

A GUN MOUNT

\*G00002\*

Field of the invention

The present invention relates to a gun mount, and in particular, to a gun mount that is especially suitable for use in a confined space with limited standing room or height, such as at the rear of a light military vehicle.

Background and prior art

It is advantageous to mount a gun on a military vehicle to improve firepower and versatility. On a typical light military vehicle, a machine gun or the like is normally mounted on a pedestal at the rear of the vehicle with a gunner positioning himself next to the gun. At the rear of the vehicle, space is always at a premium, and it is a problem to provide more space for the gunner.

Furthermore, it is usually desirable to design the vehicle such that it is transportable on an aircraft and it should preferably be ready to be put into action once it is rolled out from the aircraft. In such cases, a two-tier telescopic mount may be used to allow a mounted gun to be lowered for height clearance during loading or raising the gun when unloaded from the aircraft.

In situations where light mobility vehicles with high suspensions need to be transported onto an aircraft with a much lower clearance height (such as the V-22 Osprey), a three-tier telescopic mast with a mounted gun may even be used. However, if the machine gun is long (such as the M2 Browning Machine Gun) and it were to be manned by a gunner, the gunner would have difficulty in operating the gun within the limited standing space at the rear of the vehicle. It is also difficult to achieve a 360° arc of fire because of this problem.



\*166166\*

Summary of the Invention

The invention seeks to avoid at least some of the above disadvantages of the prior art. An objective of the invention is thus to provide the gunner with more room for movement and to enable a gunner to achieve a 360 degree arc of fire.

An objective of one embodiment of the invention is to allow the raising and lowering of the gun mount relative to a telescopic mast or pedestal.

Accordingly in a first aspect the present invention provides a gun mount including: a gun mount adapter rotatably mounted on a support structure; coupling means coupling the gun mount adapter to the support structure; and a gun holder assembly connected to the gun mount adapter and adapted to have a gun affixed thereto; wherein: the gun holder assembly is at a position offset from the axis of rotation of the gun mount adapter; the gun holder assembly is axially extendible, to permit the raising and lowering of a part of the gun holder assembly relative to the support structure; and the gun holder assembly includes resilient means for generating a biasing pressure to cause the gun holder assembly to extend axially.

In a second aspect the present invention provides a gun mount including: a gun mount adapter rotatably mounted on a support structure; coupling means coupling the gun mount adapter to the support structure; and a gun holder assembly connected to the gun mount adapter and adapted to have a gun affixed thereto; wherein: the gun holder assembly is at a position offset from the axis of rotation of the gun mount adapter; the gun holder assembly includes an inner gun mount holder and an outer gun mount holder; the inner gun mount holder and outer gun mount holder are capable of sliding movement relative to each other, to raise or lower one of the inner and outer gun mount holders relative to the support structure; and the gun holder assembly includes resilient means for generating a biasing pressure between the inner gun mount holder and the outer gun mount holder to cause relative sliding movement thereto. The gun mount may include locking means to prevent relative movement between the inner gun mount holder and the outer gun mount holder.

The resilient means may be a gas spring that has an approximately linear progressive spring curve.

Preferably the gun holder assembly is adapted to have the gun secured thereto by means of a gun cradle, which may be mounted on the gun holder assembly, and adapted to have a gun fixed thereto. Alternatively, the gun mount adapter may be adapted to have the gun secured directly thereto.

The gun mount preferably also includes means for controlling the raising and lowering of the gun cradle.

Preferably, the gun cradle has a rotational axis relative to the gun holder assembly, and is adapted to rotate in a 360 degree range of motion, relative to the gun holder assembly. Preferably, the gun cradle is adapted to be moveable in a rocking motion, relative to the gun holder assembly. Typically the rotational axis of the gun mount adapter will be aligned with the vertical axis.

Preferably, the gun mount includes a rotary-mounting platform at an intermediate position between the gun mount adapter and the support structure.

The gun mount may further include stopper means for releasable locking of the gun mount adapter to prevent rotary movement of the adapter relative to the support structure. Preferably, the stopper means includes plunger means releasably engaging a set of gear teeth associated with the support structure.

The support structure may be telescopically extendible.

The support structure is typically relatively fixed, and adapted to be fixed to a carrier, such as a vehicle. The support structure may be adapted to be bolted to the carrier, or attached by any other means. Typically, the carrier will be a vehicle.

According to another aspect of the invention a vehicle is provided having a gun mount according to the invention attached thereto.

It will be convenient to hereinafter describe an embodiment of the present invention with reference to the accompanying drawings which illustrate one form of a gun mount incorporating the invention. It is to be understood that the particularity of the drawings and the related description is not to be understood as superseding the generality of the broad description of the invention as defined in the claims.

#### Brief description of the drawings

Figure 1 shows a telescopic mast on which is mounted a bracket mount adapter according to a preferred embodiment of the present invention.

Figure 2 is a cross-sectional view showing the top of the telescopic mast with a rotary platform adjacent the bracket mount adapter, in a preferred embodiment.

Figures 3 and 5 are side views of the bracket mount adapter illustrated in Figure 1 in a compressed mode.

Figure 4 is a cross-sectional view of the bracket mount adapter along sectional line D-D of Figure 3.

Figure 6 is a cross-sectional view of the bracket mount adapter along sectional line G-G of Figure 5.

Figures 7 and 9 are side views of the bracket mount adapter, illustrated in Figure 1, in an extended mode.

Figure 8 is a cross-sectional view of the bracket mount adapter along sectional

line D-D of Figure 7.

Figure 10 is a cross-sectional view of the bracket mount adapter along sectional line G-G of Figure 9.

Detailed description of the Preferred embodiment of the invention

Figure 1 shows a support structure, in the form of a telescopic mast 1 in the preferred embodiment, on which is mounted a bracket mount adapter 2 according to the preferred embodiment of the present invention. The base of the telescopic mast 1 is preferably adapted to be bolted to the floor of a vehicle. On a conventional telescopic mast, the surface at the top of the telescopic mast has mounting holes or interfaces for the mounting of the gun and its pintle cradle. This would allow the gun with its pintle cradle to swivel 360 degrees about the telescopic mast. However, in the present invention, a bracket mount adapter 2 is mounted onto the top of the telescopic mast using coupling means.

The bracket mount adapter 2 includes a gun mount holder assembly 10, and an inner gun mount holder 14. A spring plunger stopper 6 controls the rotary movement of the bracket mount adapter 2, whereas an administrative lock shaft 13 locks the inner gun holder 14 in position. A gun (not shown) can be mounted onto a cradle 11 on top of the inner gun mount holder 14. The cradle 11 can swivel together with the gun relative to the gun mount holder assembly 10. This is so, even when the inner gun mount holder 14 is locked by the administrative lock shaft 13, so as to allow free swiveling of the gun to achieve a wide arc of fire.

Figure 2 is a cross-sectional view showing the top of the telescopic mast 1 with a rotary-mounting platform 8 adjacent the bracket mount adapter 2. At the top of the telescopic mast 1, there are two angular contact ball bearings 3 which are

separated by a spacer 4 and are press-fitted into the internal diameter of the telescopic mast 1. A standard spur gear 5 is used as a cover to retain the ball bearings 3 inside the telescopic mast 1. At the same time, the gear teeth of the spur gear 5 are used as the locator and stopper for the spring plunger 6 that is housed at the edge of the bracket mount adapter 2. When released, the spring plunger stopper 6 will engage the teeth of the spur gear 5 and restrain the rotary motion of the bracket mount adapter 2. To rotate the bracket mount adapter 2, the spring plunger 6 is pulled out of engagement with the gear teeth of the spur gear 5. To lock the bracket mount adapter 2 into position, the spring plunger 6 is pushed into engagement with the gear teeth.

To provide rotating movement to the bracket mount adapter 2, a holder shaft 7 is press-fitted into the ball bearings 3 and forms a rotary-mounting platform 8. To ensure that the holder shaft 7 would not dislodge from the assembly, a lock nut (not shown) could be applied at the rear of the threaded holder shaft 7. On the rotary-mounting platform 8, there are threaded mounting holes 9 that allow the bracket mount adapter 2 to be secured. The bracket mount adapter 2 is mounted and secured onto the rotary-mounting platform 8 with bolts.

At an offset distance, there is a gun mount holder assembly 10 at the front end of the bracket mount adapter 2. Figures 3 and 5 are side views of the bracket mount adapter illustrated in Figure 1 in a compressed mode. In the compressed mode, the gun and cradle 11 are lowered for storage so that the vehicle can be located in a space with lower clearance height. Figure 3 and 5 show the gun mount holder 10 adjacent the inner gun mount holder 14, on which is mounted a cradle 11. A lock pin 20 is included so as to secure the cradle 11 to the inner gun mount holder 14. The spring plunger 6 for controlling the rotary movement of the bracket mount adapter 2 and administrative lock shaft 13 for locking the gun holder assembly are also illustrated.

The inner gun mount holder 14 allows the cradle 11 of the gun mount to be fitted to, and to swivel about the gun mount holder assembly 10 axis. With the offset distance, the gun is brought forward, giving additional space to the gunner equivalent to the offset distance.

Figure 4 is a cross-sectional view of the bracket mount adapter along sectional line D-D of Figure 3. Figure 6 is a cross-sectional view of the bracket mount adapter along sectional line C-C of Figure 5. The gun mount holder assembly 10 comprises the following major components: a resilient means which may be a gas spring 12, an administrative lock shaft 13, an inner gun mount holder 14 and an outer gun mount holder 15. The gas spring 12 is a hydropneumatic adjusting element, consisting of a pressure tube 17 with a connecting fitting 18a, 18b at the top and bottom ends, a piston rod 19 with piston system and a piston rod connection fitting. The gas spring 12 preferably has an approximately linear progressive spring rate curve.

With this characteristic of the gas spring 12, it is employed within the gun mount holder assembly 10 where the bottom and top ends of the gas spring 12 are anchored to the outer gun mount holder 15 and inner gun mount holder 14 respectively. The inner gun mount holder 14 will slide within the outer gun mount holder 15. There are two holes 16 used as locking positions for the inner gun mount holder 14 relative to the outer gun mount holder when it engages either of the holes 16. The administrative lock shaft 13 locks the assembly in either the raised or lowered position.

At the top of the inner gun mount holder 14, the gun mount holder 14 holds the cradle 11 of the gun. To raise the gun at the compressed position, the administrative lock shaft 13 should be disengaged from the upper hole 16 and by the action of the gas spring 12 aiding the lifting, one person can lift the gun and cradle 11 easily. Once raised, the inner gun mount holder 14 is locked using the

administrative lock shaft 13. Figures 7 and 9 are side views of the bracket mount adapter illustrated in Figure 1 in an extended mode.

To stow the gun, the administrative lock shaft 13 is removed. By depressing the gun against the gas spring 12, a downward force could be used to lower the gun. Thereafter, the administrative lock shaft 13 can be engaged to hold the stowed gun in position.

While a particular embodiment of the invention has been shown and described, it will be appreciated by those skilled in the art that changes and modifications of the present invention may be made without departing from the invention in broadest aspects. As such, the scope of the invention should not be limited by the particular embodiment and specific construction described herein but should be defined by the appended claims and equivalents thereof. Accordingly, the aim in the appended claims is to cover all such changes and modifications as fall within the spirit and scope of the invention.

**CLAIMS**

1. A gun mount including: a gun mount adapter rotatably mounted on a support structure; coupling means coupling the gun mount adapter to the support structure; and a gun holder assembly connected to the gun mount adapter and adapted to have a gun affixed thereto; wherein: the gun holder assembly is at a position offset from the axis of rotation of the gun mount adapter; the gun holder assembly is axially extendible, to permit the raising and lowering of a part of the gun holder assembly relative to the support structure; and the gun holder assembly includes resilient means for generating a biasing pressure to cause the gun holder assembly to extend axially.

2. A gun mount including: a gun mount adapter rotatably mounted on a support structure; coupling means coupling the gun mount adapter to the support structure; and a gun holder assembly connected to the gun mount adapter and adapted to have a gun affixed thereto; wherein: the gun holder assembly is at a position offset from the axis of rotation of the gun mount adapter; the gun holder assembly includes an inner gun mount holder and an outer gun mount holder; the inner gun mount holder and outer gun mount holder are capable of sliding movement relative to each other, to raise or lower one of the inner and outer gun mount holders relative to the support structure; and the gun holder assembly includes resilient means for generating a biasing pressure between the inner gun mount holder and the outer gun mount holder to cause relative sliding movement thereto.

3. A gun mount according to claim 2, which includes locking means to prevent relative movement between the inner gun mount holder and the outer gun mount holder.

4. A gun mount according to any preceding claim, wherein the resilient means is a gas spring that has an approximately linear progressive spring curve.

5. A gun mount according to any preceding claim, which includes a gun cradle mounted on the gun holder assembly, wherein the gun cradle is adapted to have a gun fixed thereto.

6. A gun mount according to claim 5, which includes means for controlling the raising and lowering of the gun cradle.

7. A gun mount according to claim 5 or 6, wherein the gun cradle has a rotational axis relative to the gun holder assembly, and is adapted to rotate in a 360 degree range of motion, relative to the gun holder assembly.

8. A gun mount according to claim 5, 6 or 7, wherein the gun cradle is adapted to be moveable in a rocking motion, relative to the gun holder assembly.

9. A gun mount according to any preceding claim, which includes a rotary-mounting platform at an intermediate position between the gun mount adapter and the support structure.

10. A gun mount according to any preceding claim, which includes stopper means for releasable locking of the gun mount adapter to prevent rotary movement of the adapter relative to the support structure.

11. A gun mount according to claim 10, wherein the stopper means includes plunger means releasably engaging a set of gear teeth associated with the support structure.

12. A gun mount according to any preceding claim, wherein the support structure is telescopically extendible.

13. A gun mount according to any one of the preceding claims, wherein the support structure is adapted to be bolted to a vehicle.

14. A vehicle having a gun mount according to any one of the preceding claims attached thereto.

**Abstract****A GUN MOUNT**

This invention relates to a gun mount for mounting a gun to a support structure, particularly where space is at a premium, such as on a vehicle. The gun mount generally includes: a gun mount adapter 2 rotatably mounted on a support structure 1; coupling means, coupling the gun mount adapter 2 to the support structure 1; and a gun holder assembly 10 connected to the gun mount adapter 2 and adapted to have a gun affixed thereto; wherein the gun holder assembly 10 is at a position offset from the axis of rotation of the gun mount adapter 2, and the gun holder assembly 10 includes a resilient means 12 for generating a biasing pressure to extend the gun holder assembly 10.

**Figure 1**

\*G00002\*



\*162162\*