US012383013B2

(12) **United States Patent**
Winefordner et al.

(10) **Patent No.: US 12,383,013 B2**
(45) **Date of Patent: Aug. 12, 2025**

(54) **HELMET AND CHIN STRAP**

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(73) Assignee: **DoubleThree, LLC**, Laguna Beach, CA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **18/363,485**

(22) Filed: **Aug. 1, 2023**

(65) **Prior Publication Data**

US 2024/0315374 A1 Sep. 26, 2024

Related U.S. Application Data

(60) Provisional application No. 63/491,666, filed on Mar. 22, 2023.

(51) **Int. Cl.**
A42B 3/08 (2006.01)
A42B 3/32 (2006.01)

(52) **U.S. Cl.**
CPC . ***A42B 3/08*** (2013.01); ***A42B 3/32*** (2013.01)

(58) **Field of Classification Search**
CPC A42B 3/08; A42B 3/32; A42B 3/00
USPC 2/421
See application file for complete search history.

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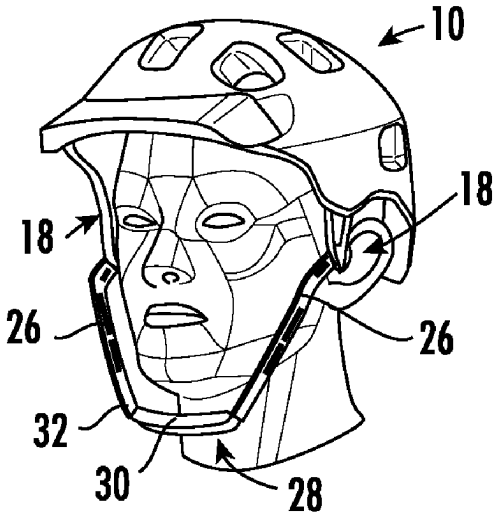
Primary Examiner — Timothy K Trieu
(74) *Attorney, Agent, or Firm* — Stetina Garred Brucker & Newboles

(57) **ABSTRACT**

A helmet comprises a shell having a front portion, a rear portion, and a pair of lateral portions extending between the front portion and the rear portion. The shell is sized and configured to be placeable on the head of a user. The helmet additionally includes a chin strap having a pair of end portions and an intermediate portion located between the pair of end portions. The end portions are fixedly connected to respective ones of the pair of lateral portions of the shell so as to restrict movement of the end portions relative to the shell. The chin strap is flexible to facilitate placement of the chin strap around a chin of a user in connection with placement of the shell on the head of the user.

10 Claims, 15 Drawing Sheets



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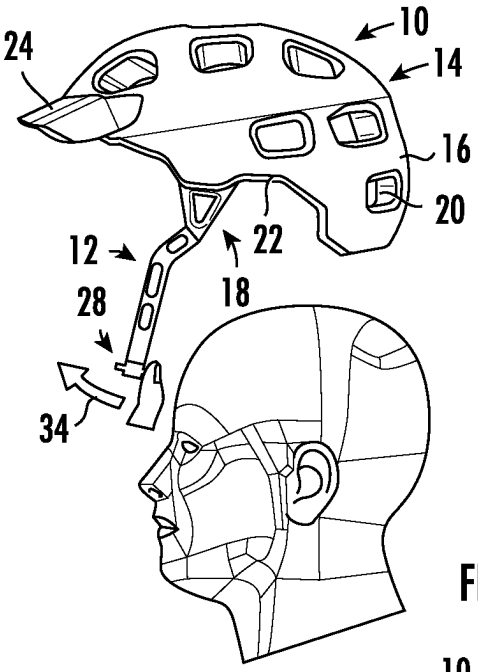


FIG. 1

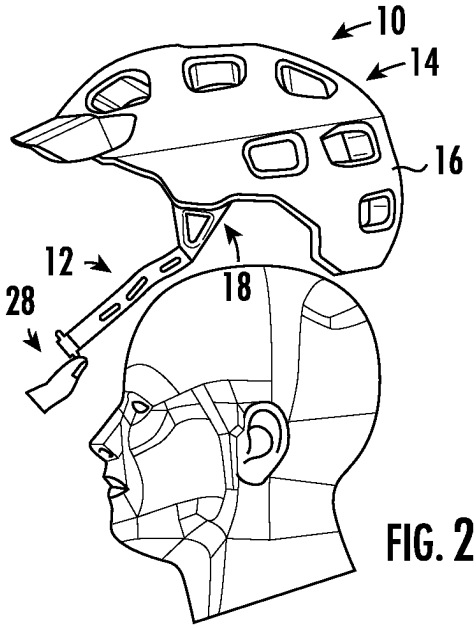
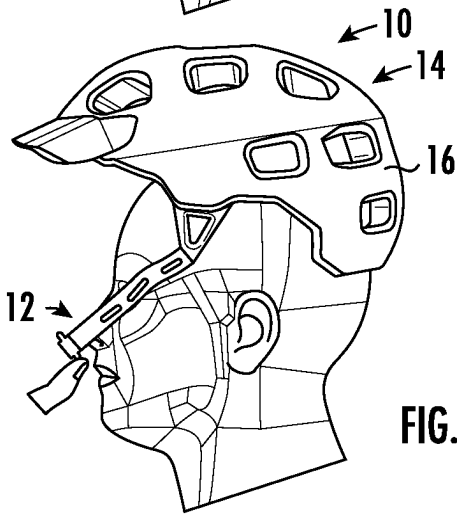


FIG. 2



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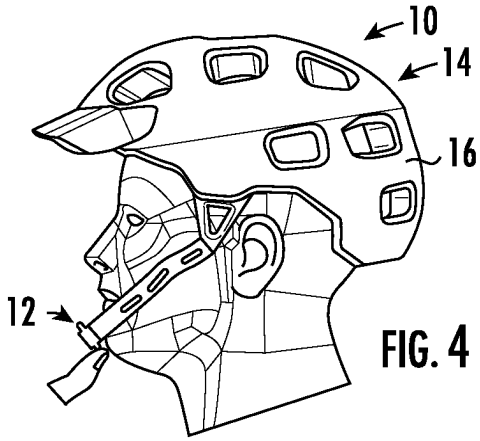

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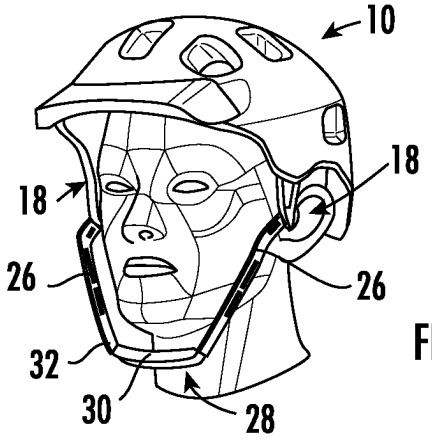

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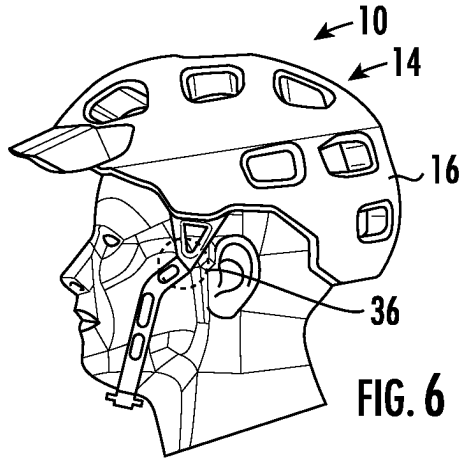
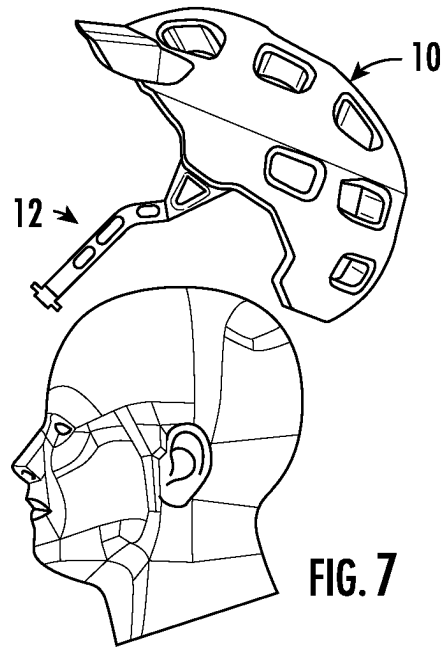


FIG. 6



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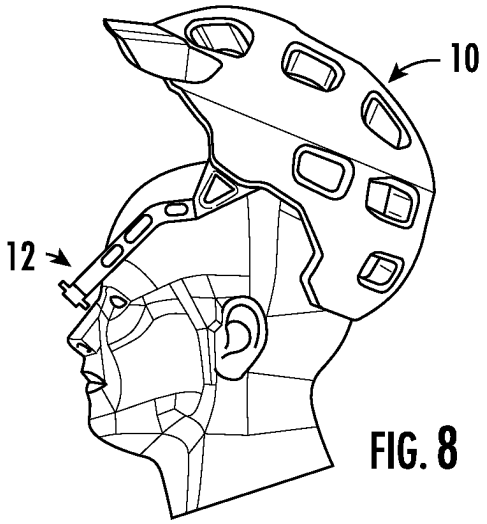

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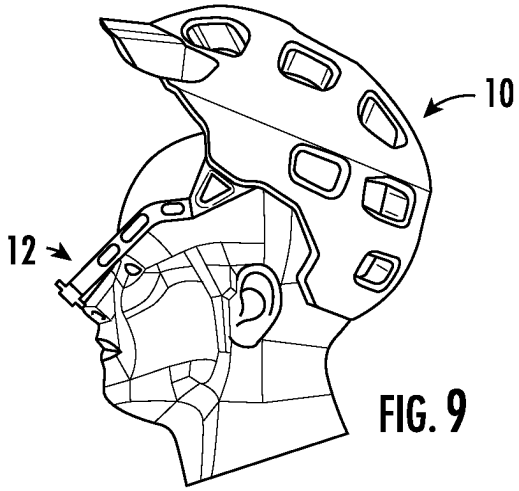

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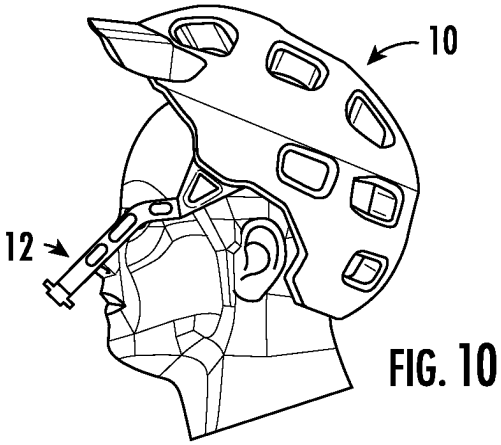

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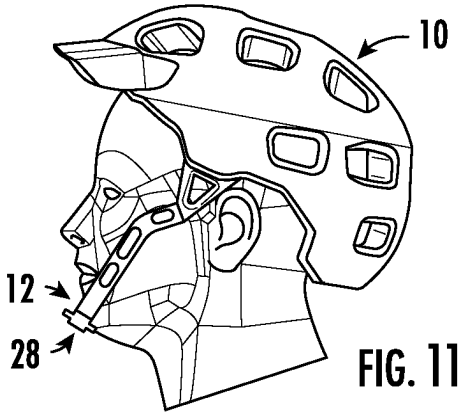

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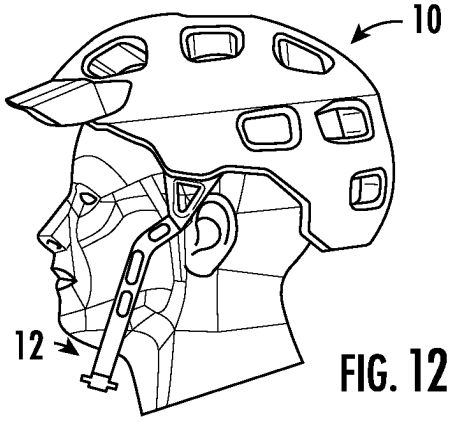

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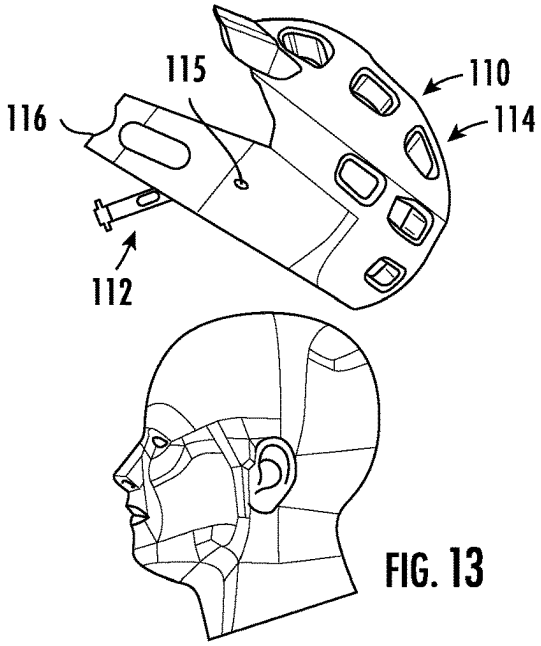

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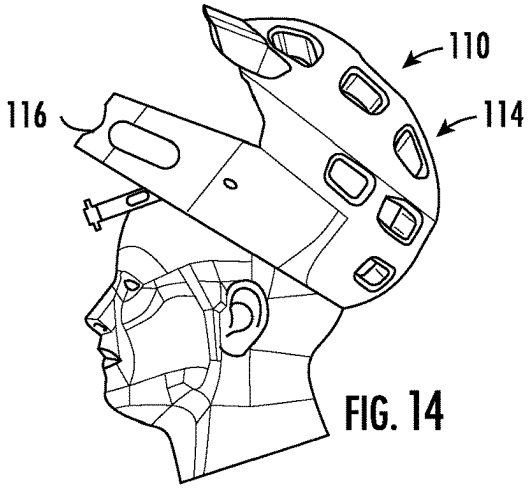

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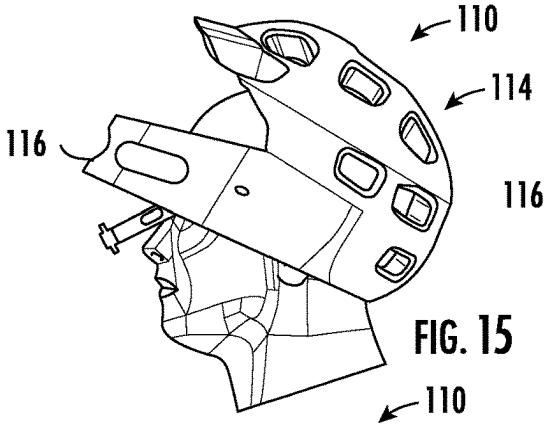

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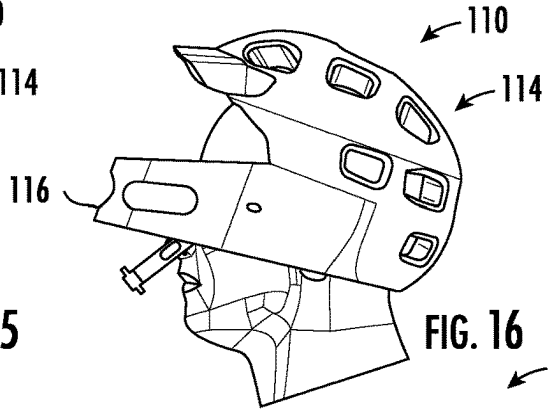

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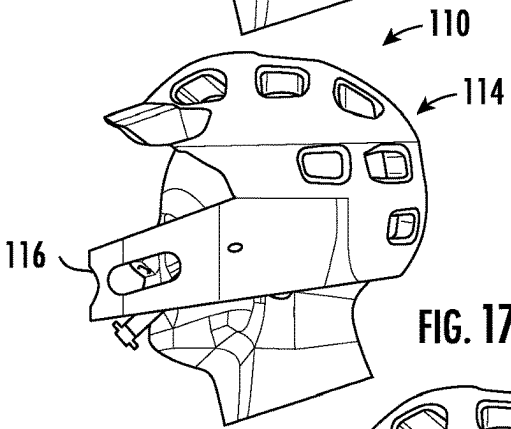

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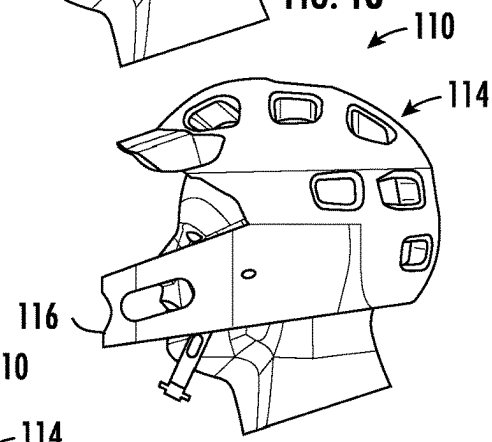

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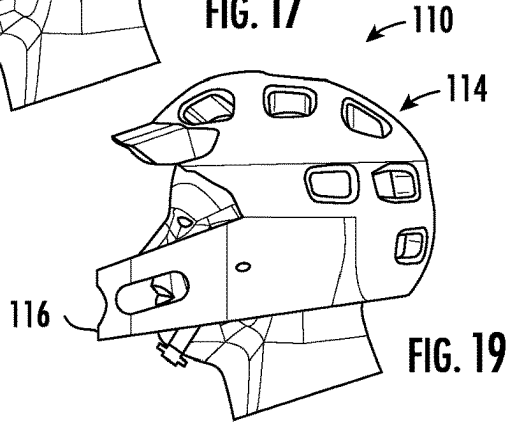

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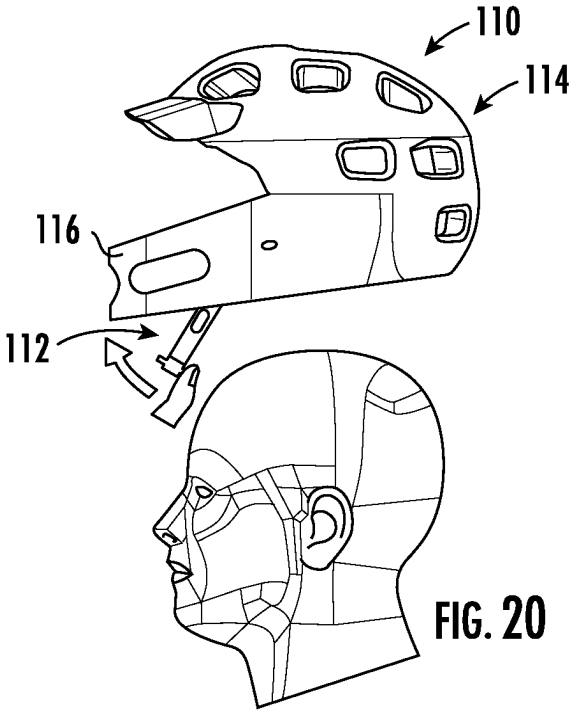

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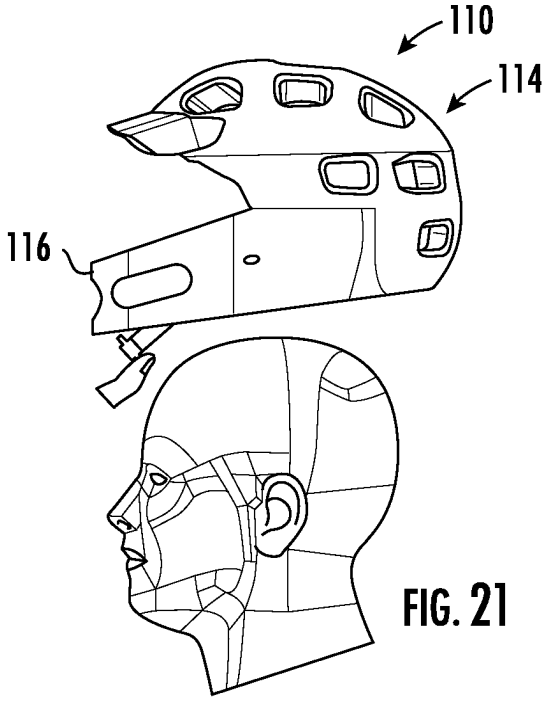

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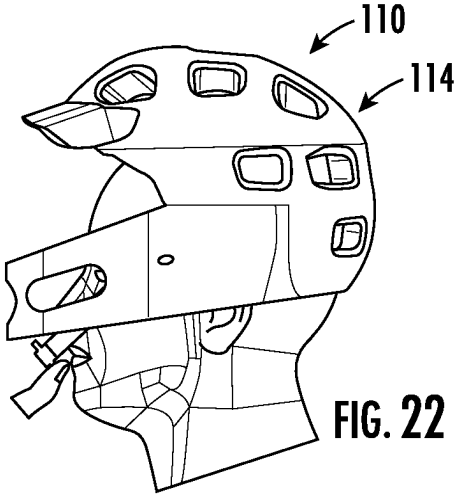

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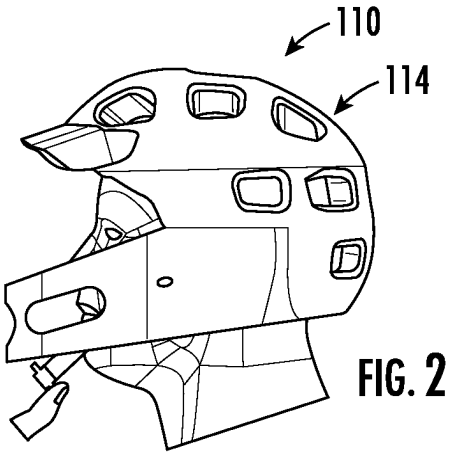

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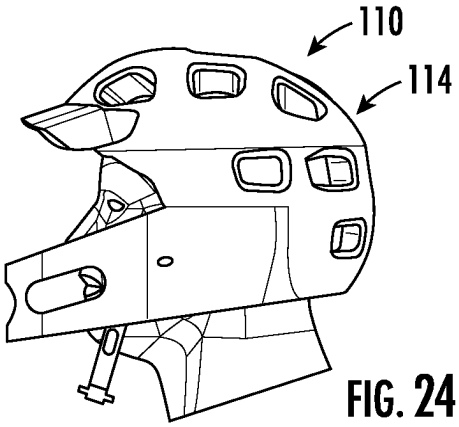

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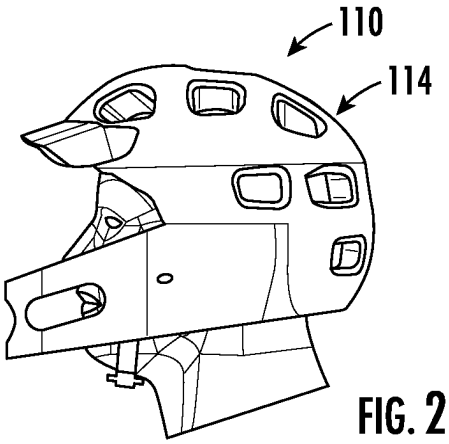

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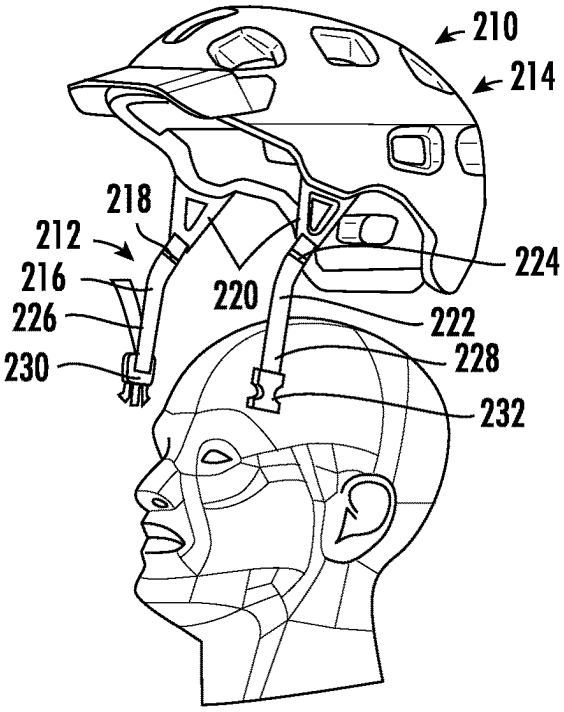

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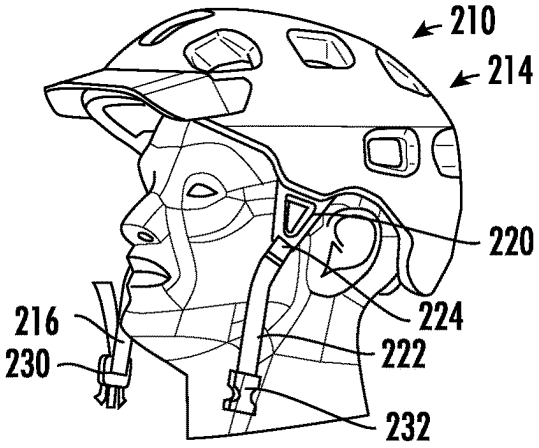

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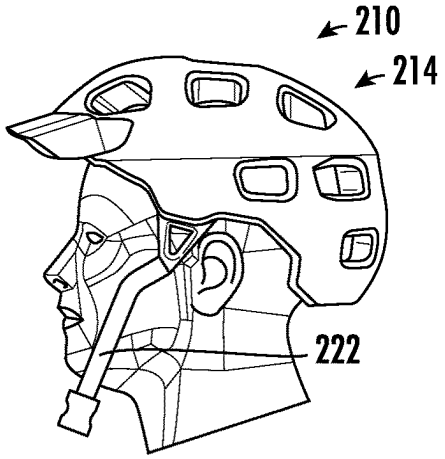

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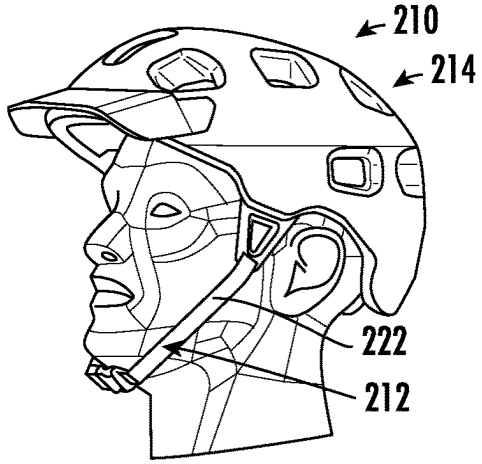

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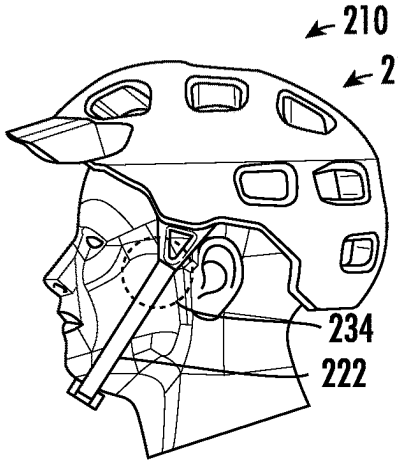

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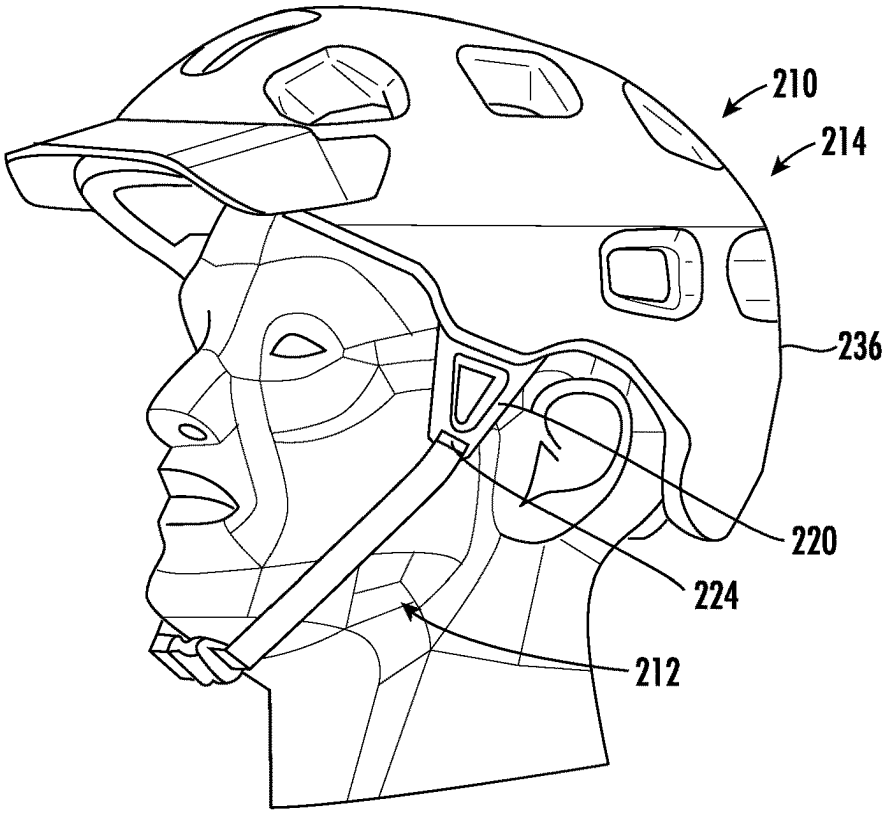

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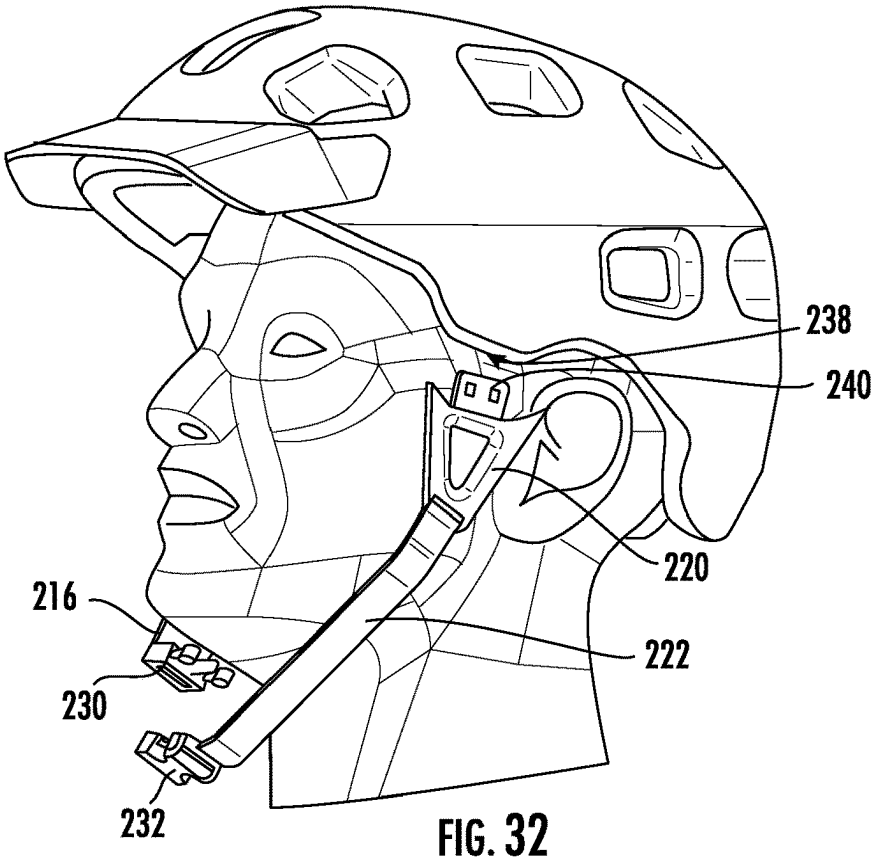

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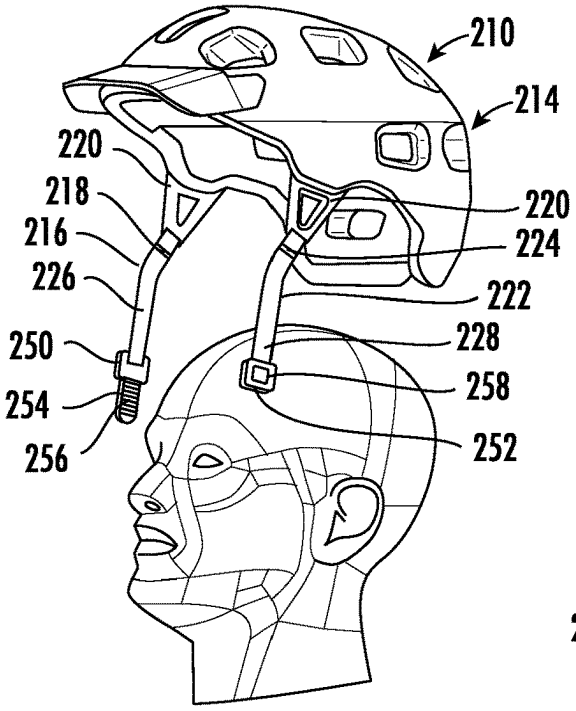

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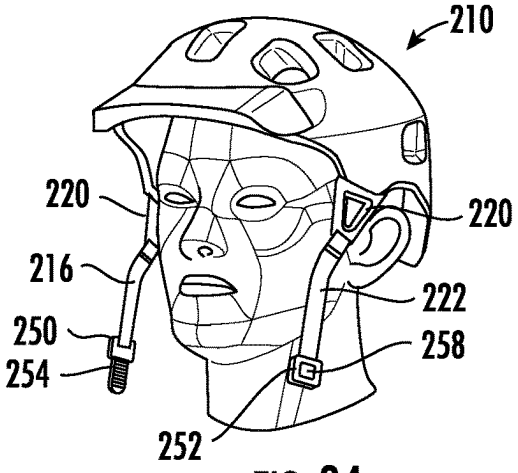

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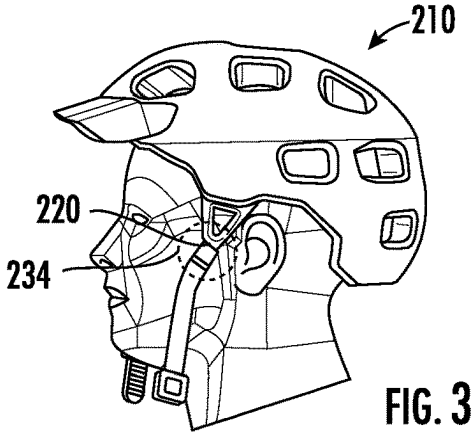

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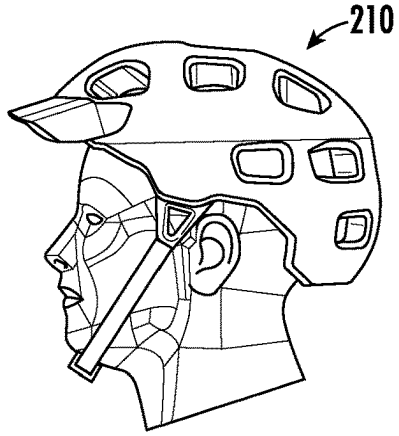

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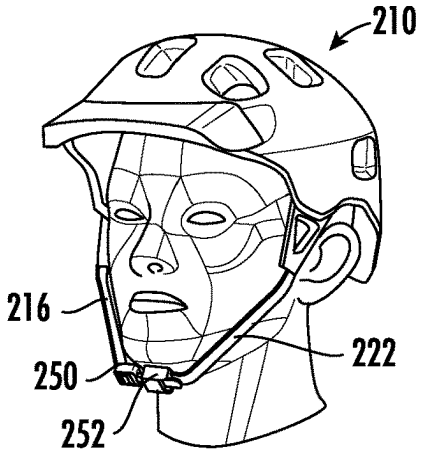

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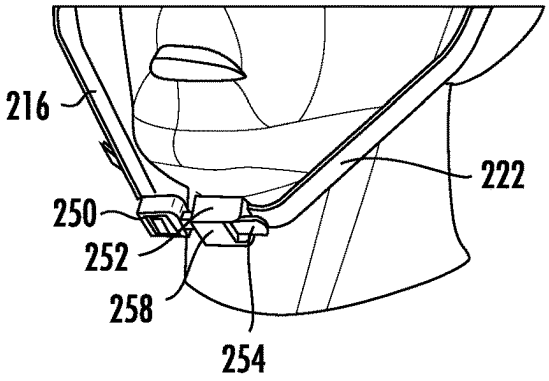

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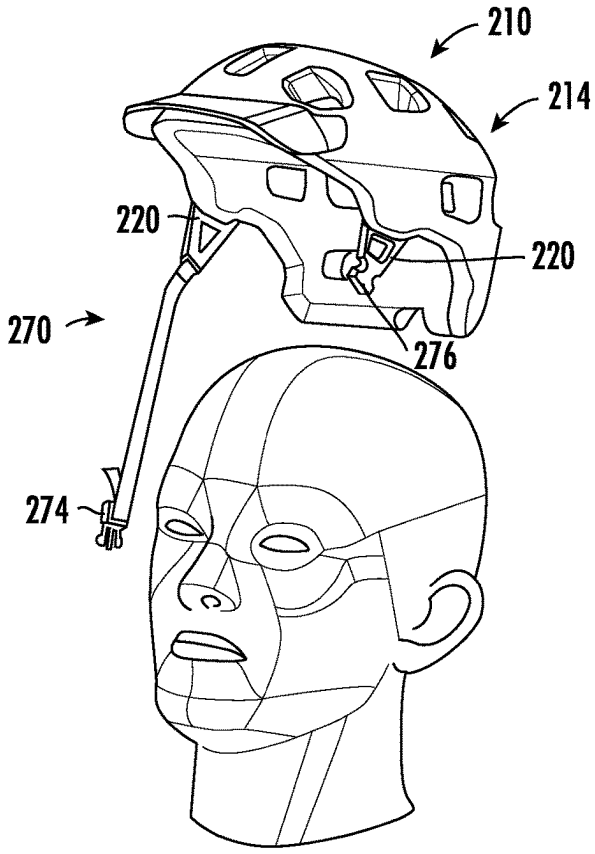

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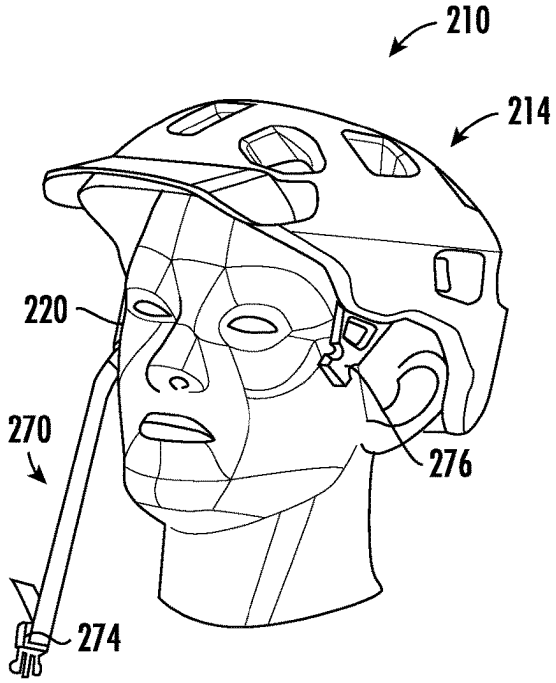


FIG. 40

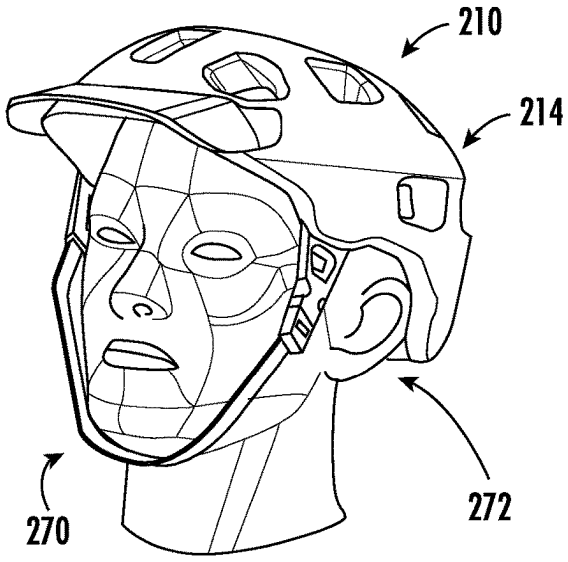


FIG. 41

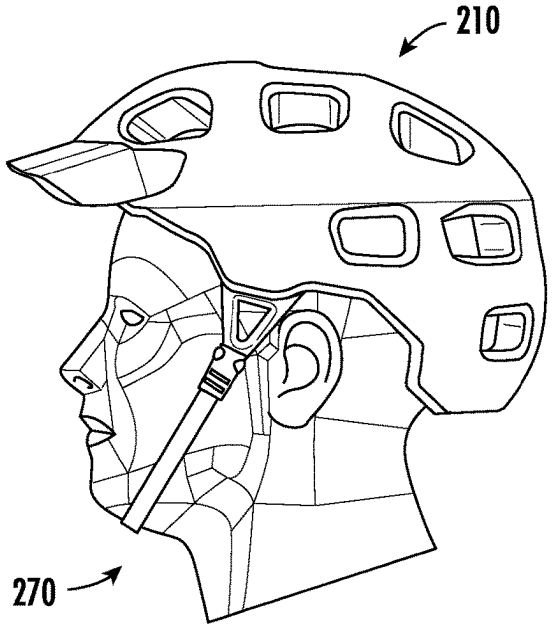
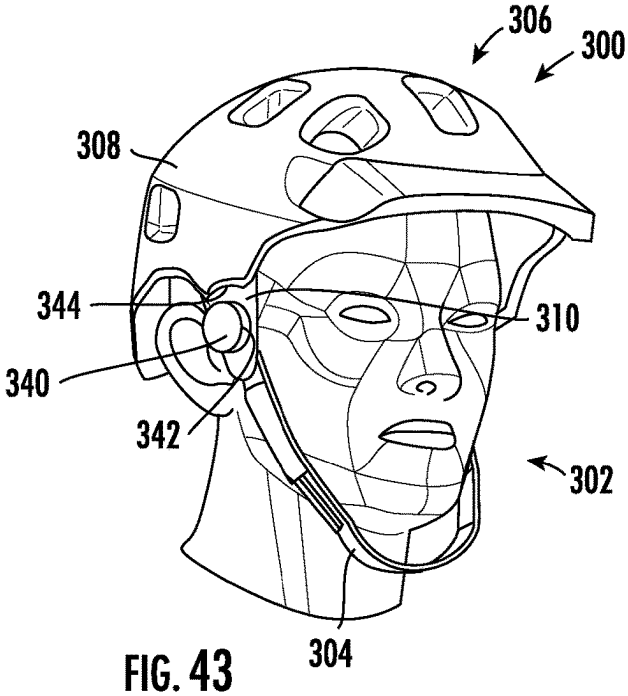


FIG. 42



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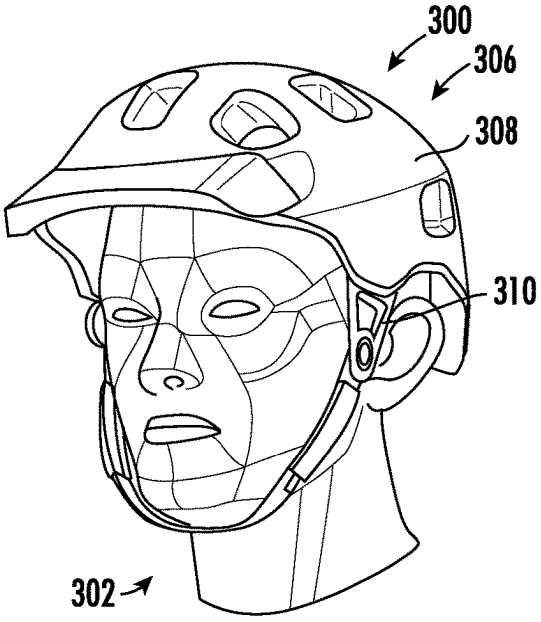

FIG. 44

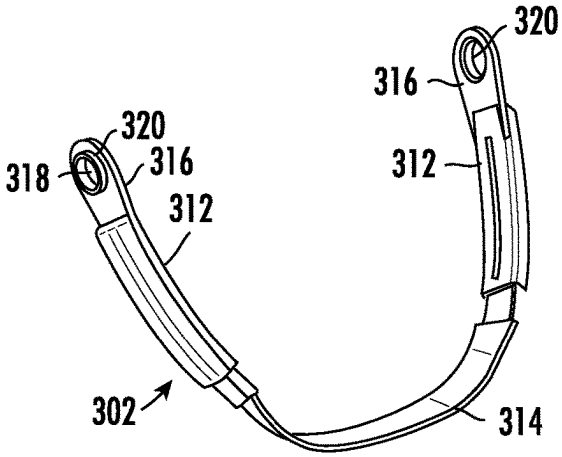

FIG. 45

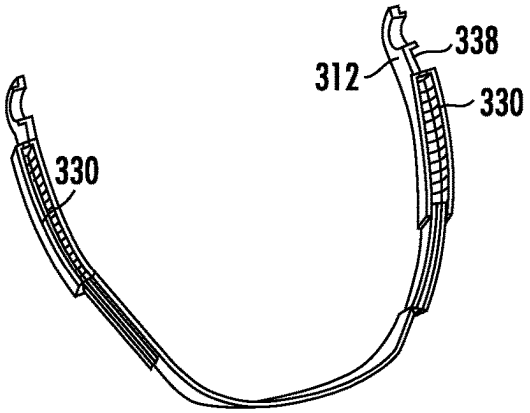

FIG. 46

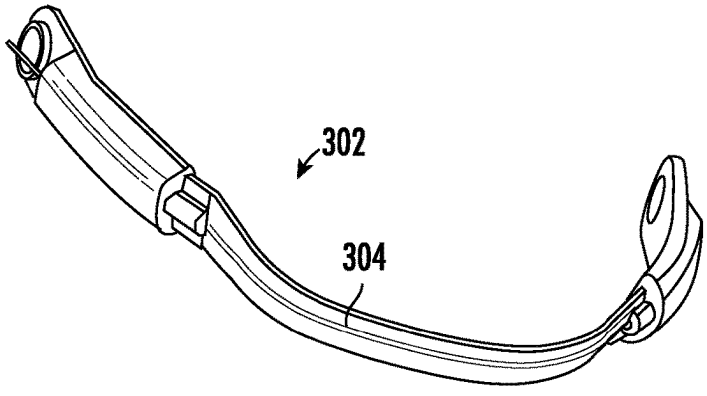

FIG. 47

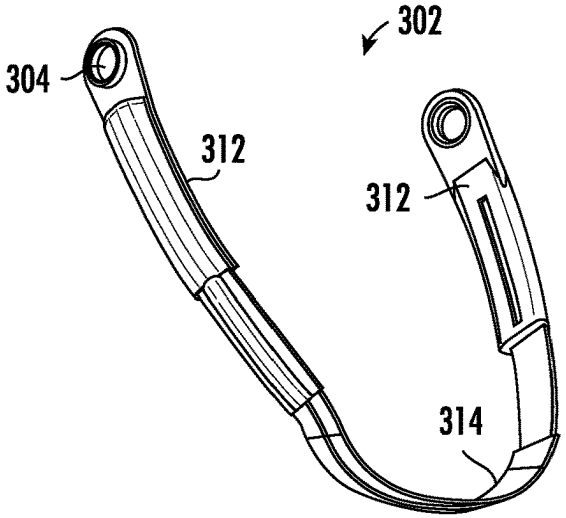

FIG. 48

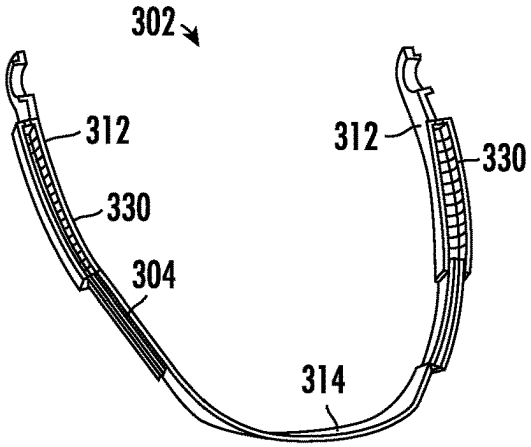

FIG. 49

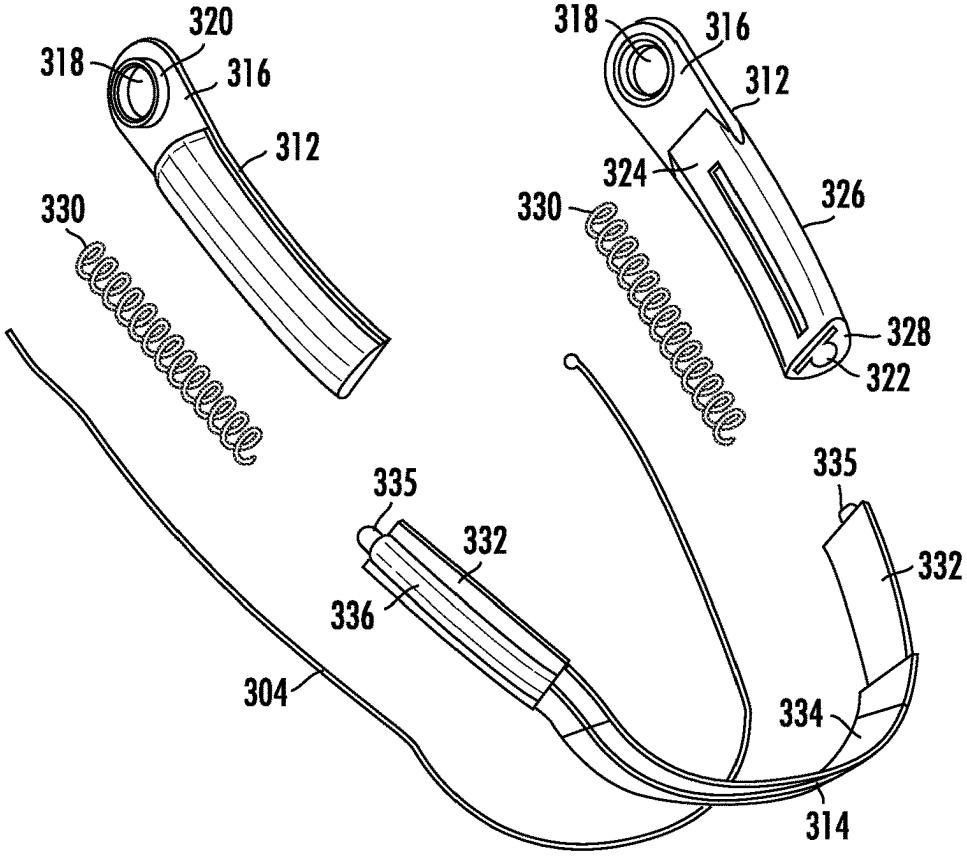

FIG. 50

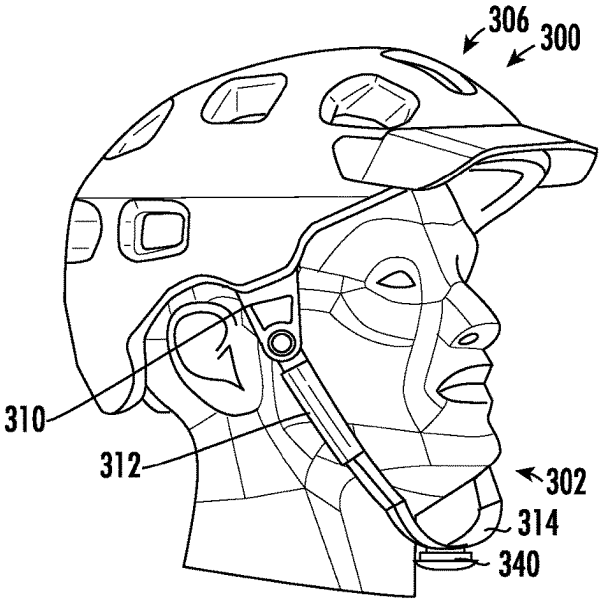

FIG. 51

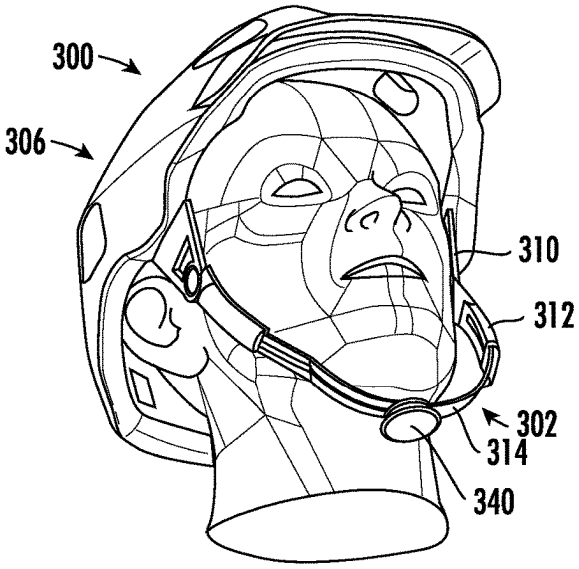

FIG. 52

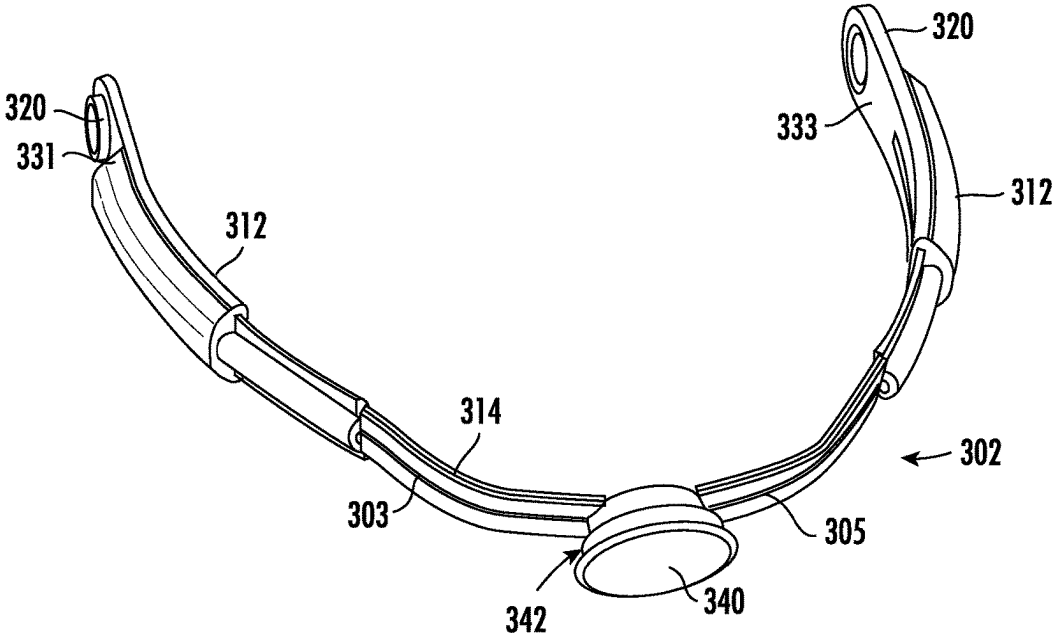

FIG. 53

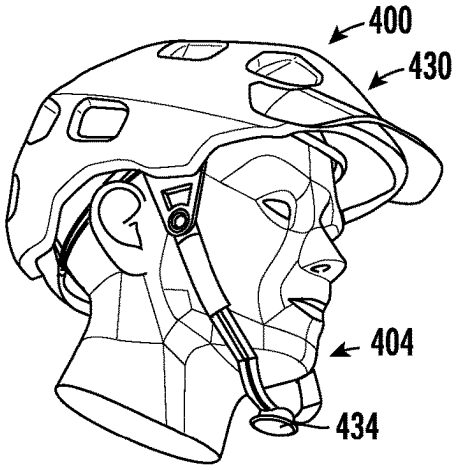

FIG. 54

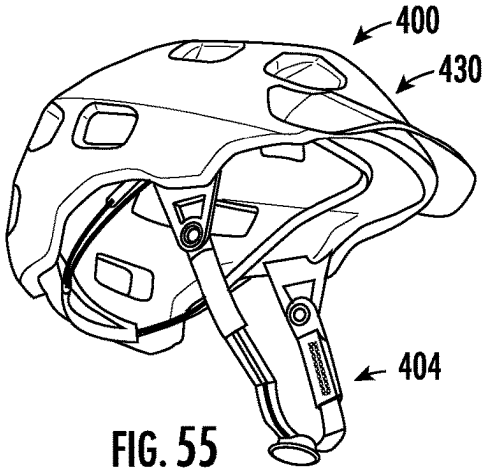

FIG. 55

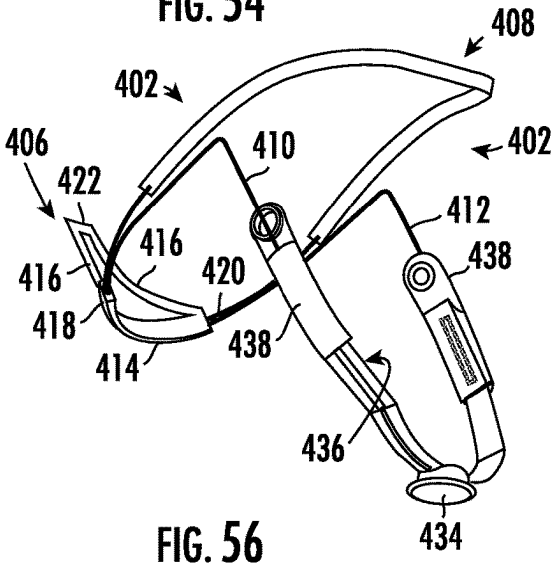

FIG. 56

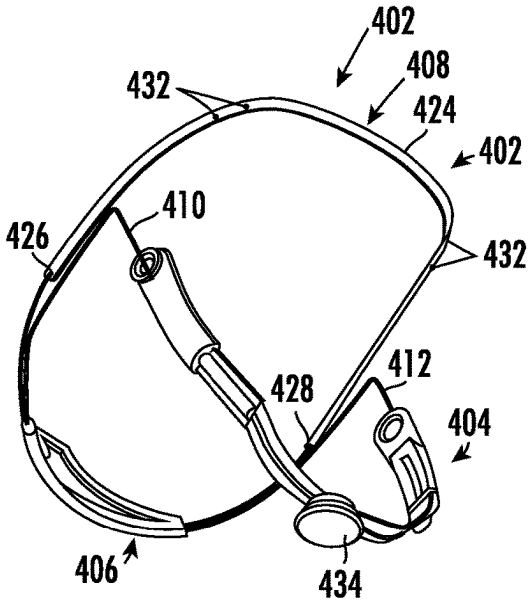

FIG. 57

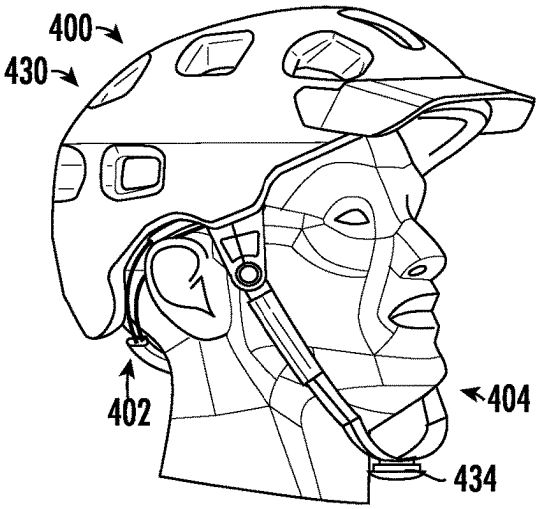

FIG. 58

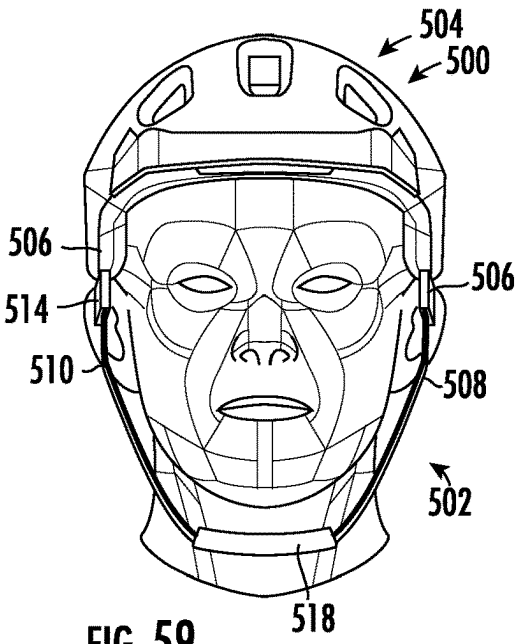

FIG. 59

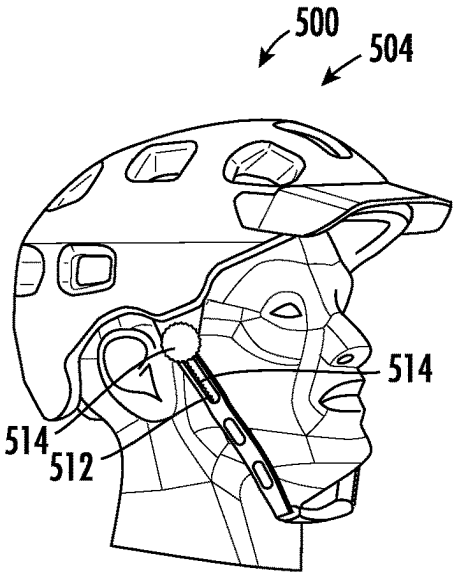

FIG. 60

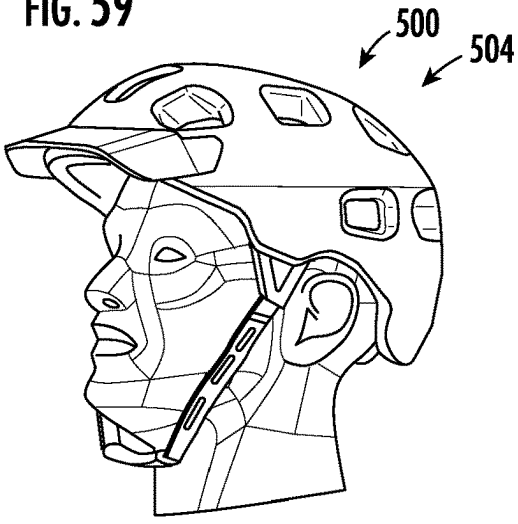

FIG. 61

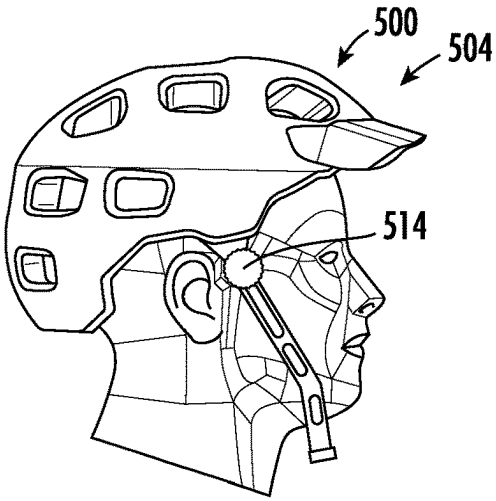

FIG. 62

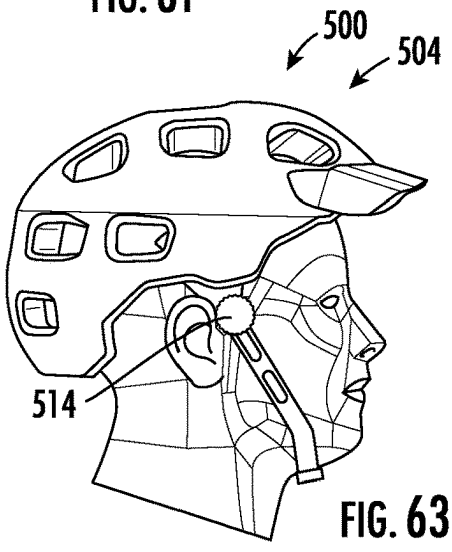

FIG. 63

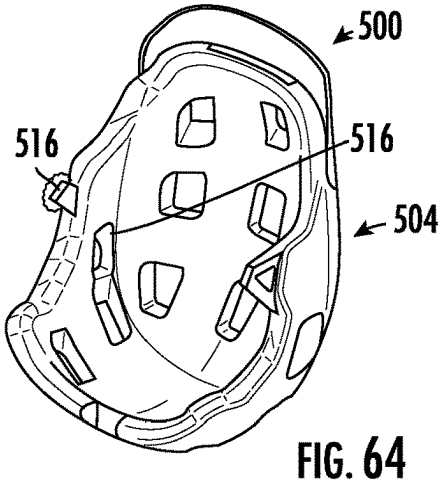

FIG. 64

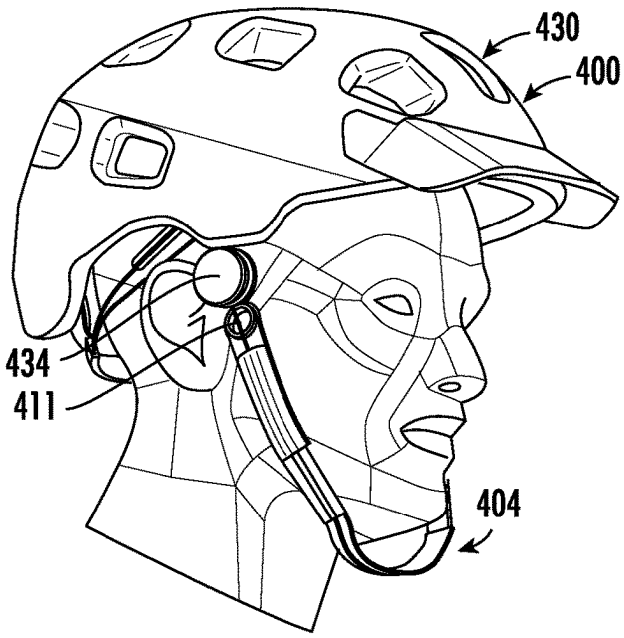

FIG. 65

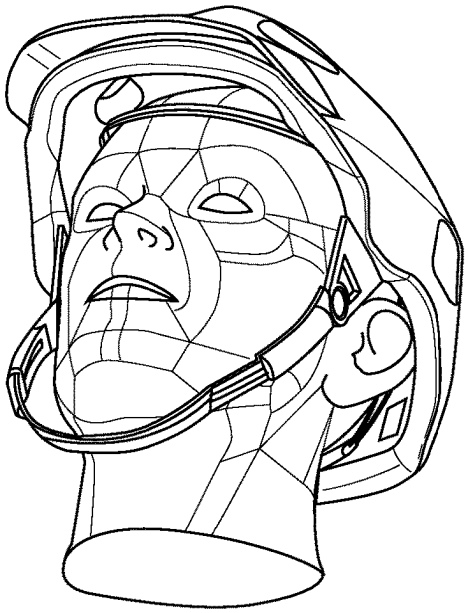

FIG. 66

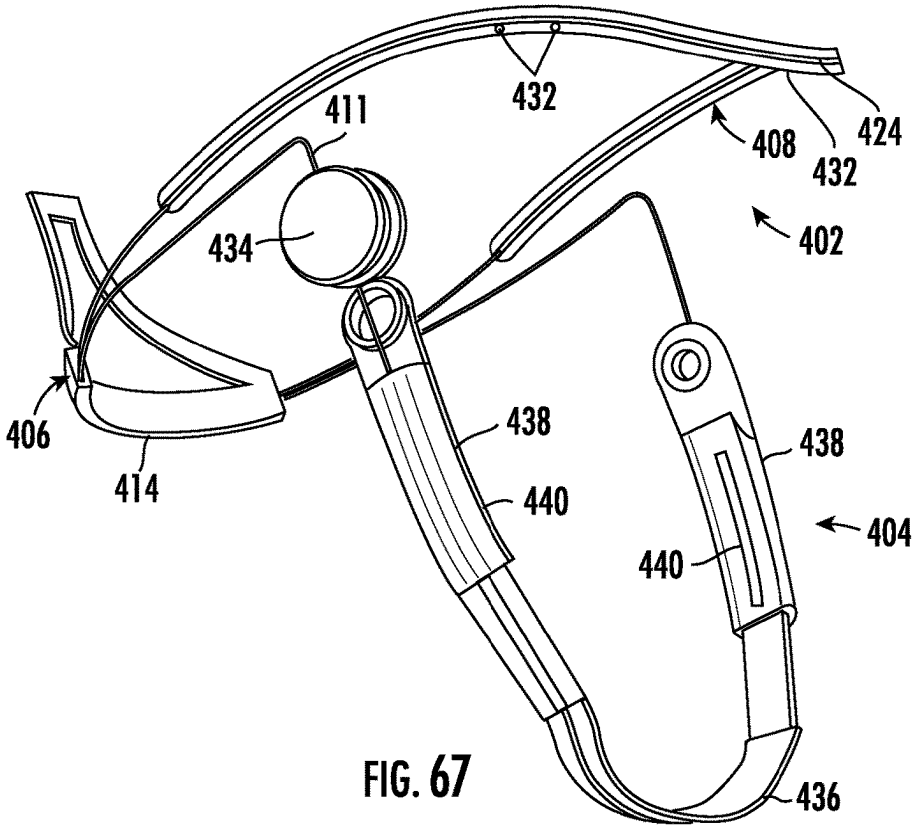

FIG. 67

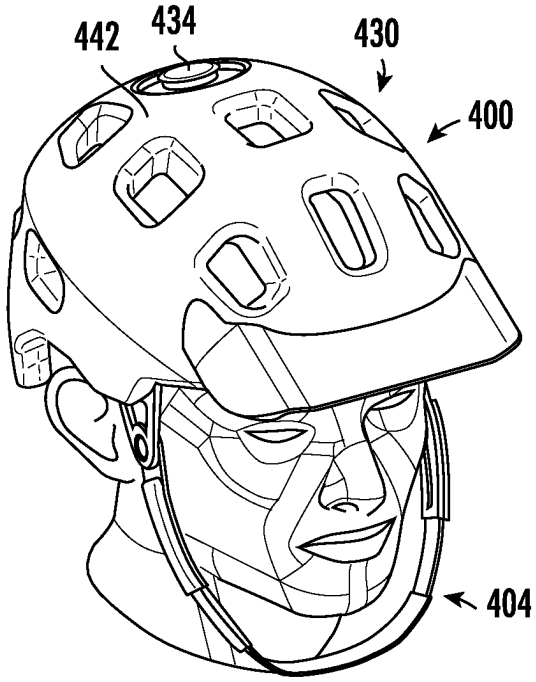

FIG. 68

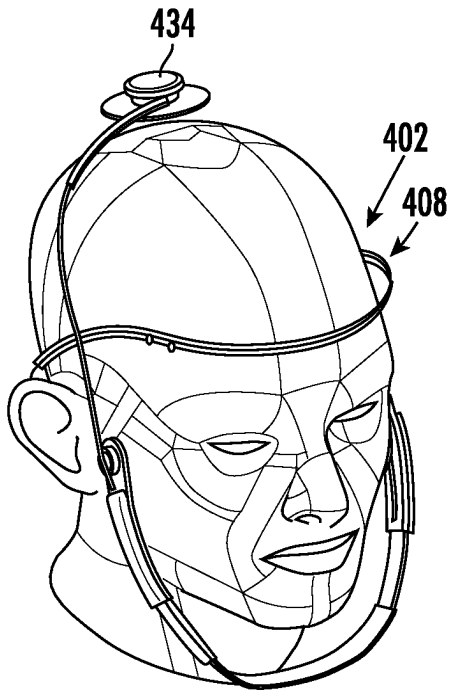

FIG. 69

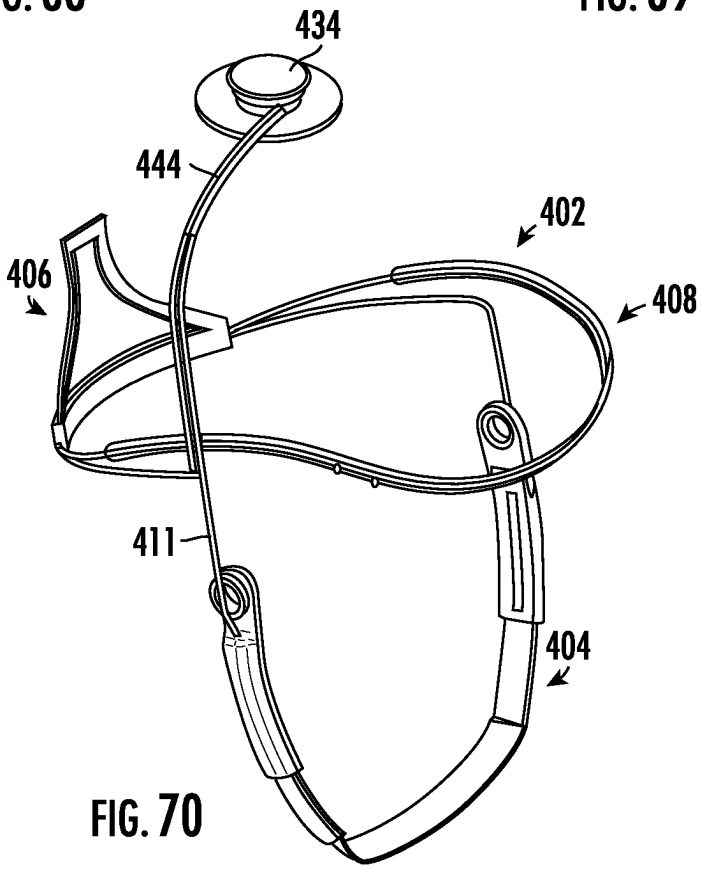

FIG. 70

HELMET AND CHIN STRAP

CROSS-REFERENCE TO RELATED APPLICATIONS

This application claims the benefit of U.S. Provisional Application Ser. No. 63/491,666 filed Mar. 22, 2023, the contents of which are expressly incorporated herein by reference.

STATEMENT RE: FEDERALLY SPONSORED RESEARCH/DEVELOPMENT

Not Applicable

BACKGROUND

1. Technical Field

The present disclosure generally relates to an improved retention system for a helmet. More specifically, the present disclosure relates to an easily adjustable chin strap apparatus for a helmet.

2. Related Art

Safety helmets are well known and may be worn when participating in a wide variety of activities, including but not limited to, many different areas of recreation, transportation, military, and construction. For example, helmets are typically worn while cycling, snowboarding and skiing, skateboarding, rock climbing, football, baseball, field hockey, ice hockey, horse riding, scooter and motorcycle riding, on battle fields, and on construction sites, to name a few. One aspect that nearly every conventional helmet has in common is one or more flexible webbing straps that connect under the user's chin to help keep the helmet in place on the wearer's head.

Conventional safety helmets typically worn by users participating in activities requiring head protection, such as for example cyclists, may include a domed-shaped body in various sizes and shapes. Fastening chin straps may be required to retain the helmet more securely in position on the wearer's head. The chin straps may include flexible webbing and a buckle to form a helmet retention system which may be mounted to the helmet and extend under the chin of the helmet wearer during use. In many helmets, one strap may be connected to the helmet behind each of the user's cars and another strap may be connected to the helmet in front of each of the user's cars. On each side, these straps may be connected together to effectively form a single strap. The two single straps may be adjustable in length to achieve a tight fit under the user's chin.

Helmet chin straps assist in maintaining the helmet securely attached to the wearer's head. Indeed, not only do they minimize the occurrences of vertical movement of the helmet being projected off of the wearer's head, but they also generally help to minimize the occurrences where the helmet is pivoted off of or out of position on the front or rear portion of the wearer's head, exposing vulnerable parts of the user's head to impact.

These straps are typically difficult to adjust properly, and thus, many users wear helmets that are improperly adjusted, which may mitigate the effectiveness of the safety helmet. For example, it may be difficult to adjust the straps so that on a given side of the helmet, the straps are symmetrical from where the straps intersect under the user's cars. Further difficulty may be associated with adjusting the straps such that all of the straps are taut when the buckle is connected.

While conventional helmets may meet certain safety standards when the straps are adjusted correctly, very few users actually use their helmets in a correctly adjusted configuration. Also, many user's make necessary adjustments to the straps while the helmet is off the user's head, which may result in the process being completed by trial and error. Typically, even with several adjustment attempts, when the buckle is connected, at least one of the straps (e.g., in front of or in back of cars) will be loose, which could allow the helmet to become dislodged in the event of a crash. Furthermore, adjustment may be so cumbersome that few users are willing to adjust their chin strap to be as tight as it should be because a requisite level of tightness may not be comfortable and much of the time, the user may not be engaging in the most dangerous part of their activity which would require a tight strap. Therefore, most users end up wearing their helmet with the straps being uneven and too loose, even when they know they may engage in the most dangerous part of their activity. Undoubtedly, such improper fitting of conventional straps may cause a significant number of head trauma injuries, and in some cases, deaths.

When conventional straps are not adjusted properly, the straps may not always prevent undesirable pivotal movement of the helmet toward the front or rear of the wearer's head. This potential pivotal movement may result in exposing the back or front of the wearer's head, which may be hazardous especially during a multiple-impact fall.

For a helmet to properly protect a user's head, it is typically critical that the chin strap be properly adjusted. However, when properly adjusted, the snug chin strap may not be comfortable and so many users unbuckle their chin strap during times of use that are not as dangerous. For example, while riding a ski lift, a ski or snowboard helmet may not be necessary for safety and so many users will unbuckle their chin strap for the ski lift ride, and then buckle their chin strap prior to skiing. Understandably, users sometimes forget to buckle their straps, which is dangerous and could lead to their helmet falling off of their head.

Accordingly, there is a need in the art for a helmet retention system that is easy to adjust to a proper retention position, without creating discomfort to the user. Various aspects of the present disclosure address this particular need, as will be discussed in more detail below.

BRIEF SUMMARY

According to one embodiment, there is provided a helmet comprising a shell having a front portion, a rear portion, and a pair of lateral portions extending between the front portion and the rear portion. The shell is sized and configured to be placeable on the head of a user. The helmet additionally includes a chin strap having a pair of end portions and an intermediate portion located between the pair of end portions. The end portions are fixedly connected to respective ones of the pair of lateral portions of the shell so as to restrict movement of the end portions relative to the shell. The chin strap is flexible to facilitate placement of the chin strap around a chin of a user in connection with placement of the shell on the head of the user.

The shell and the chin strap may collectively define a continuous loop configured to remain intact while the shell is placed on the head of the user and the chin strap is placed around the chin of the user.

The chin strap may define a length as a distance along the chin strap between the end portions, with the chin strap being configured to facilitate selective adjustment of the length.

The chin strap and helmet may be configured such that when the helmet is worn by the user the pair of end portions extend adjacent only one side of a respective one of a pair of cars of the user.

The shell may include a main body having a lower peripheral edge, and a pair of strap mounts coupled to the main body in spaced relation to each other and extending from the lower peripheral edge. The pair of end portions of the strap may be fixedly connected to respective ones of the pair of strap mounts. Each strap mount may be detachably connected to the main body. The strap may include a pair of segments, with each segment being connected to a respective one of the pair of strap mounts and the segments being configured to be detachably engageable with each other. Each segment may include a portion fabricated from woven material. The helmet may also include a pair of connectors coupled to respective ones of the pair of segments. The pair of connectors may be cooperatively engageable with each other to facilitate connection of the pair of segments together.

The shell may include a mouth-guard portion extending below the front portion and between the pair of lateral portions.

The chin strap may have internal strength to retain a prescribed shape unless acted on by an outside force that is above a desired magnitude.

According to another embodiment, there is provided a helmet comprising a shell having a front portion, a rear portion, a pair of lateral portions extending between the front portion and the rear portion, and a pair of strap attachment portions located at respective ones of the pair of lateral portions. The shell is sized and configured to be placeable on the head of a user. The helmet additionally includes a chin strap having a pair of end portions and an intermediate portion located between the pair of end portions. At least one of the pair of end portions is fixedly connected to a respective one of the pair of strap attachment portions so as to restrict movement at least one of the pair of end portions relative to the shell.

The helmet may include a pair of connectors configured to be engageable with the strap, with the pair of connectors being detachably engageable with each other.

One of the pair of connectors may be connected to the strap and the other of the pair of connectors being connectable to the shell at the strap attachment portion.

The shell may include a main body having a lower peripheral edge, and a pair of strap mounts coupled to the main body in spaced relation to each other and extending from the lower peripheral edge, with the pair of strap mounts defining the pair of strap attachment portions. Each strap mount may be detachably connected to the main body.

According to another embodiment, there is provided a helmet comprising a shell sized and configured to be placeable on the head of a user. The helmet additionally includes a chin strap coupled to the shell, with the chin strap being formed from a semi-rigid material and having at least two segments moveable relative to each other. The chin strap includes two attachment portions, with the chin strap being connectable to the shell at the two attachment portions. The chin strap defines a length as the distance along the chin strap between the two attachment portions. The chin strap is configured to be selectively transitional between a lengthened configuration and a tightened configuration, with the length decreasing as the chin strap transitions from the lengthened configuration toward the tightened configuration.

The helmet may include a spring coupled to the segments to bias the chin strap toward the lengthened configuration. The helmet may also include a cable extending between the segments to facilitate movement of the segments relative to each other. The cable may be configured to facilitate application of a force to two segments that overcomes the spring to transition the two segments toward the tightened configuration.

The helmet may also include a dial coupled to the cable to facilitate movement of the cable relative to at least one of the segments. The dial may be coupled to the shell or coupled to the chin strap.

The chin strap may include a pair of lateral segments and a center segment extending between the pair of lateral segments and being moveable relative to lateral segments.

The chin strap may be fixedly coupled to the shell at one of the two attachment portions, and moveably coupled to the shell at the other one of the two attachment portions. The chin strap may include a toothed segment, with the helmet further comprising a dial engageable with the toothed segment to facilitate movement of the chin strap relative to the shell.

The chin strap may be pivotable relative to shell.

The shell may include a main body having a lower peripheral edge, and a pair of strap mounts coupled to the main body in spaced relation to each other and extending from the lower peripheral edge. The chin strap may be coupled to the shell at the pair of strap mounts.

According to another embodiment, there is provided a helmet comprising a shell sized and configured to be placeable on the head of a user. The helmet additionally includes a chin strap coupled to the shell, with the chin strap being formed from a semi-rigid material. The helmet further includes a head support coupled to the shell and having at least two support bodies. The head support is transitional being an expanded configuration and a retracted configuration, with portions of the at least two support bodies moving toward each other as the head support transitions from the expanded configuration to the retracted configuration.

The chin strap may be configured to be extendable between a lengthen configuration and a tightened configuration, with a length of the chin strap decreasing as the chins trap transitions from the lengthened configuration toward the tightened configuration. The chin strap and the head support may be operatively coupled to each other to facilitate simultaneous adjustment of both the chin strap and the head support. The helmet may additionally include a dial in operative communication with the chin strap and the head support to facilitate simultaneous adjustment of both the chin strap and the head support. The helmet may include a cable interconnecting the dial to the head support and the chin strap.

The head support may include a rear support member and a front support member operatively connected to the rear support member.

The presently contemplated embodiments will be best understood by reference to the following detailed description when read in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

These and other features and advantages of the various embodiments disclosed herein will be better understood with respect to the following description and drawings, in which:

FIG. **1** is a side view of a first embodiment of a helmet with non-pivotable chin strap located above a head of a user;

FIGS. **2-4** are side views of the helmet of FIG. **1** depicting placement of a helmet shell on the head of the wearer and flexing of the chin strap to avoid interference with the face of the user;

FIG. **5** is an upper perspective view of the helmet of FIG. **1** on the head of the user and the chin strap in a lengthened configuration;

FIG. **6** is a side view of the helmet of FIG. **1** on the head of the user and the chin strap in a tightened configuration;

FIGS. **7-12** illustrate sequential placement of the helmet of FIG. **1** on the head of the user without flexing the chin strap, and instead, by tilting the helmet rearwardly to angle the chin strap away from the face of the user;

FIGS. **13-19** illustrate sequential placement of a full-face helmet having a chin strap on a head of a user, wherein the helmet is rotated in a rearward direction to provide clearance between the chin strap and the face of the user;

FIGS. **20-25** illustrate sequential placement of the full-face helmet of FIGS. **13-19** on the head of the user, wherein the chin strap is flexed to provide clearance between the chin strap and the face of the user;

FIG. **26** is a perspective view of another embodiment of a helmet having a pair of webbing strap segments extending from respective strap mounts located below a lower edge of a helmet shell, the helmet being positioned above a head of a user;

FIG. **27** is a perspective view of the helmet of FIG. **26**, with the helmet shell resting on the head of the user and the strap segments disconnected from each other;

FIG. **28** is a side view of the helmet of FIG. **27**;

FIG. **29** is a perspective view of the helmet of FIG. **27**, with the strap segments connected to each other;

FIG. **30** is a side view of the helmet of FIG. **29**;

FIG. **31** is an enlarged view of FIG. **29**;

FIG. **32** is an enlarged perspective view of the helmet of FIG. **31**, with the strap mount being disconnected from the helmet shell;

FIG. **33** is a perspective view of another embodiment of the helmet with a pair of webbing strap segments with a toothed buckle;

FIG. **34** is a perspective view of the helmet of FIG. **33**, with the helmet shell resting on the head of the user and the strap segments disconnected from each other;

FIG. **35** is a side view of the helmet of FIG. **34**;

FIG. **36** is a side view of the helmet of FIG. **35**, with the strap segments connected via the toothed buckle;

FIG. **37** is a perspective view of the helmet of FIG. **36**;

FIG. **38** is an enlarged perspective view depicting the toothed buckle included in the helmet of FIG. **37**;

FIG. **39** is a perspective view of another embodiment of a helmet having a strap connected to one strap mount, and a strap connector connected to another strap mount, with the strap being disconnected to the strap connector;

FIG. **40** is a perspective view of the helmet of FIG. **39**;

FIG. **41** is a perspective view of the helmet of FIG. **39**, with the strap connected to the strap connector;

FIG. **42** is a side view of the helmet of FIG. **41**;

FIG. **43** is a first side perspective view of a helmet having a cable-type chin strap adjuster;

FIG. **44** is a second side perspective view of the helmet of FIG. **43** with the chin strap being tightened;

FIG. **45** is a front upper perspective view of the cable-type chin strap adjuster included in the helmet of FIG. **43**;

FIG. **46** is a rear upper perspective view of the cable-type chin strap adjuster included in the helmet of FIG. **43**;

FIG. **47** is an enlarged lower perspective view of the cable-type chin strap adjuster;

FIG. **48** is a front upper perspective view of the cable-type chin strap adjuster;

FIG. **49** is a front upper perspective sectional view of the cable-type chin strap adjuster of FIG. **48**;

FIG. **50** is an exploded upper perspective view of the cable-type chin strap adjuster;

FIG. **51** is a perspective view of an embodiment of the helmet having a cable-type chin strap adjuster with an adjustment dial located on the chin strap;

FIG. **52** is a lower perspective view of the helmet depicted in FIG. **51**;

FIG. **53** is a lower perspective view of the cable-type chin strap adjuster having the adjustment dial located on the chin strap;

FIG. **54** is a lower perspective view of a helmet on a user, with the helmet having a cable-type head and chin strap adjuster;

FIG. **55** is a lower perspective view of the helmet of FIG. **54**;

FIG. **56** is a first lower perspective view of the cable-type head and chin strap adjuster included in the helmet of FIG. **54**;

FIG. **57** is a second lower perspective view of the cable-type head and chin strap adjuster included in the helmet of FIG. **54**;

FIG. **58** is a lower perspective view of the helmet of FIG. **54** on the user, with perspective of FIG. **58** being different from the perspective depicted in FIG. **54**;

FIG. **59** is a front view of a helmet having a rack and pinion type chin strap adjuster;

FIG. **60** is a first side perspective view of the helmet depicted in FIG. **59**;

FIG. **61** is a second side perspective view of the helmet depicted in FIG. **59**;

FIG. **62** is a side view of the helmet depicted in FIG. **59**, with the chin strap being in a lengthened configuration;

FIG. **63** is a side view of the helmet depicted in FIG. **59**, with the chin strap being in a tightened configuration;

FIG. **64** is a lower perspective view of a helmet depicted in FIG. **59**, with the chin strap having been removed;

FIG. **65** is a first perspective view of a helmet on the head of a user, the helmet having a cable-type head and chin strap adjuster having a dial located on a strap mount;

FIG. **66** is a second perspective view of the helmet of FIG. **65** on the head of the user;

FIG. **67** is a perspective view of the cable-type head and chin strap adjuster used on the helmet of FIG. **65**;

FIG. **68** is an upper perspective view of a helmet on the head of a user, the helmet having a cable-type head and chin strap adjuster having a dial located on a helmet shell;

FIG. **69** is an upper perspective view of the cable-type head and chin strap adjuster of FIG. **68** on the head of the user, with the helmet shell having been removed; and

FIG. **70** is an upper perspective view of the cable-type head and chin strap adjuster of FIG. **68**.

Common reference numerals are used throughout the drawings and the detailed description to indicate the same elements.

DETAILED DESCRIPTION

The detailed description set forth below in connection with the appended drawings is intended as a description of certain embodiments of a retention mechanism for a helmet and is not intended to represent the only forms that may be

developed or utilized. The description sets forth the various structure and/or functions in connection with the illustrated embodiments, but it is to be understood, however, that the same or equivalent structure and/or functions may be accomplished by different embodiments that are also intended to be encompassed within the scope of the present disclosure. It is further understood that the use of relational terms such as first and second, and the like are used solely to distinguish one entity from another without necessarily requiring or implying any actual such relationship or order between such entities.

Referring now to the drawings, wherein the drawings are for purposes of illustrating a preferred embodiment of the present invention only, and are not for purposes of limiting the same, FIGS. **1-12** depict a first embodiment of a helmet **10** having an easy-to-use, comfortable chin strap **12**. The helmet **10** generally includes a shell **14** coupled to the chin strap **12**, with the shell **14** including a main body **16** and a pair of strap mounts **18** coupled to the main body **16**. The main body **16** includes an inner surface defining a cavity sized to receive at least a portion of the head of the user. An exposed outer surface is opposite the inner surface and one or more openings **20** may extend between the inner and outer surfaces to enhance ventilation and reduce the overall weight of the helmet **10**. The main body **16** may also include a front portion, a crown portion, a rear portion, and a pair of lateral portions extending between the front and rear portions and below the crown portion. The main body **16** further includes a lower peripheral edge **22** extending around the main body **16** across the front portion, the lateral portions and the rear portion. The main body **16** may be sized such that the lower peripheral edge **22** extends over the user's forehead, across the user's temples, over and around the user's ears, and across the back of the user's head, slightly above where the user's head connects with the user's neck. In this regard, the lower peripheral edge **22** may be non-linear to correspond to the anatomy of the wearer. The main body **16** may be fabricated from foam, plastic, or other materials known in the art, which may be lightweight, but also capable of absorbing impacts to protect the user's head.

The pair of strap mounts **18** may be connected to the main body **16** and may extend from the main body **16** below the lower peripheral edge **22** from the area where the strap mounts **18** extend. In this regard, other portions of the lower peripheral edge **22** may extend below the strap mounts **18**, particularly at the rear portion of the helmet **10**. However, the strap mounts **18** extend below the lower peripheral edge **22** at the lateral portions of the helmet **10**.

The strap mounts **18** are arranged on opposite sides of the main body **16** in generally opposed relation to each other. When the helmet **10** is worn, the strap mounts **18** may be located in front of the user's ears in general proximity to where sideburns may extend on a wearer. In one embodiment, the strap mounts **18** include a tapered configuration, with a wider portion adjacent the main body **16** to provide for a more robust interconnection between the strap mounts **18** and the main body **16**, and a narrower portion extending away from the main body **16**. In the example depicted in FIGS. **1-12**, the strap mounts **18** are of a generally triangular configuration, with the apex of the triangle pointing away from the main body **16**. The strap mount **18** depicted in FIGS. **1-12** includes a forward edge that includes two linear segments angularly offset from each other, with a distal-most segment being angled to correspond to the attachment of the chin strap **12** thereto, as will be described in more detail below.

The helmet **10** may additionally include a visor **24** defining a pocket recess. For more information regarding the visor and potential uses thereof, please refer to U.S. Pat. No. 11,089,831, entitled INCREMENTALLY ADJUSTABLE AND PIVOTABLE SEMI-RIGID RETENTION STRAP FOR A HELMET, the contents of which are expressly incorporated herein by reference.

The chin strap **12** may include a pair of strap arms **26**, each having a respective upper end portion configured to be fixedly attached to the strap mounts **18**. According to one embodiment, each strap arm **26** may be made from a semi-rigid material, such as injection molded Nylon, Pebax®, or other equivalent materials known in the art capable of being flexed. In this regard, at least the strap arms **26** may be disposable in both tension and compression. Thus, the strap arms **26** differ from conventional woven chin straps, which are generally incapable of being disposed in compression. The strap arms **26** may be attached to the strap mounts **18** via adhesives, rivets, or other mechanical fasteners in the art. It is also contemplated that the strap arms **26** and the strap mounts **18** may be molded together, with each strap arm **26** and strap mount **18** forming a single integral structure, although the thickness of the strap arm **26** may be less than that of the strap mount **18** to allow for greater flexibility of the strap arm **26**.

The lower end portions of the strap arms **26** may be connected via a twist adjustment mechanism **28** with a twisting adjustment knob **30**, and a pad **32**. In more detail, lower end portions of the strap arms **26** may be coupled to the twist adjustment mechanism **28** in a manner which allows for movement of the lower end portions of the strap arms **26** relative to each other. Turning of the twisting adjustment knob **30** in a first direction may move the lower end portions of the strap arms **26** toward each other to facilitate selective tightening of the chin strap **12**, while turning of the twisting adjustment knob **30** in an opposite second direction may move the lower end portions of the strap arms **26** away from each other to facilitate selective lengthening of the chin strap **12**.

The upper end portions of the chin strap **12** may be fixedly connected (e.g., non-pivotally connected) to the strap mounts **18** such that at least one point or area on the upper end portions of the chin strap **12** remains fixed relative to the strap mounts **18**, while the remainder of the strap arms **26** may be flexed relative to the strap mount **18**. In this respect, a pivoting joint may not be required between strap mount **18** and the chin strap **12**, which may allow for reduced manufacturing costs relative to pivoting chin strap embodiments. The upper end portions of the strap arms **26** may be fixed to the strap mounts **18** via a rivet, adhesive, or with other fixed attachment mechanisms known by those skilled in the art. It is also contemplated that the strap arms **26** may be molded as part of the strap mount **18**, and thus, may form a single, integrated unit.

The fixed connection between the chin strap **12** and the shell **14** results in the chin strap **12** and shell **14** defining a continuous loop that remains intact during use of the helmet **10**. The shell **14** defines an upper portion of the loop while the chin strap **12** defines a lower portion of the loop. The continuous loop configuration is a departure from conventional helmets that include a buckle connector in the middle of the strap that is disconnected to break the loop when removing the helmet from the user's head.

According to one embodiment, the location of the attachment point between the chin strap **12** and the shell **14** falls within an attachment zone **36**, which may be strategically positioned to cause the chin strap **12** to tighten when the

shell **14** is rotated forwards or backwards so that helmet **10** stays firmly on the user's head. For more information regarding the attachment zone **36** (also referred to as a location zone), please refer to U.S. Pat. No. 11,089,831, entitled INCREMENTALLY ADJUSTABLE AND PIVOTABLE SEMI-RIGID RETENTION STRAP FOR A HELMET, the contents of which are expressly incorporated herein by reference.

Furthermore, the configuration of the chin strap **12**, the strap mounts **18** and the main body **16** allows for the chin strap **12** to extend adjacent only one side of the user's ear, i.e., in front of the user's ear, without having to extend adjacent both sides of the user's ear. This is a significant departure from conventional chin straps, which typically include two segments that extend in front of the user's ear, as well as behind the user's ear, which creates complications when adjusting, and may also result in discomfort during use.

FIGS. **1-6** depict sequential placement of the helmet **10** on the user's head. As shown in FIG. **1**, the main body **16** of shell **14** is oriented with the visor **24** pointing forward, and the top of the crown defining a tangential plane that is generally horizontal. The chin strap **12** extends downwardly from the main body **16** toward the head of the user. The user then urges the chin strap **12** forwardly and upwardly in the direction of arrow **34** shown in FIG. **1** to provide sufficient clearance. The chin strap **12** is flexed by a certain amount to provide sufficient clearance around the user's face, particularly around the user's nose. FIG. **1** shows the chin strap **12** in a neutral state, while FIG. **2** shows the chin strap **12** in a flexed state, wherein the lower end of the chin strap **12** has been flexed upwardly and forwardly toward the visor **24** or front portion of the shell **14**. When in the flexed state, a forward edge of the chin strap **12** may be disposed in compression, while an opposing rearward edge of the chin strap **12** may be disposed in tension.

While the chin strap **12** is flexed, the main body **16** of the shell **14** is lowered onto the user's head, as can be seen in FIGS. **2-4**. Once the main body **16** is resting on the user's head, the strap **12** may be carefully released to allow the strap **12** to return to its neutral position, which will cause the strap **12** to extend under the user's chin. The strap **12** may have material characteristics which result in the strap **12** being biased toward the neutral position due to an internal biasing force. Once the strap **12** is in the neutral position under the user's chin, the chin strap **12** may be tightened using the adjustment knob **30**, as described above.

Referring now to FIGS. **7-12**, there is depicted another technique for placement of the helmet **10** on the user's head without flexing the chin strap **12**. In this regard, the technique depicted in FIGS. **7-12** may allow for use of a chin strap **12** that is more rigid than the chin strap **12** used for placement on the user's head in the manner depicted in FIGS. **1-6**. As shown in FIG. **7**, the main body **16** of shell **14** is oriented with the visor **24** pointing upwardly, and the top of the crown defining a tangential plane that is angled upwardly, preferably between 5°-65° relative to the horizontal. Angling the main body **16** in this manner aligns the opening defined by the chin strap **12** and the main body **16** with the user's head, with the chin strap **12** extending forwardly in front of the user's face so as to avoid contact with the user's face. The main body **16** of the shell **14** is then lowered toward the user's head, with the helmet **10** maintaining the angled configuration, as shown in FIGS. **8-10**. Once the helmet **10** is placed on the user's head, the helmet **10** may be rotated to bring the chin strap **12** under the user's chin, as can be seen in FIGS. **10-12**.

Referring now to FIGS. **13-25**, there is depicted another embodiment of a helmet **110** including a full-face shell **114**. The helmet **110** includes a chin strap **112** coupled to the full-face shell **114** via rivets **115**, or other mechanical attachment mechanisms known in the art. The chin strap **112** is similar to the chin strap **12** described above. In this regard, the primary distinction between the embodiment depicted in FIGS. **13-25** and the embodiment depicted in FIG. **1-12** is the configuration of the shell **114**. The full-face shell **114** includes a front portion, a crown portion, a rear portion, and a pair of lateral portions extending between the front and rear portions and below the crown portion. The full-face shell **114** also includes a lower face guard **116** (e.g., mouthguard portion) extending from one lateral portion of the shell **114** to another lateral portion of the shell **114** opposite the rear portion. When the helmet **110** is worn by the user, the lower face guard **116** extends over the mouth of the user.

The helmet **110** shown in FIGS. **13-25** may be placed on the user in the same manner as the helmet **10** depicted in FIGS. **1-12**. In other words, the helmet **110** may be placed on the user's head by tilting the helmet **110**, as shown in FIG. **13-19**, or by flexing the chin strap **112**, as shown in FIGS. **20-25**.

Referring now to FIGS. **26-30**, there is depicted another embodiment of the helmet **210** having a shell **214** and a chin strap **212** formed from a woven or webbing material, such as woven Nylon or other woven/webbing materials known in the art. The shell **214** is similar to the shell **14** discussed above, and thus, the following discussion will focus on the unique attributes of the chin strap **212**.

The chin strap **212** includes a first segment **216** having a fixed end portion **218** fixedly coupled to a first one of the strap mounts **220** and a second segment **222** having a fixed end portion **224** fixedly attached to a second strap mount **220**. The straps segments **216**, **222** may be attached to the respective strap mounts **220**, such as via sewing, welding, adhesives, hooks and loops fasteners (e.g., VELCRO™), or the like.

Each of the first and second segments **216**, **222** may additionally include a free end portion **226**, **228** opposite the fixed end portion **218**, **224**. Each free end portion **226**, **228** may be coupled to a strap connector **230**, **232**, such that the strap connector **230** on the first segment **216** is cooperatively engageable with the strap connector **232** on the second segment **222**. In one embodiment, the first and second strap connectors **230**, **232** may be cooperatively engageable male and female buckles.

The length of the chin strap **212** may be defined as the distance along the strap **212** between the attachment portions of the strap mounts **220** when the first and second segments **216**, **222** are coupled to each other via the strap connectors **230**, **232**. The strap connectors **230**, **232** may be slidably connected to their respective strap segments **216**, **222** to selectively increase or decrease the strap length.

The location where the strap segments **216**, **222** attach to the respective strap mounts **220** may fall within a respective attachment zone **234**, which is similar to the attachment zone **36** discussed above. In this regard, the attachment zone **234** is located such that the chin strap **212** is pulled tighter, or is disposed in tension, or increased tension, as the helmet **210** slides fore or aft on the user's head to inhibit the helmet **210** from being displaced from the user's head, or moved to a position which is no longer suitable for effectively protecting the user's head. The position of the attachment zone **234** allows each of the strap segments **216**, **222** to extend only in front of the user's ear, without having any portion extending behind the user's ear. Thus, adjustment of the strap does not

require adjustment of strap portions on both sides of the user's ears. Furthermore, the location of the attachment zone **234** allows the strap **212** to secure the shell **214** to the user's head, while also preventing significant pivoting of the shell **214** during use. As such, when the strap **212** is properly tightened to the user, the shell **214** may provide protection to the front, back, and sides of the user's head.

Referring now to FIGS. **31** and **32**, it is contemplated that one or both of the strap mounts **220** may be detachably connectable to the main body **236** of the shell **214**. In this regard, the main body **236** may include a slot **238** that receives a corresponding fin **240** located on the detachable strap mount **220**. Of course, the structure may be reversed, with the fin **240** extending from the main body **236** and the slot **238** is formed on the strap mount **220**. In either case, the strap mount **220** and the main body **236** may include detachable engagement features that allow for selective attachment and detachment of the strap mount **220** relative to the main body **236** of the shell **214**. The detachable engagement features (e.g., the fin **240** and corresponding slot **238**) may be configured to facilitate sufficient engagement strength therebetween when the features are coupled to each other to prevent inadvertent detachment of the strap mount **220** from the main body **236** of the shell **214**. For instance, the axis along which the fin **240** is received in the corresponding slot **238** may be offset from the angle at which the chin strap **212** is tensioned during normal use of the helmet **210** to prevent the tension from inadvertently pulling the strap mount **220** out of engagement with the main body **236** of the shell **214**.

Referring now to FIGS. **33-38**, there is depicted another implementation of chin strap connectors **250**, **252** that may be used to secure the first and second segments **216**, **222** to each other. The chin strap connectors **250**, **252** include a ratchet-style buckle, with an elongate strip **254** having a plurality of teeth or serrations **256** that that is engageable with catch member **258**, similar to the buckles used on conventional ski boots. In this regard, the length of the chin strap **212** may be adjusted by selectively adjusting the amount of the toothed strip **254** that is received within the catch member **258**. The elongate nature of the strip **254** may accommodate length adjustability. In this regard, the chin strap length becomes shorter as more of the toothed strip **254** is advanced through the catch member **258**, and conversely, the chin strap length is longer when more of the toothed strip **254** is not advanced through the catch member **258**.

Referring now to FIGS. **39-42** illustrate another embodiment of the strap **270** and buckle **272**, wherein the strap **270** includes a single strip of webbing material having one end portion coupled to a strap mount **220** and another end portion coupled to a strap connector **274**. The other strap mount **220** is connected to the corresponding strap connector **276**. In this regard, a key aspect of the embodiment depicted in FIGS. **39-42** is that the chin strap may include a single segment (as shown in FIG. **39-42**), or multiple segments (as shown in FIGS. **26-33**), and that the one of the strap connectors may be attached directly to the strap mount **220**.

Referring now to FIGS. **43-50**, there is depicted another embodiment of a helmet **300** having a chin strap **302** which utilizes a filament or cable **304** to facilitate selective length adjustment of the chin strap **302**. In more detail, the helmet **300** includes a shell **306** having a main body **308** and a pair of strap mounts **310**, as described in more detail above. The chin strap **302** includes a pair of lateral segments **312** and an intermediate segment **314** extending between the pair of lateral segments **312**. Each lateral segment **312** includes an attachment portion **316** that is connected to a respective strap mount **310**. In the exemplary embodiment depicted in FIGS. **43-50**, each attachment portion **316** may include an opening **318** formed at an end portion of the lateral segment **312**. A boss **320** may extend around the opening **318** to facilitate engagement between the lateral segment **312** and the strap mount **310**. The strap mounts **310** may include corresponding openings, which may be aligned with the openings **318** on the lateral segments **312** to facilitate engagement between the lateral segments **312** and the strap mounts **310**. It is contemplated that the chin strap **302** may be configured to pivot relative to the strap mounts **310** between a lowered position under the user's chin, and a raised position, above the user's eyes, and tucked under the visor. However, it is understood that the scope of the present disclosure also includes a chin strap **302** that does not pivot relative to the strap mounts **310**. Furthermore, it is contemplated that some embodiments of the helmet may include a visor, while other embodiments may not include a visor.

At least one, and preferably both, lateral segments **312** may also be configured to move relative to the intermediate segment **314** to facilitate overall length adjustment of the chin strap **302**. Each lateral segment **312** may include a guide to direct movement of the intermediate segment **314** relative to the lateral segment **312**. In the embodiment depicted in FIGS. **43-50**, the guide includes a channel **322** formed in the lateral segment **312**. In more detail, each lateral segment **312** may include an inner surface **324**, an outer surface **326**, an end face **328**, with the guide channel **322** extending from the end face **328** into the lateral segment **312** between the inner and outer surfaces **324**, **326**. The guide channel **322** may be shaped to include a portion that is complementary to the configuration of the intermediate segment **314**. The guide channel **322** may also be configured to accommodate a spring **330**, which may be received within the guide channel **322** and may act on the lateral segment **312** and the intermediate segment **314** to bias the intermediate segment **314** toward a lengthened configuration, as will be explained in more detail below.

The intermediate segment **314** includes a pair of end portions **332** and a middle portion **334** extending between the end portions **332**. The intermediate segment **314** may also include an inner surface and an outer surface. Each end portion **332** is configured to be translatably received within a respective guide channel **322**, and may include a pair of opposed edges and a cable guide **336** extending longitudinally along the end portion **332** between the pair of edges. In one embodiment, the cable guide **336** is a cylindrical structure extending outwardly from the outer surface. The middle portion **334** may include a curvature to accommodate the natural contours of a user's chin.

Although the exemplary embodiment shows a channel **322** formed in the lateral segment **312**, within which the intermediate segment **314** may move, it is contemplated that the opposite configuration may also be used. In particular, the intermediate segment **314** may include one or more channels, within which the lateral segments **312** may move.

The lateral segments **312** and intermediate segment **314** may be formed from a semi-rigid material, such as a molded plastic, other polymers, rubber, or other materials known in the art. The semi-rigid nature of the material refers to the ability of the material to independently retain its shape, while also having the ability to be slightly flexed in response to a certain amount of force being applied thereto.

The cable **304** may operatively interconnect the lateral segments **312** and the intermediate segment **314** to facilitate selective positioning of the intermediate segment **314** relative to the lateral segments **312**. The cable **304** may include

one end **338** connected to a lateral segment **312** and another end connected to a dial **340**, as will be explained in more detail below. In the cross sectional views depicted in FIGS. **46** and **49**, the end **338** of the cable **304** is retained within a bore formed in the lateral segment **312** adjacent the opening **318**. The cable **304** may be coupled to the lateral segment **312** via an adhesive, a rivet, molding, or other mechanical fastening techniques known in the art. The cable **304** may also be routed into the guide channel **322** on one lateral segment, through a first cable guide **336** on the intermediate segment **314**, along an outer surface of the intermediate segment **314**, through a second cable guide **336** on the intermediate segment **314**, and through another guide channel **322** on another lateral segment **312**, and then to the dial **340**. The intermediate segment **314** may include a groove or other structure configured to retain the cable in place, adjacent the outer surface of the middle portion **334** of the intermediate segment **314**. The cable **304** may be string, nylon filament, braided cable, or other suitable material that bends easily and exhibits sufficient pull strength.

The chin strap **302** may define a length as the distance along the chin strap **302** between the two attachment portions **316**. In one embodiment, this measurement may be taken as a distance long the chin strap **302** between the axes about which the openings **318** are disposed. The chin strap **302** may be configured to be selectively transitional between a lengthened configuration and a tightened configuration, with the length decreasing as the chin strap **302** transitions from the lengthened configuration toward the tightened configuration, and the length increasing as the chin strap **302** transitions from the tightened configuration toward the lengthened configuration. In the embodiment depicted in FIGS. **43-50**, when the chin strap **302** transitions from the lengthened configured toward the tightened configuration the degree to which the intermediate segment **314** is exposed decreases, and when the chin strap **302** transitions from the tightened configuration toward the lengthened configuration, the degree to which the intermediate segment **314** is exposed increases. In one particular embodiment, the chin strap **302** may be biased toward the lengthened configuration by the spring(s) **330**, which may act on the lateral segments **312** and the intermediate segment **314** to push the lateral segments **312** away from the intermediate segment **314**. Each spring **330** may extend between a spring retaining post **335** extending a respective end of the intermediate segment **314**, and an abutment wall on a given lateral segment **312**. The springs **330** may be configured to push the retaining post **335** away from the abutment wall on the lateral segment **312**, which biases the chin strap **302** toward the lengthened configuration.

The user may be able to selectively transition the chin strap **302** between the lengthened configuration and the tightened configuration through the use of the cable **304**. In this regard, the cable **304** may be configured to facilitate application of a force to the segments **312**, **314** that overcomes the biasing force of the spring **330** to transition the segments **312**, **314** toward the tightened configuration. The dial **340** may be coupled to the cable **304** to facilitate movement of the cable **304** relative to at least one of the segments **312**, **314**. An effective length of the cable **304** may be defined as the distance along the cable **304** between the dial **340** and bore within which the cable **304** is mounted; or the distance between the dial **340** and the end **338** of the cable **304**.

The dial **340** may be mounted to the strap mount **310** via a dial connector **342** and may be operatively coupled to a reel about which the cable **304** may be wound during tightening of the chin strap **302**, and from which the cable **304** may be released during lengthening of the chin strap **302**. In one embodiment, the dial **340** is axially moveable relative to the strap mount **310** between a locked position and an unlocked position. In other words, the dial **340** may be pushed toward the shell **306** or pulled away from the shell **306** as it transitions between the locked and unlocked positions. When the dial **340** is in the unlocked position, the dial **340** may not restrict movement of the cable **340**, which allows the springs **330** to transition the chin strap **302** to its lengthened configuration. When the dial **340** is in the locked position, the dial **340** may restrict lengthening of the cable **302**, while allowing for shortening of the cable **302**. In this regard, the dial **340** may be allowed to rotate in a prescribed direction to allow for shortening of the cable **302** to selectively adjust the size of the chins strap **302**, so long as the dial **340** remains in the locked position. The chin strap **302** may remain in the tightened configuration until the user wants to lengthen the chin strap **302**, which may be done by moving the dial from the locked position toward the unlocked position. Once the dial **340** has been moved to the unlocked position, the springs **330** may urge the segments **312**, **314** away from each other to automatically transition the chin strap **302** to the lengthened configuration. In this regard, the chin strap **302** may not require rotation of the dial **340** to transition from the tightened configuration to the lengthened configuration. Rather, all that may be needed is to move the dial **340** from the locked position to unlocked position (e.g., pulling the dial **340** out, or pushing the dial **340** in).

In another embodiment, the dial **340** may be configured to be turned in opposite directions to facilitate either lengthening or shortening of the cable **304**.

It is contemplated that the dial **340** may be located at various locations on the helmet **300**, without departing from the spirit and scope of the present disclosure. As shown in FIGS. **43-44**, the dial **340** may be located on the shell **306**, and in particular, on a strap mount **310**. The shell **306** may have a curved edge **344** that extends around the dial **340** to accommodate placement and use of the dial **340**.

FIGS. **51-53** show an alternative placement of the dial **340** on the chin strap **302**. In particular, the dial **340** is shown as being attached to the intermediate segment **314**, although it is contemplated that the dial **340** may also be connected to the lateral segments **312** without departing from the spirit and scope of the present disclosure. In the exemplary embodiment depicted in FIGS. **51-53**, the dial **340** interfaces with two separate cables **303**, **305** that may be simultaneously extended or retracted to selectively adjust the length of the chin strap **302**. Each cable **303**, **305** may have one end portion **331**, **332** fixed to a respective lateral segment **312**, while the other end portion interfaces with the dial **340**. Thus, each cable **303**, **305** may be capable of moving a respective lateral segment **312** relative to the intermediate segment **314**. Each cable **303**, **305** may be configured to overcome the biasing force applied by the respective spring located within the corresponding lateral segment **312**. The use of two cables **303**, **305**, each connecting the dial **340** to the lateral segments **312** may result in simultaneous, equal, incremental adjustment of each lateral segment **312** relative to the intermediate segment **314**. Thus, the length of the chin strap **302** may be balanced, without one side being longer than the other.

While the exemplary embodiment includes a chin strap **302** including a pair of lateral segments **312** and an intermediate segment **314** (e.g., 3 segments in total), it is contemplated that in other embodiments, the chin strap **302** may

include only two segments that are moveable relative to each other to achieve desired length adjustability. In this regard, a cable may be coupled to one segment to facilitate movement of that segment relative to the other segment. A spring may act on the segments to allow for lengthening of the chin strap **302** when tension in the cable is relaxed.

Referring now to FIGS. **54-58**, there is depicted another embodiment of the helmet **400**, which includes an adjustable head support **402** for fitting the helmet **400** to the user's head. As will be described in more detail below, the head support **402** may be operatively coupled to the chin strap **404**, such that the user may be able to simultaneously adjust the head support **402** when the chin strap **404** is adjusted.

The head support **402** may include a rear support body **406** and a front support body **408** operatively coupled to each other via cables **410**, **412**. The rear support body **406** may include a rear circumferential segment **414** and a pair of vertical segments **416** that extend from opposite ends of the rear circumferential segment **414**. The rear circumferential segment **414** may include a channel formed therethrough to accommodate passage of the cables **410**, **412** through the rear circumferential segment **414** between two ends **418**, **420** of the rear circumferential segment **414**. The vertical segments **416** may be curved or arcuate and may be connected at the upper ends by an upper segment **422**.

The front support body **408** may be elongate and configured to extend around the front portion of the user's head, from one side of the user's head to the other side of the user's head. A central region **424** may be located between opposite end portions **426**, **428** of the front support body **408**, with the central region **424** being configured to extend over the user's forehead during use. Each end portion **426**, **428** may have an aperture formed therein to facilitate connection with a respective cable **410**, **412**, as will be described in more detail below.

The front support body **408** may be connected to the shell **430** via buttons **432** configured to be snap-engageable with corresponding receptacles formed on the shell **430**. The rear support body **406** may be coupled to the shell **430** via the operative connection between the front and rear support bodies **408**, **406**. In this regard, the connection between the front support body **408** facilitates operative engagement between the user's head and the shell **430**, and by adjusting the size of the head support **402**, the user may fit the helmet **400** to the size of the user's head.

As noted above, a pair of cables **410**, **412** may be used to facilitate selective adjustment of both the head support **402** and the chin strap **404**. A first cable **410** may extend from the dial **434** along a first side of the intermediate segment **436**, through a channel in a first lateral segment **438**, through a channel in the rear circumferential segment **414**, and then connect to the aperture formed on end portion **428** of the front support body **408**. In this regard, the lateral segment **438** through which the first cable **410** passes, and the end portion **428** of the front support body **408** are on opposite sides of the helmet **400**. A second cable **412** may extend from the dial **434** along a second side of the intermediate segment **436**, through a channel in a second lateral segment **438**, through the channel in the rear circumferential segment **414**, and then connect to the aperture formed on end portion **426** of the front support body **408**. In this regard, the lateral segment **438** through which the second cable **412** passes, and the end portion **426** of the front support body **408** are on opposite sides of the helmet **400**. The cables **410**, **412** may be extended or retracted to selectively adjust the size/circumference/peripheral dimension of the head support **402**. In particular, the head support **402** is configured to be transitional being an expanded configuration and a retracted configuration, with portions of the front and rear support bodies **408**, **406** moving toward each other as the head support **402** transitions from the expanded configuration to the retracted configuration, and portions of the front and rear support bodies **408**, **406** moving away from each other as the head support **402** transitions from the retracted configuration to the expanded configuration. In other words, an operative circumference collectively defined by the front and rear support bodies **408**, **406** may increase as the head support **402** transitions from the retracted configuration toward the expanded configuration. Conversely, the operative circumference may decrease as the head support **402** transitions from the expanded configuration toward the retracted configuration.

Due to the use of two cables **410**, **412**, as the cables **410**, **412** are tightened, both cables **410**, **412** pull the front support body **408** from the opposite ends thereof toward the rear support body **406**, until the head support **402** becomes tightened around the user's head to cause the springs **330** to compress. As the springs **330** compress, the chin strap **404** begins to tighten. Loosening the cables **410**, **412** causes the chin strap **404** to lengthen, which allows the springs to transition the chin strap **404** toward the expanded position, and then the head support **402** will begin to loosen. In this way, head support **402** remains tight to the user's head until the chin strap **404** is fully expanded due to the urging of the springs **330**. Effectively, helmet **400** includes a two-stage adjustment, with one stage of adjustment being associated with the head support **402** and a second stage of adjustment being associated with the chin strap **404**. In one embodiment, the head support **402** tightens first, with the chin strap **404** tightening second, and with regard to loosening, the chin strap **404** loosens first, with the head support **402** loosening second. In this regard, by allowing the chin strap **404** to loosen first, a user may loosen the chin strap **404** while maintaining the head support **402** in a tight-fitting configuration, which may be desirable while the user makes a temporary stop and wanting to remove the tightness of the chin strap **404** while continuing to wear the helmet.

Although two cables **410**, **412** are shown in FIGS. **54-58**, it is contemplated that in alternative embodiments, a single cable may be used. FIGS. **65-67** show an example of a single cable system. From the dial **434** shown in FIG. **67**, the cable **411** extends upwardly and is routed through a cable guide in the main body of the shell **430**, through the rear support **406**, through the front support **408**, through the rear support **406**, through another cable guide in the main body of the shell **430**, and then through/around the chin strap **404**.

The chin strap **404** and the head support **402** may be operatively coupled to each other to facilitate adjustment of both the chin strap **404** and the head support **402** through rotation of the dial **434**. In this regard, a single modality, e.g., the dial **434**, may facilitate adjustment of both the chin strap **404** and the head support **402**. When the user tightens chin strap **404** and head support **402**, the head support **402** may be tightened first due to the springs **440** in the chin strap **404**, and only after the head support **402** is somewhat tightened to the user's head does the chin strap **404** begin to tighten. Accordingly, the user may tighten and loosen the chin strap **404** without loosening the head support **402**, unless the chin strap **404** is at full length.

It is understood that other embodiments of the chin strap **404** may not have springs **440**. However, the springs **440** facilitate the two-stage tightening, wherein a first stage

entails tightening of the head support **402**, and then a subsequent second stage entails tightening of the chin strap **404**.

FIGS. **68-70** show another embodiment of the helmet **400** with the dial **434** located on the main body **442** of the shell **430**. The cable **411** may be routed through a guide **444** in the helmet shell **430**, as well as through the rear support **406**, the front support **408**, through the chin strap **404**, and back to the dial **434**.

The various embodiments depicted herein demonstrate that the dial may be integrated into any portion of the helmet, such as on the main body of the shell, on the strap mount, or on the chin strap. Furthermore, the helmet may include a single cable, or multiple cables, as may be desired. Moreover, although the exemplary embodiments, show a single dial for adjusting the head support and the chin strap, primarily to simplify use of the helmet, it is contemplated that other embodiments may include separate dials or adjustment mechanisms for the head support and the chin strap. In other words, the helmet may include two dials; one for adjusting the chin strap, and another for adjusting the head support.

It is also contemplated that one embodiment of the head support and chin strap may allow for automatic tightening adjustment to the user's head. For instance, the user may press a button (e.g., the dial), which may cause the device to automatically tighten the cables until the head support and the chin strap are snug on the user. A reel operatively connected to the cables may be biased in the direction which pulls the cables in, such that when the button is pushed, the bias on the reel pulls the cables in, which in turn, tightens the head support and chin strap. To loosen the chin strap and head support, the user may press and hold the button, while pulling on the chin strap to lengthen the chin strap. When the button is released, the reel may lock in place, to hold the extended position of the chin strap. The user may also be able to manually extend the head support, either by moving the helmet over the user's head or pulling on one of the head supports while pressing the button. The automatic tightening may also be facilitated through one or more small electronic motors which can automatically adjust the head support and chin strap as may be desired, e.g., either lengthening or tightening. For instance, the motors may be in operative communication with a controller which may be programmed to recognize a preferred loosened configuration as well as a preferred tightened configuration. Thus, the user may simply touch a button, which may cause the controller to facilitate adjustment to the preferred tightened position. Subsequent actuation of the button may cause the controller to facilitate adjustment to the preferred loosened position.

Referring now to FIGS. **59-64**, there is depicted another embodiment of the helmet **500** having a rack and pinion type adjustment mechanism for adjusting the length of chin strap **502**. In more detail, the chin strap **502** may be coupled to a shell **504** at strap mounts **506**, and may be formed of a single, integral body having a fixed end portion **508** and an adjustable end portion **510**. The fixed end portion **508** may be fixed to the strap mount **506**, and thus, may not move relative to the strap mount **508** during use of the chin strap **502**. The adjustable end portion **510** may include an elongate slot **512** formed therein. Teeth **515** are formed on the inner surface of the elongate slot **512**, which are configured to operatively engage with corresponding teeth on an adjustment knob/dial **514**. The chin strap **502** may define a length as the distance along the chin strap **502** between the dial **514** and the portion of the chin strap **502** fixedly connected to the strap mount **506**. The length may be adjusted by rotating the dial **514**, wherein rotation of the dial **514** in a first direction results in lengthening of the chin strap **502**, while rotation of the dial **514** in an opposing second direction results in tightening of the chin strap **502**. When the chin strap **502** is tightened, the portion of the strap **502** extending upwardly beyond the dial **514** increases. Thus, the strap mount **506** and the shell main body may include channels **516** formed therein, which may receive a portion of the chin strap **502** extending upwardly beyond the dial **514**. In this regard, that portion of the chin strap **502** may be shielded from the user's head for enhanced comfort.

When the chin strap **502** is sufficiently loosened, the helmet **500** may be placed on the user's head or removed from the user's head. Alternatively, the strap **502** may be designed to be disengaged from the shell to allow for helmet installation or removal.

A chin pad **518** may be coupled to the chin strap **502** and may be slidable along the chin strap **502** to facilitate centering of the chin pad **518** under the user's chin.

This disclosure provides exemplary embodiments of the present invention. The scope of the present invention is not limited by these exemplary embodiments. Numerous variations, whether explicitly provided for by the specification or implied by the specification, such as variations in structure, dimension, type of material and manufacturing process may be implemented by one of skill in the art in view of this disclosure.

What is claimed is:

1. A helmet comprising:

a shell including:

a main body having a front portion, a rear portion, a pair of lateral portions extending between the front portion and the rear portion, a crown portion extending between the front portion, the rear portion, and the pair of lateral portions, and a lower peripheral edge continuously circumnavigating the main body and extending along the front portion, the rear portion, and the pair of lateral portions, the shell being sized and configured to be placeable on the head of a user; and

a pair of strap mounts coupled to the main body and extending from respective ones of the pair of lateral portions of the main body beyond the lower peripheral edge in a direction away from the crown portion; and

a chin strap having a pair of end portions and an intermediate portion located between the pair of end portions, the end portions being irremovably connected to respective ones of the pair of strap mounts so as to restrict movement of the end portions relative to the strap mounts, the chin strap being flexible to facilitate placement of the chin strap around a chin of a user in connection with placement of the shell on the head of the user;

the chin strap, strap mounts, and shell being collectively configured such that the chin strap is configured to remain connected to the pair of strap mounts, and the strap mounts are configured to remain connected to the shell as the shell is placed on the head of the user and removed from the head of the user;

the pair of strap mounts being configured such that when the helmet is worn by the user, the pair strap mounts extend adjacent only a front side of a respective one of the pair of ears of the user.

2. The helmet recited in claim **1**, wherein the shell and the chin strap collectively define a continuous loop configured

to remain intact while the shell is placed on the head of the user and the chin strap is placed around the chin of the user.

3. The helmet recited in claim **1**, wherein the chin strap includes a first segment and a second segment and defines a length as a distance along the chin strap between the end portions, the chin strap being configured to facilitate selective adjustment of the length via movement of the first segment relative to the second segment at a location between the pair of strap mounts.

4. The helmet recited in claim **1**, wherein the chin strap and helmet are configured such that when the helmet is worn by the user the pair of end portions extend adjacent only the front side of a respective one of a pair of ears of the user.

5. The helmet recited in claim **1**, wherein each strap mount is of a tapered configuration such that the strap mount becomes narrower as the strap mount extends away from the main body when the strap mount is connected to the main body.

6. The helmet recited in claim **1**, wherein each strap mount is more rigid than the chin strap.

7. The helmet recited in claim **1**, wherein the chin strap is configured to retain an arcuate shape independent of external support.

8. A helmet sized for use on an intended user having a head of prescribed size, the helmet comprising:

a shell having:

a front portion;

a rear portion;

a crown portion between the front portion and the rear portion

a pair of lateral portions extending between the front portion and the rear portion;

a lower peripheral edge extending along the front portion, the rear portion, and the pair of lateral portions; and

a pair of strap mounts extending from respective ones of the pair of lateral portions beyond the lower peripheral edge in a direction away from the crown portion;

the shell being sized and configured to be placeable on the head of the intended user; and

a chin strap having a pair of end portions and an intermediate portion located between the pair of end portions, at least one of the pair of end portions being fixedly connected to a respective one of the pair of strap mounts so as to restrict movement of the at least one of the pair of end portions relative to the shell;

the chin strap, strap mounts, and shell being collectively configured such that the chin strap is configured to remain connected to the pair of strap mounts, and the strap mounts are configured to remain located at respective ones of the pair of lateral portions as the shell is placed on the head of the intended user and removed from the head of the intended user;

the pair of strap mounts being configured such that when the helmet is worn by the intended user, the pair strap mounts extend adjacent only a front side of a respective one of the pair of ears of the intended user.

9. The helmet recited in claim **8**, wherein the pair of strap mounts extend from the lower peripheral edge.

10. A helmet comprising:

a shell including:

a main body having a front portion, a rear portion, a pair of lateral portions extending between the front portion and the rear portion, and a lower peripheral edge extending along the front portion, the rear portion, and the pair of lateral portions, the lower peripheral edge including a pair of concave portions each being configured to extend around one ear of the user, the shell being sized and configured to be placeable on the head of a user; and

a pair of strap mounts coupled to the main body and extending from the main body beyond the lower peripheral edge, each strap mount being coupled to the shell at a location between a respective one of the pair of concave portions and the front portion of the shell, each strap mount being sized and configured to extend only in front of a respective ear of the user when the helmet is worn by the user; and

have a tapered configuration such that a width of the strap mount decreases as the strap mount extends away from the main body; and

a chin strap having a pair of end portions and an intermediate portion located between the pair of end portions, the end portions being connected to respective ones of the pair of strap mounts, the chin strap being formed independent of a detachable buckle;

the chin strap, strap mounts and shell being collectively configured such that the chin strap is configured to remain connected to the pair of strap mounts, as the shell is placed on the head of the user and removed from the head of the user.

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