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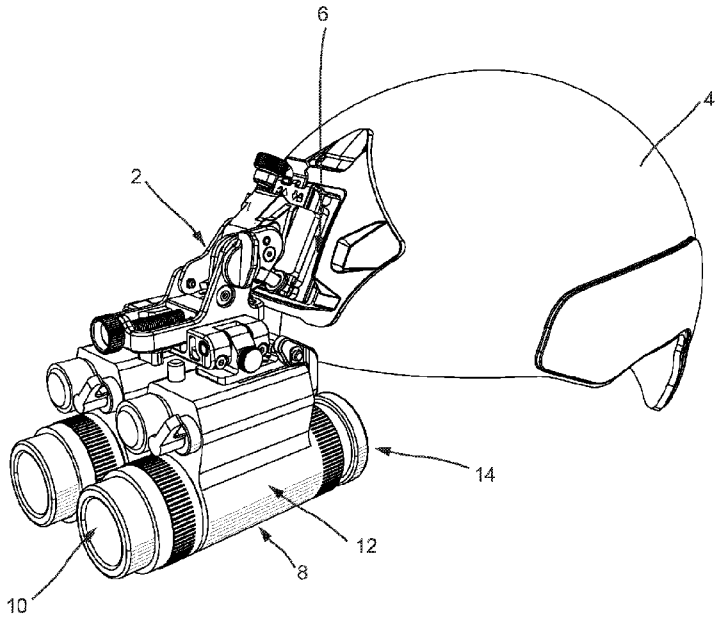

FIG. 1

(57) Abstract: The present invention relates to a helmet mounting assembly for enhanced night vision goggles, and more particularly to a flip-up helmet mount (2) designed to allow for automatic shutoff of an attached ENVG (8) when stowed, and automatic activation of an ENVG when returned to the in-use position. An automatic shutdown assembly including a magnet module (26) and a magnetically- responsive sensor (36) wherein the magnet module comprising a magnet (28) that emits the necessary magnetic field (34) which influences the magnetically-responsive sensor when in the stowed position in order to turn the ENVG off.

[Continued on next page]

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OPERATIONAL MODE SENSING SWITCH SYSTEM AND MULTI-ORIENTATED MOUNTING SYSTEM FOR A HELMET MOUNTED NIGHT VISION DEVICE

TECHNICAL FIELD

[0001] The present invention relates to mounting assemblies for enhanced night vision goggles (ENVG), and more particularly to a switch system and mounting system for a single or dual ENVG.

BACKGROUND ART

[0002] Night vision devices are commonly used by military personnel for conducting operations in low light and night conditions. These night vision devices typically include image intensifier tubes and associated optics that convert infrared and near infrared light into viewable images.

[0003] Assemblies for mounting night vision goggles to a helmet or other headpieces are well known in the art. The mounting assemblies allow a user's hands to remain free while viewing a scene through the night vision goggles. Prior art mounting assemblies typically include one or more of the following features: positional adjustment of the night vision goggles between an in-use position and a flip-up stowed position; a quick release system for detachment of ENVG from the mount; and semi-automatic shutdown of an attached ENVG.

[0004] Preferred assemblies for mounting night vision goggles to a helmet provide for the goggles to be attached to the helmet in a manner that allows a user to view a scene through the goggles without having to hold the goggles. Some of the prior mounting assemblies allow the user to reposition the mounting assembly and attached ENVG so that when a night vision device is not needed, such as in well-lit surroundings, the ENVG can be stowed while remaining attached to the helmet.

[0005] Some prior art devices include a semi-automatic shutdown feature that turns the ENVG off when repositioned to the stowed position. Some devices utilise a magnetic switch in the semi-automatic shutdown, but these are limited in their operational aspects because, amongst other reasons, the user can falsely trigger the magnetic switch by looking up towards the sky while the ENVG is in the in-use position or by looking down when the ENVG is in the stowed position. This is a considerable disadvantage as the user is unable to see with the ENVG while looking up beyond a certain angle. It is also a disadvantage as the ENVG produces a viewable image by emitting visible light for the user when switched on and the user's position can be given away to the enemy when the ENVG is falsely turned on while in the stowed position on the user's helmet.

This is a particularly serious issue for soldiers using ENVG.

[0006] While known mounting assemblies try to overcome this issue with specially shaped cavities for a magnet to travel in, or electronic sensors placed within the ENVG, it can be difficult to automatically distinguish the operational mode (*i.e.* in-use or stowed) of the ENVG.

[0007] An example of a prior art mounting assembly for night vision devices can be seen in U.S. Patent No. 6,862,748 to Prendergast. Prendergast discloses a module with an L-shaped cavity for a magnet to move in. The magnet moves by gravity from one end of the cavity to the other when repositioning the ENVG from an in-use position to a stowed position and activates a magnetic reed switch on the ENVG, turning the unit off. However, the magnet may also move from one end of the cavity to the other when the user looks up beyond a certain angle.

[0008] A further example of a prior art mounting assembly for night vision devices can be seen in U.S. Patent No. 8,497,465 to Hammond. Hammond disclosed an electronic orientation sensing switch system that uses accelerometers and gyroscopes to distinguish the position of the ENVG and adjust the power state of the ENVG accordingly. False activation of the switch can still occur if the user is required to look up or down beyond a preset angle.

[0009] It would be desirable to have the ability to distinguish if the ENVG is placed in an in-use position or in a stowed position with a higher degree of accuracy, and preferably without limiting a user's visual range.

[0010] Known mounting assemblies also typically have a removable carriage that detaches from the main assembly. The ENVG is mounted to the removable carriage such that the ENVG can be removed from the helmet when not in use for extensive periods of time and stored more securely. The main assembly can remain attached to the helmet block for quick reattachment of the ENVG. The carriage assembly is usually slidably connected to the main assembly in a double dovetail interface, wherein a pair of parallel ridges in the carriage slidably engage a pair of recesses in the main assembly.

[0011] In some prior mounting assemblies only one eyepiece monocular ENVG can be attached. A user must preselect if the left or right eye is preferred. While some mounting systems allow the ENVG to be mounted on the left or right side, often additional parts or tools are required to swap sides. It would therefore be desirable if the monocular mounting assembly could be used for both left and right eyes, and be easily swapped between left and right in the field.

[0012] It will be clearly understood that, if a prior art publication is referred to herein, this reference

does not constitute an admission that the publication forms part of the common general knowledge in the art in Australia or in any other country.

SUMMARY OF INVENTION

[0013] The present invention is directed to a helmet mounting assembly for enhanced night vision goggles, which may at least partially overcome at least one of the abovementioned disadvantages or provide the consumer with a useful or commercial choice. More particularly, the helmet mounting assembly according to the present invention is designed to allow for automatic shutoff of an attached ENVG when stowed, and automatic activation of an ENVG when returned to the in-use position.

[0014] With the foregoing in view, the present invention in one form, resides broadly in an automatic shutdown assembly for automatically shutting down a night vision device when it is not in the in-use position.

[0015] In a first aspect, the invention provides a flip-up helmet mount for an enhanced night vision goggle (ENVG) comprising (i) a helmet block adapted to secure the flip-up helmet mount to a helmet; (ii) a bracket member coupled to the helmet block and comprising an automatic shutoff mechanism; (iii) a carriage chassis coupled to the bracket member, wherein the carriage chassis is adapted to receive an ENVG; and (iv) a hinged pivot assembly associated with the carriage chassis, wherein the bracket member provides for rotational coupling between the carriage chassis and the helmet block, wherein the hinged pivot assembly enables the ENVG to be moved from a stowed position to an in-use position, and wherein the automatic shutoff mechanism comprises a magnet module.

[0016] Preferably, the automatic shutdown assembly comprises a magnet module that is positioned on the bracket member. In a particularly preferred embodiment, the magnet module comprises a magnet and a magnetically-responsive sensor.

[0017] The magnetically-responsive sensor can comprise a sensor or reed switch. The position of the sensor is such that it aligns with the magnet when the carriage chassis is repositioned from the in-use to the stowed position and is close enough in proximity for the magnet to activate the sensor. The sensor must also be far enough away from the magnet when in the in-use position such that it is not activated by the magnet.

[0018] Alternatively, the position of the magnet is such that it aligns with the sensor when the carriage chassis is in an in-use position and thus activates the ENVG. In this alternative, when the

ENVG is in a stowed position, the sensor and magnet are far enough away from each other so that the ENVG is shutdown.

[0019] In certain embodiments, the magnet is associated with one side of the bracket member and the magnetically-responsive sensor is associated with the opposite side of the bracket member. Positioning both the magnet and the magnetically-responsive sensor on opposite sides of the bracket member provides for a higher degree of accuracy in responding to the ENVG being in an in-use position or a stowed position. Advantageously, such a positioning of the magnet and the magnetically-responsive sensor does not limit the head movements of the user.

[0020] In some embodiments, the magnet can be attached to one end of a Bowden cable. The Bowden cable can be associated with, or attached to, the hinged pivot assembly such that movement of the ENVG actuates the cable and attached magnet. When the ENVG is moved to a stowed position, the magnet is pushed by the Bowden cable to align with the sensor or reed switch, thus activating shutdown of the ENVG. Conversely, when the ENVG is moved to an in-use position, the magnet is pulled by the Bowden cable out of the field of the sensor or reed switch, thus activating the ENVG.

[0021] Alternatively, the magnet and Bowden cable can be associated with, or attached to, the hinged pivot assembly such that when the ENVG is moved to a stowed position, the magnet is pulled by the Bowden cable out of the field of the sensor or reed switch, thus activating shutdown of the ENVG. Conversely, when the ENVG is moved to an in-use position, the magnet is pushed by the Bowden cable to align with the sensor or reed switch, thus activating the ENVG.

[0022] In alternative embodiments, the magnet can be replaced with other proximity sensors.

[0023] For example, a mechanical switch or an electronic switch such as a reed switch could be associated with, or attached to, the hinged pivot assembly and connected to cables or wires connected to contact pads inside the carriage assembly proximate the ENVG connection to the carriage chassis. Reciprocal contact pads on the ENVG make an electronic connection between the mount and the ENVG to form a switching loop. Thus, when the ENVG is in a stowed position, the switch is open and the ENVG is off, and conversely when the ENVG is in an in-use position, the switch is closed, thus activating the ENVG. Alternatively, the

[0024] The helmet mount can further comprise a mode selection switch, wherein the modes that can be selected comprise 'on' or 'off', with 'on' corresponding to enabling automatic shutdown, and 'off' corresponding to disabling automatic shutdown. Thus, the magnet module operates to automatically shutdown the night vision device whenever it is not in the in-use position, and the

appropriate switch selection ('on') is made on the ENVG.

[0025] In a further embodiment, rotating the carriage chassis from the in-use position to the stowed position moves the magnet towards the sensor to increase the proximity of the magnet module to the sensor in the stowed position, thereby activating shutdown of the ENVG.

[0026] In a further alternative embodiment, the magnet can be positioned on the carriage chassis to increase the proximity of the magnet to the sensor.

[0027] In a further alternative embodiment, the sensor can be located in the carriage chassis. The sensor can be coupled to the ENVG through conductive pins or similar means and send its magnetic activation to the ENVG.

[0028] In a further alternative embodiment, the magnet can be positioned in the carriage chassis or ENVG, and the sensor positioned in the bracket member. The sensor can be powered by an external power supply or battery, with the battery not located in the ENVG. Advantageously with this embodiment, the weight of the power supply is removed from the ENVG and positioned closer to the spine, reducing fatigue on the user. The external battery could also power the ENVG.

[0029] Positioning of the magnet in relation to the sensor as described, produces a reliable automatic shutdown assembly that senses the proximity of the bracket member or carriage chassis and ENVG, irrespective of the orientation of the user's viewing angle. This leads to greater accuracy in distinguishing the operational mode (*i.e.*, in use or stowed).

[0030] Preferably, the carriage chassis is removably secured into a receiving socket on the bracket member, thereby providing for quick separation of the carriage chassis from the bracket member and thus rapid removal of the ENVG from the helmet.

[0031] In a second aspect, the invention provides a flip-up helmet mount for an enhanced night vision goggle (ENVG) comprising (i) a helmet block adapted to secure the flip-up helmet mount to a helmet; (ii) a bracket member coupled to the helmet block; (iii) a carriage chassis coupled to the bracket member; (iv) a hinged pivot assembly associated with the carriage chassis; and (v) a bridge assembly coupled to the carriage chassis, wherein the bracket member provides for rotational coupling between the carriage chassis and the helmet block, wherein the hinged pivot assembly enables the ENVG to be moved from a stowed position to an in-use position, and wherein the coupling between the bridge assembly and the carriage chassis enables a monocular ENVG to be attached for either right eye or left eye viewing.

[0032] In one embodiment, the coupling between the bridge assembly and the carriage chassis

comprises a moveable dovetail plate that couples into a corresponding receiving socket of the carriage chassis.

[0033] In use, the ENVG is removably secured to the helmet mount via coupling of the dovetail plate on the bridge assembly and the receiving socket of the carriage chassis. The bridge assembly can be uncoupled from the carriage chassis, rotated horizontally by 180 degrees and recoupled to the carriage chassis, thereby switching a monocular ENVG from either left or right eye viewing to the other side. Horizontal rotation of the ENVG by 180 degrees is also required to ensure the eyepiece of the ENVG is correctly positioned against the user's eye.

[0034] Preferably, the dovetail plate is symmetrical such that it can be secured into the corresponding receiving socket in multiple orientations. Advantageously, the dovetail plate does not need to be removed from the bridge assembly, and therefore no tools are required by the user in order to convert a monocular ENVG from right eye viewing to left eye viewing.

[0035] Any of the features described herein can be combined in any combination with any one or more of the other features described herein within the scope of the invention.

[0036] The reference to any prior art in this specification is not, and should not be taken as an acknowledgement or any form of suggestion that the prior art forms part of the common general knowledge.

BRIEF DESCRIPTION OF DRAWINGS

[0037] The invention may take form in various components and arrangements of components, and in various steps and arrangement of steps. The drawings are only for purposes of illustrating preferred embodiments and are not to be construed as limiting the invention.

[0038] Preferred features, embodiments and variations of the invention may be discerned from the following Detailed Description which provides sufficient information for those skilled in the art to perform the invention. The Detailed Description is not to be regarded as limiting the scope of the preceding Summary of the Invention in any way. The Detailed Description will make reference to a number of drawings as follows:

[0039] FIG. **1** is a perspective schematic view of a helmet with an associated ENVG device using a helmet mount system according to an embodiment of the invention wherein the ENVG is in the in-use position.

[0040] FIG. **2** is an enlarged view of the helmet mount system shown in FIG. **1** wherein the helmet

is not shown and the system is in the in-use position.

[0041] FIG. **3** is an exploded perspective view of the helmet mount system shown in FIG. **2** in the in-use position.

[0042] FIG. **4** is a perspective schematic view of a helmet mount system according to an embodiment of the invention in the stowed position, wherein the helmet is not shown.

[0043] FIG. **5** is a perspective schematic side view of a helmet mount system according to an embodiment of the invention in the stowed position.

[0044] FIG. **6** is a schematic exploded perspective view of a helmet mount system with an automatic shutdown assembly according to an embodiment of the invention.

[0045] FIG. **7** is a schematic side view of a helmet mount system with an automatic shutdown assembly according to an embodiment of the invention in the in-use position.

[0046] FIG. **8** is a schematic side view of helmet mount system with an automatic shutdown assembly according to an embodiment of the invention in the stowed position.

[0047] FIG. **9** is a schematic side view of a helmet mount system with an automatic shutdown assembly according to an embodiment of the invention in the in-use position.

[0048] FIG. **10** is a schematic side view of a helmet mount system with an automatic shutdown assembly according to an embodiment of the invention in the stowed position.

[0049] FIG. **11** is a perspective schematic view of a helmet with an associated monocular ENVG device using a helmet mount system according to an embodiment of the invention wherein the ENVG is in a position for viewing with the right eye of a user.

[0050] FIG. **12** is a perspective schematic view of a helmet with an associated monocular ENVG device using a helmet mount system according to an embodiment of the invention wherein the ENVG is in a position for viewing with the left eye of a user.

[0051] FIG. **13** is a schematic exploded perspective view of the helmet mounting system and ENVG shown in Fig. **12**.

[0052] FIG. **14** is an enlarged view of the helmet mount system and ENVG shown in FIG. **11** wherein the helmet is not shown.

[0053] FIG. **15** is a schematic top view of a helmet mount system and ENVG according to one

embodiment of the invention.

[0054] FIG. **16** is a schematic front view of a helmet mount system and ENVG according to one embodiment of the invention.

[0055] FIG. **17** is a schematic top view of a dual sided dovetail plate according to an embodiment of the invention.

[0056] FIG. **18** is a schematic bottom view of a dual sided dovetail plate according to an embodiment of the invention.

[0057] FIG. **19** is a schematic perspective view of a dual sided dovetail plate according to an embodiment of the invention.

[0058] Fig. **20** is a schematic side perspective view of a helmet mount system with an automatic shutdown assembly according to an embodiment of the invention in the in-use position.

[0059] FIG. **21** is a schematic side view of helmet mount system with an automatic shutdown assembly according to an embodiment of the invention in the in-use position.

[0060] FIG. **22** is a schematic side perspective view of a helmet mount system with an automatic shutdown assembly according to an embodiment of the invention in the stowed position.

[0061] FIG. **23** is a schematic side view of a helmet mount system with an automatic shutdown assembly according to an embodiment of the invention in the stowed position.

DESCRIPTION OF EMBODIMENTS

[0062] Referring now to **FIG. 1**, **2**, **3, 4** and **5**, an embodiment of a flip-up helmet mount **2** according to the present invention is shown. The flip-up helmet mount **2** is shown in use with a standard composite helmet with a Visual Augmentation System (VAS) shroud **4**. The flip-up helmet mount **2** is attached to the helmet **4** by a helmet block **6**. A pair of enhanced night vision goggles (ENVG) **8** are secured to the helmet **4** by use of the flip-up helmet mount **2**. Each ENVG **8** shown in **FIG. 1** is a device that includes a single objective lens **10**, a ENVG housing **12**, and an eye-piece **14**. The ENVG **8** is attached individually to the helmet mount **2** by a carriage chassis **18**, which is mounted to a bracket member **16**. The bracket member **16** comprises a bracket member upper **20** and a bracket member lower **22** which can rotate around the bracket member hinge **24**. To use the ENVG **8**, the operator places it in the position depicted in **FIG. 1** and looks into the eye-pieces **14** to see an enhanced image representative of the low-level light from a night scene which has entered the objective lens **10**.

[0063] As shown in **FIG. 1,** the ENVG **8** is positioned to be in front of the operator's eyes so that the operator may look through the eye-pieces **14** of the ENVG **8**. This position is referred to as the "in-use" position. However, the flip-up helmet mount **2** also allows the operator to rotate the bracket member lower **22** around the bracket member hinge **24,** allowing the operator to stow the ENVG **8** completely above the line of sight of the operator, to permit normal, unobstructed vision as depicted in **FIG. 4** and **5**. This position is referred to as the "stowed" position.

[0064] Automatic Shut Down Assembly

[0065] The flip-up helmet mount **2** provides for automatic shutdown of the ENVG **8** when in the stowed position. More particularly, the flip-up helmet mount **2** provides for reliable and automatic shutdown of the night vision device **8**. Accordingly, the flip-up helmet mount **2** provides for automatic activation of the ENVG **8** when in the in-use position. Furthermore, the flip-up helmet mount **2** provides for maintenance and servicing of the automatic shutdown assembly in the field.

[0066] As is well known in the art, the night vision goggle **8** includes a power supply in the form of a battery pack (not shown) internal to the housing **12** or remotely on the rear of the helmet **4**. A power supply circuit provides power to an image intensifier tube (not shown), which supplies an intensified image in phosphor yellow/green light of the scene viewed by the objective lens **10** to the eye-pieces **14**.

[0067] Referring now to **FIG. 2, 3, 4, 6**, **7**, **8**, **9** and **10**, the flip-up helmet mount includes a magnet module **26** located on the bracket member upper **20**. The magnet module **26** comprises a magnet **28** held in a magnet cavity **30** by a magnet cover **32** (**FIG. 6**). The magnet **28** emits a magnetic field **34** (**FIG. 7** and **8**).

[0068] The ENVG **8** also includes a magnetically-responsive sensor **36** inside the ENVG housing **12**. The magnetically-responsive sensor **36** removes electrical power to the ENVG **8** when a magnetic field **34** of sufficient strength is supplied to the magnetically-responsive sensor **36**. An automatic shutdown assembly is essential when using a flip-up helmet mount **2**, since, as best seen in **FIG. 5**, should the user forget to turn off the night vision goggle before moving it to the stowed position, the phosphor yellow/green light emitted from the eye-pieces **14** would be visible to possibly hostile personnel in front of the user. The phosphor yellow/green light would appear as a pair of small spot lights and may be visible at great distances at night, indicating the position of the user of the night vision goggle to those in front of the user.

[0069] Accordingly, the flip-up helmet mount **2** includes an automatic shutdown assembly to provide the necessary magnetic field **34** to the magnetically-responsive sensor **36** when the night

vision device **8** is in the stowed position, while at the same time ensuring that the magnetic field is removed from the magnetically-responsive sensor **36** when the night vision goggle **8** is pivoted to the in-use position.

[0070] One of the advantages of the automatic shutdown assembly provided for in the flip-up helmet mount **2** is that it is more reliable than the assemblies provided for in the prior art. This reliability of the shutdown assembly is due an understanding of the absolute position between the bracket member upper **20** and bracket member lower **22** and therefore operational mode of the ENVG **2**. Advantageously, the absolute position of the bracket member **16** is irrespective of the user's head position and is not altered by gravity or other outside circumstances.

[0071] When using the flip-up helmet mount **2**, the operator can adjust the position of the eye-pieces **14** in relation to the operator's eyes, to optimize the viewing conditions of the ENVG **8**. The magnet module **26** may also require some positional adjustment to ensure that the magnetically-responsive sensor **36** can optimally sense the magnetic field **34** produced by the magnet **28** when in the stowed position, and not when in the in-use position.

[0072] The magnet module **26** can be repositioned using a magnet adjustment assembly **38** as shown in **FIG. 9** and **10**. The magnet adjustment assembly **38** can be geared or coupled with the bracket member hinge **24**, such that when the bracket member lower **22** is rotated towards the bracket member upper **20**, the magnet adjustment assembly **38** pivots towards the bracket member upper **20**, ensuring the magnet **28** is in proximity to the magnetically-responsive sensor **36**. Other adjustment methods can be utilised to adjust the proximity of the magnet **28** and magnetically-responsive sensor **36** when in the stowed and in-use positions, providing for optimisation of the magnetically controlled automatic shutdown of the ENVG.

[0073] Alternatively, the magnet module 26 can be positioned inside the ENVG housing **12** and the magnetically-responsive sensor **36** can be placed on the bracket member upper **20**, helmet block **6**, or helmet **4**.

[0074] Multi Orientated Mounting System

[0075] Referring now to **FIG. 11** and **12**, an embodiment of a flip-up helmet mount **2** according to the present invention is show where only a single ENVG **8** is attached the flip-up helmet mount **2** providing a monocular system that provides an eye-piece **14** to only one of the operator's eyes.

[0076] In the embodiments as shown in **FIG. 13** and **14**, the ENVG **8** is removable from the carriage chassis **18** for storage purposes. As shown in **FIG. 13, 14, 15,** and **16**, the ENVG **8** is

attached to the carriage chassis **18** through a bridge assembly **40**. The bridge assembly **40** includes a slidable dovetail plate **42** that is received by the carriage chassis dovetail receiver slot **54** in the carriage chassis **18**. The ENVG **8** includes a Picatinny rail **46** which is a military standard rail interface system used by many manufacturers. The Picatinny rail **46** is received by a Picatinny clamp **48** located on the bridge assembly **40**.

[0077] The bridge assembly **40** can be removed from the carriage chassis **18** and rotated horizontally and re-attached to the carriage chassis **18** allowing the operator to swap the monocular ENVG system **8** from the left eye to the right eye and vice versa.

[0078] Similarly, the Picatinny rail **46** and Picatinny clamp **48** allow the operator to rotate the ENVG **8** horizontally and reattach it to the Picatinny clamp **48**. This ensures the eye-piece **14** is up against the operator's eye, irrespective of whether the bridge assembly **40** is positioned on the left or right side.

[0079] Turning now to **FIG. 13**, **14**, **15**, **16**, **17**, **18** and **19**, there is shown an embodiment wherein the ENVG **8** is secured to the slidable dovetail plate **42** through dovetail locating holes **50**. The slidable dovetail plate **42** includes several dovetail tapered faces **52** that interface with the carriage chassis dovetail receiver slot **54** ensuring the slidable dovetail plate **42** and attached ENVG **8** are secured firmly. This firm interface is important as it reduces the amount of movement of the ENVG **8** relative to the user's eye(s).

[0080] The slidable dovetail plate **42** includes a dovetail locking face **56**. In some embodiments this face is shared with the dovetail tapered face **52**. The carriage chassis dovetail receiver **44** includes a dovetail locking ball **58** (not shown) or similar mechanism that pushes against the dovetail locking face **56** and ensures the slidable dovetail plate **42** cannot be removed until the dovetail release button **60** (not shown) is actuated.

[0081] In a particular embodiment, the slidable dovetail plate **42** includes dovetail tapered faces **52** and dovetail locking face **56** which are symmetrical around the slidable dovetail plate's **42** mid-point. The symmetrical dovetail tapered faces **52** allow the slidable dovetail plate to be inserted into the carriage chassis dovetail receiver slot **54** from multiple directions allowing an operator to affix the ENVG **8** to the bridge assembly **40** in multiple orientations without the need to remove the slidable dovetail plate **42** from the ENVG **8**. The symmetrical dovetail locking face **56** allows the dovetail locking ball **58** (not shown) to secure the slidable dovetail plate **42** to the bridge assembly **40** from any orientation.

[0082] Automatic Shut Down Assembly – Bowden cable

[0083] Referring now to **FIG. 20, 21, 22** and **23**, the flip-up helmet mount includes a magnet **62** at one end of a Bowden cable **64** as part of an automatic shutdown assembly. Moving the ENVG from the in-use position of **FIG. 20** and **21** to the stowed position of **FIG. 22** and **23**, as indicated by the dashed arrows 66 in **FIG. 21**, results in activating shutdown of the ENVG. Dependent on where the magnetically-responsive sensor (not shown) is positioned relative to the magnet **62**, moving the ENVG to a stowed position either removes the magnet **62** from the magnetically-responsive sensor to activate shutdown of the ENVG, or positions the magnet within range of the magnetically-responsive sensor to activate shutdown of the ENVG.

[0084] Conversely, moving the ENVG from the stowed position of **FIG. 22** and **23** to the in-use position of **FIG. 20** and **21**, as indicated by the dashed arrows **66** in **FIG. 23**, results in activating shutdown of the ENVG. Dependent on where the magnetically-responsive sensor (not shown) is positioned relative to the magnet **62**, moving the ENVG to an in-use position either removes the magnet **62** from the magnetically-responsive sensor to activate the ENVG, or positions the magnet within range of the magnetically-responsive sensor to activate the ENVG.

[0085] In the present specification and claims (if any), the word 'comprising' and its derivatives including 'comprises' and 'comprise' include each of the stated integers but does not exclude the inclusion of one or more further integers.

[0086] Reference throughout this specification to 'one embodiment' or 'an embodiment' means that a particular feature, structure, or characteristic described in connection with the embodiment is included in at least one embodiment of the present invention. Thus, the appearance of the phrases 'in one embodiment' or 'in an embodiment' in various places throughout this specification are not necessarily all referring to the same embodiment. Furthermore, the particular features, structures, or characteristics may be combined in any suitable manner in one or more combinations.

[0087] In compliance with the statute, the invention has been described in language more or less specific to structural or methodical features. It is to be understood that the invention is not limited to specific features shown or described since the means herein described comprises preferred forms of putting the invention into effect. The invention is, therefore, claimed in any of its forms or modifications within the proper scope of the appended claims (if any) appropriately interpreted by those skilled in the art.

CLAIMS

1. A flip-up helmet mount for an enhanced night vision goggle (ENVG), comprising:
   (i) a helmet block adapted to secure the flip-up helmet mount to a helmet;
   (ii) a bracket member coupled to the helmet block and comprising an automatic shutoff mechanism;
   (iii) a carriage chassis coupled to the bracket member, wherein the carriage chassis is adapted to receive an ENVG; and
   (iv) a hinged pivot assembly associated with the carriage chassis;

wherein the bracket member provides for rotational coupling between the carriage chassis and the helmet block, wherein the hinged pivot assembly enables the ENVG to be moved from a stowed position to an in-use position, and wherein the automatic shutoff mechanism comprises a magnet module.

2. The flip-up helmet mount of claim 1, wherein the automatic shutoff mechanism further comprises a magnetically-responsive sensor.

3. The flip-up helmet mount of claim 2, wherein the magnetically-responsive sensor is positioned adjacent to the magnet module, such that the ENVG is switched off when the magnetically-responsive sensor is under the influence of a sufficient magnetic field from a magnet associated with the magnet module, and the ENVG is switch on when the magnetically-responsive sensor is no longer under the influence of sufficient magnetic field from a magnet associated with the magnet module.

4. The flip-up helmet mount of claim 3, wherein as the ENVG is rotated between an in-use position and a stowed position, the magnetically-responsive sensor is rotated, such that the magnet provides sufficient magnetic field required to turn the ENVG off.

5. A flip-up helmet mount for an enhanced night vision goggle (ENVG) comprising:
   (i) a helmet block adapted to secure the flip-up helmet mount to a helmet;
   (ii) a bracket member coupled to the helmet block;
   (iii) a carriage chassis coupled to the bracket member;
   (iv) a hinged pivot assembly associated with the carriage chassis; and
   (v) a bridge assembly coupled to the carriage chassis,

wherein the bracket member provides for rotational coupling between the carriage chassis and the helmet block, wherein the hinged pivot assembly enables the ENVG to be moved from a stowed

position to an in-use position, and wherein the coupling between the bridge assembly and the carriage chassis enables a monocular ENVG to be attached for either right eye or left eye viewing.

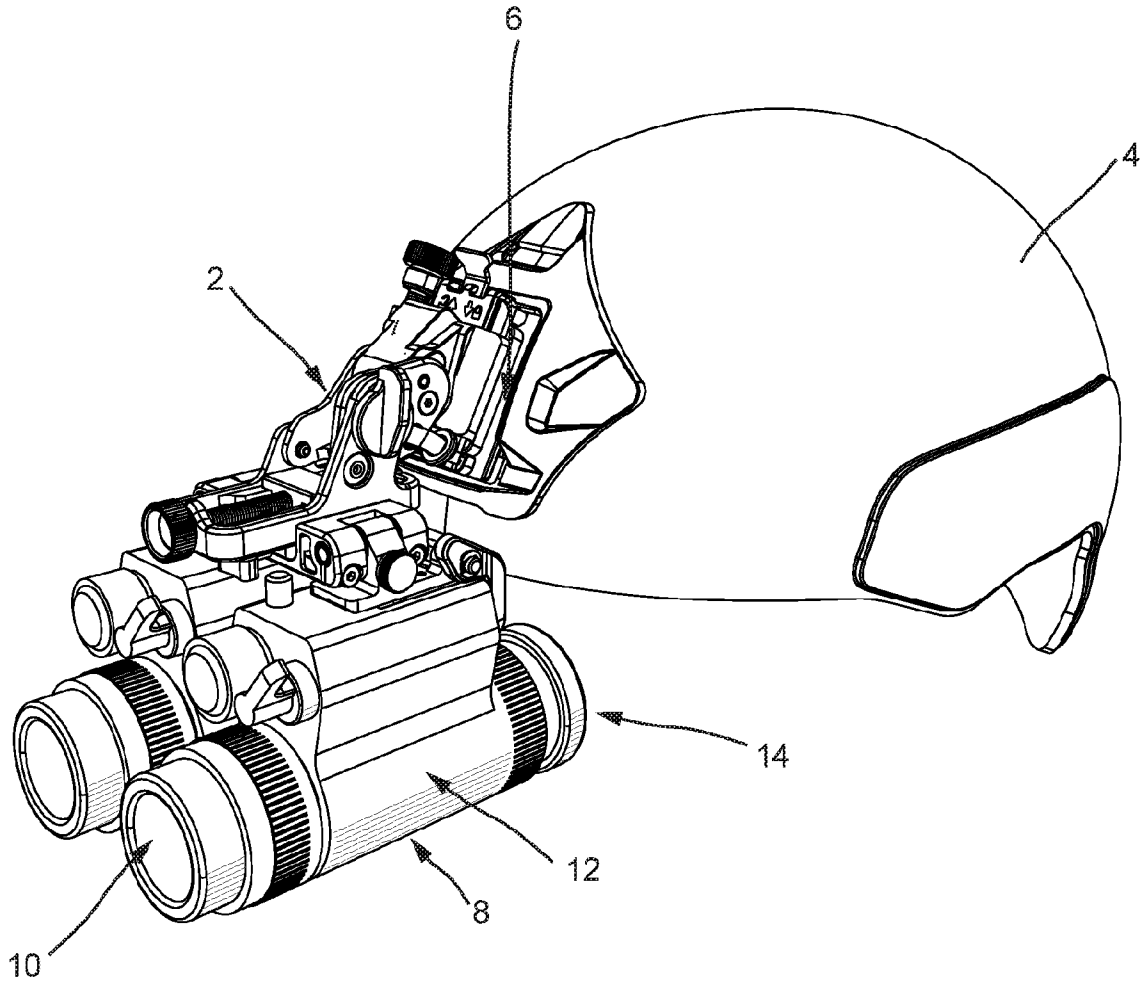

FIG. 1

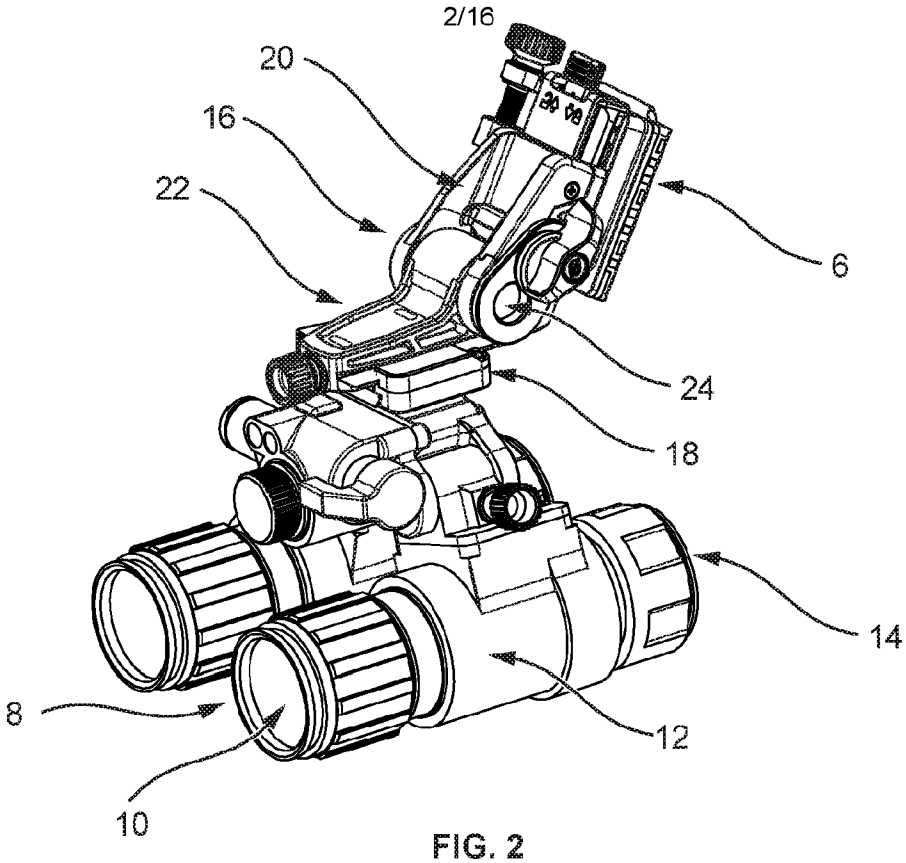

FIG. 2

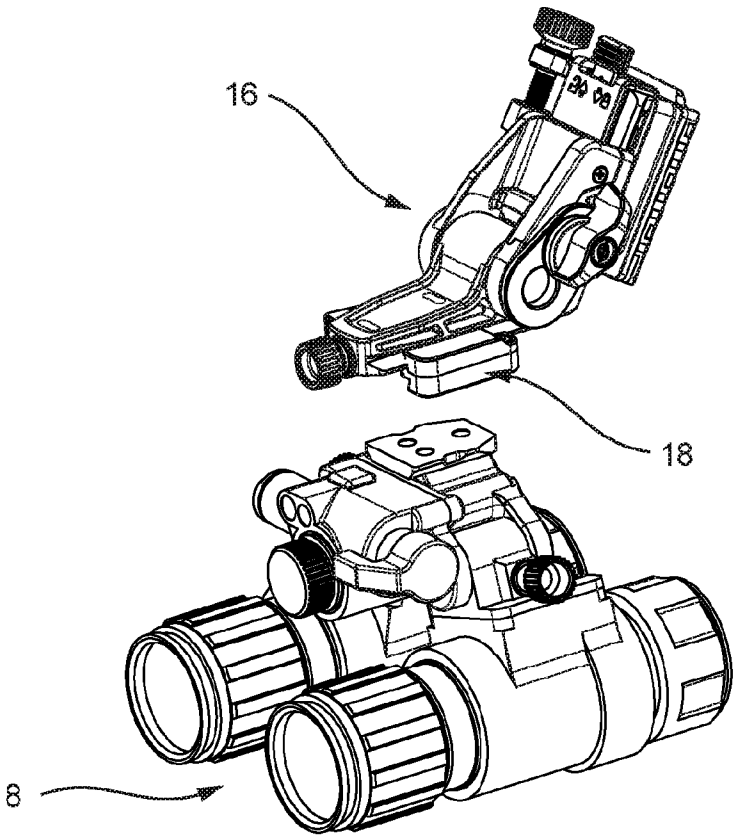

FIG. 3

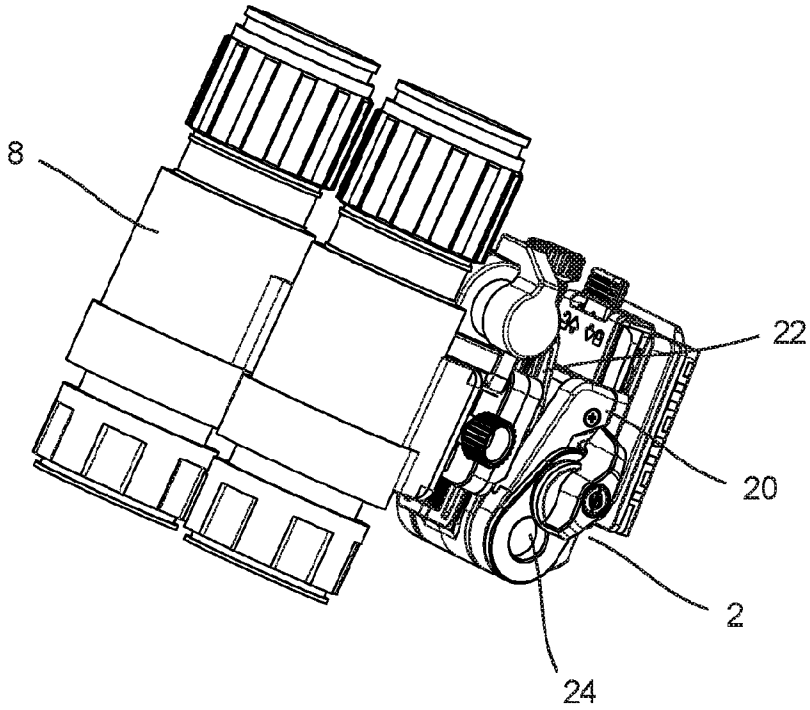

FIG. 4

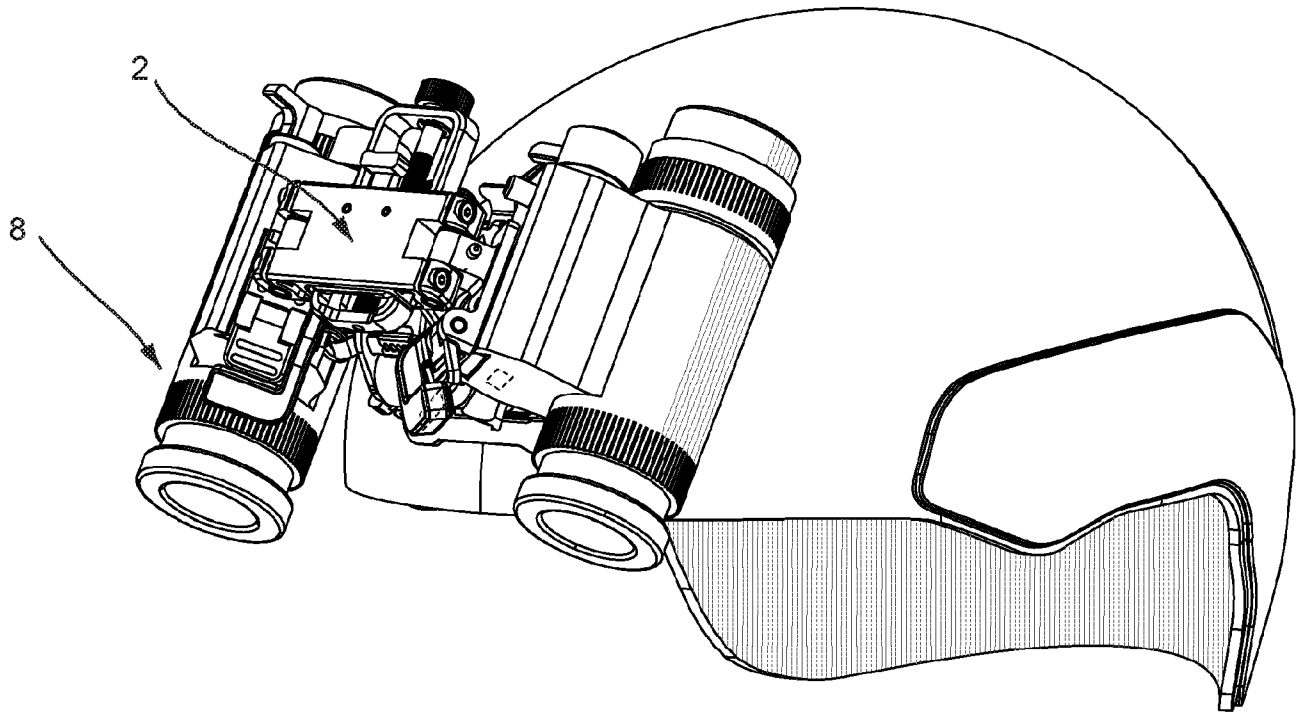

FIG. 5

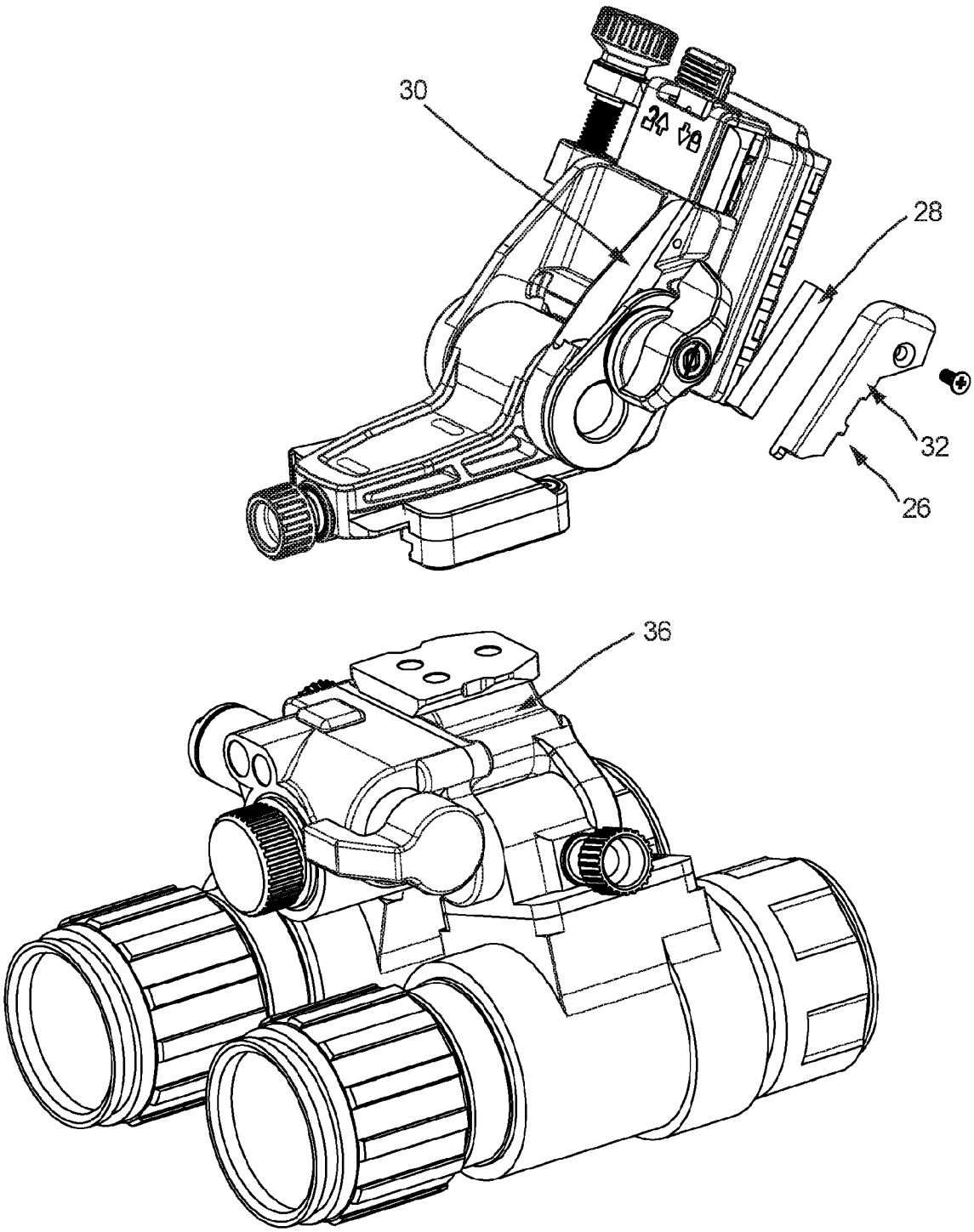

FIG. 6

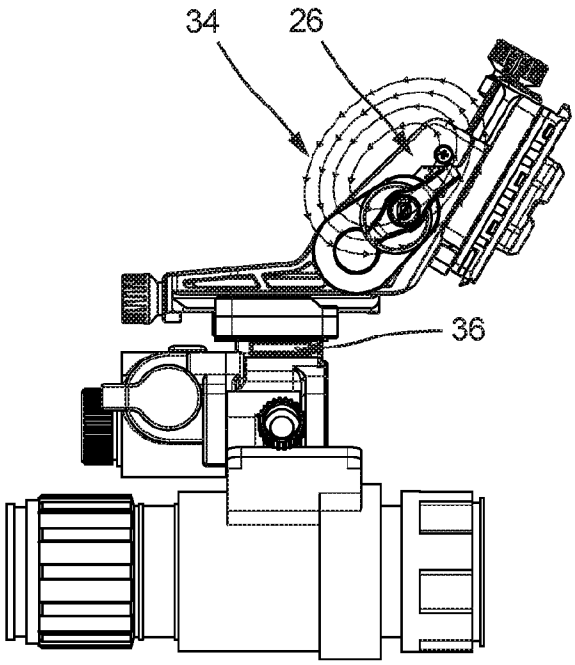

FIG. 7

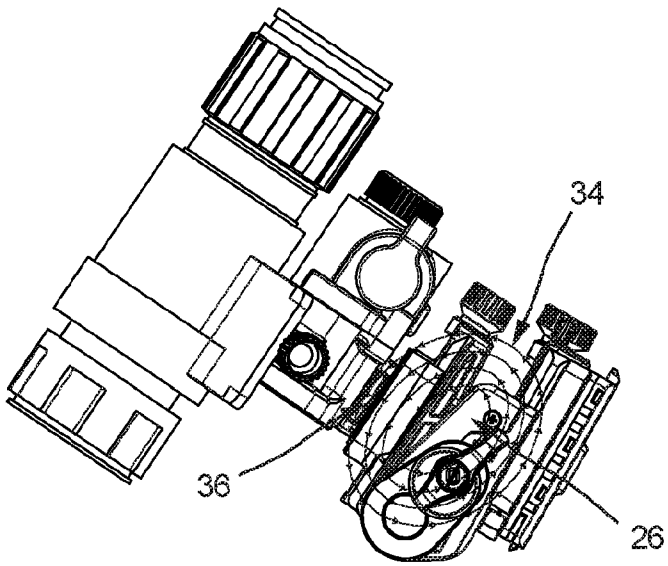

FIG. 8

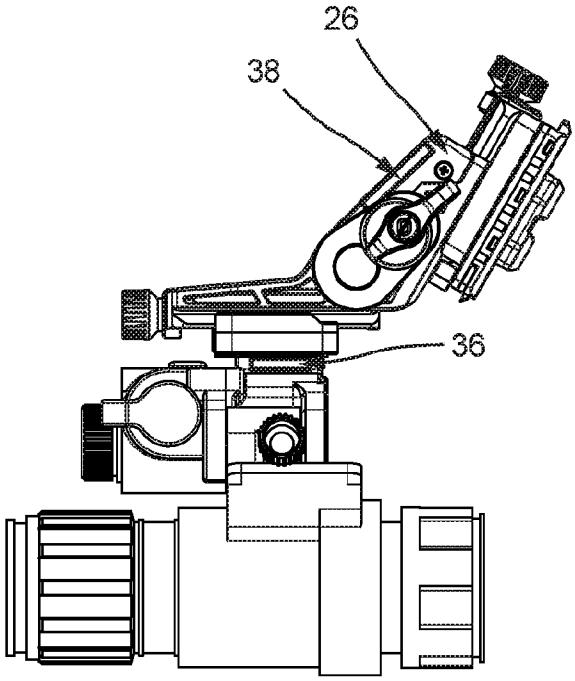

FIG. 9

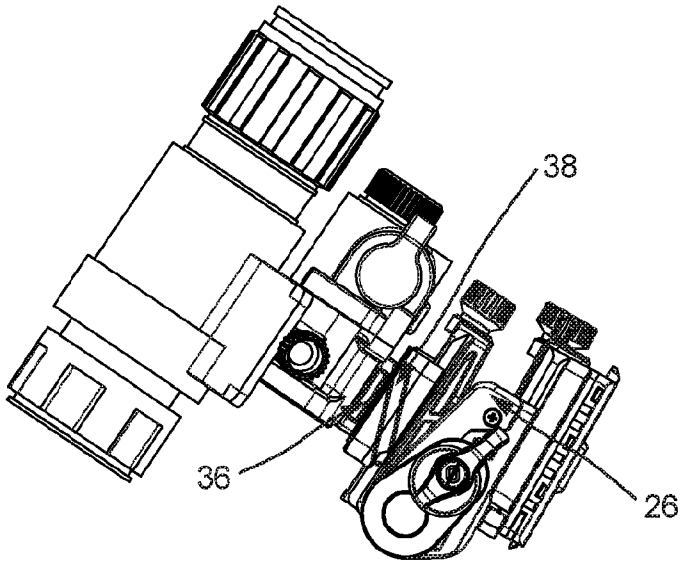

FIG. 10

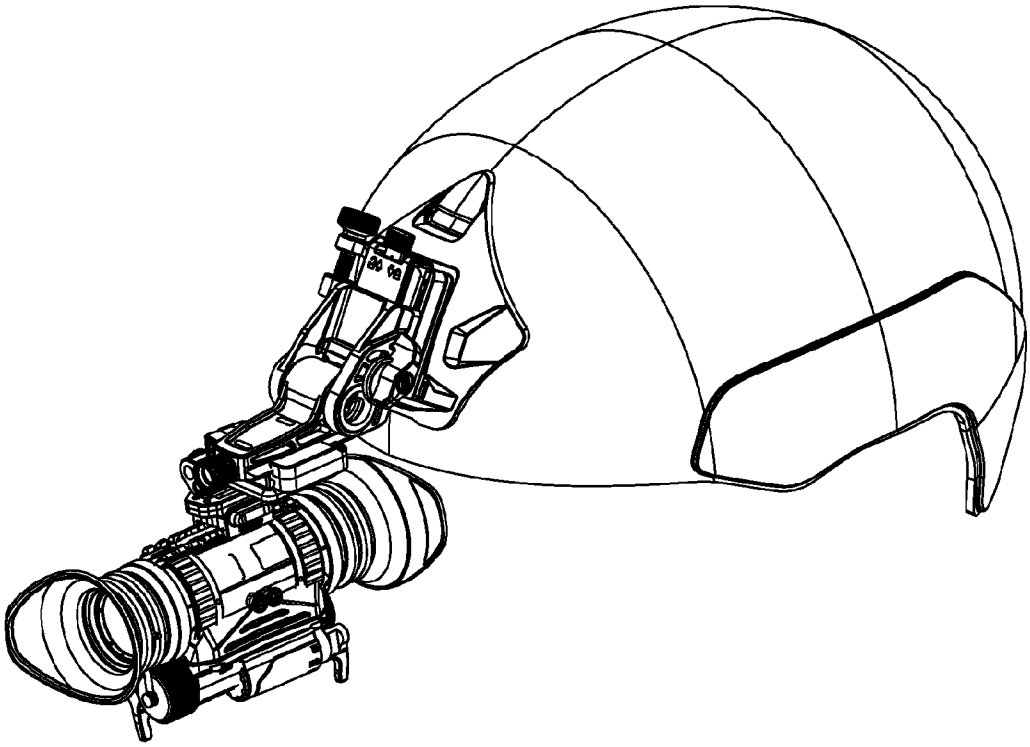

FIG. 11

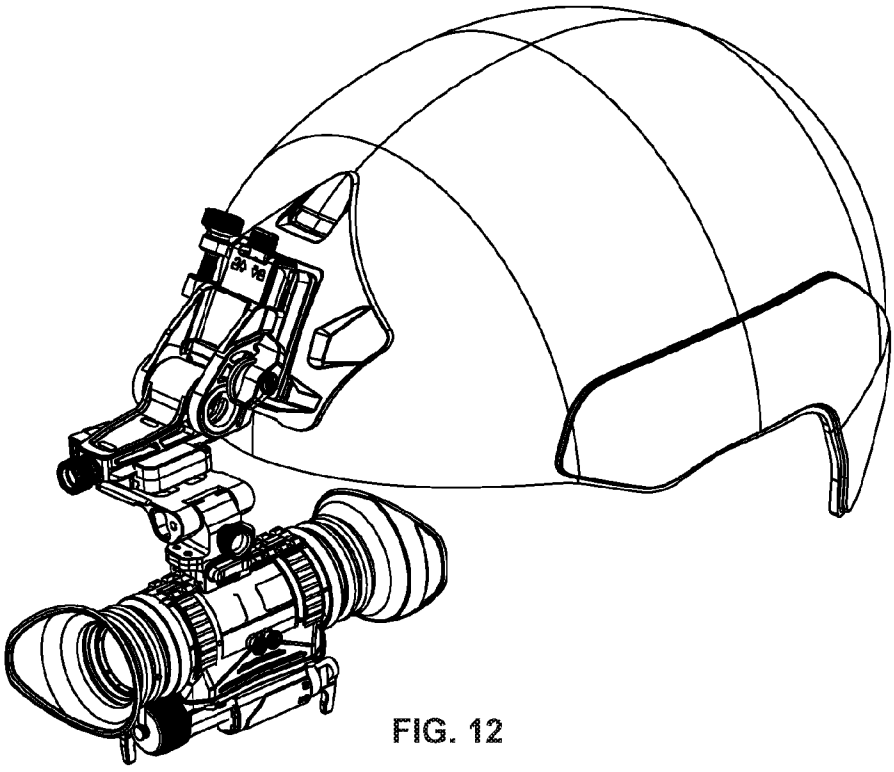

FIG. 12

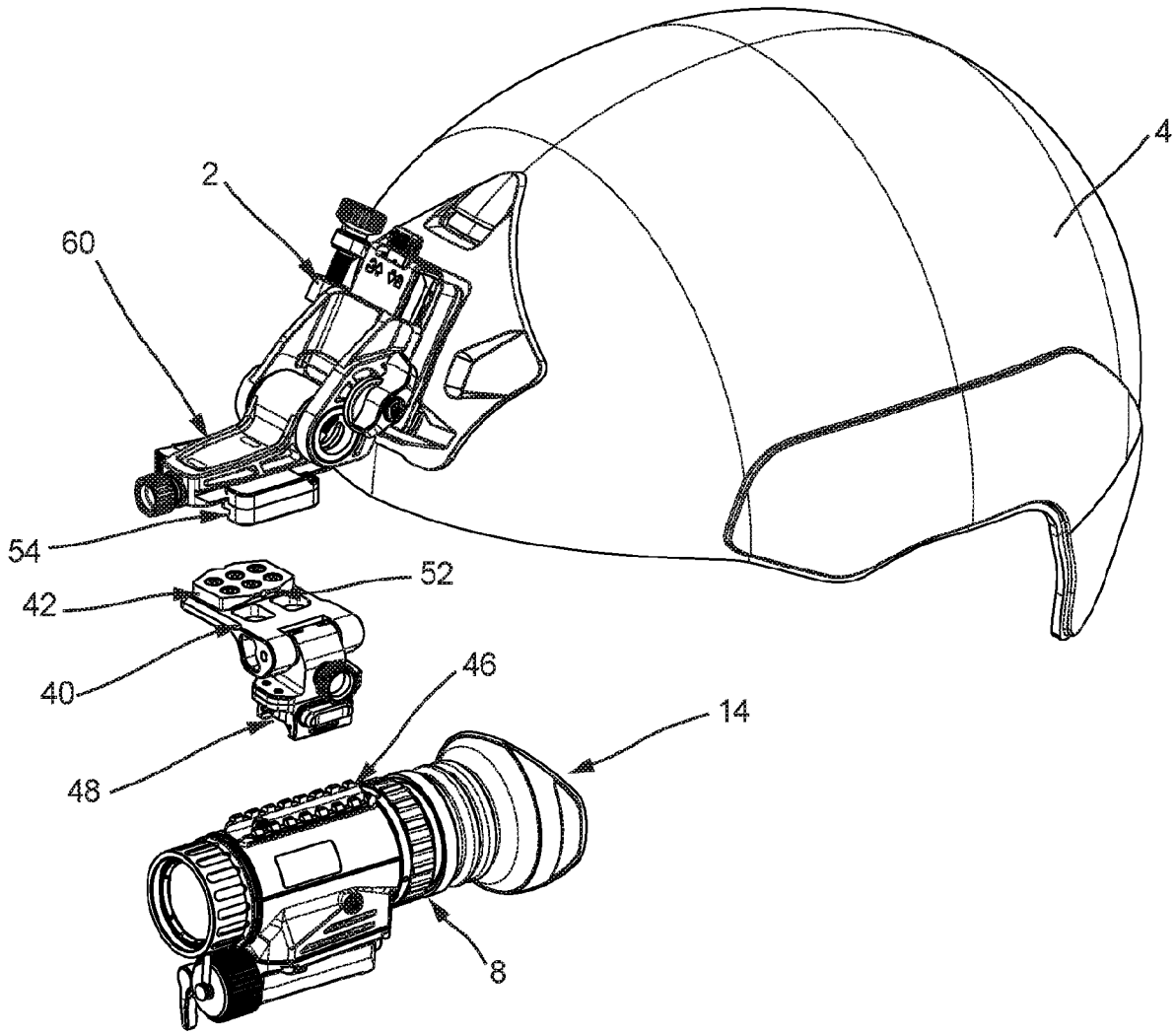

FIG. 13

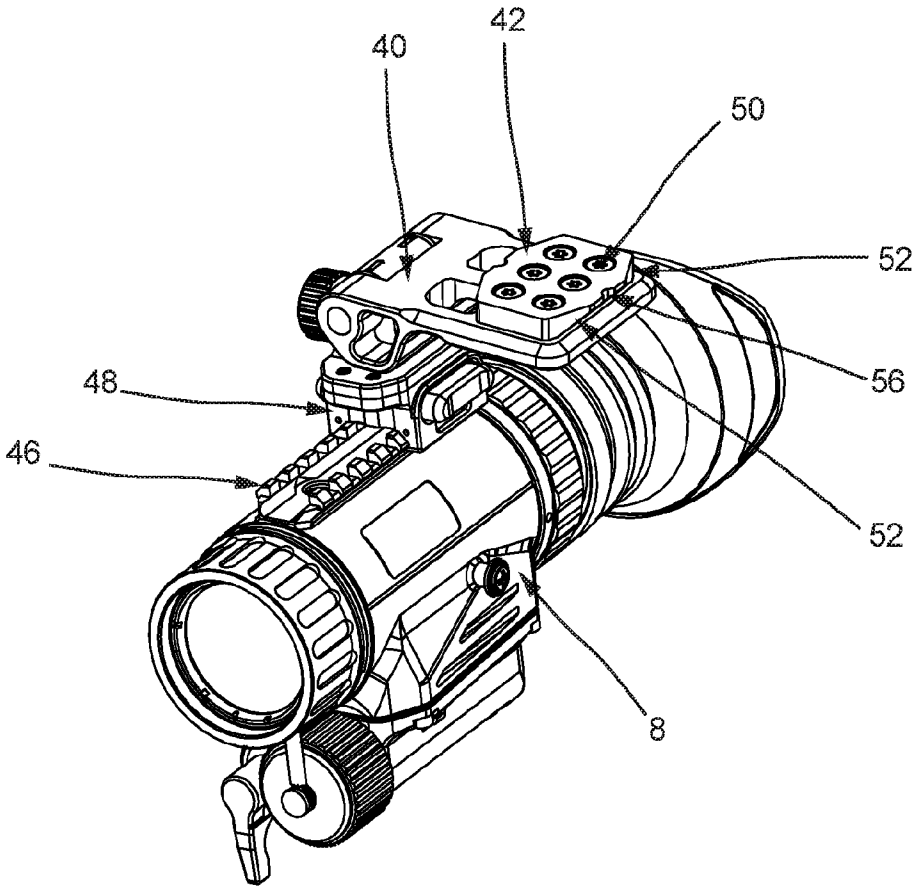

FIG. 14

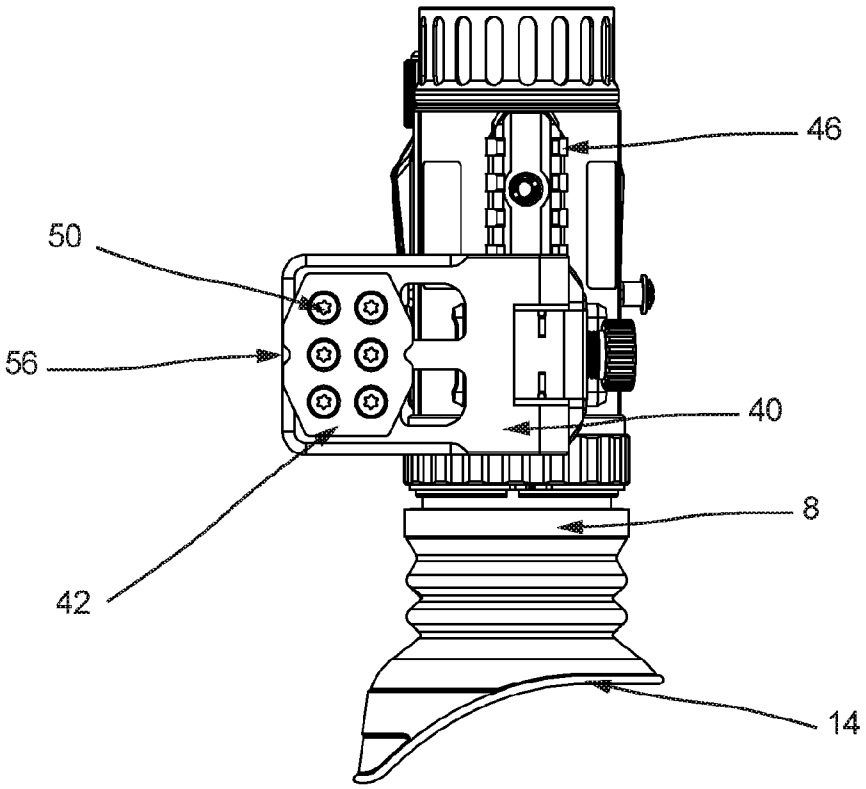

FIG. 15

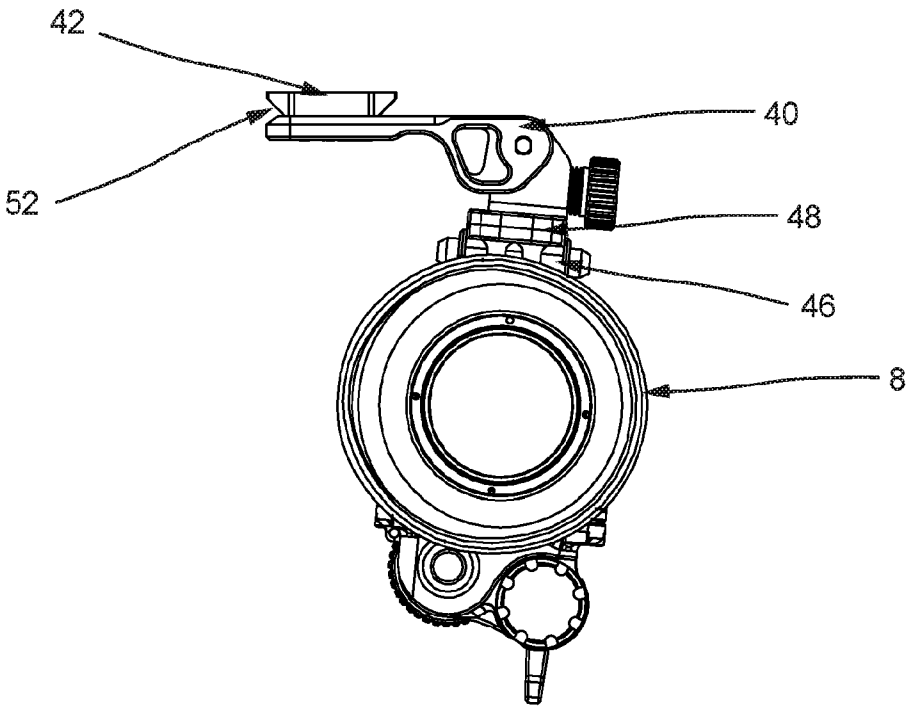

FIG. 16

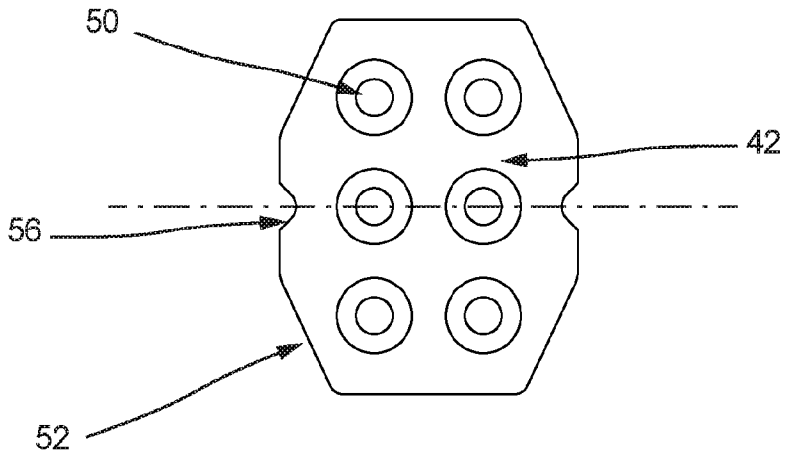

FIG. 17

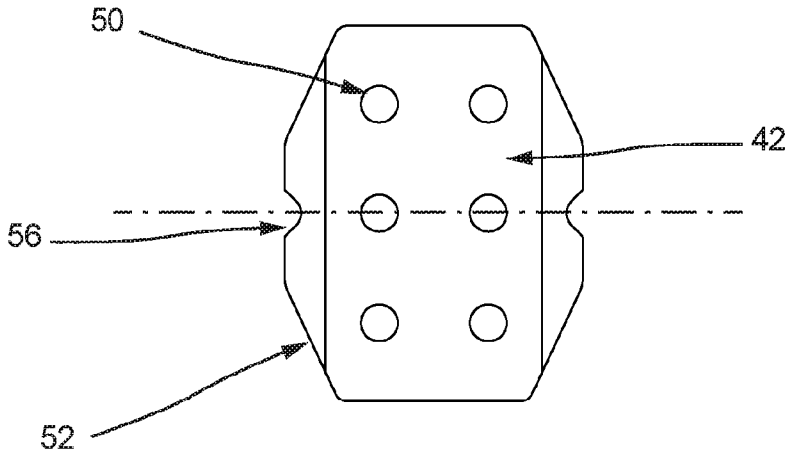

FIG. 18

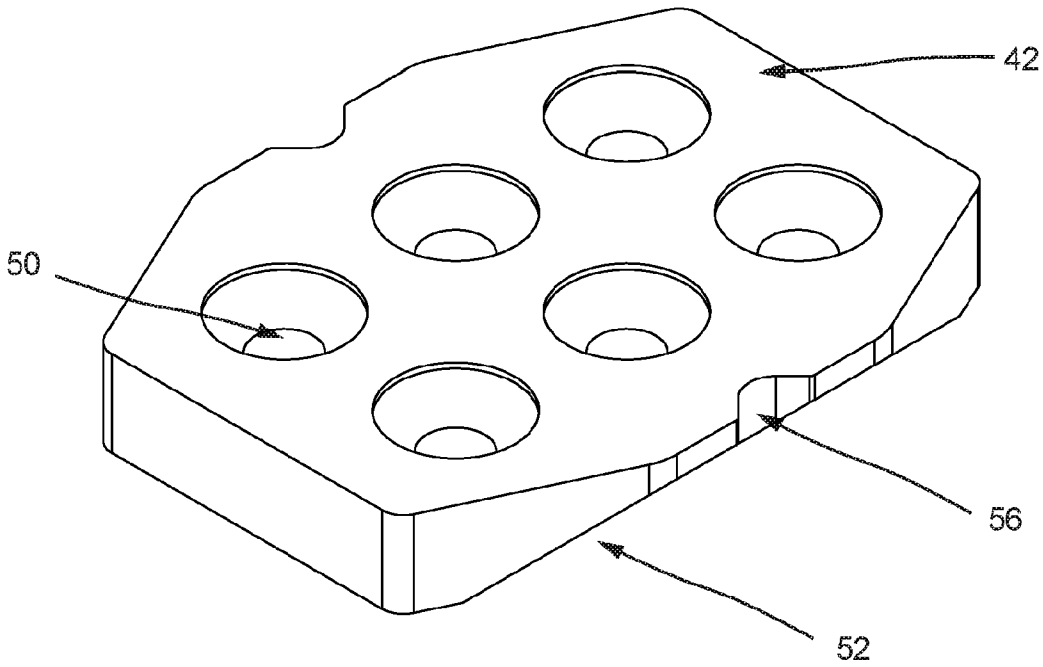

FIG. 19

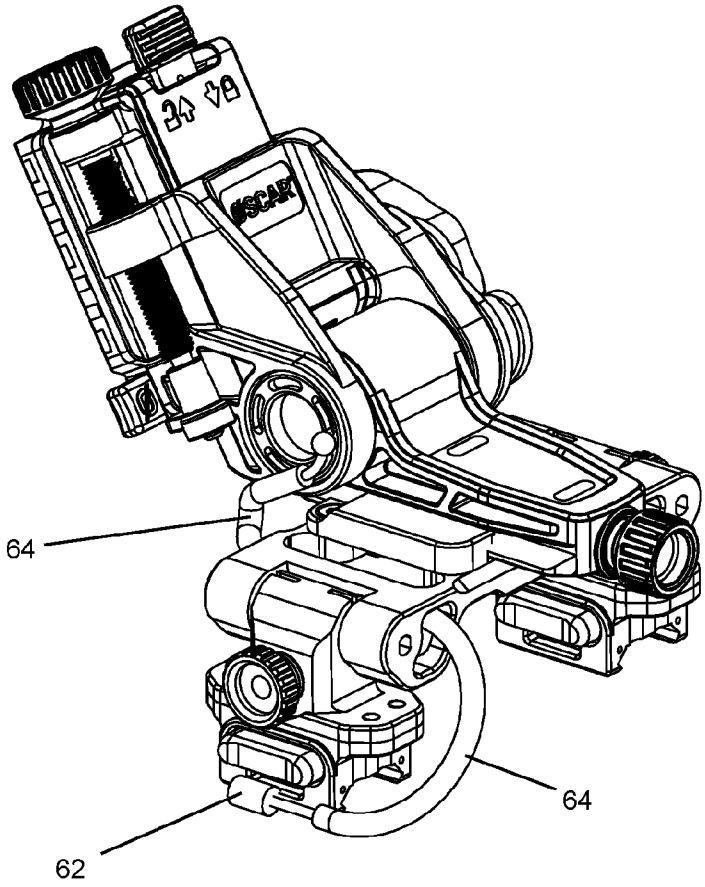

FIG. 20

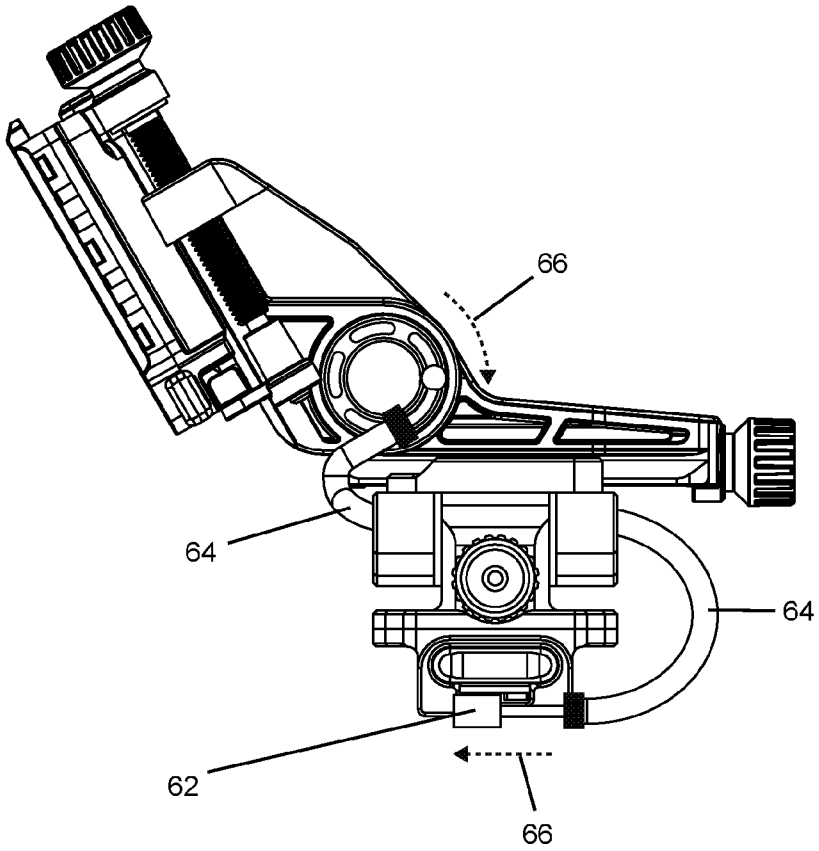

FIG. 21

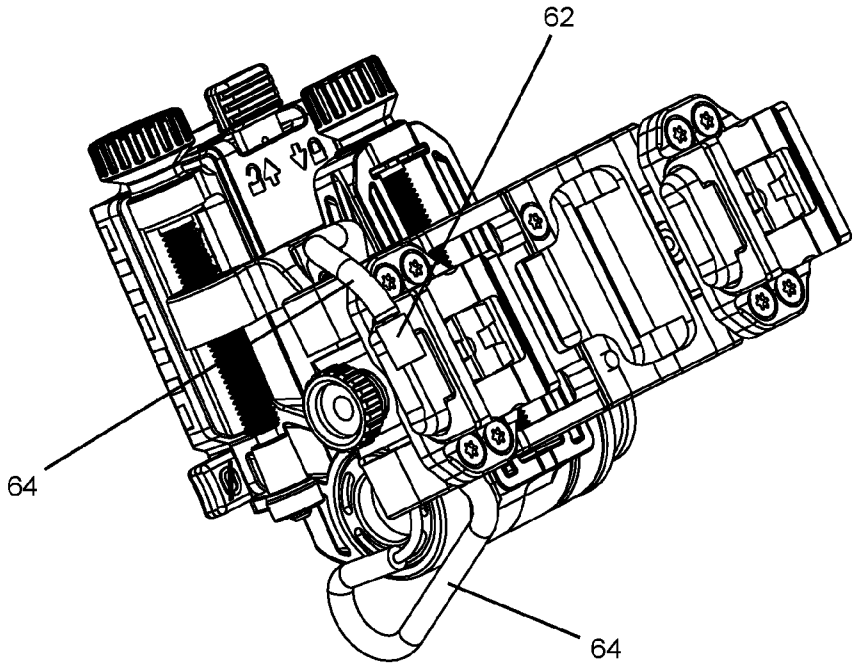

FIG. 22

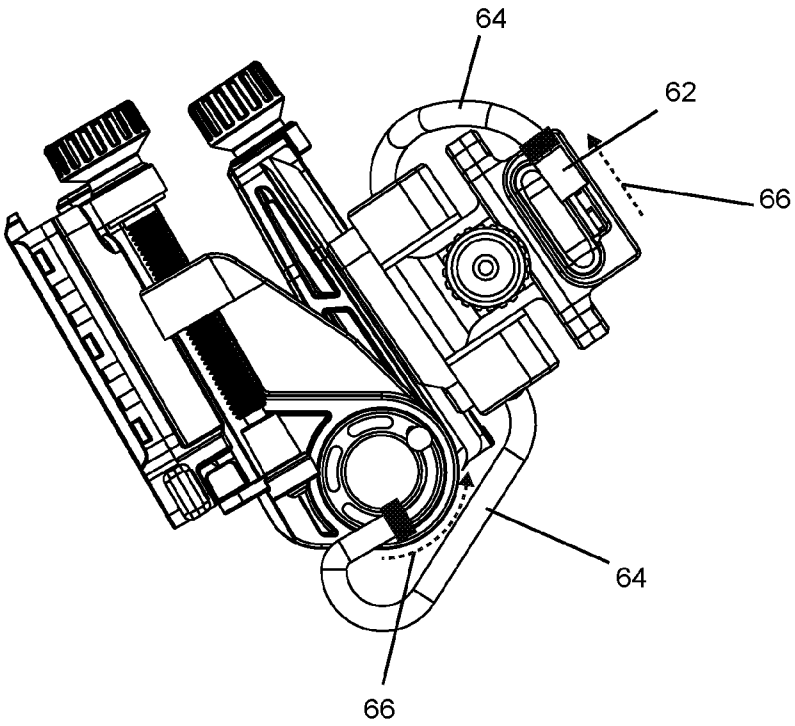

FIG. 23

INTERNATIONAL SEARCH REPORT

International application No.
PCT/AU2019/050947

A. CLASSIFICATION OF SUBJECT MATTER

A42B 3/04 (2006.01) G02B 23/12 (2006.01) F41H 1/04 (2006.01)

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)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

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

PATENW, WPI, EPODOC

IPC/CPC: A42B3/04, A42B3/042, G02B23/12, G02B23/125, F41H1/04 & Keywords: auto, turnoff, shutoff, shutdown, power down, magnet, electromagnet, sensor, switch, detect, night vision, night goggle, night sight, ENVG, attach, mount, bracket, carriage, interchange, module, position, left, right and similar terms.

Applicant/Inventor name search in Espacenet, AUSPAT, Google Patents and IP Australia internal databases.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
	Documents are listed in the continuation of Box C	

[X] Further documents are listed in the continuation of Box C [X] See patent family annex

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"D" document cited by the applicant in the international application

"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
24 October 2019	24 October 2019

Name and mailing address of the ISA/AU	**Authorised officer**
AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA Email address: pct@ipaustralia.gov.au	Ashwin Lazaro AUSTRALIAN PATENT OFFICE (ISO 9001 Quality Certified Service) Telephone No. +61262832181

INTERNATIONAL SEARCH REPORT

International application No.
PCT/AU2019/050947

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:

the subject matter listed in Rule 39 on which, under Article 17(2)(a)(i), an international search is not required to be carried out, including

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:

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:

See Supplemental Box for Details

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.

INTERNATIONAL SEARCH REPORT	International application No. PCT/AU2019/050947

Supplemental Box

Continuation of: **Box III**

This International Application does not comply with the requirements of unity of invention because it does not relate to one invention or to a group of inventions so linked as to form a single general inventive concept.

This Authority has found that there are different inventions based on the following features that separate the claims into distinct groups:

- Claims 1 to 4 are directed to a flip-up helmet mount for an enhanced night vision goggle (ENVG). The feature of a bracket member comprising an automatic shutoff mechanism, a carriage chassis adapted to receive an ENVG, and wherein the automatic shutoff mechanism comprises a magnet module is specific to this group of claims.

- Claim 5 is directed to a flip-up helmet mount for an enhanced night vision goggle (ENVG). The feature of a bridge assembly coupled to the carriage chassis, and wherein the coupling between the bridge assembly and the carriage chassis enables a monocular ENVG to be attached for either right eye or left eye viewing is specific to this group of claims.

PCT Rule 13.2, first sentence, states that unity of invention is only fulfilled when there is a technical relationship among the claimed inventions involving one or more of the same or corresponding special technical features. PCT Rule 13.2, second sentence, defines a special technical feature as a feature which makes a contribution over the prior art.

When there is no special technical feature common to all the claimed inventions there is no unity of invention.

In the above groups of claims, the identified features may have the potential to make a contribution over the prior art but are not common to all the claimed inventions and therefore cannot provide the required technical relationship. The only features common to all of the claimed inventions and which provides a technical relationship among them are *a helmet block adapted to secure the flip-up helmet mount to a helmet; a bracket member coupled to the helmet block; a carriage chassis coupled to the bracket; a hinged pivot assembly associated with the carriage chassis; wherein the bracket member provides for rotational coupling between the carriage chassis and the helmet block, wherein the hinged pivot assembly enables the ENVG to be moved from a stowed position to an in-use position.*

However these features do not make a contribution over the prior art because they are disclosed in:

D1: US2002/0120979 A1 (PRENDERGAST) 05 September 2002

D2: WO 1995/007489 A1 (LITTON SYSTEMS, INC.) 16 March 1995

D3: AU 2013242851 A1 (WILCOX INDUSTRIES CORP.) 22 January 2015

D4: US 2015/0323777 A1 (WILCOX INDUSTRIES CORP.) 12 November 2015

Therefore in the light of these documents these common features cannot be special technical features. Therefore there is no special technical feature common to all the claimed inventions and the requirements for unity of invention are consequently not satisfied *a posteriori*.

INTERNATIONAL SEARCH REPORT C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		International application No. **PCT/AU2019/050947**
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2002/0120979 A1 (PRENDERGAST) 05 September 2002 Figures 1-3, 7-8, paragraphs [0013], [0017], [0089], [0103], [0111]	1-4
X	WO 1995/007489 A1 (LITTON SYSTEMS, INC.) 16 March 1995 Figures 1-4, page 14 lines 28-29	1-4
X	AU 2013242851 A1 (WILCOX INDUSTRIES CORP.) 22 January 2015 Figures 1-2, 6-7, paragraph [0058]	5
X	US 2015/0323777 A1 (WILCOX INDUSTRIES CORP.) 12 November 2015 Figures 7-8, paragraphs [0013], [0040]	5

INTERNATIONAL SEARCH REPORT Information on patent family members	International application No. **PCT/AU2019/050947**

This Annex lists known patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document/s Cited in Search Report		**Patent Family Member/s**	
Publication Number	**Publication Date**	**Publication Number**	**Publication Date**
US 2002/0120979 A1	05 September 2002	US 2002120979 A1	05 Sep 2002
		US 6457179 B1	01 Oct 2002
WO 1995/007489 A1	16 March 1995	WO 9507489 A1	16 Mar 1995
		AU 7722794 A	27 Mar 1995
		AU 678290 B2	22 May 1997
		EP 0719423 A1	03 Jul 1996
		FI 961052 A	07 Mar 1996
		IL 110873 A	13 Jul 1997
		KR 960705247 A	09 Oct 1996
		NO 315999 B1	24 Nov 2003
		NZ 273793 A	24 Feb 1997
		SG 43883 A1	14 Nov 1997
		TR 28609 A	14 Nov 1996
		US 5506730 A	09 Apr 1996
AU 2013242851 A1	22 January 2015	AU 2013242851 A1	22 Jan 2015
		AU 2013242851 B2	18 Oct 2018
		US 2015002930 A1	01 Jan 2015
		US 9709792 B2	18 Jul 2017
		US 2017184835 A1	29 Jun 2017
US 2015/0323777 A1	12 November 2015	US 2015323777 A1	12 Nov 2015
		US 9778453 B2	03 Oct 2017

End of Annex

Due to data integration issues this family listing may not include 10 digit Australian applications filed since May 2001.