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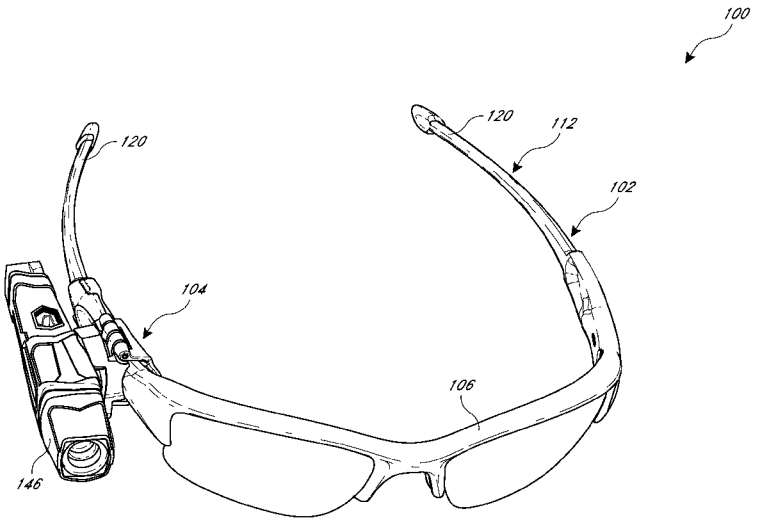

FIG. 28

(57) Abstract: This disclosure provides systems and methods for removably coupling an electronic device to eyewear. In one aspect, an eyeglass is provided. The eyeglass includes an eyeglass frame adapted to be carried by a head of a wearer, at least a first lens, and at least a first lens support portion of the eyeglass frame configured to position the at least first lens in a path of a field of view of a wearer. The eyeglass further includes an attachment device that comprises a first connector and a second connector, where the first connector removably couples the attachment device to the eyeglass frame, and an electronic device, where the second connector removably couples the electronic device to the attachment device.

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SYSTEMS AND METHODS FOR REMOVABLY COUPLING AN ELECTRONIC DEVICE TO EYEWEAR

BACKGROUND

Field

[0001] This disclosure generally relates to wearable headwear. Specifically, this disclosure relates to wearable headwear that includes removable electronic and/or mechanical devices.

Description of the Related Art

[0002] There are numerous situations in which it is convenient and preferable to mount electronic and/or mechanical devices so that they can be worn on the head of a user. Such devices can be used for portable entertainment, personal communications, making recordings, and the like.

[0003] However, with such mountable devices, whenever a user wants to wear glasses or sunglasses, the user must adjust or remove the devices from their ears. Further, it is often quite uncomfortable to wear both a mountable device and a pair of sunglasses at the same time. Such discomfort, when applied for a long period of time, can cause muscular pain and/or headaches. In addition, cables that may extend from the mountable device to other third party devices and the instability of simultaneously wearing eyewear and a mountable device can limit mobility of the wearer; particularly those participating in law enforcement activities. Thus, there exists a need for improved mountable electronic and/or mechanical devices for providing utility to a wearer.

SUMMARY

[0004] One aspect of the disclosure provides an eyeglass. The eyeglass includes an eyeglass frame adapted to be carried by a head of a wearer, at least a first lens, and at least a first lens support portion of the eyeglass frame configured to position the at least first lens in a path of a field of view of a wearer. The eyeglass further includes an attachment device that comprises a first connector and a second connector, where the first connector removably couples the attachment device to the eyeglass frame. The eyeglass further includes an electronic device, where the second connector removably couples the electronic device to the attachment device.

[0005] Another aspect of the disclosure provides a dual attachment member that includes an attachment device and an electronic device. The attachment device includes a first connector and a second connector, where the first connector removably couples the attachment device to a headwear apparatus. The second connector removably couples the electronic device to the attachment device.

[0006] Another aspect of the disclosure provides an implementation of a method for removably coupling an electronic device to eyewear. The method includes placing an attachment device against an inside end of a support member of an eyewear frame, where the attachment device comprises a first connector and where the inside end is an end of the support member closer to a wearer of the eyewear frame. The method further includes rotating a second plate of the first connector about a hinge of the first connector, where the hinge couples a first end of a first plate of the first connector to a first end of the second plate, and wherein the second plate comprises a second connector. The method further includes locking a second end of the first plate to a second end of the second plate. The method further includes attaching the electronic device to the second connector.

[0007] Another aspect of the disclosure provides an implementation of a method for removably coupling an attachment device to eyewear. The method includes placing the attachment device against an inside end of a support member of an eyewear frame, where the attachment device comprises a first connector, and where the inside end is an end of the support member closer to a wearer of the eyewear frame. The method further includes rotating a second plate of the first connector about a hinge of the first connector, where the hinge couples a first end of a first plate of the first connector to a first end of the second plate, and where the second plate comprises a second connector that removably couples an electronic device to the attachment device. The method further includes locking a second end of the first plate to a second end of the second plate.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] Features and aspects, and advantages of the embodiments of the invention are described in detail below with reference to the drawings of various embodiments, which are intended to illustrate and not to limit the invention. The drawings include the following figures in which:

[0009] FIG. 1 is a side view of a support assembly in accordance with one embodiment of the present disclosure.

[0010] FIG. 2 is a partial side view of the support assembly of FIG. 1 showing lenses moved out of a wearer's field of view.

[0011] FIG. 3 is a top view of the support assembly of FIG. 1.

[0012] FIG. 4 is a perspective partial plan view of a detachable module and a connector assembly.

[0013] FIG. 5 is a perspective partial plan view of the detachable module of FIG. 4 prior to complete installation on the support assembly of FIG. 1.

[0014] FIG. 6 is a perspective view of a detachable module in accordance with one embodiment of the present disclosure.

[0015] FIG. 7 is another perspective view of the detachable module of FIG. 6.

[0016] FIG. 8 is a top view of the detachable module of FIG. 6.

[0017] FIG. 9 is a side view of the detachable module of FIG. 6.

[0018] FIG. 10 is an end view of the detachable module of FIG. 6.

[0019] FIG. 11 is another end view of the detachable module of FIG. 6.

[0020] FIG. 12 is a perspective exploded view of the detachable module of FIG. 4.

[0021] FIG. 13 is another perspective view of the detachable module of FIG. 6.

[0022] FIG. 14 is an exploded view of the internal assembly of the detachable module of FIG. 6.

[0023] FIG. 15 is another exploded view of the internal assembly of the detachable module of FIG. 6.

[0024] FIG. 16 is a perspective front plan view of a second plate of the detachable module of FIG. 4.

[0025] FIG. 17 is an isometric front view of the second plate of FIG. 16.

[0026] FIG. 18 is a perspective rear plan view of the second plate of FIG. 16.

[0027] FIGS. 19A-19B show one aspect of the second plate of the detachable module of FIG. 6.

[0028] FIGS. 20A-20B show one aspect of the second plate of the detachable module of FIG. 6.

[0029] FIGS. 21A-21B show one aspect of the second plate of the detachable module of FIG. 6.

[0030] FIGS. 22A-22B show one aspect of the second plate of the detachable module of FIG. 6.

[0031] FIG. 23 shows one aspect of the angular adjustability of the first plate and the second plate of the detachable module of FIG. 6.

[0032] FIG. 24 is a perspective view of a second module in accordance with one embodiment of the present disclosure.

[0033] FIG. 25 is another perspective view of the second module of FIG. 24.

[0034] FIG. 26 is a top view of the second module of FIG. 24.

[0035] FIG. 27 is a top view of the detachable module of FIG. 6 and the second module of FIG. 24.

[0036] FIG. 28 is a partial side view of the support assembly of FIG. 1, the detachable module of FIG. 6, and the second module of FIG. 24.

[0037] FIG. 29 is an isometric side view of the detachable module and the support assembly of FIG. 4.

[0038] FIG. 30 is a cross section view A-A identified in FIG. 29.

[0039] FIG. 31 is one embodiment of a method for removably coupling an electronic device to eyewear.

[0040] FIG. 32 is one embodiment of a method for removably coupling an attachment device to eyewear.

DETAILED DESCRIPTION OF THE EMBODIMENT

[0041] Systems and methods of the present disclosure are directed to adequately coupling an object (e.g., a communication module, a music module, an audio-video module, an illuminator, etc.) and a structure (e.g., a support assembly). Adequate mechanical coupling will depend on the object, the available structure, and the purposes the object and structure serve after coupling is established. Coupling may involve maintaining a relationship between the object and the structure (e.g., orienting, positioning, maintaining, retaining, etc.). Coupling may involve supporting the object by the structure (e.g., attaching, holding, fixing, mounting, etc.). Any or all of the functions discussed above in any combination may be provided by an apparatus herein called a detachable module.

[0042] A detachable module includes any component or combination of components capable of coupling an object and a structure. A first portion of the detachable module may couple the object and the detachable module and a second portion

of the detachable module may couple the detachable module and the structure. The operation of the first portion is substantially independent of operation of the second portion. In some embodiments, the detachable module substantially prevents movement of the object with respect to the structure. In other embodiments, the detachable module permits one or more degrees of freedom of the object, the structure, or both with respect to each other (e.g., rotational, translational, limited rotations, translations, etc.).

[0043] A clasp includes any apparatus for establishing a releasable coupling. The clasp may have at least an open position and a closed position. A clasp may be maintained in the closed position by a coupling (e.g., a latch). Portions of the clasp may form the latch. The clasp may include two components that are separable or movable with respect to each other to attain the open position and that are coupled (e.g., fixed, attached, confined, attracted, held, adhered, encircled, captured, wrapped) to or with each other to attain the closed position.

[0044] A latch includes any apparatus for establishing a releasable coupling involving surfaces that abut to prevent release. The latch may have at least an open position and a closed position. The latch may be maintained in the closed position by a force (e.g., expansion of material, contraction of material, spring force, torsion, tension, friction, stiction, reaction force of abutting relatively incompressible surfaces, etc.). To release a latch, the surfaces may generally be moved with respect to each other to avoid abutment. A latch may remain in a closed state due to the existence of potential energy (e.g., stored torsion, tension, elasticity, etc.). A latch in a closed position may be in a stable state where potential energy is not involved to maintain the position. Energy may be expended to move a latch out of its closed position.

[0045] A magnetic clasp includes any clasp that is maintained in the closed position by magnetic flux. A portion of the clasp may have suitable magnetic permeability for being part of a path for the magnetic flux. A portion of the clasp may provide some or all of the magnetic flux (e.g., clasp includes a magnet, clasp is magnetized, etc.).

[0046] A hinge includes any apparatus that permits movement of a first surface about an axis with respect to a second surface. When the hinge and the surfaces are coextensive of the same material, the hinge is referred to as a living hinge. A barrel hinge includes a bearing that cooperates with at least one hollow cylinder formed in or

coupled to each surface. The axis of a barrel hinge coincides with the central axis of the bearing (e.g., pin, post, shaft, bump, etc.).

[0047] A lip includes any apparatus that grips the exterior surface of an object (e.g., by attracting, attaching, adhering, holding, clamping, encircling, capturing, wrapping, clasping, etc.). The exterior surface may have undulations that cooperate with the lip to accomplish gripping. The exterior surface and the lip may cooperate as a latch.

[0048] A detachable module according to various aspects of the present disclosure includes a fold over clasp comprising at least a portion of a magnetic clasp. In an embodiment where the fold over clasp includes two components, the portion of a magnetic clasp may be implanted on, in, or with the first component, the second component, or both components. The combination provides simplicity of manufacturing and operation. Such a detachable module may be used to couple an object (e.g., a communication module, a music module, an audio-video module, an illuminator, etc.) to a structure (e.g., a support assembly) by coupling (e.g., fixing, attaching, confining, attracting, holding, adhering, encircling, capturing, wrapping, etc.) the structure with the fold over clasp and maintaining a relationship with the object via the magnetic clasp. The fold over clasp may employ a latch to maintain the closed position of the fold over clasp.

[0049] A magnetic flux circuit of the magnetic clasp may employ a relatively higher permeability material to permit the remainder of the detachable module to be formed of a relatively lower magnetic permeability material, avoiding the cost and weight of ferromagnetic materials.

[0050] The relatively lower permeability material may include one or more of conventional polymer, plastic, or resin. This material may be formed using conventional techniques including, for example, injection molding, blow molding, compression molding, extrusion, casting, rotomolding, rotocasting, and/or the like. The relatively higher permeability material may be formed into a sheet or wafer (e.g., circle, oval, rectangle, regular polygon, etc.) with suitable thickness (uniform, stepped, graded) by one or more conventional techniques including, for example, molding, casting, stamping, cut sheet, web processing, and/or the like. In some embodiments, the relatively higher permeability material may be unmagnetized. In other embodiments, the relatively higher permeability material may be magnetic or magnetized, for example, as a source of magnetic flux for the magnetic clasp.

[0051] In an embodiment, the relatively higher permeability material is held in a suitable position by at least a portion of the magnetic clasp. When the magnetic clasp includes a cup shape having an interior, such a portion of the magnetic clasp may include one or more interior surfaces of the cup.

[0052] Assembly of a pivot of the fold over clasp may consequently assist in maintaining, or may substantially maintain, a suitable position of the relatively higher permeability material of the magnetic clasp. The magnetic clasp may include structure to substantially support the object. Support may provide a substantially rigid mount for the object to the structure.

[0053] In an embodiment, the magnetic clasp includes one or more surfaces that maintain an orientation of the object with respect to the structure. Such surfaces may cooperate by abutment, stiction, and/or friction. Such surfaces may be implemented on one or more portions of the magnetic clasp. Such surfaces may be implemented on one or more portions of each of the magnetic clasp and the object.

[0054] A portion of the latch of the fold over clasp may flex to facilitate positioning of the relatively higher permeability material and to facilitate holding the relatively higher permeability material by at least a portion of the magnetic clasp. For example, flexing may provide a tension to facilitate holding.

[0055] In an embodiment, the portion of the fold over clasp that serves as a portion of the magnetic clasp may include a slot that is temporarily spread to facilitate assembly of the fold over clasp to include the relatively higher permeability material. For example, the portion of the fold over clasp that serves as a portion of the magnetic clasp may include a left portion, a right portion coupled to the left portion, and a first coupling that permits the left portion and right portion to be spread away from each other. The first coupling may include one or more surfaces that function as part of the latch of the fold over clasp.

[0056] A support assembly 100 in accordance with one embodiment of the present disclosure is illustrated in FIG. 1. The support assembly 100 generally includes a support 102 and a detachable module 104, and can be any structure worn by a wearer that is adapted to carry, hold, or contain another device, such as an electronic device. For example, the support assembly 100 can be or include an audio device. In addition, the support assembly 100 can include an eyeglass frame, sports or other protective goggle, visors, magnifiers, masks, headwear without lenses, or other eyewear assembly. The

support assembly 100 may be symmetric in a conventional manner about bridge 103. Although generally described herein as a detachable module, the module 104 can also be permanently mounted (by rigid fixation, or adjustably as disclosed in greater detail below) to a support member (e.g., earstem, temple, temple arm, headband, strap or outrigger of a goggle, hook over an ear, loop, support, etc.), slide rail, or other component of the eyeglass or other headwear. The support assembly 100 may be constructed of suitable conventional materials using suitable conventional technologies.

[0057] The support 102 is generally any structure capable of being worn that is also able to carry a device such as an electronic device. The support 102 can include any of a variety of wearable structures such as, for example, a hat, a belt, a vest, an article of clothing, and/or eyewear, including eyeglasses. In some embodiments, the support 102 is configured to support the detachable module 104 such that the detachable module 104 is directed into the field of the user's view. In other embodiments, the support 102 is configured to support the detachable module 104 for purposes unrelated to the field of the user's view. For example, the support 102 may support the detachable module 104 such that the detachable module 104 is within a convenient reach of the user.

[0058] The detachable module 104 is any structure capable of being carried by the support 102. In one embodiment, the detachable module 104 includes a housing containing a connection assembly, as is described in greater detail below.

[0059] In the illustrated embodiment, the support 102 includes eyeglasses, which have a frame 106 that can include at least one lens support 108. The lens support 108 (e.g., orbital) is adapted to hold at least one lens 110 in the field of vision of the wearer of the support assembly 100.

[0060] The support 102 also includes at least one support member 112 (e.g., earstem, temple, temple arm, headband, strap or outrigger of a goggle, hook over an ear, loop, support, etc.). For example, the support 102 may include a first support member 112 and a second support member 112 (e.g., the support 102 may include an earstem positioned adjacent to the left side of a head and an earstem positioned adjacent to the right side of the head, a temple positioned adjacent to the left side of a head and a temple positioned adjacent to the right side of the head, a temple arm positioned adjacent to the left side of a head and a temple arm positioned adjacent to the right side of the head, a first headband positioned adjacent to the left side of a head that couples to a second headband positioned adjacent to the right side of the head, a first strap or outrigger of a

goggle positioned adjacent to the left side of a head that couples to a second strap or outrigger of a goggle positioned adjacent to the right side of the head, a hook over a left ear and a hook over a right ear, a first loop positioned adjacent to the left side of a head that couples to a second loop positioned adjacent to the right side of the head, a support positioned adjacent to the left side of a head and a support positioned adjacent to the right side of the head, etc.). As another example, the support 102 may include a single support member 112 (e.g., the support 102 may include an earstem, temple, or temple arm positioned adjacent to the left side of a head or a right side of the head, a headband that wraps around a top, bottom, and/or side of a head, a strap or outrigger of a goggle that wraps around a top, bottom, and/or size of a head, a hook over a left ear or a hook over a right ear, a loop, etc.).

[0061] The support member 112 is coupled to the frame 106 with a coupling 114 located at the anterior portion 116 of the support member 112. In one embodiment, the coupling 114 is a hinge, although the coupling 114 can be any structure known to those of skill in the art for coupling an support member 112 to a frame 106. In other embodiments, the support 102 does not include a coupling 114. In such embodiments, the at least one support member 112 are integrally formed with the frame 106.

[0062] The support member 112 includes a support section or rail 118 and a head contacting portion 120. The rail 118 is designed to engage a corresponding clamp on the detachable module 104. The detachable module 104 is detachably coupled to the rail 118 by any of a variety of mechanisms, such as those described in greater detail below. In some implementations, the detachable module 104 is adapted to not move with respect to rail 118. In other implementations, the detachable module 104 is adapted to move with respect to the rail 118. In one embodiment, the detachable module 104 moves along the rail's longitudinal axis in an anterior-posterior (or posterior-anterior) direction (not shown). Axial movement of the detachable module 104 with respect to the rail 118 may be limited in the anterior direction and the posterior direction by stops (not shown).

[0063] The head contacting portion 120 of the support member 112 can be provided with an elastomeric traction device, such as that disclosed in U.S. Patent No. 5,249,001, filed August 27, 1991, which is incorporated by reference herein. A padded portion on the head contacting portion 120 is generally made from a soft material, such as a foam, a plastic, cloth, or any of a variety of soft polymers, and provides a comfortable interface between the wearer's head and the support assembly 100 when worn by a user.

[0064] A second module 146 can be attached to the detachable module 104. In one embodiment, the detachable module 104 includes as an attachment one or more of a communication module, a music module, an audio-video module, an illuminator, and/or another electronics module. In one embodiment, the detachable module 104 includes as an attachment an audio-video module that allows the wearer of the support assembly 100 to capture snapshots or video of the wearer's surroundings and/or audio of the wearer's surroundings. For example, the second module 146 can include a still camera, a video camera, an infrared camera, a thermal imaging camera, and/or another type of visual or aural recording device. In another embodiment, the detachable module 104 includes as an attachment a communications module that allows the wearer of the support assembly 100 to wirelessly communicate with an electronic device. For example, the second module 146 can include one or more of a speaker, a microphone, a power supply and a Bluetooth or other radio frequency transceiver for wirelessly communicating with a remote device such as a cellular telephone.

[0065] In another embodiment, the detachable module 104 includes as an attachment one or more of a noise module, a flashlight, a laser pointer, a substance dispenser, an object launcher, and/or another mechanical module. In one embodiment, the second module 146 is a pepper spray dispenser that allows the wearer of the support assembly 100 to disperse pepper spray in the wearer's vicinity.

[0066] In some embodiments, the detachable module 104 provides a mechanism to allow the second module 146 and the support assembly 100 to communicate. For example, the detachable module 104 may include a medium capable of carrying signals (e.g., a trace, a wire, a cable, etc.), electrical inputs, electrical outputs, and/or other circuitry such that an electrical connection and/or a data connection is established between the second module 146 and the support assembly 100. Thus, the second module 146 may be configured to transmit electrical signals (e.g., data, control signals, power, etc.) to the support assembly 100 and may be configured to receive electrical signals from the support assembly 100.

[0067] In the embodiment illustrated in FIG. 1, the rail 118 is a longitudinal segment of the support member 112. In the illustrated embodiment, the rail 118 is in line with the longitudinal axis of the support member 112. However, in other embodiments, not shown, the rail 118 is spaced an offset distance from the longitudinal axis of the support member 112.

[0068] The lens supports 108 of the support 102 can be integrally formed with the frame 106, such as illustrated in FIG. 1. However, in other embodiments, the lens supports 108 are hingably connected to the frame 106. By hingably coupling the lens supports 108 to the frame 106, the lenses 110 may be rotated about a hinge axis and moved out of the wearer's line of sight when desired. For example, if lenses 110 include sunglass lenses then lens support hinge 128 allows the wearer of the support assembly 100 to lift the lenses 110 out of the field of view when the wearer moves indoors without removing the support assembly 100 from his head. In any of the embodiments herein, the lenses may be supported in a "rimless" design as is understood in the art, in which the lens is attached to the frame or other adjacent components without the use of a lens support.

[0069] Another embodiment of a support assembly 100 is illustrated in FIG. 2. In the illustrated embodiment, at least a portion of the rail 118 has a non-round cross-sectional shape to prevent undesired rotation of the detachable module 104 about the rail 118 longitudinal axis 130. The rail 118 cross-sectional shape may be any of a variety of shapes, including noncircular shapes to prevent undesired rotation. For example, in one embodiment, the rail 118 cross-sectional shape is oval, elliptical, square, triangular, or any other noncircular shape. In one embodiment, the rail 118 includes an edge extending along a portion of its longitudinal axis 130, which prevents rotation of the detachable module 104 about the rail 118. The module clamp may be provided with complementary clamping surfaces, for conforming to the cross sectional configuration of the rail to permit axial (anterior-posterior) adjustability while resisting or preventing rotation about the axis of the rail.

[0070] In addition, any of a variety of anti-rotational structures may be provided with, or coupled to the rail 118 and the detachable module 104. For example, the anti-rotational structure can include a high friction surface to provide a friction fit, a locking arrangement, a pin, or any other structure known to those of skill in the art. In other embodiments, the rail 118 has a substantially circular cross-sectional shape and the detachable module 104 includes a suitable structure for preventing rotation of the detachable module 104 about the rail 118 longitudinal axis 130. For example, the detachable module 104 can include a friction mount, a rubber or elastomeric polymer pad, or other locking mechanism to prevent rotation about the rail 118.

[0071] The rail 118 can be located at any of a variety of locations with respect to the frame 106. In general, the rail 118 is located in the anterior two-thirds of the

support member 112. Alternatively, the rail 118 is in the anterior half of the support member 112.

[0072] Another embodiment of a support assembly 100 is illustrated in FIG. 3. The second module 146 can be removably attached to the detachable module 104 via a connector assembly 122. In one embodiment, the detachable module 104 may include a coupling device that can be paired with the connector assembly 122. For example, the connector assembly 122 may include a magnet and the detachable module 104 may include a magnet, where the connector assembly 122 magnet and the detachable module 104 magnet are polar opposites such that the two magnets are attracted to each other. In other embodiments, the detachable module 104 and the connector assembly 122 are paired using any known connection medium, such as by using a mount, button, clip, clip-on, tape, or the like.

[0073] In another embodiment, the second module 146 is permanently affixed to the detachable module 104. The second module 146 can be permanently attached to the detachable module 104 using any known connection medium, such as with an adhesive, weld, glue, or the like, or formed entirely or partially by insert molding or co-molding processes to produce the second module 146 and the detachable module 104 in a unitary or monolithic module.

[0074] Any of a variety of couplings can be utilized with the detachable module 104 for releasably or permanently attaching the detachable module 104 to an eyeglass frame or other support. Likewise, any of a variety of couplings can be utilized with the detachable module 104 and the second module 146 for releasably or permanently attaching the detachable module 104 to the second module 146. In many applications, releasable connections are preferred. The coupling may be an integral component of the detachable module 104 and/or the second module 146, or may be attached to the detachable module 104 and/or the second module 146. In general, the coupling for the detachable module 104 will include at least a first coupling surface for contacting a first surface on the rail or other support from which the coupling will depend, and a second coupling surface for contacting a second surface on the support. The first and second coupling surfaces are generally moveable with respect to each other, such as to permit positioning the coupling over or around the structure to which it is to be attached, and then tightened to the structure by bringing the first and second coupling surfaces towards each other, as is illustrated in FIG. 23. The configuration of the first and second coupling

surfaces, or third or fourth or more, depending upon the design, can be provided with any of a variety of configurations. Normally, the coupling surfaces will be configured in a manner that cooperates with the complementary shape of the rail, support member, or other component to which they are to be attached.

[0075] Likewise, in general, the coupling for the detachable module 104 and the second module 146 will include at least a first coupling surface for contacting a first surface on the detachable module 104 or other support from which the coupling will depend, and a second coupling surface for contacting the second module 146.

[0076] In an embodiment in which the detachable module 104 may be attached (at the user's choice) to either a left support member or a right support member of an eyeglass, the coupling is pivotably or otherwise moveably connected to the module 104, to permit shifting between a "right hand" and "left hand" coupling configuration. Certain specific examples will be given below. Alternatively, in certain embodiments, a left hand module and a right hand module are provided as a system, such that, in the case that the second module 146 is a camera, everything in the line of sight of the wearer can be captured. In this application, a first detachable module 104 may be adapted for coupling to the left support member and a second detachable module 104 may be adapted for coupling to the right support member.

[0077] FIG. 4 is a perspective partial plan view of the detachable module 104 and the connector assembly 122. The connector assembly 122 may be a semi-rigid assembly that includes grip 416, grip 418, and/or a coupling device 182. The connector assembly 122 is illustrated as being separate from the support 102 for the purposes of clarity.

[0078] In an embodiment, the grips 416 and 418 support the second module 146. For example, the grips 416 and 418 may flex to allow the second module 146 to be held therebetween by tension in grips 416 and 418 and/or by friction created by the abutting surfaces of the grips 416 and 418 and the second module 146.

[0079] The connector assembly 122 may couple to the detachable module 104 via the coupling device 182. For example, a surface of the coupling device 182 is pressed toward or against a surface 422 of the detachable module 104. The coupling device 182 and the surface 422 may operate as a magnetic clasp. The coupling device 182 may be a magnet, a mount, a button, a clip, a clip-on, tape, or the like. The coupling device 182 may be integrated into the connector assembly 122.

[0080] FIG. 5 is a perspective partial plan view of the detachable module 104 prior to complete installation on the support assembly 100. As described in greater detail below, the detachable module 104 includes a first coupling 142 (e.g., a flexible region), a second plate 150, a lip 152 (e.g., a hook), a top lip 154, a bottom lip 156, a hinge 158. These components cooperate as a fold over clasp that operate by wrapping about support member 112. The first coupling 142 may include the lip 152. The coupling of the detachable module 104 to the support member 112 may be temporary or permanent. In an embodiment, top lip 154 and bottom lip 156 provide or receive one or more contact surfaces of the support member 112 without marring the support member 112.

[0081] The detachable module 104 may include any structure that couples to a second plate via a hinge and provides a portion of a first coupling that holds the second plate in a closed position, thereby grasping an support member. For example, the detachable module 104 may include cylindrical barrels, such as the cylindrical barrels 310 and 312 that are discussed below with reference to FIG. 12, and the lip 152. As described in greater detail below, the detachable module 104 may include conventional surfaces and surface features to reduce the possibility of movement of the detachable module 104 along a length of the support member 112.

[0082] In an embodiment, the second plate 150 includes any component of a detachable module that cooperates with the top lip 154 and the bottom lip 156 to wrap about the support 102 and/or close the detachable module 104. For example, the second plate 150 cooperates with the other components of the detachable module 104 to provide an open position and a closed position of the fold over clasp of the detachable module 104.

[0083] In an embodiment, to mechanically couple the support member 112 and the detachable module 104 with the fold over clasp in an open position, the detachable module 104 is brought into contact with an inner surface of the support member 112. The second plate 150 may be moved in an arc on hinge 158 until a surface of the first coupling 142 is caught by the lip 152 to latch the second plate 150 in the closed position of the fold over clasp (e.g., to latch the second plate 150 to a first plate 148, as described in greater detail below). The lip 152 may flex when urged into position onto a surface of the first coupling 142. With the second plate 150 in the closed and latched position, the detachable module 104 and support member 112 are mechanically coupled (e.g., assembled, fixed, rigidly mounted, friction fitted, bound together, etc.).

Adhesives may additionally be used to bond the detachable module 104 to the support member 112.

[0084] In another embodiment, not shown, the support member 112 is formed to include a portion of the hinge 158 and a portion of the first coupling 142. Thus, the top lip 154 and the bottom lip 156 may be omitted. The remainder of the hinge 158 and the remainder of the first coupling 142 may be part of the second plate 150.

[0085] In an embodiment, when the detachable module 104 is brought against the support member 112 without adhesives therebetween, the detachable module 104 is easily removed from the support member 112 by lifting the lip 152 away from first coupling 142 to allow the second plate 150 to move in an arc about hinge 158 and then be moved away from the support member 112. In another embodiment, in addition to or in place of the lip 152, the detachable module 104 may be coupled to the support member 112 in any conventional manner (e.g., screws, snaps, ties, grips, etc.).

[0086] One embodiment of a detachable module 104 is illustrated in FIGS. 6-13. The detachable module 104 includes a first plate 148, the second plate 150, the first coupling 142, and a second coupling 144. The plates as referred to herein (e.g., first plate 148 and second plate 150) can also be referred to as housings, clipped portions, or supports. The first plate 148, the second plate 150, and the first coupling 142 allow the detachable module 104 to be removably connected to the support member 112 of support 102 of the support assembly 100. As is described in greater detail below, the first plate 148 and the second plate 150 can be coupled at one end with the hinge 158. In other embodiments, not shown, the first plate 148 and the second plate 150 can be coupled at one end using any known connection device. In an embodiment, the first plate 148 rests against the support member 112, such as against the rail 118, on a side closer to the wearer. The first plate 148 includes the lip 152 (e.g., a hook) that can secure the first plate 148 to the second plate 150 at a second end. The second plate 150, which rests against the support member 112, such as against the rail 118, on a side farther from the wearer, includes an opening in which the lip 152 can be inserted to form the first coupling 142.

[0087] While FIGS. 6-13 illustrate a lip 152, the first coupling 142 can include any of a variety of locking mechanisms to allow opening and closing of the first coupling 142. The first plate 148 is movable with respect to the second plate 150 when the locking mechanism is released. Such moveability of the first plate 148 and the second plate 150

allow the first coupling 142 to at least partially surround and enclose a portion of a rail (not shown), such as rail 118 described above. In addition, the locking mechanism can be released to remove the first coupling 142 from the rail.

[0088] In an embodiment, the first plate 148 can be molded to fit securely against a portion of the support member 112, such as against the rail 118. For example, the first plate 148 can include a top lip 154 and a bottom lip 156, where the top lip 154 rests against the top of a portion of the support member 112 and the bottom lip 156 rests against the bottom of a portion of the support member 112. As another example, the first plate 148 can include a tab 160 that can be inserted into the support member 112. As another example, the first plate 148 can include an area (e.g., a convex indentation 162) that can rest against a complementary area (e.g., a concave indentation) of the support member 112. The top lip 154, the bottom lip 156, the tab 160, and/or the convex indentation 162 can help support the detachable module 104 and hold it in place. Likewise, the second plate 150 can also be molded to fit securely against a portion of the support member 112, such as against the rail 118.

[0089] In one embodiment, the detachable module 104 also includes the second coupling 144 that allows the detachable module 104 to be removably connected to the second module 146, such as, for example, a camera. In an embodiment, the second coupling 144 is embedded in a housing of the second plate 150. The second coupling 144 can be molded into the housing or can be removably coupled to the housing. For example, the second coupling 144 can be a magnet that is removably coupled to the housing. In one embodiment, the second coupling 144 is secured in the housing of the second plate 150 without any adhesive material. For example, the housing can be of a general circular shape, but can include indentations, such as indentation 164, that are complementary to indentations included in the second coupling 144, such that the second coupling 144 can mechanically lock into place in the housing of the second plate 150.

[0090] As illustrated in FIG. 12, the detachable module 104 further includes a sheet 174 (e.g., a cylindrical wafer) and a pin 166. The sheet 174 may include, or be formed of, material having magnetic permeability greater than the magnetic permeability of the material from which the remainder of the second plate 150 is made. Conventional material of higher magnetic permeability may be substantially heavier than conventional materials for forming the second plate 150. By reducing the size of the portion of the second plate 150 having higher magnetic permeability, low density material (e.g., plastic)

may be used to form the majority of the second plate 150 to reduce the overall weight of the second plate 150. In an embodiment, the sheet 174 includes unmagnetized steel for low cost construction. In another embodiment, the sheet 174 includes a conventional magnet having a magnetic pole on one circular face (e.g., surface 1222) of its cylindrical form and an opposite magnetic pole on the opposite face (e.g., surface 1204).

[0091] The second plate 150 may further include a cylindrical barrel 311 and a cylindrical barrel 309 formed integrally with the second plate 150. The first plate 148 may further include the cylindrical barrel 310 and the cylindrical barrel 312 formed integrally with the first plate 148. When the central axes of barrels 309, 310, 311, and/or 312 are aligned on central longitudinal axis 176 of the pin 166, the pin 166 passes axially through bores in barrels 309, 310, 311, and/or 312 in sequence to form the hinge 158. The interior diameters of axial bores in barrels 309, 310, 311, and/or 312 pass around or bind a diameter of the pin 166 as needed to accomplish the function of the hinge 158 discussed above and to maintain the pin 166 in position after assembly of the hinge 158. An end portion 314 of the pin 166 may have a smaller diameter than a central portion 316 of the pin 166 so that the pin 166 binds in the barrel 312. In a similar manner, the pin 166 may also bind in the barrel 310.

[0092] In another embodiment, not shown, the pin 166 is omitted. The barrels 309 and 311 may each instead be designed with a circularly symmetric, axially aligned post or bump facing barrels 310 and 312 respectively in place of the axial bores. Consistent design of the barrels 310 and 312 admits the posts or bumps to form hinge 158. The barrels 309 and 311 may be compressed together to facilitate alignment and assembly into the barrels 310 and 312. Residual tension in the first plate 148 and/or the second plate 150 maintains this alignment. The hinge 158 in this embodiment may be stiffer to operate than in the embodiment discussed above that included the pin 166. Compression and tension may be facilitated by slot 434 and the first coupling 142, as discussed below with respect to FIGS. 16-17.

[0093] An exploded view of one implementation of detachable module 104 is illustrated in FIGS. 14-15. The detachable module 104 includes the first plate 148, which includes a housing in which pin 166 can be placed. The detachable module 104 also includes the second plate 150, which includes the second coupling 144 and a housing in which pin 166 can be placed. Pin 166 hingably connects the first plate 148 with the second plate 150.

[0094] In an embodiment, the second plate 150 includes an interior cavity in which the second coupling 144 is placed. The second coupling 144 includes a coupling device 168 and a coupling device housing 170. For example, the coupling device 168 can be a magnet and the coupling device housing 170 can be any magnetic or non-magnetic structure. In some embodiments, the coupling device 168 and the coupling device housing 170 are molded to produce a unitary or monolithic module. In other embodiments, the coupling device 168 and the coupling device housing 170 are separate structures and may be coupled using any known methods. The coupling device housing 170 can include one or more indentations 172 that correspond to the one or more indentations 164 of the second plate 150. In one embodiment, the coupling device housing 170 can lock into the second plate 150 via the one or more indentations 172 and the one or more indentations 164. In other embodiments, the coupling device housing 170 is permanently affixed to the second plate 150. Note that in still further embodiments, the coupling device 168 and/or the coupling device housing 170 may be affixed to the housing 180.

[0095] In an embodiment, the interior cavity of the second plate 150 also includes a sheet 174. In an embodiment, the sheet 174 is mechanically secured inside the second plate 150. As an example, the sheet 174 can be a magnet with an opposite polarity of the coupling device 168 and/or the coupling device housing 170. The magnetic force may be sufficient to hold the coupling device housing 170 to the second plate 150.

[0096] FIG. 16 is a perspective front plan view of the second plate 150 of the detachable module 104 of FIG. 4. As illustrated in FIG. 16, the second plate 150 includes left portion 402, right portion 404, surface 406 the first coupling 142, bar 408, and a cup shape having an interior 410. The terms "left" and "right" are arbitrary as to any convenient orientation of the second plate 150 (e.g., any portions on opposite sides of a central axis constitute "left" and "right" portions). Left portion 402 and right portion 404 have symmetrically arranged components protruding into interior 410. The components of the left portion 402 include rear wall 522 having front surface 412, rear wall 424 having front surface 414, and front wall 426 having rear surface 516. In addition, interior 410 includes surfaces 444 and 432 and retention features 440 and 438 that abut corresponding surfaces of the connector assembly 122 to locate the connector assembly 122 in interior 410 and to align the second module 146 with respect to the second plate

150. As a consequence of the features of the detachable module 104 discussed above, the second module 146 is aligned with support member 112 and the field of view of the user.

[0097] In an embodiment, a portion of the cup shape of the second plate 150 may constitute any structure that permits spreading of a slot. The first coupling 142 may solely, or in concert with other features, join a left portion to a right portion. In addition, the first coupling 142 may provide one or more surfaces that constitute a portion of a latch. For example, the first coupling 142 includes the bar 408. The bar 408 joins the left portion 402 and the right portion 404. The left portion 402 and the right portion 404 define slot 434, as illustrated in FIGS. 16-17. The first coupling 142 may provide the surface 406 that, when the first plate 148 and the second plate 150 are in the closed, retains the lip 152. The first coupling 142 may also provide surface 602, as illustrated in FIG. 18. The lip 152 may slide on the surface 602 when the first plate 148 and the second plate 150 are transitioned from the open position to the closed position (e.g., when the second plate 150 is latch closed to create the fold over clasp).

[0098] In an embodiment, the slot 434 includes any free space for the movement of structural portions that include one or more flexible regions. The slot 434 may be central between generally symmetric portions. The slot 434 may include or define an orifice 502 facilitating the latching of the second plate 150 into a closed position, as illustrated in FIG. 17. For example, the slot 434 passes between the left portion 402 and the right portion 404 through a center of the interior 410 of the cup shape of the second plate 150. At one end of the slot 434, the orifice 502 provides space for the lip 152 to move into position onto surface 406.

[0099] FIG. 19A illustrates the second plate 150 in greater detail. The second plate 150 may have a cavity or slot and retention feature(s) molded into it such that the sheet 174 may be inserted into the second plate 150. For example, the retention feature(s) may form the cavity. Lips 338 and 340 may define an opening of the cavity as the lips 338 and 340 may be spread apart to allow an object to be inserted into the cavity. The lips 338 and 340 may be spread apart or separated a distance equal to a diameter, length, and/or width of the sheet 174. The second plate 150 may contain retention features to hold the sheet 174 loosely or firmly in place. Lips 338 and 340, which may comprise part of the retention features, may be pulled apart such that the sheet 174 may be inserted into the second plate 150. In some embodiments, the sheet 174 may have a shape that conforms to or is the same as the shape of the volume of the cavity.

[0100] FIG. 19B illustrates the second plate 150 in greater detail. In FIG. 19B, lips 338 and 340 of the second plate 150 are pulled apart such that the sheet 174 can be inserted into the second plate 150. Note that the first coupling 142 may have an elastic of spring-like characteristic so that it can be deformed to the extent that the lips 338 and 340 may be pulled apart. In this way, the sheet 174 may be inserted into the second plate 150 without the use of glue or other types of fasteners (e.g., screws).

[0101] FIGS. 20A and 20B illustrate the second plate 150 in greater detail. In an embodiment, the sheet 174 may sit in place as the lips 338 and 340 revert to their normal positions as illustrated in FIG. 19A.

[0102] FIGS. 21A and 21B illustrate a cutaway view of the second plate 150. FIGS. 21A and 21B illustrate some of the retention features present in the second plate to loosely or firmly hold the sheet 174 in place. For example, retention feature 438 and retention feature 440 may rest against one side of sheet 174 such that sheet 174 is secure. In some embodiments, the retention features, such as 438 and/or 440 may couple with a barrier 540 (see FIG. 14) of the coupling device housing 170 such that the thickness of the material between the sheet 174 and the coupling device 168 is of a uniform thickness. For example, the retention features 438 and/or 440 may mate with the barrier 540 such that a thickness or amount of space between the sheet 174 and the coupling device 168 is equal to the thickness of one of the retention features 438 and/or 440 and/or the barrier 540. In other words, the retention features 438 and/or 440 may be of the same thickness as the barrier 540. The retention features 438 and/or 440 and the barrier 540 may be aligned with respect to each other so that when the sheet 174 is coupled to the coupling device 168, the retentions features 438 and/or 440 and the barrier 540 do not press against each other on their external faces, but instead are adjacent to each other laterally. The retention features 438 and/or 440 and the barrier 540 may interface in such a way that at any given location between the sheet 174 and the coupling module 168, only of the retention features 438 and/or 440 and the barrier 540 lies between the sheet 174 and the coupling module 168. In some embodiments, however, there may be no material between the sheet 174 and the coupling device 168.

[0103] FIGS. 22A and 22B illustrate the first plate 148 and the second plate 150. In an embodiment, an object, for example a pin 166 (e.g., a press-fitted pin, etc.), may not only couple the first plate 148 and the second plate 150, but may also ensure the sheet 174 is secured within the second plate 150. The pin 166 geometry may firmly hold

and lock the lips 338 and 340 to prevent them from opening. For example, the pin 166 may be inserted coaxially through the openings in a hinge (e.g., hinge 128) to prevent the lips from moving apart. In addition, this may prevent or reduce the likelihood that the sheet 174 will fall out and/or rattle during use. The pin 166 may be placed to couple the first plate 148 and the second plate 150 without the use of glue or other fasteners (e.g., screws).

[0104] The pin 166 can be uniform in diameter. In some embodiments, as described above, the pin 166 has a larger diameter at one end than the other end. For example, the pin 166 can have a larger diameter at the anterior portion 116 of the support member 112 than at the posterior portion of the support member 112.

[0105] An operational view of detachable module 104 is illustrated in FIG. 23. As described herein, the pin 166 hingably connects the first plate 148 with the second plate 150. The first plate 148 and/or the second plate 150 may rotate about the longitudinal axis 176. When oriented such that the top lip 154 and the bottom lip 156 are closer in view than the tab 160, the first plate 148 and/or the second plate 150 can rotate clockwise about longitudinal axis 176 until the lip 152 clasps to the second plate 150. When both plates are coupled together via lip 152, the plates can be parallel or substantially parallel with each other. The distance between a portion of the first plate 148 and a portion of the second plate 150 when both are coupled together via lip 152 can be the width of a portion of the support member 112. When oriented such that the top lip 154 and the bottom lip 156 are closer in view than the tab 160, the first plate 148 and/or the second plate 150 can rotate counterclockwise about the longitudinal axis 176 until a top portion of the second plate 150 touches a top portion of the first plate 148. In one embodiment, the first plate 148 and/or the second plate 150 is rotated at least about 5 degrees to release the first coupling 142.

[0106] One embodiment of the second module 146 is illustrated in FIGS. 24-26. The second module 146 includes a housing 180 and a connector assembly 122. While FIGS. 24-26 illustrate a housing 180 that resembles a camera, it should be apparent to one skilled in the art that the housing 180 may be designed to be any mountable structure. The housing 180 is formed by attaching at least two body portions along a part line, to provide a protective outer wall which defines at least one interior cavity for housing electronics or mechanical devices. In an embodiment, at least partially inside of the housing 180 can be a power module, an electronics module, a memory module, a data

port, and a holder that supports a microphone. The body portions may be made from any of a variety of materials, including plastic or metal. Alternatively, the second module 146 can be formed entirely or partially by insert molding or co-molding processes to produce embedded electronics in a unitary or monolithic module.

[0107] The power supply is any of a variety of power structures able to power a second module 146. For example, the power module may include a battery, a capacitor, or other power supply. The power module can be coupled to the electronics module with an adhesive. The electronics module can be coupled to switches which are accessed by the user by pressing one or more buttons (not shown). The switches can include any of a variety of switches known to those of skill in the art, including micro switches, snap switches, and dome switches. In one embodiment, the switches are snap dome F06180 switches. An LED (not shown) can provide status indication to the wearer.

[0108] In an embodiment, the housing 180 supports or includes a microphone and/or a microphone grommet. The microphone grommet can be made from any of a variety of materials well known to those of skill in the art, including: PTFE, polyethylene, polyurethane, or TPE. In addition, the grommet can have a hardness or stiffness of about 20 to 30 durometers, about 40 to 50 durometers, about 60 durometers, or about 70 durometers. A windscreen can be provided with the grommet to reduce noise. The microphone can be any of a variety of microphones known to those of skill in the art.

[0109] In other embodiments, at least partially inside of the housing 180 can be a liquid, gas, or solid substance stored in a canister and/or a dispensing mechanism that can eject the substance from the canister.

[0110] In an embodiment, the connector assembly 122 includes the coupling device 182 and one or more indentations 184. For example, the coupling device 182 may be a magnet with an opposite polarity as the coupling device 168. In this way, the second module 146 and the detachable module 104 may be removably attached. The one or more indentations 184 may be used to secure and hold the second module 146 in place. In some embodiments, the second module 146 cannot rotate or pivot about an axis through the center of the coupling device 182. For example, the one or more indentations 184 can be complementary to the one or more indentations 164 such that the one or more indentations 184 prevent the second module 146 from rotating. In other embodiments, the second module 146 can rotate or pivot about an axis through the center of the coupling device 182. For example, the one or more indentations 184 can be spaced such that the

second module 146 can rotate or pivot to a certain degree about an axis through the center of the coupling device 182. The second module 146 may rotate such that it can be positioned to point parallel to the line of sight of the wearer, to point perpendicular to the line of sight of the wearer, and/or to point in any direction in between. Alternatively, the second module 146 may rotate such that it can point in any direction with no restrictions.

[0111] The connector assembly 122 may be coupled to the housing 180 via a mechanical clasp or via an adhesive material. For example, the connector assembly 122 may include tabs 186 and 188 that can fit into at least one complementary insert 190 in housing 180 such that the connector assembly 122 securely snaps to the housing 180. In other embodiments, glue, tape, or any other adhesive material and/or snaps, clips, buttons, or other fastening devices may be used to couple the connector assembly 122 to the housing 180.

[0112] The coupling device 182 may include a tab 640. The tab 640 may function to prevent or reduce movement of the housing 180 during use. The tab 640 and its functionality is described in more detail with respect to FIG. 27.

[0113] One embodiment of the detachable module 104 and the second module 146 is illustrated in FIG. 27. In one implementation, the second module 146 can rotate about an axis 192 through the detachable module 104. For example, the second module 146 may be rotated ± 180 degrees. In another implementation, the second module 146 cannot rotate about the axis 192. For example, one or more indentations 184 and/or one or more indentations 172 may prevent the second module 146 from rotating about the axis 192.

[0114] The tab 640 may rest against a portion of the second plate 150. In an embodiment, an anterior side of the second module 146 could be an end in which, for example, an opening is placed to allow a camera or other object to point in the direction that a user is facing. As illustrated in FIG. 27, the anterior portion may be the bottom end of the second module 146. In an embodiment, a posterior side of the second module 146 could be an end in which, for example, a cable or wire (not shown) juts out to connect to another device on the person of the user. As illustrated in FIG. 27, the posterior portion may be the top end of the second module 146. In some embodiments, the cable or wire that extends from the posterior end of the second module 146 may be tugged or pulled such that a force is applied to the second module 146 to push the anterior end of the second module 146 towards the user. In other words, a force may be applied to rotate the

longitudinal axis 630 that extends in an inferior-superior direction with respect to the second module 146. The tab 640 may couple with the second plate 150 such that the second module 146 remains coupled to the detachable module 104 even when this pressure is applied. In this way, the tab 640 may allow the sheet 174 to stay coupled to the coupling device 168 during movement and operation of the apparatus by a user.

[0115] One embodiment of the detachable module 104 and the second module 146 attached to the support assembly 100 is illustrated in FIG. 28. In some implementations, the detachable module 104 and the second module 146 may be coupled to a right side of the support assembly 100 as shown. In other implementations, not shown, the detachable module 104 and the second module 146 may be coupled to a left side of the support assembly 100. In still further implementations, not shown, a first detachable module 104 and a first second module 146 may be coupled to a right side of the support assembly 100, and a second detachable module 104 and a second module 146 may be coupled to a left side of the support assembly 100. In any implementation, a detachable module 104 coupled to one support member 112 may be detached and coupled to the other support member 112. The second module 146 may be rotated and/or detached and reattached to point in a direction that corresponds with a line of sight of the wearer.

[0116] FIG. 29 is an isometric side view of the detachable module 140 and the support assembly 100 of FIG. 4. As illustrated in FIG. 29, the support assembly 100 is shown as fully assembled. A cross-section view A-A of the support assembly 100 and the detachable module 104 is illustrated in FIG. 30. As illustrated in FIG. 30, the plane of the cross-section view A-A longitudinally bisects the slot 434, passing through the center of symmetry of the second plate 150, the sheet 174, and the connector assembly 122.

[0117] In an embodiment, the lip 152 includes surface 802 that abuts the surface 406 when the first plate 148 and the second plate 150 are in the closed position. The sheet 174 in the assembled configuration of the second plate 150, as shown in FIGS. 4, 5, and 30, is held in a pocket 804 of the interior 410. The rear face 1204 of the sheet 174 may face or abut surfaces 412 and/or 414 and/or symmetrically arranged surfaces of the right portion 404. The front face 1222 of the sheet 174 may face or abut the surface 516 and/or a symmetrically arranged surface of the right portion 404. To arrive at its operative position inside the pocket 804, the slot 434 may be enlarged by spreading the barrels 309 and 311 apart slightly against tension provided by the first coupling 142 so

that the left portion 402 moves away from the right portion 404. In the spread apart configuration, a cord of the circular interior 410 may exceed a diameter of the sheet 174, facilitating passage of the sheet 174 into the pocket 804. After the diameter of the sheet 174 intersects a center of the interior 410, the barrels 309 and 311 may return toward their original positions to relax some or all of the tension of the first coupling 142.

[0118] In an embodiment, when the barrels 309 and 311 are placed between the barrels 310 and 312, as indicated in FIG. 12, the slot 434 may not be enlarged. Consequently, the sheet 174 may be held (e.g., positioned, supported, confined, etc.) in the pocket 804 at least in part by the cooperation of the barrels 309, 310, 311, and 312 and the pin 166. The sheet 174 may be held by the second plate 150 in part by residual tension in the first coupling 142.

[0119] One method 3100 for removably coupling an electronic device to eyewear is shown in the flowchart of FIG. 31. The method 3100 begins at block 3102. At block 3104, an attachment device is placed against an inside end of a support member of an eyewear frame. In an embodiment, the attachment device includes a first connector and the inside end is an end of the support member closer to a wearer of the eyewear frame.

[0120] At block 3106, a second plate of the first connector is rotated about a hinge of the first connector. In an embodiment, the hinge couples a first end of a first plate of the first connector to a first end of the second plate and the second plate includes a second connector.

[0121] At block 3108, a second end of the first plate is locked to a second end of the second plate. At block 3110, an electronic device is attached to the second connector. At block 3112, the method 3100 ends.

[0122] One method 3200 for removably coupling an attachment device to eyewear is shown in the flowchart of FIG. 32. The method begins at block 3202. At block 3204, an attachment device is placed against an inside end of a support member of an eyewear frame. In an embodiment, the attachment device includes a first connector and the inside end is an end of the support member closer to a wearer of the eyewear frame.

[0123] At block 3206, a second plate of the first connector is rotated about a hinge of the first connector. In an embodiment, the hinge couples a first end of a first

plate of the first connector to a first end of the second plate and the second plate includes a second connector that removably couples an electronic device to the attachment device.

[0124] At block 3208, a second end of the first plate is locked to a second end of the second plate. At block 3210, the method 3200 ends.

[0125] Although this invention has been disclosed in the context of a certain preferred embodiments, it will be understood by those skilled in the art that the present invention extends beyond the specifically disclosed embodiment to other alternative embodiments and/or uses of the invention and obvious modifications and equivalents thereof. In particular, while the present support assembly, support, detachable module, second module, and methods have been described in the context of a particularly preferred embodiment, the skilled artisan will appreciate, in view of the present disclosure, that certain advantages, features and aspects of the support assembly, support, detachable module, second module, and method may be realized in a variety of other devices. Additionally, it is contemplated that various aspects and features of the invention described can be practiced separately, combined together, or substituted for one another, and that a variety of combination and sub-combinations of the features and aspects can be made and still fall within the scope of the disclosure. Thus, it is intended that the scope of the present disclosure herein disclosed should not be limited by the particular disclosed embodiment described above, but should be determined only by a fair reading of the claims that follow.

WHAT IS CLAIMED IS:

1. An eyeglass, comprising:

an eyeglass frame, adapted to be carried by a head of a wearer;

at least a first lens;

at least a first lens support portion of the eyeglass frame being configured to position the at least first lens in a path of a field of view of a wearer;

an attachment device comprising a first connector and a second connector, wherein the first connector removably couples the attachment device to the eyeglass frame; and

an electronic device, wherein the second connector removably couples the electronic device to the attachment device.

2. The eyeglass of Claim 1, wherein the first connector is different than the second connector.

3. The eyeglass of Claim 1 or 2, wherein the first connector is a clip.

4. The eyeglass of Claim 2 or 3, wherein the second connector is a magnet.

5. The eyeglass of any of the preceding claims, wherein the first connector comprises:

a first plate molded to couple to an inside end of the eyeglass frame, the first plate comprising a snap;

a second plate comprising the second connector and configured to support the electronic device; and

a hinge coupled to a first end of the first plate and to a first end of the second plate, wherein the hinge operates to squeeze the second plate against an outside end of the eyeglass frame, and wherein the snap couples to the second plate when the hinge operates to squeeze the second plate against the outside end of the eyeglass frame to hold the second plate against the outside end of the eyeglass frame.

6. The eyeglass of any of the preceding claims, wherein the electronic device is a device from the group comprising of a flashlight, a camera, a microphone, and a laser pointer.

7. The eyeglass of any of the preceding claims, wherein the electronic device is a camera comprising a battery, memory, and a microphone.

8. The eyeglass of any of the preceding claims, wherein the first connector is securely affixed to the attachment device without any adhesive material, and wherein the second connector is securely affixed to the attachment device without any adhesive material.

9. The eyeglass of any of the preceding claims, wherein the attachment device is secured to the eyeglass frame such that the attachment device remains coupled to the eyeglass frame during motion of the wearer.

10. The eyeglass of any of the preceding claims, wherein the electronic device points in a direction that is aligned with the path of the field of view of the wearer.

11. The eyeglass of Claim 1 or 10, wherein the electronic device maintains its position of pointing in the direction that is aligned with the path of the field of view of the wearer during motion of the wearer.

12. The eyeglass of any of the preceding claims, wherein the electronic device rotates about an axis perpendicular to a support member of the eyeglass frame.

13. The eyeglass of any of the preceding claims, wherein the attachment device is configured to provide at least one of an electrical connection or a data connection between the electronic device and the eyeglass frame.

14. A dual attachment member, comprising:

an attachment device comprising a first connector and a second connector, wherein the first connector removably couples the attachment device to a headwear apparatus; and

an electronic device, wherein the second connector removably couples the electronic device to the attachment device.

15. The dual attachment member of Claim 14, wherein the first connector is different than the second connector.

16. The dual attachment member of Claim 14 or 15, wherein the first connector is a clip.

17. The dual attachment member of any of Claims 14-16, wherein the second connector is a magnet.

18. The dual attachment member of any of Claims 14-17, wherein the first connector comprises:

a first plate molded to couple to an inside end of the headwear apparatus, the first plate comprising a snap;

a second plate comprising the second connector and configured to support the electronic device; and

a hinge coupled to a first end of the first plate and to a first end of the second plate, wherein the hinge operates to squeeze the second plate against an outside end of the headwear apparatus, and wherein the snap couples to the second plate when the hinge operates to squeeze the second plate against the outside end of the headwear apparatus to hold the second plate against the outside end of the headwear apparatus.

19. The dual attachment member of any of Claims 14-18, wherein the electronic device is a device from the group comprising of a flashlight, a camera, a microphone, and a laser pointer.

20. The dual attachment member of any of Claims 14-19, wherein the electronic device is a camera comprising a battery, memory, and a microphone.

21. The dual attachment member of any of Claims 14-20, wherein the first connector is securely affixed to the attachment device without any adhesive material, and wherein the second connector is securely affixed to the attachment device without any adhesive material.

22. The dual attachment member of any of Claims 14-21, wherein the attachment device is secured to the headwear apparatus such that the attachment device remains coupled to the headwear apparatus during motion of the wearer.

23. The dual attachment member of any of Claims 14-22, wherein the electronic device points in a direction that is aligned with the path of the field of view of the wearer.

24. The dual attachment member of any of Claims 14-23, wherein the electronic device maintains its position of pointing in the direction that is aligned with the path of the field of view of the wearer during motion of the wearer.

25. The dual attachment member of any of Claims 14-24, wherein the electronic device rotates about an axis perpendicular to a support member of the headwear apparatus frame.

26. The dual attachment member of Claim 25, wherein the support member is an earstem, and wherein the headwear apparatus is an eyeglass frame.

27. The dual attachment member of Claim 25, wherein the support member is a strap, and wherein the headwear apparatus is a goggle.

28. The dual attachment member of any of Claims 14-27, wherein the attachment device is configured to provide at least one of an electrical connection or a data connection between the electronic device and the headwear apparatus.

29. A method for removably coupling an electronic device to eyewear, the method comprising:

placing an attachment device against an inside end of a support member of an eyewear frame, wherein the attachment device comprises a first connector, and wherein the inside end is an end of the support member closer to a wearer of the eyewear frame;

rotating a second plate of the first connector about a hinge of the first connector, wherein the hinge couples a first end of a first plate of the first connector to a first end of the second plate, and wherein the second plate comprises a second connector;

locking a second end of the first plate to a second end of the second plate; and

attaching the electronic device to the second connector.

30. The method of Claim 29, wherein the first connector is different than the second connector.

31. The method of Claim 29 or 30, wherein the first connector is a clip.

32. The method of any of Claims 29-31, wherein the second connector is a magnet.

33. The method of any of Claims 29-32, wherein the locking further comprises:

squeezing the second plate against an outside end of the support member of the eyewear frame; and

inserting a lip of the first plate into an opening of the second plate to hold the second plate against the outside end.

34. The method of any of Claims 29-33, wherein the electronic device is a device from the group comprising of a flashlight, a camera, a microphone, and a laser pointer.

35. The method of any of Claims 29-34, wherein the electronic device is a camera comprising a battery, memory, and a microphone.

36. The method of any of Claims 29-35, wherein the first connector is securely affixed to the attachment device without any adhesive material, and wherein the second connector is securely affixed to the attachment device without any adhesive material.

37. The method of any of Claims 29-36, wherein locking further comprises locking the second end of the first plate to the second end of the second plate such that the attachment device remains coupled to the eyewear frame during motion of the wearer.

38. The method of any of Claims 29-37, further comprising adjusting the electronic device so that it points in a direction that is aligned with a path of the field of view of the wearer.

39. The method of any of Claims 29-38, further comprising maintaining a position of the electronic device during motion of the wearer.

40. The method of any of Claims 29-39, wherein the electronic device rotates about an axis perpendicular to a support member of the headwear apparatus frame.

41. A method for removably coupling an attachment device to eyewear, the method comprising:

placing the attachment device against an inside end of a support member of an eyewear frame, wherein the attachment device comprises a first connector, and wherein the inside end is an end of the support member closer to a wearer of the eyewear frame;

rotating a second plate of the first connector about a hinge of the first connector, wherein the hinge couples a first end of a first plate of the first connector to a first end of the second plate, and wherein the second plate comprises a second connector that removably couples an electronic device to the attachment device; and

locking a second end of the first plate to a second end of the second plate.

42. The method of Claim 41, wherein the first connector is different than the second connector.

43. The method of Claim 41 or 42, wherein the first connector is a clip.

44. The method of any of Claims 41-43, wherein the second connector is a magnet.

45. The method of any of Claims 41-44, wherein the locking further comprises:

squeezing the second plate against an outside end of the support member of the eyewear frame; and

inserting a lip of the first plate into an opening of the second plate to hold the second plate against the outside end.

46. The method of any of Claims 41-45, wherein the electronic device is a device from the group comprising of a flashlight, a camera, a microphone, and a laser pointer.

47. The method of any of Claims 41-46, wherein the electronic device is a camera comprising a battery, memory, and a microphone.

48. The method of any of Claims 41-47, wherein the first connector is securely affixed to the attachment device without any adhesive material, and wherein the second connector is securely affixed to the attachment device without any adhesive material.

49. The method of any of Claims 41-48, wherein locking further comprises locking the second end of the first plate to the second end of the second plate such that the attachment device remains coupled to the eyewear frame during motion of the wearer.

50. The method of any of Claims 41-49, further comprising adjusting the electronic device so that it points in a direction that is aligned with a path of the field of view of the wearer.

51. The method of any of Claims 41-50, further comprising maintaining a position of the electronic device during motion of the wearer.

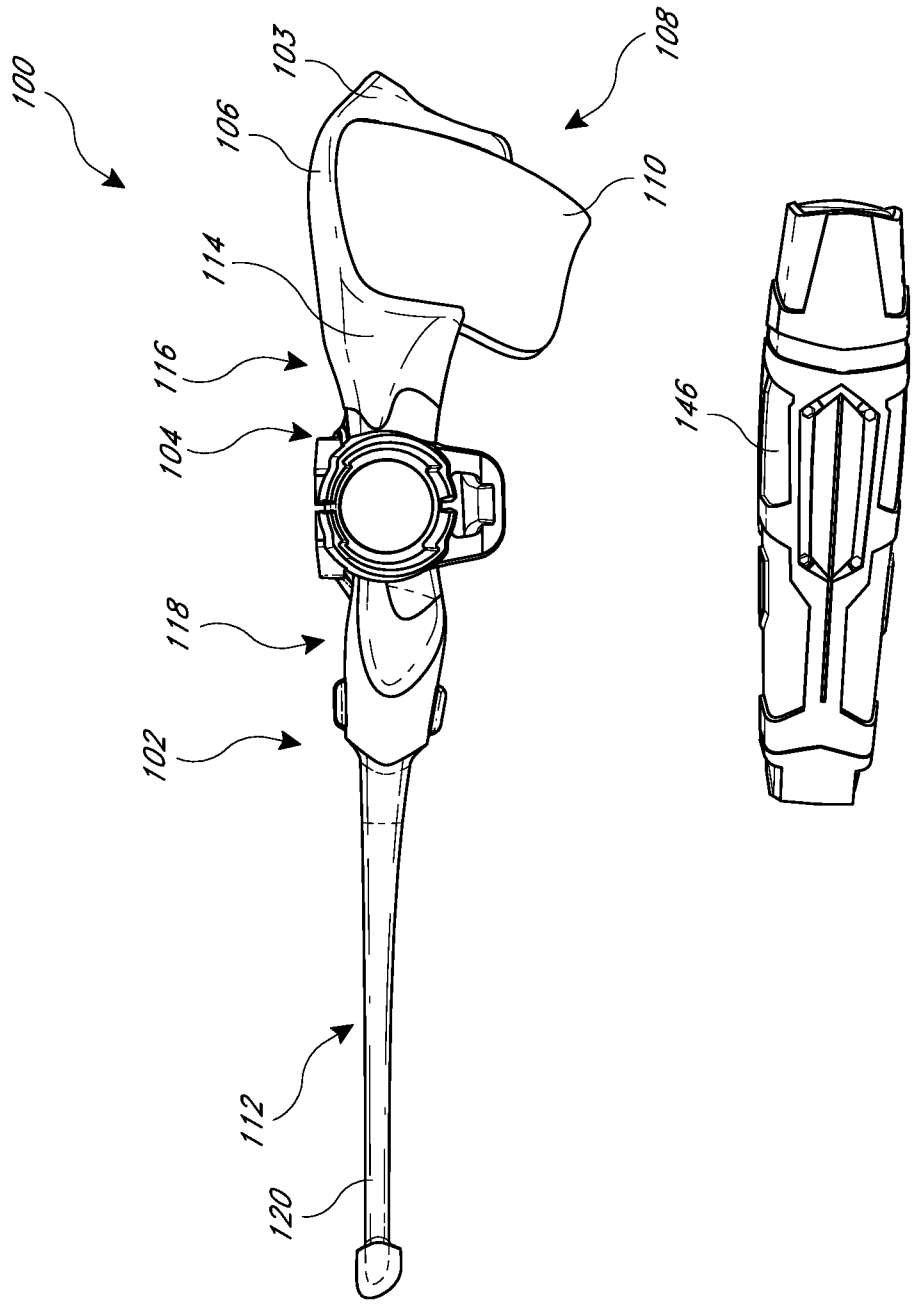

FIG. 1

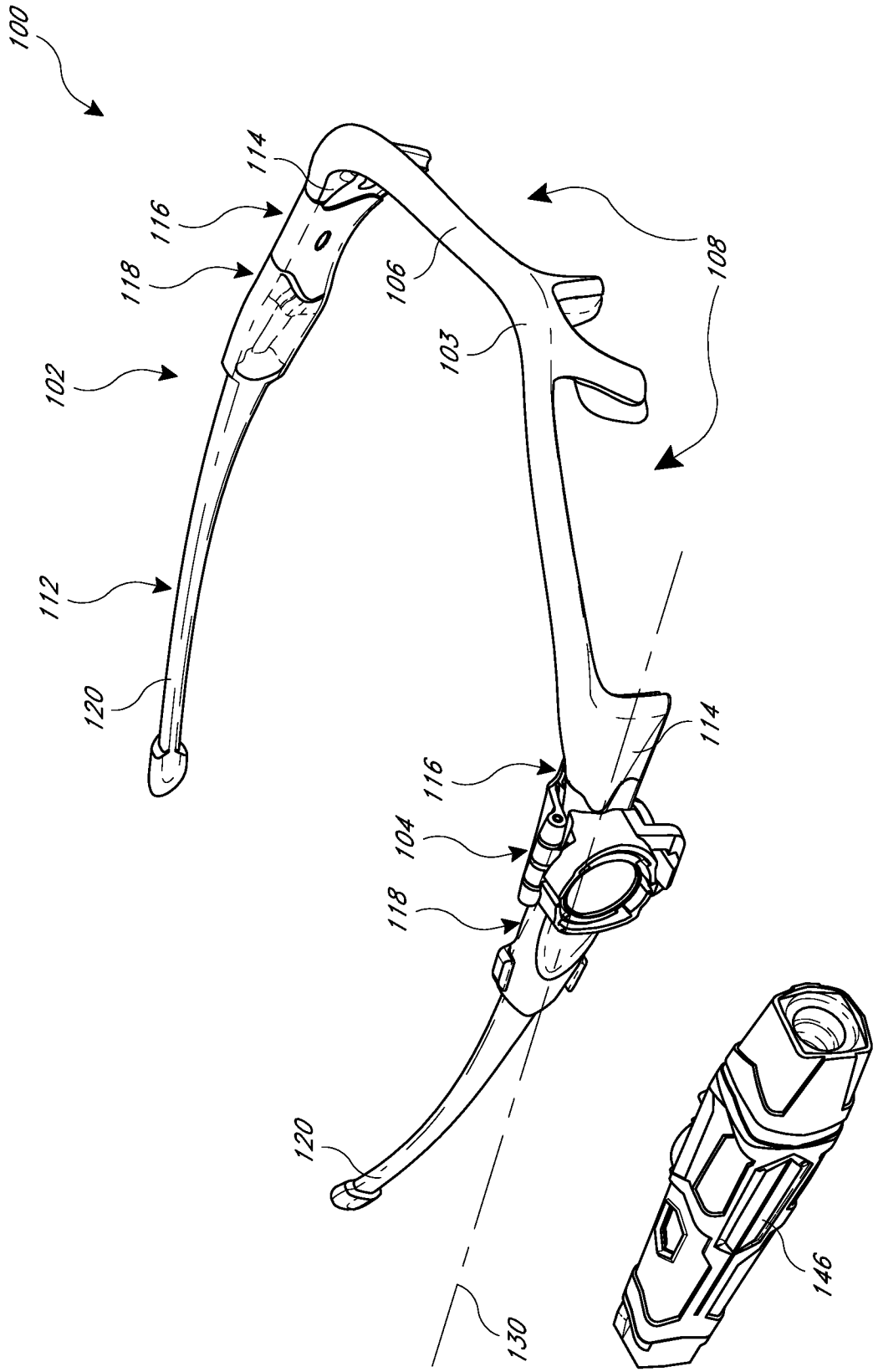
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FIG. 2

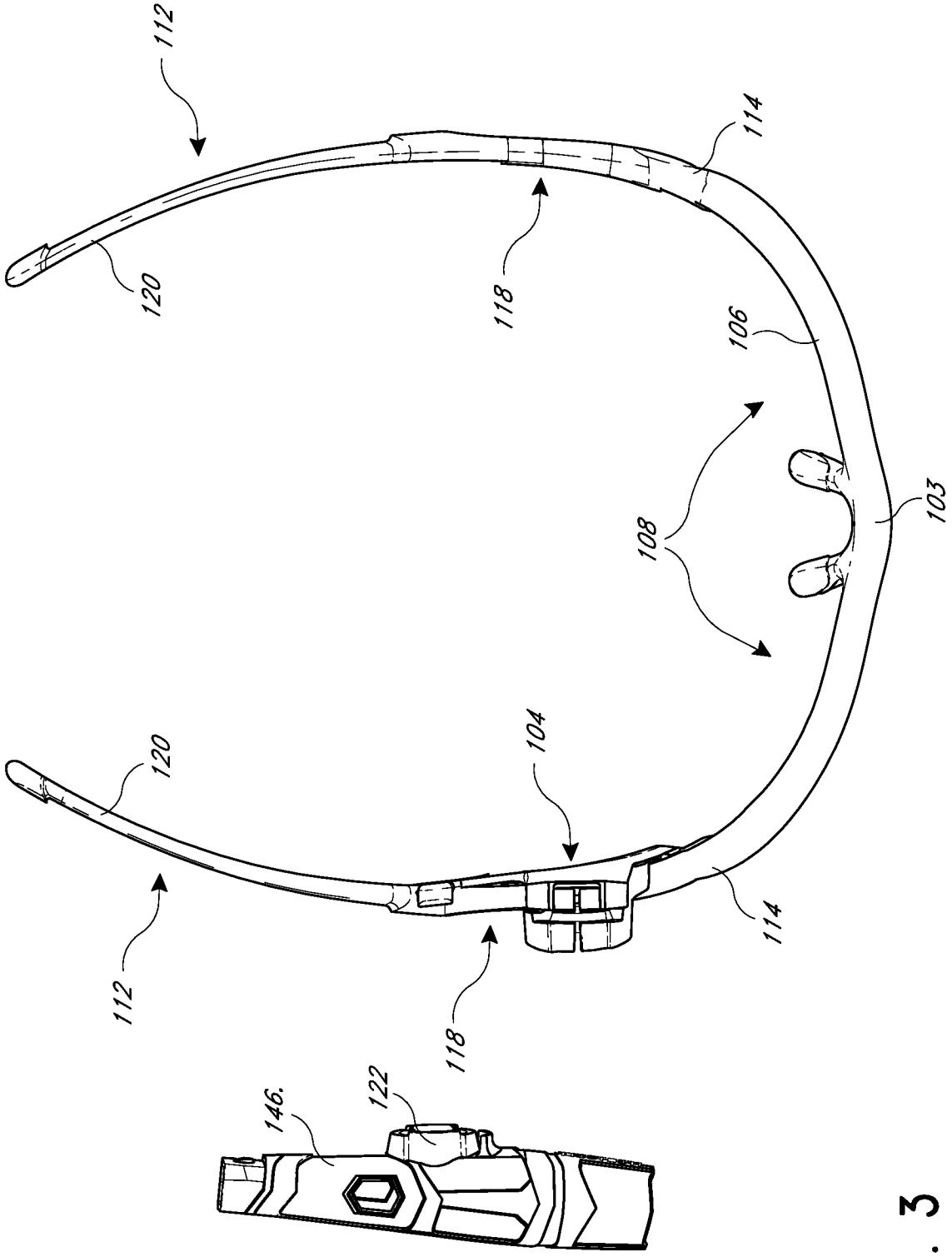

FIG. 3

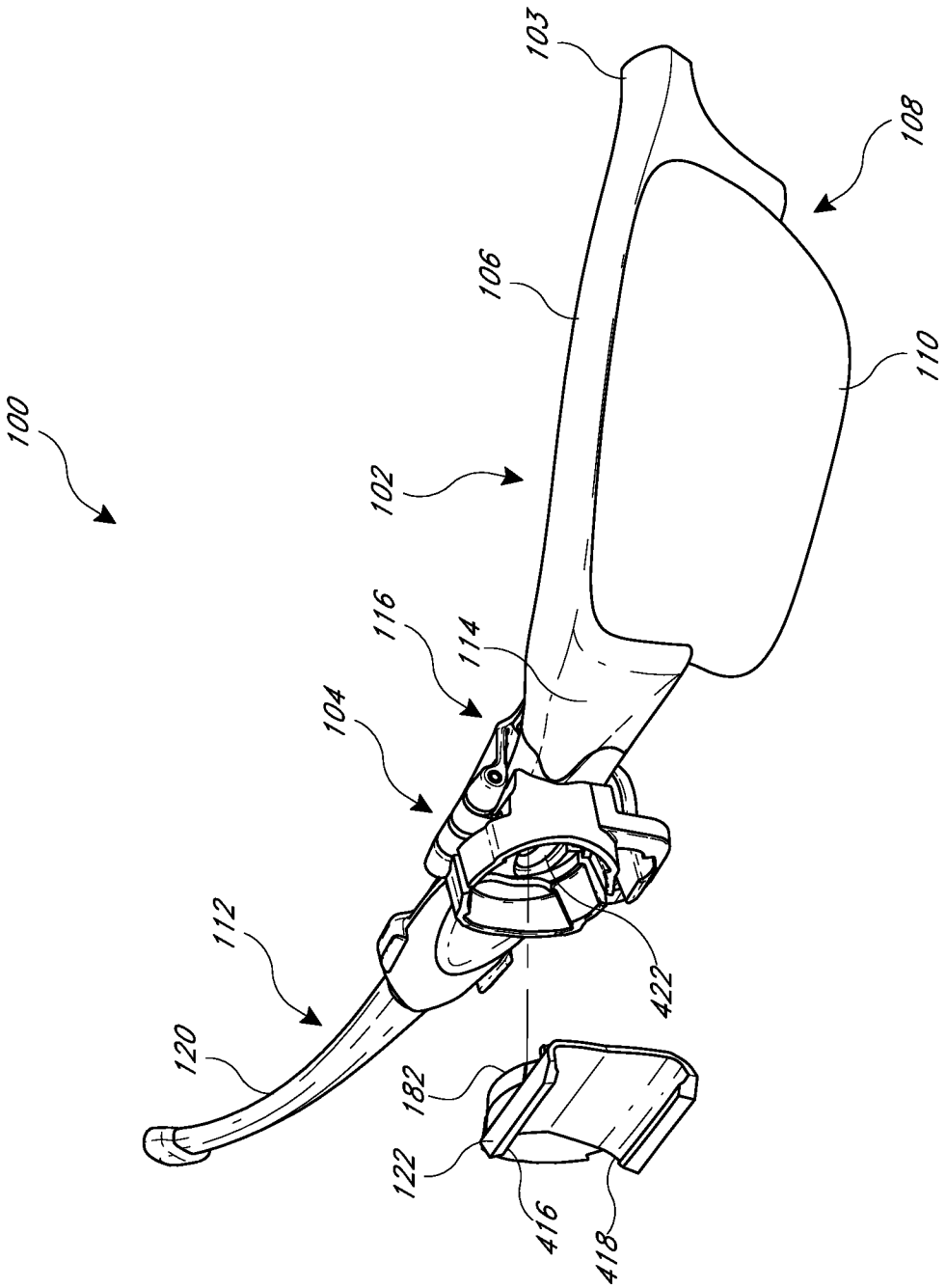

FIG. 4

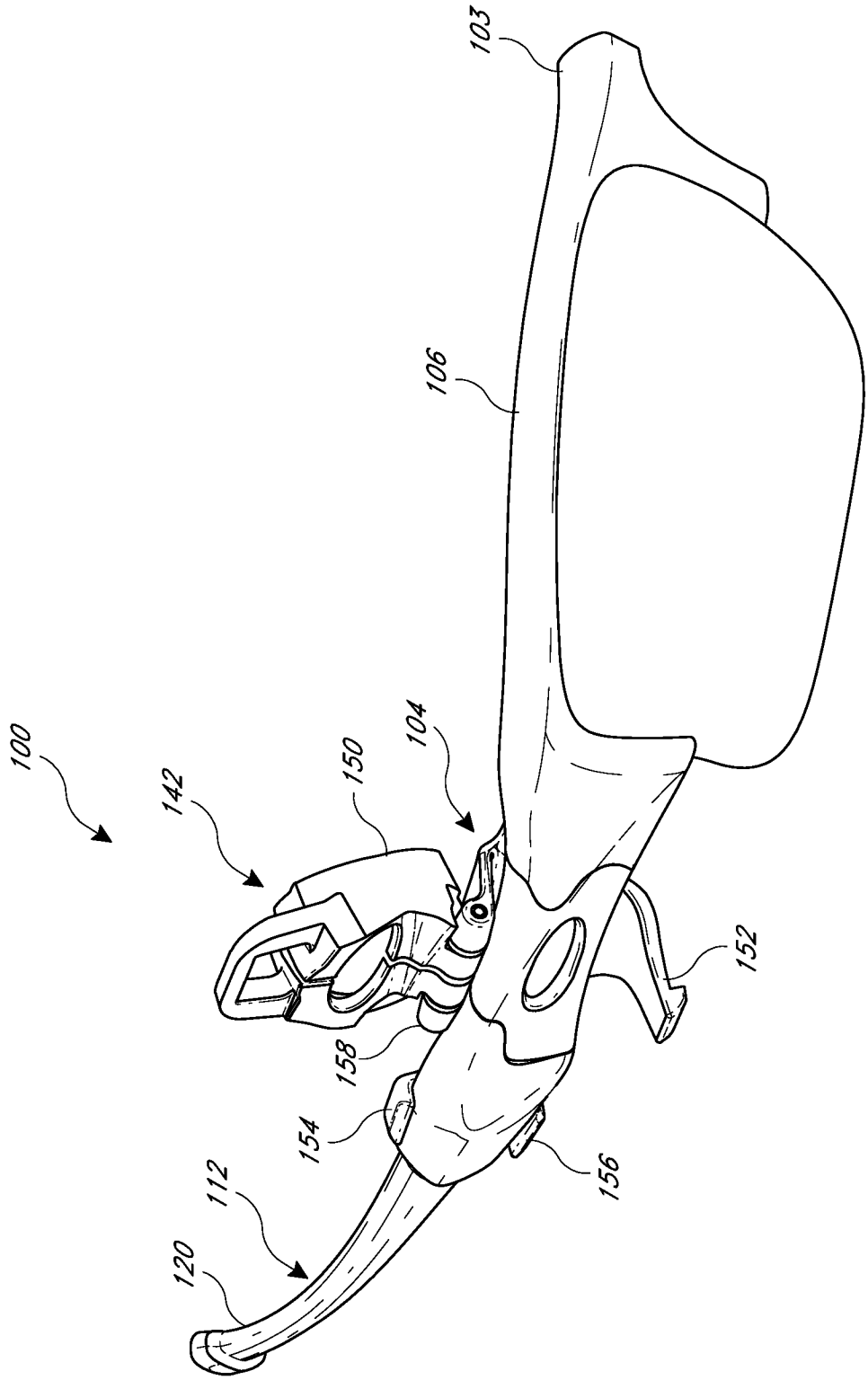

FIG. 5

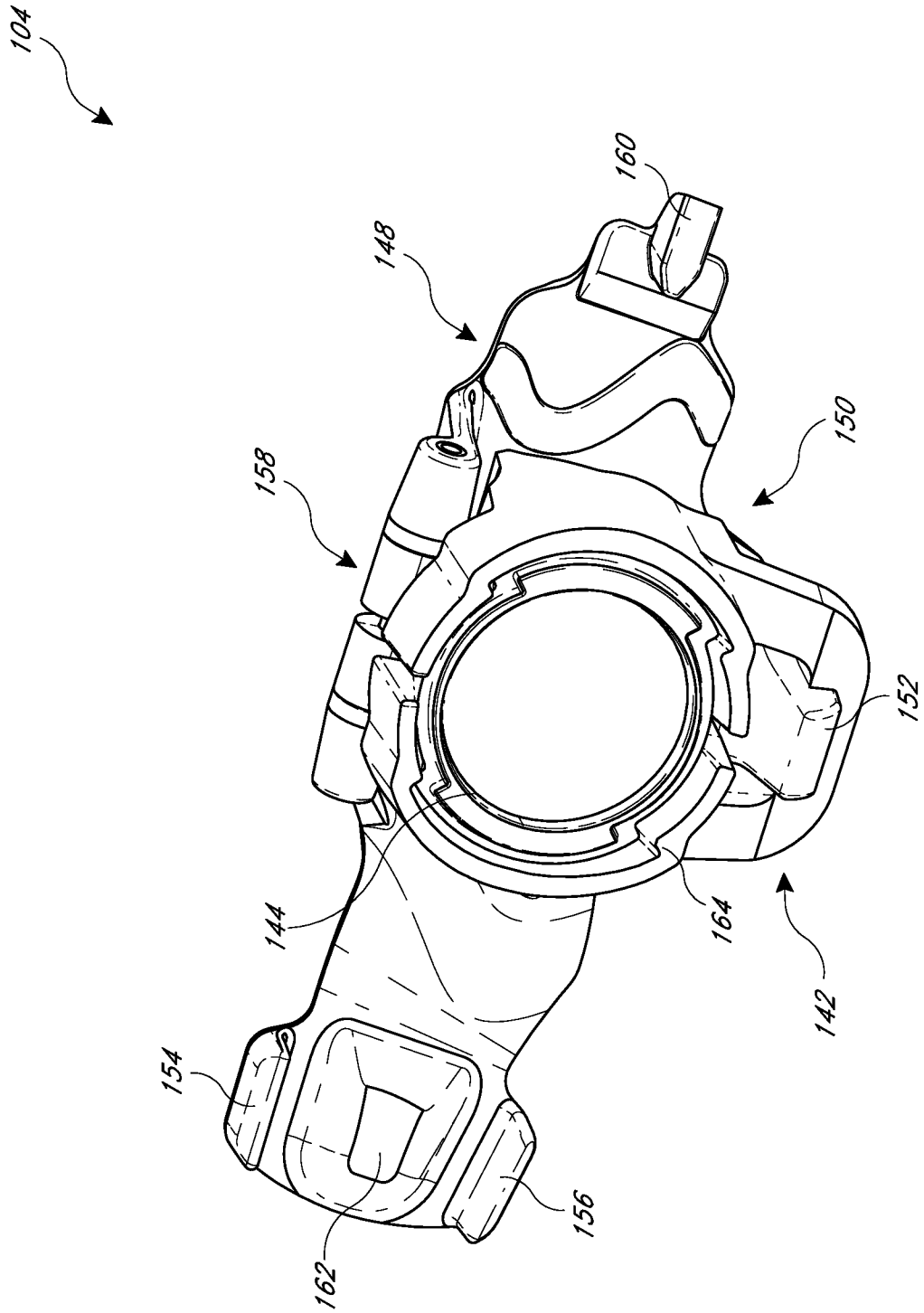

FIG. 6

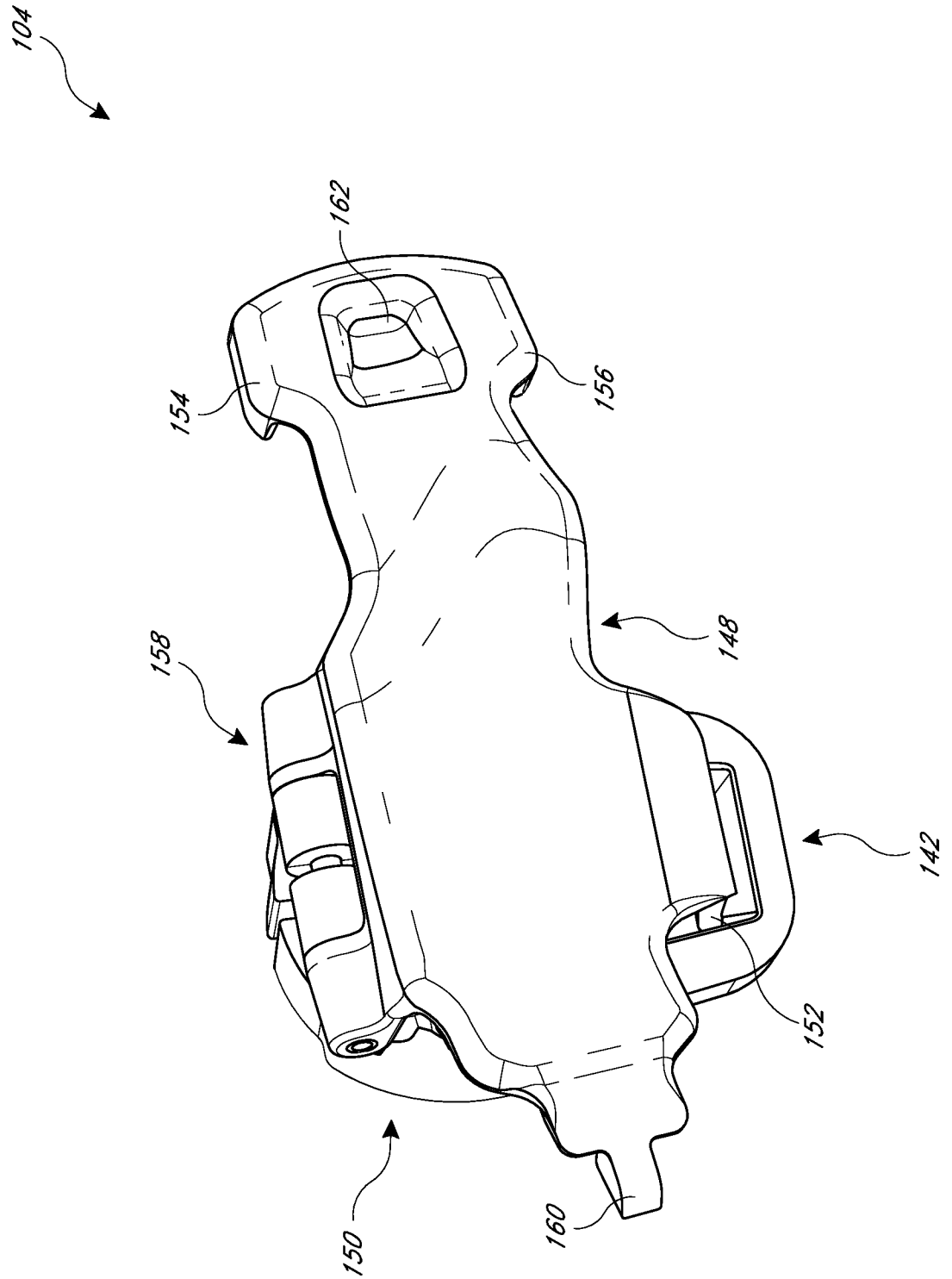

FIG. 7

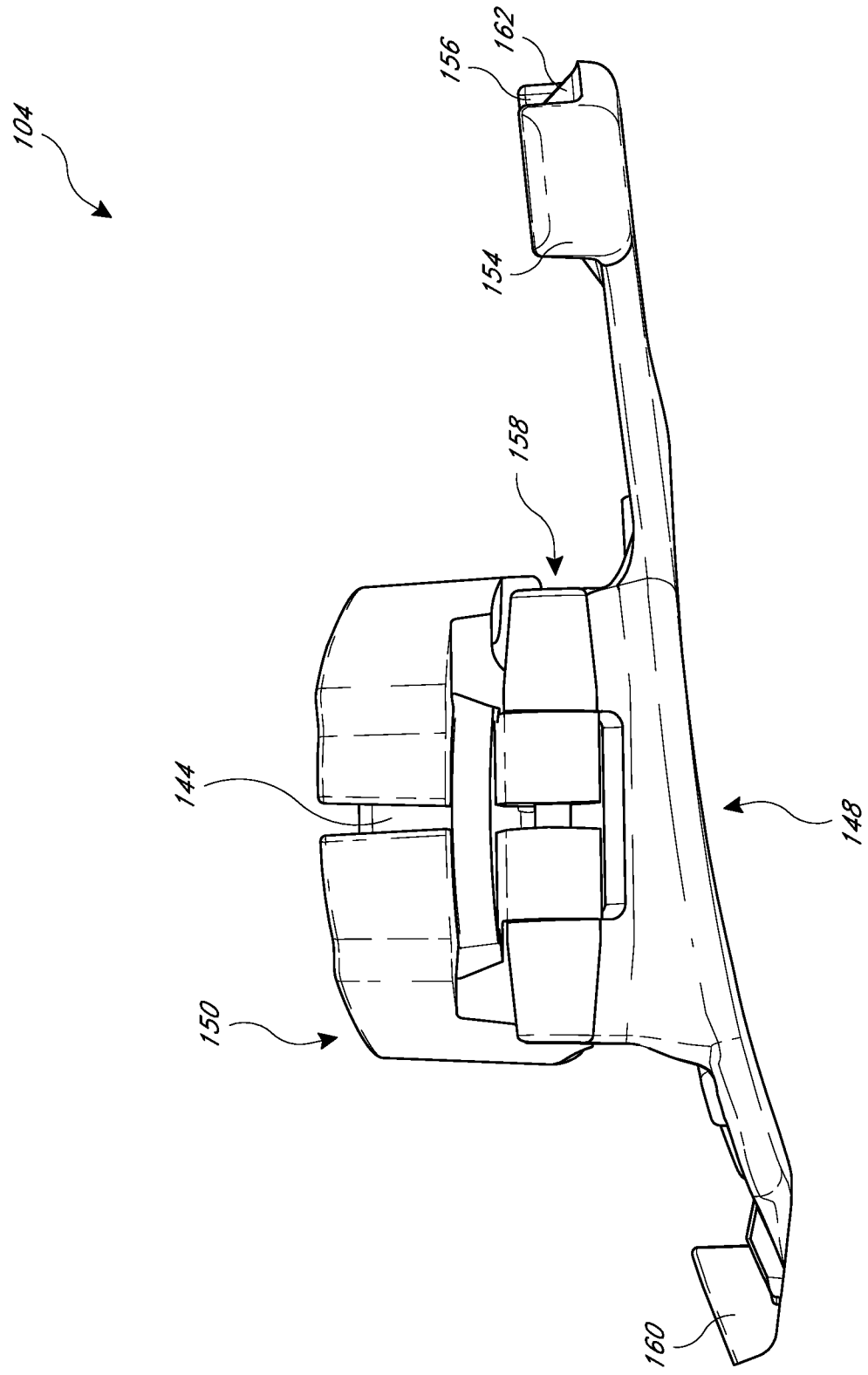

FIG. 8

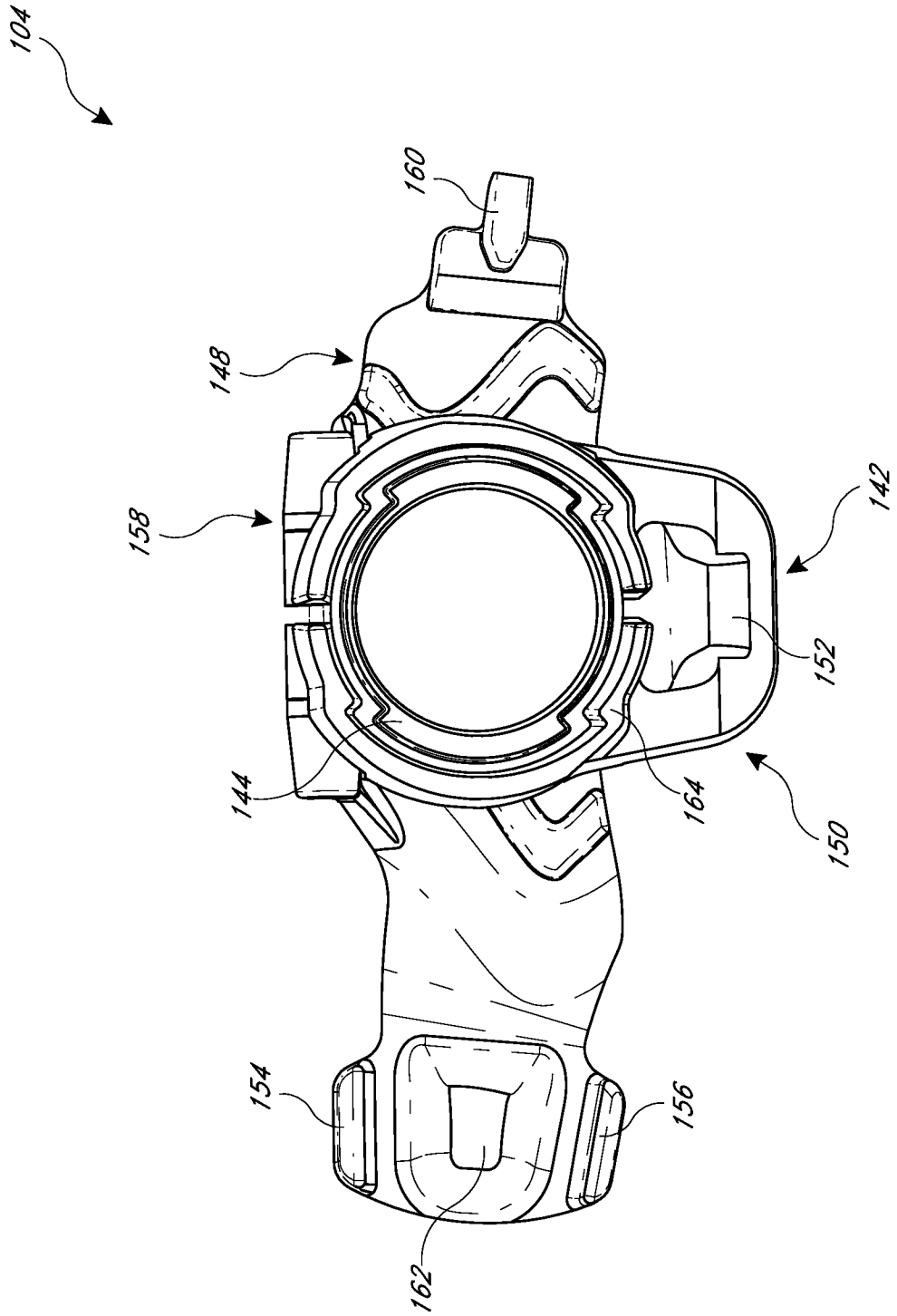

FIG. 9

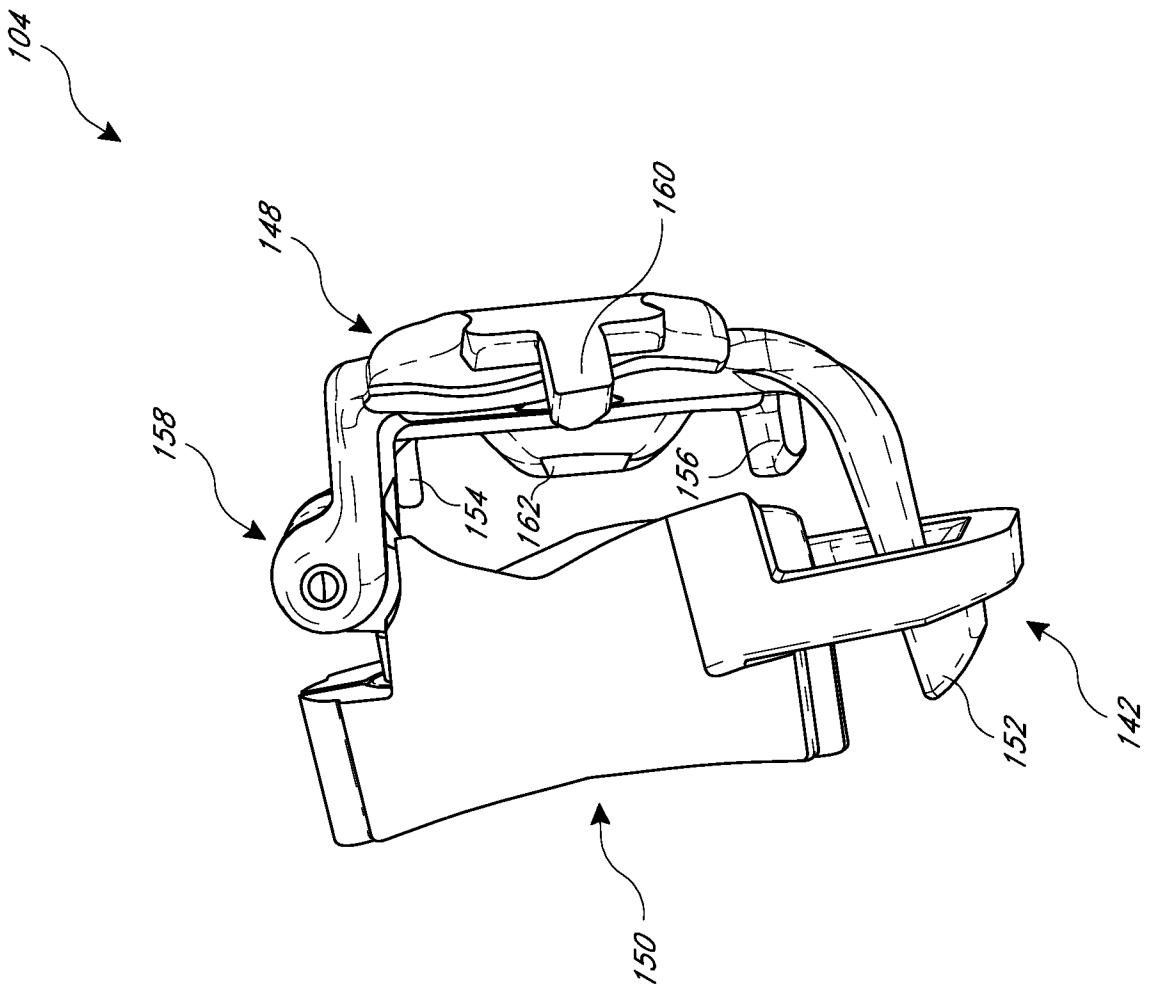

FIG. 10

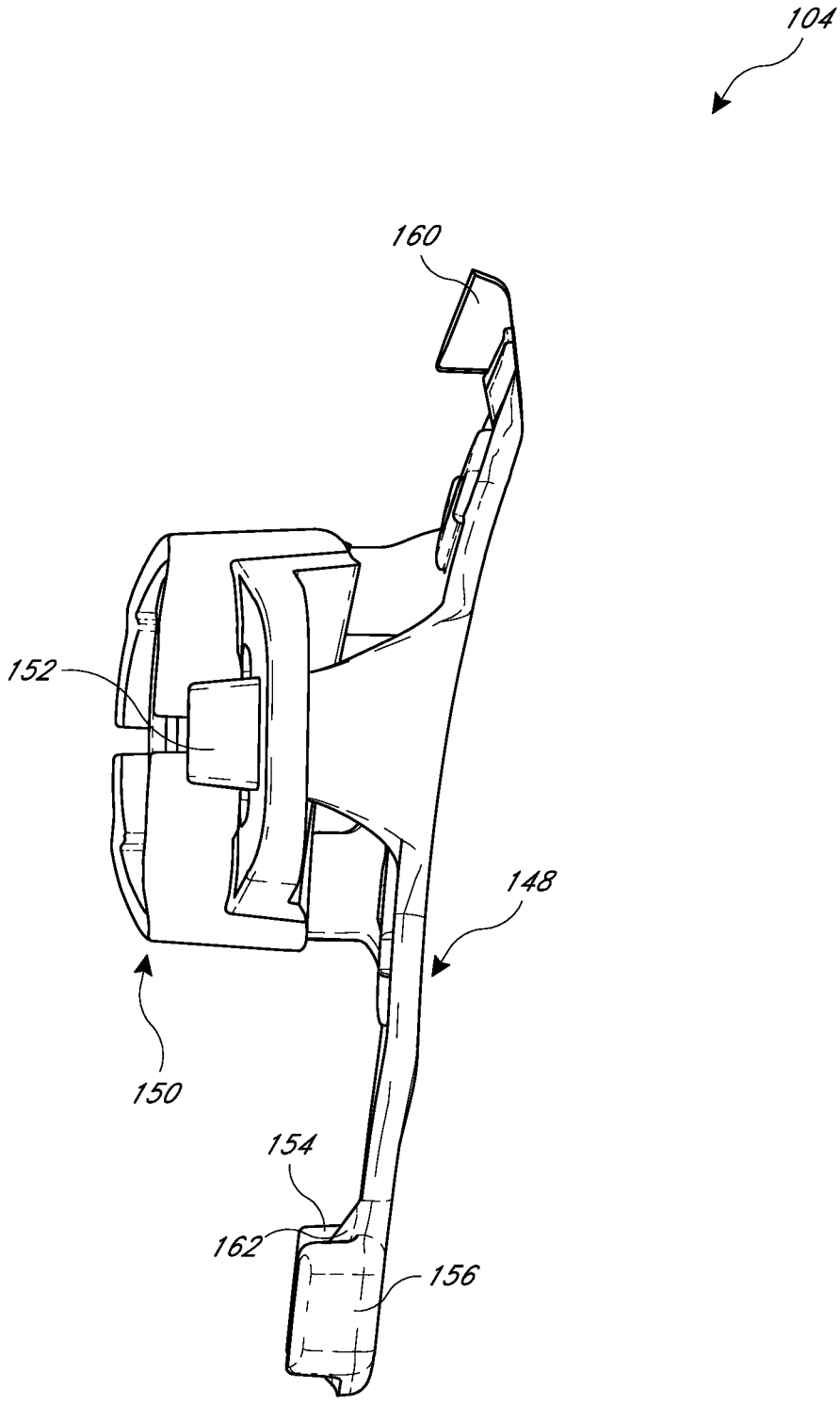

FIG. 11

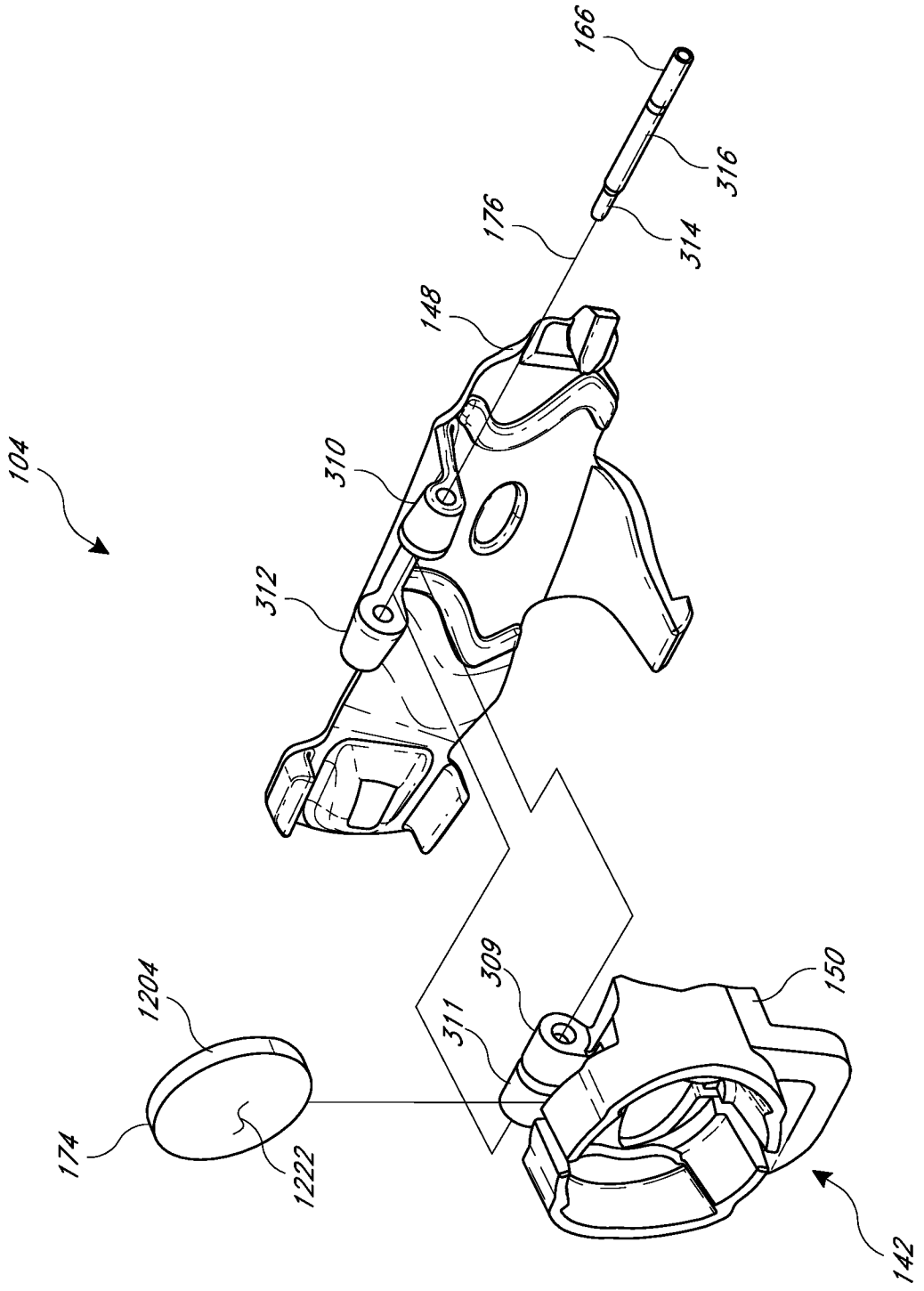

FIG. 12

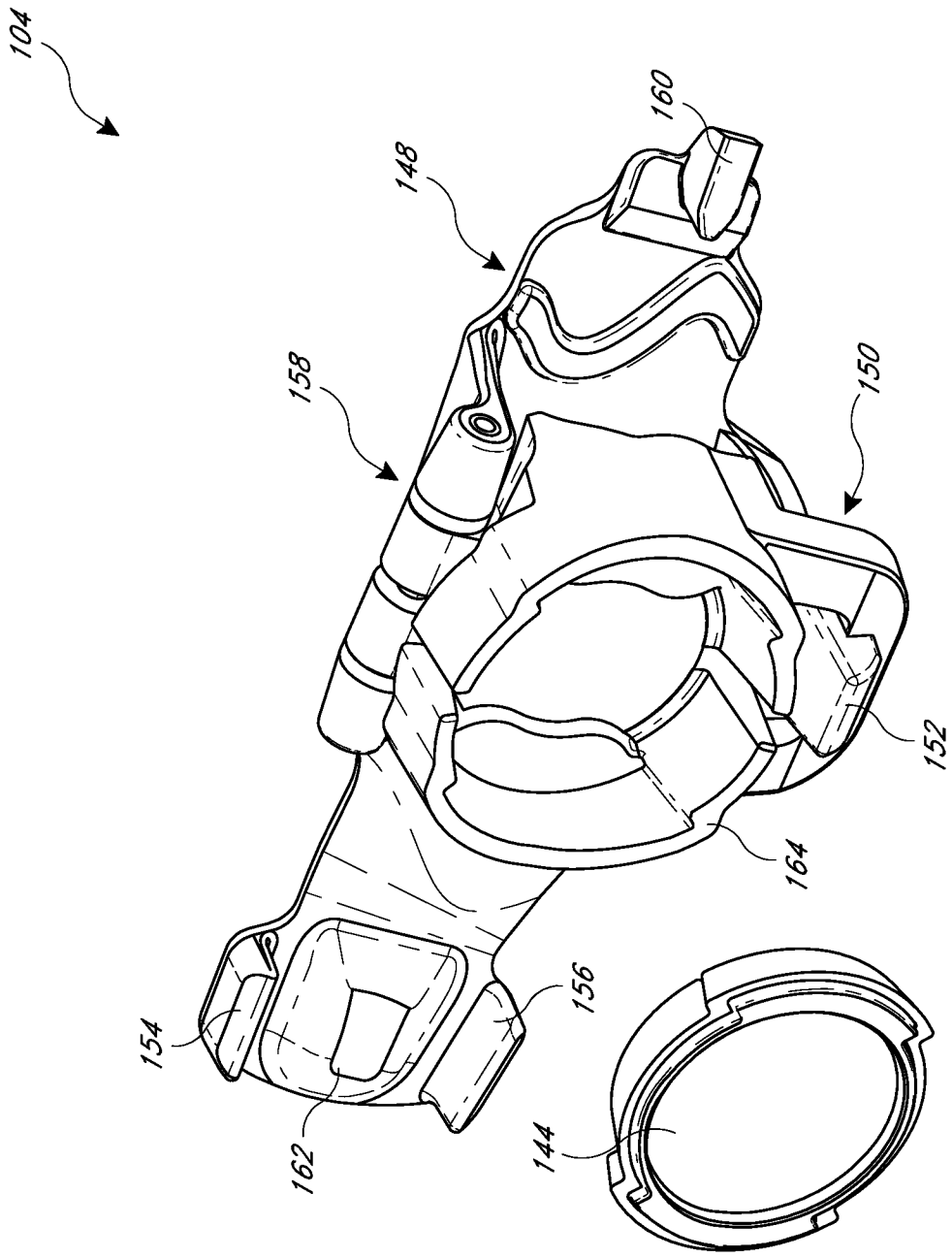

FIG. 13

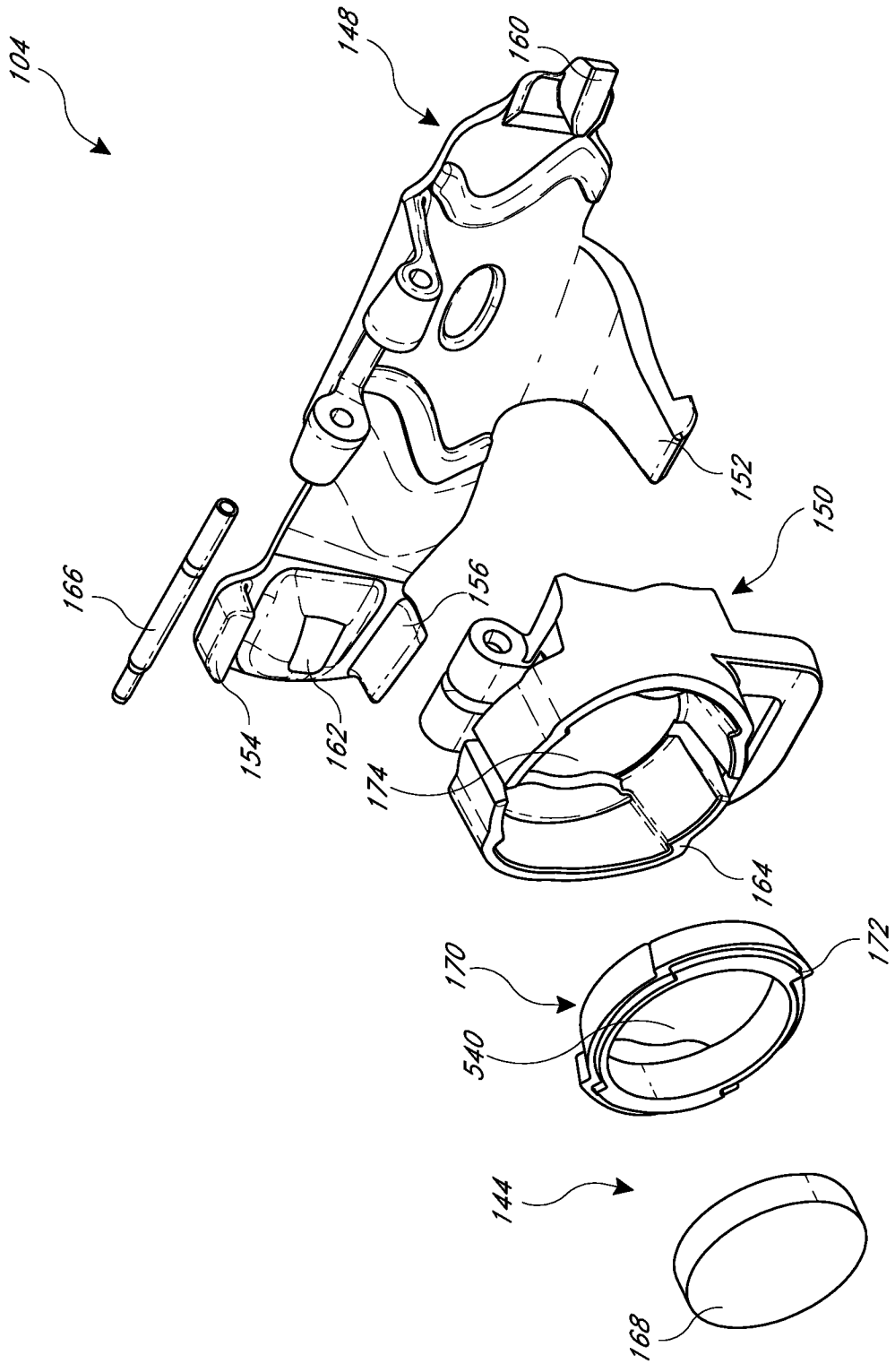

FIG. 14

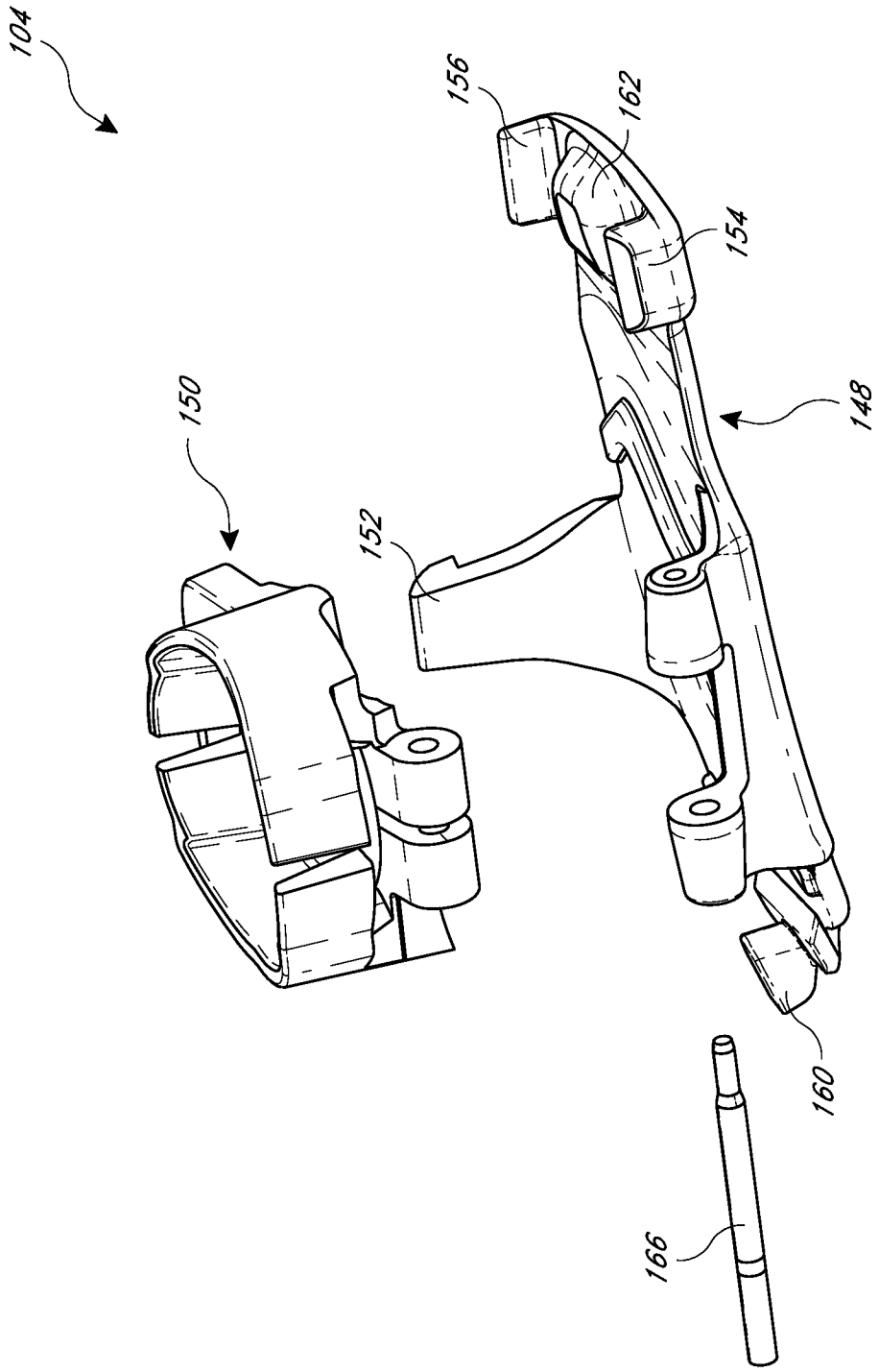

FIG. 15

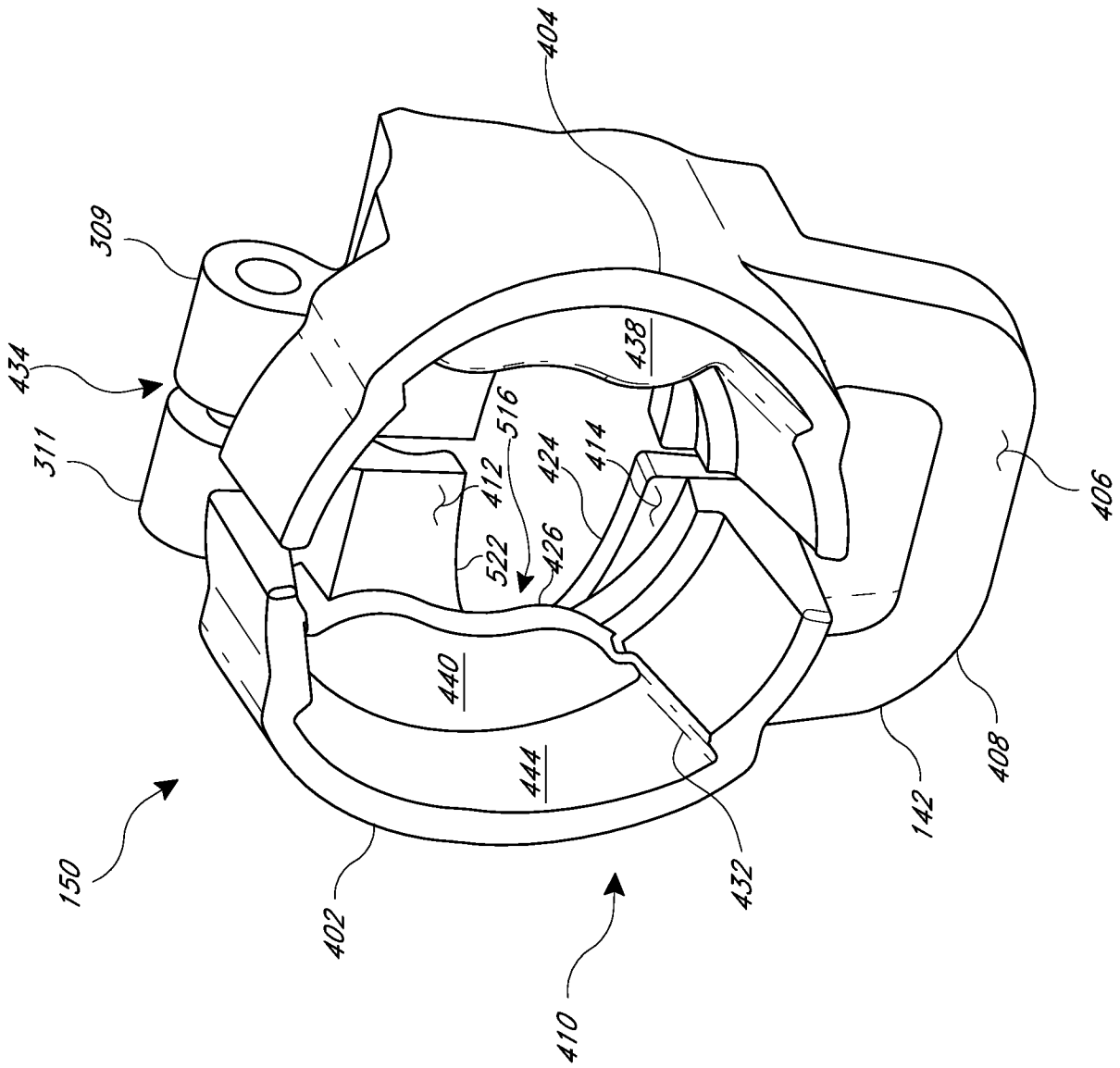
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FIG. 16

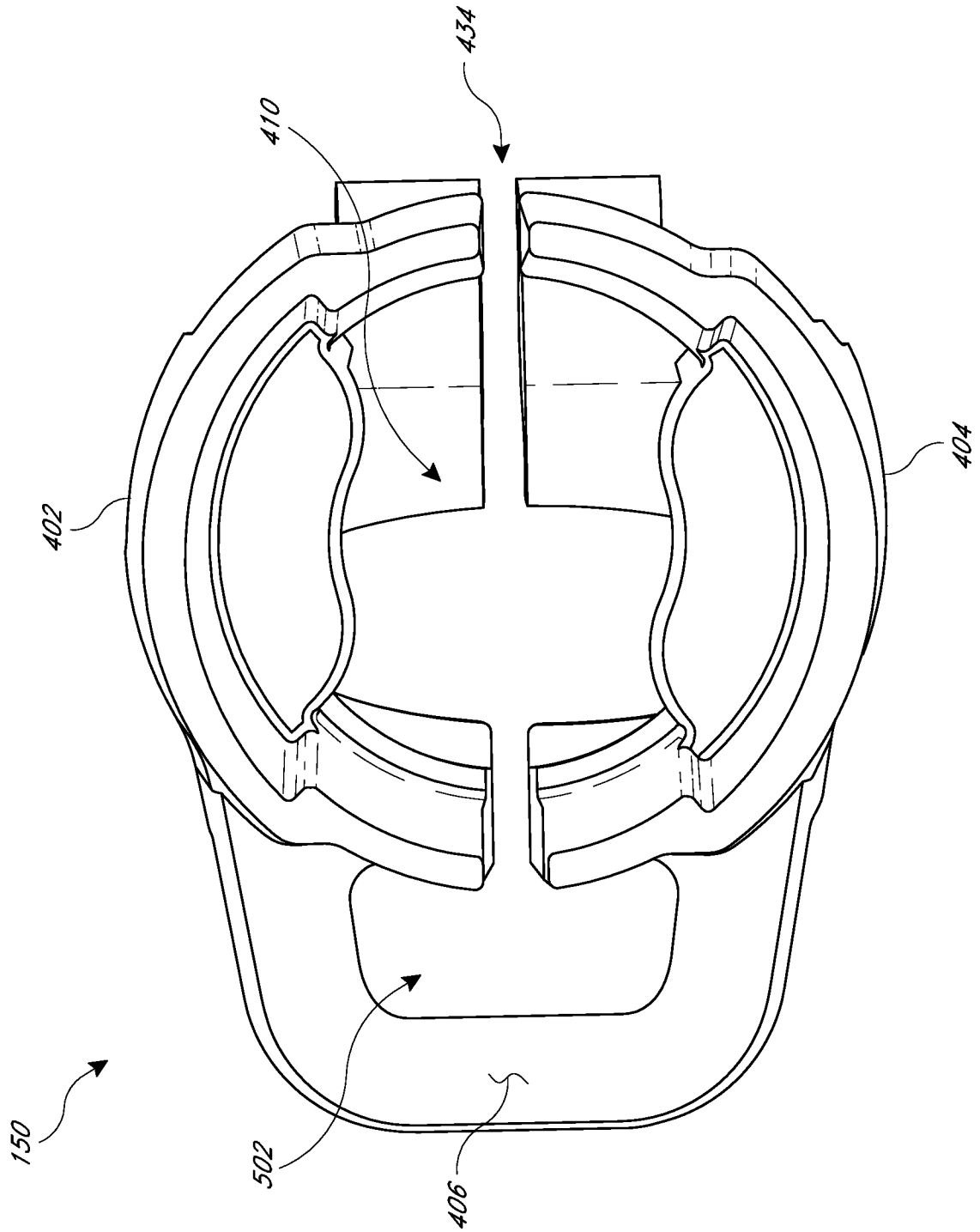

FIG. 17

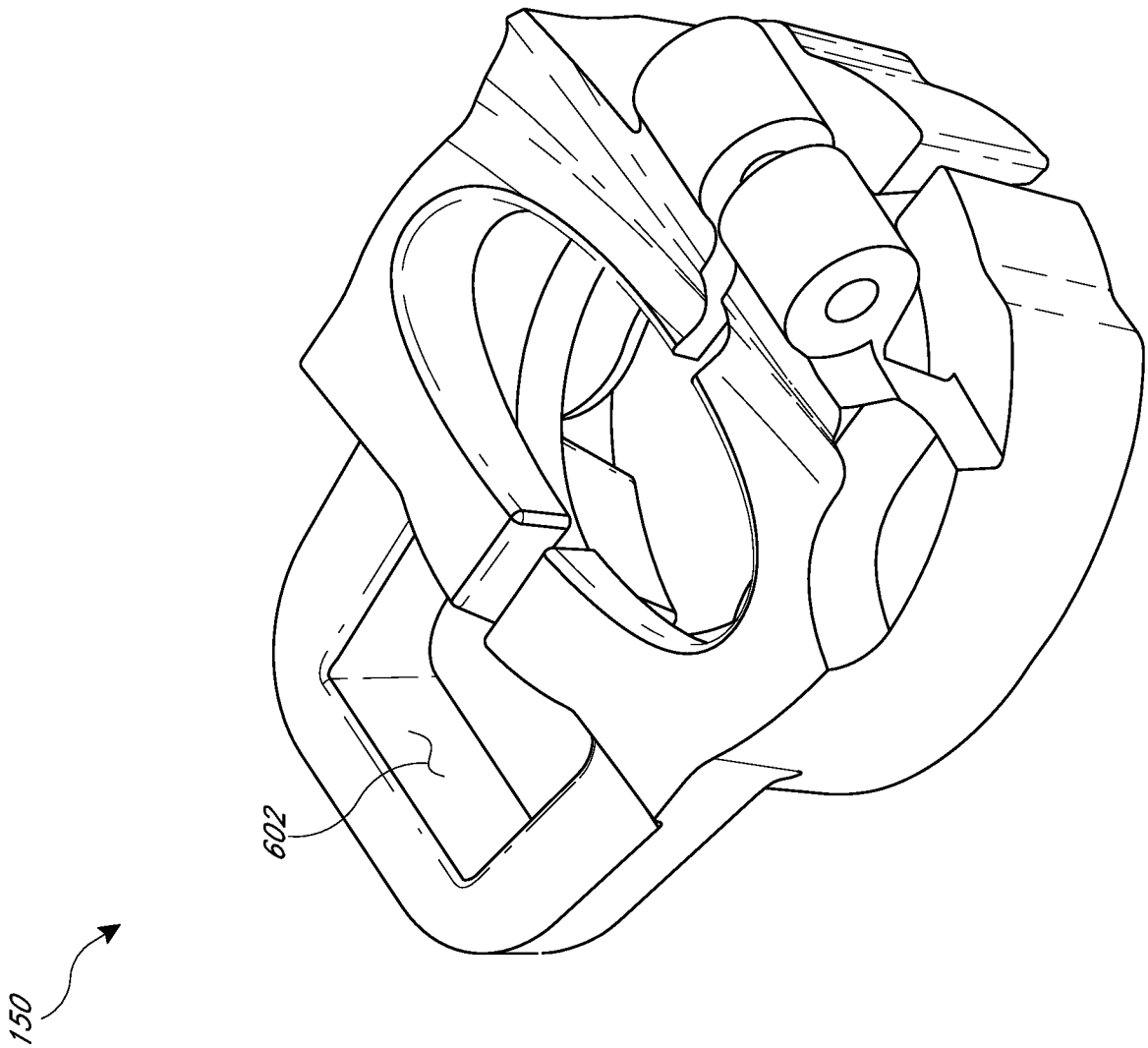

FIG. 18

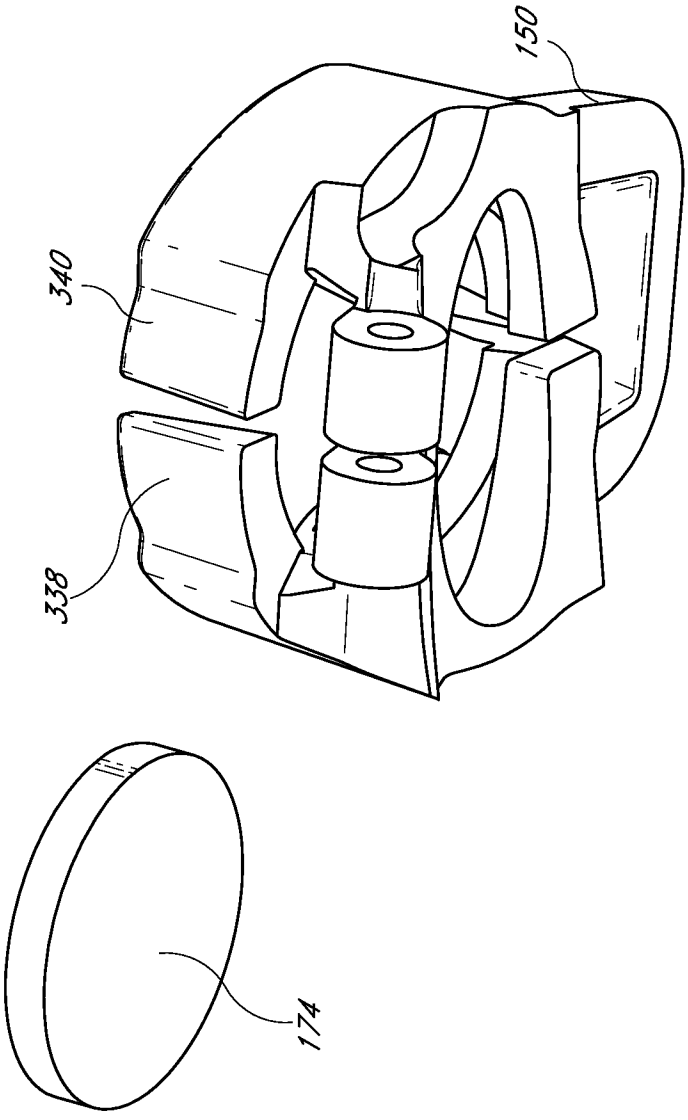

FIG. 19A

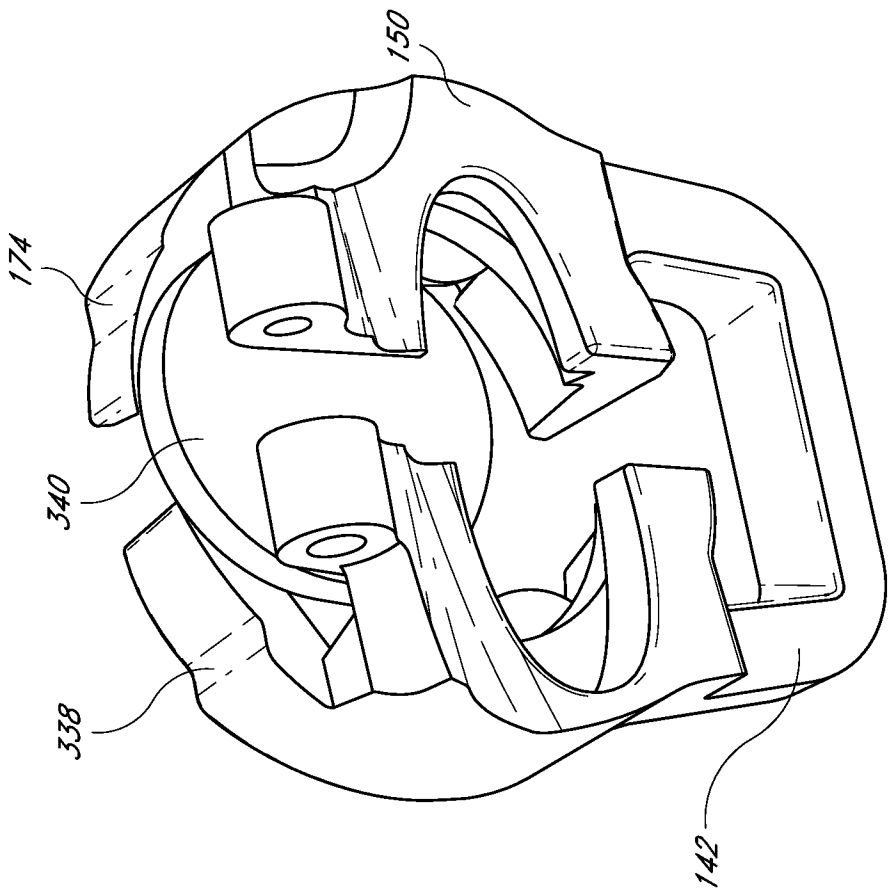

FIG. 19B

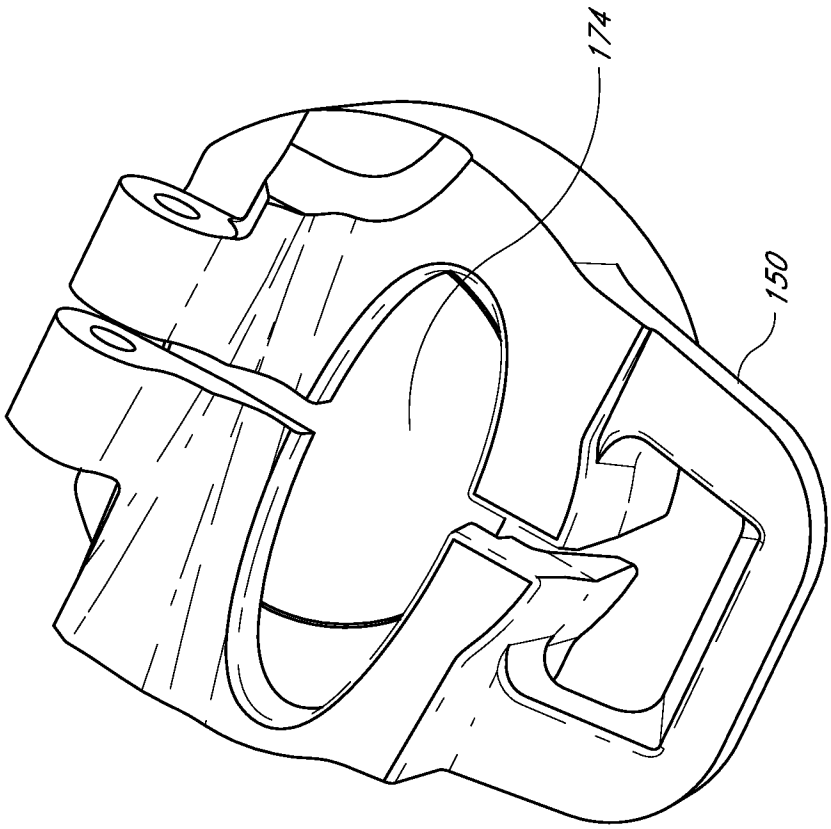

FIG. 20A

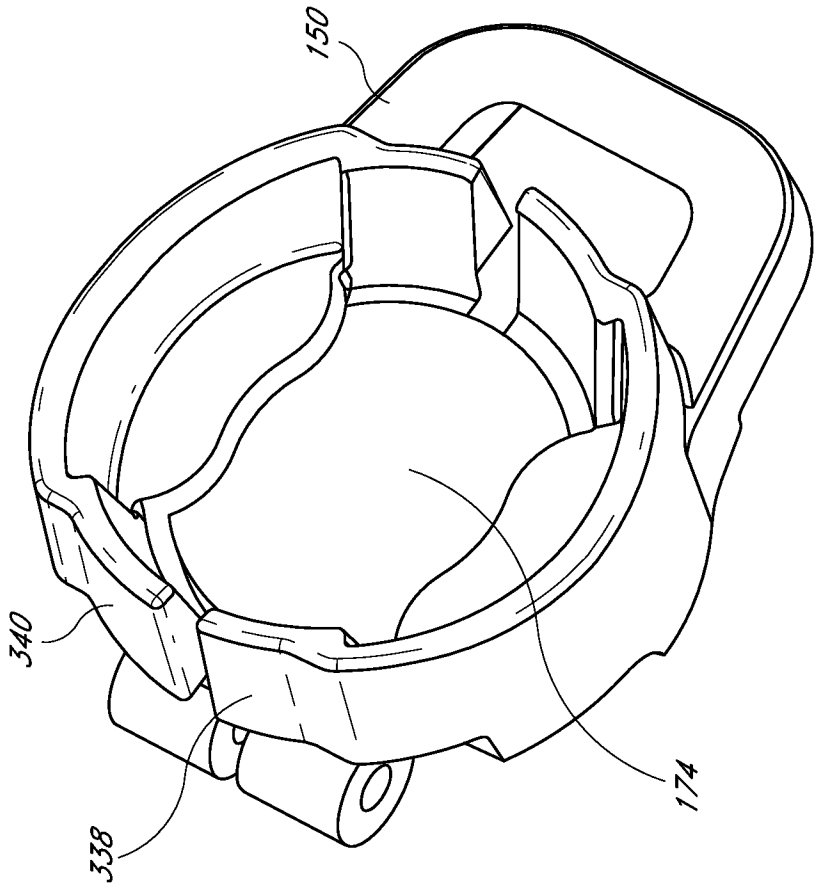

FIG. 20B

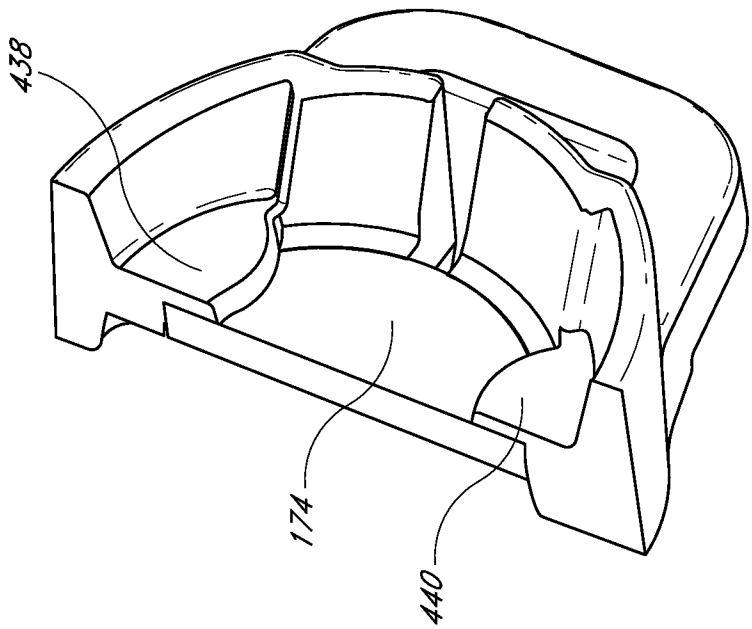

FIG. 2IA

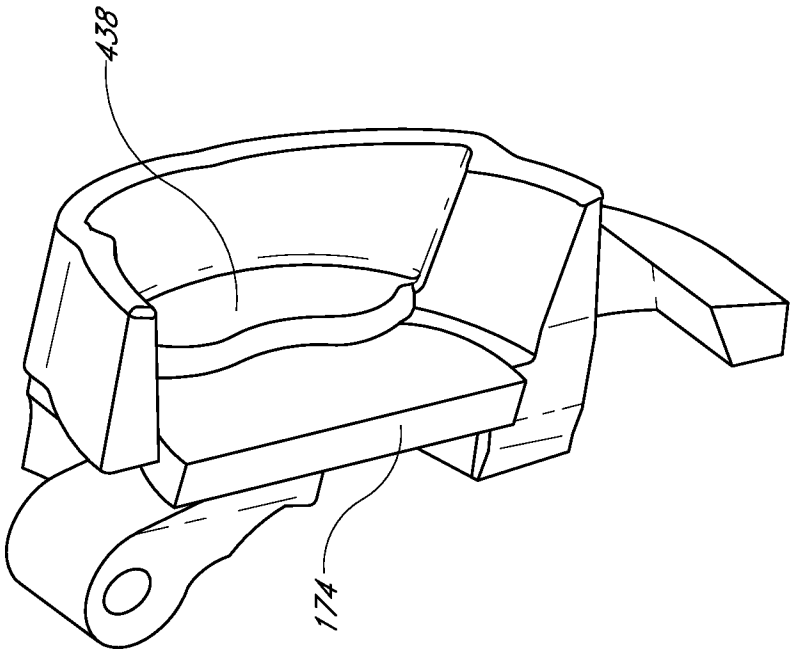

FIG. 2IB

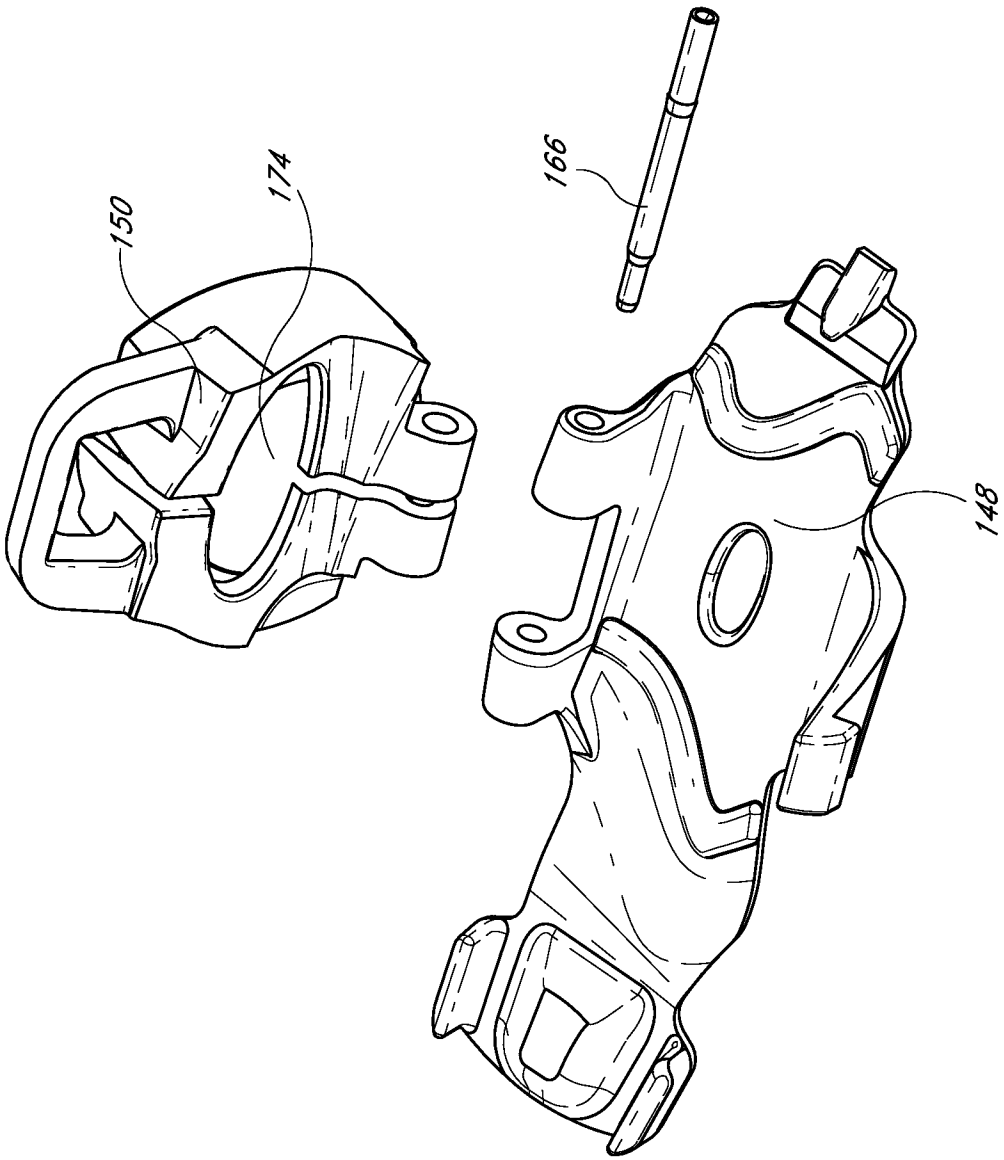

FIG. 22A

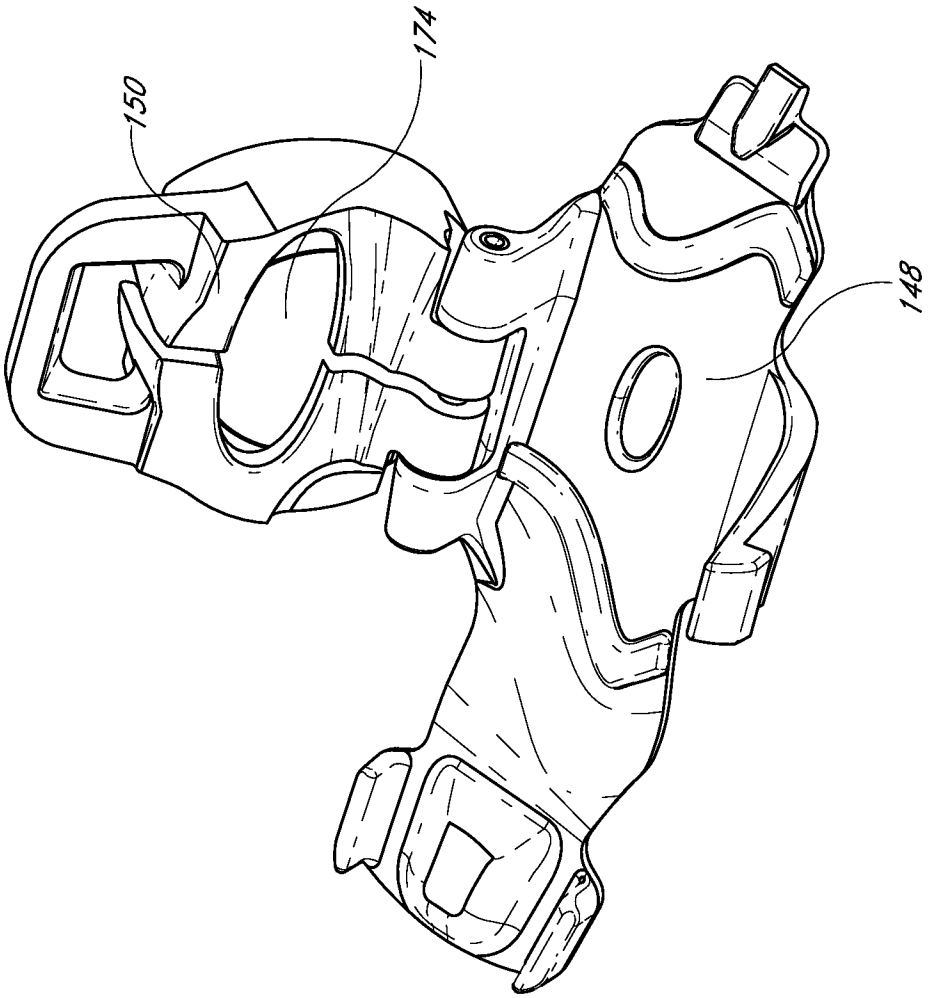

FIG. 22B

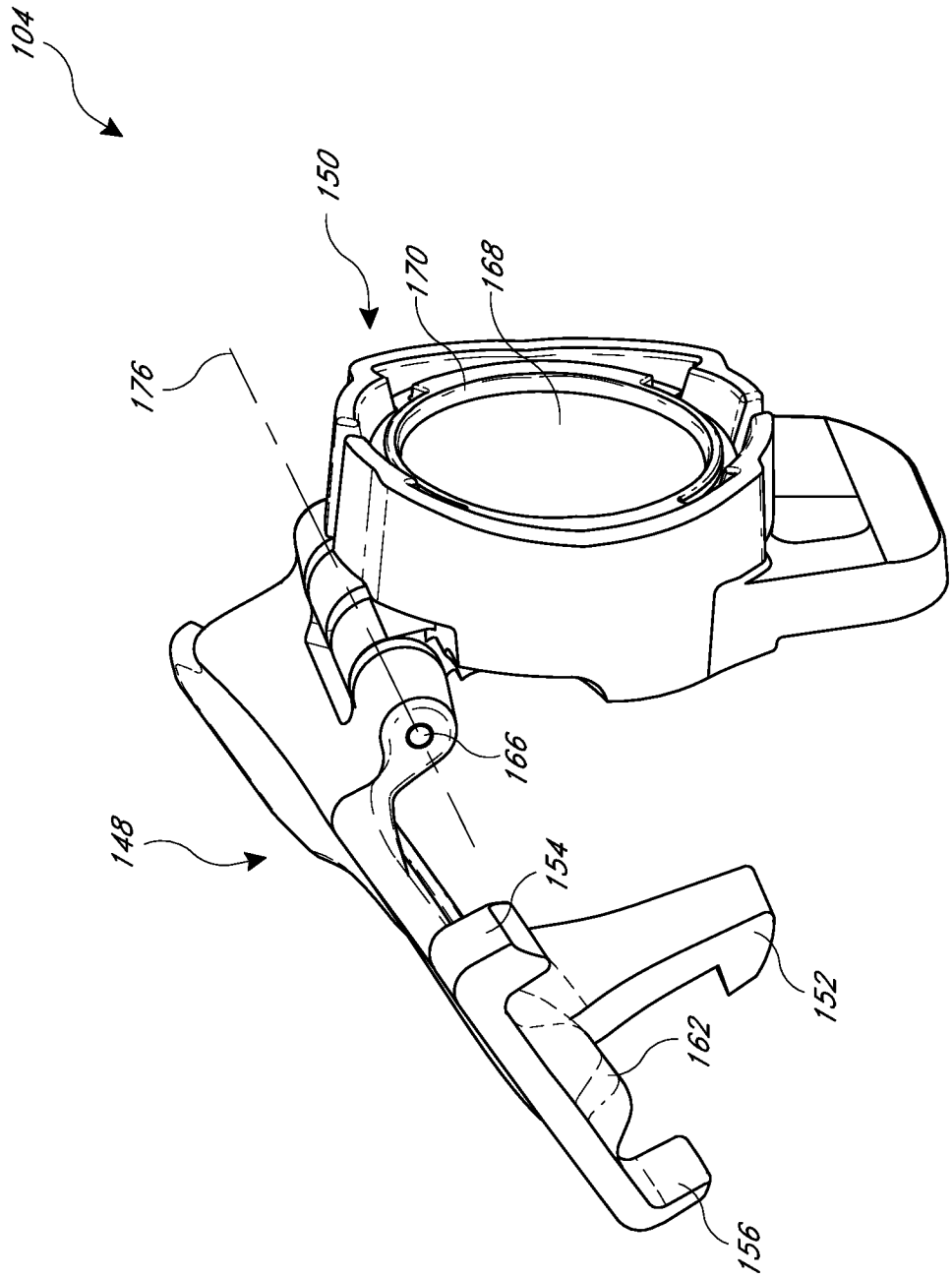

FIG. 23

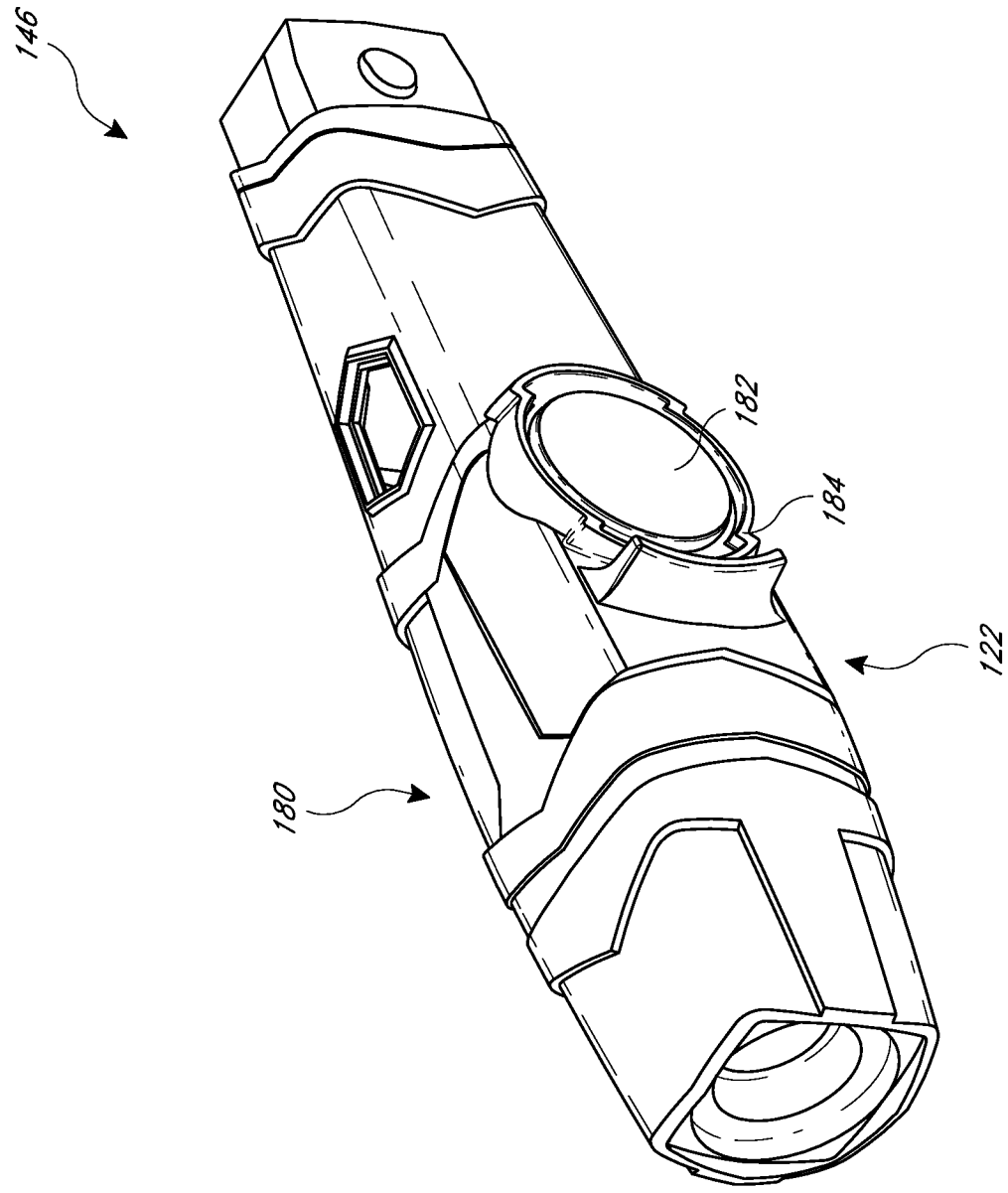

FIG. 24

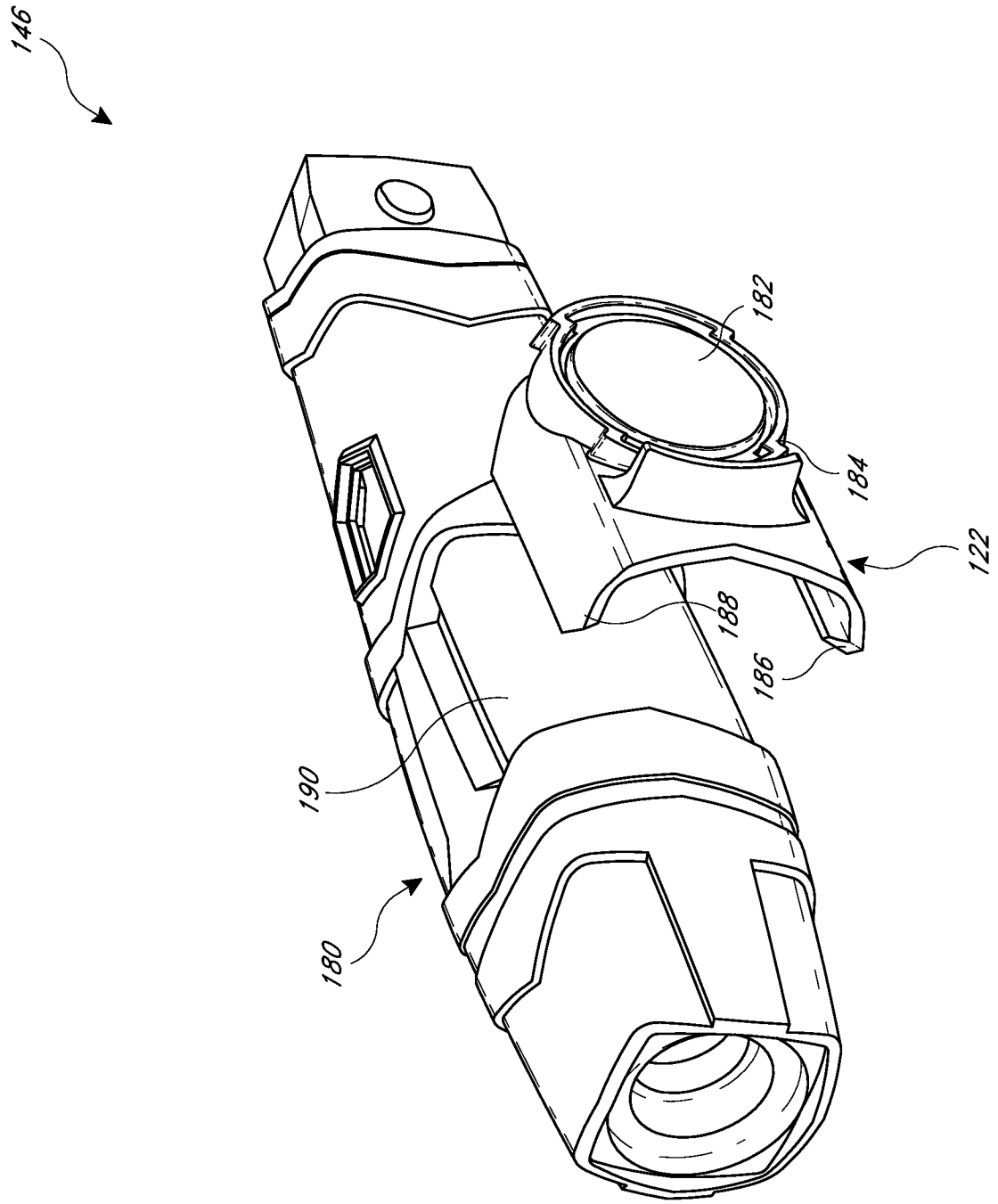

FIG. 25

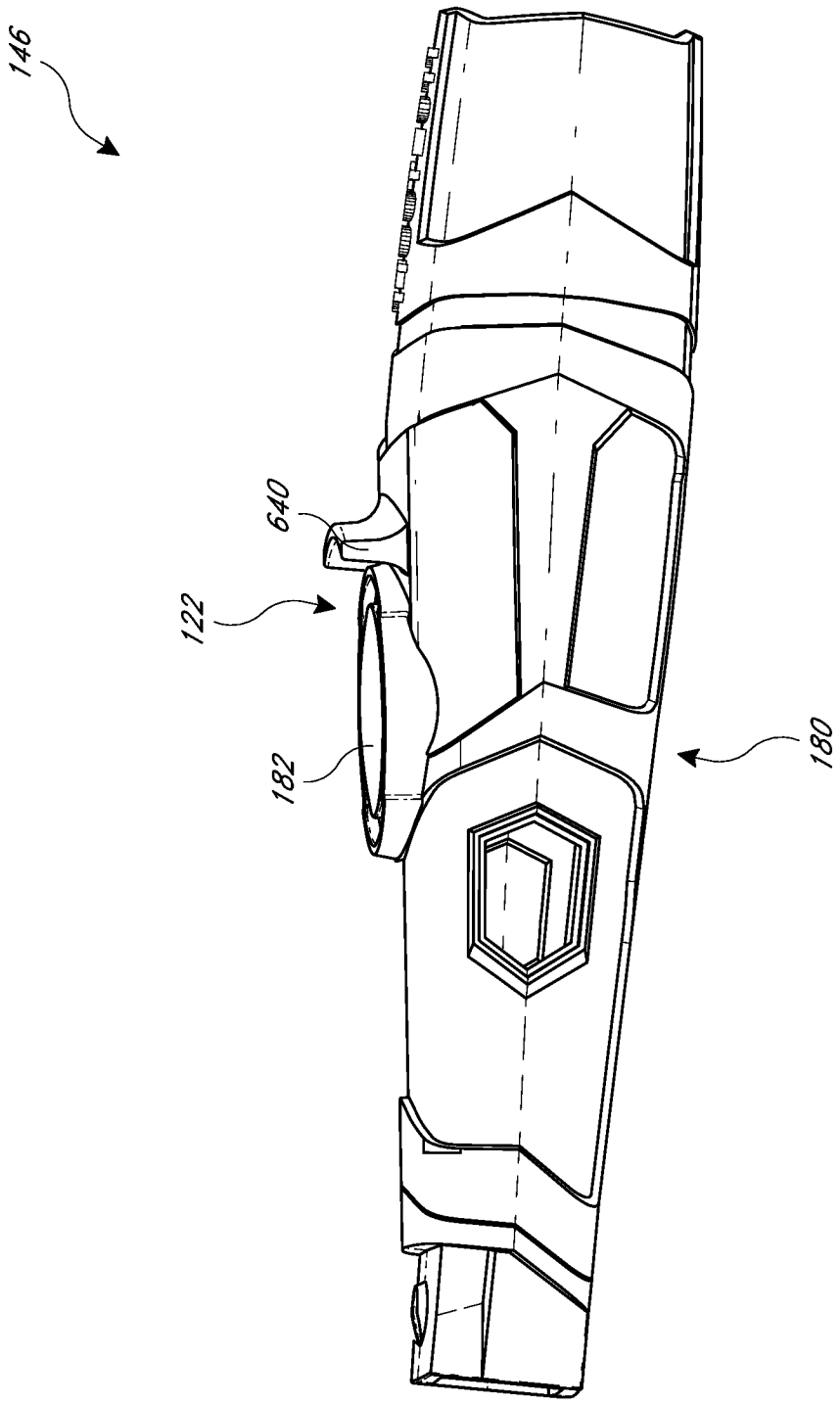

FIG. 26

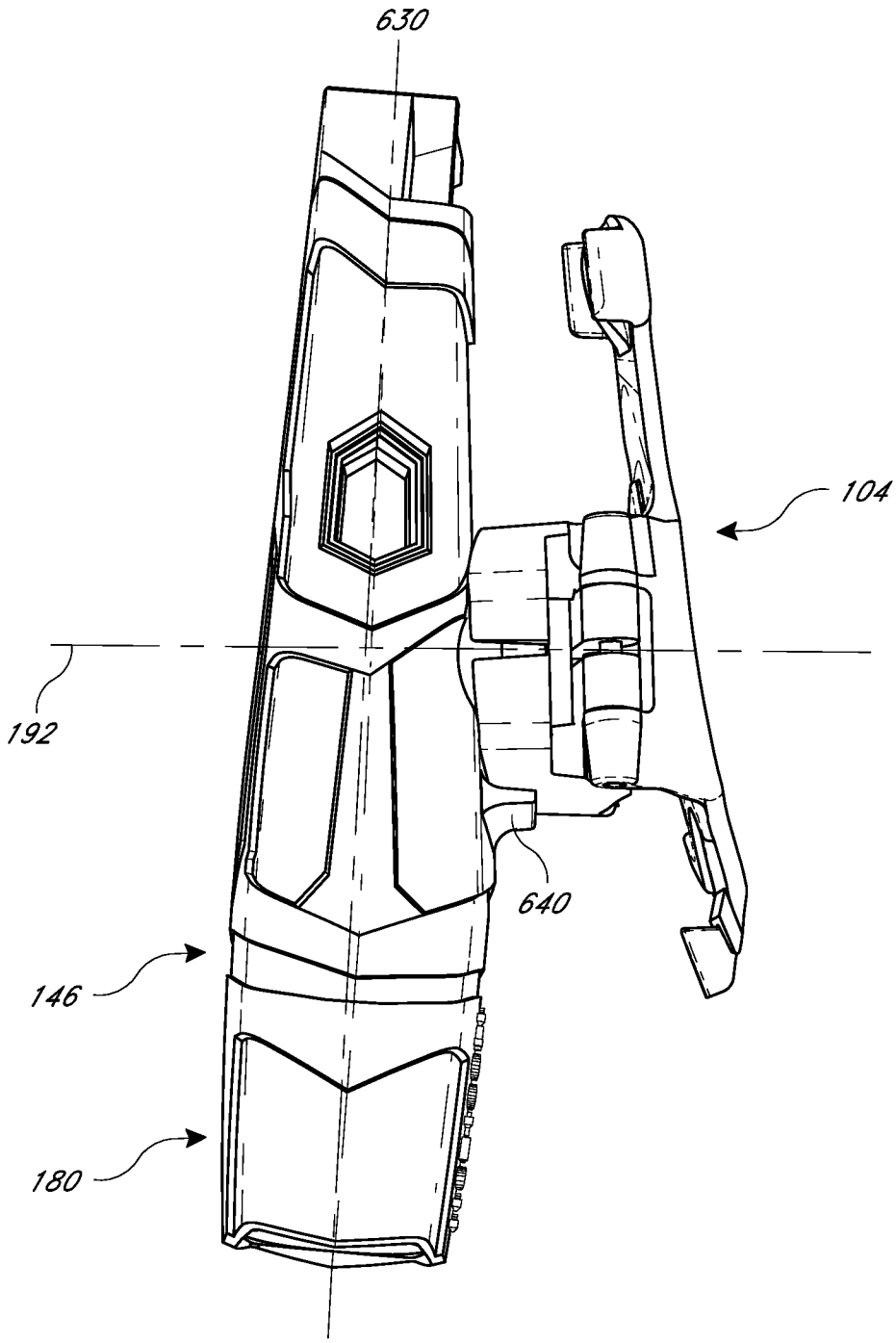

FIG. 27

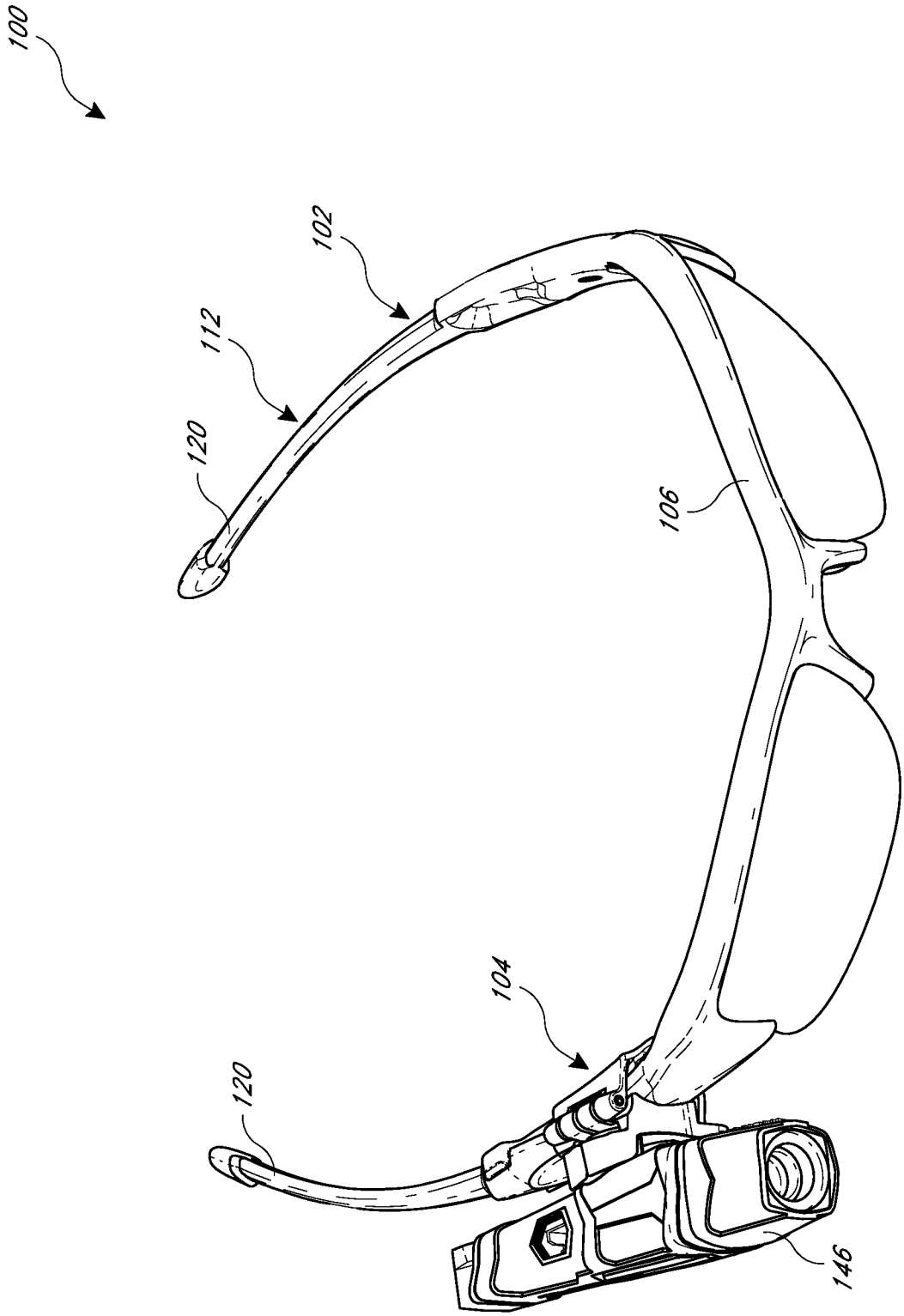

FIG. 28

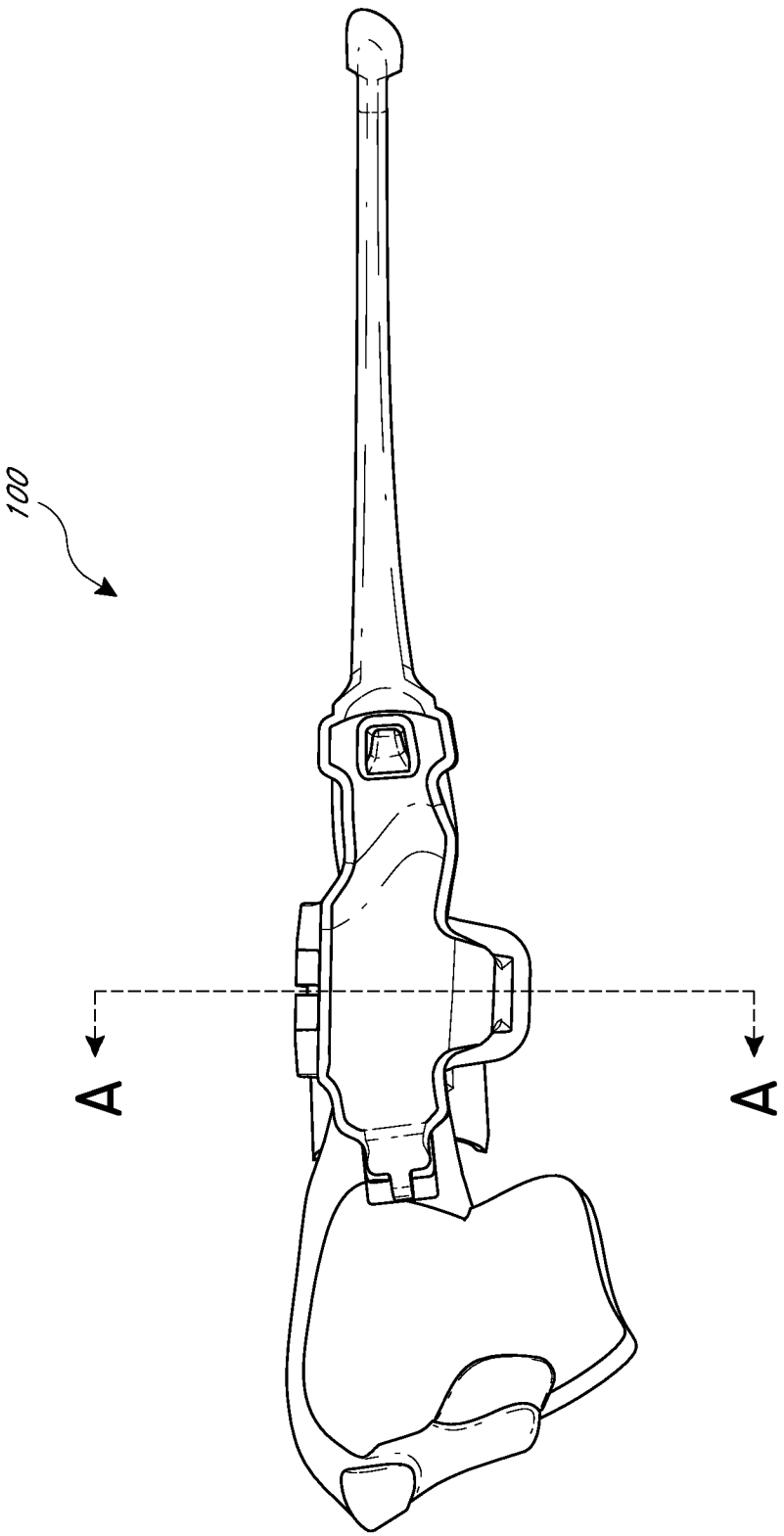

FIG. 29

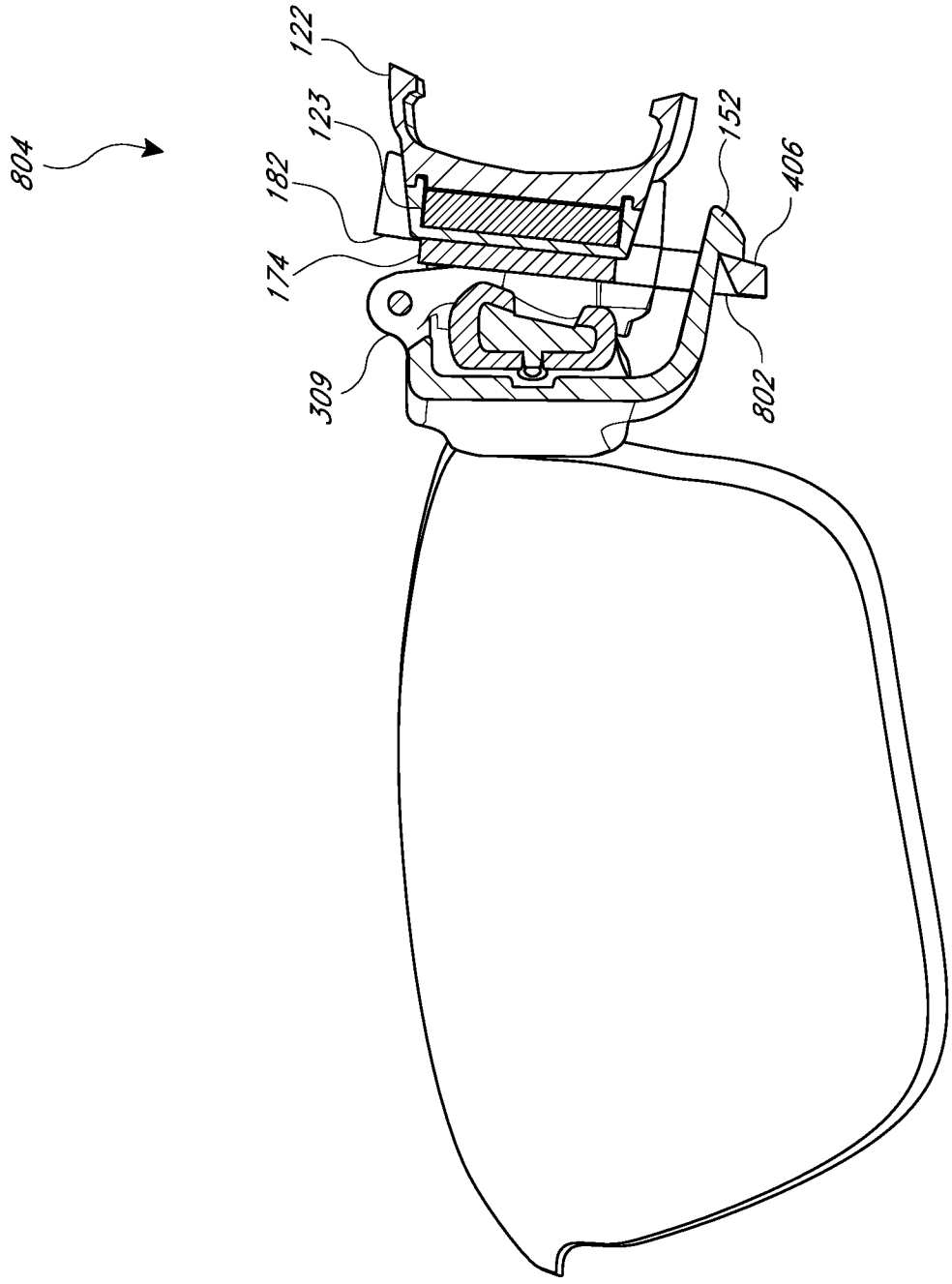

FIG. 30

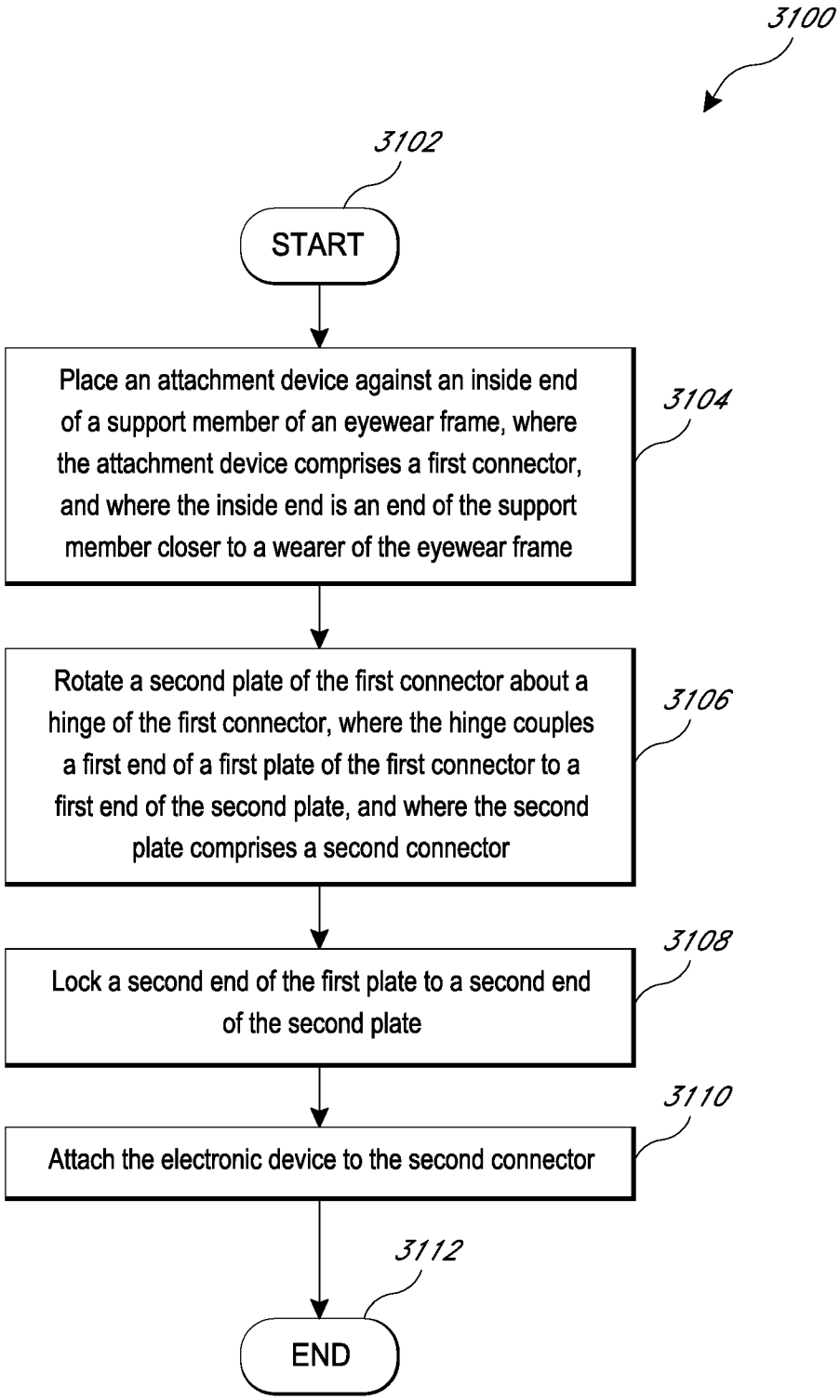
3100
3102
START
Place an attachment device against an inside end of a support member of an eyewear frame, where the attachment device comprises a first connector, and where the inside end is an end of the support member closer to a wearer of the eyewear frame
3104
Rotate a second plate of the first connector about a hinge of the first connector, where the hinge couples a first end of a first plate of the first connector to a first end of the second plate, and where the second plate comprises a second connector
3106
Lock a second end of the first plate to a second end of the second plate
3108
Attach the electronic device to the second connector
3110
3112
END

FIG. 31

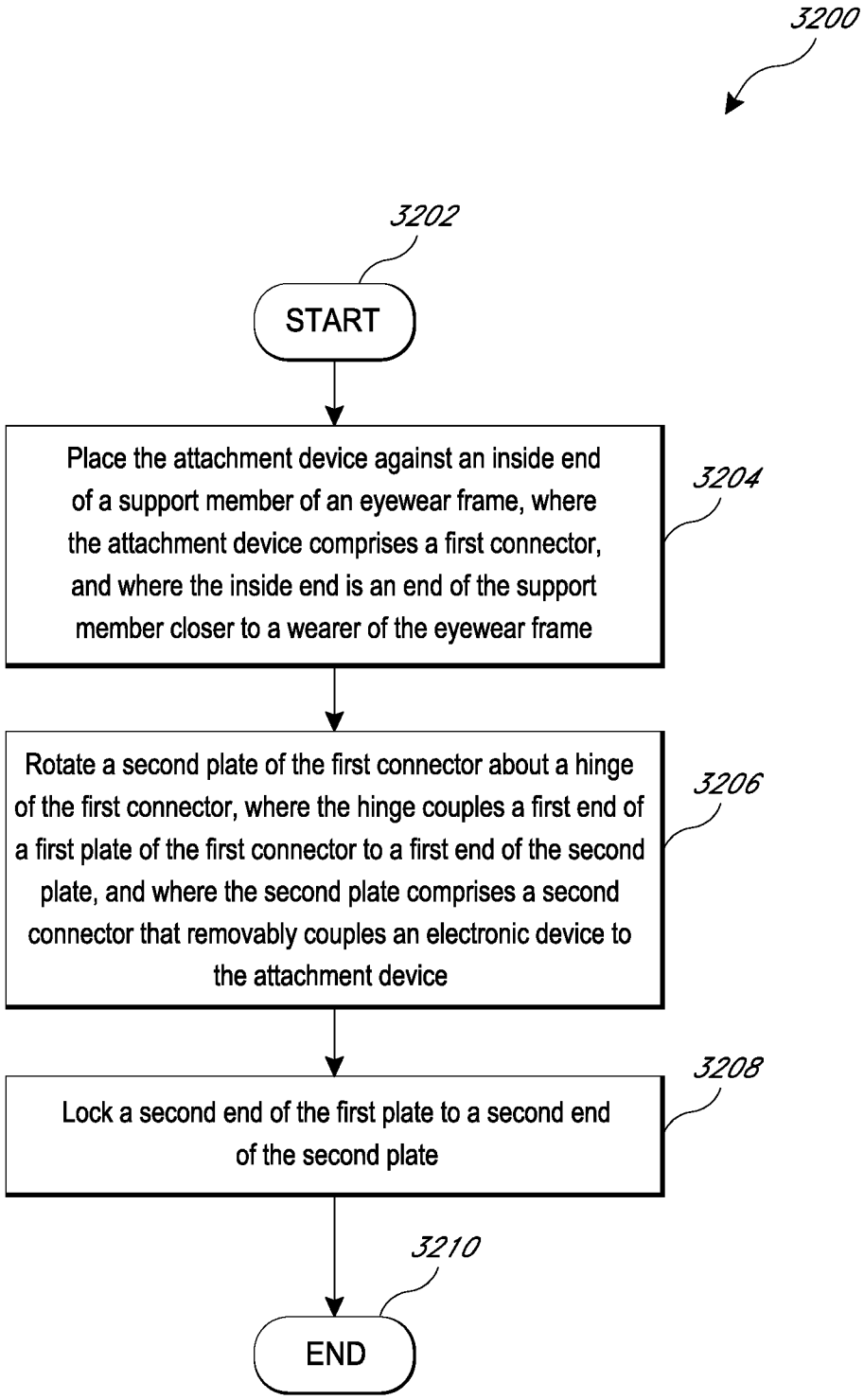
3200
3202
START
Place the attachment device against an inside end of a support member of an eyewear frame, where the attachment device comprises a first connector, and where the inside end is an end of the support member closer to a wearer of the eyewear frame
3204
Rotate a second plate of the first connector about a hinge of the first connector, where the hinge couples a first end of a first plate of the first connector to a first end of the second plate, and where the second plate comprises a second connector that removably couples an electronic device to the attachment device
3206
Lock a second end of the first plate to a second end of the second plate
3208
3210
END

FIG. 32

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2013/026230

A. CLASSIFICATION OF SUBJECT MATTER
IPC(8) - G02C 11/00 (2013.01)
USPC - 351/158
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC(8) - G02C 11/00, 04, 06 (2013.01)
USPC - 248/689; 351/158; 362/104, 105; 381/327

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
CPC - G02C 11/04, 06, 10 (2013.01)

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
PatBase, Google Patents, Google Scholar

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2010/0238396 A1 (JANNARD) 23 September 2010 (23.09.2010) entire document	1-3, 14-16, 29-31, 41-43
A	US 6,007,035 A (FEINBLOOM et al) 28 December 1999 (28.12.1999) entire document	1-3, 14-16, 29-31, 41-43
A	US 7,677,722 B1 (MEDNICK et al) 16 March 2010 (16.03.2010) entire document	1-3, 14-16, 29-31, 41-43
A	US 3,769,663 A (PERL) 06 November 1973 (06.11.1973) entire document	1-3, 14-16, 29-31, 41-43

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

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
08 April 2013	26 APR 2013
Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US, Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-3201	Authorized officer: Blaine R. Copenheaver PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2013/026230

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☒ Claims Nos.: 4-13, 17-28, 32-40, 44-51
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. ☐ As all searchable claims could be searched without effort justifying additional fees, this Authority did not invite payment of additional fees.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.

☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.

☐ No protest accompanied the payment of additional search fees.