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Teetzel et al.

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(54) **HELMET MOUNT WITH INTEGRAL BINOCULAR BRIDGE**

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G02B 27/01 (2006.01)

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CPC ***G02B 23/18*** (2013.01); ***G02B 27/0149*** (2013.01); *G02B 2027/0156* (2013.01)

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USPC 359/409, 410–413, 815, 817, 481; 2/6.1, 2/6.2, 422, 426; 361/807
See application file for complete search history.

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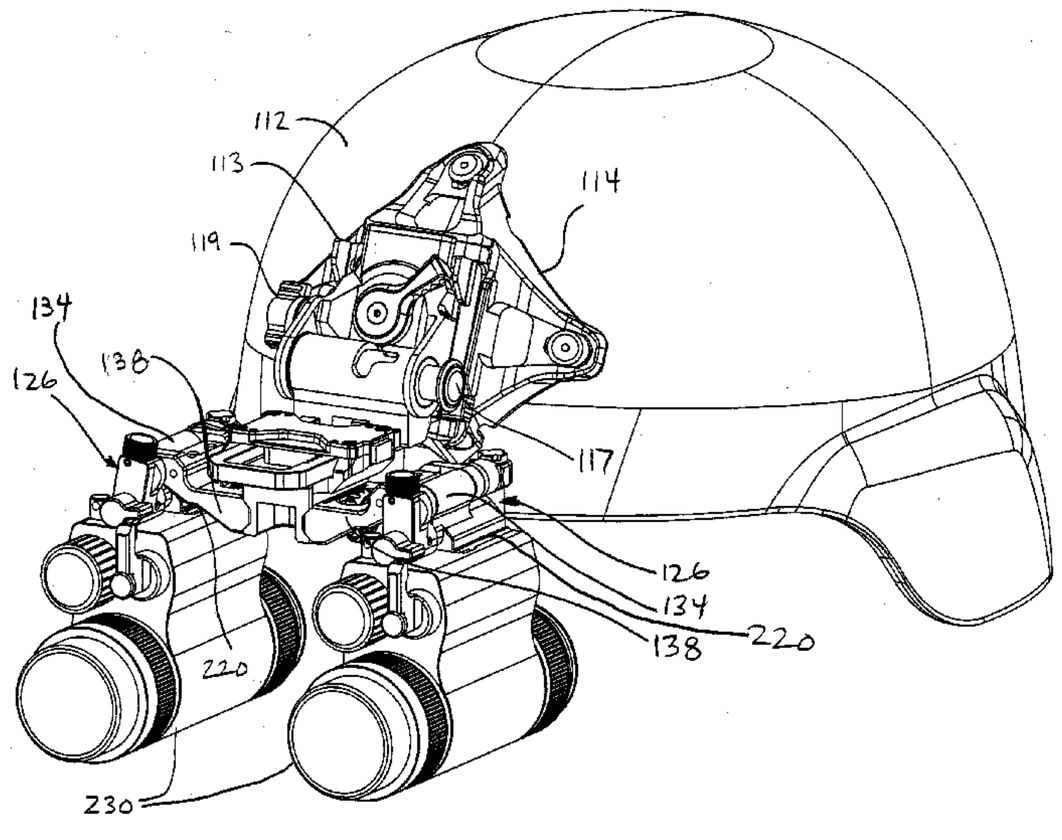
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(74) *Attorney, Agent, or Firm* — McLane Middleton, Professional Association

(57) **ABSTRACT**

A helmet mount for attaching a viewing device to a helmet includes a helmet interface assembly removably attachable to the helmet. A pivot arm is attached to the helmet interface assembly and is pivotal about a horizontal, transverse axis. A carriage member is carried on the pivot arm and slidable between the distal end and the proximal end of the pivot arm. The carriage member includes a bridge member integral therewith, the bridge member including a first fastener configured to removably attach a first viewing device and a second fastener configured to attach a second viewing device.

17 Claims, 12 Drawing Sheets



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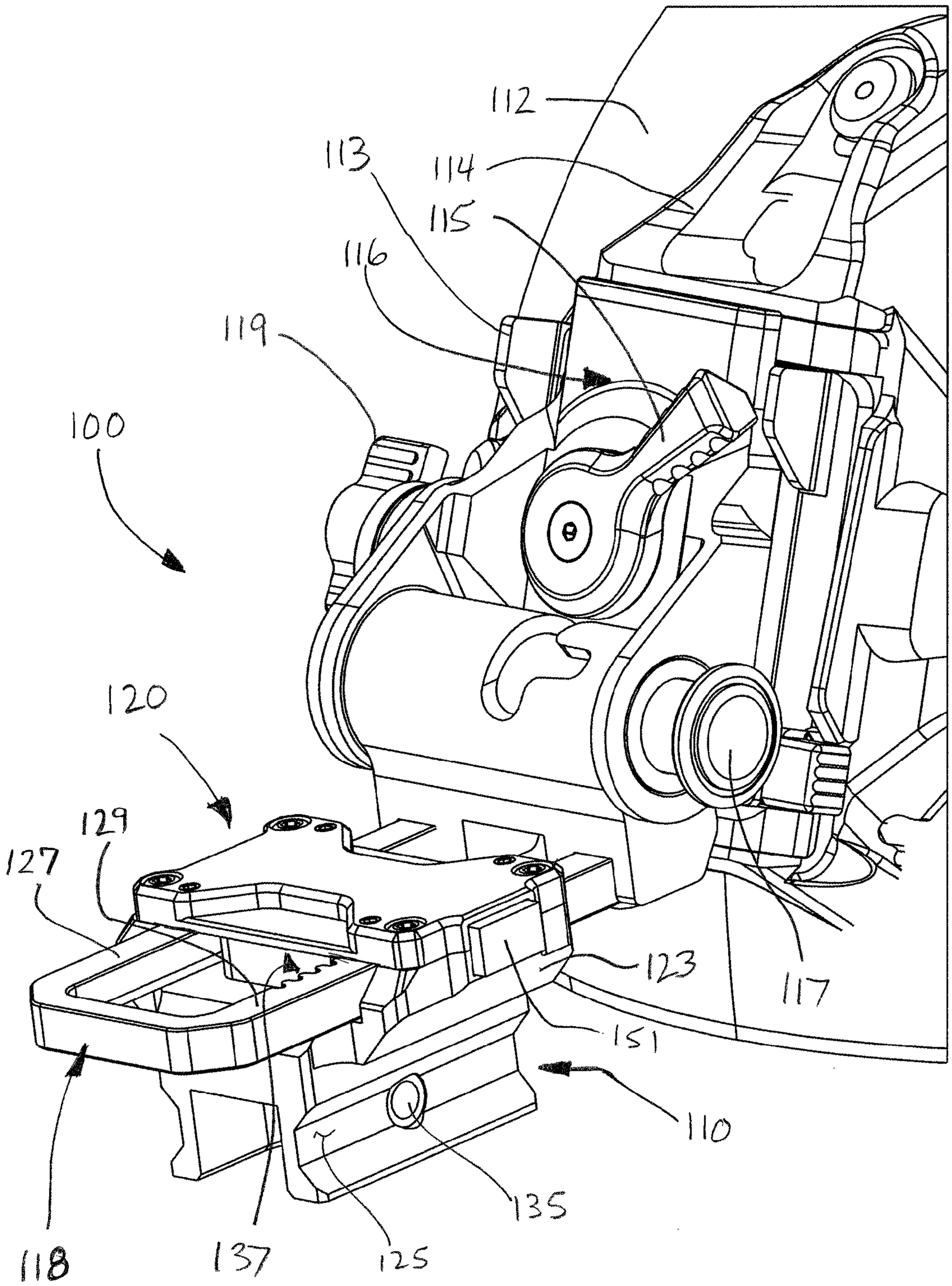

112
113
114
115
116
119
100
120
129
127
123
117
151
110
135
118
137
125

FIG. 1

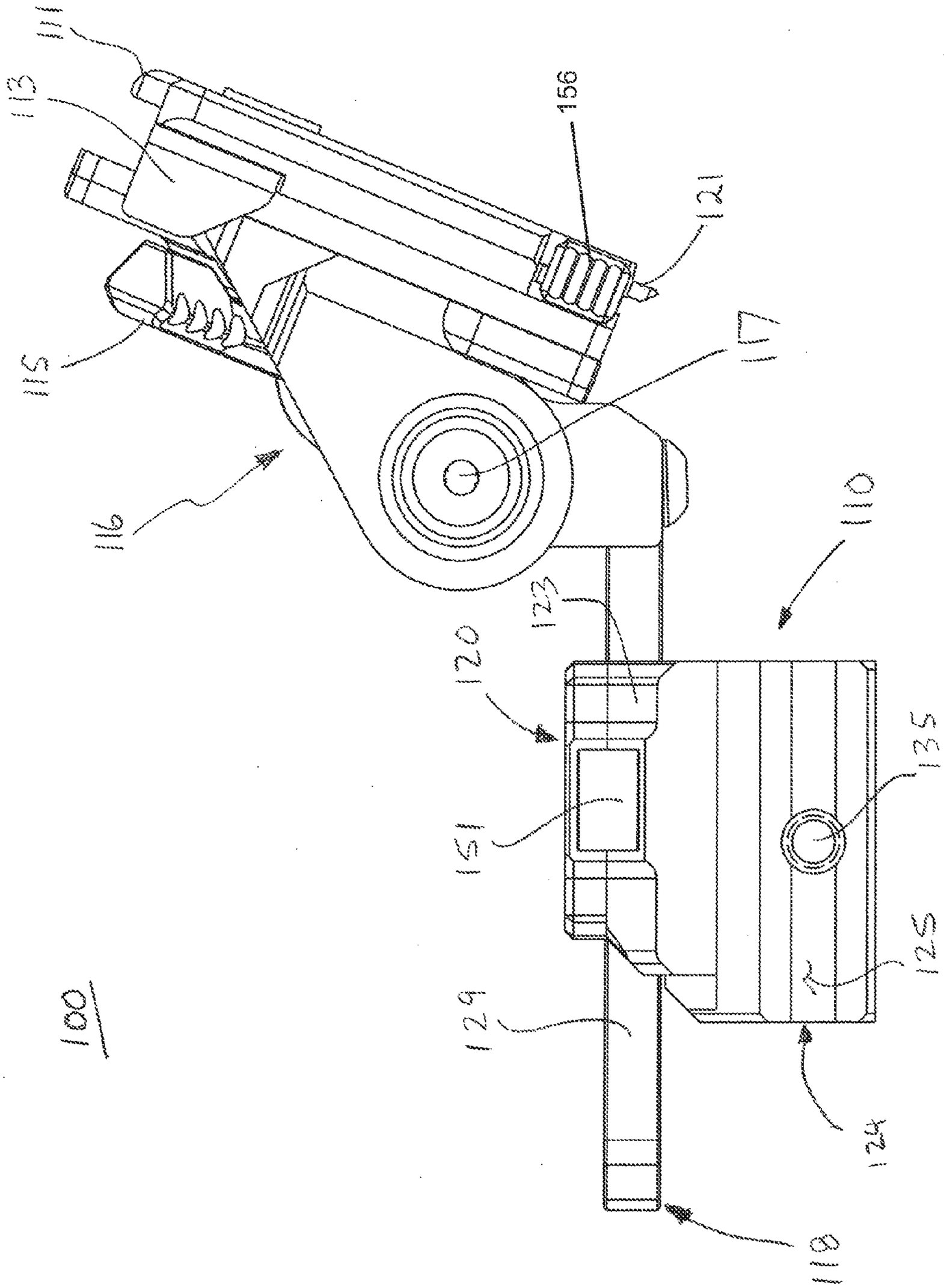

180
113
111
156
121
115
117
116
110
122
120
151
125
129
123
124
118

FIG. 2

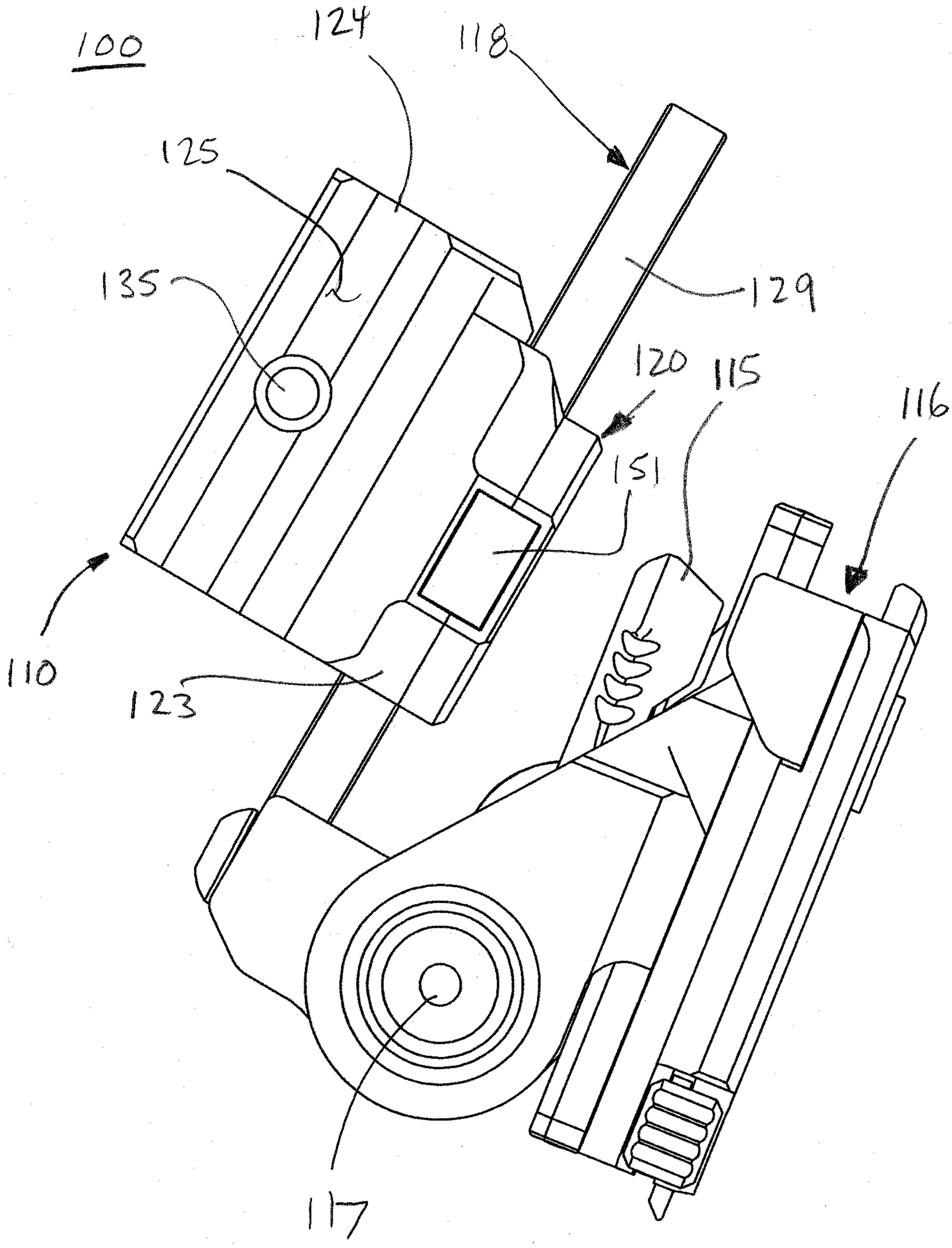


FIG. 3

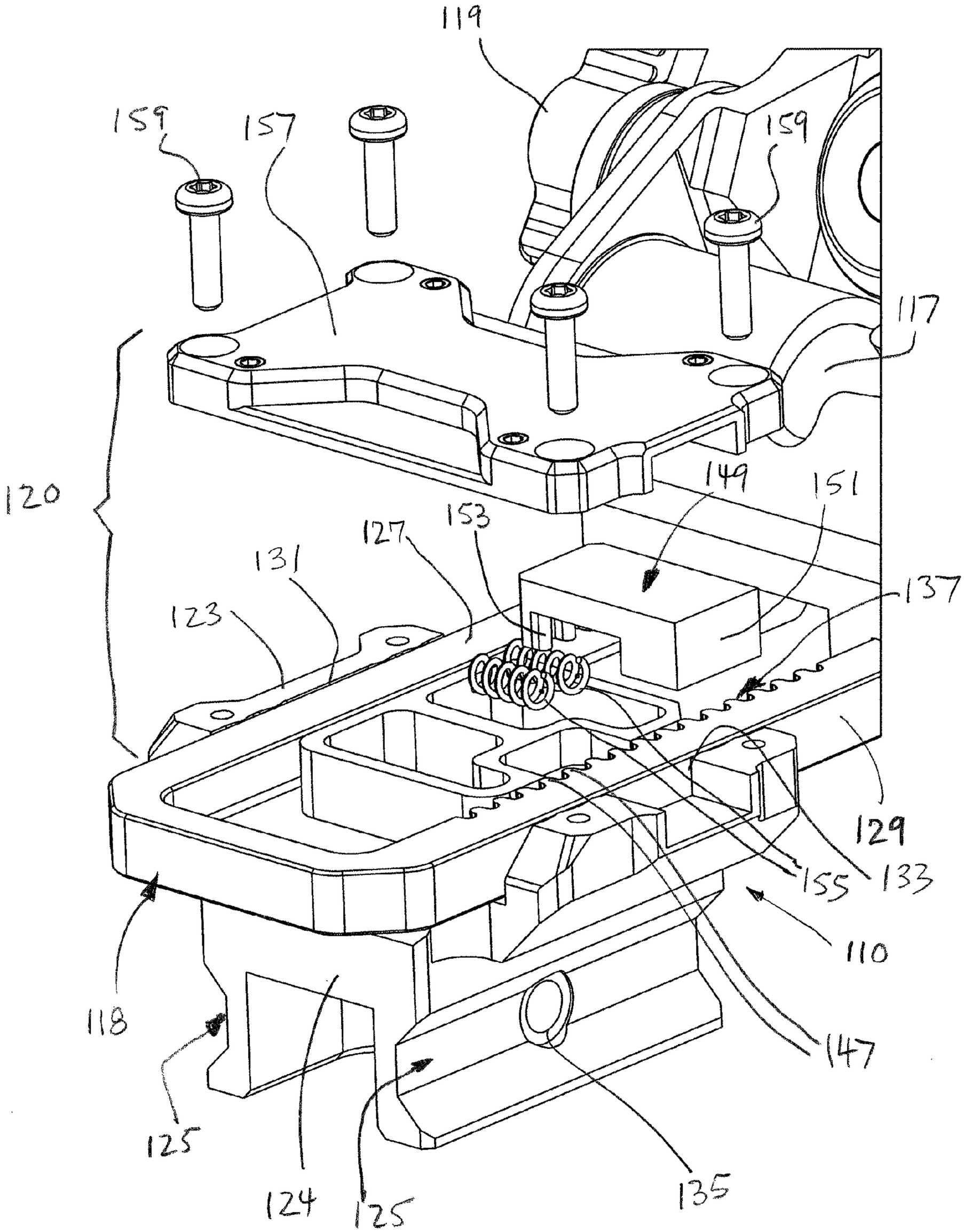

119
159
157
159
117
120
149
151
153
127
131
123
137
129
155
133
110
118
147
125
124
125
135

FIG. 4

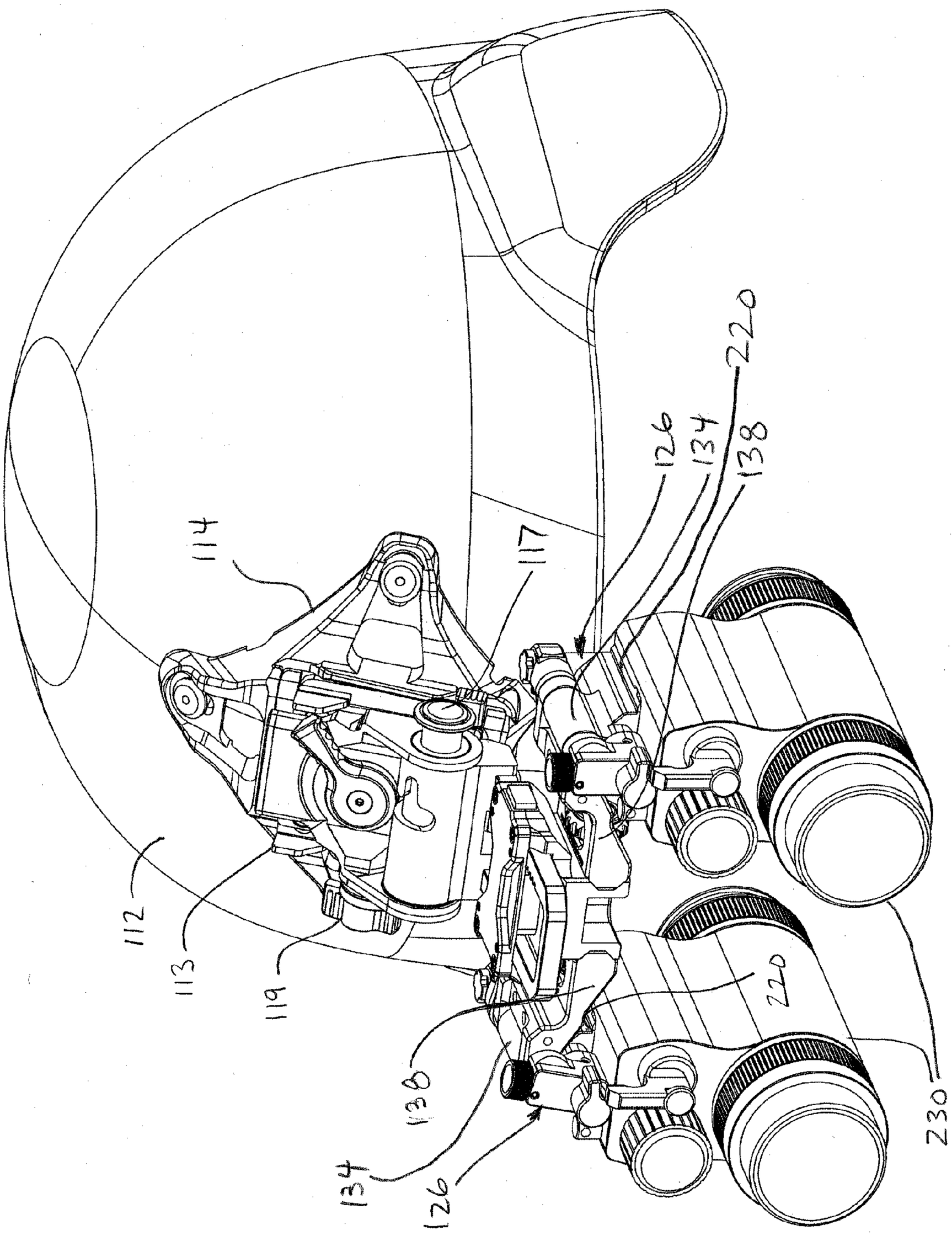


FIG. 5

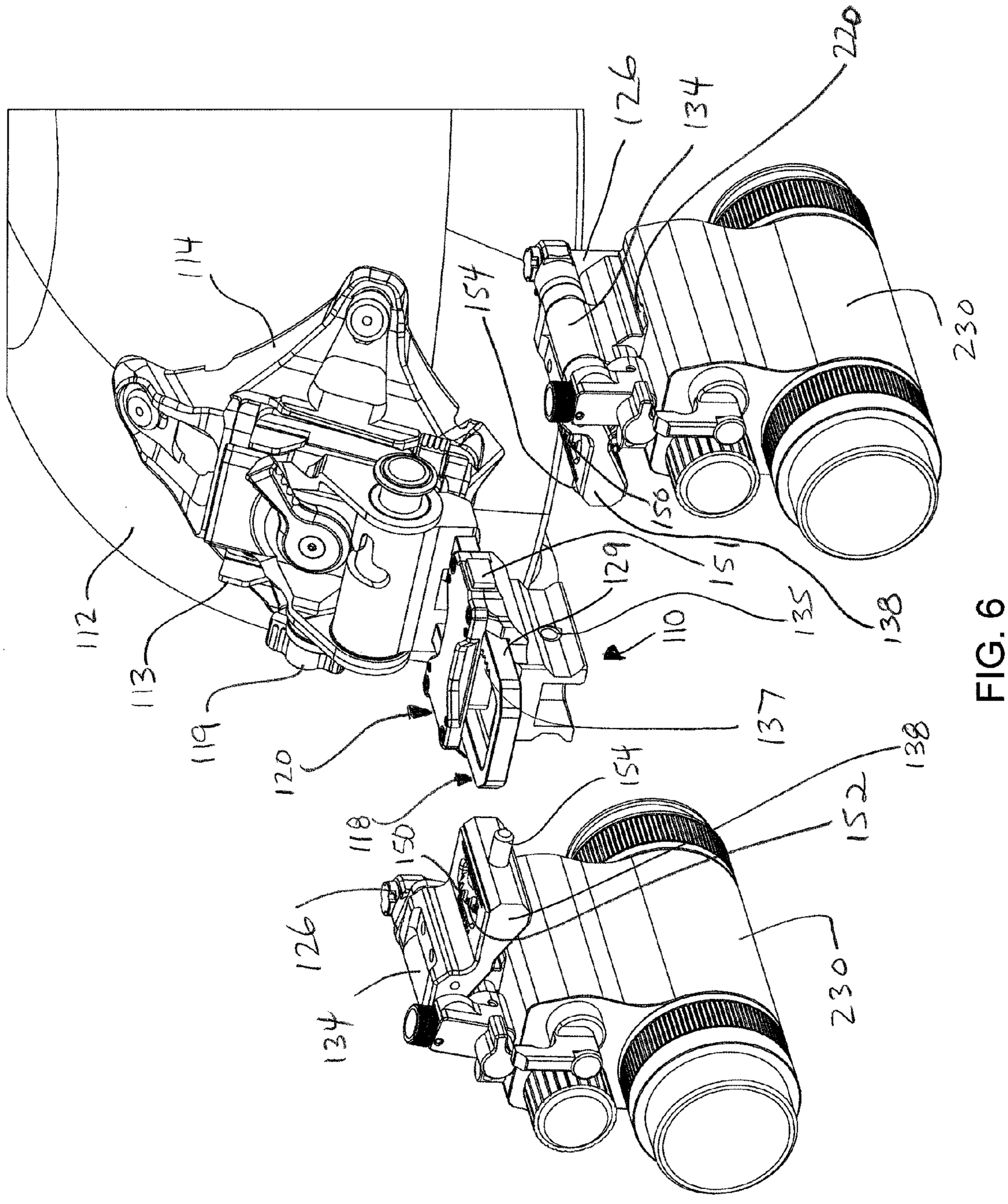

126
134
220
114
154
112
113
119
120
118
150
129
151
135
138
110
137
154
138
152
126
134
230
230

FIG. 6

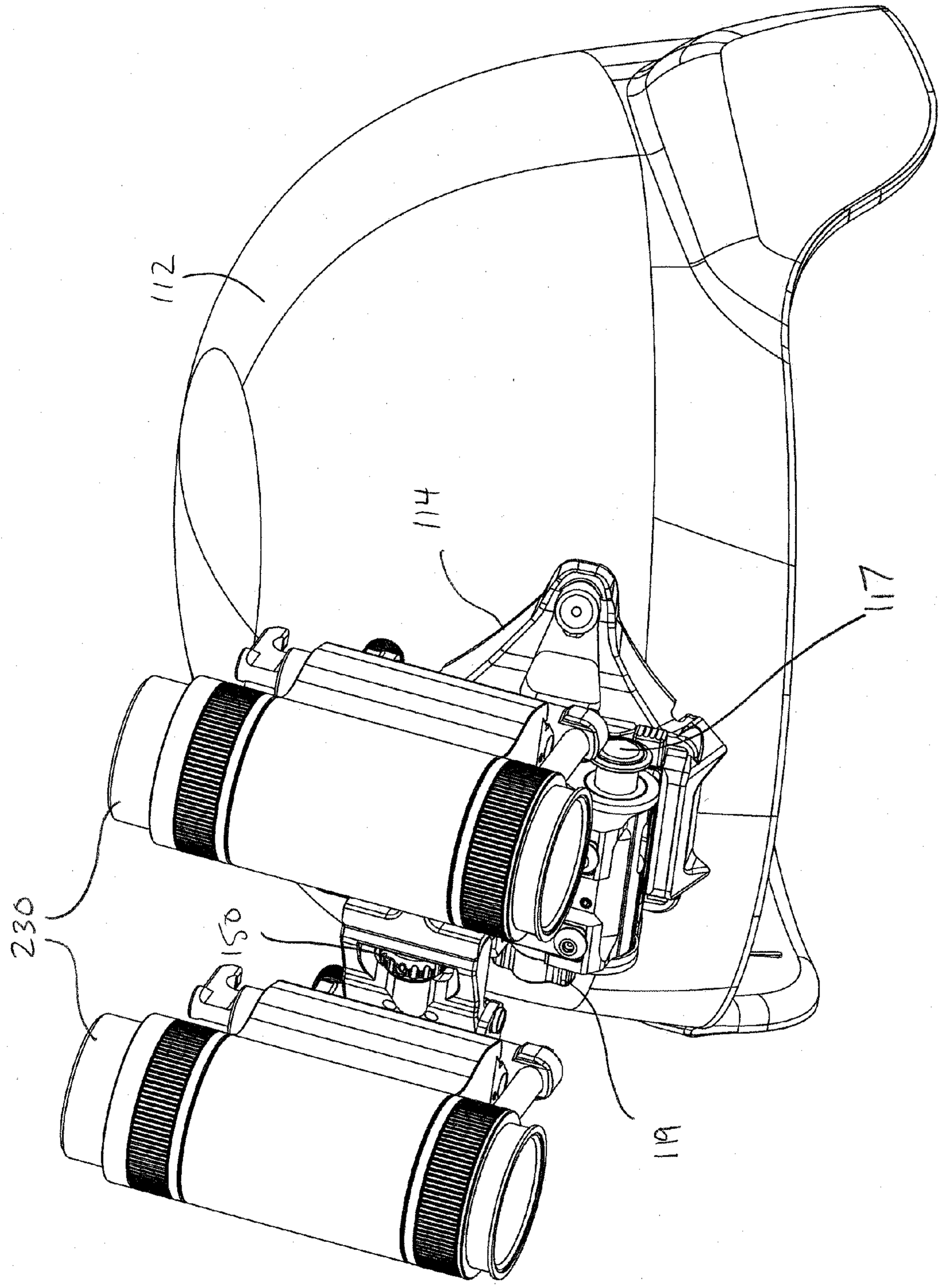


FIG. 7

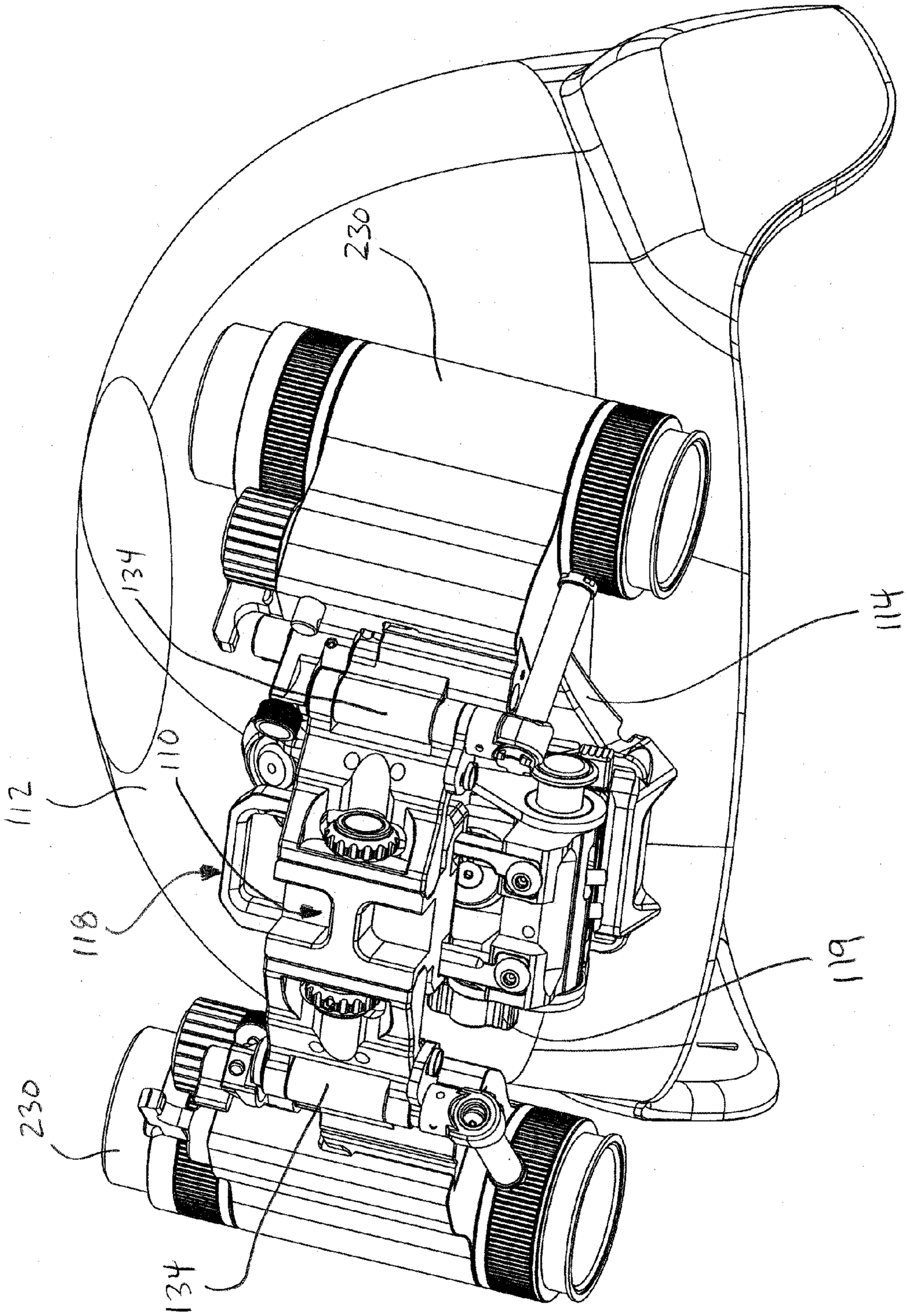


FIG. 8

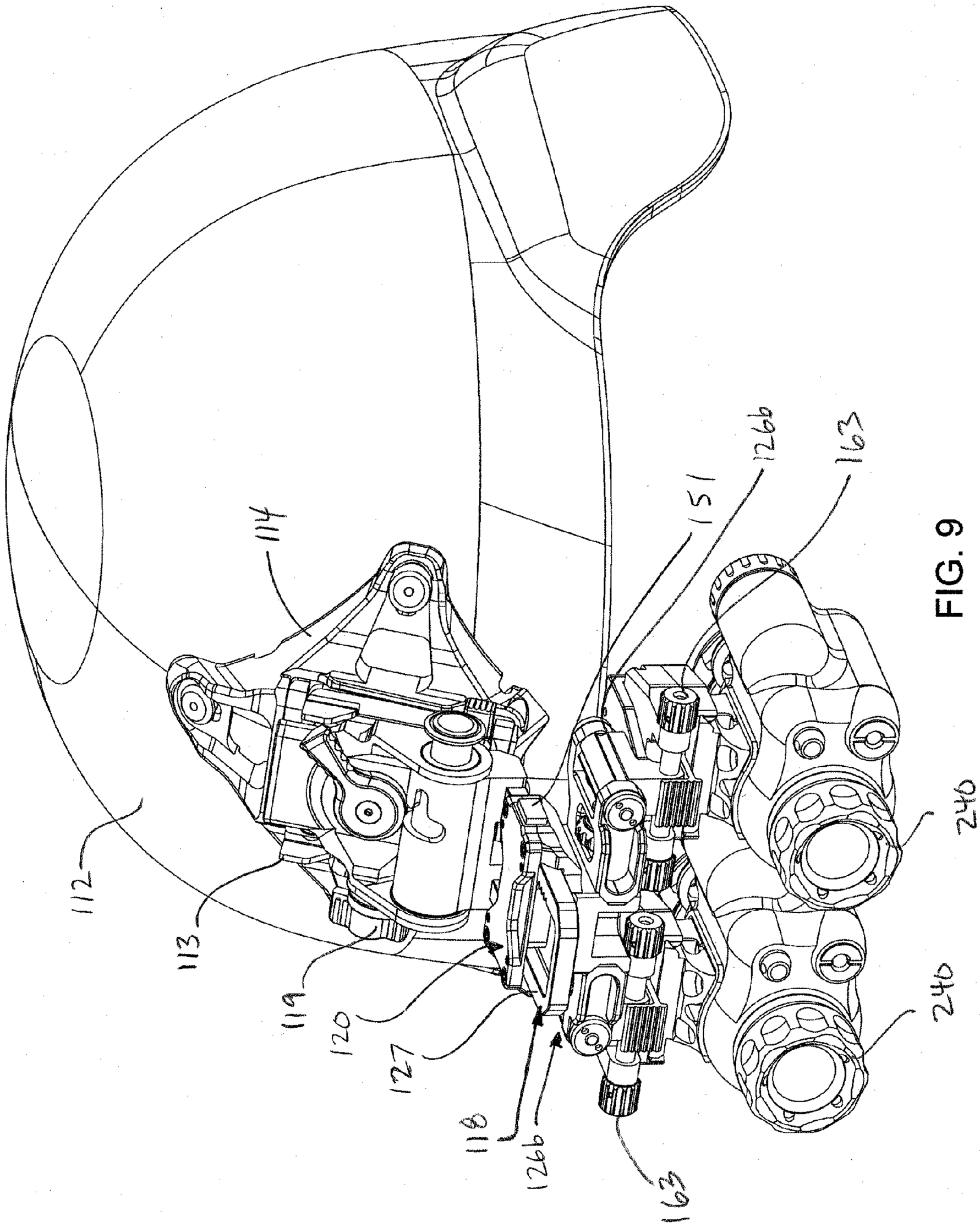


FIG. 9

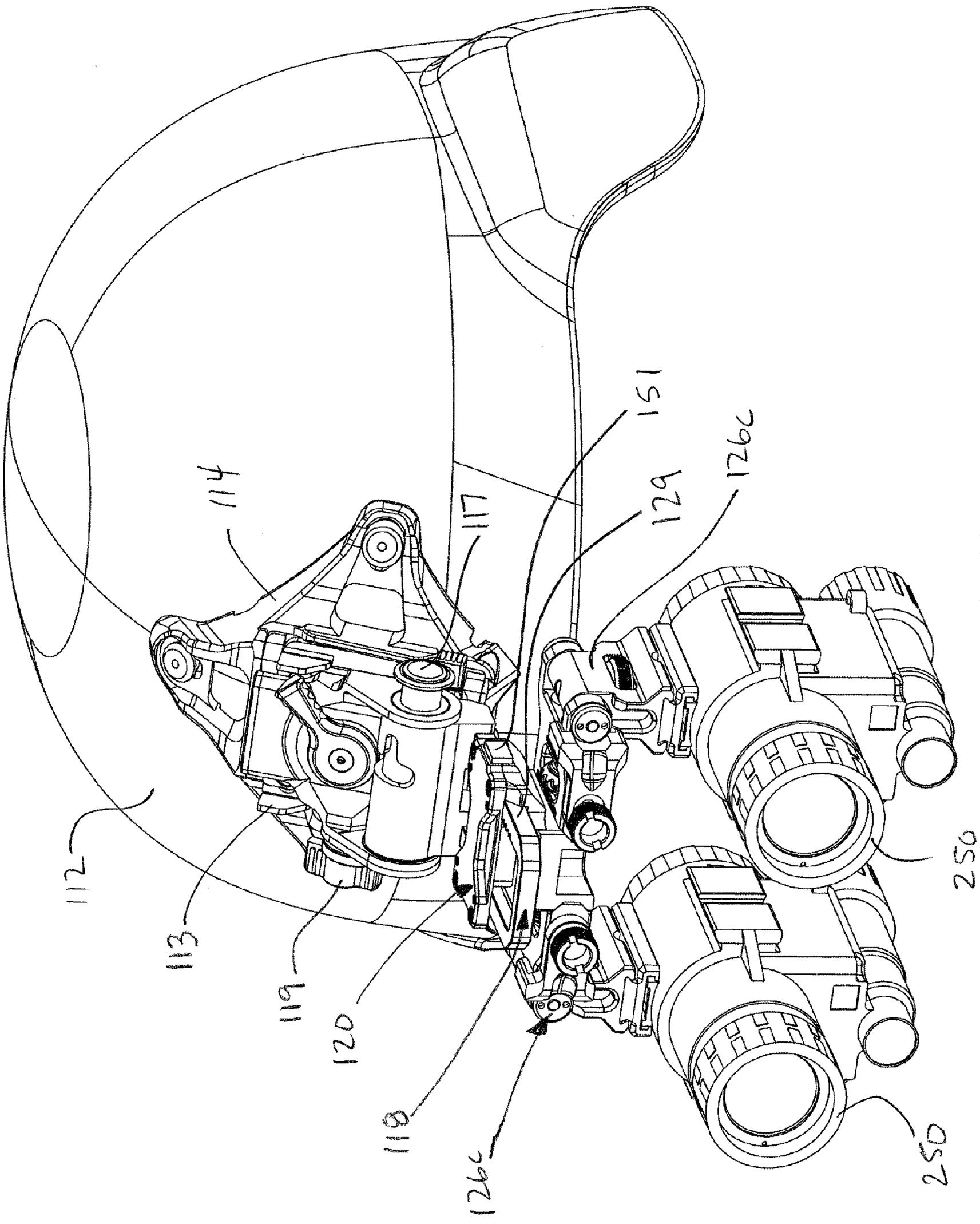


FIG. 10

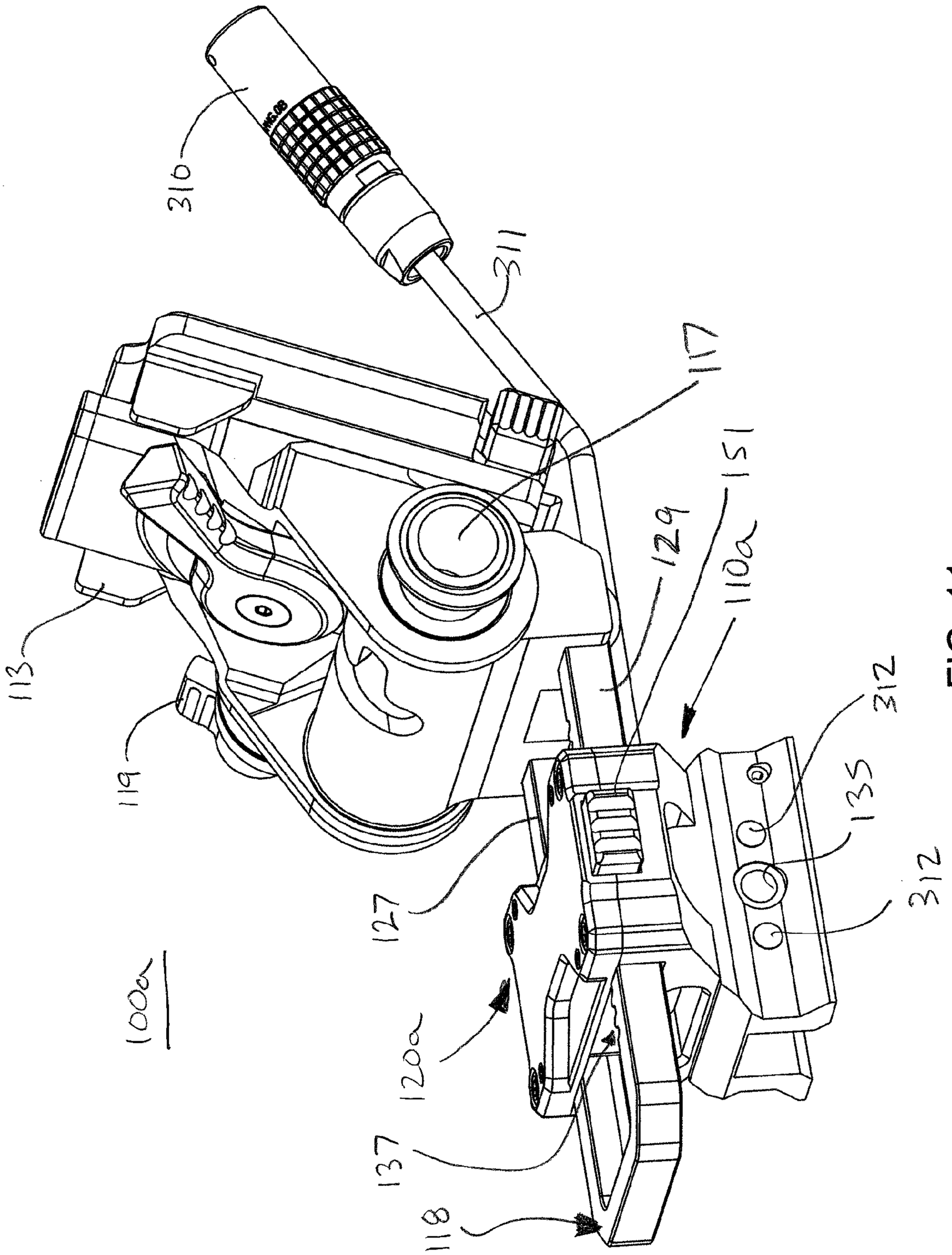

310
311
117
113
119
129
110a
151
312
135
312
127
137
120a
118
100a

FIG. 11

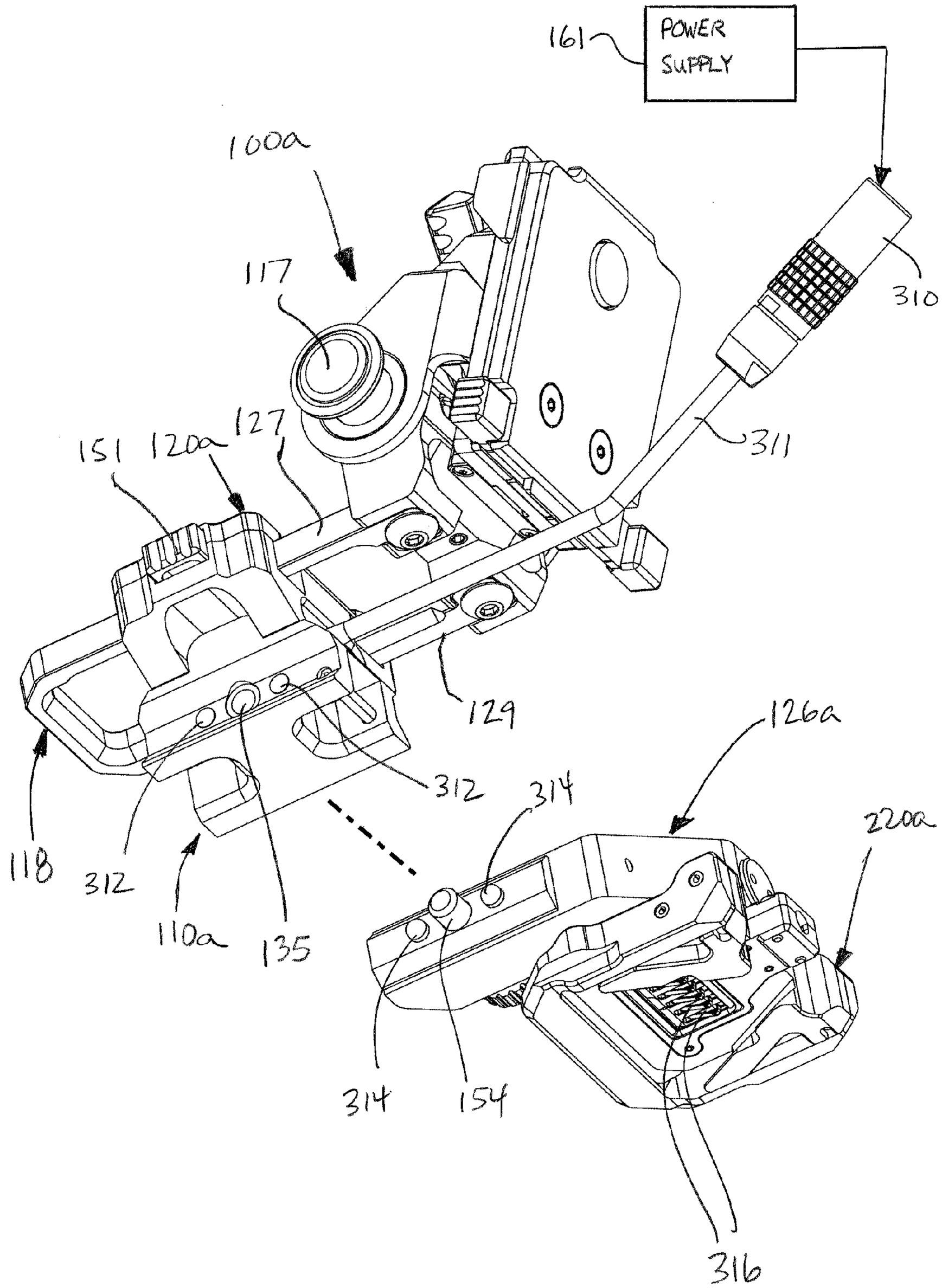

161
POWER SUPPLY
100a
117
310
311
151
120a
127
129
312
118
312
110a
135
126a
314
220a
314
154
316

FIG. 12

HELMET MOUNT WITH INTEGRAL BINOCULAR BRIDGE

BACKGROUND

The present disclosure relates to an improved helmet mounting system for mounting a viewing device to headgear such as a tactical or military field helmet, and specifically, a mount with an integral binocular bridge attachment for same, which replaces the conventional dovetail shoe interface commonly found on existing helmet mounting systems. The integral bridge unit herein provides multiple options for monocular or binocular viewing devices and multiple flip options for moving an attached viewing device between a viewing position when the device is in use and a flipped or stowed position out of the user's line of sight when the viewing device is not in use. The integral bridge unit may be adapted to removably attach one or two viewing devices. The attached devices may be the same or different type of device and/or of the same viewing/imaging modality. The integral bridge herein may be adapted for use with any type of optical, opto-electronic, or electronic viewing device, including without limitation, night vision devices that enable viewing under nighttime or other low light conditions, such as a passive night vision goggle (NVG) device or enhanced night vision goggle (ENVG) device, thermal imaging device, short wave infra-red (SWIR) device, camera, head mounted display screen, and so forth. In a further aspect, the bridge system herein may include a plurality of side attachment members, each of which are adapted for a particular viewing device and which are removably and interchangeable attachable to the integral bridge member.

SUMMARY

A helmet mount for attaching a viewing device to a helmet includes a helmet interface assembly removably attachable to the helmet. A pivot arm is attached to the helmet interface assembly and is pivotal about a horizontal, transverse axis. A carriage member is carried on the pivot arm and slidable between the distal end and the proximal end of the pivot arm. The carriage member includes a bridge member integral therewith, the bridge member including a first fastener configured to removably attach a first viewing device and a second fastener configured to attach a second viewing device.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention may take form in various components and arrangements of components, and in various steps and arrangements of steps. The drawings are only for purposes of illustrating preferred embodiments and are not to be construed as limiting the invention.

FIG. **1** is an isometric view of a helmet mount with integral binocular bridge according to a first exemplary embodiment.

FIG. **2** is a side view of the helmet mount appearing in FIG. **1**, with the carriage arm in the deployed position.

FIG. **3** is a side view of the helmet mount appearing in FIG. **1**, with the carriage arm moved to the stowed position.

FIG. **4** is an exploded view of the integral sliding carriage/binocular bridge member.

FIG. **5** is an isometric view of the helmet mount appearing in FIG. **1** with left and right viewing devices attached and in the deployed position.

FIG. **6** is a partially exploded view of the helmet mounting system appearing in FIG. **1** with the left and right viewing devices detached.

FIG. **7** is an isometric view of the helmet mount appearing in FIG. **1** with left and right viewing devices attached and in a first stowed position.

FIG. **8** is an isometric view of the helmet mount appearing in FIG. **1** with left and right viewing devices attached and in a second stowed position.

FIG. **9** is an isometric view of the helmet mount appearing in FIG. **1** with a pair of OASYS Technology SkeetIR thermal imaging monoculars attached.

FIG. **10** is an isometric view of the helmet mount appearing in FIG. **1** with a pair of MUM-14B passive night vision monoculars.

FIG. **11** is an isometric view of a helmet mount with integral binocular bridge according to a second exemplary embodiment.

FIG. **12** is a partially exploded view taken generally from the bottom of the helmet mount appearing in FIG. **11** and a right side mounting member.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to the drawings, wherein like reference numerals refer to like or analogous components throughout the several views, FIGS. **1-8** depict an exemplary helmet mount **100** having an integral binocular bridge **110**. The helmet mount **100** is attached to a helmet **112** to position optical devices **230**, which may be MINI N/SEAS night vision monoculars in FIGS. **4-7** before the left and right eyes of a user. It will be recognized that the present binocular bridge may be used with all manner of viewing devices, wherein the left and right devices may be the same or different. The helmet mounting system **100** may include as helmet interface assembly **116** for attachment to a mounting bracket **114** or other helmet interface, a vertical adjustment mechanism, tilt axis adjustment mechanism, and breakaway/nonbreakaway features, and so forth, as described in commonly owned U.S. Pat. No. 7,219,370 or U.S. Patent Application Publication No. 2013/0083391, each of which is incorporated herein by reference in its entirety. The sliding carriage with integral binocular bridge is shown and described herein with a preferred pivoting helmet mount **100**. It will be recognized that the present development can be adapted for use with other helmet mounts including without limitation alternative helmet mounts available from Wilcox Industries Corp. of Newington, N.H.

The helmet mount **100** attached to a bracket **114** attached to the front portion of the helmet **112**. A first pivoting segment **116** is removably attached to the bracket **114** and may include a vertical adjustment mechanism **115** for positioning the devices **230** at a desired height, a breakaway mechanism **113** e.g., in which the segment **116** (or a portion thereof) will release upon application of a predetermined force, a tilt adjustment mechanism **119** for adjusting the angle of the optical axis of the viewing devices **230**, and so forth.

In the illustrated embodiment, the helmet mount **100** includes an upper locking tab **111** and a lower locking tab **121**, which engage complimentary grooves (not shown) on the bracket **114**. The helmet mount **100** may also include a breakaway selector **113** which can be moved between breakaway and nonbreakaway positions. A slider bar **156** is mechanically linked to the lower tab **121** and slidable to allow the user to selectively attach and remove the helmet

mount **100** to and from the bracket **114**. When the selector **113** is moved to the breakaway position, the lower tab **121** is movable (e.g., against a biasing spring) wherein the beveled edge enables the lower tab to move upward and disengage from the groove upon the application of a sufficient force. When the selector **113** is in the nonbreakaway position, the tab **121** is rigidly retained within the corresponding groove. The breakaway setting is advantageous in that it may prevent injury to the wearer, e.g., in the event of entanglement or impact of the optical device.

A second pivoting segment **118** is pivotally attached to the first pivoting segment **116** about a pivot axis or cylinder **117**. The second segment **118** extends horizontally when in the deployed position (see, e.g., FIGS. **1** and **2**). The second segment **118** includes carriage rails **127** and **129** and a sliding carriage member **120** with integral binocular bridge **110**. The sliding carriage member **120** is slidable on the rails **127**, **129** which provides a fore-and-aft adjustment mechanism for positioning the devices **230** at a desired distance or focal position in front of the user's eyes. Pivoting movement of the second segment **118** relative to the first segment **116** allows a wearer to selectively move the viewing devices between the deployed position as shown in FIGS. **1**, **2** and **5**, to a first stowed position wherein the viewing devices are pivoted up and out of the user's line of sight, as shown in FIG. **7**. In preferred embodiments, further pivoting movement on the vision device interface as described below allows the vision devices **230** to be pivoted to a second stowed position, as shown in FIG. **8**, wherein the devices **230** are moved back and over the helmet, thereby reducing torque and strain on the user's neck.

As best seen in FIG. **4**, the bridge unit **110** comprises a slide portion **123** which slidably engages the rail members **127**, **129**. A center section **124** attached to or integral with the slide **123** includes a left and right grooves or channels **125** which are shaped or keyed to provide a stable contacting surface for providing stability and preventing wobbling of an attached viewing device **230**. The center section **124** includes an opening **135** on each side for receiving a threaded fastener **154** for securing the viewing devices **230**.

The pivoting assembly **118** includes the first and second parallel arms **127**, **129**. The first arm **127** is received within a channel **131** formed in the slide portion **123**. The second arm **129** is received within channel **133** in the slide **123** and includes a gear rack portion **137** having a plurality of spaced apart teeth **147** on an inward facing edge thereof.

A slide lock member **149** includes an actuator portion **151** disposed so as to be manually actuatable by the user and locking teeth **153** engaging the gear rack **137**. One or more captured springs **155** bear against the actuator portion **151**, urging the locking teeth **153** into engagement with the gear rack **137** to secure the bridge unit **110** at a desired position on the rail **118**. The springs **155** may be coil springs or other type of spring or resilient member.

In operation, to adjust the fore and aft position of the bridge member **110**, the actuator portion **151** is manually depressed by the user, against the bias of the springs **155**, to move the locking teeth **153** out of engagement with the gear rack **137** to allow the slide **123** to be moved to a desired position along the rail **118**. A cover plate **157** is secured to the slide portion **123** via fasteners **159**, such as threaded fasteners.

Left and right side sections **126** are removably attachable to the center section **124** on opposite transverse sides and are generally arranged as mirror images of each other. The left and right side sections **126** are also removably attachable to the viewing devices **230** to provide an interface between the viewing device and the bridge member **110**. The sections **126** are secured to the center section via the threaded member **154** which rotatably engages the corresponding left or right opening **135** in the center section **124**. The threaded member **154** includes an enlarged diameter wheel **150** which is received within an opening **152** in the side section **126** to allow the user to manually rotate the threaded member **154**. Rotating the wheel **150** allows the side section **126** to selectively be removed from and secured to the center section **124** via fastener **135**.

Each side section **126** includes a hinged mounting arm **138** hingedly attached to a viewing device mount **220** about a pivot or hinge **134**. The mounts **220** are configured to removably attach to a mounting shoe on the viewing device, such as a dovetail mounting shoe as are known in the art.

Referring now to FIGS. **11** and **12**, there appears an alternative embodiment helmet mounting system **100***a* operable to provide electrical power from an external power supply **161** to an electrically operated viewing device (e.g., **230**) to provide greater operation time and ready replacement of the power supply. The system **100***a* includes an electrical connector **310** which may removably connect with a mating connector (not shown) electrically coupled to the power supply **161**. For example, the connector **310** may connect to a mating connector on the helmet **112**, which may be coupled to a remote power supply, such as a power supply attached to another location on the helmet **112** or otherwise worn or carried by the user.

The connector **310** is attached to a cable **311** with electrical conductors, which are electrically coupled to electrical contacts **312** in a binocular bridge member **110***a* integral with a sliding carriage **120***a*. The contacts **312** engage contacts **314** in an attached side member **126***a*. The contacts **314** may be spring biased to bear against the contacts **312**. The contacts **314**, in turn, are electrically coupled to electrical contacts **316** in the device mount portion **220***a* of the side member **126***a*. The contacts **316** engage aligned electrical contacts (not shown) on the viewing device mounting shoe to power the viewing device.

Referring again to FIGS. **1-8**, in the illustrated embodiment, the side sections **126** may be as shown and described in the above-incorporated U.S. Patent Application Publication No. 2013/0083391 and may have the lateral adjustment and pivoting features as described therein. In 2013/0083391, lateral spacing, e.g., for pupillary alignment is accomplished by rotation, and is advantageous for optical viewing devices or night vision devices employing photomultiplier tubes.

Referring to FIG. **9**, in alternative embodiments, the side sections (see, e.g., side sections **126***b* in FIG. **9**) may be as described in commonly owned U.S. Provisional Patent Application No. 61/819,199 filed May 3, 2013, the entire contents of which are incorporated herein by reference. The bridge side attachment sections in the aforementioned application No. 61/819,199 includes linear pupillary/transverse adjustment (see, e.g., side sections **163** in FIG. **9**) and are therefore particularly advantageous for use in connection with viewing devices such as a thermal imaging device **240** or other viewing device employing a display screen.

Referring again to FIGS. **1-8**, outward pivoting of each of the left and right side sections **126** about the pivot hinge **134** allows each of the attached viewing devices **230** to be moved to a non-viewing position when not in use (see FIG. **8**). One or both of the devices **230** can be pivoted independently of the other. This allows the user to move one or both of the viewing devices **230** up and out of the user's line of sight without the need to pivot the second segment **118** of the helmet mount **100** to the stowed position. If the user intends

to stow the viewing devices for a longer period, the second segment **118** can be additionally pivoted to the stowed position to move the device further back toward the user's center of mass in order to reduce neck strain and fatigue, as shown in FIG. **8**.

Unlike some of the prior art helmet mounts, which are adapted for use with a particular model viewing device, the present development provides a universal bridge as an integral component, which allows the helmet mount **100** to function as a universal helmet mount, which can be adapted for binocular viewing with all manner of monocular viewing devices. In certain embodiments, the present development is directed to a modular system, wherein a plurality of side sections may be interchanged to provide a desired binocular system.

For example, FIGS. **6-8** illustrate a binocular system employing two MINI N/SEAS night vision monoculars. Systems employing other passive or enhanced night vision devices are also contemplated.

FIG. **9** shows an alternative system wherein device interface members **126***b* are adapted for use with thermal camera systems **240**, such as the OASYS Technology SkeetIR thermal imaging monoculars. The interface members **126***b* may be as described in the above-incorporated Application No. 61/819,199.

FIG. **10** shows yet another alternative embodiment wherein device interface members **126***c* are adapted for use with MUM 14-B night vision monoculars **250**. Other viewing systems include the AN/PVS-14 night vision system, visible wavelength imaging systems, and others.

Although the illustrated embodiments illustrate binocular systems wherein the same type of viewing device is provided for each eye, it will be recognized that the left and right side viewing devices may be attached independently such that each eye may view devices of different types and/or imaging modalities.

The invention has been described with reference to the preferred embodiments. Modifications and alterations will occur to others upon a reading and understanding of the preceding detailed description. It is intended that the invention be construed as including all such modifications and alterations.

What is claimed is:

1. A helmet mount for attaching a viewing device to a helmet, the mount comprising:

a helmet interface assembly removably attachable to the helmet;

a pivot arm attached to the helmet interface assembly and pivotal about a horizontal, transverse axis, the pivot arm having a proximal end and a distal end;

a carriage member carried on the pivot arm and slidable along the pivot arm between the distal end and the proximal end of the pivot arm, the carriage member having an upper extent lying in an upper plane extending parallel to said pivot arm;

the carriage member including a bridge member integral therewith, the bridge member disposed beneath the upper plane, the bridge member including opposed first and second side surfaces, the first and seconds side surfaces being on opposite transverse sides of the pivot arm;

a first side section including a first mounting arm hingedly attached to a first viewing device mount;

a second side section including a second mounting arm hingedly attached to a second viewing device mount;

the first side surface including a first plurality of electrical contacts configured to be mated with corresponding contacts on the first mounting arm;

the second side surface including a second plurality of electrical contacts configured to be mated with corresponding contacts on the second mounting arm;

the first mounting arm including a first fastener element extending from a first mating surface and the second mounting arm including a second fastener element extending from a second mating surface;

the first side surface having a first opening removably receiving the first fastener element, the first fastener element and the first opening being positioned to guide mating of the first plurality of electrical contacts with the corresponding contacts on the first mounting arm; and

the second side surface having a second opening removably receiving the second fastener element, the second fastener element and the second opening being positioned to guide mating of the second plurality of electrical contacts with the corresponding contacts on the second mounting arm.

2. The helmet mount of claim **1**, further comprising:

the first viewing device mount including a first mounting shoe receptacle configured to removably attach to a mounting shoe of a first viewing device; and

the second viewing device mount including a second mounting shoe receptacle configured to removably attach to a mounting shoe of a second viewing device.

3. The helmet mount of claim **2**, further comprising:

the first side section including a first hinge that allows rotation of a first attached viewing device between a viewing position before a first eye of a user and a first non-viewing position out of a line of sight of the user; and

the second side section including a second hinge that allows rotation of a second attached viewing device between a second viewing position before a second eye of a user and a second non-viewing position out of the line of sight of the user.

4. The helmet mount of claim **3**, wherein the first and second hinges each pivot about a pivot axis that is parallel to optical axes of the first and second attached viewing devices.

5. The helmet mount of claim **2**, further comprising:

an electrical circuit for electrically coupling a power supply to one or both of a first attached viewing device and a second attached viewing device.

6. The helmet mount of claim **2**, wherein the first and second mounting shoe receptacles are linearly movable with respect to the first and second side sections, respectively, along a horizontal axis orthogonal to optical axes of the first and second viewing devices when the first and second side sections are in a deployed position.

7. The helmet mount of claim **1**, wherein the helmet interface assembly includes one or both of:

a vertical adjustment assembly for positioning an attached viewing device at a desired vertical position; and

a tilt adjustment assembly for adjusting a viewing angle of an attached viewing device.

8. The helmet mount of claim **1**, wherein the pivot arm pivots between a lower position and an upper position for use and stowage, respectively, of a viewing device attached to the bridge member.

9. The helmet mount of claim **1**, wherein the carriage member is slidable along the pivot arm to a desired position between the proximal end and the distal end of the pivot arm.

10. The helmet mount of claim 1, wherein the helmet interface assembly includes a breakaway connector which causes at least a portion of the helmet mount to detach from the helmet upon the application of a predetermined force.

11. The helmet mount of claim 1, further comprising:

a gear rack on said pivot arm;

a slide lock carried on said carriage member, the slide lock having locking teeth which intermesh with the gear rack to secure the carriage member at a desired position on the pivot arm, the slide lock being manually actuatable to selectively move the locking teeth out of engagement to provide fore-and-aft adjustment of the carriage member.

12. The helmet mount of claim 1, further comprising a captured spring within said carriage member urging the locking teeth into engagement with the gear rack.

13. The helmet mount of claim 1, further comprising a viewing device.

14. The helmet mount of claim 13, wherein the viewing device comprises a pair of monocular viewing devices.

15. The helmet mount of claim 1, wherein each of the the first and second side sections is adapted for mounting one or more viewing devices selected from the group consisting of an optical device, opto-electronic device, sighting device, targeting device, passive night vision device, enhanced night vision device, thermal imaging device, infrared imaging device, short-wave infrared imaging device, helmet mounted display screen, and combinations thereof.

16. The helmet mount of claim 1, wherein the first side surface is keyed to mate with the first mating surface and the second side surface is keyed to mate with the second mating surface.

17. The helmet mount of claim 1, further comprising:

at least one device interface member configured to attach to a different type of viewing device, wherein each of the at least one device interface member is attachable to the bridge member and interchangeable with one or both of the first and second side sections.

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