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(54) **PROTECTIVE WATER HEADWEAR**

(57) Water headwear (100) can include a plurality of openings (104) that permit water to pass through the water headwear. Further, the water headwear can include at least one rib (308) between the openings, the at least one rib being configured to reduce drag and cause the water headwear to more easily penetrate the surface of a body of water.

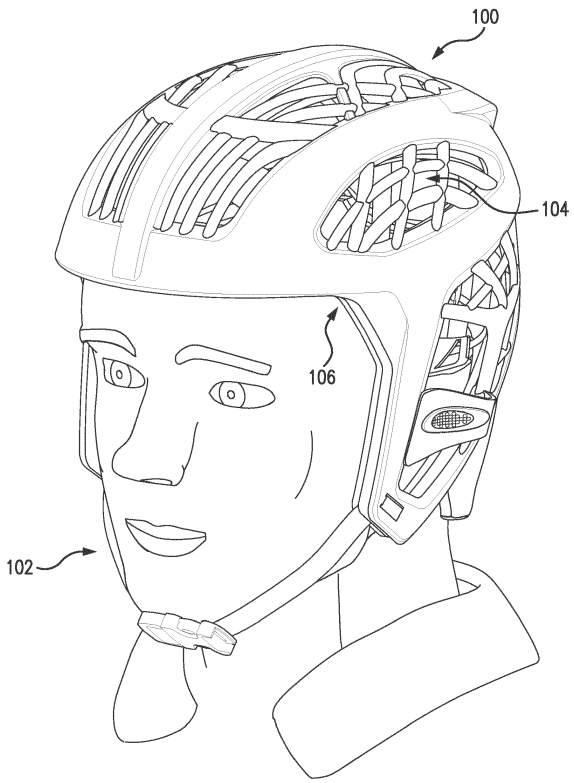

FIG. 1

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Description

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims the benefit of U.S. Provisional Application No. 63/506,333, filed June 5, 2023 and titled "PROTECTIVE WATER HEADWEAR," the disclosure of which is incorporated by reference herein in its entirety.

BACKGROUND

[0002] An individual engaged in water activities or water sports often desires to protect his or her head from injuries. In some cases, the individual can do so by wearing protective headwear. However, the use of such headwear can be undesirable due to a variety of factors. For example, the headwear can block water from passing over a wearer's head, preventing the wearer from experiencing the natural feeling of contact with the water. Additionally, the headwear can create bubbling or gurgling when submerged, which can be a nuisance to the wearer. The headwear can also increase drag experienced by the wearer when at least partially submerged. Further, the headwear can prevent a wearer's head from easily penetrating the surface of the water due to its buoyancy and/or surface configuration. In water activities such as surfing, it can be important for a wearer's head to easily penetrate the surface of the water so that a wave is not able to carry and throw the wearer, which can lead to injuries.

BRIEF SUMMARY

[0003] Accordingly, there is a need to provide water headwear that allows water to pass through the water headwear. The headwear can easily penetrate the surface of a body of water. As used herein, "water headwear" can be any headwear designed for use in activities conducted on or in a body of water (e.g., surfing, wakeboarding, water skiing, windsurfing, boating, canoeing, swimming, diving, etc.). Aspects of water headwear according to the present disclosure include a plurality of openings that permit water to pass through the water headwear. Further, aspects of water headwear according to the present disclosure include at least one rib between the openings that are configured to reduce drag and cause the water headwear to more easily penetrate the surface of a body of water.

[0004] In an aspect, the water headwear can include a body, the body including an upper cranial portion. In an aspect, the upper cranial portion can protect frontal, parietal, and occipital regions of a wearer's head. In an aspect, the body can further include a temporal portion. In an aspect, the temporal portion can protect a temporal region of the wearer's head. In an aspect, the body can further include a first plurality of openings extending through the upper cranial portion. In an aspect, the body can further include a second plurality of openings extending through the temporal portion. In an aspect, the first plurality of openings and the second plurality of openings can permit the passage of water through the water headwear. In an aspect, the first and second plurality of openings can include between 10% and 40% of an exterior surface area of the body.

[0005] In an aspect, the water headwear can be a helmet.

[0006] In an aspect, the first plurality of openings can include a first percentage of an exterior surface area of the upper cranial portion and the second plurality of openings can include a second percentage of an exterior surface area of the temporal portion. In an aspect, the second percentage can be greater than the first percentage.

[0007] In an aspect, the upper cranial portion can further include a transverse rib. In an aspect, the transverse rib can be between adjacent openings of the first plurality of openings. In an aspect, the transverse rib can extend approximately perpendicularly to a longitudinal centerline of the body. In an aspect, the transverse rib can have a cross section configured to reduce drag. In an aspect, the cross section can be shaped as a convex-convex foil. In an aspect, the convex-convex foil can have a chord length and a maximum thickness at a distance of about one-third the chord length from a leading edge of the convex-convex foil. In an aspect, a chord line of the convex-convex foil can be substantially tangent to a curvature of the body at a location of the cross section.

[0008] In an aspect, the upper cranial portion can further include a support rib. In an aspect, the support rib can be between adjacent openings of the first plurality of openings. In an aspect, the support rib can transect the transverse rib. In an aspect, the support rib can have a lateral cross section configured to reduce drag. In an aspect, the lateral cross section can be shaped as an ellipse. In an aspect, the ellipse can have an aspect ratio of less than or equal to 4:1. In an aspect, a major axis of the ellipse can be substantially tangent to a curvature of the body at a location of the lateral cross section.

[0009] In an aspect, the upper cranial portion can further include a circumferential rim extending around a circumference of a wearer's head when worn. In an aspect, the upper cranial portion can further include one or more bars extending longitudinally between points on the circumferential rim. In an aspect, the transverse rib can be coupled to a first bar of the one or more bars. In an aspect, the transverse rib can extend approximately perpendicularly to the first bar. In an aspect, the transverse rib can connect the first bar to a second bar of the one or more bars. In an aspect, the transverse rib can further connect the first bar to a third bar of the one or more bars.

[0010] In an aspect, the temporal portion can further include a transverse rib. In an aspect, the transverse rib can extend approximately perpendicularly to a longitudinal centerline of the body. In an aspect, the transverse rib can have a cross section configured to reduce drag. In an aspect, the cross section can be shaped as a con-

vex-convex foil. In an aspect, the convex-convex foil can have a chord length and a maximum thickness at a distance of about one-third the chord length from a leading edge of the convex-convex foil. In an aspect, a chord line of the convex-convex foil can be substantially tangent to a curvature of the body at a location of the cross section.

[0011] In an aspect, the temporal portion can further include a peripheral rim framing at least a portion of an ear of a wearer when worn. In an aspect, the transverse rib of the temporal portion can be coupled to the peripheral rim. In an aspect, the transverse rib of the temporal portion can have a forked shape

In an aspect, the first plurality of openings can include a rear opening larger than any other of the first plurality of openings.

[0012] In an aspect, the water headwear can further include a fit system to adjust the fit of the water headwear on a head of a wearer. In an aspect, the fit system can include a gear to adjust the length of a strap.

[0013] In an aspect, the water headwear can further include an ear cover. In an aspect, the ear cover can be vertically adjustable. In an aspect, the ear cover can include a plurality of holes to aerate water entering a wearer's ears.

[0014] In an aspect, water headwear can include a body, the body including a first layer including a first material. In an aspect, the body can further include a second layer including a second material. In an aspect, the second material can be less rigid than the first material. In an aspect, the body can further include a plurality of openings extending through the first layer and the second layer. In an aspect, the plurality of openings can permit the passage of water through the water headwear. In an aspect, the plurality of openings can include between 10% and 40% of an exterior surface area of the body.

[0015] In an aspect, the water headwear can be a helmet.

[0016] In an aspect, the first layer can be a rigid outer layer exterior to the second layer.

[0017] In an aspect, the body can further include a rib. In an aspect, the rib can be between adjacent openings of the plurality of openings. In an aspect, the rib can have a cross section configured to reduce drag. In an aspect, the cross section can be shaped as a convex-convex foil. In an aspect, the convex-convex foil can have a chord length and a maximum thickness at a distance of about one-third the chord length from a leading edge of the convex-convex foil. In an aspect, a chord line of the convex-convex foil can be substantially tangent to a curvature of the body at a location of the cross section.

[0018] In an aspect, the body can further include a second rib. In an aspect, the second rib can be between adjacent openings of the plurality of openings. In an aspect, the second rib can have a lateral cross section configured to reduce drag. In an aspect, the lateral cross section of the second rib can be a substantially different shape than the cross section of the rib along an entire lengthwise axis of each of the rib and second rib. In an aspect, the lateral cross section can be shaped as an ellipse. In an aspect, the ellipse can have an aspect ratio of less than or equal to 4:1. In an aspect, a major axis of the ellipse can be substantially tangent to a curvature of the body at a location of the lateral cross section.

[0019] In an aspect, a respective shape of each of the rib and the second rib can vary depending on a respective angle that each of the rib and the second rib extends with respect to a longitudinal centerline of the body.

[0020] In an aspect, the body can further include channels in the second layer. In an aspect, the channels can facilitate a flow of water between an interior and an exterior of the water headwear. In an aspect, the channels can be oriented longitudinally within the second layer.

[0021] In an aspect, the body can further include a third layer disposed interior to the second layer.

[0022] In an aspect, water headwear can include an upper cranial portion. In an aspect, the upper cranial portion can protect frontal, parietal, and occipital regions of a wearer's head. In an aspect, the upper cranial portion can include a rigid layer. In an aspect, the upper cranial portion can further include an impact-absorbing layer. In an aspect, the upper cranial portion can further include a plurality of openings extending through the rigid layer and the impact-absorbing layer. In an aspect, the plurality of openings can permit the passage of water through the upper cranial portion. In an aspect, the upper cranial portion can further include a rib. In an aspect, the rib can be between adjacent openings of the plurality of openings. In an aspect, the rib can have a lateral cross section with a boundary not having a radius of curvature greater than or equal to 50 mm.

[0023] In an aspect, the water headwear can be a helmet.

[0024] In an aspect, the impact-absorbing layer can be an inner foam layer interior to the rigid layer.

[0025] In an aspect, the plurality of openings can include between 5% and 30% of an exterior surface area of the upper cranial portion.

[0026] In an aspect, the rigid layer can include the rib.

[0027] In an aspect, the water headwear can further include a temporal portion to protect a temporal region of the wearer's head. In an aspect, the temporal portion can include a second plurality of openings. In an aspect, the second plurality of openings can permit the passage of water through the temporal portion. In an aspect, the second plurality of openings can include between 15% and 40% of an exterior surface area of the temporal portion.

BRIEF DESCRIPTION OF THE FIGURES

[0028] The accompanying figures, which are incorporated herein and form a part of the specification, illustrate the present disclosure and, together with the description, further serve to explain the principals thereof and to enable a person skilled in the pertinent art to make and use the same. Aspects of the present disclosure are best un-

derstood from the following detailed description when read with the accompanying figures. It is noted that features may not be drawn to scale. In fact, the dimensions of the features may be arbitrarily increased or reduced for clarity of discussion. In the drawings:

FIG. 1 is a perspective view of water headwear in use by a wearer, according to an aspect.
FIG. 2 is an exploded view of the water headwear shown in FIG. 1, according to an aspect.
FIGS. 3A-3D are perspective views of the water headwear shown in FIG. 1, according to an aspect.
FIG. 4 is a diagram of a human head, according to an aspect.
FIG. 5A is a top view of the water headwear shown in FIG. 1 in use by a wearer, according to an aspect.
FIG. 5B is a side view of the water headwear shown in FIG. 1 in use by a wearer, according to an aspect.
FIG. 5C is a side view of the water headwear shown in FIG. 1 in use by a wearer, according to an aspect.
FIG. 5D is a front, section view of the water headwear shown in FIG. 1, according to an aspect.
FIG. 6 is a top view of the water headwear shown in FIG. 1, according to an aspect.
FIG. 7 is a detail view of the top of the water headwear shown in FIG. 6, according to an aspect.
FIG. 8 is a section view along line 8-8 of the portion of the water headwear shown in FIG. 7, according to an aspect.
FIG. 9 is a diagram of a cross section of a rib, according to an aspect.
FIG. 10 is a section view along line 10-10 of the portion of the water headwear shown in FIG. 7, according to an aspect.
FIG. 11 is a diagram of a cross section of a rib, according to an aspect.
FIG. 12 is a side view of the water headwear shown in FIG. 1, according to an aspect.
FIG. 13 is a detail view of the side of the water headwear shown in FIG. 12, according to an aspect.
FIG. 14 is a section view along line 14-14 of the portion of the water headwear shown in FIG. 13, according to an aspect.
FIG. 15 is a section view along line 15-15 of the portion of the water headwear shown in FIG. 13, according to an aspect.
FIG. 16 is a detail view of the rear of water headwear shown in FIG. 1, according to an aspect.
FIG. 17 is a perspective view of the water headwear shown in FIG. 1, according to an aspect.
FIG. 18 is a detail view of the water headwear shown in FIG. 1 from the perspective of FIG. 17, according to an aspect.

DETAILED DESCRIPTION

[0029] In the following detailed description, aspects can be described with respect to a particular half of the water headwear illustrated in the accompanying figures. It should be understood that water headwear can include two halves including components (e.g., temporal portions, etc.) that are substantially mirror images of one another. Therefore, aspects described with respect to one half of the water headwear disclosed should be understood to disclose aspects that are functionally and structurally identical for a corresponding second half including the aspects described.

[0030] FIG. 1 shows water headwear 100 in use by a wearer 102. As shown in FIG. 1, water headwear 100 can include openings 104. Openings can permit the passage of water through water headwear 100. For ease of illustration, only a single opening 104 is designated in FIG. 1. However, it should be understood that openings 104 include all openings in the body of water headwear 100 apart from cavity 106, which allows wearer 102 to insert his or her head into water headwear 100.

[0031] For example, wearer 102 can be an individual engaged in a water activity or water sport. For example, wearer 102 can be an individual engaged in surfing, wakeboarding, water skiing, windsurfing, boating, canoeing, swimming, diving, etc. Accordingly, wearer 102 can be likely to submerge his or her head underwater.

[0032] When wearer 102's head is at least partially submerged in water, water can flow through openings 104. For example, water can flow into openings 104 on portions of water headwear 100 facing wearer 102's direction of movement. The water can then flow out of openings 104 on portions of water headwear 100 not facing wearer's 102 direction of movement. Accordingly, water can pass through water headwear 100 when wearer 102's head is at least partially submerged. The water can touch wearer 102's scalp and/or hair, producing a natural feel for wearer 102 when engaged in a water activity or water sport (i.e., wearer 102 can experience the natural sensation of contact with the water). Additionally, the water can serve to remove impurities such as sweat or sand from wearer 102's scalp and/or hair, increasing the comfort of wearer 102. Openings 104 can allow air to easily escape from water headwear 100, reducing bubbling or gurgling caused by trapped air slowly escaping. Further, when wearer 102's head is not submerged in water, openings 104 can allow fresh air to contact wearer 102's scalp and/or hair, cooling wearer 102 and increasing the comfort of wearer 102 in hot and/or humid conditions.

[0033] Water headwear 100 can include openings 104 to secure the above benefits. However, water headwear 100 can still include enough material to protect the head of wearer 102 from injury due to impacts. In an aspect, water headwear 100 can be a helmet. For example, in an aspect, water headwear 100 can have a rigid shell (e.g., a plastic shell including ABS, polycarbonate, or another rigid thermoplastic) or can include additional material to protect the head of wearer 102 from impact. Water headwear 100 can include adequate protective material such that it can withstand an external impact energy

of not less 15 Joules (J) without breaking. Additionally, water headwear 100 can not cause the deceleration of a testing headform to exceed 250 g (g = 9.81 m/s^2). Water headwear can also include a shell that covers specific portions of a testing headform. Further, water headwear 100 can include a retention system (e.g., a chin strap). Additionally, in an aspect, water headwear 100 can meet one or more of the criteria set forth in EN 1385:2012 ("Helmets for canoeing and white water sports").

[0034] In an aspect, water headwear 100 can be a surfing helmet. In an aspect, water headwear 100 can be protective headwear or a helmet that does not meet all of the standards set forth in EN 1385:2012 but that nonetheless provides some level of protection for the head of wearer 102. For example, in such an aspect, water headwear 100 can be a bump cap such as a surfing or sailing cap with padding and/or a rigid shell to protect wearer 102's head from impact.

[0035] FIG. 2 shows an exploded view of water headwear 100. As shown in FIG. 2, water headwear 100 can include multiple layers. For example, in an aspect, water headwear 100 can include a first layer 202, a second layer 204, and a third layer 206. In other aspects, water headwear 100 can include only first layer 202 or only first layer 202 and second layer 204. Further, in an aspect, first layer 202 can be omitted such that water headwear 100 does not include a rigid shell. In an aspect, water headwear 100 can include other structural reinforcement components such as an internal roll cage comprising a rigid material.

[0036] First layer 202 can include a different material than second layer 204. Likewise, first layer 202 can include a different material than third layer 206. In an aspect, second layer 204 can include a different material than third layer 206.

[0037] First layer 202 can be a rigid layer to prevent objects (e.g., points on a rock or reef) from rupturing water headwear 202 and injuring the head of wearer 102. In an aspect, first layer 202 can include a material with a Shore D hardness rating between about 10 and about 100. More specifically, in an aspect, first layer 202 can include a material with a Shore D hardness rating between about 20 and about 100, between about 30 and about 100, between about 40 and about 100, between about 50 and about 90, between about 60 and about 90, between about 70 and about 90, or about 80. In an aspect, first layer 202 can include acrylonitrile butadiene styrene (ABS). In another aspect, first layer 202 can include polycarbonate (PC). In another aspect, first layer 202 can include any similar thermoplastic polymer.

[0038] In an aspect, first layer 202 can include a thickness between about 1 mm and about 5 mm. More specifically, in an aspect, first layer 202 can include a thickness between about 1.5 mm and about 4 mm, between about 2 mm and about 3 mm, or a thickness of about 2.5 mm.

[0039] In an aspect, second layer 204 can be an impact-absorbing layer. Accordingly, in such an aspect, second layer 204 can be less rigid than first layer 202 such that second layer 204 can flex to absorb the force of an impact on water headwear 100. In an aspect, second layer 204 can include a material with a Shore A hardness rating between about 0 and about 70. More specifically, in an aspect, second layer 204 can include a material with a Shore A hardness rating between about 10 and about 70, between about 20 and about 70, between about 30 and about 60, or between about 40 and about 50. In an aspect, second layer 204 can include expanded polypropylene (EPP). In another aspect, second layer 204 can include expanded polystyrene (EPS). In another aspect, second layer 204 can include any similar foam, for example, any similar thermoplastic foam.

[0040] In an aspect, second layer 204 can include a thickness between about 2 mm and about 20 mm. More specifically, in an aspect, second layer 204 can include a thickness between about 3 mm and about 17 mm, between about 4 mm and about 16 mm, between about 5 mm and about 15 mm, between about 6 mm and about 14 mm, between about 7 mm and about 13 mm, between about 8 mm and about 12 mm, between about 9 mm and about 11 mm, or a thickness of about 10 mm.

[0041] In an aspect, third layer 206 can also be an impact-absorbing layer. Accordingly, in such an aspect, third layer 206 can be less rigid than first layer 202 such that third layer 206 can flex to absorb the force of an impact on water headwear 100. In addition, in an aspect, third layer 206 can be less rigid than second layer 204. In an aspect, third layer 206 can include a material with a Shore A hardness rating between about 0 and about 70. More specifically, in an aspect, third layer 206 can include a material with a Shore A hardness rating between about 10 and about 70, between about 20 and about 70, between about 30 and about 60, or between about 40 and about 50. In an aspect, third layer 206 can include vinyl nitrile. In another aspect, third layer 206 can include any similar foam, for example, any similar thermoplastic foam.

[0042] In an aspect, third layer 206 can include a thickness between about 1 and about 10 mm. More specifically, third layer 206 can include a thickness between about 2 and about 8 mm, between about 2.5 mm and about 7.5 mm, between about 3 mm and about 7 mm, between about 3.5 mm and about 6.5 mm, between about 4 mm and about 6 mm, between about 4.5 mm and about 5.5 mm, or a thickness of about 5 mm. In an aspect, the thickness of third layer 206 can be substantially uniform, that is, it can have a single thickness apart from manufacturing imperfections.

[0043] In an aspect, at least one of first layer 202, second layer 204, and third layer 206 can be solid layers (i.e., layers that do not include air bladders or are otherwise inflatable).

[0044] In addition to second layer 204 and third layer 206 providing impact absorption, second layer 204 and third layer 206 can increase the comfort of wearer 102 by preventing wearer 102's head from contacting a rigid

interior surface within water headwear 100.

[0045] In an aspect, first layer 202, second layer 204, and third layer 206 can be formed separately and bonded together using an adhesive (e.g., glue). In such an aspect, first layer 202 can be injection molded. In another aspect, water headwear 100 can be in-molded. For example, in such an aspect, EPP or EPS (e.g., second layer 204) can be in-molded with a PC shell (e.g., first layer 202) to form water headwear 100. In such an aspect, vinyl nitrile or another soft material can then be added as padding (e.g., third layer 206).

[0046] As shown in FIG. 2, in an aspect, second layer 204 can include channels 208. Additionally, in an aspect, third layer 206 can include channels 210. Channels 208 and 210 can facilitate the passage of water through water headwear 100. When water headwear 100 is assembled, channels 208 and 210 can be aligned and can correspond to regions on first layer 202 that include openings 104, as shown in FIG. 3C. Accordingly, channels 208 and 210 can receive and direct water that has entered water headwear 100 through openings 104.

[0047] FIG. 3A shows a perspective view of the assembled water headwear 100. As shown in FIG. 3A, in an aspect, first layer 202 can be exterior to second layer 204. In addition, in an aspect, second layer 204 can be exterior to third layer 206. As used herein, a component being "exterior" to another component can mean the "exterior" component is further from wearer 102's head when water headwear 100 is worn. Likewise, a component being "interior" to another component means the "interior" component is closer to wearer 102's head when water headwear 100 is worn.

[0048] In an aspect, first layer 202 can form an exterior surface 302 of a body 304 of water headwear 100. As shown in FIG. 3A, body 304 can include a frame 306 and ribs 308 between adjacent openings of openings 104. In an aspect, ribs 308 can be formed in first layer 202. For example, in such an aspect, ribs 308 can be integrally molded in first layer 202. In another aspect, ribs 308 can be formed in second layer 204 and/or third layer 206. In an aspect, ribs 308 can be formed separately and attached to frame 306. In such an aspect, ribs 308 can include the same or a different material of at least one of first layer 202, second layer 204, or third layer 206. Frame 306 and ribs 308 can define openings 104.

[0049] Water headwear 100 can further include a chin strap 310 to secure water headwear 100 to the head of wearer 102, particularly during impacts. Chin strap 310 can extend from body 304. Chin strap 310 can include a buckle 311 that can enable the length of the chin strap to be adjusted and the ends of chin strap 310 to be affixed to one another. In an aspect, buckle 311 can be a snap buckle. In an aspect, chin strap 310 can be omitted.

[0050] Water headwear 100 can further include ear covers 312. Ear covers 312 can reduce the impact of an influx of water into wearer 102's ears, which in some cases can cause damage to wearer 102's ear drums. Ear covers 312 can include a number of holes 313 that aerate the water entering wearer 102's ears. Aeration can reduce the energy and density of the water, reducing its potential to damage the ear drums of wearer 102. By being spaced from wearer 102's ears and including holes 313, ear covers 312 can protect wearer 102's ears without substantially impacting wearer 102's hearing ability. Ear covers 312 can be vertically adjustable on water headwear 100 such that they can be moved to match the position of various wearers' ears. In an aspect, ear covers 312 can be omitted.

[0051] Body 304 can have an exterior surface area. As used herein, "exterior surface area" of body 304 refers to the surface area of an imaginary shell 305 with no thickness that contacts and covers exterior surface 302 of body 304, as shown in FIG. 3B. Accordingly, the exterior surface area includes the area of openings 104 (i.e., the area of portions of openings 104 touching shell 305) in exterior surface 302. In an aspect, openings 104 can include between about 10% and about 40% of the exterior surface area of body 304. More specifically, in an aspect, openings 104 can include between about 12% and about 38%, between about 14% and about 36%, between about 16% and about 34%, between about 18% and about 32%, between about 18% and about 30%, between about 18% and about 28%, between about 20% and about 26%, or about 23% of the exterior surface area of body 304. In an aspect, openings 204 can include about 10%, about 15%, about 20%, about 25%, about 30%, about 35%, or about 40% of the exterior surface area of body 304.

[0052] Accordingly, the flow of water within water headwear 100 can be increased as compared to water headwear with little or no open space between the interior and exterior of the water headwear. Additionally, the ability of water headwear 100 to penetrate a surface of a body of water can be increased. This can be due to at least two factors: 1) water headwear 100 can include fewer flat surfaces that resist submersion by "skimming" over a surface; 2) water headwear 100 can include less overall material, including buoyant material (e.g., EPP) that resists submersion. However, water headwear 100 can include sufficient buoyant material such that it meets the buoyancy standards of EN 1385:2012 and/or as is otherwise needed to adequately assist the wearer.

[0053] Additionally, openings can include a percentage of the exterior surface area of body 304 such that the ability of water headwear 100 to protect from impact is not substantially hindered. For example, the size of openings 104 can be configured to minimize a risk of a sharp projection (e.g., the sharp edge of a rock or reef) from entering the interior of water headwear 100. Further the size and number of openings 104 can be configured such that water headwear 100 can include sufficient material (e.g., in at least one of first layer 202, second layer 204, or third layer 206) to absorb the force of an impact. For example, body 304 of water headwear 100 can withstand an external impact with an impact energy of at least 15 Joules (J) without breaking.

[0054] FIG. 3C shows an interior surface 315 of water headwear 100. As shown in FIG. 3C, channels 208 and 210 of second layer 204 and third layer 206 (or just channels 208 if third layer 206 is omitted) can form channels 314 in an interior surface 315 of body 304. Channels 314 can facilitate the passage of water through water headwear 100, for example, by serving as voids between openings 104 and the head of wearer 102. In an aspect, some or all of channels 314 can be oriented longitudinally (i.e., channels 314 can run from the front of water headwear 100 framing wearer 102's face to the rear of water headwear 100). In another aspect, some or all channels 314 can be oriented laterally (i.e., channels 314 can run from a side of headwear 100 adjacent wearer 102's ear to an opposite side adjacent wearer 102's other ear). In another aspect, some of channels 314 can be oriented longitudinally while other of channels 314 can be oriented laterally. In another aspect, some or all of channels 314 can be oriented diagonally (i.e., in a direction between longitudinally and laterally). In an aspect, some or all of channels 314 can be oriented such that they substantially align with a common direction of travel of wearer 102. For example, some or all of channels 314 being oriented longitudinally can facilitate water passing through water headwear 100 if wearer 102 falls backward off of a surfboard.

[0055] While FIG. 3C shows body 304 including four channels 314, body 304 can include any number of channels, such as one, two, three, five, six, seven, or eight channels, etc. However, increasing the number and/or size of channels 314 can reduce the amount of impact-absorbing material included within water headwear 100. Thus, the number and size of channels 314 must be balanced with the other safety and performance characteristics of the water headwear.

[0056] Channels 314 can correspond to regions of body 304 that include openings 104. Accordingly, channels 314 can direct water passing through water headwear 100 into regions of the interior of water headwear 100 directly adjacent openings 104. In an aspect, portions of openings 104 can touch a bottom surface of channels 314. As used herein, the "bottom surface" of channels 314 can be the portions of channels 314 that terminate at the plane defined by the innermost surface of first layer 202 (or more generally, the layer exterior to the channel 314). In an aspect, the area of the portions of openings 104 touching the bottom surface of channels 314 (the "open area") can include greater than about 25% of the bottom surface area of channels 314. For example, in an aspect, the open area can include greater than about 30%, greater than about 35%, greater than about 40%, greater than about 45%, or greater than about 50% of the bottom surface area of channels 314. In an aspect, the open area can be a greater percentage of the bottom surface area of channels 314 as compared to the percentage of the exterior surface area of body 304 that openings 104 include (see percentages described above with reference to FIG. 3B). The open area being a greater percentage of the bottom surface area of channels 314 can increase the flow of water into and out of water headwear 100 while maintaining or increasing the amount of impact-absorbing and/or rigid material that can be included in water headwear 100.

[0057] As shown in FIG. 3D, water headwear 100 can include a rear opening 104a to facilitate the ingress or egress of water. In an aspect, rear opening 104a can be larger than other openings 104. For example, in an aspect, rear opening 104a can be larger than an average size of all other openings 104. In an aspect, rear opening 104a can be the largest of all openings 104 on water headwear 100.

[0058] As shown in FIGS. 3C-3D, channels 314 can connect to rear opening 104. Accordingly, channels 314 can direct water through rear opening 104a to facilitate the egress of water from water headwear 100. Similarly, rear opening 104a can direct water into channels 314, which can direct the water through other openings 104 to facilitate the egress of water from water headwear 100.

[0059] Based on at least one of the percentage of the exterior surface area of body 304 that openings 104 include, the shape(s) of ribs 308, or the size/number of channels 314, water can flow into and out of water headwear 100 at various rates. The following provides an example for measuring a rate of flow out of water headwear such as water headwear 100. In an aspect, the water headwear can be fully submerged upside down in water such that the cavity for receiving a wearer's head (e.g., cavity 106) faces upward. The water headwear can then be quickly (e.g., in about .5 seconds) and fully withdrawn from the water while the water headwear is held level. The water headwear can continue to be held level while water drains from the water headwear. The amount of time it takes for the water that drains from the water headwear to exit the water headwear, as measured from the point when the water headwear becomes fully withdrawn, can provide a measure for the rate of flow the water headwear can facilitate. (It should be understood that some water can remain in the water headwear, for example, in indentations on the interior surface of the water headwear or in materials that have absorbed the water; the amount of time corresponds to how long it takes for the water that is not absorbed or trapped to exit the water headwear). In an aspect, when water headwear 100 is subjected to such a test, water headwear 100 can drain instantaneously (i.e., all water that drains from water headwear 100 can exit water headwear 100 while it is being withdrawn from the water). In another aspect, water headwear 100 can drain in less than about 6 seconds. More specifically, in such an aspect, water headwear 100 can drain in less than about 5.5 seconds, less than about 5 seconds, less than about 4.5 seconds, less than about 4 seconds, less than about 3.5 seconds, less than about 3 seconds, less than about 2.5 seconds, less than about 2 seconds, less than about 1.5 seconds, less than about 1 second, or less than about .5 seconds.

[0060] FIG. 4 shows various regions of the human

head (e.g., the head of wearer 102). As shown in FIG. 4, the head of wearer 102 can include a frontal region 402, a parietal region 404, an occipital region 406, a temporal region 408, a zygomatic region 410, a parotid region 412, a mastoid region 414, and an auricular region 416. These regions can correspond to bones, glands, or other structures of wearer 102's head. For example, frontal region 402 can correspond to the frontal bone of wearer 102's cranium. Parietal region 404 can correspond to the two parietal bones of wearer 102's cranium. Occipital region 406 can correspond to the occipital bone of wearer 102's cranium. Temporal region 408 can correspond to the left temporal bone and the left greater wing of the sphenoid bone of wearer 102's cranium. Zygomatic region 410 can correspond to the left zygomatic bone of wearer 102's cranium. Parotid region 412 can correspond to the left parotid gland of wearer 102. Mastoid region 414 can correspond to the left mastoid process of the left temporal bone of wearer 102's cranium. Auricular region 416 can correspond to the left ear of wearer 102. It should be understood that any region shown on one side of wearer 102's head as in FIG. 4 has a corresponding region of the same name on the opposite side of wearer 102's head.

[0061] FIGS. 5A-5D illustrate the division of body 304 of water headwear 100 into three portions: an upper cranial portion 502 to protect frontal region 402, parietal region 404, and occipital region 406 of wearer 102's head and two temporal portions 504 to protect temporal regions 408 of wearer 102's head. Upper cranial portion 502 protecting frontal region 504, parietal region 404, and occipital region 406 can include upper cranial portion 502 protecting portions of each of these three regions. Likewise, a temporal portion 504 protecting a temporal region 408 can include the temporal portion 504 protecting portions of the temporal region 408. Additionally, in an aspect, a temporal portion 504 can protect other regions, depending on the size of the temporal portion 504. For example, a temporal portion 504 can protect at least one of zygomatic region 410, parotid region 412, mastoid region 414, or auricular region 416 in addition to temporal region 408.

[0062] FIGS. 5A-5D illustrate a method of delineating upper cranial portion 502 and temporal portions 504 on a body of an article of water headwear. While the method is described with respect to body 304 of water headwear 100, it should be understood that the method of FIGS. 5A-5D applies to any article of water headwear such that an upper cranial portion and temporal portions of a body of an article of water headwear can be determined geometrically using the method of FIGS. 5A-5D.

[0063] FIG. 5A shows lines A, B, C_1, and C_2. Line A can be a longitudinal centerline that follows exterior surface 302 from a front to a rear of water headwear 100. Line A can divide body 304 into two substantially symmetric halves. Line B can transect line A perpendicularly at point P_1 and follow exterior surface 302 while remaining perpendicular with respect to line A. P_1 can mark the apex of water headwear 100. The apex of water headwear 100 can be defined as the highest point of water headwear 100 when water headwear 100 is positioned on the head of a wearer 102 and wearer 102's head is substantially level (i.e., the straight-ahead line of sight of wearer 102 is parallel to the plane of the horizon). FIGS. 5B-5C illustrate water headwear 100 in such a configuration, where the straight-ahead line of sight of wearer 102 is shown by line S.

[0064] Lines C_1 and C_2 can extend rearward of line B from point P_1 at angles C_1' and C_2', respectively. Lines C_1 and C_2 can follow exterior surface 302 while maintaining their angles (e.g., C_1' and C_2') with respect to line A (as measured from the view of FIG. 5A). Angles C_1' and C_2' can be measured with respect to the portion of line A rearward of P_1, as shown in FIG. 5A. Angles C_1' and C_2' can both be 55 degrees.

[0065] FIG. 5B shows line D_1. Line D_1 can transect line B perpendicularly at point $P_{2\text{-}1}$. Line D_1 can follow exterior surface 302 while remaining perpendicular with respect to line B. Line D_1 can extend in opposite directions from point $P_{2\text{-}1}$ until it intersects with a front edge 506 of body 304 and with line C_1.

[0066] FIG. 5C shows line D_2. Line D_2 can transect line B perpendicularly at point $P_{2\text{-}2}$. Line D_2 can follow exterior surface 302 while remaining perpendicular with respect to line B. Line D_2 can extend in opposite directions from point $P_{2\text{-}2}$ until it intersects with a front edge 506 of body 304 and with line C_2.

[0067] FIG. 5D illustrates a method for determining the locations of points $P_{2\text{-}1}$ and $P_{2\text{-}2}$. FIG. 5D shows lines E, F, Gi, and G_2. Line E can be a vertical line passing through point P_1. As used herein, "vertical" refers to a direction perpendicular to the plane of the horizon. Line F can represent the curvature of body 304 along the plane that includes line B. As used herein, a "curvature" of body 304 is delineated by a smooth "best-fit" line that follows the general shape of body 304, such as line F. Lines G_1 and G_2 can be lines that intersect line B and are perpendicular to the curvature of body 304 (line F). Such lines necessarily intersect line E at angles G_1' and G_2', respectively, as measured from the portion of line E above the intersection. Depending on the selection of lines G_1 and G_2 that fit the above description (i.e., lines that intersect line B and are perpendicular to line F), angles G_1' and G_2' can have various values. Points $P_{2\text{-}1}$ and $P_{2\text{-}2}$ can be defined as the points on line B that, when intersected by lines that are perpendicular to the curvature of body 304 (lines G_1 and G_2), cause the values of angles G_1' and G_2' to each be 75 degrees.

[0068] As used herein, the directional terms "above" and "below" refer to a coordinate system where a point on water headwear 100 "above" another point is nearer to point P_1 (i.e., regardless of whether the points are situated on the same vertical axis). Likewise, a point on water headwear 100 "below" another point is farther from point P_1. As used herein, the directional terms "frontward" and "rearward" refer to a coordinate system where a point

on water headwear 100 "frontward" of another point is farther in the direction indicated by line S (i.e., regardless of whether the points are situated on the same horizontal axis). Likewise, a point on water headwear "rearward" of another point is farther in the direction opposite that indicated by line S.

[0069] As shown in FIGS. 5B-5C, an "upper cranial portion" of a body of an article of water headwear can be the regions of the body that are rearward of lines C_1 and C_2 and above lines D_1, D_2, and front edge 506. In FIG. 5B, a half of this portion is illustrated as the regions rearward of line C_1 and above line D_1 and front edge 506 (designated as upper cranial portion 502 and demarcated by solid lines). In FIG. 5C, the other half of this portion is illustrated as the regions rearward of line C_2 and above line D_2 and front edge 506 (designated as upper cranial portion 502 and demarcated by solid lines). Upper cranial portion 502 can extend across the top and rear of body 304 between line D1 and line D2 and between line C1 and line C2.

[0070] Likewise, as shown in FIGS. 5B-5C, a "temporal" portion of a body of an article of water headwear can be the regions of the body that are frontward of line C_1 or C_2 and below line D_1, D_2, or front edge 506. In FIG. 5B, this portion is illustrated as the portion frontward of line C_1 and below line D_1 (designated as temporal portion 504a and demarcated by solid lines). In FIG. 5C, this portion is illustrated as the portion frontward of line C_2 and below line D_2 (designated as temporal portion 504b and demarcated by solid lines).

[0071] An "upper cranial portion" or a "temporal portion" of a body of an article of water headwear can be either larger or smaller than upper cranial portion 502 and temporal portions 504 shown in FIGS. 5B-5C. However, if a body of an article of water headwear has any regions that are rearward of lines C_1 and C_2 and above lines D_1, D_2, and front edge 506, it is considered to have an "upper cranial portion." Likewise, if a body of an article of water headwear has any regions that are frontward of line C_1 or C_2 and below line D_1, D_2, or front edge 506, it is considered to have a "temporal portion."

[0072] In an aspect, water headwear 100 can include both an upper cranial portion 502 and at least one temporal portion 504. In another aspect, water headwear 100 can include only an upper cranial portion 502.

[0073] Openings 104 can be disposed in both upper cranial portion 502 and temporal portions 504. For example, at least one opening 104 can be disposed in upper cranial portion 502 and at least one opening 104 can be disposed in each of temporal portions 504.

[0074] Openings 104 can include a first percentage of the exterior surface area of upper cranial portion 502. As used herein, "exterior surface area" of any portion (e.g., upper cranial portion 502) of body 304 refers to the surface area of the portion of imaginary shell 305, shown in FIG. 3B, that covers exterior surface 302 within that portion of body 304. Accordingly, the exterior surface area of the portion (e.g., upper cranial portion 502) includes the area of openings 104 in exterior surface 302 (i.e., the area of portions of openings 104 touching shell 305) within the portion. Openings 104 can include a second percentage of the exterior surface area of temporal portion 504a. Openings 104 can include a third percentage of the exterior surface area of temporal portion 504b. In an aspect, the first and second percentages can be different. For example, in an aspect, the second percentage can be higher than the first percentage. Likewise, in an aspect, the first and third percentages can be different. For example, in an aspect, the third percentage can be higher than the first percentage. In an aspect, the second and third percentages can be substantially the same. In another aspect, the second and third percentages can be different. In another aspect, the first, second, and third percentages can be substantially the same.

[0075] In an aspect, the first percentage can be between about 5% and about 30%. More specifically, in an aspect, the first percentage can be between about 7% and about 28%, between about 9% and about 26%, between about 11% and about 24%, between about 13% and about 22%, between about 15% and about 20%, or about 18%.

[0076] In an aspect, the second percentage can be between about 15% and about 40%. More specifically, in an aspect, the second percentage can be between about 17% and about 38%, between about 19% and about 36%, between about 21% and about 34%, between about 23% and about 32%, between about 25% and about 30%, or about 27.5%.

[0077] In an aspect, the third percentage can be between about 15% and about 40%. More specifically, in an aspect, the third percentage can be between about 17% and about 38%, between about 19% and about 36%, between about 21% and about 34%, between about 23% and about 32%, between about 25% and about 30%, or about 27.5%.

[0078] In an aspect, rear opening 104a can be disposed in upper cranial portion 502. In an aspect, rear opening 104a can be larger than other openings 104 on upper cranial portion 502. For example, in an aspect, rear opening 104a can be larger than an average size of all other openings 104 on upper cranial portion 502. In an aspect, rear opening 104a can be the largest of all openings 104 on upper cranial portion 502.

[0079] FIG. 6 shows upper cranial portion 502 of water headwear 100. As shown in FIG. 6, the portion of frame 306 within upper cranial portion 502 can include a circumferential rim 602. Circumferential rim 602 can extend around a circumference of wearer 102's head when worn. The portion of frame 306 within upper cranial portion 502 can further include bars 604, such as bars 604a, 604b, and 604c. Circumferential rim 602 and bars 604 can provide structural support. In an aspect, bars 604 can be substantially thicker (as measured along exterior surface 302) than ribs 308. For example, in an aspect, at their thinnest points, bars 604 can each be at least twice as thick as any of ribs 308 on upper cranial portion 502. In

an aspect, at least one of bars 604 can extend longitudinally between points of circumferential rim 602. In another aspect, at least one of bars 604 can extend laterally between points of circumferential rim 602. In another aspect, at least one of bars 604 can extend longitudinally while at least one of bars 604 can extend laterally between points of circumferential rim 602. In another aspect, at least one or all of bars 604 can extend diagonally (i.e., between longitudinally and laterally) between points of circumferential rim 602.

[0080] While FIG. 6 shows three bars 604, upper cranial portion 502 can include any number of bars 604, such as one, two, four, five, or six bars, etc. However, the number and size of bars 604 should be selected in view that a greater number and/or size of bars 604, while increasing protection, can reduce the percentage of open space between the interior and exterior of body 304 and thus impact the ingress and egress of water into and out of water headwear 100.

[0081] Upper cranial portion 502 can further include a transverse rib 308a extending between adjacent openings 104. In an aspect, transverse rib 308a can be coupled to bar 604a. In an aspect, bar 604a can be a central bar (i.e., a bar arranged along a centerline, such as longitudinal centerline A, of body 304). In an aspect, transverse rib 308a can extend at an angle greater than 45 degrees with respect to bar 604a and/or longitudinal centerline A. For example, in an aspect, transverse rib 308a can extend approximately perpendicularly to bar 604a. As used herein, "approximately perpendicular" to bar 604a and/or longitudinal centerline A refers to a direction at an angle between 80 degrees and 110 degrees with respect to a lengthwise axis (in this case, along line A) of bar 604a and/or with respect to longitudinal centerline A. As used herein, "lengthwise axis" refers to a line that passes through the center of an object along the direction of its length. Further, as used herein, that an object "extends" in a particular direction or at a particular angle means that at least a portion of its lengthwise axis extends in the direction or at the angle. As shown in FIG. 6, a lengthwise axis of transverse rib 308a (shown as line H) can extend approximately perpendicularly to line A at the intersection of line A and line H. For transverse rib 308a to extend approximately perpendicularly to bar 604a and/or longitudinal centerline A, the entirety of its lengthwise axis (shown as line H) need not extend approximately perpendicularly to bar 604a and/or longitudinal centerline A. Only a portion of its lengthwise axis need extend approximately perpendicularly to a portion of the lengthwise axis of bar 604a and/or longitudinal centerline A. Additionally, as shown in FIG. 6, transverse rib 308a can be arc-shaped. For example, transverse rib 308a can be curved rearward. For example, transverse rib 308a can be curved such that is approximately follows the shape of front edge 506 of body 304 from the view of FIG. 6.

[0082] As shown in FIG. 6, in an aspect, transverse rib 308a can connect bar 604a to bar 604b. Further, in such an aspect, transverse rib 308a can connect bar 604a to bar 604c.

[0083] While FIG. 6 shows transverse rib 308a coupled to bar 604a, transverse rib 308a can be coupled to any of circumferential rim 602, any one of bars 604, or any one of ribs 308, in combination or in isolation. Transverse rib 308a need only extend at an angle greater than 45 degrees with respect to longitudinal centerline A to be considered a "transverse rib."

[0084] Upper cranial portion 502 can further include a support rib 308b between adjacent openings 104. In an aspect, support rib 308b can transect transverse rib 308a. In an aspect, support rib 308b can connect transverse rib 308a to frame 306 (i.e., to at least one of circumferential rim 602 or one of bars 604). In an aspect, upper cranial portion 502 can include multiple support ribs 308b, 308c, 308d, etc. In an aspect, at least one of support ribs 308b, 308c, or 308d, etc. can be connected to at least one of bars 604, such as support ribs 308d, 308e, 308f, for example. In an aspect, at least one of support ribs 308b, 308c, or 308d, etc. can extend at an angle less than 45 degrees with respect to bar 604a and/or longitudinal centerline A. For example, in an aspect, at least one of support ribs 308b, 308c, or 308d, etc. can extend approximately parallel (i.e., at an angle between 0 and 20 degrees) to bar 604a and/or longitudinal centerline A.

[0085] While FIG. 6 shows a single transverse rib 308a and 16 support ribs 308b-308q, upper cranial portion 502 can include any number of transverse ribs 308a and/or support ribs 308b-308q. However, the number and size of transverse rib(s) 308a and/or support ribs 308b-308q should be selected in view that a greater number and/or size of transverse rib(s) 308a and/or support ribs 308b-308q, while increasing protection, can reduce the percentage of open space between the interior and exterior of body 304 and thus impact the ingress and egress of water into and out of water headwear 100.

[0086] FIG. 7 shows a region of upper cranial portion 502 including transverse rib 308a and support ribs 308b, 308c, and 308q.

[0087] FIG. 8 shows a cross section 802 of transverse rib 308a. Cross section 802 can be a cross section of transverse rib 308a that is parallel to longitudinal centerline A at the point where section line 8-8 intersects the lengthwise axis (shown as line H in FIGS. 6-7) of transverse rib 308a. However, cross section 802 can be representative of transverse rib 308a's cross section, as taken parallel to longitudinal centerline A, at many or all points along transverse rib 308a. As shown in FIG. 8, cross section 802 can be substantially aligned with the curvature of body 304 (shown as line I) at the location of cross section 802. Accordingly, exterior surface 302 of body 304 can be substantially smooth in the surrounding region (i.e., bars 604 and ribs 308 can be substantially in plane with one another).

[0088] Cross section 802 can be configured to reduce drag. For example, in an aspect, cross section 802 can

be shaped as a foil. In an aspect, cross section 802 can be shaped as a convex-convex foil, for example, a symmetric foil. It should be understood that "convex-convex" refers to a foil shape that is convex on both its exterior- and interior-facing sides, where the exterior side is the side of cross section 802 facing away from wearer 102's head when water headwear 100 is worn. In another aspect, cross section 802 can be shaped as an asymmetric foil, for example, a convex-planar foil or a convex-concave foil. It should be understood that "convex-planar" or "convex-concave" refers to foil shapes that are convex on their exterior-facing sides and planar or concave, respectively, on their interior-facing sides.

[0089] FIG. 9 shows a diagram of cross section 802. As shown in FIG. 9, cross section 802 can have a boundary 902 and a chord line (shown as line J). Cross section 802 can further have a leading edge 904 and a trailing edge 906. In an aspect, leading edge 904 can face frontward on water headwear 100. In another aspect, leading edge 904 can face rearward on water headwear 100. In an aspect, cross section 802 can include a planar portion 908 adjacent trailing edge 906. Cross section 802 can be configured to reduce drag by including no substantially flat portions on boundary 902 adjacent leading edge 904 (i.e., on all of boundary 902 but planar portion 908).

[0090] As shown in FIG. 9, cross section 802 can have a chord length d_J, a maximum thickness h_{MAX}, and a distance d_{MAX} from leading edge 904 and the point along chord line J at which h_{MAX} occurs. In an aspect, d_{MAX} can be between about one-eighth d_J and about seven-eighths d_J. More specifically, in an aspect, d_{MAX} can be between about one-eighth d_J and about three-fourths d_J, between about one-eighth d_J and about five-eighths d_J, between about one-fourth d_J and about one-half d_J, or about one-third d_J.

[0091] As noted with reference to FIG. 8, in an aspect, cross section 802 can be substantially aligned with the curvature of body 304 (shown as line I in FIG. 8) at the location of cross section 802. In other words, in an aspect, chord line J can be substantially tangent to line I at the location of cross section 802.

[0092] FIG. 10 shows a lateral cross section 1002 of support rib 308b. As used herein, "lateral cross section" refers to a cross section taken at an angle perpendicular to a lengthwise axis of a rib 308 at a given point. Lateral cross section 1002 can be representative of support rib 308b's lateral cross section at many or all points along support rib 308b. Further, lateral cross section 1002 can be representative of lateral cross sections of support ribs 308c, 308d, etc. As shown in FIG. 10, lateral cross section 1002 can be substantially aligned with the curvature of body 304 (shown as line K) at the location of lateral cross section 1002. Accordingly, exterior surface 302 of body 304 can be substantially smooth in the surrounding region (i.e., bars 604 and ribs 308 can be substantially in plane with one another).

[0093] Lateral cross section 1002 can be configured to reduce drag. For example, in an aspect, lateral cross section 1002 can be shaped as an ellipse. In another aspect, lateral cross section 1002 can be shaped as a circle. In another aspect, lateral cross section 1002 can be shaped as an oval.

[0094] FIG. 11 shows a diagram of lateral cross section 1002. As shown in FIG. 11, lateral cross section 1002 can have a boundary 1102. Lateral cross section 1002 can be configured to reduce drag by boundary 1102 being devoid of substantially flat portions. As used herein "substantially flat" refers to a curve having a radius of curvature greater than or equal to about 50 mm. In an aspect, boundary 1102 can be devoid of portions having a radius of curvature greater than or equal to about 50 nm. More specifically, boundary 1102 can be devoid of portions having a radius of curvature greater than or equal to about 40 mm, greater than or equal to about 30 mm, greater than or equal to about 20 mm, or greater than or equal to about 10 mm. Boundary 1102 including no substantially flat portions can increase the ability of water headwear 100 to penetrate the surface of a body of water, for example, by reducing flat surfaces that resist submersion by "skimming" over the water.

[0095] As shown in FIG. 11, lateral cross section 1002 can have a major axis L having a length d_L and a minor axis M having a length d_M. In an aspect, lateral cross section 1002 can have an aspect ratio (the ratio of d_L/d_M) of less than or equal to about 8:1. More specifically, in an aspect, lateral cross section 1002 can have an aspect ratio of less than or equal to about 7:1, less than or equal to about 6:1, less than or equal to about 5:1, or less than or equal to about 4:1. In an aspect, lateral cross section 1002 can have an aspect ratio between about 8:1 and about 1:1. More specifically, in an aspect, the aspect ratio of lateral cross section 1002 can be between about 8:1 and about 1:1, between about 7:1 and about 1:1, between about 6:1 and about 1:1, between about 5:1 and about 1:1, between about 4:1 and about 1:1, between about 3:1 and about 1:1, or about 2:1.

[0096] As noted with reference to FIG. 10, in an aspect, lateral cross section 1002 can be substantially aligned with the curvature of body 304 (shown as line K) at the location of lateral cross section 1002. In other words, in an aspect, major axis L can be substantially tangent to line K at the location of lateral cross section 1002.

[0097] In an aspect, the general shape of a cross section of a rib 308 can vary depending on the angle the rib 308 extends with respect to longitudinal centerline A of body 304. For example, as described above, cross section 802 of transverse rib 308a, which extends at an angle greater than 45 degrees with respect to longitudinal centerline A, can be shaped as a foil, for example, a symmetric foil similar to that shown in FIG. 9. Meanwhile, lateral cross section 1002 of support rib 308b, which extends at an angle less than 45 degrees with respect to longitudinal centerline A, can be shaped as an ellipse, for example, similar to that shown in FIG. 11. Accordingly, a rib 308 extending at an angle less than 45 degrees with respect longitudinal centerline A along its entire length-

wise axis can have cross sections shaped differently than those of a rib 308 with at least a portion of its lengthwise axis extending at an angle greater than 45 degrees with respect to longitudinal centerline A. For example, in an aspect, cross section 802 of transverse rib 308a can be a different general shape than lateral cross section 1002 of support rib 308b along an entire length of each of transverse rib 308a and support rib 308b. Additionally, in an aspect, any rib 308 extending at an angle less than 45 degrees with respect to longitudinal centerline A along its entire lengthwise axis is devoid of a cross section shaped as a foil (e.g., any of the foil shapes identified above), while a rib 308 extending at an angle greater than 45 degrees with respect to longitudinal centerline A can have a cross section shaped as a foil. More specifically, in an aspect, any rib 308 extending approximately parallel to longitudinal centerline A along its entire lengthwise axis is devoid of a cross sections shaped as a foil (e.g., any of the foil shapes identified above), while a rib 308 extending approximately perpendicularly to longitudinal centerline A can have a cross section shaped as a foil.

[0098] FIGS. 12-13 show temporal portion 504a of water headwear 100. As shown in FIG. 12, the portion of frame 306 within temporal portion 504a can include a peripheral rim 1202. Peripheral rim 1202 can frame at least a portion of an ear of wearer 102 when worn.

[0099] Temporal portion 504a can further include a transverse rib 308r extending between adjacent openings 104. In an aspect, transverse rib 308r can be coupled to peripheral rim 1202. In an aspect, transverse rib 308r can extend at an angle greater than 45 degrees with respect to longitudinal centerline A. For example, in an aspect, transverse rib 308r can extend approximately perpendicularly to longitudinal centerline A. In other words, a lengthwise axis (e.g., along line N) of at least a portion of transverse rib 308r can extend at an angle between 80 degrees and 110 degrees with respect to longitudinal centerline A. In an aspect, transverse rib 308r can have a forked shape. For example, in such an aspect, transverse rib 308r can have more than two terminal points. As shown in FIGS. 12-13, transverse rib 308r can have multiple prongs, such as prongs 1204, 1206, and 1208. In such an aspect, transverse rib 308r can be coupled to peripheral rim 1202 at more than two points. For example, in such an aspect, transverse rib 308r can be coupled to peripheral rim at three points at the terminal points of prongs 1204, 1206, and 1208.

[0100] While FIGS. 12-13 show transverse rib 308r coupled to peripheral rim 1202, transverse rib 308r can be coupled to peripheral rim 1202 or any one of ribs 308, in combination or in isolation. Transverse rib 308r need only extend at an angle greater than 45 degrees with respect to longitudinal centerline A to be considered a "transverse rib."

[0101] Temporal portion 504a can further include a support rib 308s between adjacent openings 104. In an aspect, support rib 308s can be coupled to transverse rib 308r. In an aspect, support rib 308s can connect transverse rib 308r to frame 306 (i.e., to peripheral rim 1202). In an aspect, temporal portion 504 can include multiple support ribs 308s, 308t, 308u, and 308v. In an aspect, at least one of support ribs 308s, 308t, 308u, or 308v (e.g., support rib 308s) can extend at an angle less than 45 degrees with respect to longitudinal centerline A. For example, in an aspect, at least one of support ribs 308s, 308t, 308u, or 308v (e.g., support rib 308s) can extend approximately perpendicularly to portions of transverse rib 308r that in turn extend approximately perpendicularly to longitudinal centerline A. Additionally, at least one of support ribs 308s, 308t, 308u, or 308v can extend approximately parallel (i.e., at an angle between 0 and 20 degrees) to longitudinal centerline A

[0102] While FIGS. 12-13 show a single transverse rib 308r and four support ribs 308s-308v, temporal portion 504 can include any number of transverse ribs 308r and/or support ribs 308s-308v. However, the number and size of transverse rib(s) 308r and/or support ribs 308s-308v should be selected in view that a greater number and/or size of transverse rib(s) 308r and/or support ribs 308s-308v, while increasing protection, can reduce the percentage of open space between the interior and exterior of body 304 and thus impact the ingress and egress of water into and out of water headwear 100.

[0103] FIG. 14 shows a cross section 1402 of transverse rib 308r. Cross section 1402 can be a cross section of transverse rib 308r that is parallel to the ground plane at the point where section line 14-14 intersects the lengthwise axis of transverse rib 308r when water headwear 100 is oriented as described with respect to FIGS. 5B-5C (i.e., the straight-ahead line of sight of wearer 102 is parallel to the plane of the horizon). However, cross section 1402 can be representative of transverse rib 308r's cross section, as taken parallel to the ground plane when water headwear 100 is oriented as described with respect to FIGS. 5B-5C, at many or all points along prong 1204 of transverse rib 308r. As shown in FIG. 14, cross section 1402 can be substantially aligned with the curvature of body 304 (shown as line O) at the location of cross section 1402. Accordingly, exterior surface 302 of body 304 can be substantially smooth in the surrounding region (i.e., ribs 308 can be substantially in plane with one another).

[0104] Like cross section 802 of transverse rib 308a, cross section 1402 of transverse rib 308r can be configured to reduce drag. For example, in an aspect, cross section 1402 can be shaped as a foil. In an aspect, cross section 1402 can be shaped as a convex-convex foil, for example, a symmetric foil. In another aspect, cross section 1402 can be shaped as an asymmetric foil, for example, a convex-planar foil or a convex-concave foil.

[0105] Cross section 1402 can have some or all of the features and characteristics of cross section 802 shown and described with respect to FIGS. 8-9. For example, cross section 1402 can have a chord line such as chord line J, a leading edge such as leading edge 904, and a trailing edge such as trailing edge 906. The dimensions

of a cross section of transverse rib 308r taken parallel to the ground plane when water headwear 100 is oriented as described with respect to FIGS. 5B-5C (e.g., cross section 1402), for example, the length of its chord line and maximum height, can vary from those of a cross section of transverse rib 308a taken parallel to longitudinal centerline A (e.g., cross section 802). However, the dimensions of cross section 1402 can fall within the parameters discussed above for cross section 802.

[0106] As noted above, in an aspect, cross section 1402 can be substantially aligned with the curvature of body 304 (shown as line O) at the location of cross section 1402. In other words, in an aspect, the chord line of cross section 1402 can be substantially tangent to line O at the location of cross section 1402.

[0107] FIG. 15 shows a lateral cross section 1502 of support rib 308s. As noted above, "lateral cross section" refers to a cross section taken at an angle perpendicular to a lengthwise axis of a rib 308 at a given point. Lateral cross section 1502 can be representative of support rib 308s's lateral cross section at many or all points along support rib 308s. Further, lateral cross section 1502 can be representative of lateral cross sections of support ribs 308t, 308u, 308v. As shown in FIG. 15, lateral cross section 1502 can be substantially aligned with the curvature of body 304 (shown as line P) at the location of lateral cross section 1502. Accordingly, exterior surface 302 of body 304 can be substantially smooth in the surrounding region (i.e., peripheral rim 1202 and/or ribs 308 can be substantially in plane with one another).

[0108] Like lateral cross section 1002 of support rib 308b, lateral cross section 1502 can be configured to reduce drag. For example, in an aspect, lateral cross section 1502 can be shaped as an ellipse. In another aspect, lateral cross section 1502 can be shaped as a circle. In another aspect, lateral cross section 1502 can be shaped as an oval.

[0109] Lateral cross section 1502 can have some or all of the features and characteristics of lateral cross section 1002 shown and described with respect to FIGS. 10-11. For example, lateral cross section 1502 can have a major axis such as major axis L and a minor axis such as minor axis M. The dimensions of a lateral cross section of support rib 308s (e.g., lateral cross section 1502), for example, its aspect ratio, can vary from those of a lateral cross section of support rib 308b (e.g., lateral cross section 1002). However, the dimensions of lateral cross section 1502 can fall within the parameters discussed above for lateral cross section 1002.

[0110] As noted above, in an aspect, lateral cross section 1502 can be substantially aligned with the curvature of body 304 (shown as line P) at the location of lateral cross section 1502. In other words, in an aspect, the major axis of lateral cross section 1502 can be substantially tangent to line P at the location of lateral cross section 1502.

[0111] FIG. 16 shows a fit system 1602 of water headwear 100. Fit system can adjust the fit of water headwear 100 on the head of wearer 102. As shown in FIG. 16, fit system 1602 can include a carriage 1604, a gear 1606, and straps 1608. In an aspect, gear 1606 can be an internal gear configured to receive a tool used to rotate gear 1606, for example, an actuator wheel or other user engagement piece. Gear 1606 can be coupled to straps 1608 such that rotation of gear 1606 in a tightening direction can exert tension on straps 1608 and can shorten the distance straps 1608 extend from carriage 1604 to their attachment points within water headwear 100. Likewise, rotation of gear 1606 in a loosening direction can release tension on straps 1608 and can lengthen the distance straps 1608 extend from carriage 1604 to their attachment points within water headwear 100. Therefore, rotating gear 1606 in the tightening direction can move carriage 1604 forward within water headwear 100 such that cavity 106 for receipt of wearer 102's head within water headwear 100 is effectively smaller. Accordingly, when wearer 102 inserts his or her head into cavity 106, carriage 1604 can contact the back of wearer 102's head, ensuring a snug fit. If the fit is too snug (i.e., wearer 102 cannot insert his or her head into cavity 106 or experiences discomfort upon inserting his or her head into cavity 106), gear 1606 can be rotated in the loosening direction to lengthen straps 1608 and move carriage 1604 backward.

[0112] As shown in FIG. 17, fit system 1602 can further include straps 1702. Straps 1702 can secure carriage 1604 such that carriage 1604 contacts a substantially fixed location on wearer 102's head. For example, the length of straps 1702 can be configured such that carriage 1604 contacts occipital region 406 of wearer 102's head. In an aspect, straps 1702 can extend across rear opening 104a. While FIG. 17 shows two straps 1702, fit system 1602 can include any number of straps 1702, such as one, three, four, five, or six straps, etc. However, the number and size of straps 1702 should be selected in view that a greater number and/or size of straps 1702 can reduce the percentage of open space between the interior and exterior of body 304 and thus impact the ingress and egress of water into and out of water headwear 100.

[0113] As shown in FIG. 18, straps 1702 can be secured to body 304 of water headwear 100 by connectors 1802. In an aspect, connectors 1802 can be positioned within channels 314. In an aspect, connectors 1802 can be connected to first layer 202 and/or second layer 204. Each of connectors 1802 can include at least one hole 1804. In an aspect, each of connectors 1802 can include multiple holes 1804. Holes 1804 can be configured to receive a protrusion on one of straps 1702 to secure the strap 1702 to the connector 1802. The protrusion on strap 1702 can be inserted into any one of holes 1804 on connector 1802 such that the vertical position of carriage 1604 can be adjusted. Accordingly, fit system 1602 can be configured to fit the head of an individual wearer 102.

[0114] Along with chin strap 310, fit system 1602 can ensure that water headwear 100 is secured snugly on

the head of wearer 102. Accordingly, due to chin strap 310 and fit system 1602, when water headwear 100 experiences an impact, water headwear 100 cannot be easily jarred loose from the head of wearer 102. Further, wearer 102 cannot be easily injured by interior surface 315 of body 304 crashing into the head of wearer 102 upon impact.

[0115] The aspect(s) described, and references in the specification to "one aspect," "an aspect," "an example aspect," "an exemplary aspect," etc., indicate that the aspect(s) described can include a particular feature, structure, or characteristic, but every aspect may not necessarily include the particular feature, structure, or characteristic. Moreover, such phrases are not necessarily referring to the same aspect. Further, when a particular feature, structure, or characteristic is described in connection with an aspect, it is understood that it is within the knowledge of one skilled in the art to affect such feature, structure, or characteristic in connection with other aspects whether or not explicitly described.

[0116] Spatially relative terms, such as "beneath," "below," "lower," "above," "on," "upper" and the like, can be used herein for ease of description to describe one element or feature's relationship to another element(s) or feature(s) as illustrated in the figures. The spatially relative terms are intended to encompass different orientations of the device in use or operation in addition to the orientation depicted in the figures. The apparatus can be otherwise oriented (rotated 90 degrees or at other orientations) and the spatially relative descriptors used herein can likewise be interpreted accordingly.

[0117] The term "about" or "substantially" or "approximately" as used herein means the value of a given quantity that can vary based on a particular technology. Based on the particular technology, the term "about" or "substantially" or "approximately," unless otherwise specified, can indicate a value of a given quantity that varies within, for example, 0.1-10% of the value (e.g., $\pm$0.1%, $\pm$1%, $\pm$2%, $\pm$5%, or $\pm$10% of the value).

[0118] Numerical values, including endpoints of ranges, can be expressed herein as approximations preceded by the term "about," "substantially," "approximately," or the like. In such cases, other aspects include the particular numerical values. Regardless of whether a numerical value is expressed as an approximation, two aspects are included in this disclosure: one expressed as an approximation, and another not expressed as an approximation. It will be further understood that an endpoint of each range is significant both in relation to another endpoint, and independently of another endpoint.

[0119] The foregoing description of the specific aspects will so fully reveal the general nature of the aspects that others can, by applying knowledge within the skill of the art, readily modify and/or adapt for various applications such specific aspects, without undue experimentation, without departing from the general concept of the aspects. Therefore, such adaptations and modifications are intended to be within the meaning and range of equivalents of the disclosed aspects, based on the teaching and guidance presented herein. It is to be understood that the phraseology or terminology herein is for the purpose of description and not of limitation, such that the terminology or phraseology of the present specification is to be interpreted by those skilled in relevant art(s) in light of the teachings herein.

[0120] It is to be appreciated that the Detailed Description section, and not the Summary and Abstract sections, is intended to be used to interpret the claims. The Summary and Abstract sections may set forth one or more but not all exemplary aspects of the present disclosure as contemplated by the inventor(s), and thus, are not intended to limit the present disclosure and the appended claims in any way.

[0121] The breadth and scope of the aspects should not be limited by any of the above-described exemplary aspects, but should be defined only in accordance with the following claims and their equivalents.

[0122] The following aspects are preferred embodiments of the invention.

1. Water headwear, comprising:
a body, comprising:

    an upper cranial portion to protect frontal, parietal, and occipital regions of a wearer's head;
    a temporal portion to protect a temporal region of the wearer's head; and
    a first plurality of openings extending through the upper cranial portion and a second plurality of openings extending through the temporal portion that permit the passage of water through the water headwear, the first and second plurality of openings comprising between 10% and 40% of an exterior surface area of the body.

2. The water headwear of aspect 1, wherein the water headwear is a helmet.

3. The water headwear of any one of aspects 1-2, wherein the first plurality of openings comprises a first percentage of an exterior surface area of the upper cranial portion and the second plurality of openings comprises a second percentage of an exterior surface area of the temporal portion, the second percentage being greater than the first percentage.

4. The water headwear of any one of aspects 1-3, the upper cranial portion further comprising a transverse rib between adjacent openings of the first plurality of openings, the transverse rib extending approximately perpendicularly to a longitudinal centerline of the body.

5. The water headwear of aspect 4, wherein the transverse rib has a cross section configured to re-

duce drag.

6. The water headwear of aspect 5, wherein the cross section is shaped as a convex-convex foil.

7. The water headwear of aspect 6, wherein the convex-convex foil has a chord length and a maximum thickness at a distance of about one-third the chord length from a leading edge of the convex-convex foil.

8. The water headwear of any one of aspects 6-7, wherein a chord line of the convex-convex foil is substantially tangent to a curvature of the body at a location of the cross section.

9. The water headwear of any one of aspects 4-8, the upper cranial portion further comprising a support rib between adjacent openings of the first plurality of openings, the support rib transecting the transverse rib.

10. The water headwear of aspect 9, wherein the support rib has a lateral cross section configured to reduce drag.

11. The water headwear of aspect 10, wherein the lateral cross section is shaped as an ellipse.

12. The water headwear of aspect 11, wherein the ellipse has an aspect ratio of less than or equal to 4:1.

13. The water headwear of any one of aspects 10-11, wherein a major axis of the ellipse is substantially tangent to a curvature of the body at a location of the lateral cross section.

14. The water headwear of any one of aspects 4-13, the upper cranial portion further comprising a circumferential rim extending around a circumference of a wearer's head when worn.

15. The water headwear of aspect 14, the upper cranial portion further comprising one or more bars extending longitudinally between points on the circumferential rim.

16. The water headwear of aspect 15, wherein the transverse rib is coupled to and extends approximately perpendicularly to a first bar of the one or more bars and connects the first bar to a second bar of the one or more bars.

17. The water headwear of aspect 16, wherein the transverse rib further connects the first bar to a third bar of the one or more bars.

18. The water headwear of aspect 1, the temporal portion further comprising a transverse rib extending approximately perpendicularly to a longitudinal centerline of the body.

19. The water headwear of aspect 18, wherein the transverse rib has a cross section configured to reduce drag.

20. The water headwear of aspect 19, wherein the cross section is shaped as a convex-convex foil.

21. The water headwear of aspect 20, wherein the convex-convex foil has a chord length and a maximum thickness at a distance of about one-third the chord length from a leading edge of the convex-convex foil.

22. The water headwear of any one of aspects 20-21, wherein a chord line of the convex-convex foil is substantially tangent to a curvature of the body at a location of the cross section.

23. The water headwear of any one of aspects 18-22, the temporal portion further comprising a peripheral rim framing at least a portion of an ear of a wearer when worn, wherein the transverse rib is coupled to the peripheral rim.

24. The water headwear of any one of aspects 18-23, wherein the transverse rib has a forked shape.

25. The water headwear of any one of aspects 1-24, the first plurality of openings comprising a rear opening larger than any other of the first plurality of openings.

26. The water headwear of any one of aspects 1-25, further comprising a fit system to adjust the fit of the water headwear on a head of a wearer, the fit system comprising a gear to adjust the length of a strap.

27. The water headwear of any one of aspects 1-26, further comprising an ear cover, the ear cover being vertically adjustable and comprising a plurality of holes to aerate water entering a wearer's ears.

28. Water headwear, comprising:
a body, comprising:

a first layer comprising a first material;
a second layer comprising a second material, the second material being less rigid than the first material; and
a plurality of openings extending through the first layer and the second layer that permit the passage of water through the water headwear, the plurality of openings comprising between 10% and 40% of an exterior surface area of the body.

29. The water headwear of aspect 28, wherein the water headwear is a helmet.

30. The water headwear of any one of aspects 28-29, wherein the first layer is a rigid outer layer exterior to the second layer.

31. The water headwear of any one of aspects 28-30, the body further comprising a rib between adjacent openings of the plurality of openings.

32. The water headwear of aspect 31, wherein the rib has a cross section configured to reduce drag.

33. The water headwear of aspect 32, wherein the cross section is shaped as a convex-convex foil.

34. The water headwear of aspect 33, wherein the convex-convex foil has a chord length and a maximum thickness at a distance of about one-third the chord length from a leading edge of the convex-convex foil.

35. The water headwear of any one of aspects 33-34, wherein a chord line of the convex-convex foil is substantially tangent to a curvature of the body at a location of the cross section.

36. The water headwear of any one of aspects 31-35, the body further comprising a second rib between adjacent openings of the plurality of openings, wherein the second rib has a lateral cross section configured to reduce drag.

37. The water headwear of aspect 36, wherein the lateral cross section of the second rib is a substantially different shape than the cross section of the rib along an entire length of each of the rib and second rib.

38. The water headwear of any one of aspects 36-37, wherein the lateral cross section is shaped as an ellipse.

39. The water headwear of aspect 38, the ellipse having an aspect ratio of less than or equal to 4:1.

40. The water headwear of any one of aspects 38-39, wherein a major axis of the ellipse is substantially tangent to a curvature of the body at a location of the lateral cross section.

41. The water headwear of any one of aspects 36-37, wherein a respective shape of each of the rib and the second rib varies depending on a respective angle that each of the rib and the second rib extends with respect to a longitudinal centerline of the body.

42. The water headwear of any one of aspects 28-41, the body further comprising channels in the second layer to facilitate a flow of water between an interior and an exterior of the water headwear.

43. The water headwear of aspect 42, wherein the channels are oriented longitudinally within the second layer.

44. The water headwear of any one of aspects 28-43, the body further comprising a third layer disposed interior to the second layer.

45. The water headwear of any one of aspects 28-44, wherein the water headwear does not retain water, such that the water drains from the water headwear in less than 2 seconds when the water headwear is submerged and quickly withdrawn from water while upside-down.

46. Water headwear, comprising:
an upper cranial portion to protect frontal, parietal, and occipital regions of a wearer's head, the upper cranial portion comprising:

a rigid layer;
an impact-absorbing layer;
a plurality of openings extending through the rigid layer and the impact-absorbing layer that permit the passage of water through the upper cranial portion;
a rib between adjacent openings of the plurality of openings, the rib having a lateral cross section with a boundary not having a radius of curvature greater than or equal to 50 mm.

47. The water headwear of aspect 46, wherein the water headwear is a helmet.

48. The water headwear of any one of aspects 46-47, wherein the impact-absorbing layer is an inner foam layer interior to the rigid layer.

49. The water headwear of any one of aspects 46-48, the plurality of openings comprising between 5% and 30% of an exterior surface area of the upper cranial portion.

50. The water headwear of any one of aspects 46-49, wherein the rigid layer comprises the rib.

51. The water headwear of any one of aspects 46-50, further comprising a temporal portion to protect a temporal region of the wearer's head.

52. The water headwear of aspect 51, the temporal portion comprising a second plurality of openings that permit the passage of water through the tempo-

ral portion.

53. The water headwear of aspect 52, the second plurality of openings comprising between 15% and 40% of an exterior surface area of the temporal portion.

Claims

1. Water headwear, comprising:
a body, comprising:

a first layer comprising a first material;
a second layer comprising a second material, the second material being less rigid than the first material; and
a plurality of openings extending through the first layer and the second layer that permit the passage of water through the water headwear, the plurality of openings comprising between 10% and 40% of an exterior surface area of the body.

2. The water headwear of claim 1, wherein the water headwear is a helmet.

3. The water headwear of any one of claims 1-2, wherein the first layer is a rigid outer layer exterior to the second layer and the second layer is an impact-absorbing layer.

4. The water headwear of any one of claims 1-3, the body further comprising a rib between adjacent openings of the plurality of openings.

5. The water headwear of claim 4, wherein the rib has a cross section configured to reduce drag.

6. The water headwear of claim 5, wherein the cross section is shaped as a convex-convex foil, and wherein the convex-convex foil has a chord length and a maximum thickness at a distance of about one-third the chord length from a leading edge of the convex-convex foil.

7. The water headwear of any one of claims 4-6, the body further comprising a second rib between adjacent openings of the plurality of openings, wherein the second rib has a lateral cross section configured to reduce drag.

8. The water headwear of claim 7, wherein the lateral cross section of the second rib is a substantially different shape than the cross section of the rib along an entire length of each of the rib and second rib.

9. The water headwear of any one of claims 7-8, wherein the lateral cross section is shaped as an ellipse, the ellipse having an aspect ratio of less than or equal to 4:1.

10. The water headwear of any one of claims 1-9, the body further comprising a third layer disposed interior to the second layer.

11. The water headwear of any one of claims 1-10, wherein the water headwear does not retain water, such that the water drains from the water headwear in less than 2 seconds when the water headwear is submerged and quickly withdrawn from water while upside-down.

12. The water headwear of any one of claims 1-11, further comprising an ear cover, the ear cover being vertically adjustable and comprising a plurality of holes to aerate water entering a wearer's ears.

13. The water headwear of any one of claims 1-12, wherein the body comprises:

an upper cranial portion to protect frontal, parietal, and occipital regions of a wearer's head; and
a temporal portion to protect a temporal region of the wearer's head;
wherein the plurality of openings comprises a first plurality of openings extending through the upper cranial portion and a second plurality of openings extending through the temporal portion, and
wherein the first plurality of openings comprises a first percentage of an exterior surface area of the upper cranial portion and the second plurality of openings comprises a second percentage of an exterior surface area of the temporal portion, the second percentage being greater than the first percentage.

14. The water headwear of claim 13, wherein the first percentage is between 5% and 30% and the second percentage is between 15% and 40%.

15. The water headwear of any one of claims 4-14, wherein the first layer comprises the rib.

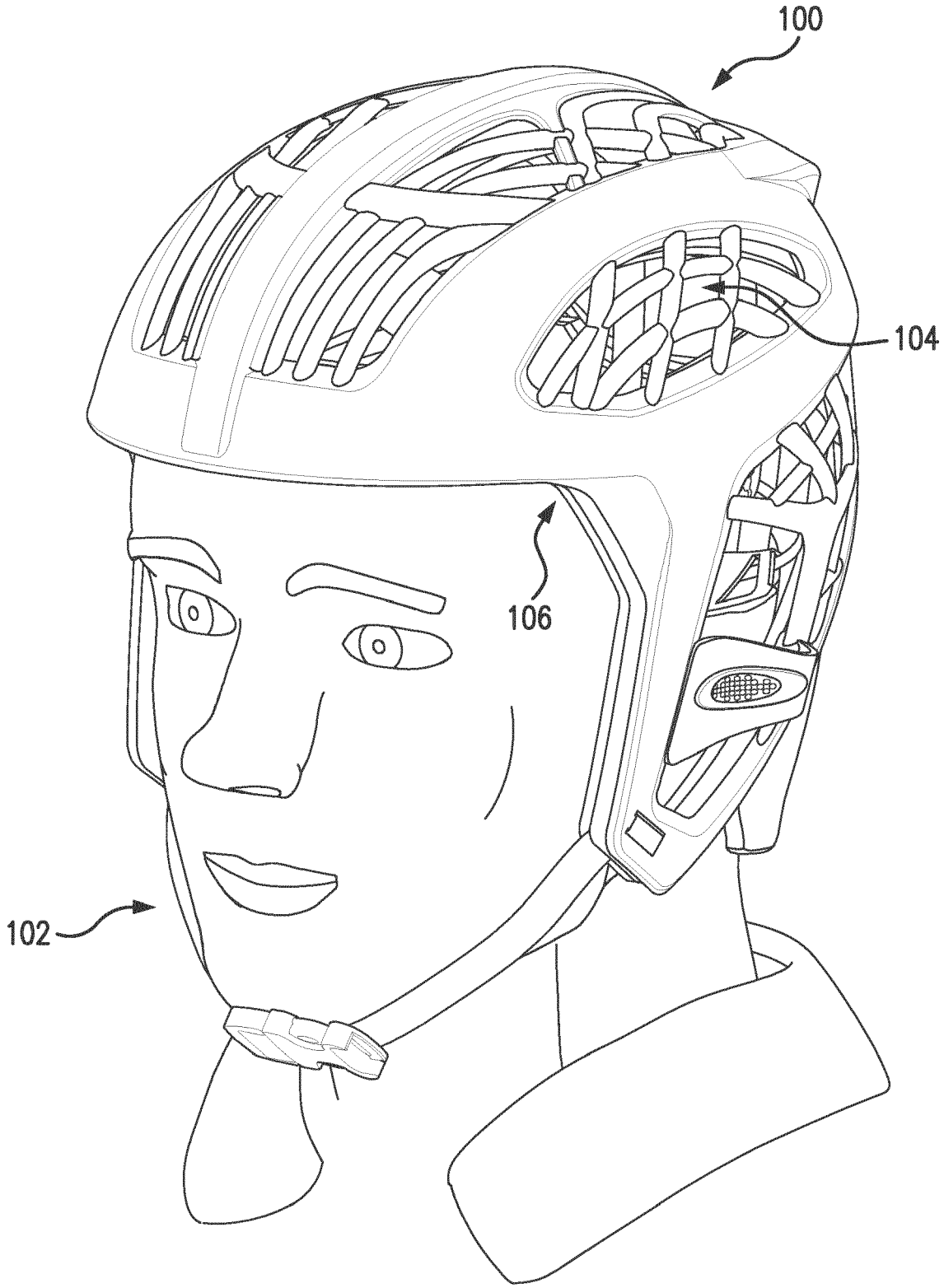

FIG. 1

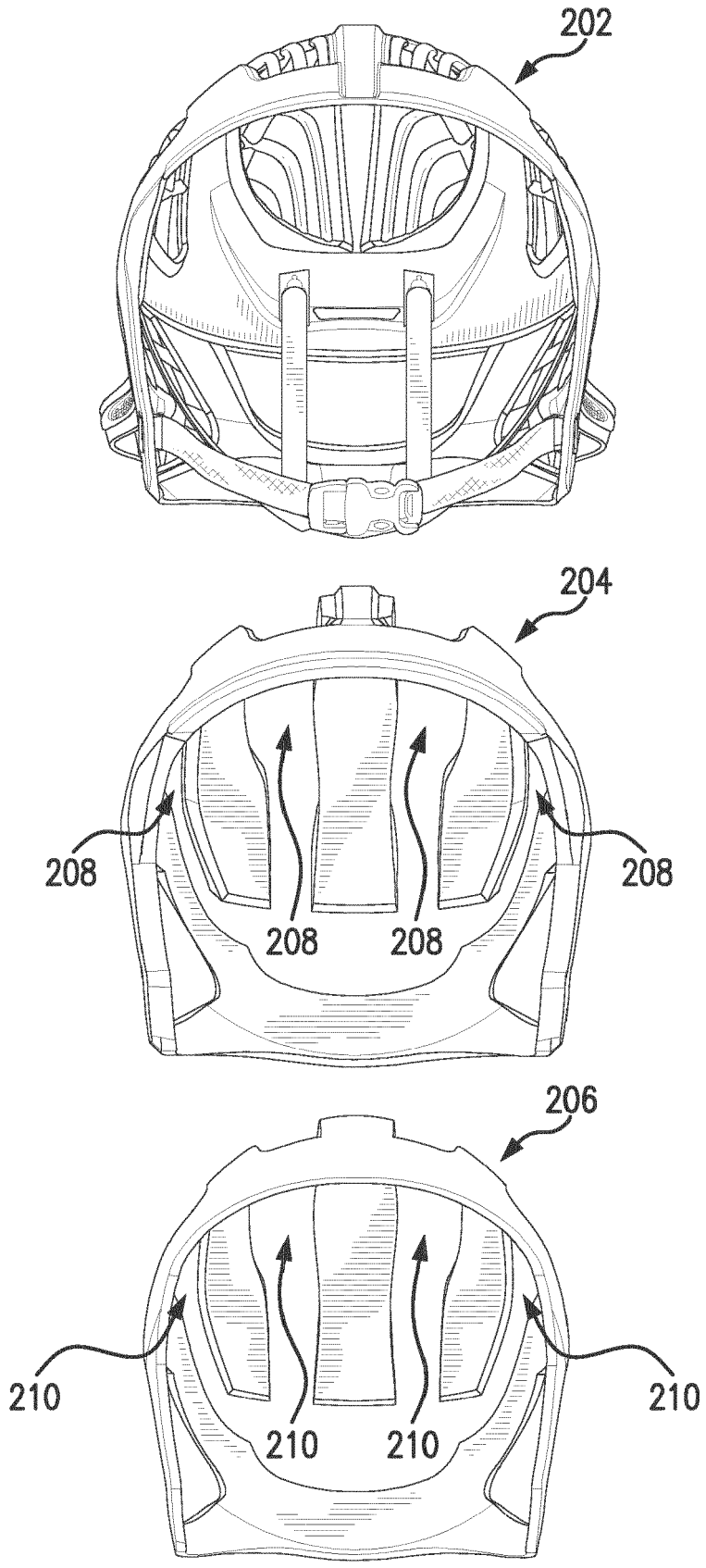

FIG. 2

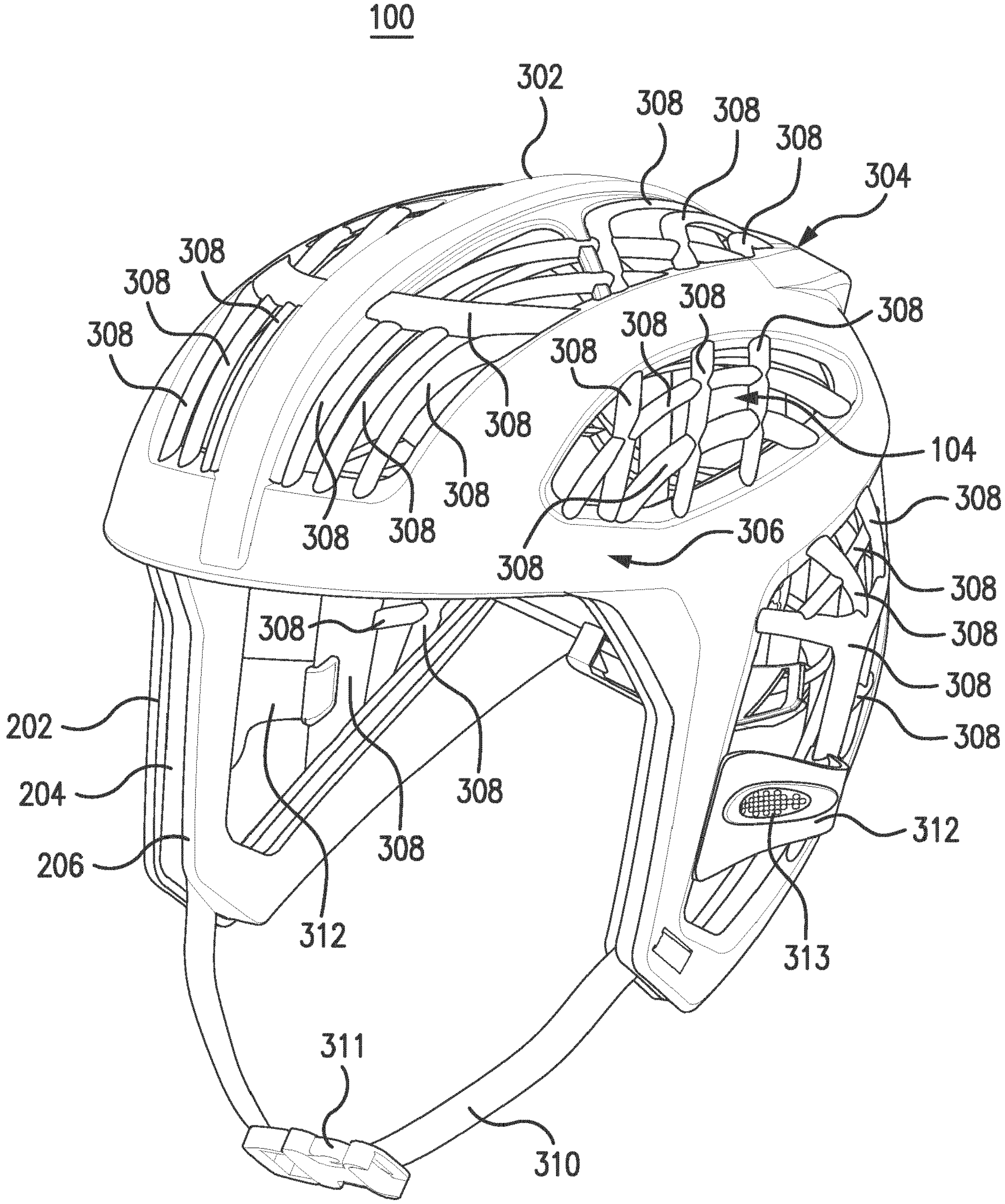
100
302
308
308
308
304
308
308
308
308
308
308
308
308
308
104
308
308
308
308
306
308
308
308
308
308
308
202
204
206
312
308
308
312
313
311
310

FIG. 3A

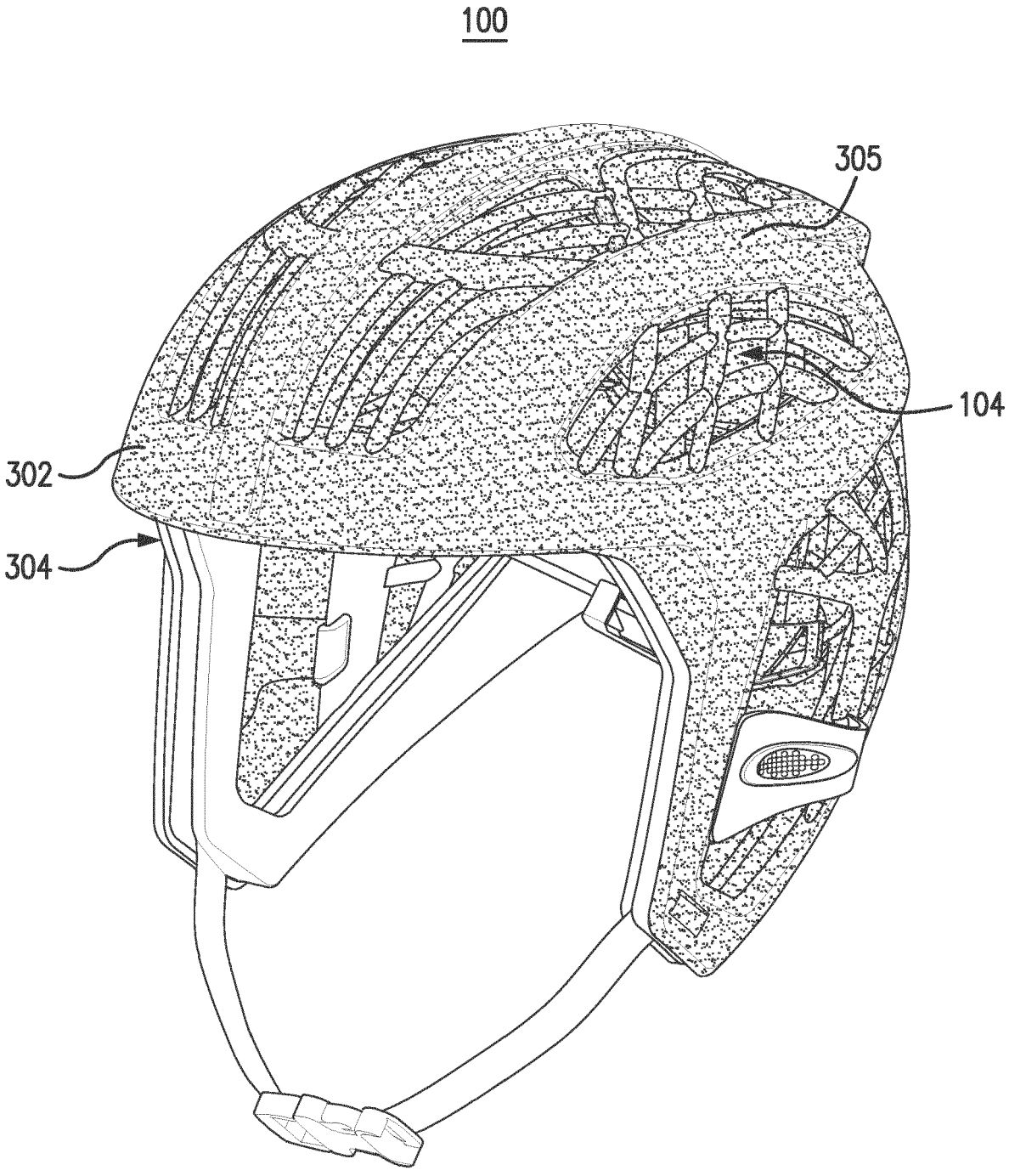

FIG. 3B

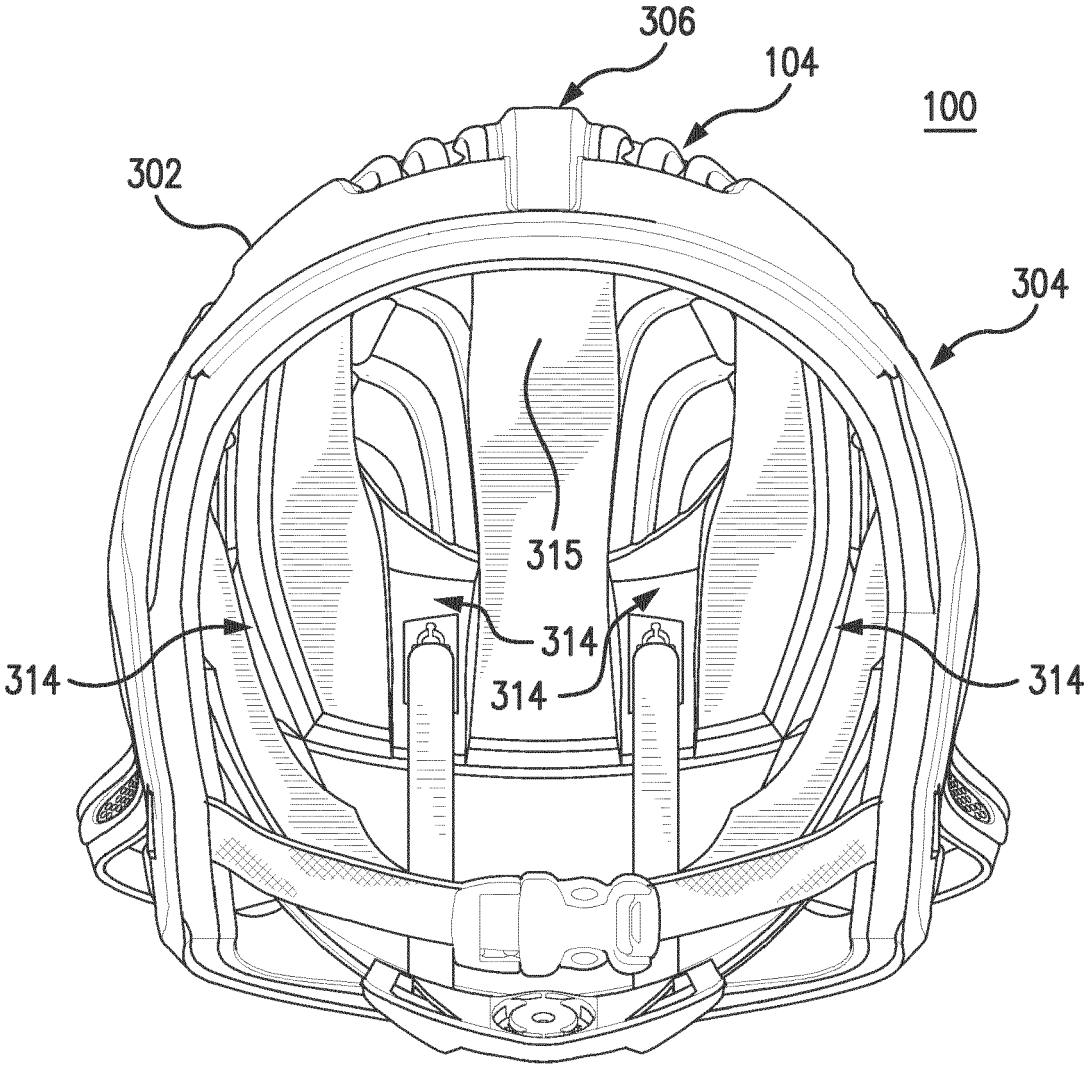

FIG. 3C

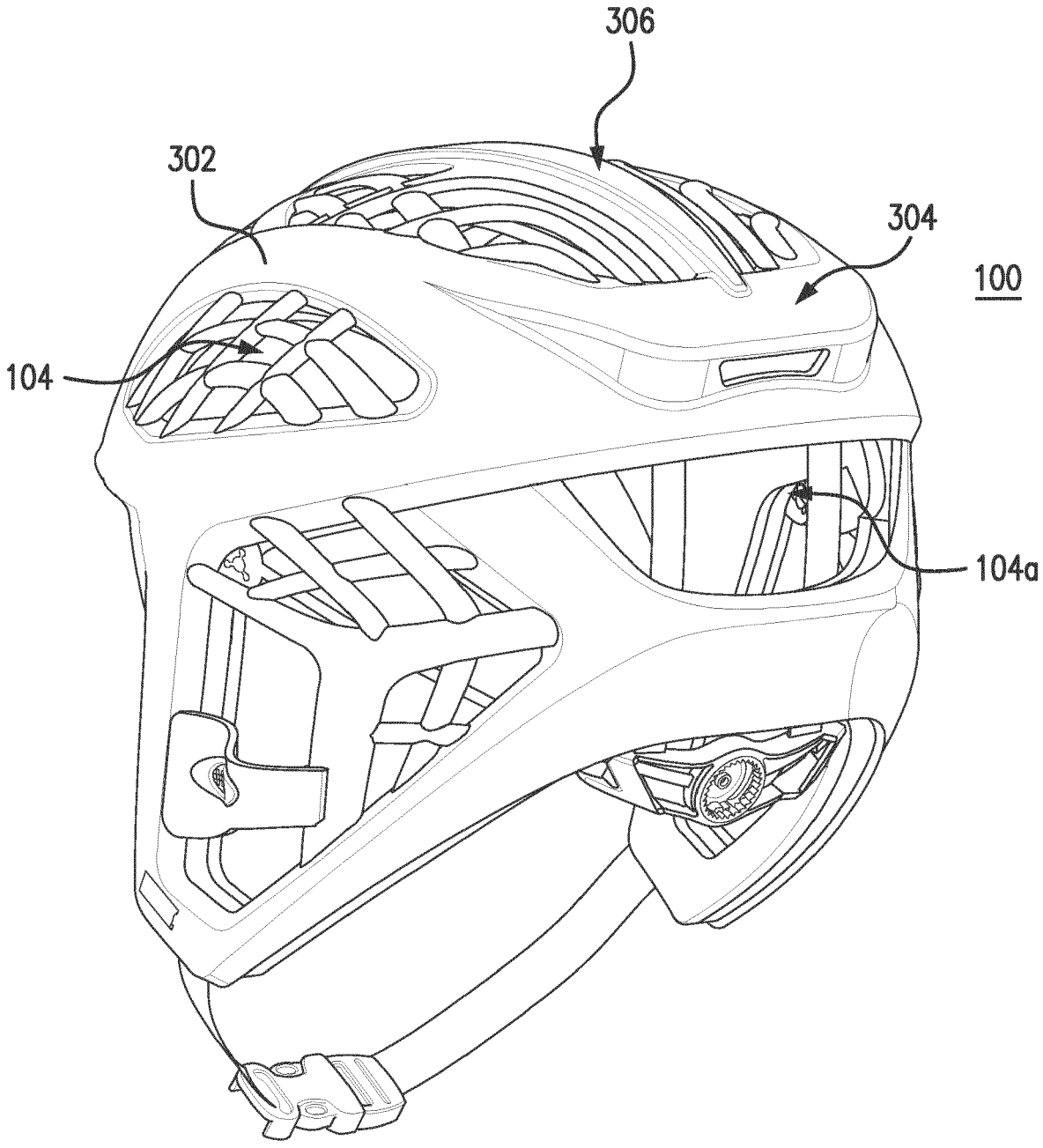

FIG. 3D

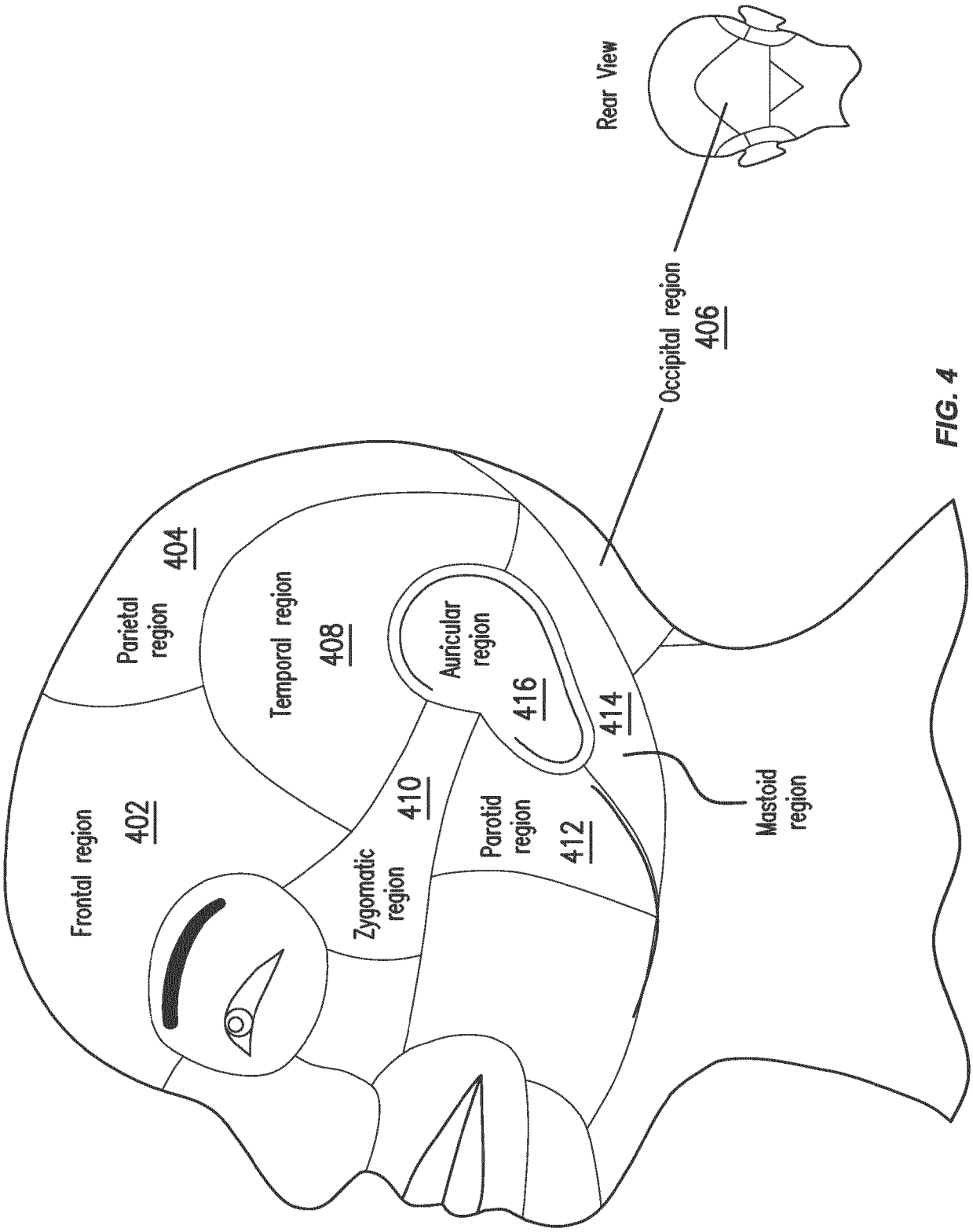
Rear View
Occipital region
406
Frontal region
402
Parietal region
404
Temporal region
408
Zygomatic region
410
Parotid region
412
Auricular region
416
414
Mastoid region

FIG. 4

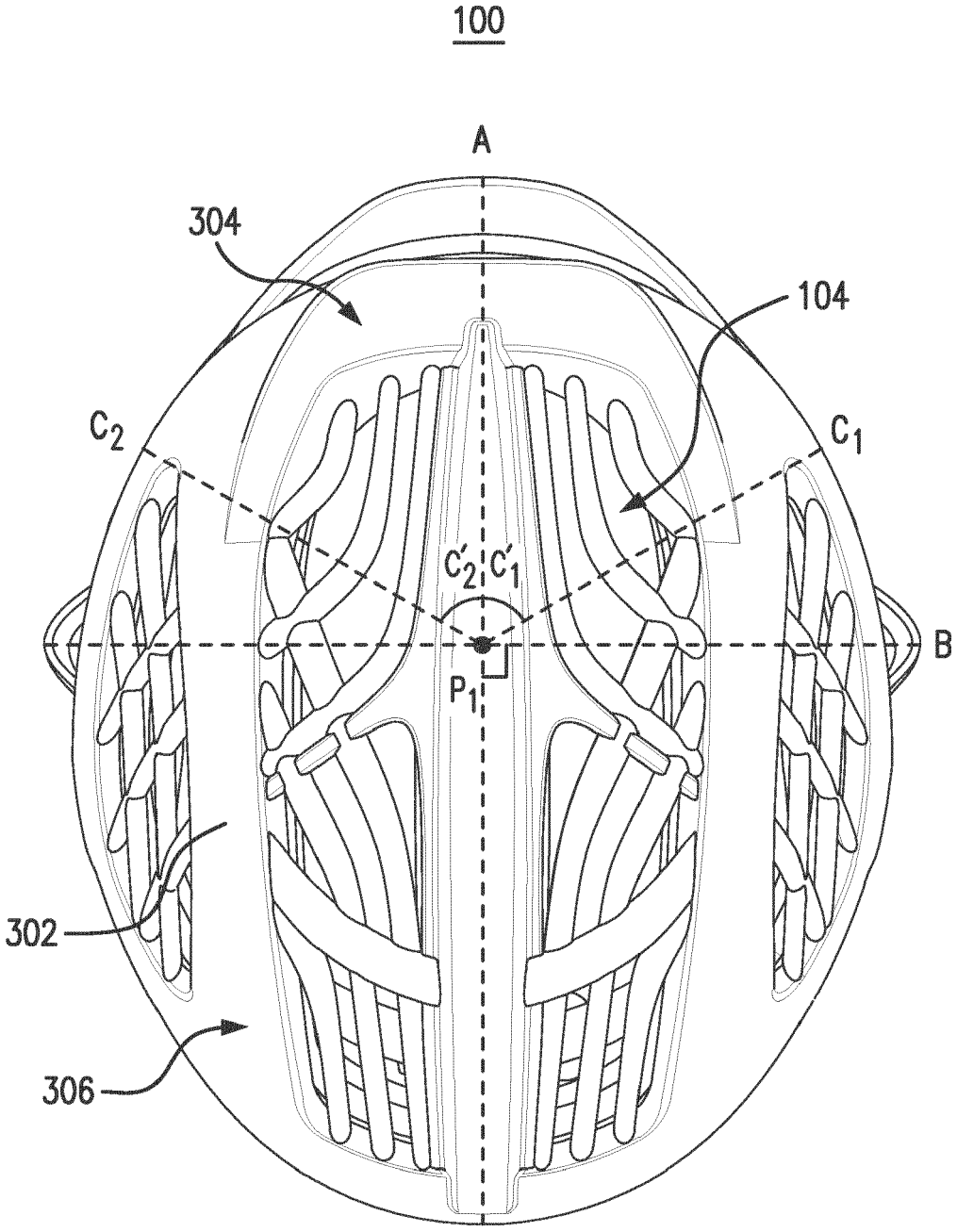

FIG. 5A

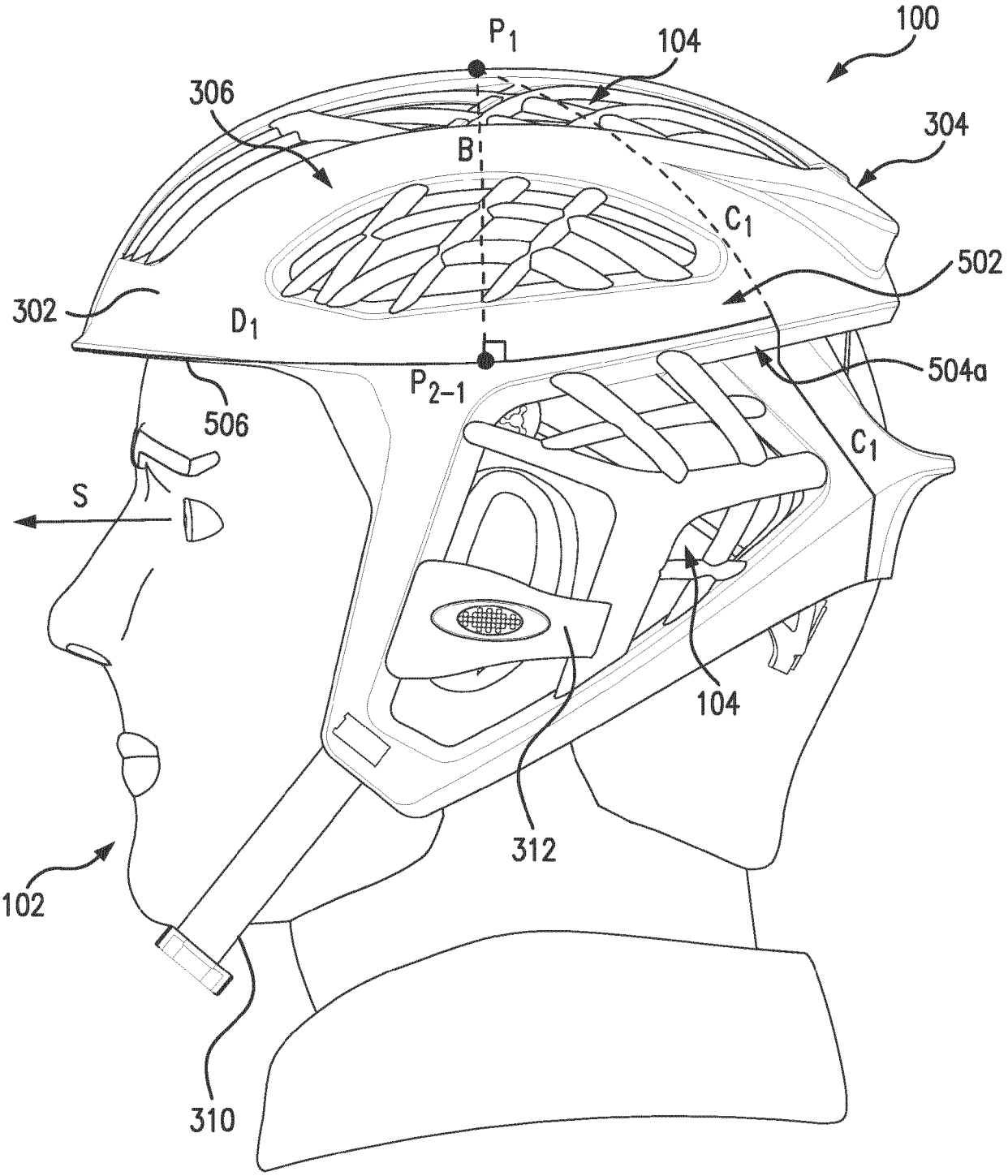
100
P_1
104
306
304
B
C_1
502
302
D_1
P_{2-1}
504a
506
C_1
S
104
312
102
310

FIG. 5B

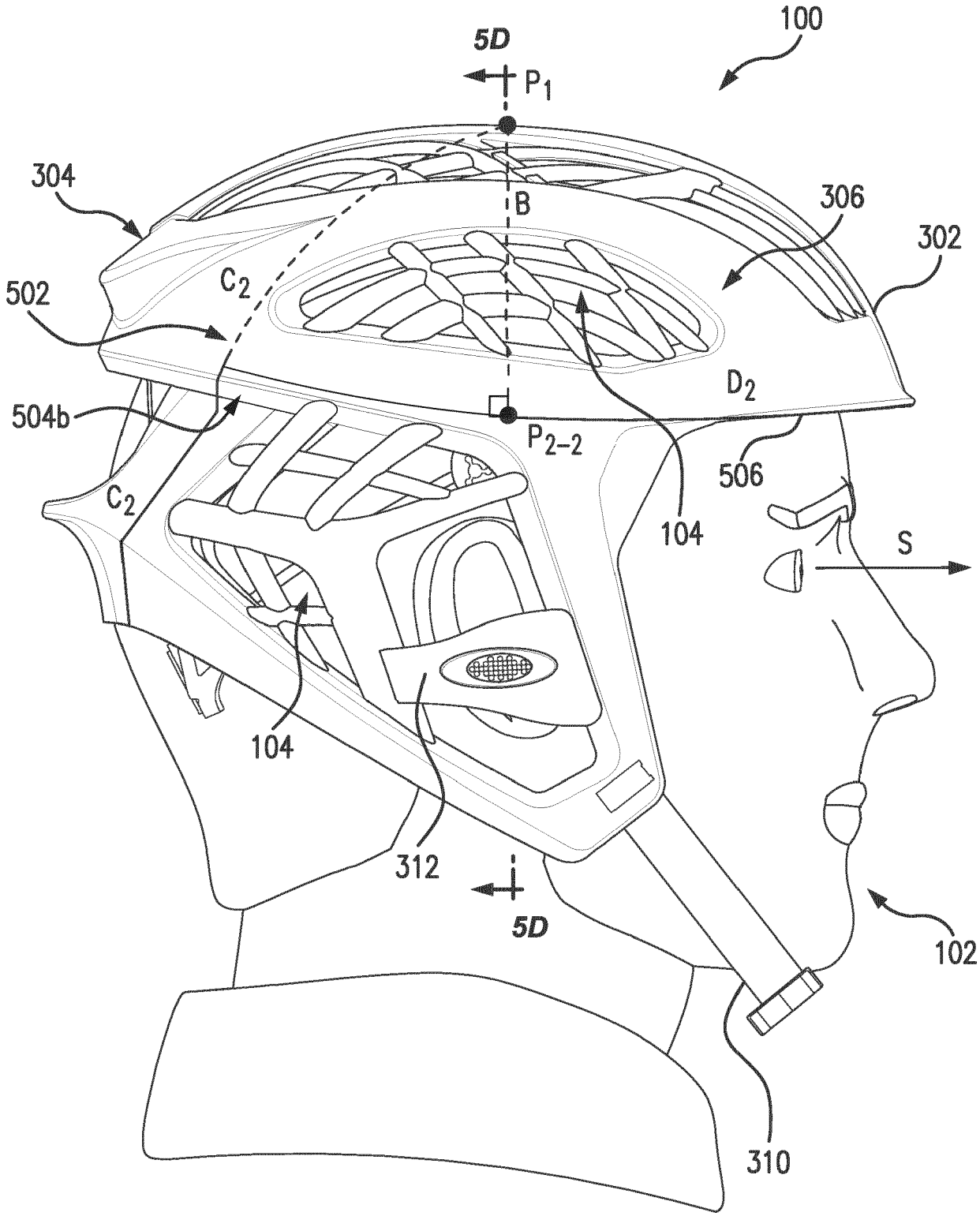
100
5D
P1
304
B
306
302
502
C2
D2
504b
P2-2
506
C2
104
S
104
312
5D
102
310

FIG. 5C

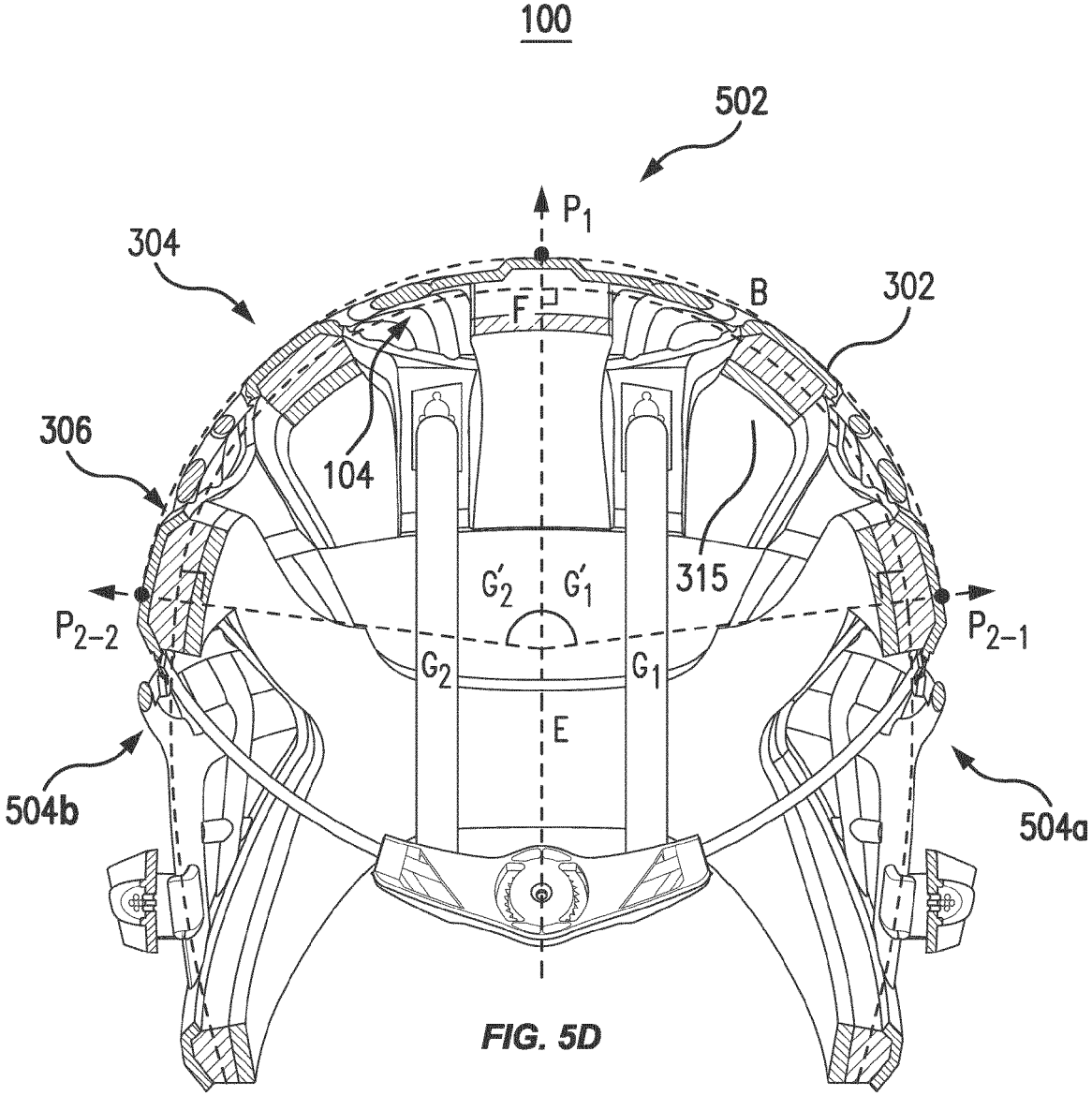

FIG. 5D

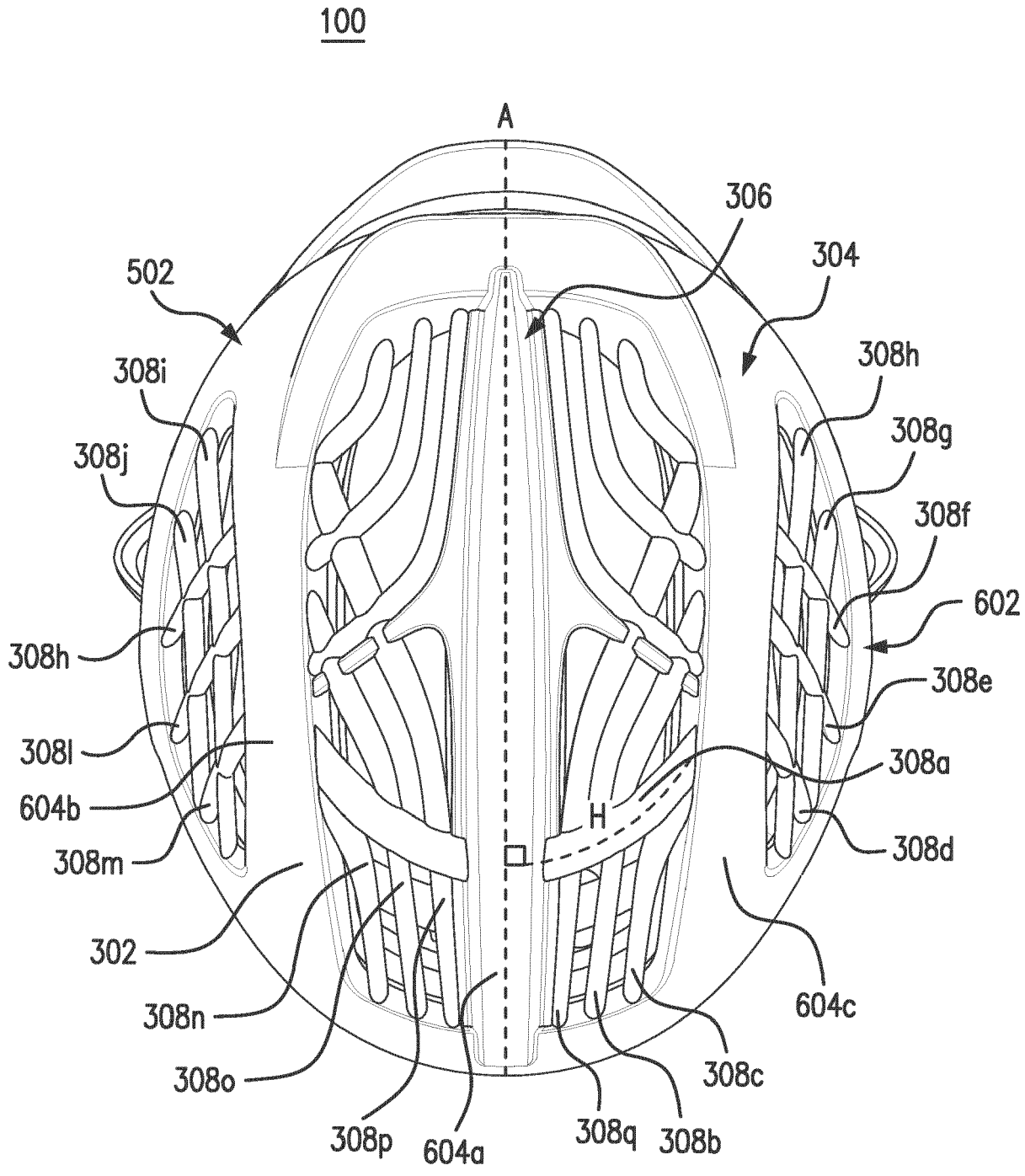
100
A
306
304
502
308i
308h
308j
308g
308f
602
308h
308e
308l
308a
604b
H
308m
308d
302
604c
308n
308o
308c
308p
604a
308q
308b

FIG. 6

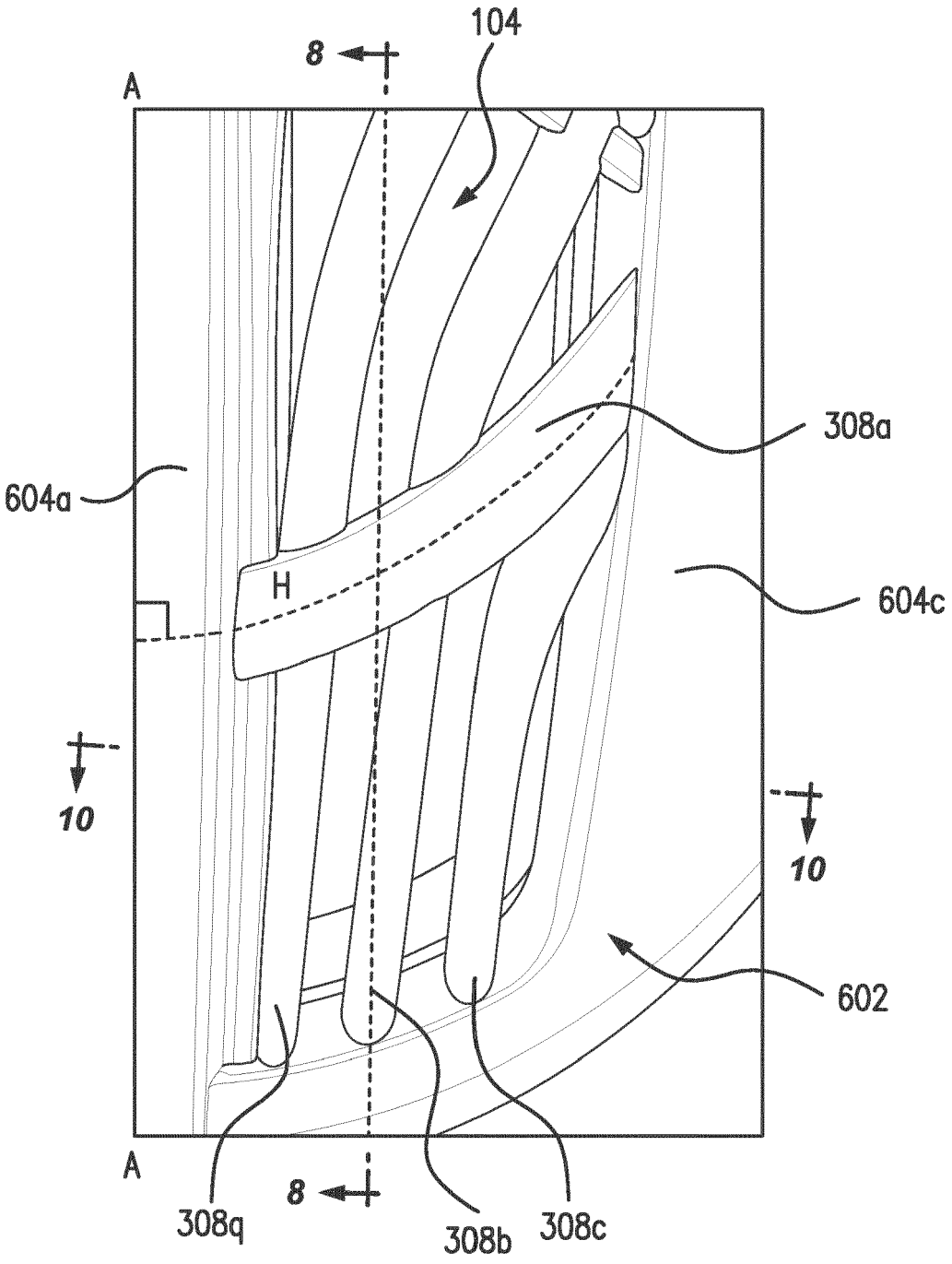

FIG.7

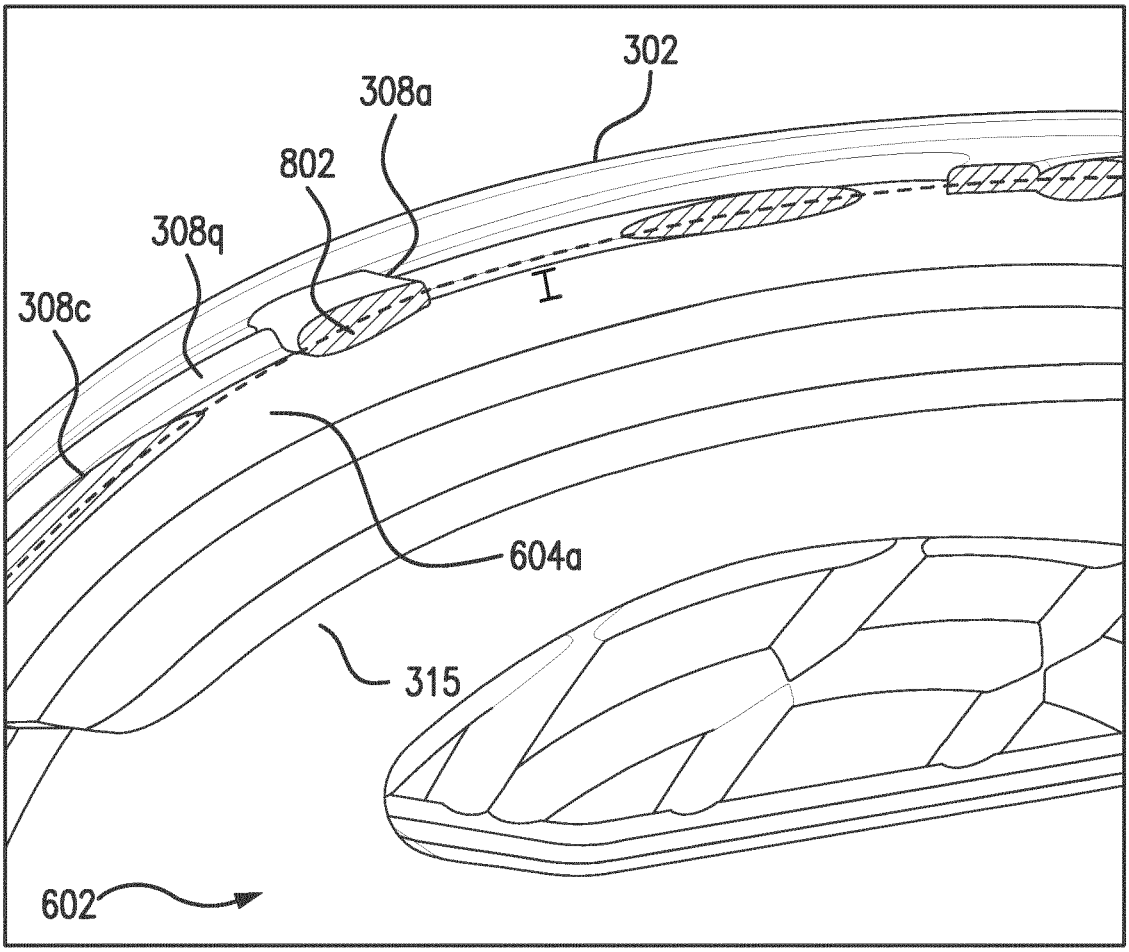

FIG. 8

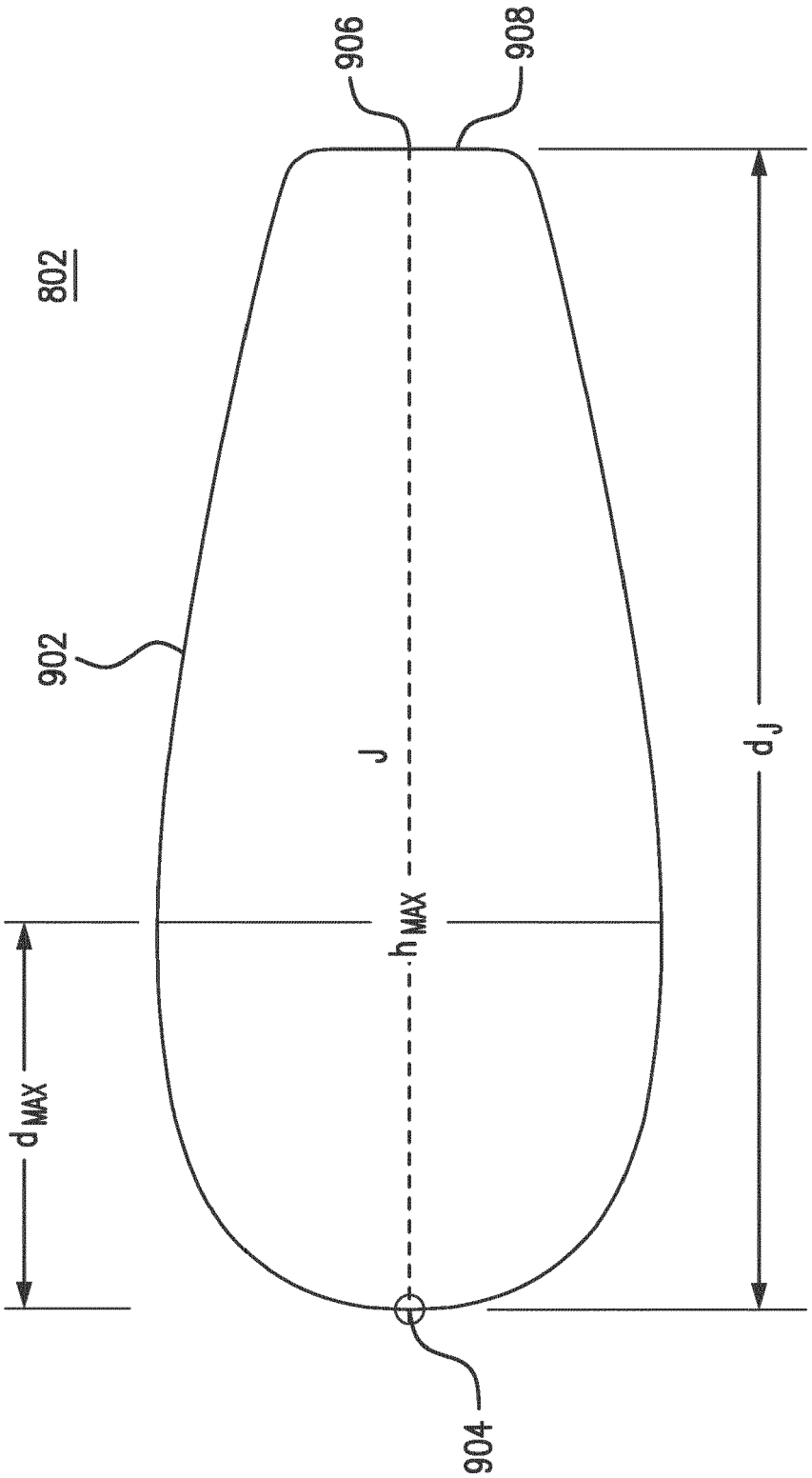

FIG. 9

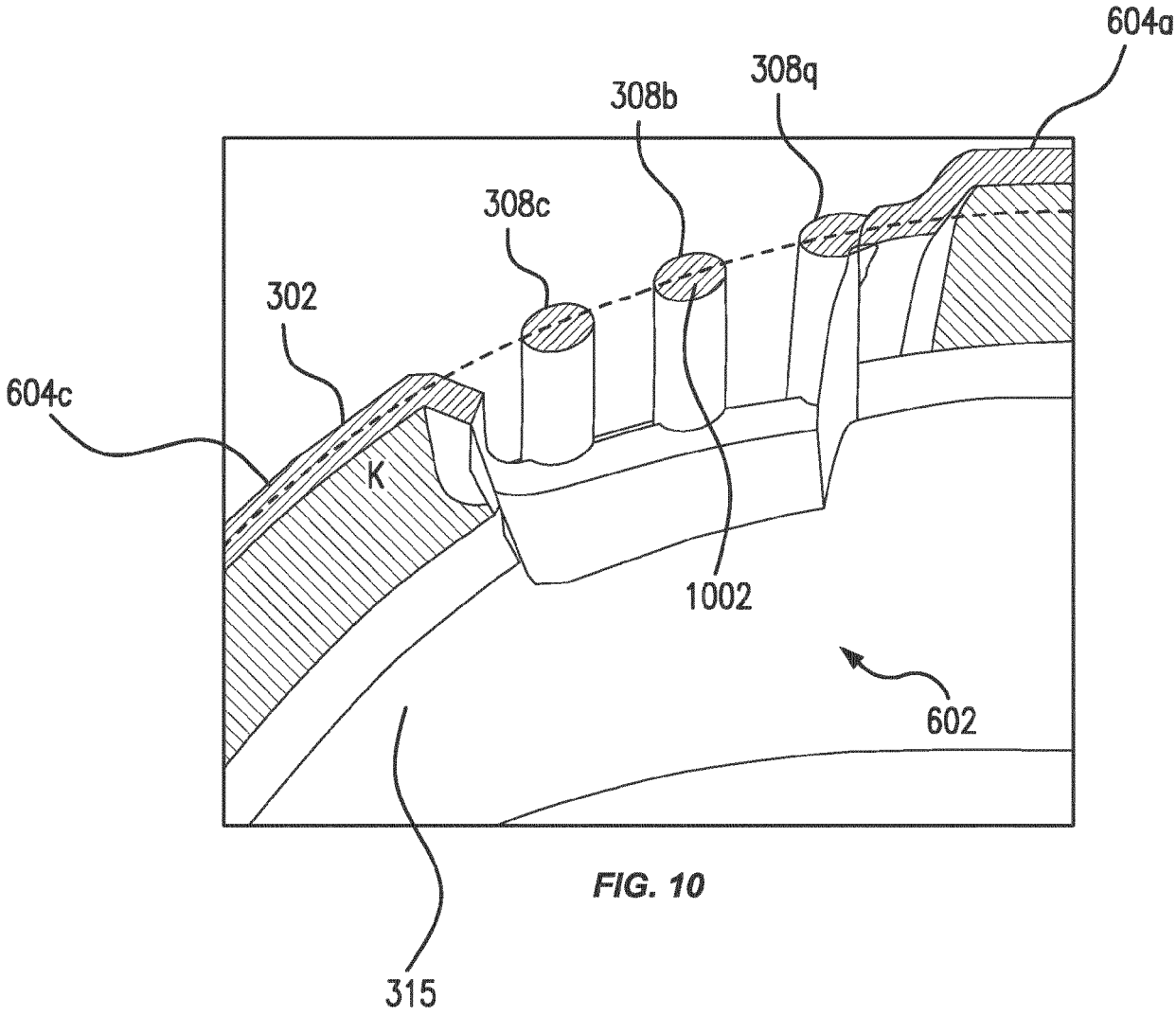

FIG. 10

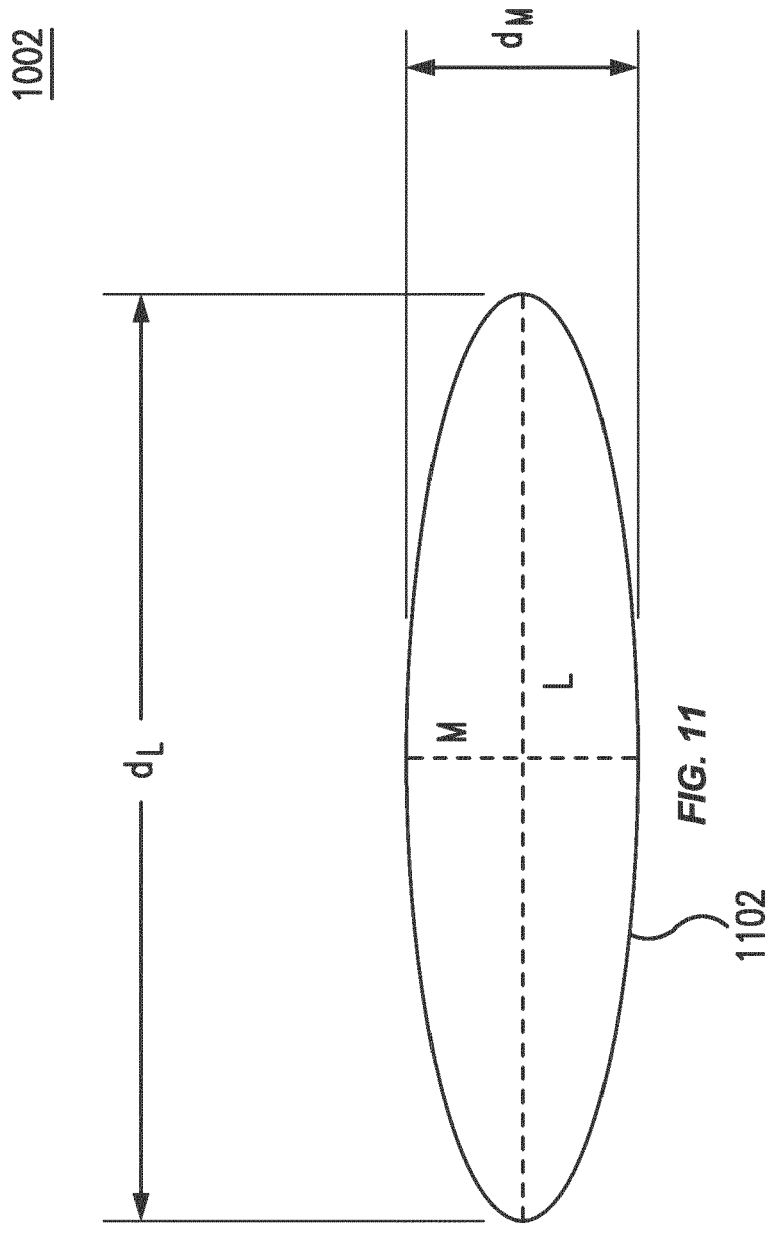

FIG. 11

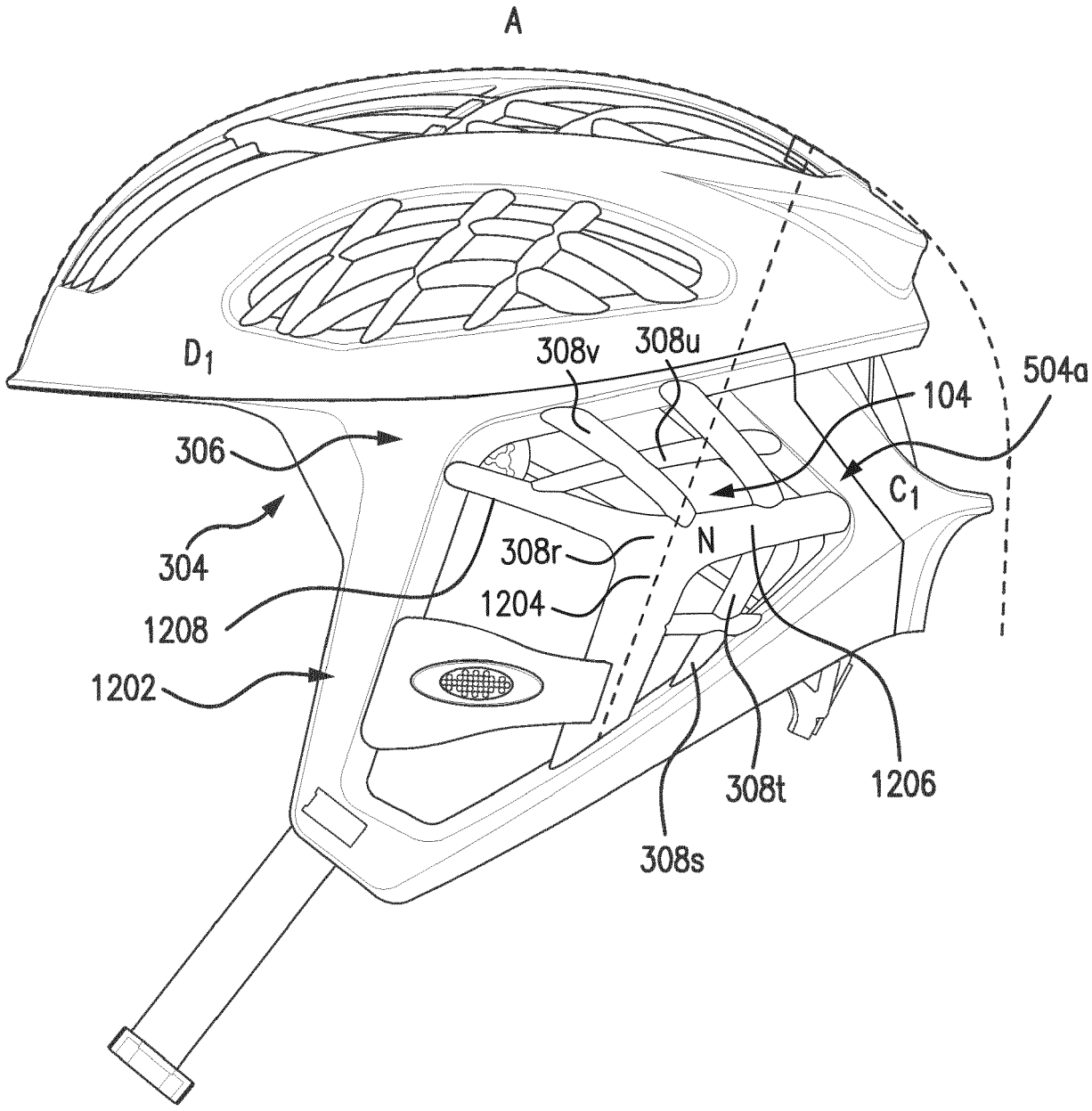
A
D1
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FIG. 12

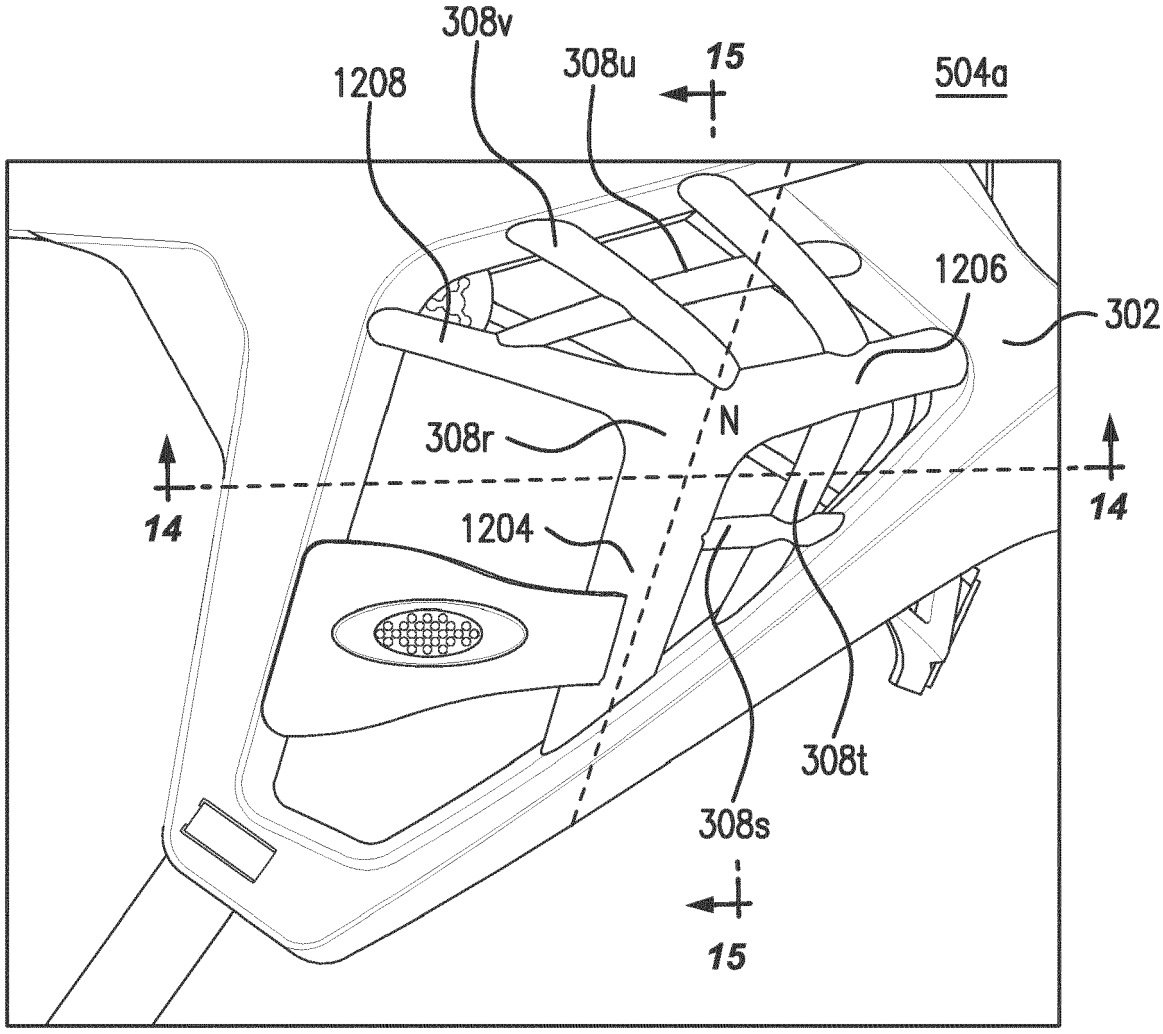


FIG. 13

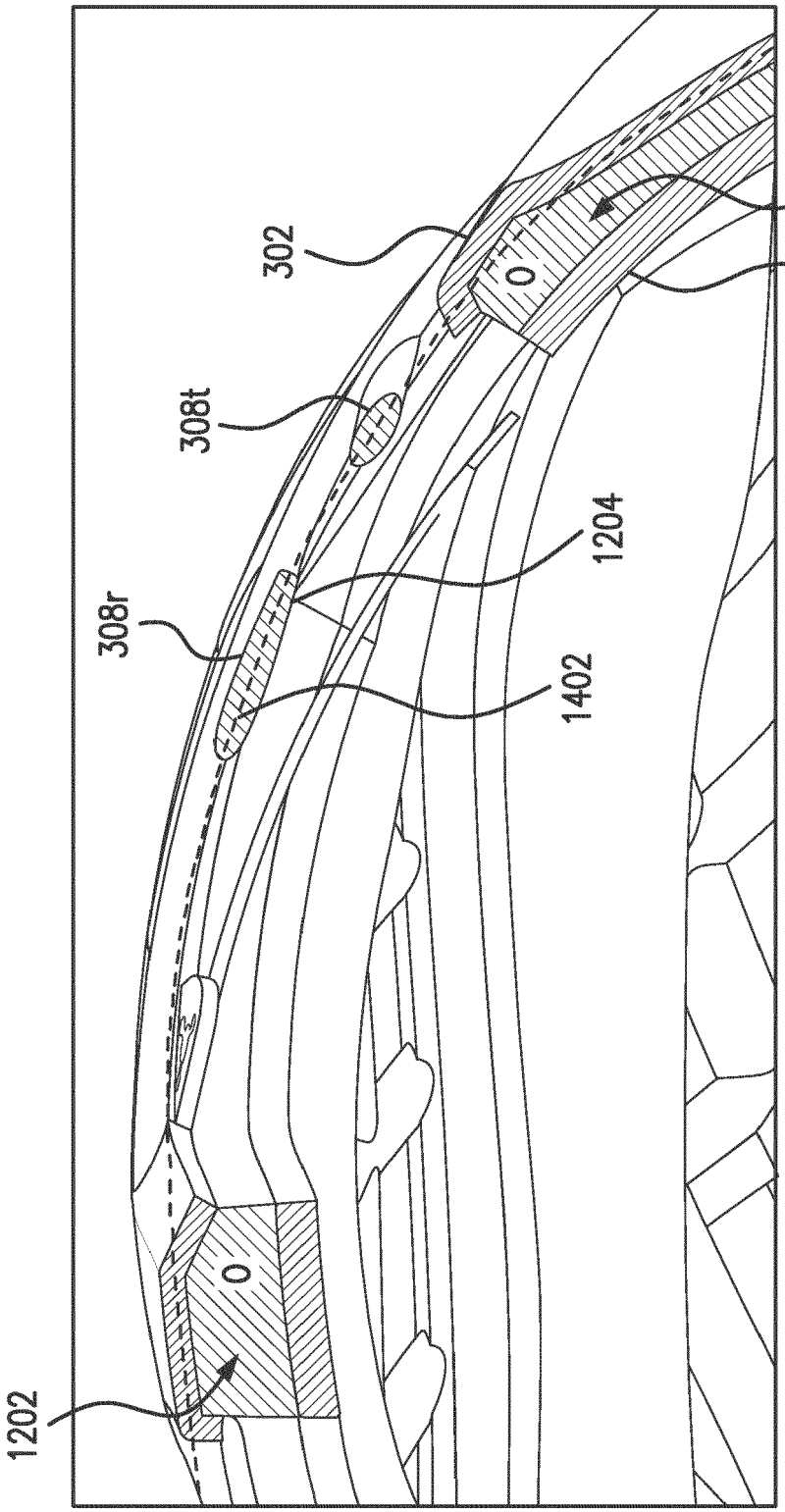


FIG. 14

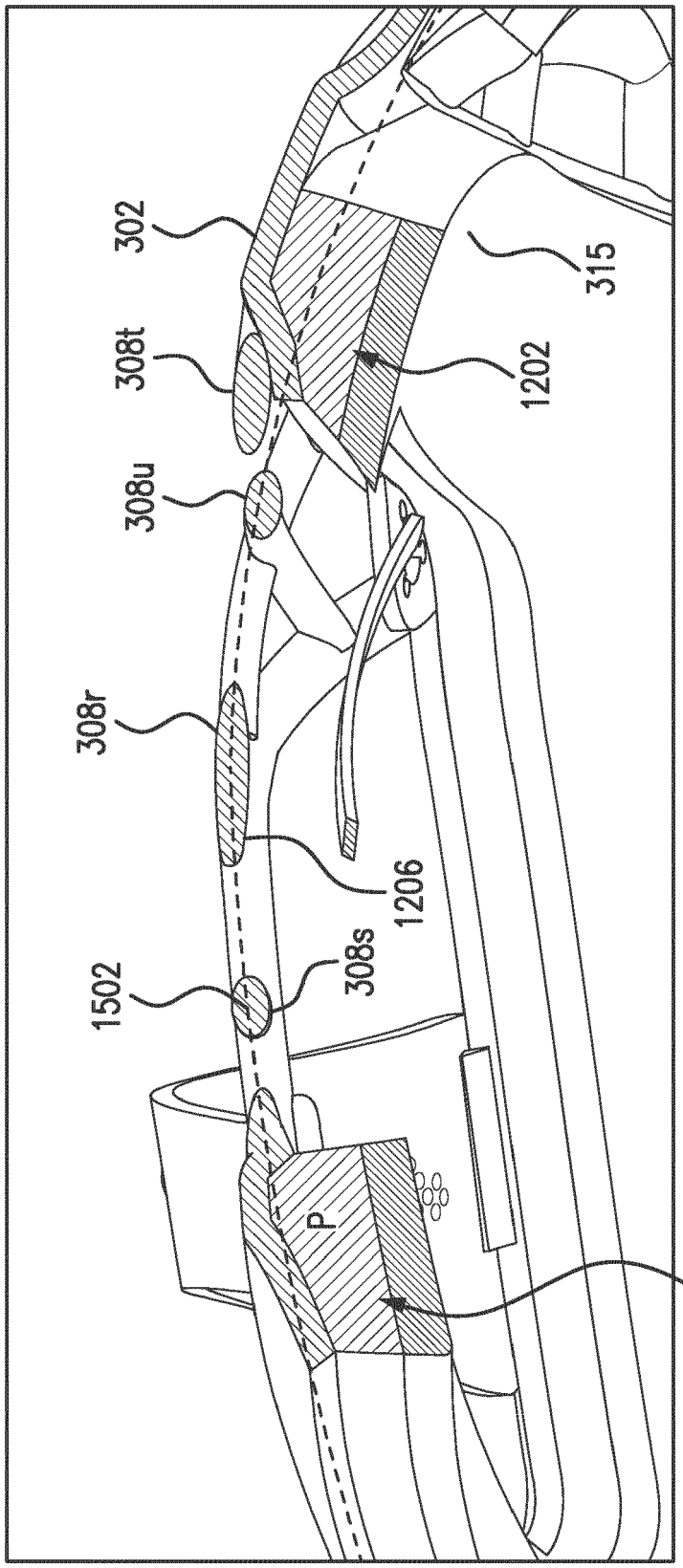


FIG. 15

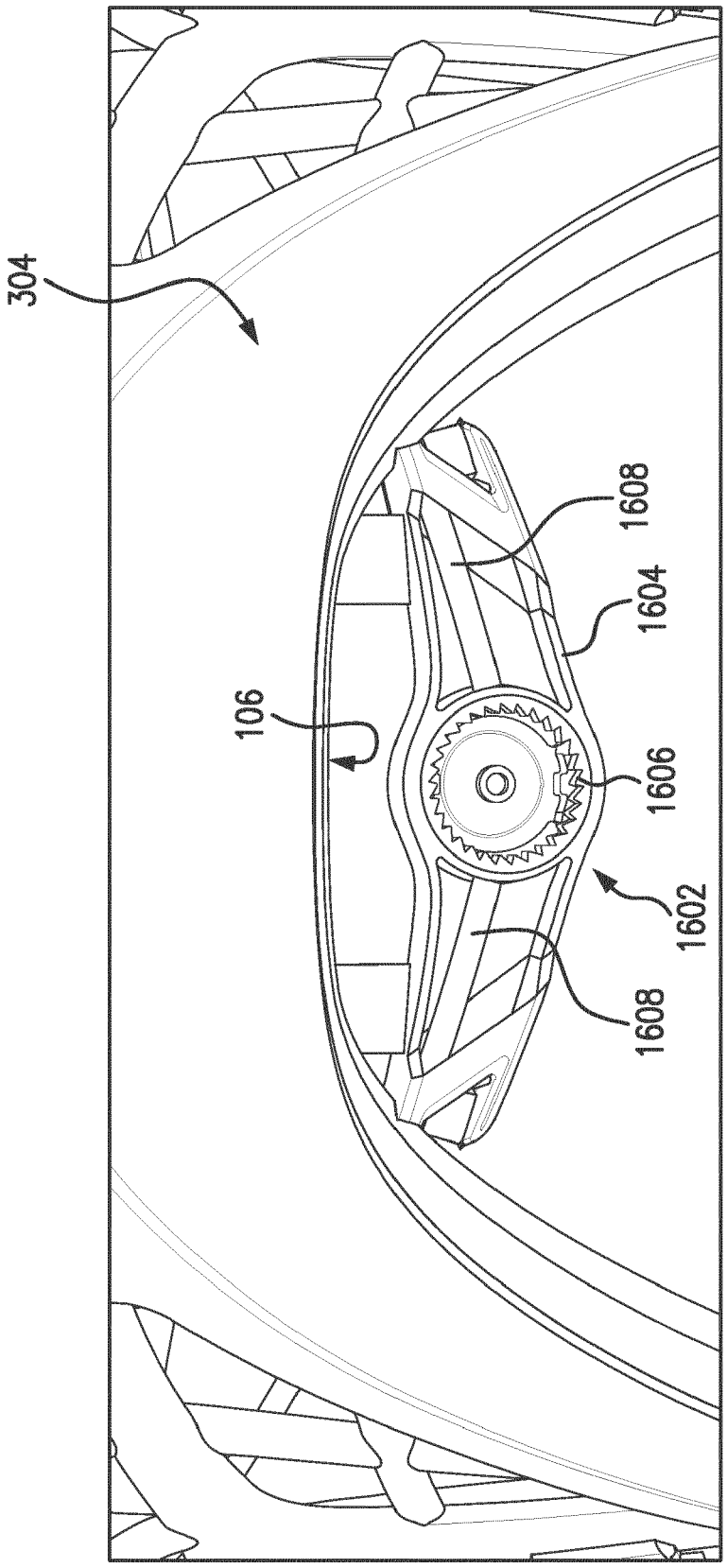
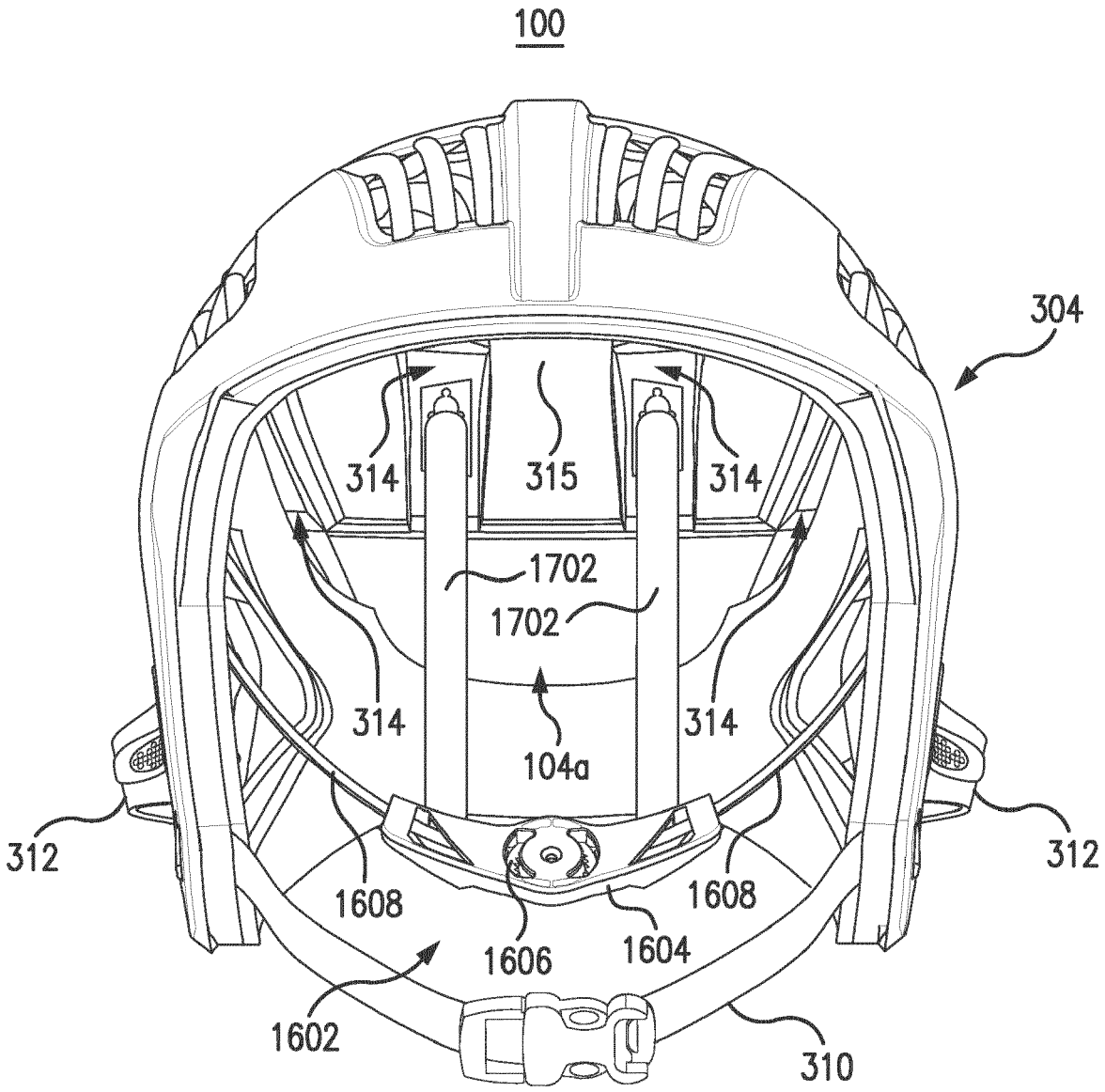


FIG. 16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1602
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FIG. 17

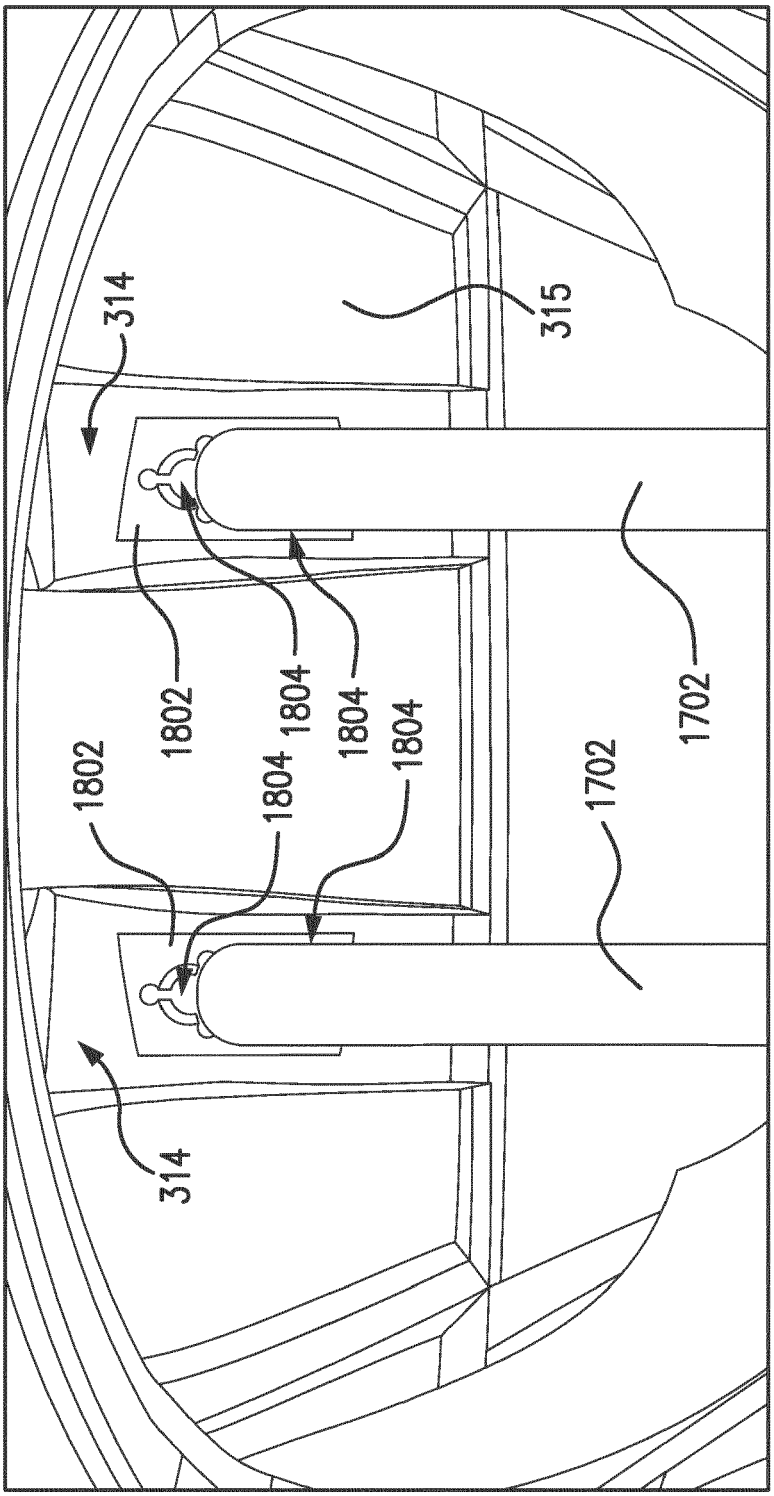

FIG. 18

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EUROPEAN SEARCH REPORT

Application Number
EP 24 17 9991

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	WO 2023/055983 A1 (BAPTIST HEALTH SOUTH FLORIDA INC [US]) 6 April 2023 (2023-04-06) * figures 1-3 *	1-15	INV. A42B3/06 ADD. A42B3/16
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TECHNICAL FIELDS SEARCHED (IPC)

A42B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	16 October 2024	van Voorst, Frank

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16-10-2024

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