.33 inches, or any other suitable distance between 0.2-0.8 inches. FIGS. 2A-2B show that the first conformable member 116 may have at least one surface that has a concave section 202, 204. The first conformable member 116 may have a surface having a first protrusion 206 and a second protrusion 208. An indentation 210 may be disposed between surfaces 212 and 214, so as to be disposed between the first protrusion 206 and the second protrusion 208. The first conformable member 116 may have a surface 215 that may be continuously curved. In some implementations, the surface 215 of the first conformable member 116 may be straight. In some implementations, the surface 215 may be affixed to back side 106 of the transparent plastic piece 102.

[43] FIG. 2C shows a top-down view of the first conformable member 116. A distance 220 may be between opposite ends of the first conformable member 116 (e.g., at the ends of the concave sections 202 and 204). The distance may be 6.25 inches, or any other suitable distance, such as between 4-8 inches. A distance 222 may be a distance between an end of the concave section 202 and the indentation 210. In some implementations, the distance 222 may be 3.13 inches, or may be any other suitable distance between 2-5 inches. A similar distance may be between an end of the concave section 204 and the indentation 210. A distance 224 between the indentation 210 and second protrusion 208 may be 0.5 inches, or any other suitable distance, such as between 0.25-1 inches. A similar distance may be between the indentation 210 and the first protrusion 206. A differential distance 226 between inner and outer points of the concave section 202 may be 0.14 inches, or any other suitable distance, such as 0.1-0.8 inches. An angle 228 between surfaces 212 and 214 may be, for example 125.7° degrees, or any other suitable angle between 90° and 180° degrees. A radius 230 of the concave section 204 may be 5.24 inches, or any other suitable radius, such as 4-8 inches. A radius of the concave section 202 may

be similar to or the same as that of the radius 228. A radius 232 of the surface 215 of first conformable member 116 may be 6.17 inches, or any other suitable radius, such as 5-10 inches. A radius 234 may be a radius for a surface disposed between the surfaces 212 and 214, where the radius may be 0.1 inches, or any suitable radius, such as 0.05-0.5 inches.

[44] FIGS. 3A-3C show detailed views of the second conformable member 120 shown in, for example, FIGS. 1A-1M. The second conformable member 120 may have a surface 121 that is continuously curved. The second conformable member 120 may have a surface 122, where at least a portion of the surface 122 is concave. The second conformable member 120 may have a surface 123, where at least a portion of the surface 123 is convex. In some implementations, the surface 123 may be continuously curved. In some implementations, the surface 123 of the second conformable member 120 may be straight.

[45] As shown in FIG. 3B, the second conformable member 120 may have a length 300, which may be 6 inches, or any other suitable length, such as 4-8 inches. The second conformable member 120 may have a height 302, which may be 0.6 inches, or any suitable height, such as 0.4-1.0 inches.

[46] As shown in FIG. 3C, the surface 121 of the conformable member 120 may have a curvature radius 304 of 12.19 inches, or any other suitable radius, such as 8-15 inches. The surface 123 of the conformable member 120 may have a curvature radius 306 of 3.75 inches, or any other suitable radius, such as 2-5 inches.

[47] As shown in, for example, FIGS. 1B, 1D, and 1E, the first conformable member 116 and the second conformable member 120 may be affixed to the back side 106 of the transparent plastic piece 102 with adhesive. In some implementations, the first conformable member 116 and the second conformable member 120 may be bonded, molded, stitched, ultrasonically welded, or any other suitable method of forming and/or affixing the first conformable member 116 and the second conformable member 120 to the back side 106 of the transparent plastic piece 102.

[48] The transparent plastic piece 102 may be planar prior to affixing, molding, stitching, ultrasonically welding, and/or forming at least one of the first conformable member 116 and the

second conformable member 120. That is, prior to affixing at least one of the first conformable member 116 and the second conformable member 120, the transparent plastic piece 102 may lay flat and may not have pleats. When the first conformable member 116 and the second conformable member 120 are affixed, molded, stitched, ultrasonically welded, and/or formed to the transparent plastic piece 102, they cooperate to shape a curvature of the transparent plastic piece 102. In some implementations, a vertical midline of the transparent plastic piece 102 may retain a radius of curvature greater than 1 inch. In some implementations, the transparent plastic piece 102 may greater than 2 inches, and in some implementations, the radius of curvature of the transparent plastic piece 102 may be greater than 3 inches. A horizontal midline of the transparent plastic piece 102 may have a radius of curvature greater than 0.5 inch. In some implementations, the horizontal midline of the transparent plastic piece 102 may have a radius greater than 1 inch, and in some implementations, may have a radius that is greater than 2 inches. The transparent plastic piece 102 may extend away from the wearer's face, but may not protrude outwards more than 3 to 5 inches. In some implementations, transparent plastic piece 102 may extend away from the wearer's face between 2 to 4 inches, and in some implementations, between 0.1 to 2 inches.

[49] As shown in FIG. 4, the top portion 108 of the transparent plastic piece 102 may have length 400, which may be 6.5 inches, or any other suitable length, such as between 4-15 inches. In some implementations, the length 400 of the transparent plastic piece 102 be between 5 to 13 inches long, and in some implementations, between 6 and 12 inches long. The side portion 114 of the transparent plastic piece 102 may have a length 402, which may be 2.75 inches, or any other suitable length, such as between 2 to 7 inches. In some implementations, the length 402 may be between 2 to 6 inches wide, and in some implementations, between 3 to 5 inches. The side portion 112 of the transparent plastic piece 102 may have length that is similar to or the same as length 402. A length 404 between the top portion 108 and the bottom portion 406 of the transparent plastic piece 102 may be 3.75 inches, or any other suitable length, such as 2.5-5.5 inches. In implementations such as those shown in FIG. 1I, the length 404 may be increased when the face mask 100 includes an extension 102a for the plastic piece 102, as discussed below. A radius 406 of the bottom portion 110 of the transparent plastic piece 102 may be 7.8 inches, or any other suitable radius, such as 6-10 inches.

[50] The transparent plastic piece 102 and/or the extension 102a may be between 1 and 10 mils in thickness. In some implementations, the transparent plastic piece 102 and/or the extension 102a may be between 1 to 8 mils in thickness. In some implementations, the transparent plastic piece 102 and/or the extension 102a may be between 3 to 7 mils in thickness.

[51] FIG. 1G show a front view and FIG. 1H shows a side view of the face mask 100 having the extension 102a of the plastic piece 102. The extension 102a may be a portion of the plastic piece 102 which extends above a portion where the first conformable member 116 and/or at least one first strap 124 may be affixed, molded, stitched, ultrasonically welded, and/or formed to the plastic piece 102. The top portion 108 may be the top of the extension 102a of the plastic piece 102.

[52] FIG. 1I shows the extension 102a of the plastic piece 102, where portions 102b and/or 102c of the extension 102a angle outwards away from the left and right sides of the plastic piece 102 according to an implementation of the disclosed subject matter. The extension 102a may have a height 150 that is the distance between a top of the first conformable member 116 to the top portion 108, which may be have a range of 1-8 inches. The portions102b may have a width 151 and portion 102c may have a width 152, where each width 151, 152 may have a range of 0-6 inches.

[53] FIGS. 1J-1K show examples of the face mask 100 that include the extension 102a of the plastic piece 102, where the face mask 100 may include a headband 160 according to implementations of the disclosed subject matter. As shown in FIG. 1J, a portion of the headband 160 may be affixed, molded, stitched, ultrasonically welded, and/or formed to the top portion 108 of the extension 102a of the plastic piece 102. The headband 160 may be made from an elastic material, and may be used to secure the face mask 100 on the head of a user. The headband may be 4-16 inches in length, or any suitable length to fit around the user's head. The face mask 100 shown in FIG. 1J may include the at least one first strap 124 and the at least one second strap 130, which may be used to secure the face mask 100 to the head of the user, along with the headband 160. As shown in FIG. 1K, the face mask 100 may be include the headband 160 and the at least one second strap 130, which may be used to secure the face mask 100 to the head of the user. As shown in FIGS. 1J-1K, a conformable member 117 may be affixed to the

back side 106 parallel to the top portion 108 of the extension 102a of the plastic piece 102. The conformable member 117 may be affixed, molded, stitched, ultrasonically welded, and/or formed to the extension 102a of the plastic piece 102. The conformable member 117 may be foam or any suitable material, and may have a curved, straight, concave, and/or any suitably shaped surface that may conform to a user's head. The conformable member 117 may be similar to the first conformable member 116 as described throughout.

[54] FIG. 1L shows the face mask 100 having a single conformable member 120 according to an implementation of the disclosed subject matter. The face mask 100 may include the plastic piece 102 and the extension 102a, and may be fitted and/or secured to the head of the user with the at least one first strap 124, the at least one second strap 130, and/or the second conformable member 120.

[55] FIG. 1M shows the face mask 100 that is similar to the implementations shown in FIGS. 1A-1F, but the face mask 100 of FIG. 1M has the first end 126 of the at least one first strap 124 connected to the first end 134 of the at least one second strap 130 to form a first loop 124a, and the second end 128 of the at least one first strap 124 connected to the second end 134 of the at least one second strap 130 to form second loop 130a. The at least one first strap 124 and the at least one second strap 130 may be formed from a material that includes elastic. In some implementations, the first loop 124a may be an elastic strap that may be affixed, molded, stitched, ultrasonically welded, and/or formed to side portion 112, and the second loop 130 may be an elastic strap that is affixed, molded, stitched, ultrasonically welded, and/or formed to the side portion 114. The first loop 124a and the second loop 130 may be fitted around the ears of the user to secure the face mask 100 to the user.

[56] FIGS. 5A and 6A show components of a face mask 100a, and FIGS. 5B and 6B show components of a face mask 100b, which may be alternative implementations to the face mask 100 having components shown in FIGS. 1A-4. The face mask 100a and the face mask 100b may include the first conformable member 116 shown in FIGS. 2A-2C and described above, and the second conformable member 120 shown in FIGS. 3A-3C and described above.

[57] FIG. 5A shows a face mask 100a having angled side edges 112a and 114a according to an implementation of the disclosed subject matter. The face mask 100a may include a

transparent plastic piece 102b having a top side 108, a bottom side 110, a left side 112a, and a right side 114a. The transparent plastic piece 102b may have a front side and a back side, which may be similar to the front side 104 and the back side 106 of the transparent plastic piece 102 shown in FIG. 1A and described above. The top side 108 of the face mask 100a may have a plurality of edges 108a, 108b. The bottom side 110 of the face mask 100a may have a curved edge.

[58] A first conformable member, which may be similar to first conformable member 116 described above and shown in FIGS. 2A-2C, may be affixed, molded, stitched, ultrasonically welded, and/or formed to a first portion of the back side of the transparent plastic piece 102b and disposed parallel to the top side 108 of the transparent plastic piece 102b. The first conformable member may be formed from foam or any other suitable material.

[59] The transparent plastic piece 102b is shown in greater detail in FIG. 6A. In some implementations, the viewing area may be translucent, opaque, or the like. The transparent viewing area may be coated with an anti-fog or fog-resistant coating to provide full-face visibility, where the coating may prevent the condensation of water in the form of small droplets on a surface of the mask which resemble fog. That is, the anti-fog or fog-resistant coating may minimize moisture collection (e.g., from the breath of a wearer of the face mask 100a) on the back side of the transparent plastic piece 102b.

[60] A second conformable member may be affixed molded, stitched, ultrasonically welded, and/or formed to a second portion of a back side of the transparent plastic piece 102b and disposed parallel to the bottom side 110 of the transparent plastic piece 102b. The second conformable member may be similar to the second conformable member 120 shown in FIGS. 3A-3C and described above, and may be formed from foam or any other suitable material that may conform to a portion of the face of the wearer of the face mask 100a.

[61] Similar to the face mask 100 shown in FIG. 1A, the face mask 100a shown in FIG. 5A may include the at least one first strap 124, having the first end 126 and the second end 128. A portion of the at least one first strap 124 may be affixed, molded, stitched, ultrasonically welded, and/or formed to the top side 108 of the transparent plastic piece 102b between the first end 126 and the second end 128. The portion of the at least one first strap 124 may be affixed to

the top side 108 with an adhesive, or may be molded, stitched, ultrasonically welded, and/or formed to the top side 108. In implementations where the at least one first strap 124 is two or more straps, a portion of one of the straps may be affixed to the plastic piece 102b opposite the first end 126, and a portion of another one of the straps may be affixed to the plastic piece 102b opposite the second end 128. The at least one second strap 130 may have the first end 132 and the second end 134. A portion of the at least one second strap 130 may be affixed, molded, stitched, ultrasonically welded, and/or formed to the bottom side 110 of the plastic piece 102b between the first end 132 and the second end 134. The portion of the second strap 130 may be affixed to the bottom side 110 with an adhesive, or may be molded, stitched, ultrasonically welded, and/or formed to the bottom side 110. In implementations where the at least one second strap 130 is two or more straps, a portion of one of the straps may be affixed to the plastic piece 102b opposite the first end 132, and a portion of another one of the straps may be affixed to the plastic piece 102b opposite the second end 134.

[62] FIG. 5B shows a face mask 100b having straight side edges according to an implementation of the disclosed subject matter. The face mask 100b may include a transparent plastic piece 102c having a top side 108, a bottom side 110, a left side 112b, and a right side 114b. The transparent plastic piece 102c may have a front side and a back side, which may be similar to the front side 104 and the back side 106 of the transparent plastic piece 102 shown in FIG. 1A and described above. The top side 108 of the face mask 100b may have a plurality of edges 108a, 108b. The bottom side 110 of the face mask 100b may have a curved edge.

[63] A first conformable member may be affixed, molded, stitched, ultrasonically welded, and/or formed to a first portion of the back side of the transparent plastic piece 102c and disposed parallel to the top side 108 of the transparent plastic piece 102c. The first conformable member may be formed from foam or any other suitable material. The first conformable member may be similar to the first conformable member 116 shown in FIGS. 2A-2C and described above.

[64] The transparent plastic piece 102c is shown in greater detail in FIG. 6B. In some implementations, the viewing area may be translucent, opaque, or the like. The transparent viewing area may be coated with an anti-fog or fog-resistant coating to provide full-face

visibility, where the coating may prevent the condensation of water in the form of small droplets on a surface of the mask which resemble fog. That is, the anti-fog or fog-resistant coating may minimize moisture collection (e.g., from the breath of a wearer of the face mask 100b) on the back side of the transparent plastic piece 102c.

[65] A second conformable member may be affixed, molded, stitched, ultrasonically welded, and/or formed to a second portion of a back side of the transparent plastic piece 102c and disposed parallel to the bottom side 110 of the transparent plastic piece 102c. The second conformable member may be similar to the second conformable member 120 shown in FIGS. 3A-3C and described above, and may be formed from foam or any other suitable material that may conform to a portion of the face of the wearer of the face mask 100a.

[66] Similar to the face mask 100 shown in FIG. 1A, the face mask 100b shown in FIG. 5B may include the at least one first strap 124, having the first end 126 and the second end 128. A portion of the at least one first strap 124 may be affixed to the top side 108 of the transparent plastic piece 102c between the first end 126 and the second end 128. In implementations where the at least one first strap 124 is two or more straps, a portion of one of the straps may be affixed to the plastic piece 102c opposite the first end 126, and a portion of another one of the straps may be affixed to the plastic piece 102c opposite the second end 128. The portion of the at least one first strap 124 may be affixed to the top side 108 with an adhesive. The at least one second strap 130 may have the first end 132 and the second end 134. A portion of the at least one second strap 130 may be affixed to the bottom side 110 of the plastic piece 102b between the first end 132 and the second end 134. The portion of the second strap 130 may be affixed to the bottom side 108 with an adhesive. In implementations where the at least one second strap 130 is two or more straps, a portion of one of the straps may be affixed to the plastic piece 102c opposite the first end 132, and a portion of another one of the straps may be affixed to the plastic piece opposite the second end 134.

[67] FIG. 6A shows the transparent plastic piece 102b used in connection with the implementation of the face mask 100a shown in FIG. 5A. As shown in in FIG. 6A, a transparent plastic piece 102b may have the top side 108, having edges 108a1 and 108b1. An angle between the edges 108a1 and 108b1 may be between 100-180 degrees. In some implementations, the

angle between the edges 108a1 and 108b1 may be 120-180 degrees, and in some implementations, may be between 160-180 degrees with its vertex at the highest point of the vertical midline of the transparent plastic piece 102b.

[68] The transparent plastic piece 102b may have a left side 112a that has a first plurality of edges 112a1, 112a2, 112a3 and a right side 114a that includes a second plurality of edges 114a1, 114a2, 114a3. In some implementations, the first plurality of edges 112a1, 112a2, 112a3 may be symmetrical to the second plurality of edges 114a1, 114a2, 114a3. The first plurality of edges 112a1, 112a2, 112a3 may include a first plurality of angled edges (e.g., edges 112a1, 112a2, 112a3 are angled with respect to one another) and the second plurality of edges 114a1, 114a2, 114a3 comprises a second plurality of angled edges (e.g., edges 114a1, 114a2, 114a3 are angled with respect to one another).

[69] Bottom side 110a of the transparent plastic piece 102b may have a radius of curvature greater than 0.5 inch. In some implementations, the radius of curvature of the bottom side 110a may be greater than 2 inches, and in some implementations, may be greater than 3 inches.

[70] FIG. 6B shows the transparent plastic piece 102c used in connection with the implementation of the face mask 100b shown in FIG. 5B. The transparent plastic piece 102c may include the left side 112b and the right side 114b.

[71] As shown in in FIG. 6B, the transparent plastic piece 102c may have the top side 108, having edges 108a1 and 108b1. An angle between the edges 108a1 and 108b1 may be between 100-180 degrees. In some implementations, the angle between the edges 108a1 and 108b1 may be 120-180 degrees, and in some implementations, may be between 160-180 degrees with its vertex at the highest point of the vertical midline of the transparent plastic piece 102c.

[72] Similar to FIG. 6A, the bottom side 110a of the transparent plastic piece 102c shown in FIG. 6B may have a radius of curvature greater than 0.5 inch. In some implementations, the radius of curvature of the bottom side 110a may be greater than 2 inches, and in some implementations, may be greater than 3 inches.

[73] The foregoing description, for purpose of explanation, has been described with reference to specific implementations. However, the illustrative discussions above are not

intended to be exhaustive or to limit implementations of the disclosed subject matter to the precise forms disclosed. Many modifications and variations are possible in view of the above teachings. The implementations were chosen and described in order to explain the principles of implementations of the disclosed subject matter and their practical applications, to thereby enable others skilled in the art to utilize those implementations as well as various implementations with various modifications as may be suited to the particular use contemplated.

CLAIMS

1. A face mask, comprising:

a transparent plastic piece having a front side, a back side, a top side, a bottom side, a left side, and a right side;

a first conformable member affixed to a first portion of the back side and disposed parallel to the top side;

a second conformable member affixed to a second portion of the back side and disposed parallel to the bottom side;

at least one first strap having a first strap portion including a first end and a second strap portion including a second end, wherein portions of the first strap portion and the second strap portion are affixed parallel to the top side of the plastic piece; and

at least one second strap having a first strap portion including a first end and a second strap portion including a second end, wherein portions of the first strap portion and the second strap portion are affixed parallel to the bottom side of the plastic piece;

2. The face mask of claim 1, wherein the left side comprises a first plurality of edges and the right side comprises a second plurality of edges.

3. The face mask of claim 2, wherein the first plurality of edges are symmetrical to the second plurality of edges.

4. The face mask of claim 2, wherein the first plurality of edges comprises a first plurality of angled edges and the second plurality of edges comprises a second plurality of angled edges.

5. The face mask of claim 1, wherein the top side comprises a plurality of edges.

6. The face mask of claim 1, wherein the bottom side comprises a curved edge.

7. The face mask of claim 1, wherein the first conformable member has a first surface, wherein at least a portion of the first surface has at least one concave section.

8. The face mask of claim 1, wherein the first conformable member has a first surface having a first protrusion and a second protrusion.

9. The face mask of claim 1, wherein the second conformable member has a first surface that is continuously curved.

10. The face mask of claim 1, wherein the second conformable member has a first surface with a convex portion.

11. The face mask of claim 1, wherein the second conformable member has a first surface, wherein a portion of the first surface is concave.

12. The face mask of claim 1, wherein the first conformable member and the second conformable member are affixed to the back side with adhesive.

13. The face mask of claim 1, wherein the first conformable member and the second conformable member are molded or formed to the back side.

14. The face mask of claim 1, wherein the at least one first strap and the at least one second strap are formed from an elastic material.

15. The face mask of claim 14, wherein the first end of the at least one first strap is affixed to the first end of the at least one second strap to form a first loop, and the second end of the at least one first strap is affixed to the second end of the at least one second strap to form a second loop.

16. The face mask of claim 1, wherein the first conformable member affixed to the first portion of the back side and disposed parallel to the top side of the plastic piece such that a portion of the top side of the plastic piece extends from where the first conformable member is affixed.

17. The face mask of claim 16, further comprising an elastic band, wherein a portion of the elastic band is affixed parallel to the top side of the plastic piece.

18. The face mask of claim 16, wherein the portion of the top side of the plastic piece that extends from where the first conformable member is affixed has portions on the left side and the right side of the plastic piece that have a plurality of edges.

19. The face mask of claim 16, wherein the portion of the top side of the plastic piece that extends from where the first conformable member is affixed has portions on the left side and the right side of the plastic piece that have curved sections.

20. A face mask, comprising:

a transparent plastic piece having a front side, a back side, a top side, a bottom side, a left side, and a right side;

a first conformable member affixed to a portion of the front side and disposed parallel to the top side;

an elastic band, wherein a portion of the elastic band is affixed parallel to the top side of the plastic piece;

a second conformable member affixed to a portion of the back side and disposed parallel to the bottom side; and

a first strap portion having a first end and a second strap portion having a second end, wherein portions of the first strap portion and the second strap portion are affixed parallel to the bottom side of the plastic piece.

21. The face mask of claim 20, wherein a single strap includes the first strap portion and the second strap portion.

22. The face mask of claim 20, wherein a first strap includes the first strap portion and a second strap includes the second strap portion.

23. The face mask of claim 20, wherein the second conformable member has a first surface that is continuously curved.

24. The face mask of claim 20, wherein the second conformable member has a first surface, wherein a portion of the first surface is concave.

25. A face mask, comprising:

a transparent plastic piece having a front side, a back side, a top side, a bottom side, a left side, and a right side;

a first conformable member affixed to a first portion of the back side and disposed parallel to the top side;

a second conformable member affixed to a second portion of the back side and disposed parallel to the bottom side;

a first elastic strap having a first end and a second end, wherein the first end and the second end are affixed to different portions of the left side to form a first loop; and

a second elastic strap having a first end and a second end, wherein the first end and the second end are affixed to different portions of the right side to form a second loop.

26. The face mask of claim 25, wherein the left side comprises a first plurality of edges and the right side comprises a second plurality of edges.

27. The face mask of claim 26, wherein the first plurality of edges are symmetrical to the second plurality of edges.

28. The face mask of claim 26, wherein the first plurality of edges comprises a first plurality of angled edges and the second plurality of edges comprises a second plurality of angled edges.

29. The face mask of claim 25, wherein the top side comprises a plurality of edges.

30. The face mask of claim 25, wherein the bottom side comprises a curved edge.

31. The face mask of claim 25, wherein the first conformable member has a first surface, wherein at least a portion of the first surface has at least one concave section.

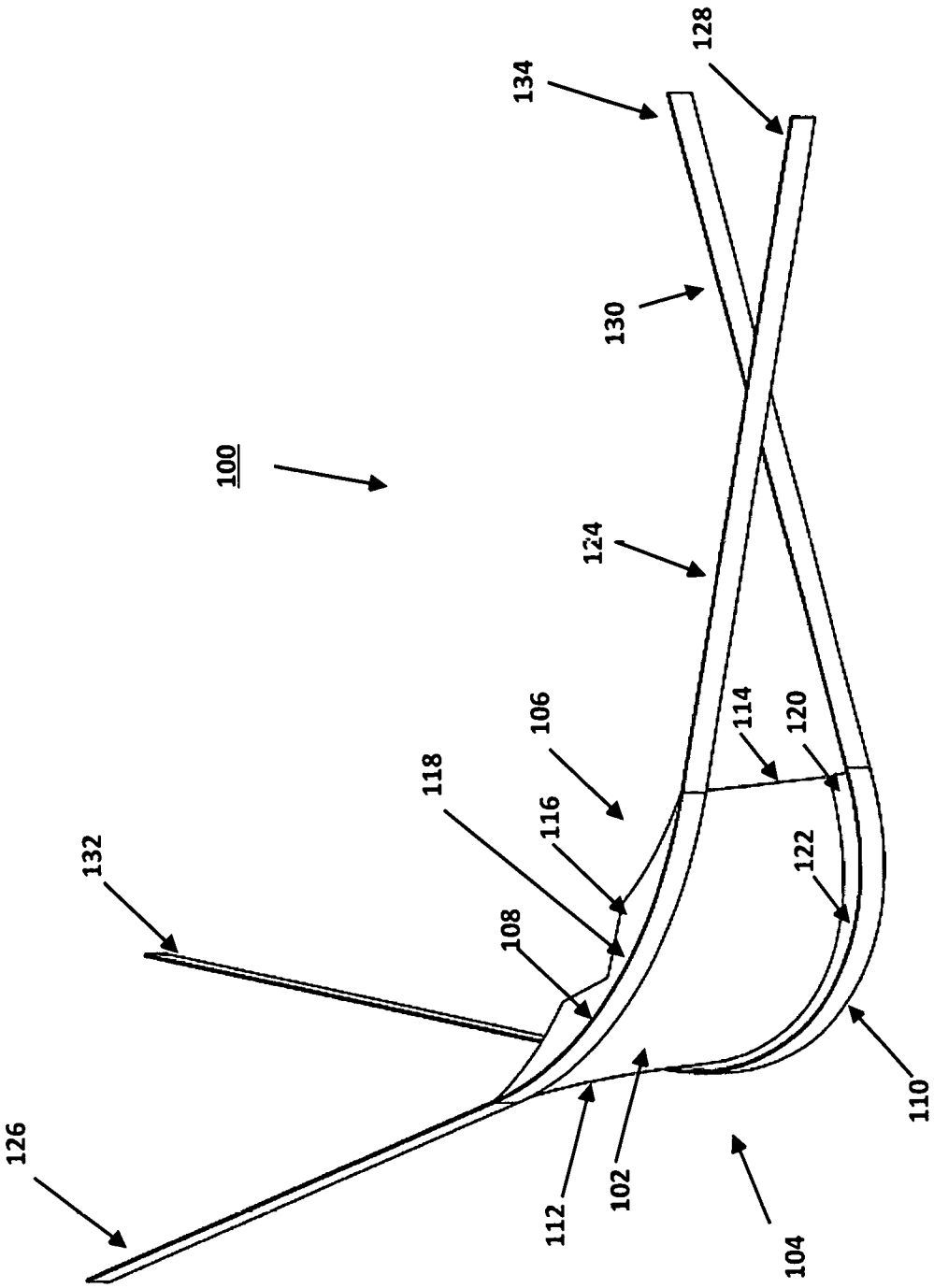
32. The face mask of claim 25, wherein the first conformable member has a first surface having a first protrusion and a second protrusion.

33. The face mask of claim 25, wherein the second conformable member has a first surface that is continuously curved.

34. The face mask of claim 25, wherein the second conformable member has a first surface with a convex portion.

35. The face mask of claim 25, wherein the second conformable member has a first surface, wherein a portion of the first surface is concave.

FIG. 1A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134

FIG. 1B

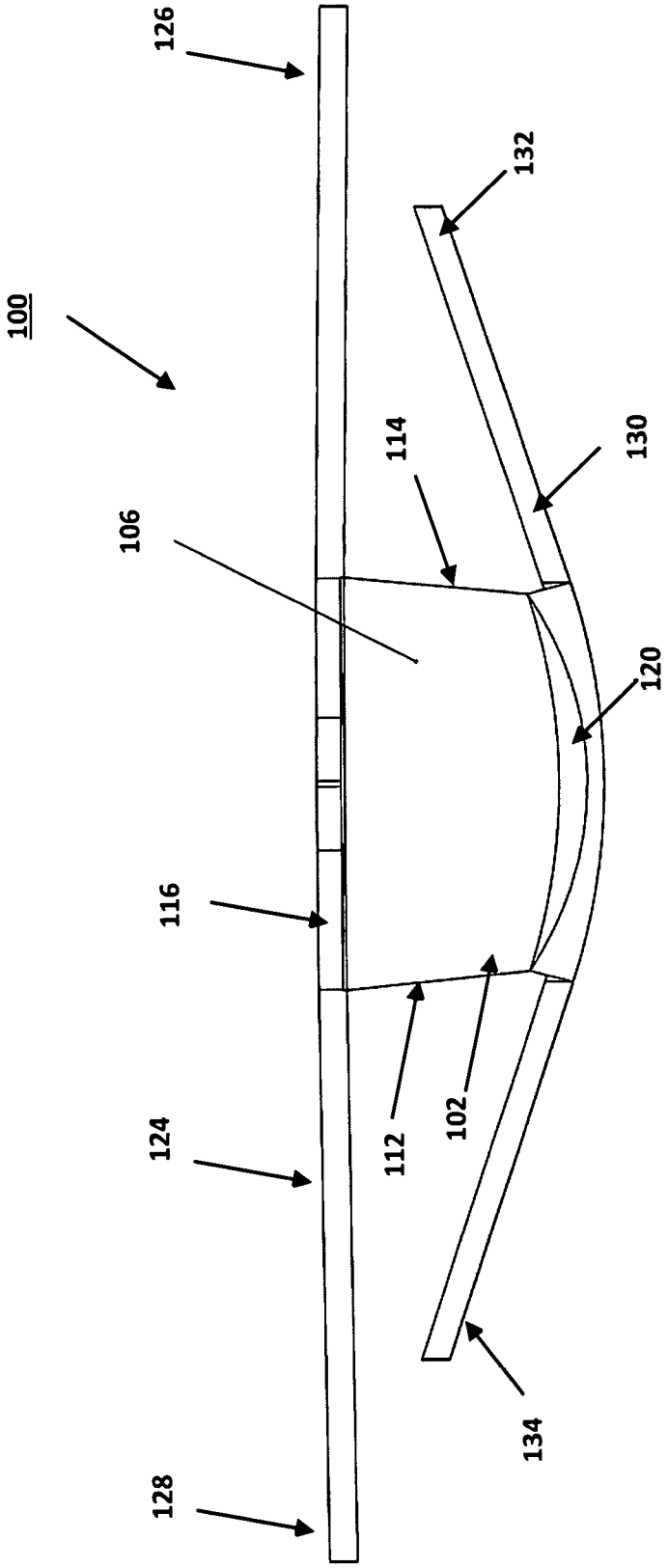


FIG. 1C

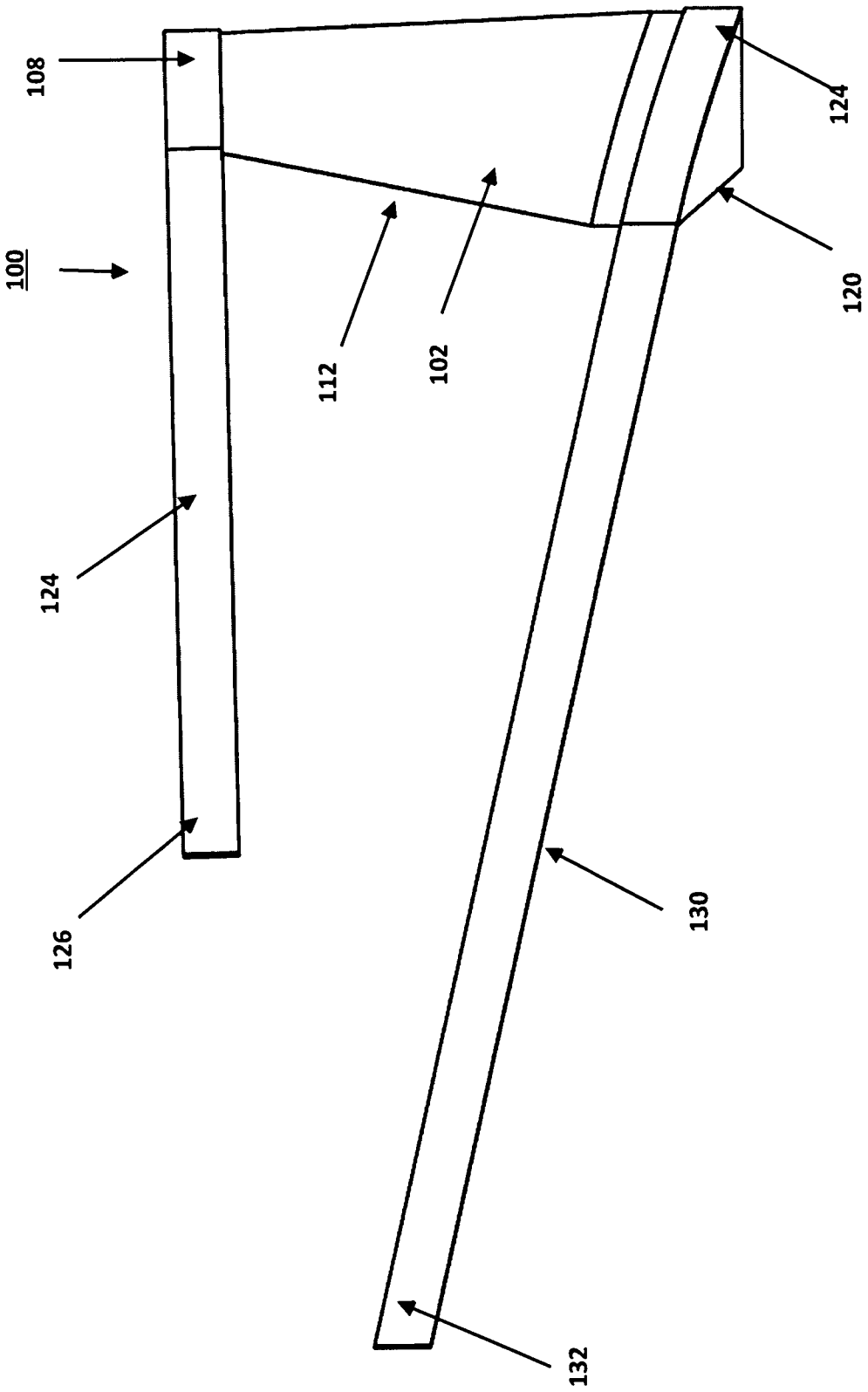


FIG. 1D

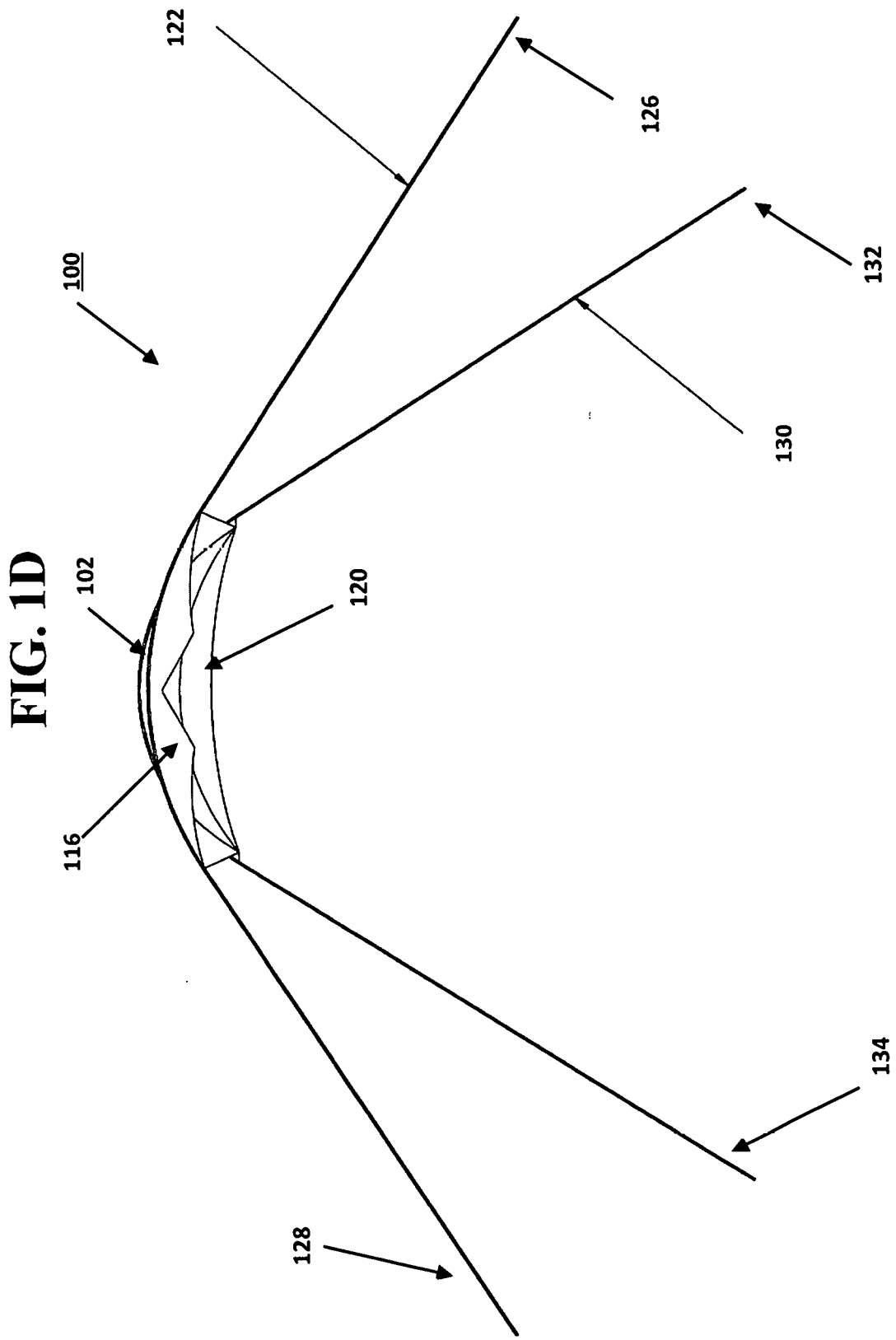


FIG. 1E

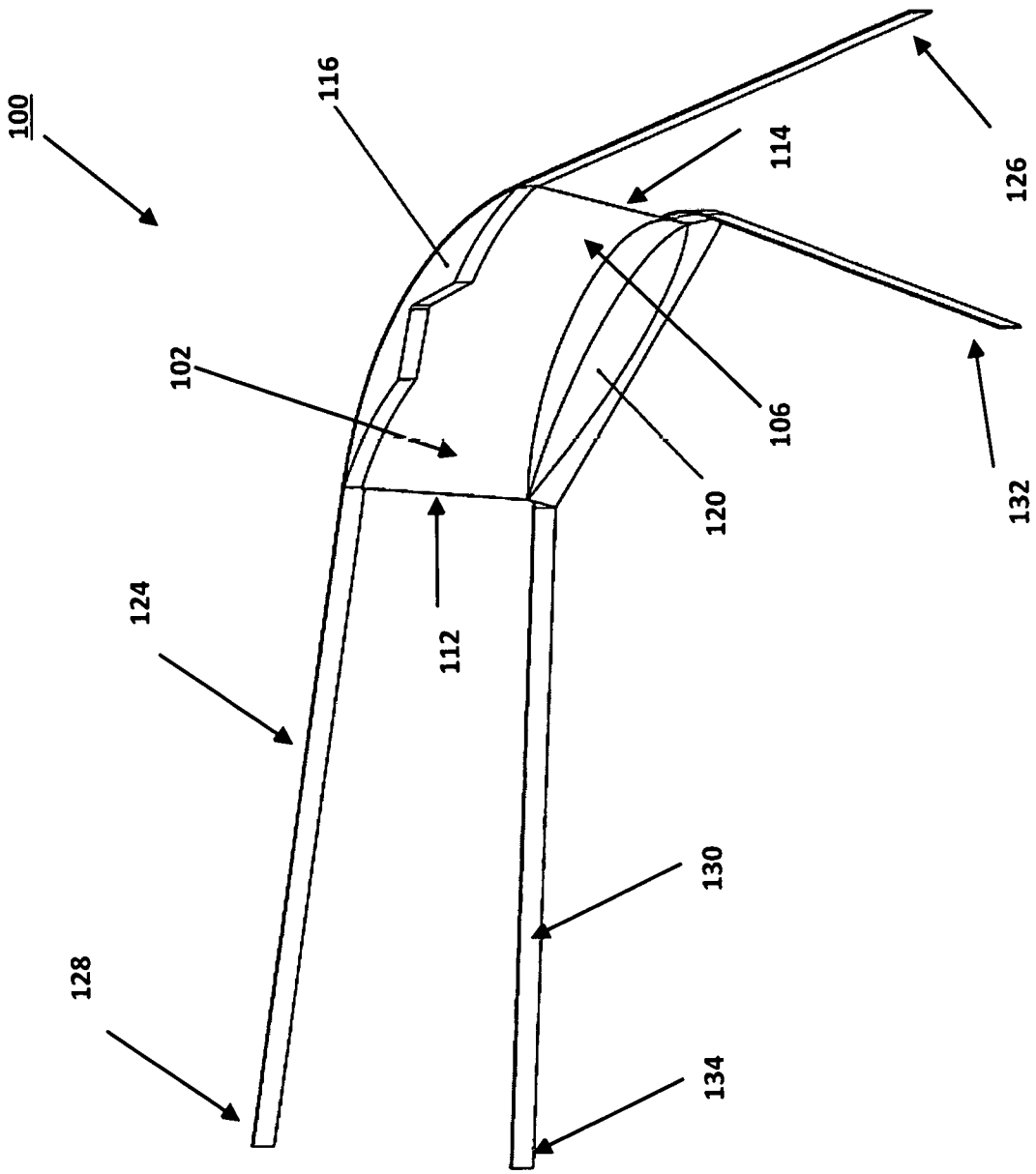


FIG. 1F

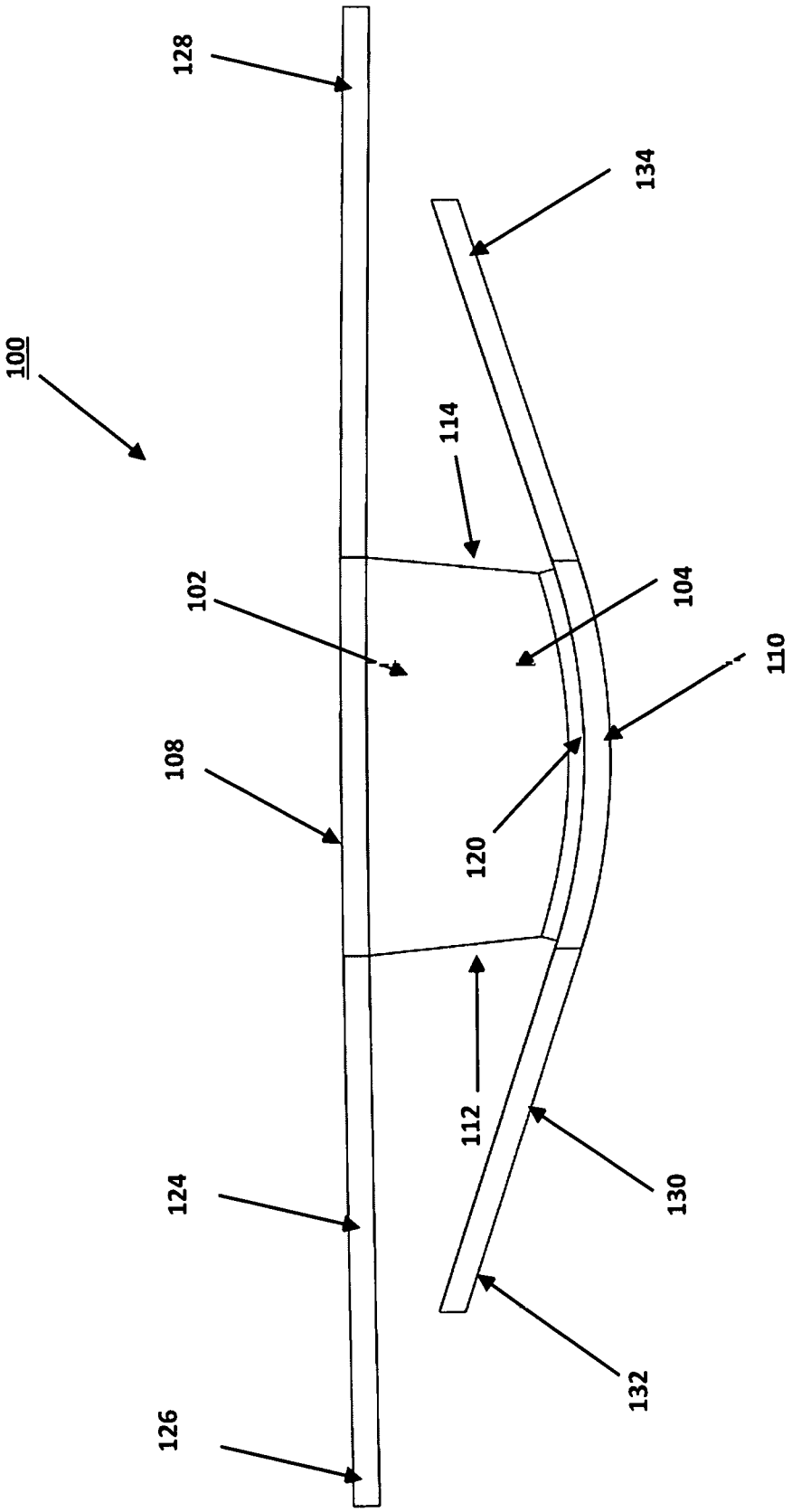


FIG. 1G

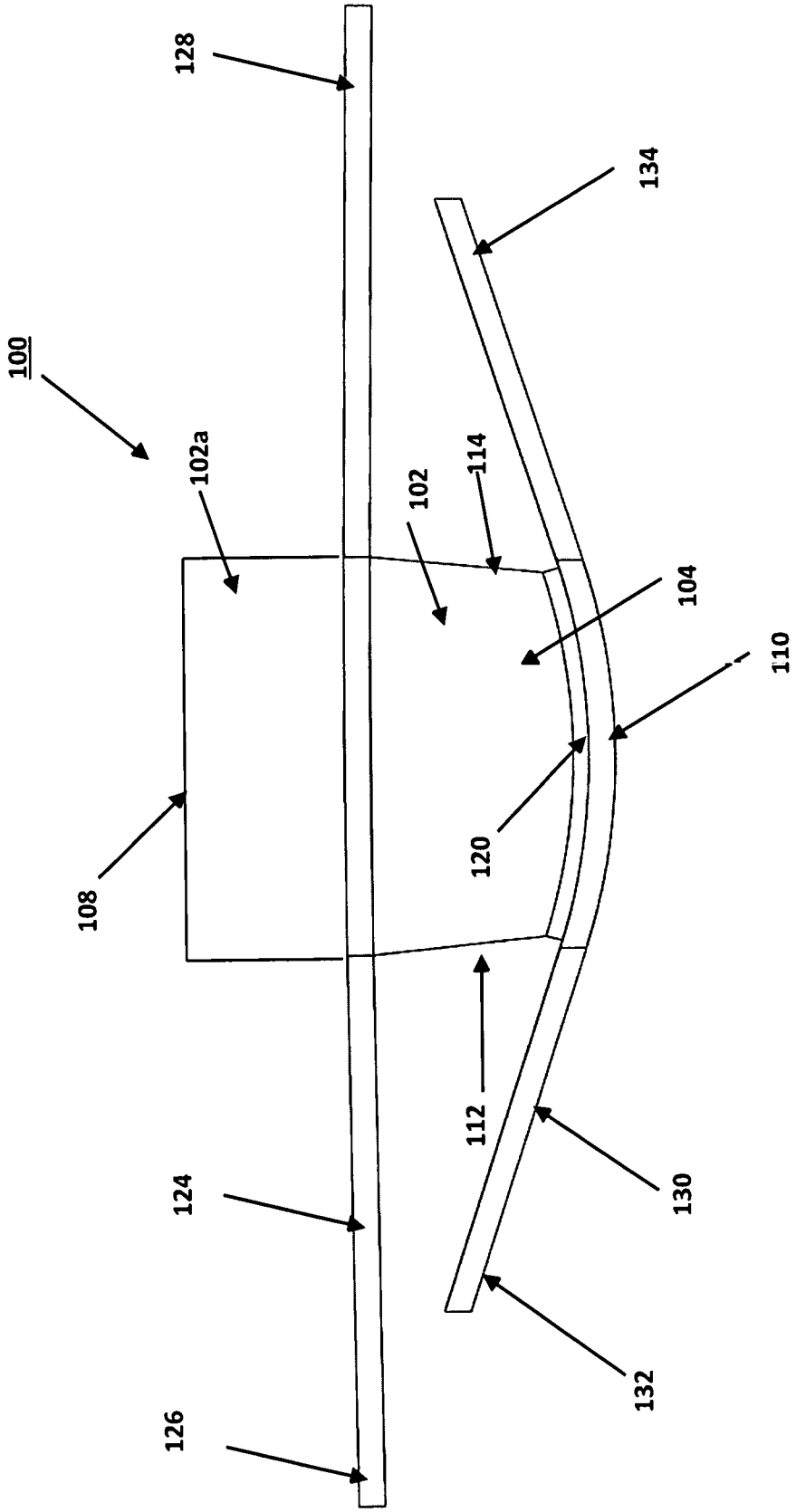


FIG. 1H

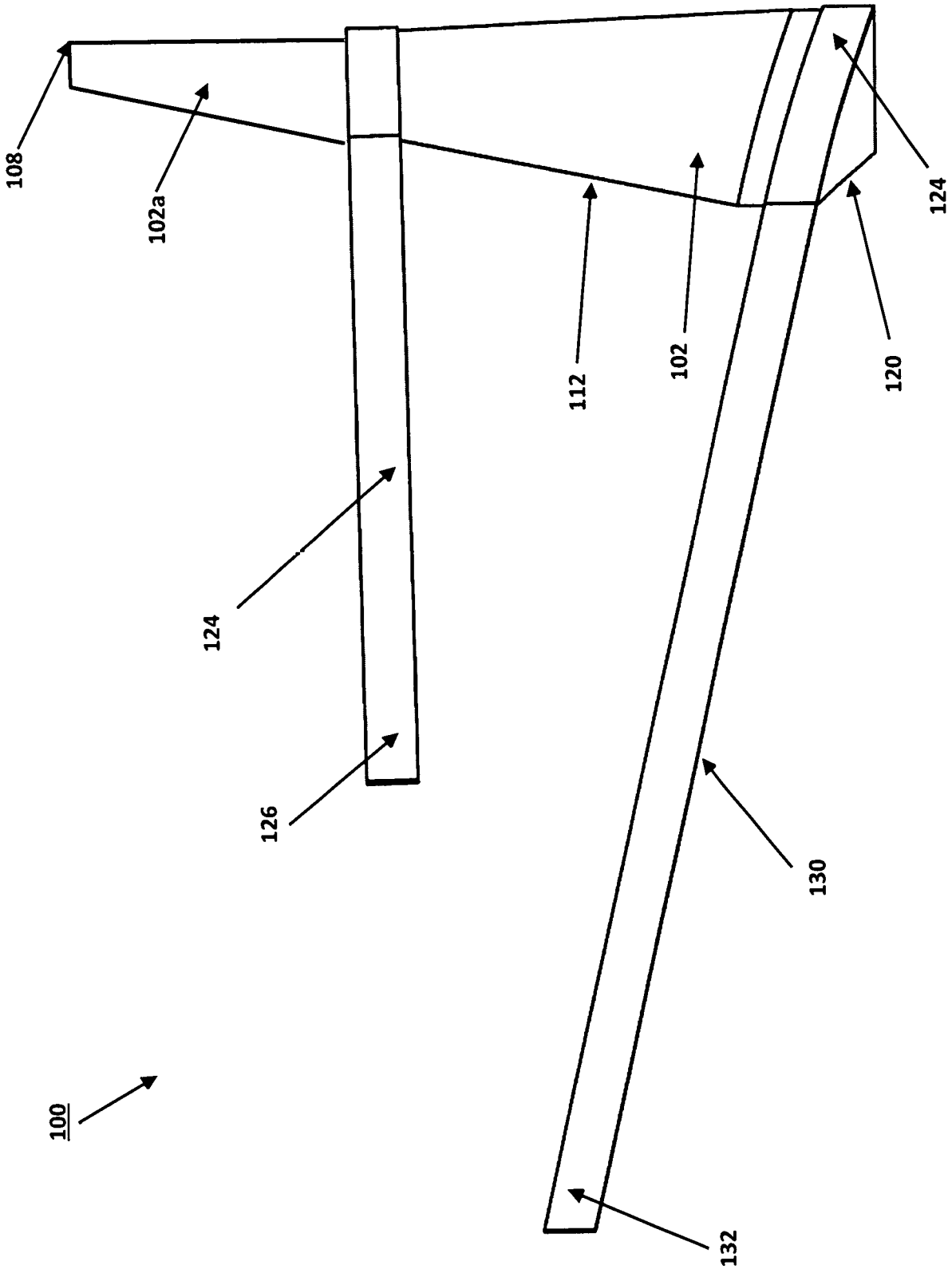
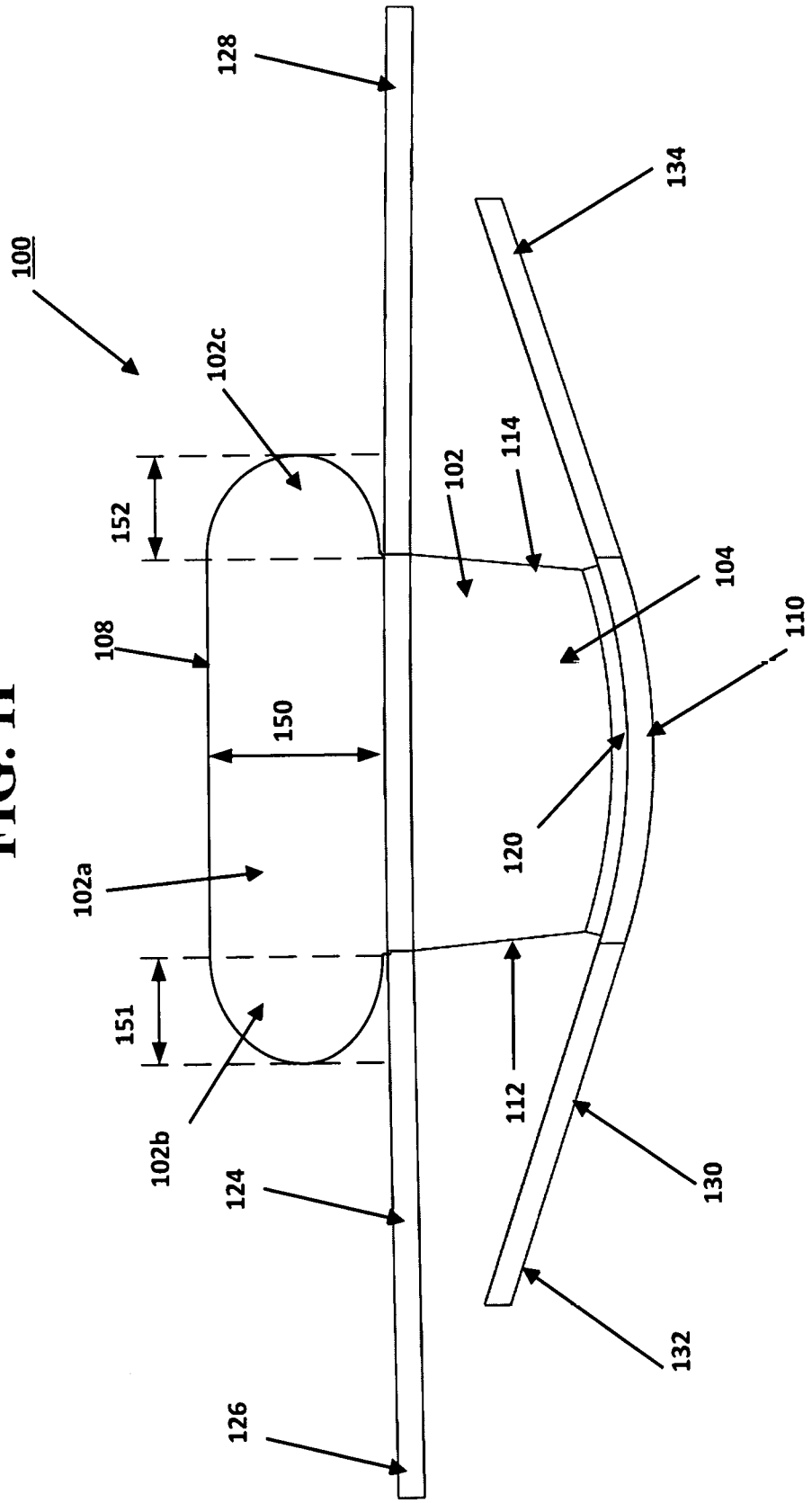


FIG. 1I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102c
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102a
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102b
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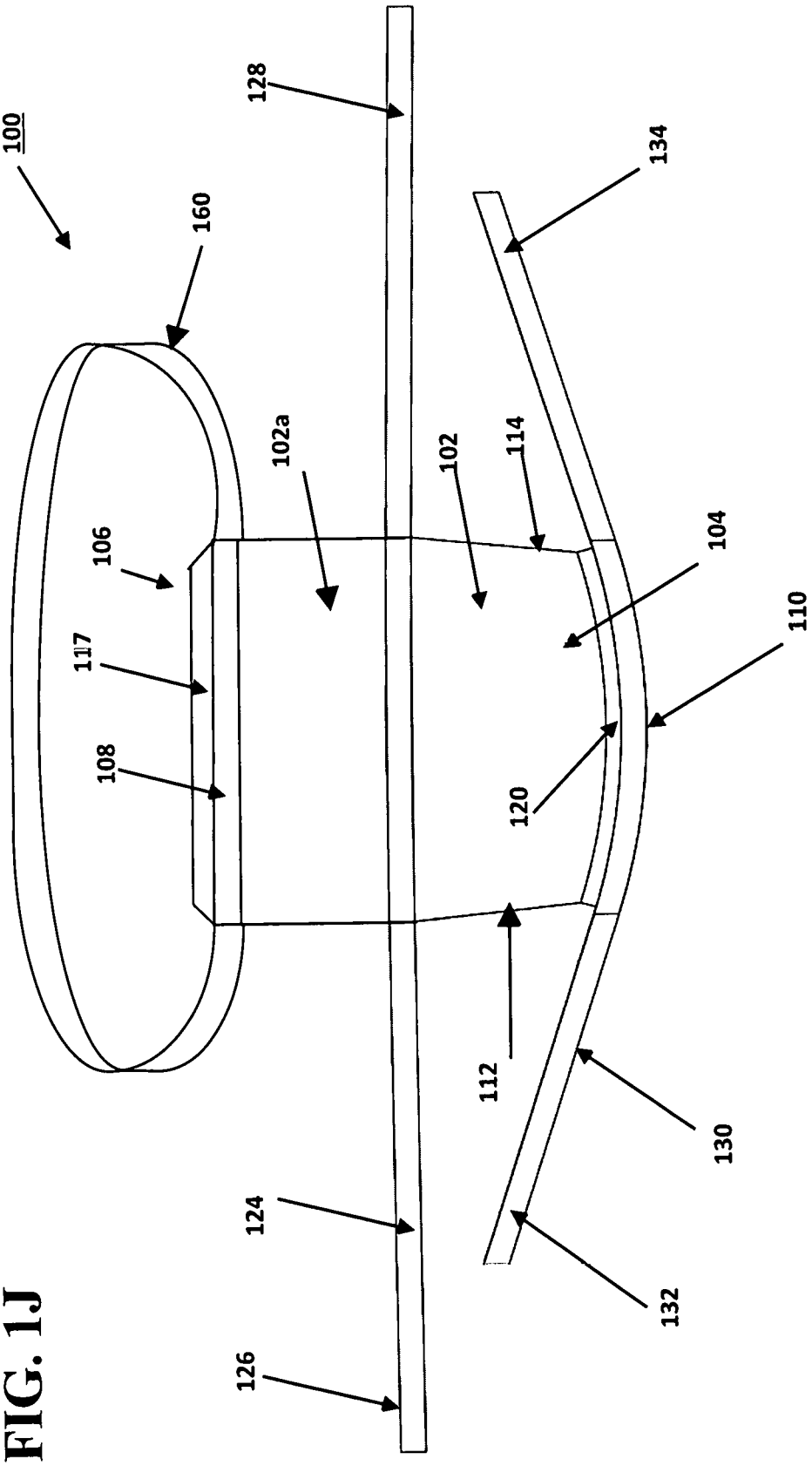
124
132
126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134
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114
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117
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120
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132
126

FIG. 1J

FIG. 1K

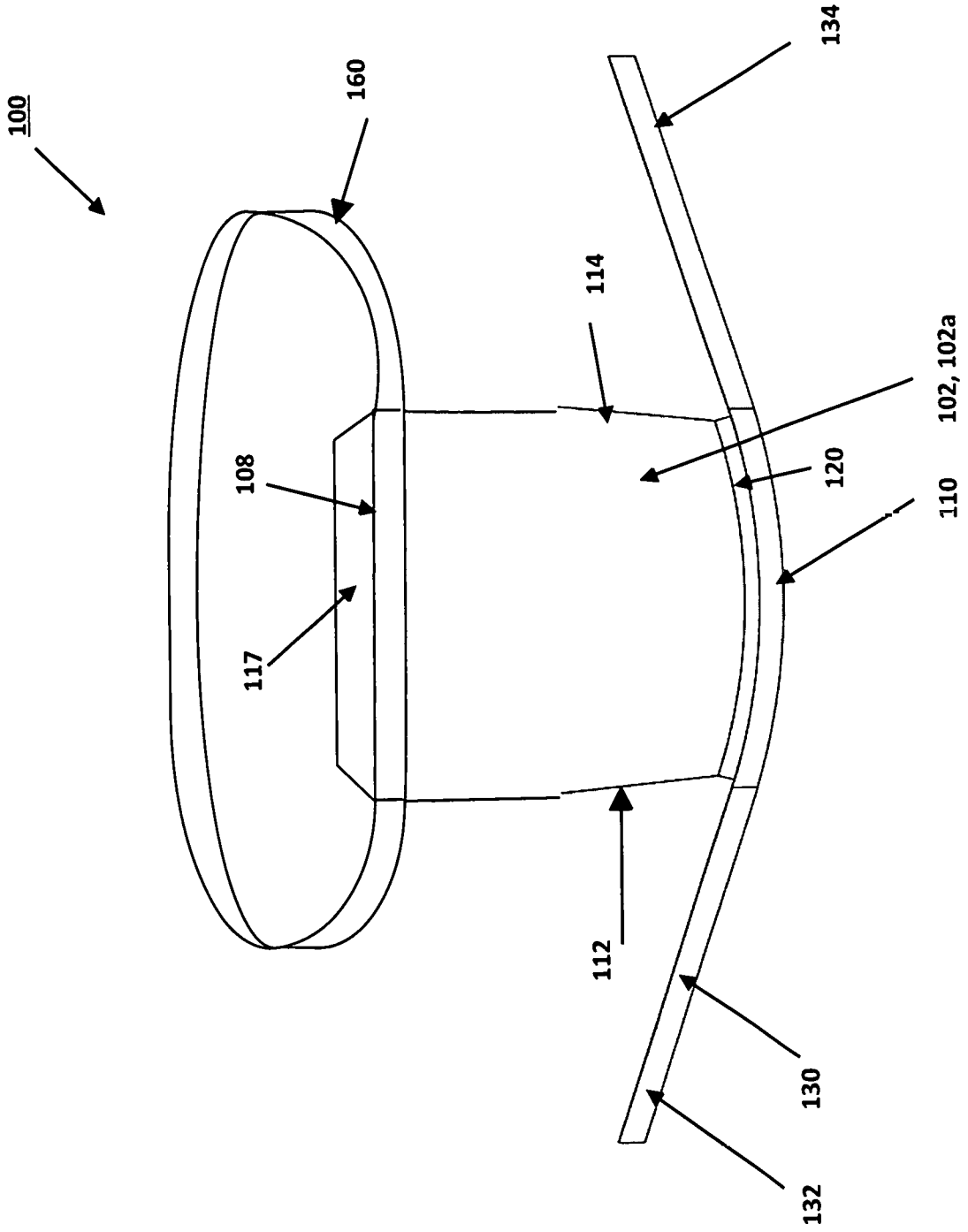


FIG. 1L

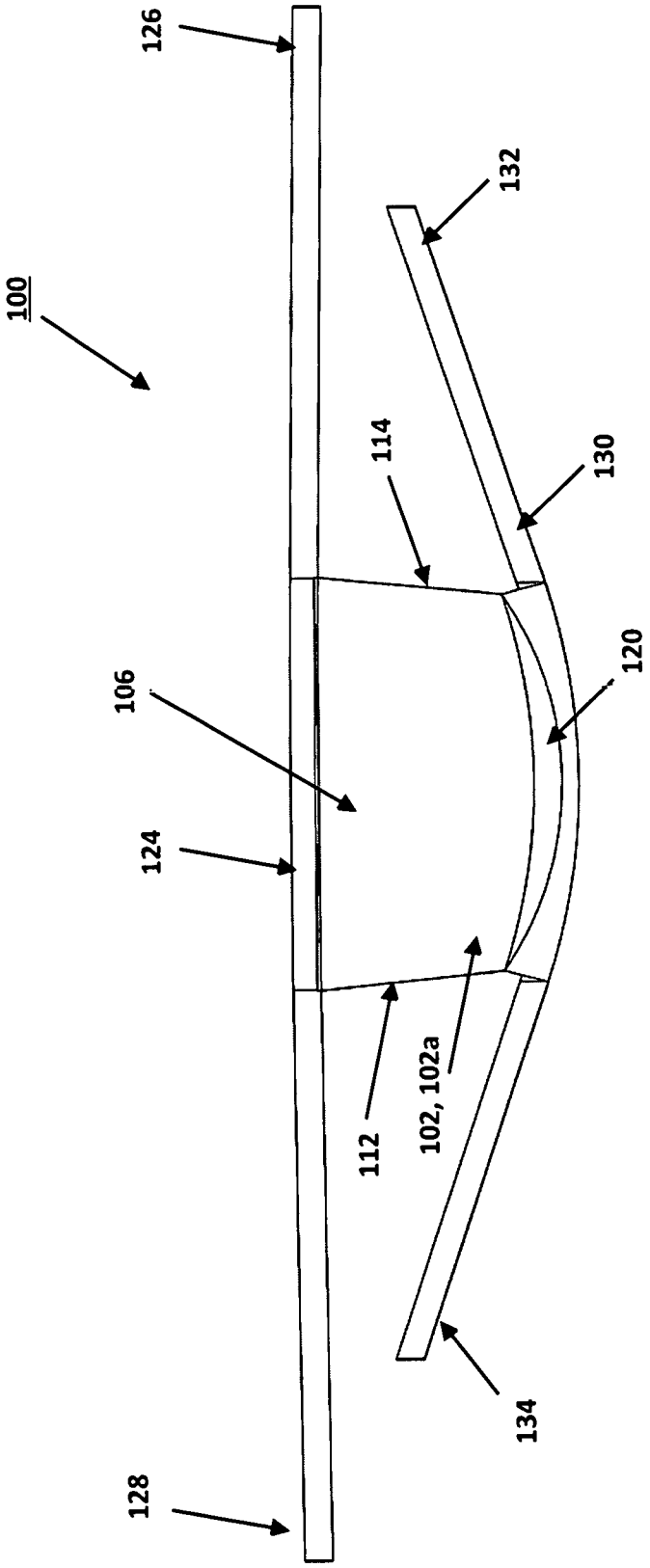


FIG. 1M

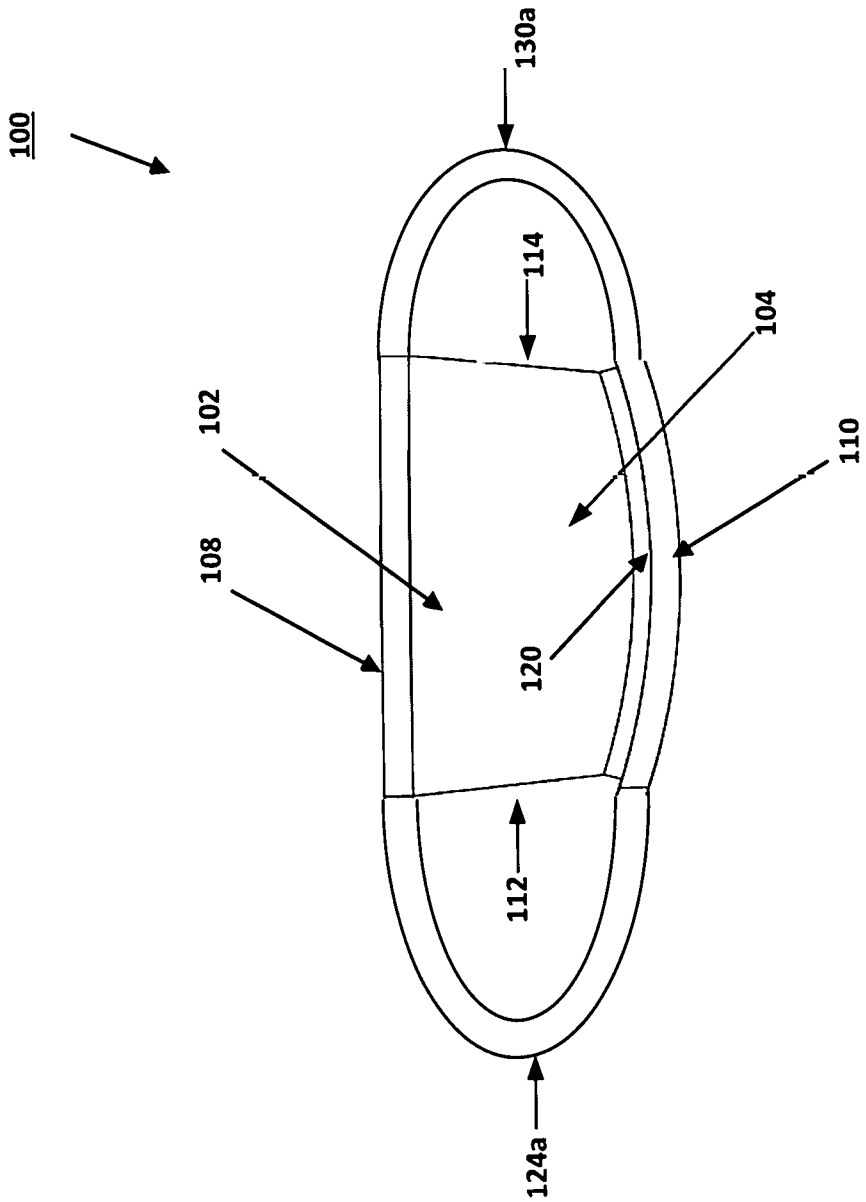
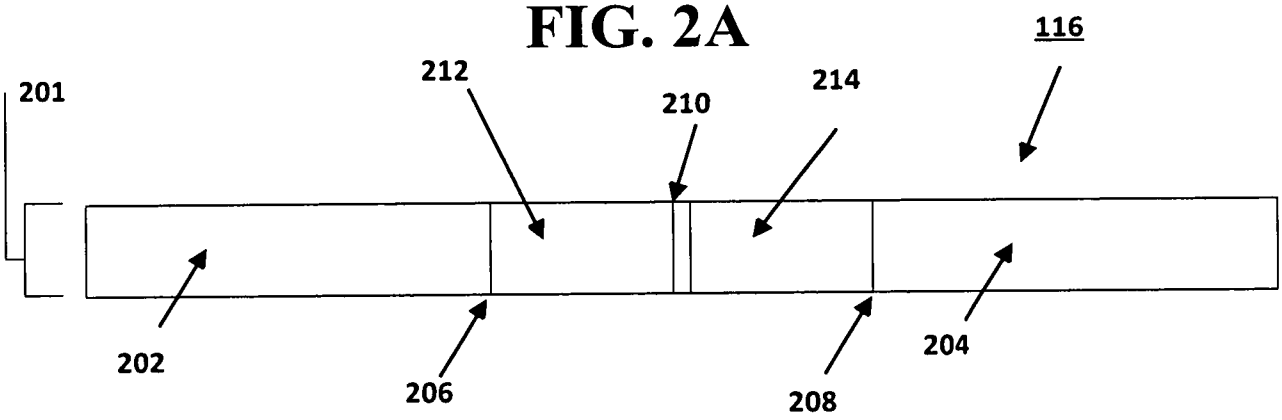


FIG. 2A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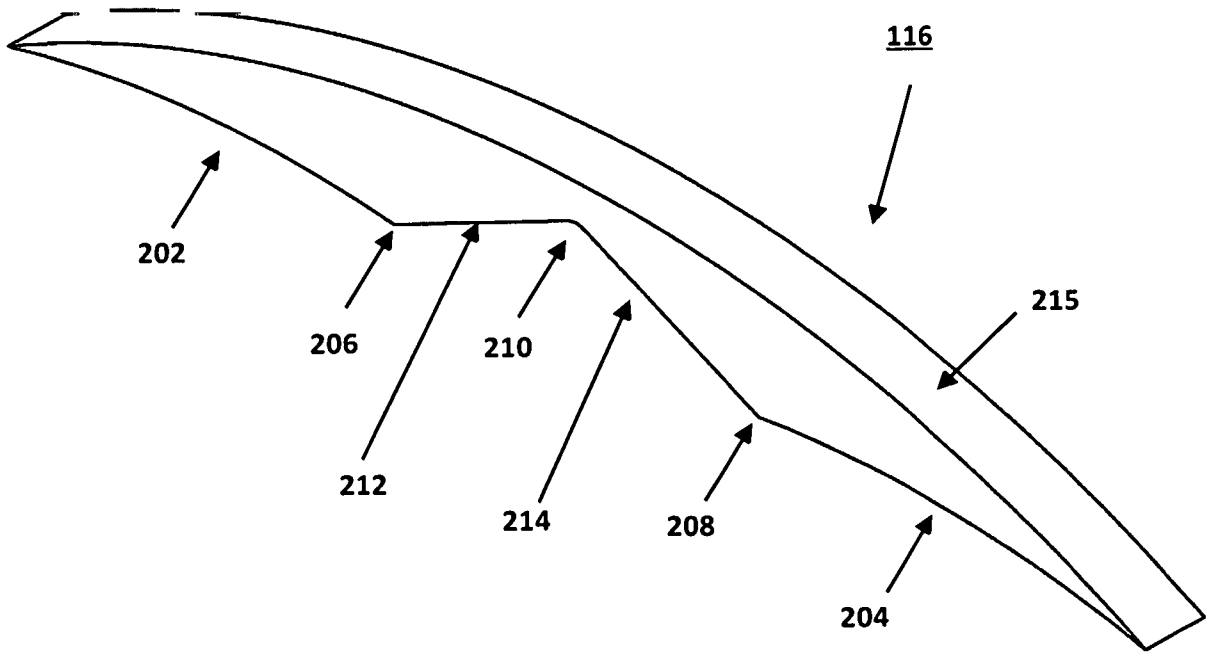
201
212
210
214
202
206
208
204

FIG. 2B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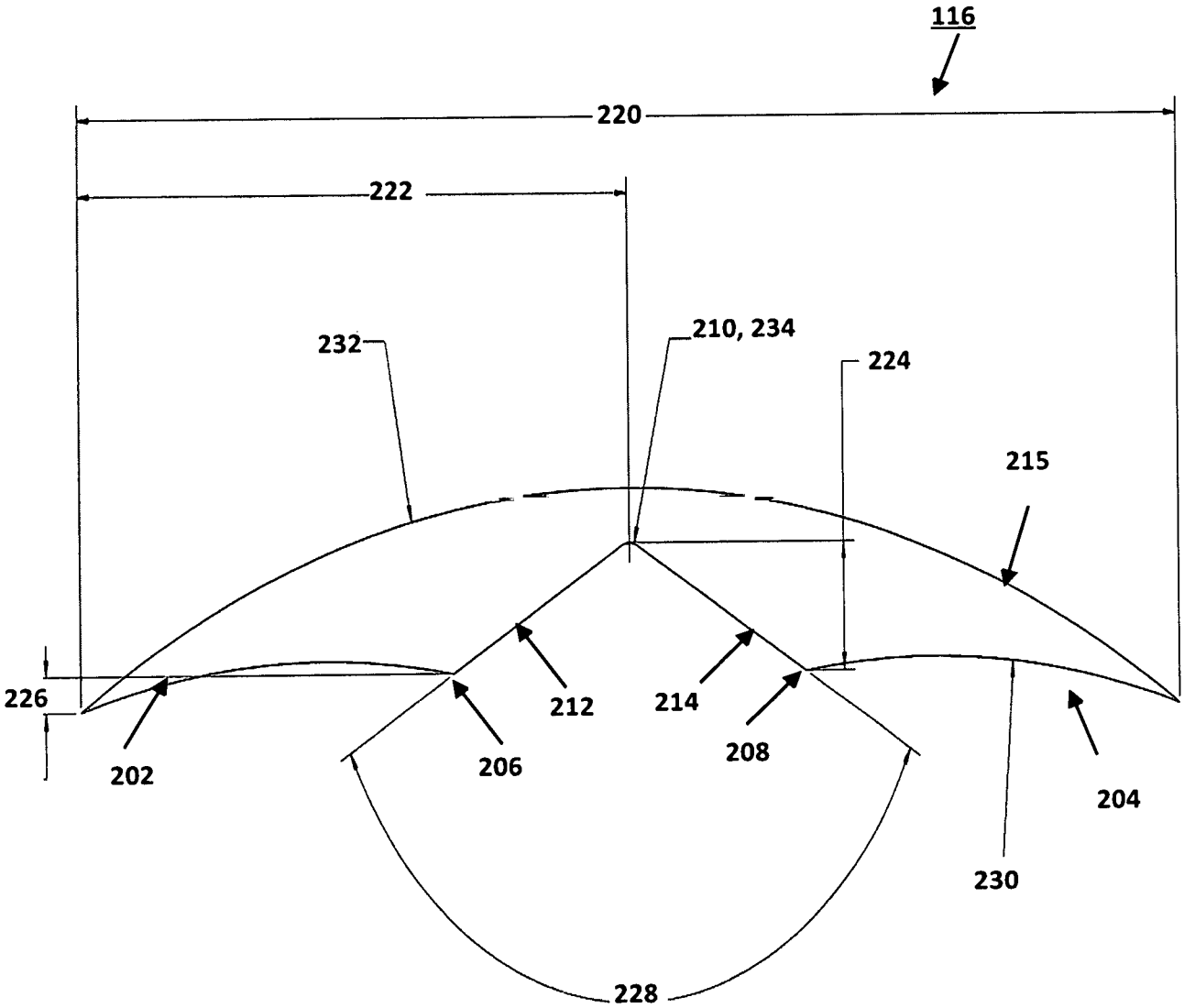
214
208
204

FIG. 2C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226
202
206
212
214
208
204
230
228

FIG. 3A

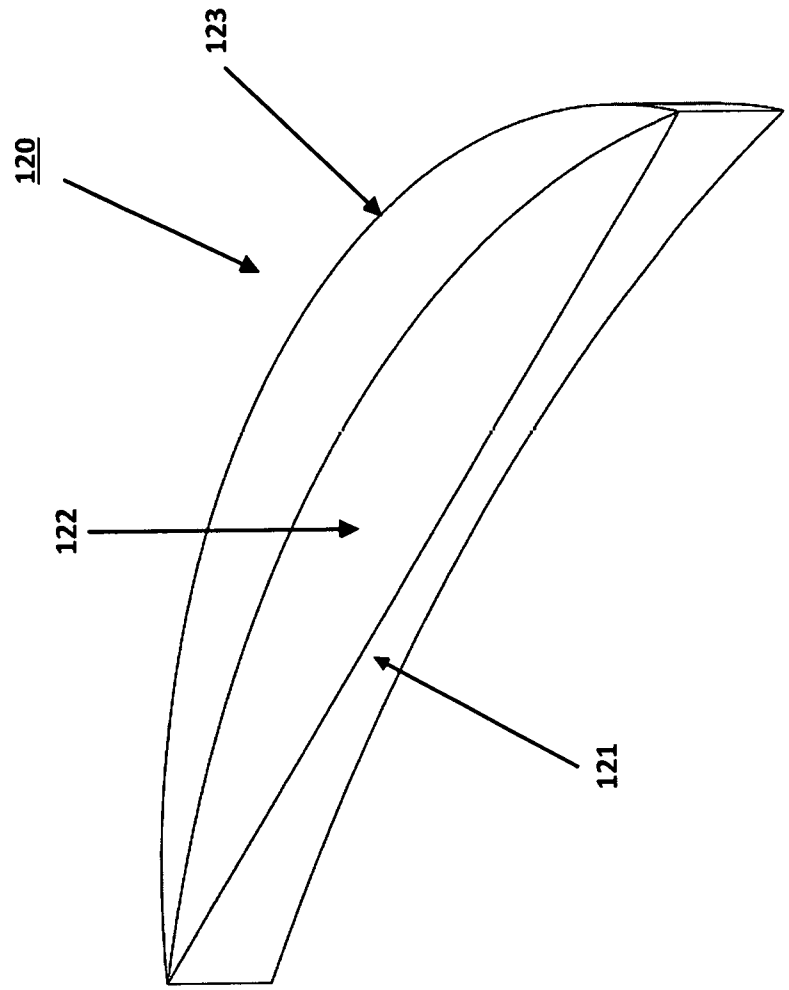


FIG. 3B

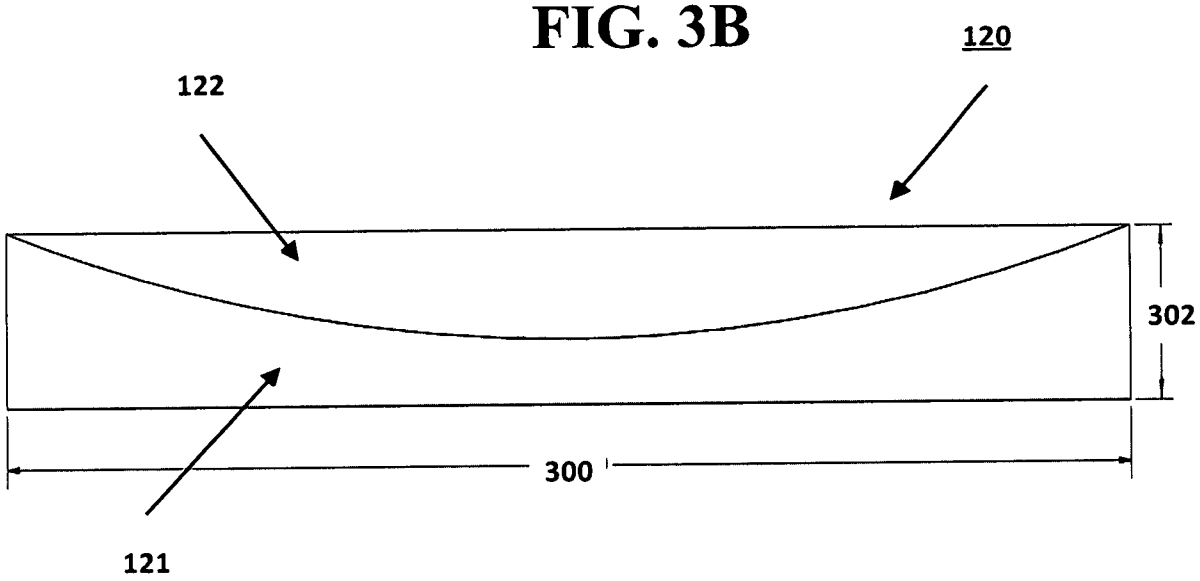


FIG. 3C

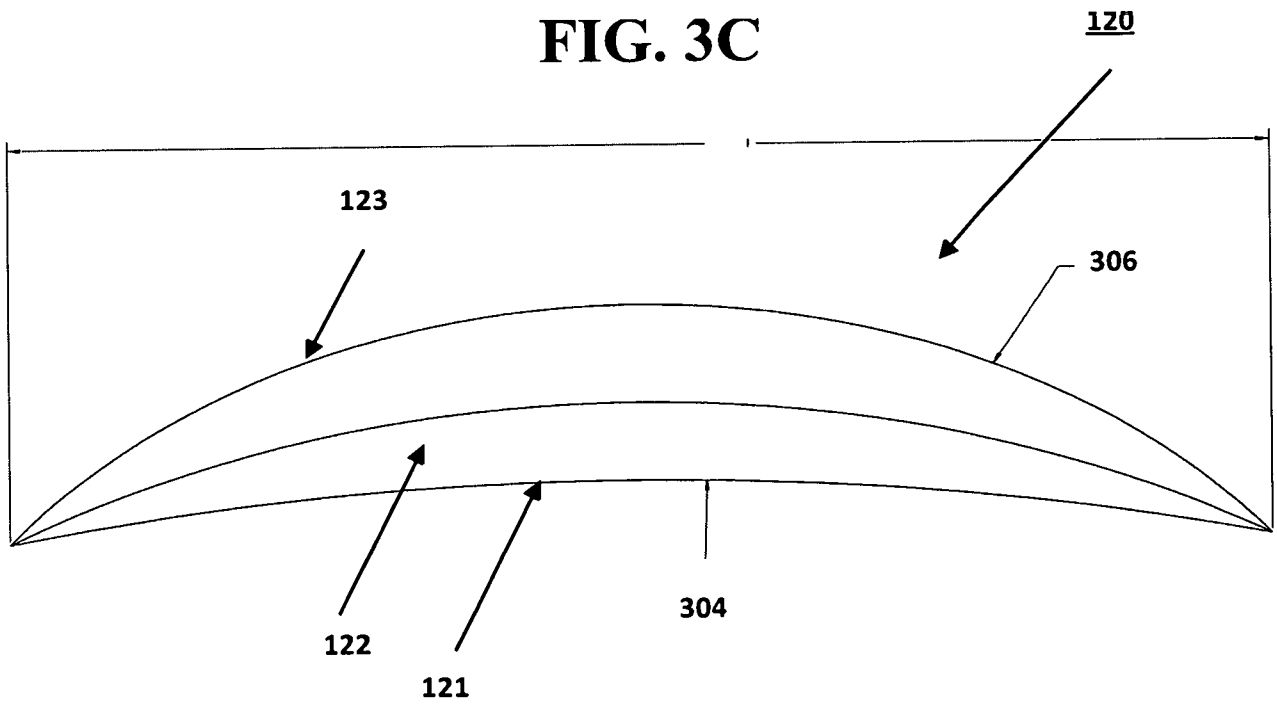


FIG. 4

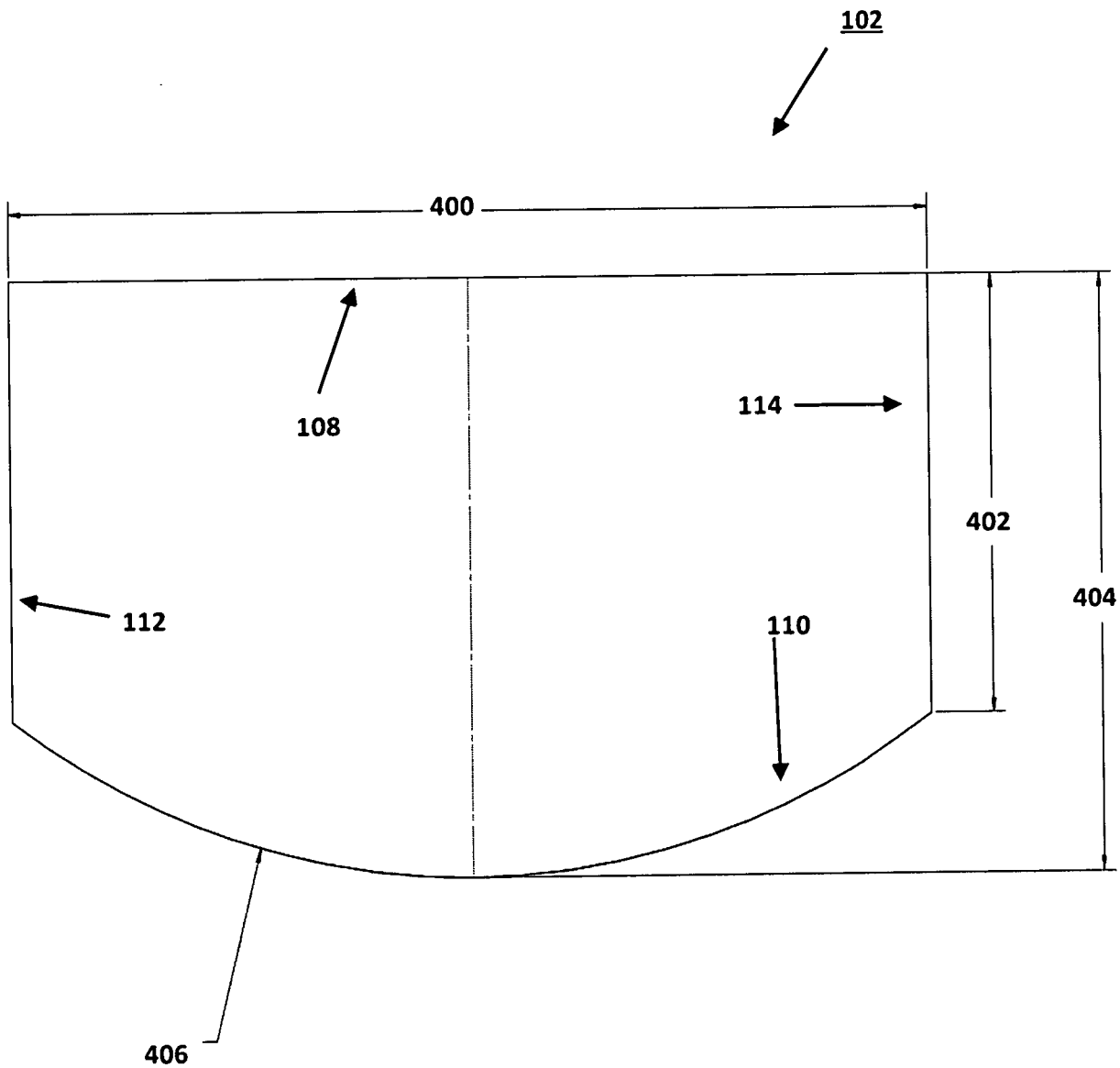


FIG. 5A

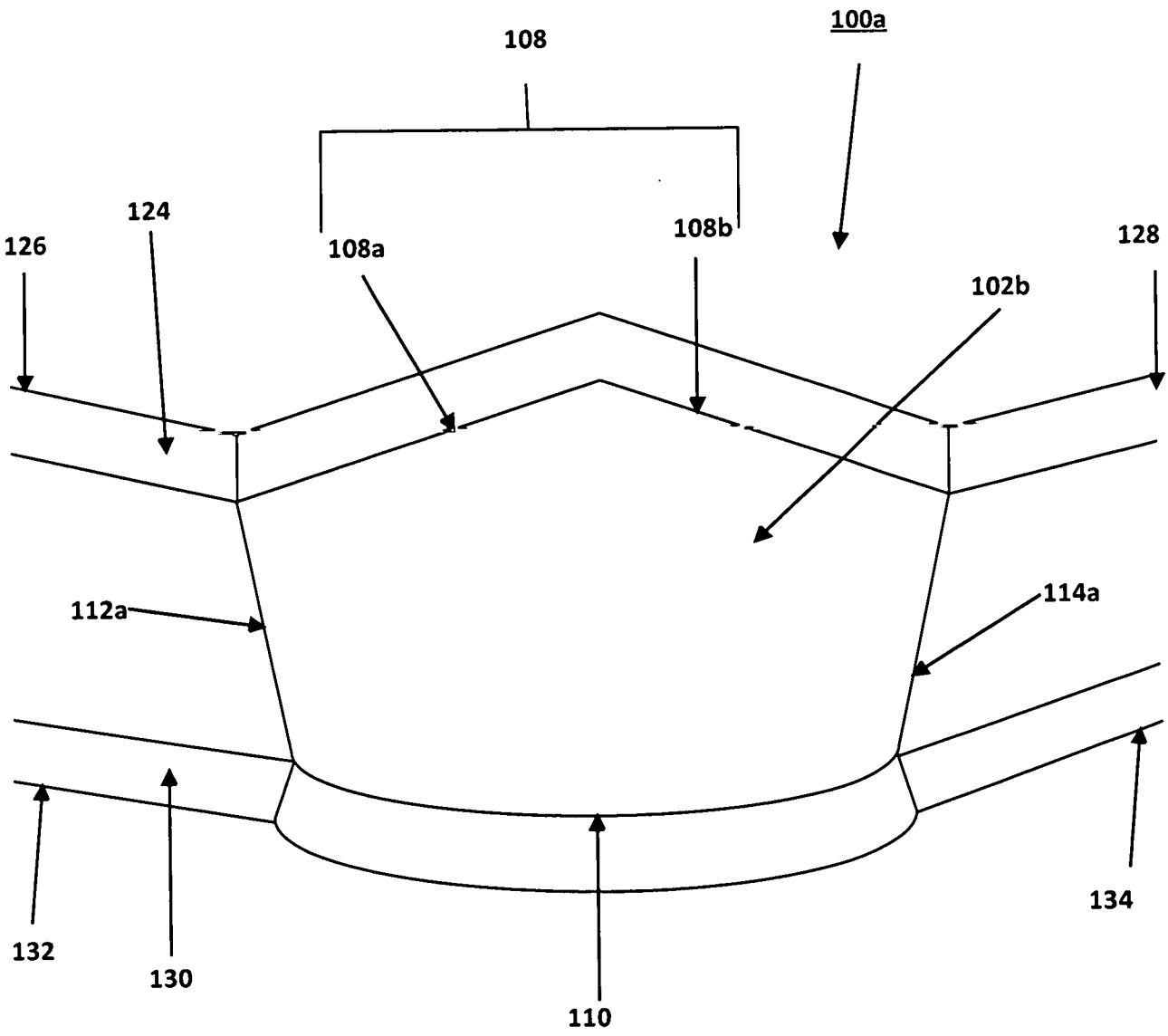


FIG. 5B

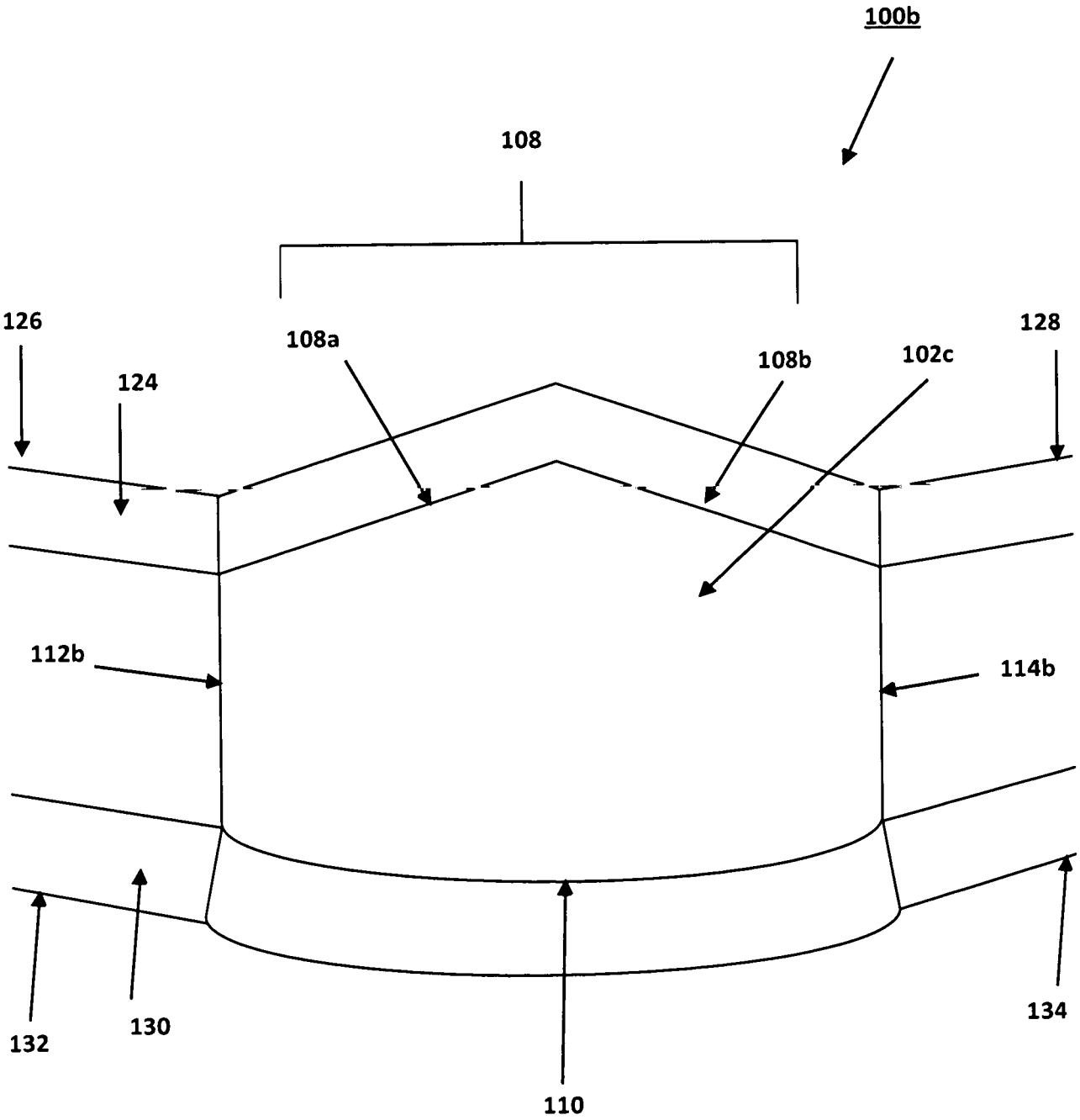
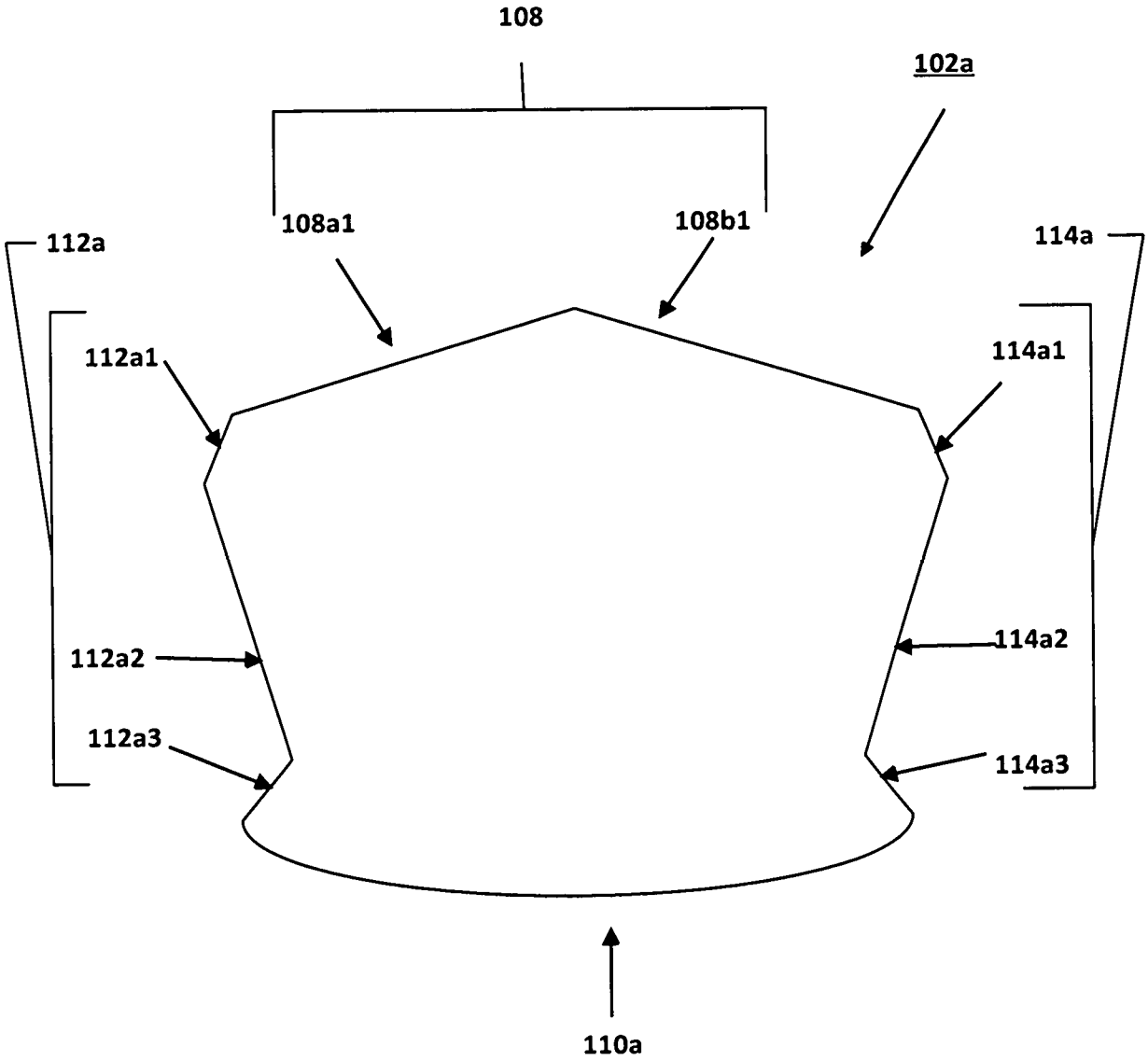


FIG. 6A


108
102a
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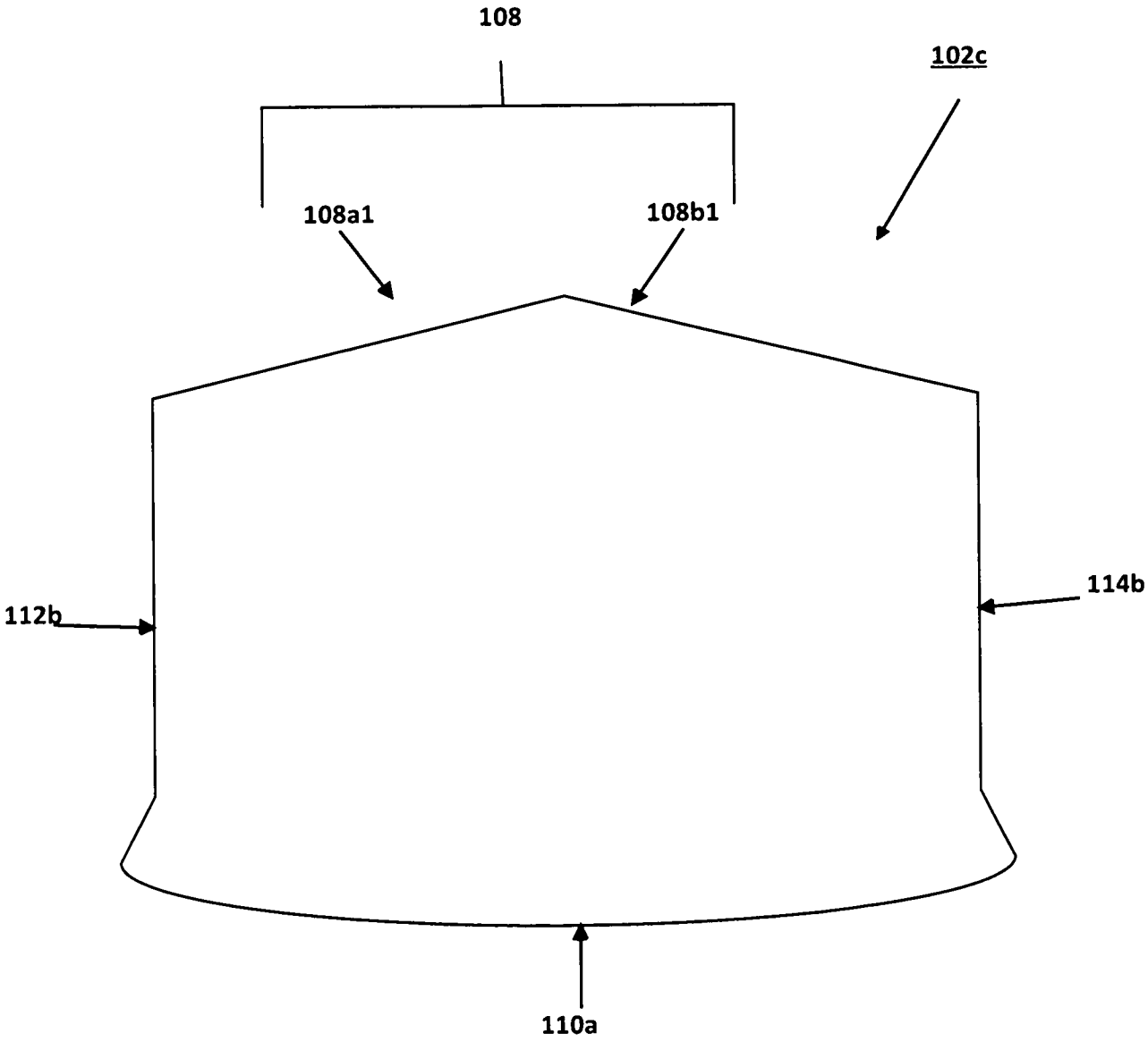
108b1
112a
114a
112a1
114a1
112a2
114a2
112a3
114a3
110a

FIG. 6B



INTERNATIONAL SEARCH REPORT

International application No
PCT/US2018/048556

A. CLASSIFICATION OF SUBJECT MATTER
INV. A41D13/11
ADD.

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
A41D

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

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2014/189364 A1 (LICA HOLDING B V [NL]) 27 November 2014 (2014-11-27)	1,6-12, 14-17, 19-25, 30,32-35
Y	claim 35; figure 3a	2-5,13, 18,26-29

X	US 6 185 740 B1 (ZEGARELLI PETER J [US] ET AL) 13 February 2001 (2001-02-13) the whole document	25,30, 31,33-35

X	WO 96/10343 A1 (KIMBERLY CLARK CO [US]) 11 April 1996 (1996-04-11)	1,20,25
Y	the whole document	13

Y	US 2015/237931 A1 (MILLER KURT [US] ET AL) 27 August 2015 (2015-08-27) figure 5	2-5,18, 26-29

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

☒ See patent family annex.

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
9 November 2018	20/11/2018

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

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/US2018/048556

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2014189364 A1	27-11-2014	NONE	
US 6185740 B1	13-02-2001	NONE	
WO 9610343 A1	11-04-1996	AU 697069 B2	24-09-1998
		BR 9509124 A	02-09-1997
		CA 2151530 A1	05-04-1996
		DE 69526237 D1	08-05-2002
		DE 69526237 T2	14-11-2002
		EP 0785732 A1	30-07-1997
		JP H10508223 A	18-08-1998
		SK 36097 A3	10-09-1997
		US 5561863 A	08-10-1996
		WO 9610343 A1	11-04-1996
US 2015237931 A1	27-08-2015	NONE	