(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 3 583 862 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
25.12.2019 Bulletin 2019/52

(51) Int Cl.:
A42B 3/06 *(2006.01)* ***A42B 3/14*** *(2006.01)*
A42B 3/28 *(2006.01)*

(21) Application number: **19176637.7**

(22) Date of filing: **24.05.2019**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
KH MA MD TN

(30) Priority: **18.06.2018 US 201862686610 P**
26.03.2019 US 201916365596

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(54) BICYCLE HELMET FIT SYSTEM

(57) A helmet (10) for a head of a user with a liner with an outer shell (22) and an energy management layer (24) having an inner surface (40) and a lower edge (38) surrounding the inner surface at a helmet opening, at least two coupling points (48) located on the inner surface proximal to the lower edge, at least one flexible forehead strap (14) following the lower edge of the energy management layer and inwardly offset from the inner surface, and coupled to the inner surface at the coupling points, a continuous gap (16) between the inner surface and the flexible forehead strap extending around an entirety of the lower edge.

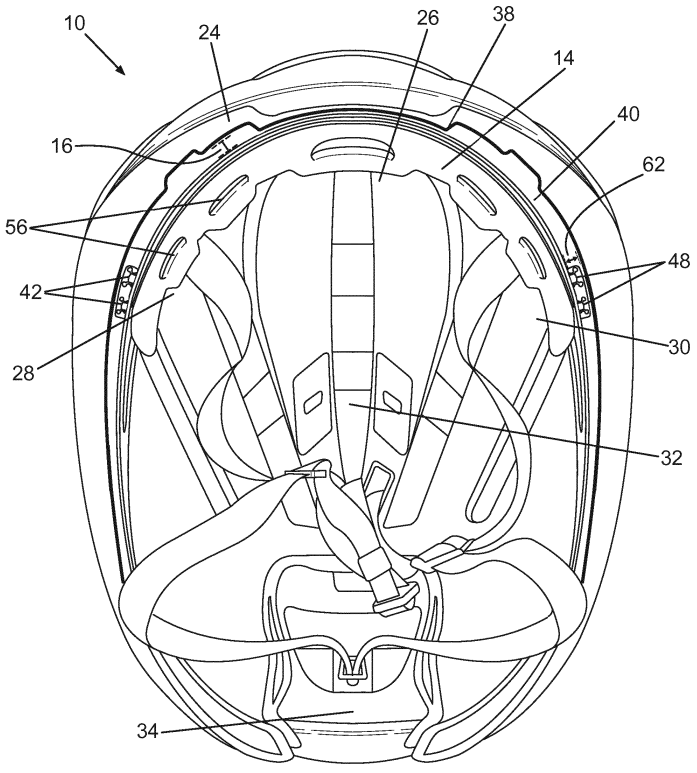

FIG. 4A

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Description

CROSS REFERENCE TO RELATED APPLICATION(S)

[0001] This application claims the benefit of and priority to U.S. Provisional Patent Application No. 62/686,610, filed June 18, 2018, the entire contents of which are hereby incorporated by reference herein.

TECHNICAL FIELD

[0002] Aspects of this document generally relate to a helmet, more particularly to a bicycle helmet having a continuous gap that allows airflow over the user's head and thus reduces heat build-up and retention.

BACKGROUND

[0003] A physical impact to the head of a person may cause serious injury or death. To reduce the probability of such consequences, protective gear, such as a helmet, is often used in activities that are associated with an increased level of risk for a head injury. Examples of such activities include, but are not limited to, skiing, snowboarding, bicycling, rollerblading, rock climbing, skate boarding, and motorcycling. In general, a helmet is designed to maintain its structural integrity and stay secured to the head of a user during an impact.

[0004] Accordingly, a bicycle helmet is designed to protect the user's head, including by absorbing and dissipating energy during an impact with a surface such as the ground. In this regard, most bicycle helmets are designed only to withstand a single major impact, and to thereafter be replaced with a new helmet. Bicycle helmet interiors include energy management materials such as an arrangement of padding and/or foam, wherein the energy management materials cover and contact a significant extent of the user's head. In this manner, the energy management materials directly or intimately contact the user's head. However, this arrangement can result in undesirable heat build-up and/or heat retention when the helmet is worn during the sporting activity. The heat build-up and/or heat retention is exacerbated in a variety of conditions, such as when the cyclist is participating in a race or training session in a warm environment.

[0005] Some bicycle helmets seek to reduce heat retention by providing openings and channels in the helmet shell and the energy management materials. The openings and channels are configured to promote air movement over portions of the user's head. For example, one conventional helmet includes a front inlet formed in the helmet shell and configured to provide for flow of inlet air onto and over the user's forehead. Channels are provided over and around a crown area of the head, and a rear port communicating with the channels discharges air flow supplied by the front inlet through the channels while the user moves in a forward direction relative to the ground. However, the energy management material of this conventional helmet directly contacts the user's head.

SUMMARY

[0006] An aspect of the disclosure relates to a helmet for protecting the head of a user that may comprise at least one liner comprising an outer shell and an energy management layer, the energy management layer comprising an inner surface and a lower edge surrounding the inner surface at a helmet opening configured to receive a head of a helmet wearer, at least two coupling points located on the inner surface proximal to the lower edge, at least one flexible forehead strap following the lower edge of the energy management layer and inwardly offset from the inner surface, at least two prongs comprising a stem and a head, the head having a larger cross-section than a cross-section of the stem, wherein the stem is attached to and projects away from the flexible forehead strap towards the inner surface and the head couples with the inner surface at one of the at least two coupling points, a continuous gap between the inner surface and the flexible forehead strap extending around an entirety of the lower edge, and an adjustable connector coupled to each end of the at least one flexible forehead strap and capable of adjusting a perimeter of the flexible forehead strap, wherein the adjustable connector comprises a knob that decreases the perimeter when rotated in a first direction and increases the perimeter when rotated in a second direction different from the first direction.

[0007] Particular embodiments may comprise one or more of the following features. The at least two coupling points may each comprise a hole wherein a length of the stem is greater than a depth of the hole and the stem is slidably coupled within the hole. A first of the at least two coupling points may be located in a right front portion of the inner surface and a second of the at least two coupling points being located in a left front portion of the inner surface. The at least two coupling points may comprise two pairs of coupling points, a first pair of coupling points located in a right front portion of the inner liner and a second pair of coupling points located in a left front portion of the inner liner; and wherein the at least two prongs comprises two pairs of prongs located on the flexible forehead strap and positioned to couple with the two pairs of coupling points. The continuous gap may have a width measuring within a range of .158cm (1/16 inches) to .635cm (1/4 inches).

[0008] According to an aspect of the disclosure, a helmet for protecting the head of a user may comprise at least one liner comprising an outer shell and an energy management layer, the energy management layer comprising an inner surface and a lower edge surrounding the inner surface at a helmet opening configured to receive a head of a helmet wearer, at least two coupling points located on the inner surface adjacent the lower edge, at least one flexible forehead strap following the

lower edge of the energy management layer, inwardly offset from the inner surface, and coupled to the inner surface at the coupling points, a coupling point gap separating the inner surface from the flexible forehead strap at each coupling point, the coupling point gap having a width measuring at least 1/16 inch, and an adjustable connector coupled to the at least one flexible forehead strap and capable of adjusting a perimeter of the flexible forehead strap.

[0009] Particular embodiments may comprise one or more of the following features. The at least two coupling points may each comprise a hole wherein the stem is slidably coupled with the hole and a portion of the stem is configured to remain outside of the hole. A first of the at least two coupling points may be located in a right front portion of the inner surface and a second of the at least two coupling points being located in a left front portion of the inner surface. The flexible forehead strap may comprise at least two prongs comprising a stem and a head, the head having a larger cross-section than a cross-section of the stem, wherein the stem is attached to and projects away from the flexible forehead strap towards the inner surface and the head couples with the inner surface at one of the at least two coupling points. Each coupling point may be configured to receive a pair of prongs and the at least two prongs comprise at least two pairs of prongs, located on the flexible forehead strap and positioned to couple with the first and second coupling points. The coupling point gap may have a width measuring 1/4 inch or less. The adjustable connector may comprise a knob that decreases the perimeter when adjusted in a first direction and increases the perimeter when adjusted in a second direction different from the first direction.

[0010] According to an aspect, a helmet for protecting the head of a user may comprise at least one helmet liner comprising an outer shell and an energy management layer, the energy management layer comprising an inner surface and a lower edge surrounding the inner surface at a helmet opening configured to receive a head of a helmet wearer, at least two coupling points located on the inner surface proximal to the lower edge, at least one flexible forehead strap following the lower edge of the energy management layer, inwardly offset from the inner surface, and coupled to the inner surface at the coupling points, and a continuous gap between the inner surface and the flexible forehead strap at each of the at least two coupling points.

[0011] Particular embodiments may comprise one or more of the following features. The at least two coupling points may each comprise a hole wherein a length of the stem is greater than a depth of the hole and a portion of the length of the stem is configured to remain outside of the hole. A coupling point gap separating the inner surface from the flexible forehead strap at each coupling point, the coupling point gap having a width measuring at least 1/16 inch. A first of the at least two coupling points may be located in a right front portion of the inner surface proximal to the lower edge and a second of the at least two coupling points being located in a left front portion of the inner surface proximal to the lower edge, wherein the at least two coupling points are proximal to a helmet wearer's head temples when in use. At least two prongs comprising a stem and a head, the head having a larger cross-section than a cross-section of the stem, wherein the stem is attached to and projects away from the flexible forehead strap towards the inner surface and the head couples with the inner surface at one of the at least two coupling points. Each coupling point may be capable of receiving a pair of prongs and the at least two prongs comprises at least two pairs of prongs, located on the flexible forehead strap and positioned to couple with the first and second coupling points. The continuous gap having a width measuring within a range of .158cm (1/16 inches) to .635cm (1/4 inches). An adjustable connector coupled to the at least one flexible forehead strap and capable of adjusting a perimeter of the flexible forehead strap.

[0012] Aspects and applications of the disclosure presented here are described below in the drawings and detailed description. Unless specifically noted, it is intended that the words and phrases in the specification and the claims be given their plain, ordinary, and accustomed meaning to those of ordinary skill in the applicable arts. The inventors are fully aware that they can be their own lexicographers if desired. The inventors expressly elect, as their own lexicographers, to use only the plain and ordinary meaning of terms in the specification and claims unless they clearly state otherwise and then further, expressly set forth the "special" definition of that term and explain how it differs from the plain and ordinary meaning. Absent such clear statements of intent to apply a "special" definition, it is the inventors' intent and desire that the simple, plain, and ordinary meaning to the terms be applied to the interpretation of the specification and claims.

[0013] The inventors are also aware of the normal precepts of English grammar. Thus, if a noun, term, or phrase is intended to be further characterized, specified, or narrowed in some way, such noun, term, or phrase will expressly include additional adjectives, descriptive terms, or other modifiers in accordance with the normal precepts of English grammar. Absent the use of such adjectives, descriptive terms, or modifiers, it is the intent that such nouns, terms, or phrases be given their plain, and ordinary English meaning to those skilled in the applicable arts as set forth above.

[0014] Further, the inventors are fully informed of the standards and application of the special provisions of 35 U.S.C. § 112, ¶ 6. Thus, the use of the words "function," "means" or "step" in the Detailed Description or Description of the Drawings or claims is not intended to somehow indicate a desire to invoke the special provisions of 35 U.S.C. § 112, ¶ 6, to define the invention. To the contrary, if the provisions of 35 U.S.C. § 112, ¶ 6 are sought to be invoked to define the inventions, the claims will specifi-

cally and expressly state the exact phrases "means for" or "step for", and will also recite the word "function" (i.e., will state "means for performing the function of [insert function]"), without also reciting in such phrases any structure, material, or acts in support of the function. Thus, even when the claims recite a "means for performing the function of..." or "step for performing the function of... ," if the claims also recite any structure, material, or acts in support of that means or step, or to perform the recited function, it is the clear intention of the inventors not to invoke the provisions of 35 U.S.C. § 112, ¶ 6. Moreover, even if the provisions of 35 U.S.C. § 112, ¶ 6, are invoked to define the claimed aspects, it is intended that these aspects not be limited only to the specific structure, material, or acts that are described in the preferred embodiments, but in addition, include any and all structures, material, or acts that perform the claimed function as described in alternative embodiments or forms in the disclosure, or that are well-known present or later-developed, equivalent structures, material, or acts for performing the claimed function.

[0015] The foregoing and other aspects, features, and advantages will be apparent to those artisans of ordinary skill in the art from the DETAILED DESCRIPTION and DRAWINGS, and from the CLAIMS.

BRIEF DESCRIPTION OF THE DRAWINGS

[0016] To understand the present disclosure, it will now be described by way of example, with reference to the accompanying drawings.

FIG. 1 illustrates a bicyclist wearing a bicycle helmet;
FIG. 2 is a bottom view of a prior art helmet showing the coupling point where the forehead strap is in contact with the inner liner;
FIG. 3 is a front view of an embodiment of a bicycle helmet with a fit system and internal ventilation system;
FIG. 4A is a bottom view of an embodiment of a bicycle helmet with a fit system and internal ventilation system;
FIG. 4B is a close-up view of a portion of the helmet of FIG. 4A surrounding the connectors;
FIG. 5 is a close-up view of a portion of the helmet of FIG. 4A with the forehead strap and fit system removed to show the connector receivers;
FIG. 6A is a front view of a forehead strap of a fit system;
FIG. 6B is a top view of the forehead strap of FIG. 6A; and
FIG. 7 is a schematic side view showing the helmet of FIG. 3 in partial section and secured to the head of a user showing airflow through the helmet.

[0017] While the present disclosure will be described in connection with the preferred embodiments shown herein, it will be understood that it is not intended to limit the disclosure to those embodiments. On the contrary, it is intended to cover all alternatives, modifications, and equivalents, as may be included within the spirit and scope of the disclosure as defined by the appended claims.

DETAILED DESCRIPTION

[0018] While this disclosure is susceptible of embodiments in many different forms, there is shown in the drawings and will herein be described in detail preferred embodiments of the disclosure with the understanding that the present disclosure is to be considered as an exemplification of the principles of the disclosure and is not intended to limit the broad aspect of the disclosure to the embodiments illustrated.

[0019] In the Figures, and referring initially to FIG. 1, a user 2 is shown riding a bicycle 4 and wearing a bicycle helmet 10 configured according to an embodiment of the present disclosure. As discussed further below, when the user 2 pedals the bicycle 4 and travels in a forward direction, air flows through the helmet 10 and over the user's head 6, thereby cooling the user's head 6.

[0020] FIG. 2 illustrates a helmet 8 having a liner comprising an outer shell 22 and an energy management layer 24, a flexible forehead strap 14, an adjustable connector 18, and a chinstrap 20. In this example, although there is a gap 9 at the front of the helmet between the flexible forehead strap 14 and the energy management layer 24, at the points where the flexible forehead strap 14 is coupled to the energy management layer 24, it is securely and closely coupled without a gap between the flexible forehead strap 14 and the energy management layer 24. This non-gapped connection restricts some of the air flow through the helmet and the fit system.

[0021] FIGs. 3-5 illustrate an embodiment of a bicycle helmet 10 including a liner 12, a flexible forehead strap 14, a continuous gap 16, an adjustable connector 18, and a chinstrap 20. In some embodiments the liner 12 comprises an outer shell 22 and an energy management layer 24. In some embodiments, only the energy management layer 24 is used. The outer shell 22 may comprise a plastic material, such as polycarbonate; however, in other embodiments, the outer shell 22 may also or alternatively comprise KEVLAR, ABS plastic, carbon fiber, fiberglass, and the like. In some embodiments, the energy management layer 24 comprises expanded polystyrene ("EPS"). In other embodiments, the energy management layer 24 may also, or alternatively, comprise expanded polypropylene ("EPP") or other energy management or energy absorbing materials. The chinstrap 20 includes connectable segments which may be attached to one or both of the outer shell 22 and the energy management layer 24 for securing the helmet 10 to the user's head 6, as generally known in the art. The energy management layer 24 includes an inner surface 40 which has a front portion 26 that overlies the user's forehead with a right front portion 28 on the right and a

left front portion 30 on the left, a top portion 32 that overlies the crown region of the user's head 6, and a rear portion 34 that overlies at least a portion of the occipital region of the user's head.

[0022] The helmet 10 embodiments of FIGs. 1-4A are commonly recognized in the cycling field as "road" helmets and are designed for general use during recreational and certain types of competitive cycling. It should be appreciated that the principles and teachings discussed herein are equally applicable to other types of bicycle helmets, such as a "sprinter" helmet, an "aero" helmet, and any other helmets that include an adjustable fit system inside the helmet. As understood by those in the art, a sprinter helmet is designed to be more aerodynamic than a typical road helmet, and as such has a more smoothly contoured outer shell 22 and fewer ventilation openings 36. As also understood by those in the art, an aero helmet is designed to be even more aerodynamic, having a substantially streamlined shape that resembles a "tear-drop" configuration. Aero helmets are also configured to have as few ventilation openings 36 as possible, and in many cases have no ventilation openings 36 whatsoever. As those skilled in the art will appreciate, the benefits and advantages associated with the concepts and teachings discussed herein may become more apparent to the user as the number of ventilation openings 36 in the helmet 10 decrease.

[0023] Referring also to FIGs. 3-5, the helmet 10 includes at least one flexible forehead strap 14 that extends around a lower edge 38 of the energy management layer 24 and adjustably contacts the user's head 6 to support the helmet 10 while defining a continuous gap 16 between the user's head 6 and an inner surface 40 of the energy management layer 24. In some embodiments, flexible forehead straps 14 also extend over the user's head 6 from the user's forehead region over the crown region and to the occipital region. In such embodiments, the continuous gap 16 may also extend across the outer surface of the user's head 6 from the user's forehead region over the crown region and to the occipital region (see FIG. 7 for example).

[0024] As illustrated in FIGs. 3-6B, the flexible forehead strap 14 includes at least two or more prongs 42 extending from an outer surface of the flexible forehead strap 14 for coupling into corresponding coupling points 48 on the inner surface 40 of the energy management layer 24. The two or more prongs 42 are elongated when compared with prongs from previous helmets (for example that shown in FIG. 2), thus extending the connecting junction between the flexible forehead strap 14 and the energy management layer 24 and creating a continuous gap 16 between the flexible forehead strap 14 and the inner surface 40 of the energy management layer 24. Each prong 42 extends outward, away from the flexible forehead strap 14 and may include a stem 44 and a head 46. The stem 44 includes a length "L" long enough to span the continuous gap 16 and allow the head 46 to couple with a corresponding coupling point 48 on the inner surface 40 of the energy management layer 24. The coupling points 48 may be receivers comprising a flexible entrance 49 that allows the head 46, when force is applied, to pass through the flexible entrance 49 to the receivers and restrict its flexible entrance 49 size to smaller than the largest dimension of the head 46 after the head 46 has passed through the flexible entrance 49 into the receiver. The coupling points 48 may be in-molded into the energy management material when the energy management material is formed, or added thereafter using methods known in the art. The head 46 of the prong 42 may be formed in a variety of shapes. As shown in FIG. 5, the prong 42 may have a mushroom-shaped head 46 which is capable of snapping into the coupling point 48. Alternatively, the head 46 may be T-shaped or any other shape, and may couple with the coupling point 48 in a variety of ways, such as through the use of adhesives, clips, clamps, snaps, hook and loop, or other types of fasteners. In some embodiments, the inside of the connection points 48 are deeper than the largest dimension of the head 46 so that when the head 46 is received in the connection point 48, the head 46 can still move within the connection point 48 to allow for an adaptable continuous gap 16 that further helps to adapt the fit system more comfortably to a wearer's head shape and dimensions by allowing for additional movement between the fit system and the inner surface 40 of the energy management layer 24.

[0025] Each of the flexible forehead straps 14 may have a pair of rails 50 intermittently joined by transverse ribs 52. The rails 50 and the ribs 52 cooperate to define a plurality of ventilation apertures 54 in the flexible forehead straps 14 in the form of generally elongated slots 56. The ventilation apertures 54 can further improve the ventilating characteristics of the flexible forehead straps 14 by minimizing the total surface area of the flexible forehead straps 14 that is in intimate contact with the user's head 6. Alternatively the flexible forehead straps 14 may be configured with a single rail 50 that precludes the apertures 54. Some embodiments of the flexible forehead straps 14 are formed of a substantially rigid but flexible material, such as rubber, plastic, carbon fiber, and the like. The flexible forehead straps 14 may also include an additional material, such as a coating or additional comfort padding, to facilitate engagement with the user's head 6.

[0026] When the helmet 10 is properly worn, the flexible forehead strap 14 extends laterally from the user's forehead, around the sides of the user's head 6, passing approximately over the user's temples 64 (FIGs. 1 and 7), and into the adjustable connector 18 (FIGs. 3 and 6A). In some embodiments, including the embodiment illustrated in FIG. 3, the adjustable connector 18 is configured for direct engagement with the user's head 6 and includes an actuator 58 (such as a dial, knob, or other adjustor that reels in or pays out the ends 60 of the flexible forehead strap 14) to adjust the perimeter of the flexible forehead strap 14. For example, by reeling in the ends

60 of the flexible forehead strap 14, the flexible forehead strap 14 is tightened against the user's head 6, whereas by paying out the ends 60 of the flexible forehead strap 14, the flexible forehead strap 14 is loosened from the user's head 6. In this regard, the flexible forehead strap 14 is adjustable to account for the size of the user's head 6. It should be understood that use and incorporation of the adjustable connector 18 with the flexible forehead strap 14 is not required. For example, in some embodiments, the flexible forehead strap 14 may be of a substantially fixed size and configuration, wherein such variations in the size or shape of a user's head may be accommodated by the flexibility of the materials of the forehead strap 14. Some embodiments may also or alternatively include fit adjusting components or structure distinct from the flexible forehead strap 14. For example, in one exemplary embodiment, the ends 60 of the flexible forehead strap 14 terminate near the rear portion 34 of the energy management layer 24, and a separate strap, band, or similar structure may be provided that extends generally around the rear occipital region of the user's head 6. The strap, band, or similar structure may be formed of a resilient material, such as elastic, and may therefore be inherently adjustable, or the strap, band or similar structure may be operably connected to an adjustable connector similar to the adjustable connector 18 discussed above.

[0027] Referring specifically to FIG. 4A, in particular embodiments, the continuous gap 16 extends around the entirety of the lower edge 38 of the energy management layer 24, defined on either side by the inner surface 40 of the energy management layer 24 and the flexible forehead strap 14. In particular embodiments, the continuous gap 16 is maintained at least for the front half of the helmet. In some embodiments, the continuous gap measures between 1/16 inches and 1/4 inches. The prongs 42 are elongated (FIG. 3) as compared to conventional prongs (see FIG. 2), allowing some movement of the helmet 10 in relation to the adjustable connector 18 and the user's head 6. Because the stem 44 of each prong 42 is thinner than the flexible entrance 49, and the connection points 48 in the helmet 10 are deeper than the size of the prong head 46, the gap 16 is a flexible gap that can extend to its maximum size, or can collapse to a smaller size if necessary, allowing the helmet 10 to "float" in relation to the flexible forehead strap 14 and allow the helmet's adjustable connector 18 to better adapt to particular head shapes and sizes. When the helmet 10 is worn, the flexible forehead strap 14 intimately contacts the user's head 6, while the inner surface 40 of the helmet 10 is spaced away from the user's head 6 to form the continuous gap 16.

[0028] The continuous gap 16 includes a coupling point gap 62 which is located at each coupling point 48. Specifically, the continuous gap 16 is not blocked at each coupling point 48 by the coupling of the flexible forehead strap 14 to the inner surface 40, but rather remains open, as shown. This allows the airflow to enter the gap 16 at any location along the lower edge 38 of the energy management layer 24 without restraint.

[0029] Referring to FIG. 5, the energy management layer 24 includes at least one coupling point 48 on each side of the front of the helmet, and in particular embodiments two coupling points 48 on each side, located proximal to a lower edge 38 of the energy management layer 24. In the illustrated embodiment, the coupling points 48 are located approximately one-quarter to one-third of the helmet periphery from the front center 26 of the energy management layer 24, with at least one coupling point 48 located on each side of the helmet 10. Alternatively, the coupling points 48 may be located anywhere along the lower edge 38 of the energy management layer 24, and additional coupling points 48 may also be located anywhere on the inner surface 40. In some embodiments, including the embodiment illustrated in FIG. 4B, the coupling points 48 are integrally formed with the energy management layer 24, and are substantially flush with the inner surface 40 of the helmet 10. The elongated prongs 42 maintain the continuous gap 16 by keeping the flexible forehead strap 14 further inward than the inner surface 40. Other embodiments may include coupling points 48 in the form of raised projections that extend generally inwardly, and standoffs, posts, spacers, and the like that are joined to the energy management layer 24. In the illustrated embodiment, the flexible forehead straps 14 are secured to the coupling points 48 with the prongs 42. However, in other embodiments the flexible forehead strap 14 can be secured to the coupling points 42 by clips, clamps, snaps, hook and loop, and other types of fasteners.

[0030] Referring to FIG. 7, the continuous gap 16 allows air to enter between the energy management layer 24 and the user's head 6. With the inner surface 40 of the energy management layer 24 spaced apart from the user's head 6, ventilating air can flow through the continuous gap 16 and between the user's head 6 and the inner surface 40. This continuous gap 16 is provided in helmets having several ventilation openings 36 and also is provided in helmets having few or no ventilation openings 36, such as the sprinter and aero helmets discussed above. Heat build-up and retention inside of the helmet may thus be reduced.

[0031] The foregoing is considered as illustrative only of the principles of the disclosure. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the disclosure to the exact construction and operation shown and described, and accordingly, all suitable modifications and equivalents may be resorted to, falling within the scope of the disclosure.

[0032] The application should be taken to further extend to the series of numbered statements below:

1. A helmet for protecting the head of a user, the helmet comprising:

at least one liner comprising an outer shell and an energy management layer, the energy management layer comprising an inner surface and a lower edge surrounding the inner surface at a helmet opening configured to receive a head of a helmet wearer;
at least two coupling points located on the inner surface proximal to the lower edge;
at least one flexible forehead strap following the lower edge of the energy management layer and inwardly offset from the inner surface;
at least two prongs comprising a stem and a head, the head having a larger cross-section than a cross-section of the stem, wherein the stem is attached to and projects away from the flexible forehead strap towards the inner surface and the head couples with the inner surface at one of the at least two coupling points;
a continuous gap between the inner surface and the flexible forehead strap extending around an entirety of the lower edge; and
an adjustable connector coupled to each end of the at least one flexible forehead strap and capable of adjusting a perimeter of the flexible forehead strap, wherein the adjustable connector comprises a knob that decreases the perimeter when rotated in a first direction and increases the perimeter when rotated in a second direction different from the first direction.

2. The helmet of statement 1, the at least two coupling points each comprising a hole wherein a length of the stem is greater than a depth of the hole and the stem is slidably coupled within the hole.
3. The helmet of statement 1, a first of the at least two coupling points being located in a right front portion of the inner surface and a second of the at least two coupling points being located in a left front portion of the inner surface.
4. The helmet of statement 1, wherein the at least two coupling points comprises two pairs of coupling points, a first pair of coupling points located in a right front portion of the inner liner and a second pair of coupling points located in a left front portion of the inner liner; and wherein the at least two prongs comprises two pairs of prongs located on the flexible forehead strap and positioned to couple with the two pairs of coupling points.
5. The helmet of statement 1, the continuous gap having a width measuring within a range of .158cm (1/16 inches) to .635cm (1/4 inches).
6. A helmet for protecting the head of a user, the helmet comprising:

at least one liner comprising an outer shell and an energy management layer, the energy management layer comprising an inner surface and a lower edge surrounding the inner surface at a helmet opening configured to receive a head of a helmet wearer;
at least two coupling points located on the inner surface adjacent the lower edge;
at least one flexible forehead strap following the lower edge of the energy management layer, inwardly offset from the inner surface, and coupled to the inner surface at the coupling points;
a coupling point gap separating the inner surface from the flexible forehead strap at each coupling point, the coupling point gap having a width measuring at least 1/16 inch; and
an adjustable connector coupled to the at least one flexible forehead strap and capable of adjusting a perimeter of the flexible forehead strap.

7. The helmet of statement 6, the at least two coupling points each comprising a hole wherein the stem is slidably coupled with the hole and a portion of the stem is configured to remain outside of the hole.
8. The helmet of statement 6, a first of the at least two coupling points being located in a right front portion of the inner surface and a second of the at least two coupling points being located in a left front portion of the inner surface.
9. The helmet of statement 8, the flexible forehead strap comprising at least two prongs comprising a stem and a head, the head having a larger cross-section than a cross-section of the stem, wherein the stem is attached to and projects away from the flexible forehead strap towards the inner surface and the head couples with the inner surface at one of the at least two coupling points.
10. The helmet of statement 9, wherein each coupling point is configured to receive a pair of prongs and the at least two prongs comprise at least two pairs of prongs, located on the flexible forehead strap and positioned to couple with the first and second coupling points.
11. The helmet of statement 6, the coupling point gap having a width measuring 1/4 inch or less.
12. The helmet of statement 6, wherein the adjustable connector comprises a knob that decreases the perimeter when adjusted in a first direction and increases the perimeter when adjusted in a second direction different from the first direction.
13. A helmet for protecting the head of a user, the helmet comprising:

at least one helmet liner comprising an outer shell and an energy management layer, the energy management layer comprising an inner surface and a lower edge surrounding the inner surface at a helmet opening configured to receive a head of a helmet wearer;
at least two coupling points located on the inner surface proximal to the lower edge;
at least one flexible forehead strap following the

lower edge of the energy management layer, inwardly offset from the inner surface, and coupled to the inner surface at the coupling points; and

a continuous gap between the inner surface and the flexible forehead strap at each of the at least two coupling points.

14. The helmet of statement 13, the at least two coupling points each comprising a hole wherein a length of the stem is greater than a depth of the hole and a portion of the length of the stem is configured to remain outside of the hole.

15. The helmet of statement 13, further comprising a coupling point gap separating the inner surface from the flexible forehead strap at each coupling point, the coupling point gap having a width measuring at least 1/16 inch.

16. The helmet of statement 15, a first of the at least two coupling points being located in a right front portion of the inner surface proximal to the lower edge and a second of the at least two coupling points being located in a left front portion of the inner surface proximal to the lower edge, wherein the at least two coupling points are proximal to a helmet wearer's head temples when in use.

17. The helmet of statement 16, further comprising at least two prongs comprising a stem and a head, the head having a larger cross-section than a cross-section of the stem, wherein the stem is attached to and projects away from the flexible forehead strap towards the inner surface and the head couples with the inner surface at one of the at least two coupling points.

18. The helmet of statement 17, wherein each coupling point is capable of receiving a pair of prongs and the at least two prongs comprises at least two pairs of prongs, located on the flexible forehead strap and positioned to couple with the first and second coupling points.

19. The helmet of statement 13, the continuous gap having a width measuring within a range of .158cm (1/16 inches) to .635cm (1/4 inches).

20. The helmet of statement 13, further comprising an adjustable connector coupled to the at least one flexible forehead strap and capable of adjusting a perimeter of the flexible forehead strap.

Claims

1. A helmet for protecting the head of a user, the helmet comprising:

at least one helmet liner comprising an outer shell and an energy management layer, the energy management layer comprising an inner surface and a lower edge surrounding the inner surface at a helmet opening configured to receive a head of a helmet wearer;

at least two coupling points located on the inner surface proximal to the lower edge;

at least one flexible forehead strap following the lower edge of the energy management layer, inwardly offset from the inner surface, and coupled to the inner surface at the coupling points; and

a continuous gap between the inner surface and the flexible forehead strap at each of the at least two coupling points.

2. The helmet of claim 1, the at least two coupling points each comprising a hole.

3. The helmet of claim 2, wherein the stem is slidably coupled with the hole and a portion of the stem is configured to remain outside of the hole.

4. The helmet of claim 2 or claim 3, wherein a length of the stem is greater than a depth of the hole and a portion of the length of the stem is configured to remain outside of the hole.

5. The helmet of claim 1 or claim 2, wherein the continuous gap comprises a coupling point gap separating the inner surface from the flexible forehead strap at each coupling point, the coupling point gap having a width measuring at least .158cm.

6. The helmet of any preceding claim, a first of the at least two coupling points being located in a right front portion of the inner surface proximal to the lower edge and a second of the at least two coupling points being located in a left front portion of the inner surface proximal to the lower edge, wherein the at least two coupling points are proximal to a helmet wearer's head temples when in use.

7. The helmet of any preceding claim, further comprising at least two prongs comprising a stem and a head, the head having a larger cross-section than a cross-section of the stem, wherein the stem is attached to and projects away from the flexible forehead strap towards the inner surface and the head couples with the inner surface at one of the at least two coupling points.

8. The helmet of claim 7, wherein each coupling point is capable of receiving a pair of prongs and the at least two prongs comprises at least two pairs of prongs, located on the flexible forehead strap and positioned to couple with the first and second coupling points.

9. The helmet of any preceding claim, wherein the continuous gap has a width less than .635cm.

10. The helmet of any preceding claim, further comprising an adjustable connector coupled to the at least one flexible forehead strap and capable of adjusting a perimeter of the flexible forehead strap.

11. The helmet of claim 10, wherein the adjustable connector comprises a knob that decreases the perimeter when adjusted in a first direction and increases the perimeter when adjusted in a second direction different from the first direction.

12. The helmet of any preceding claim, wherein a first of the at least two coupling points is located in a right front portion of the inner surface and a second of the at least two coupling points is located in a left front portion of the inner surface.

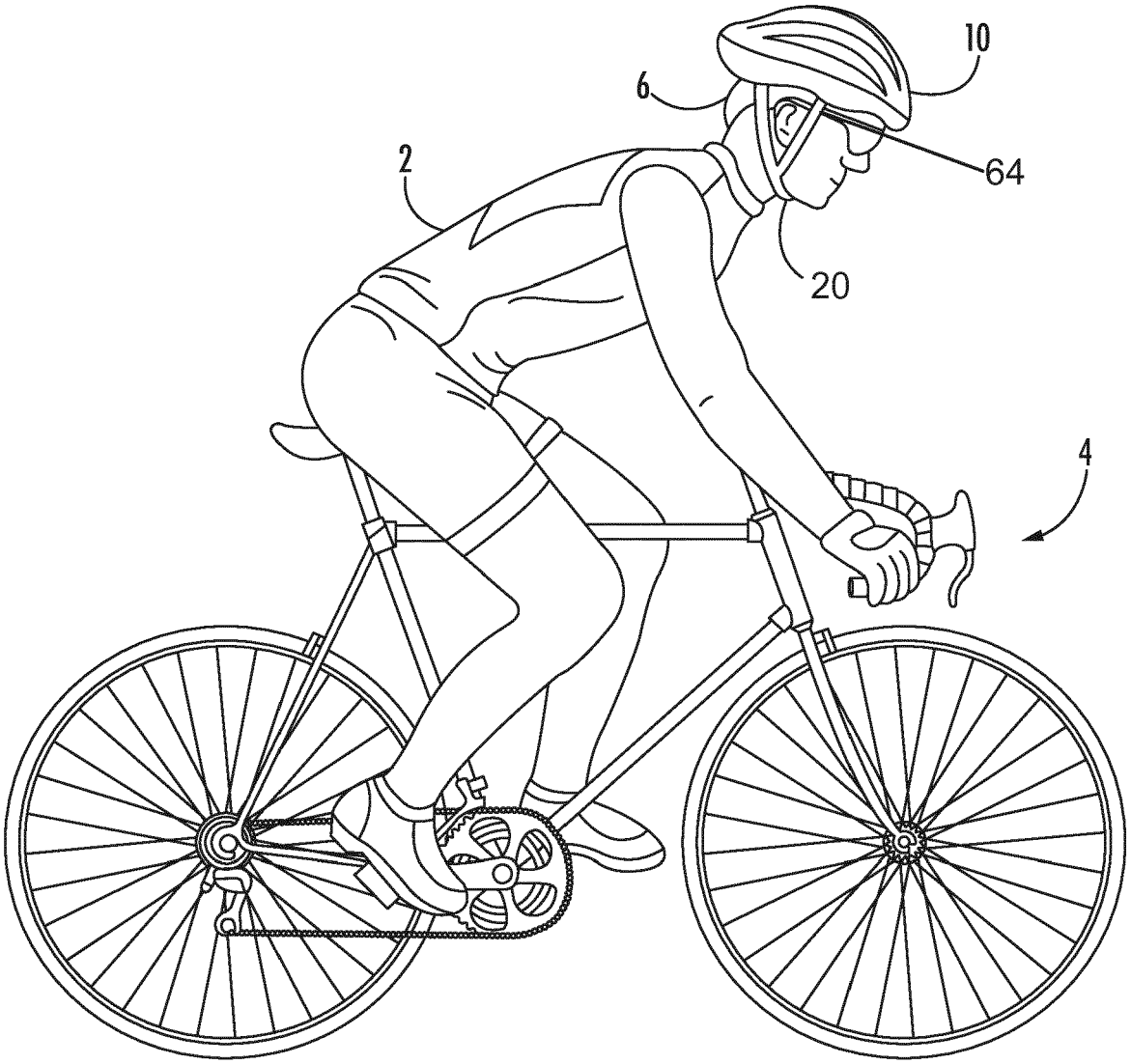

FIG. 1

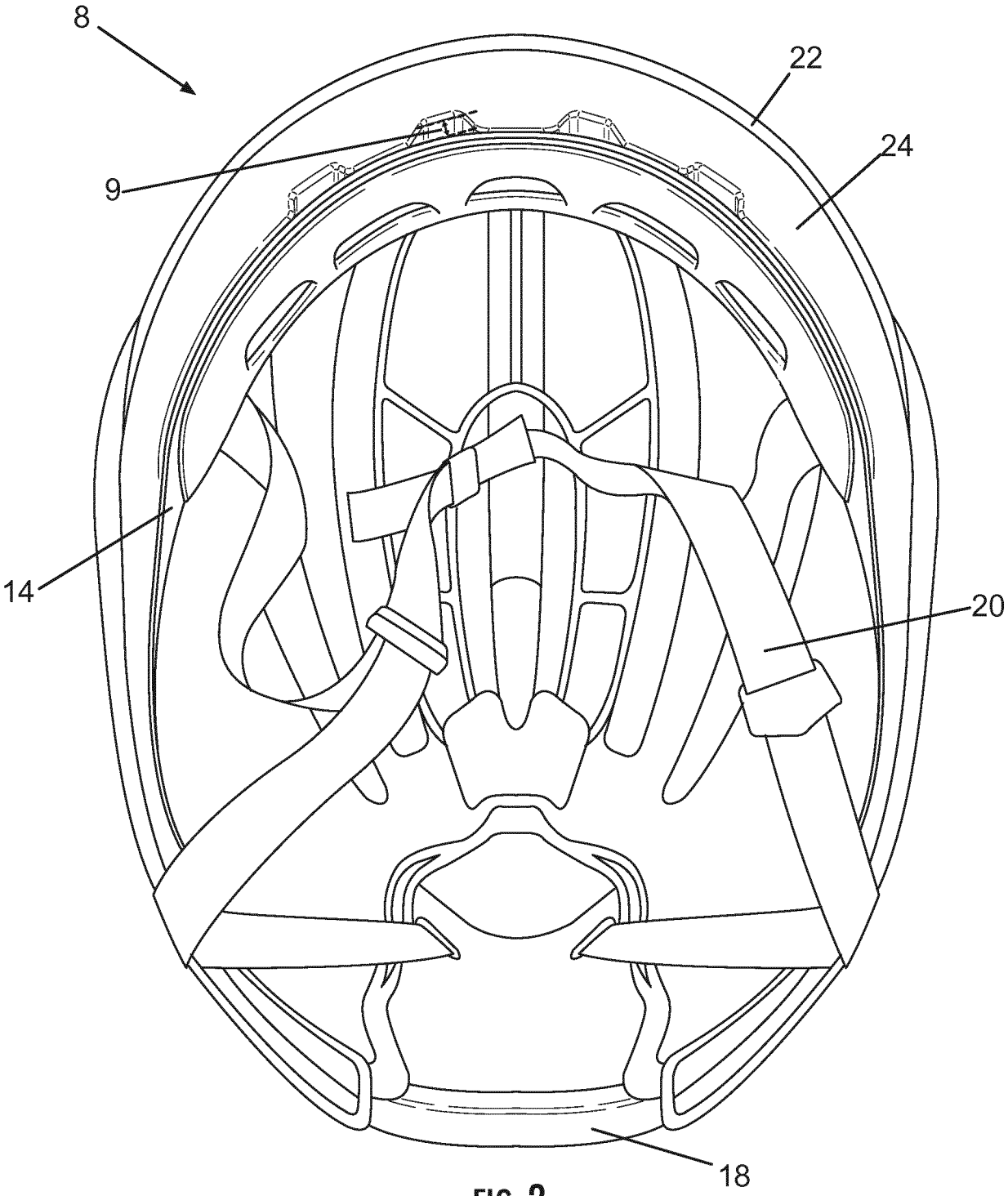

FIG. 2
PRIOR ART

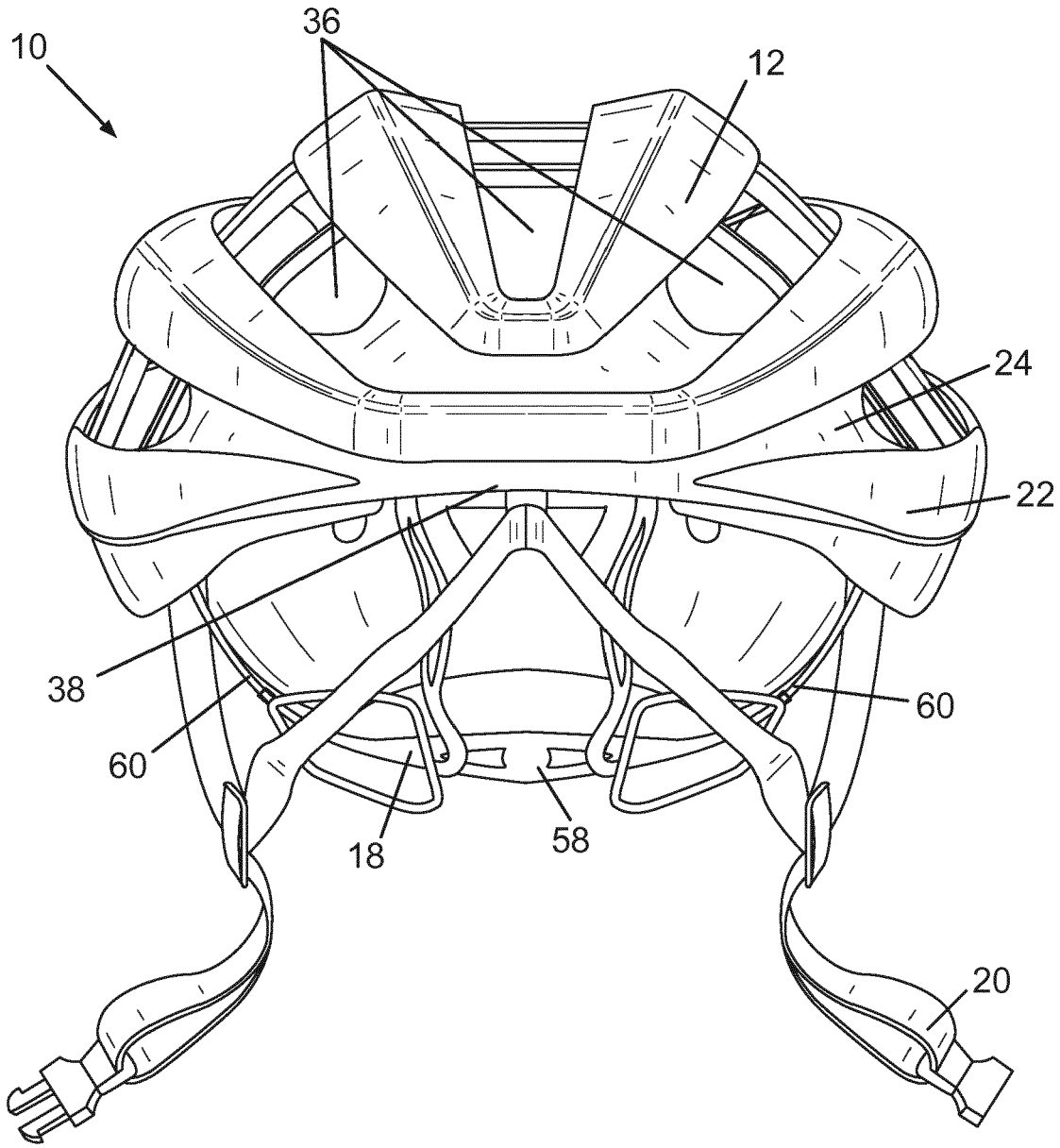

FIG. 3

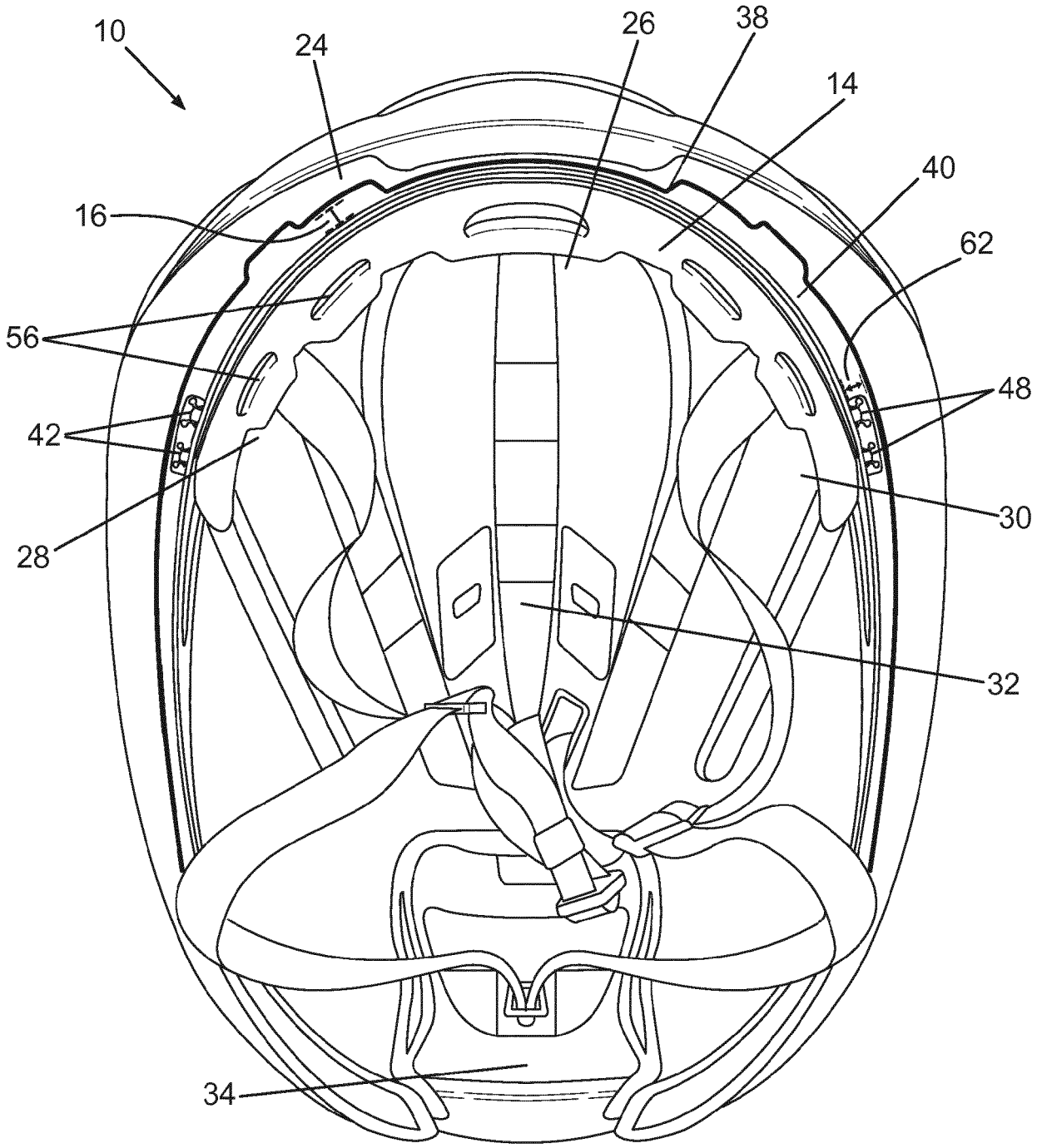

FIG. 4A

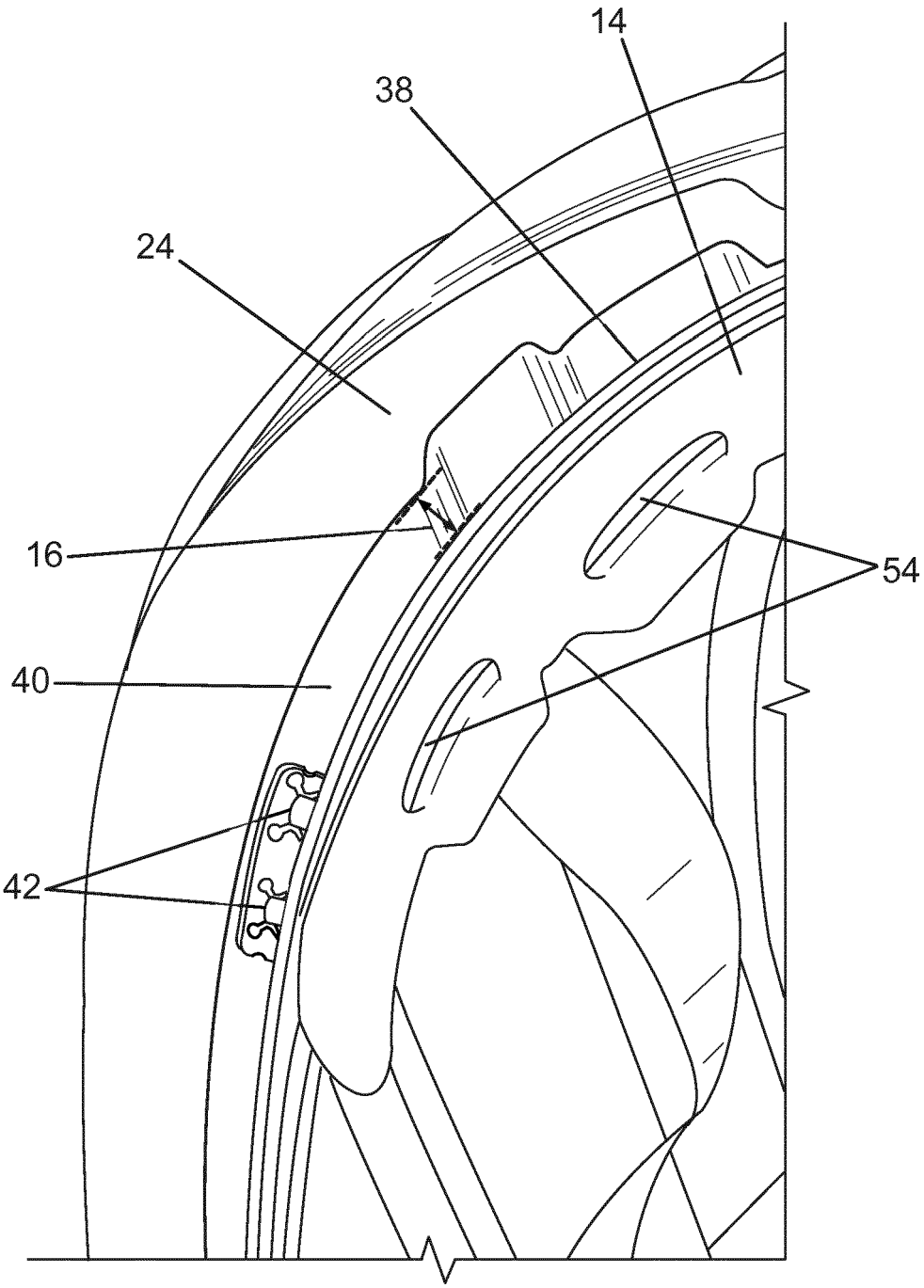

FIG. 4B

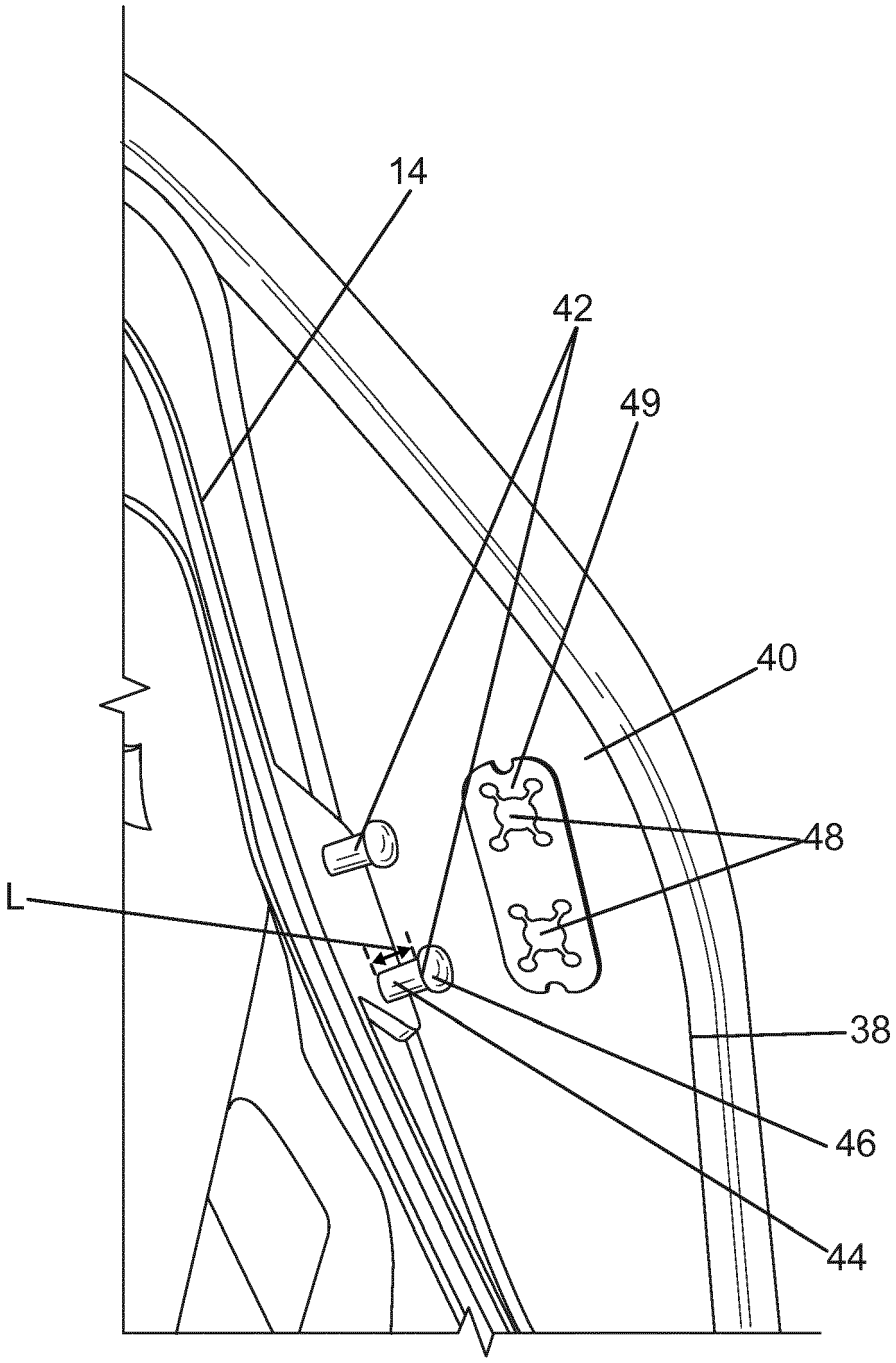

FIG. 5

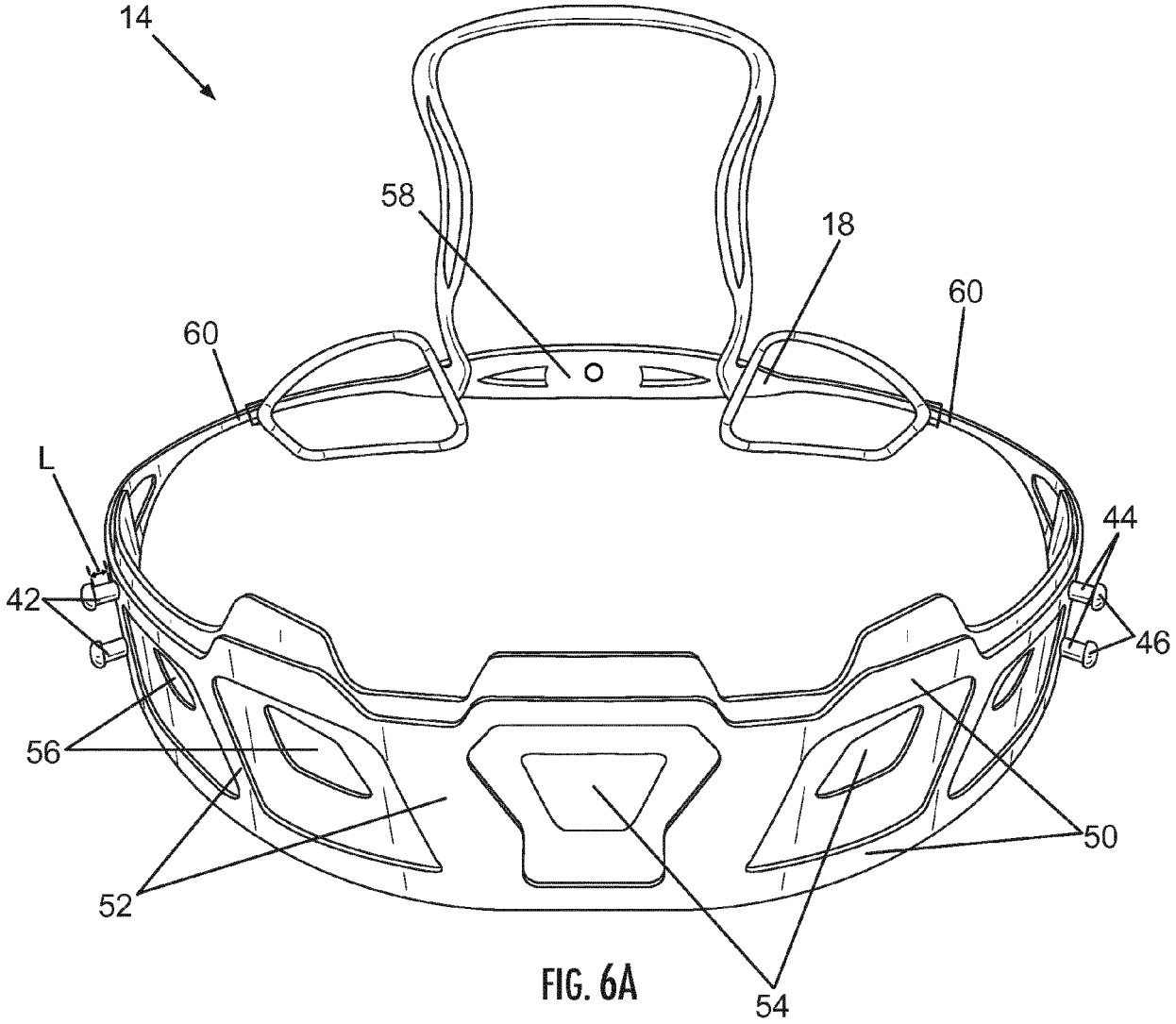

FIG. 6A

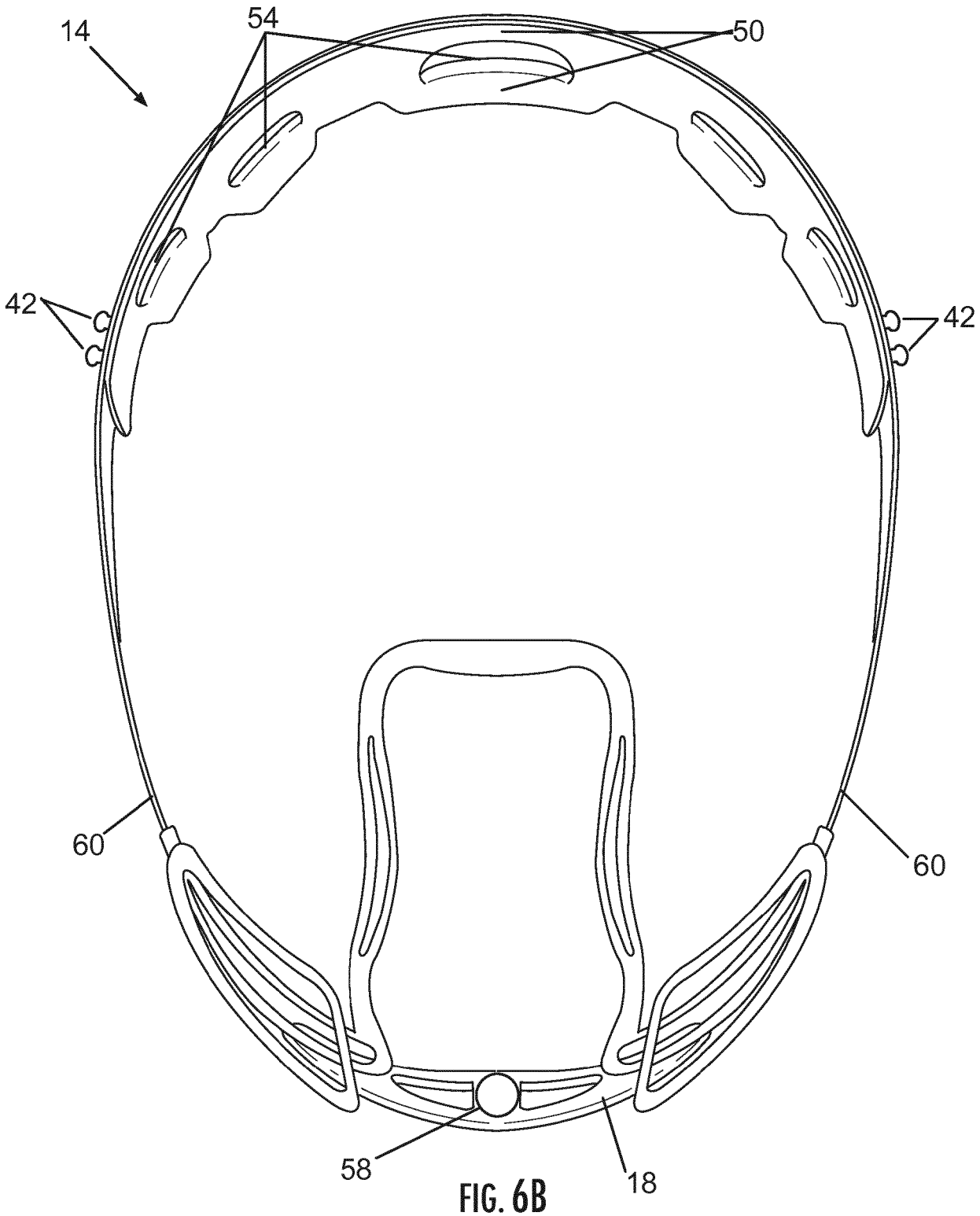

FIG. 6B

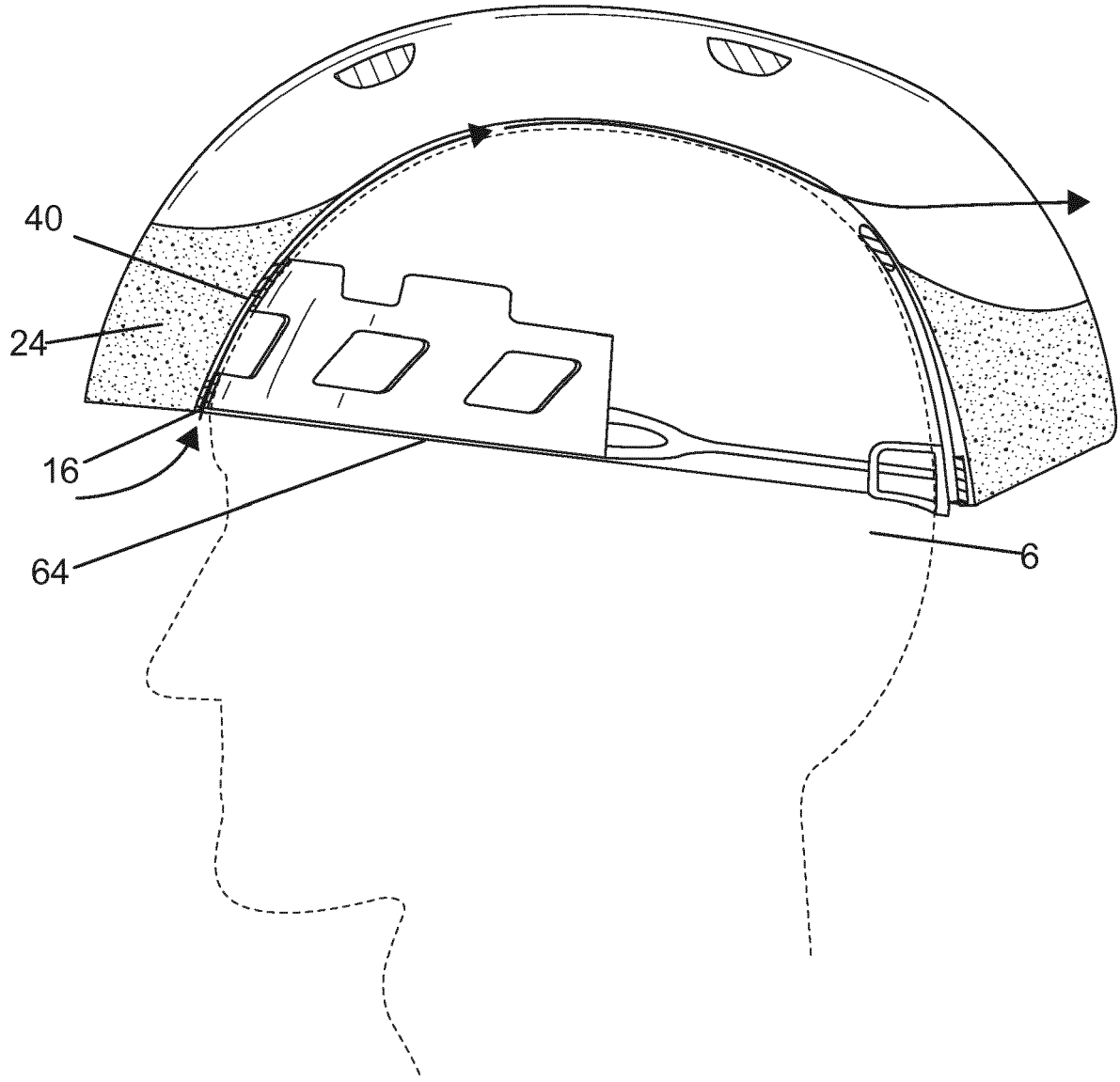

FIG. 7

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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 2019	D'Souza, Jennifer

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