

☒	Description	: paged	11A	to paged	11A
☒	Claim(s)	: paged	12B	to paged	15B
☒	Drawing(s)	: paged	1/5	to paged	5/5
☒	Abstract	: paged		to paged	

RTMPS (4/2)

C

FLIP-UP MOUNT FOR NIGHT VISION SYSTEM**BACKGROUND OF THE INVENTION****1. Related Applications**

The present invention relates to and incorporates by
reference the teachings of the following co-pending patent
applications: (1) Improved Night Vision System and
Mounting Assembly, Serial No. 07/805,187, filed December
10, 1991, by Dor; and (2) Universal Adapter For Night
Vision System, Serial No. 912,835, filed July 13, 1992
(filed concurrently herewith), by Dor.

2. Field of the Invention

The present invention relates to a night vision
system, and more particularly, to a flip-up mount for use
with a face mask or helmet which enables the night vision
system to be pivoted between an operational and a non-
operational position.

3. Description of Related Art

Night vision systems are commonly used by military
and law enforcement personnel for conducting operations in
low light or night conditions. These systems intensify
the ambient light to produce an output image which is
visible to the human eye. Such night vision systems
either take the form of binoculars, having separate eye
pieces for each eye, or monoculars, having only a single
eye piece.

It is common for operators of night vision systems to
desire hands-free operation in which the binocular or
monocular systems can be mounted to either a face mask
worn on the operator's face, or to the operator's helmet.
The typical face mask mounting assembly comprises a rod
which is held to the operator's face by use of a strap



-2-

which wraps around the head and connects to the rod at two or more places. At the center of the forehead portion of the rod, a mount is provided which would engage the binocular or monocular system. Helmet mounting assemblies
5 are also available, in which the rod mounts directly to the operator's helmet. A helmet mounting assembly of this kind is disclosed in the co-pending application described above. The components comprising a face mask or helmet mounting system are referred to collectively as headgear.

10 It frequently becomes necessary for the operator of a night vision system to temporarily remove the system from its operational position. For example, an operator of a vehicle such as a truck or a helicopter traveling during low light conditions would typically use a face
15 mask or helmet mounted night vision system. However, if it becomes necessary to quickly glance at items within the vehicle, such as a map or an instrument gauge, the operator would need to either dislodge the night vision system from within its locked position, or peek around the
20 edges of the eye piece of the system. Although installation and removal of the night vision system from its carriage on the headgear is a relatively simple task, it does require a certain degree of skill and can be hampered by the stress of the operational environment.

25 Thus, it would be desirable to provide a mount for a night vision system which enables the system to be easily pivoted from an operational to a non-operational position, without requiring removal of the system. It would be further desirable to provide a mount for a night vision
30 system that adapts with the face mask mounting assembly and helmet mounting assembly that are already commercially available.

This Sheet Has Been Replaced

-3-

SUMMARY OF THE INVENTION

Accordingly, a principal object of the present invention is to provide a flip-up mount for a night vision system which enables an operator to manipulate the system between an operational position and a non-operational position.

Another object of the present invention is to provide a flip-up mount for a night vision system which is compatible with existing face mask mounts and helmet mounts.

To achieve the foregoing objects and in accordance with the purpose of the invention, a flip-up mount for a night vision system is provided. The mount comprises a carriage which is configured to engage a coupling device provided on the night vision system and secure the system in place. A pivotal armature is attached to the carriage and extends from a pivot point. The armature pivots between a first operational position enabling an operator to use the system and a second stowed position. An anchor secures the pivot point to a helmet worn by the operator of the system. The pivot point further comprises a brace having an axle shaft, a sleeve integral to the armature and rotatable about the shaft, and a spring biased locking member securing the sleeve in a selected one of the first and second positions.

The anchor which secures the pivot point to the helmet further comprises a horizontal support rod and a pair of carriage support rods which extend perpendicularly from the horizontal support rod. The carriage support rods connect to a brace which carries the pivot point. A forward hook secured to the carriage support rods engages a forward edge of the helmet. A strap secured to the horizontal support rod secures to a rearward edge of the helmet. A ratchet mechanism is further provided to vary the length of the strap, enabling use of the flip-up mount with either a large, medium, or small helmet.

This Sheet Has Been Replaced



-4-

In an alternative embodiment of the present invention, a flip-up mount for a night vision system is provided for use with a face mask mount. The flip-up mount comprises a carriage configured to engage a coupling device provided on the night vision system and secure the system thereto. A pivotal armature is integrally formed to the carriage and extends to the pivot point. The armature pivots between a first operational position enabling the operator to use the system in a second stowed position. A brace carries the pivot point, and has an axle shaft, a sleeve integral to the armature and rotatable about the shaft, and a spring biased locking member securing the sleeve in a selected one of a first and second position. The brace secures to a face mask worn by the operator of the night vision system

A more complete understanding of the flip-up mount for a night vision system of the present invention will be afforded to those skilled in the art, as well as a realization of additional advantages and objects thereof, by a consideration of the following Detailed Description of the Preferred Embodiment. Reference will be made to the appended sheets of drawing which will first be described briefly.

25 BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 shows a perspective view of the flip-up mount secured to a helmet worn by an operator, used in conjunction with a monocular type night vision system;

Fig. 2 is a perspective view as in Fig. 1, showing the night vision monocular pivoted upward to the non-operational position;

Fig. 3 is a side view of the flip-up mount of the present invention;

Fig. 4 is the front view of the flip-up mount;

Fig. 5 is a partial cut-away top view of the flip-up mount;

This Sheet Has Been Replaced



-5-

Fig. 6 is a perspective view of the flip-up mount secured to a helmet, showing a ratchet adjustment mechanism;

Fig. 7 is a side view of the flip-up mount secured to a face mask, used in conjunction with a night vision monocular; and

Fig. 8 is a side view of the flip-up mount secured to a helmet, showing the chin strap assembly.

10 DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring first to Figs. 1 and 2, there is shown an operator 5 using a night vision monocular 10. The monocular 10 is secured to a helmet 7 by use of a flip-up mount 20, which will be further described below. The monocular 10 has an objective lens 12, an eye piece 14 and a housing 16 between the objective lens and the eye piece. To use the monocular 10, the operator 5 looks through the eye piece 14 and sees an enhanced image representative of the light which enters the objective lens 12. Although a night vision monocular 10 is shown, binocular systems are also widely used.

The night vision monocular 10 secures to the flip-up mount 20 by interaction between a carriage 22 and a coupling device 18. The coupling device 18 comprises a trapezoidal plate which is secured to the housing 16 of the monocular 10. The plate 18 engages a plate receiving portion 24 of the carriage 22. Once within the plate receiving portion 24, an internal locking mechanism (not shown) secures the plate 18 in position. To remove the night vision monocular 10 and associated plate 18 from connection with the carriage 22, an eject button 32 is provided. By manually depressing the eject button 32, the internal locking mechanism withdraws, allowing the plate 18 to be removed from engagement with the carriage 22.

35 The position of the carriage 22 relative to the operator 5 is adjustable along rails 26. The rails 26

This Sheet Has Been Replaced



-6-

enable the night vision monocular 10 to be precisely positioned relative to the operator's eye, so as to optimize the system for each particular operator. Adjustment buttons 28 are provided which release the carriage from a normally secured position relative the rails 26 to enable the carriage 22 to be repositioned. Once a desire position has been obtained, the operator releases the adjustment buttons 28 and the carriage 22 locks into place.

10 The flip-up mount 20 enables the operator 5 to manipulate the night vision monocular 10 between the operational position shown in Fig. 1, and the non-operational shown in Fig. 2. In Fig. 1, the monocular 10 is positioned relative the operator's eye so that the operator can normally view through the monocular. In Fig. 15 2, the monocular 10 has been raised to the non-operational position so that both of the operator's eyes are unobstructed. The night vision monocular 10 will remain temporarily secured in the non-operational position until the operator chooses to return the monocular to the operational position.

20 The flip-up mount 20 is shown in greater detail in Figs. 3, 4 and 5. The flip-up mount 20 comprises an armature portion 30 which carries the carriage 22, and a support brace portion 70. The support brace 70 has a pivot point from which the armature 30 pivots, as will be further described below. The support brace portion 70 secures to the helmet 7 or a face mask 120, which will also be described below.

30 The armature portion 30 comprises a back wall 35 and a carriage frame 38. The back wall 35 tapers to a top portion 34 which secures to the pivot point, which will be described below. The carriage frame 38 secures to either end of each of the adjustment rails 26, providing a rigid support structure for the carriage 22. The carriage frame 35 38 extends generally perpendicular to the back wall 35.

This Sheet Has Been Replaced



-7-

A support web 36 fills the generally triangular area formed by the intersection of the back wall 35 and the carriage frame 38, providing additional structural strength to the armature 30.

5 The support brace portion 70 has a pair of outwardly extending support arms 68 which hold a shaft 62. The shaft 62 provides the pivot point for the armature portion 30. The shaft 62 secures to the support brace 70 by end caps 64 disposed on either end of the shaft. A facing
10 washer 56 is disposed around the shaft 62 at an end of the shaft adjacent to one of the support arms 68. The facing washer 56 has a finger 58 having tapered side surfaces. The top portion 34 of the back wall 35 secures to a pivot sleeve 42 disposed around the shaft 62. An end washer 44
15 forms one end of the pivot sleeve 42. The other end of the pivot sleeve 42 is formed by a notched washer 46. The notched washer 46 has a pair of notches 52, each of which are formed to receive the finger 58 described above. The notches 52 are disposed 180° apart relative the notched
20 washer 46. As shown in Fig. 5, a compression spring 54 is provided within the pivot sleeve 42. One end of the compression spring 54 presses against the end washer 44, and a second end of the spring is secured to the facing washer 56. Thus, the compression force of the spring 54
25 maintains the pivot sleeve 42 generally pressed against the facing washer 56 with the finger 58 extending into the notch 52, effectively locking the armature 30 in place.

To manipulate the armature 30 between the first and the second positions, the armature is moved so that the
30 finger 58 leaves the first notch 52 against the normal bias of the spring 54. The operator continues to rotate the armature 30 relative the support brace until the finger 58 reaches the second notch 52, whereupon the finger snaps into the notch. In so doing, the operator
35 can easily manipulate the armature between the two positions, and the armature will remain in the selected

This Sheet Has Been Replaced



-8-

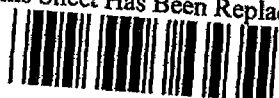
position by interaction between the finger 58 and the selected notch 52.

As shown in Figs. 1 and 2, the support brace 70 has a pair of bore holes 74 that are generally joined by a bridge portion 72. The bore holes 74 are intended to receive vertical anchor rod 78 which secure to the helmet 7. The vertical anchor rods extend along the surface of the helmet and are joined to a horizontal anchor rod 76. The lower end of the vertical anchor rod 78 holds a forward helmet hook 82 which has a curved lip portion 84. The lip portion 84 engages around the visor 9 of the helmet. The horizontal anchor rod 76 receives a pair of top straps 86 to rigidly hold the rod 76 and 78 in place.

As shown in Fig. 6, the top straps 86 join to a center strap 88 which has a ratchet mechanism, shown generally at 90. The ratchet mechanism 90 has a corrugated portion 92 having a plurality of ridges. The ridges interact with a size adjuster 94 to vary the length of the center strap 88. By pressing on the tab portion 93 of the adjuster 94, the adjuster comes out of engagement with the corrugated portion 92, allowing the corrugated portion to be either tightened or loosened, as desired. A ratchet release 96 is also provided to clamp the strap onto the helmet 7. Extending from the corrugated portion, is a rear strap 102, which terminates with a rear hook 104. The rear hook 104 engages the back edge of the helmet 7. By clamping the ratchet release 96 downward, the entire center strap 88 holds tightly across the outer surface of the helmet 7, holding the flip-up mount 20 rigidly in place. To release the helmet strap if removal from the helmet or adjustment of the helmet mount is desired, the operator lifts up on the handle portion 98 of the ratchet release, causing the entire strap to loosen.

To maintain the helmet 7 in the proper position relative the operator's head, a supplemental chin strap is provided. The standard issue helmet used by United States

This Sheet Has Been Replaced



-9-

forces employs a chin strap which secures to the helmet at two places. The standard chin strap secures to two points adjacent the operator's ear on the helmet 7 and wraps under the operator's chin to the opposite side of the helmet. When the night vision monocular 10 has been manipulated to the operational position, the additional weight of the system may cause the helmet 7 to drop forward relative the operator's face. This tends to set the system out of alignment with the operator's eye, and further causes the helmet to be uncomfortable to the operator. To remedy this problem, a supplemental chin strap 140 is incorporated into the present invention. The supplemental chin strap 140 completely replaces the standard chin strap which is provided with the helmet 7 with a first chin strap 144 and a second chin strap 142. The first chin strap 144 comprises a continuation of the rear strap 102, wrapping around the operator's neck and finally securing at the rear hook 104. The second chin strap 142 crosses and connects to the first chin strap 144 at a button 146. This 3-point supplemental chin strap maintains the helmet 7 in the proper position when the night vision system 10 is moved to the operational position.

Referring now to Fig. 7, there is shown a monocular 10 used in conjunction with a flip-up mount 20 secured to a face mask 120. The face mask 120 comprises a curved rod 122 which partially surrounds the operator's face. The curved rod 122 has a plurality of cushion plates 124 evenly spaced around the operator's face. A sponge rubber pad 126 secures to the cushion plates so as to provide a comfortable fit for the operator. A top strap 128 extends from a center portion of the rod 122, which goes over the top of the operator's head and attaches to a skull cap 134 which engages the back of the operator's head. Side straps 132 similarly combine the rod 122 with the skull cap 134. Finally, a chin strap 136 extends from the back

This Sheet Has Been Replaced



-10-

of the skull cap 134 to attach around the operator's chin.

Extending upward from a center portion of the rod 122 are a pair of extension rods 118. The extension rods are spaced similar to the vertical anchor rod 78 described above. The extension bars 118 extend through the bore holes 74 of the support brace 70, securing the support brace to the face mask 120. It should be apparent that operation of the flip-up mount 20 in conjunction with the face mask 120 would be substantially identical to that described above when used in conjunction with the helmet mount.

It is anticipated that the flip-up mount 20 be used in conjunction with a variety of types of night vision systems. Both night vision binoculars and monoculars are anticipated, as well as systems utilizing plate type mounting connectors or plug type mounting connectors. Figs. 1-7 show the use of the flip-up mount in conjunction with a plate type connector. Fig. 8 shows the flip-up mount 20 used in conjunction with a helmet 7 and a plug type connector. It is further anticipated that the adapter disclosed in the above identified co-pending patent application be used in conjunction with the face mask of Fig. 7 to enable the AN/PVS-7B night vision goggle.

Having thus described a preferred embodiment of a flip-up mount for a night vision system, it should now be apparent to those skilled in the art that the aforestated objects and advantages for the within system have been achieved. It should also be appreciated by those skilled in the art that various modifications, adaptations, and alternative embodiments thereof may be made within the scope and spirit of the present invention, which is further defined by the following claims.

This Sheet Has Been Replaced



-11-

CLAIMS

What is Claimed Is:

1. A flip-up mount for a night vision system comprising:

5 a carriage configured to engage a coupling device provided on said night vision system and secure said system thereto;

a pivotal armature integral to said carriage and extending from a pivot point, said armature pivoting
10 between a first operational position enabling the operator to use the system, in a second stowed position;

a brace having an axle shaft, a sleeve integral to said armature and rotatable about said shaft, and a spring biased locking member securing said sleeve in a
15 selected one of said first and second positions, said shaft providing said pivot point, said brace securing to a head gear worn by said operator of the system.

2. The flip-up mount of Claim 1 wherein said
20 locking member further comprises:

a finger extending outward from an end surface of said sleeve, said finger having generally bevelled edges;

said shaft having an integral facing surface and
25 a pair of notches extending into said facing surface, and said normally biased into direct contact with said facing surface by use of an internal spring, said notches disposed 180° degrees apart;

wherein, said sleeve can be rotated relative
30 said shaft until said finger engages a selected one of said notches securing said armature in place relative said pivot point.

3. The flip-up mount of Claim 2, wherein said
35 headgear comprises a helmet worn by said operator.

This Sheet Has Been Replaced



-12-

4. The flip-up mount of Claim 2 wherein said headgear comprises a face mask worn by said operator.

5. A flip-up mount for a night vision system,
5 comprising:

a carriage configured to engage a coupling device provided on said night vision system and secure said system thereto;

10 a pivotal armature integral to said carriage and extending from a pivot point, said armature pivoting between a first operational position enabling an operator to use the system, and a second stowed position; and

an anchor securing said pivot point to a helmet worn by said operator of the system.

15

6. The flip-up mount of Claim 5, wherein said pivot point further comprises:

20 a brace having an axle shaft, a sleeve integral to said armature and rotatable about said shaft, and a spring biased locking member securing said sleeve in a selected one of said first and second positions.

7. The flip-up mount of Claim 6, wherein said locking member further comprises:

25 a finger extending outward from an end surface of said sleeve, said finger having generally beveled edges;

30 said shaft having an integral facing surface and a pair of notches extending into said facing surface, said end surface normally biased into direct contact with said facing surface by use of an internal spring, said notches being disposed 180 degrees apart;

35 wherein, said sleeve can be rotated relative said shaft until said finger engages a selected one of said notches securing said armature in place relative said pivot point.

This Sheet Has Been Replaced





-13-

8. The flip-up mount of Claim 5, wherein said anchor further comprises:

a horizontal support rod and a pair of carriage support rods which extend perpendicularly from said horizontal support rod, said carriage support rods connecting to said brace;

a forward hook secured to said carriage support rods and hooking a forward edge of said helmet;

a strap secured to said horizontal support rod and securing to a rearward edge of said helmet.

9. The flip-up mount of Claim 8, further comprising a ratchet means for varying the length of said strap.

10. The flip-up mount of Claim 9, further comprising a supplemental chin strap which secures to a back portion of said helmet, said supplemental chin strap maintaining said helmet in proper orientation when said system is in said operational position.

11. The flip-up mount of Claim 10, wherein said supplemental chin strap replaces an existing chin strap provided with said helmet.

12. The flip-up mount of Claim 11, wherein said supplemental chin strap further comprises a first chin strap which secures to said back portion of said helmet, and a second chin strap which secures on both sides of said helmet, said first chin strap and said second chin strap combining together at an intersecting point at either side of an operator's chin.

13. A flip-up mount for a night vision system having an external coupling device, the mount comprising:

a carriage configured to engage said coupling device and secure said night vision system thereto;

This Sheet Has Been Replaced





a pivotal armature integral to said carriage and extending from a pivot point, said armature pivoting between a first operational position enabling an operator to use the system, and a second stowed position; and

5 a brace carrying said pivot point and having an axle shaft, a sleeve integral to said armature and rotatable about said shaft, and a spring biased locking member securing said sleeve in a selected one of said first and second positions, said brace securing to a
10 facemask worn by said operator of the night vision system.

14. The flip-up mount of Claim 13, wherein said locking member further comprises:

a finger extending outward from an end surface
15 of said sleeve, said finger having generally beveled edges;

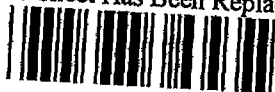
said shaft having an integral facing surface and a pair of notches extending into said facing surface, said end surface normally biased into direct contact with said
20 facing surface by use of an internal spring, said notches being disposed 180 degrees apart;

wherein, said sleeve can be rotated relative said shaft until said finger engages a selected one of said notches securing said armature in place relative said
25 pivot point.

15. The flip-up mount of Claim 13, wherein said night vision system is a binocular.

30 16. The flip-up mount of Claim 13, where in said night vision system is a monocular.

This Sheet Has Been Replaced



AMENDED CLAIMS

[received by the International Bureau on 15 November 1993 (15.11.93);
original claims 1, 2, 5-8 amended; other claims unchanged (4 pages)]

1. A flip-up mount for a night vision system comprising:

a carriage configured to engage a coupling device provided on said night vision system and secure said system thereto;

a pivotal armature carrying said carriage and extending from a pivot axis, said armature pivoting between a first operational position enabling the operator to use the system, and a second stowed position;

10 a brace having an axle shaft defining said pivot axis and carrying a locking member, a sleeve carrying said armature which is rotatable about and movable axially along said shaft, and a spring biasing said sleeve toward axial engagement with said locking member and securing
15 said sleeve in a selected one of said first and second positions, said brace securing to a head gear worn by said operator of the system.

2. The flip-up mount of Claim 1 wherein said locking member further comprises:

a finger extending axially of said shaft adjacent to an end thereof, said finger having generally bevelled
5 edges;

said sleeve having an integral facing surface and a pair of notches extending into said facing surface, and said sleeve being normally biased into direct contact with said finger at said facing surface by use of said spring,
10 said notches being disposed angularly apart;

wherein, said sleeve can be rotated and displaced axially relative said shaft until said finger engages a selected one of said notches securing said armature in place relative to said pivot point.

This Sheet Has Been Replaced



3. The flip-up mount of Claim 2, wherein said headgear comprises a helmet worn by said operator.

4. The flip-up mount of Claim 2 wherein said headgear comprises a face mask worn by said operator.

5. A flip-up mount for a night vision system, comprising:

a carriage configured to slidably receive into engagement and to supportingly couple with a coupling
5 device provided on said night vision system, and to thereby support and secure said system thereto;

a pivotal armature carrying said carriage and extending from a pivot axis, said armature pivoting between a first operational position enabling an operator
10 to use the system, and a second stowed position; and

an anchor securing said pivot axis to a helmet worn by said operator of the system.

6. The flip-up mount of Claim 5, wherein said pivot axis is further defined cooperatively by:

a brace having an axle shaft, a sleeve integral to said armature and rotatable about said shaft, and a
5 spring biased locking device securing said sleeve in a selected one of said first and second positions.

7. The flip-up mount of Claim 6, wherein said locking device further comprises:

a finger extending axially from one of said brace and sleeve of said finger having generally beveled edges;
5 the other of said brace and sleeve having an axially disposed facing surface and a pair of notches extending into said facing surface, a spring biasing said end surface normally into direct contact with said facing surface, said notches being disposed angularly apart;



10 wherein, said sleeve can be rotated relative said shaft until said finger engages a selected one of said notches securing said armature in place relative to said pivot axis.

8. The flip-up mount of Claim 6, wherein said anchor further comprises:

 a horizontal support rod and a pair of carriage support rods which extend perpendicularly from said horizontal support rod, said carriage support rods
5 connecting to said brace;

 a forward hook secured to said carriage support rods and hooking a forward edge of said helmet;

 a strap secured to said horizontal support rod
10 and securing to a rearward edge of said helmet.

9. The flip-up mount of Claim 8, further comprising a ratchet means for varying the length of said strap.

10. The flip-up mount of Claim 9, further comprising a supplemental chin strap which secures to a back portion of said helmet, said supplemental chin strap maintaining said helmet in proper orientation when said system is in
5 said operational position.

11. The flip-up mount of Claim 10, wherein said supplemental chin strap replaces an existing chin strap provided with said helmet.

12. The flip-up mount of Claim 11, wherein said supplemental chin strap further comprises a first chin strap which secures to said back portion of said helmet, and a second chin strap which secures on both sides of
5 said helmet, said first chin strap and said second chin strap combining together at an intersecting point at either side of an operator's chin.



13. A flip-up mount for a night vision system having an external coupling device, the mount comprising:

a carriage configured to engage said coupling device and secure said night vision system thereto;

5 a pivotal armature integral to said carriage and extending from a pivot point, said armature pivoting between a first operational position enabling an operator to use the system, and a second stowed position; and

a brace carrying said pivot point and having an
10 axle shaft, a sleeve integral to said armature and rotatable about said shaft, and a spring biased locking member securing said sleeve in a selected one of said first and second positions, said brace securing to a facemask worn by said operator of the night vision system.

14. The flip-up mount of Claim 13, wherein said locking member further comprises:

a finger extending outward from an end surface of said sleeve, said finger having generally beveled edges;

5 said shaft having an integral facing surface and a pair of notches extending into said facing surface, said end surface normally biased into direct contact with said facing surface by use of an internal spring, said notches being disposed 180 degrees apart;

10 wherein, said sleeve can be rotated relative said shaft until said finger engages a selected one of said notches securing said armature in place relative said pivot point.

15. The flip-up mount of Claim 13, wherein said night vision system is a binocular.

16. The flip-up mount of Claim 13, wherein said night vision system is a monocular.

