ARMOUR MOUNTING SYSTEM FOR A VEHICLE

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ABSTRACT

An armour mounting system comprising a flexible bracket (1) for attaching armour to a vehicle, the flexible bracket (1) comprising an elongate member (6) connected between a vehicle and an attached armour elements (4). The elongate member is resilient enough to support the attached armour elements and return the armour elements to their normal resting position following disturbance. The armour mounting system is beneficial in reducing damage to attached armour during manoeuvre.
ARMOUR MOUNTING SYSTEM FOR A VEHICLE

FIELD OF INVENTION

[0001] This invention relates to an armour mounting system for attaching armour to a vehicle and more particularly to an armour mounting system for a vehicle, to facilitate resilient support of armour elements during vehicle manoeuvres.

[0002] It is known that many vehicles designed to provide maximum protection for passengers currently use additional or attached armour elements by mounting such elements to the outside of the vehicle. The additional armour can provide enhanced protection against a multitude of threats. Such additional armour elements are generally mounted on the vehicle by means of rigid mounts. However, movement over rough terrain can cause damage to the attached armour and/or the mounting system itself. Weight is also a significant constraint for all vehicle armour systems to reduce the stress and burden placed upon the vehicle and for fuel efficiency. Therefore the weight of all the elements, particularly those which do not contribute directly to ballistic protection must be minimised.


SUMMARY OF THE INVENTION

[0004] The present invention aims to address the limitations of known mounting systems by providing an armour mounting system for attaching armour to a vehicle, which will reduce damage to the attached armour and the mounting system during manoeuvres.

[0005] Accordingly the present invention provides an armour mounting system for attaching armour to a vehicle comprising a flexible bracket, the flexible bracket comprising an elongate member extending between vehicle attachment means and armour attachment means wherein the elongate member is resilient such that in use an attached armour element is returned to its initial position after a temporary displacement.

[0006] The armour mounting system utilises a flexible bracket which is attached between a vehicle and armour element. An elongate member is used to provide flexibility between the vehicle and armour element. The elongate member may be a rod of resilient material; however it is preferably a length of wire rope because it provides the necessary combined properties of rigidity and resilience and is a weight efficient solution. The armour mounting system provides a degree of energy absorption from missile impact but has the further advantage of absorbing energy created by vehicle movement. A disadvantage of WO 2009/126053 A1 is the potential for armour to oscillate or resonate rapidly during vehicle movement. The resonance of such a system will inevitably place stress on the attachment points of the mounting system. The invention addresses this problem by using wire rope. Wire rope is more suitable than a spring because it has a lower Q factor, therefore it has more damping. This means that when the armour is disturbed by an external force such as a vehicle moving, the armour will not oscillate so much, reducing the stress on the attachment means such as brackets.

[0007] Preferably steel rope is used for the elongate member and a person skilled in the art will appreciate that variants of steel, such as stainless steel or galvanised steel can be used to provide a corrosion resistant capability. The use of heavy duty rubber is an alternative to wire rope but has problems with degradation due to the continuous stresses and strains resulting from supporting armour elements during manoeuvre. Other materials such as carbon fibre, spring steel or a bi-metallic strip could be utilised. A person skilled in the art will appreciate that using such materials; the design of the elongate member would need to be adjusted to provide the correct level of resilience to material mass ratio.

[0008] Preferably the elongate member is connected between the vehicle and armour using metal end plates with sockets. A metal end plate can be connected to the vehicle and armour using bolts, screws, welding or other means commonly known in the art. Preferably by attaching a socket to each metal end plate, the ends of the elongate member can be inserted into the sockets. The sockets can be attached to the end plates by welding or adhesive. The ends of the elongate member can also be held in the sockets by welding or adhesive. If the elongate member is comprised of wire rope, swaging the ends can improve the connection quality between the wire rope and the sockets. This allows the ends of the elongate member, once inserted into the sockets to be welded into position or held in place with adhesive. Alternatively bolts or screws inserted through the side walls of the sockets can be used to clamp the ends in place. It will be appreciated that the types of connection methods used will be dependent on the vehicle and armour system chosen.

[0009] For heavier armour or where a limitation of the degree of armour movement is required, the armour mounting system can include a lanyard positioned between the vehicle and the armour. When the armour is mounted onto the side of the vehicle the lanyard can be positioned at the top of the vehicle between the vehicle and the armour to prevent downward movement of the armour. Preferably the lanyard will be comprised of a robust material like steel wire. A person skilled in the art will appreciate that the lanyard can be connected between the vehicle and armour in a variety of ways including bolting one end of the lanyard to the vehicle above the armour mounting system and connecting the other end to the attachment means of the armour, such as a metal plate. By connecting the lanyard in such a way will ensure that downward movement of the armour is limited, effectively preventing sag. It will be appreciated that the armour mounting system and lanyard need not be limited to armour attached to the side of a vehicle but can be used to protect the top or beneath the vehicle. Other methods of preventing downward movement of the armour include rigid sacrificial brackets connected between the vehicle and armour. If the armour is attached to the side of the vehicle, the rigid sacrificial brackets are positioned at the top of the vehicle between the vehicle
and the armour. The rigid sacrificial brackets will prevent sag but will break if excessive force is experienced due to vehicle movement, preventing damage to the vehicle, armour or armour mounting system.

[0010] The armour mounting system can provide more resilience if a second elongate member is aligned in parallel. For example, two lengths of wire rope can be aligned one above the other. This will provide more resilience when heavier armour is attached on the side of a vehicle, especially in the vertical plane where sag is more likely to occur.

[0011] It would be beneficial for a plurality of such armour mounting systems to support several armour elements. Furthermore a plurality of armour mounting systems could be deployed over a vehicle so that several armour elements can be attached, providing greater protective coverage of the vehicle.

BRIEF DESCRIPTION OF DRAWINGS

[0012] An example of the present invention will now be given with reference to the accompanying drawings in which:

[0013] FIG. 1a illustrates a 3 dimensional cut away view of an embodiment of the invention. FIG. 1b shows the same view but with the flexible member having been pushed sideways.

[0014] FIG. 2 shows an alternative embodiment of the invention using an additional elongate member.

SPECIAL DESCRIPTION

[0015] FIG. 1a and FIG. 1b illustrate a 3 dimensional cut away view of an embodiment of the invention. Vehicle mounting bracket 2 is intended to be attached to a vehicle (not shown). The armour mounting bracket 3 is connected to the inside of the armour elements 4 to be carried by the vehicle, in this case a plurality of armour panels. A bracket bolt 5, which is one of four, extends from the rear of the armour mounting bracket 3. The bracket bolts 5 and three other bracket bolts are used to clamp armour mounting bracket 3 to the armour elements 4. The design of the brackets 2 and 3 is specific to the armour and vehicle and the bracket location on the vehicle to be fitted. FIG. 1a shows brackets 2 and 3 having two hollow cylindrical sections 7 and 8. The two hollow cylindrical sections 7 and 8 hold the ends of elongate member 6 in place using bolts or grub screws (not shown). The elongate member 6 has swaged ends which make it easier for the grub screws or bolts to hold the ends in position. FIG. 1b shows a lateral bend in the elongate member 6. In this embodiment a lanyard 9 is used to limit the extent of movement of the elongate member 6 in the vertical plane, to help support the armour elements 4 from sagging. The axes of movement 10 show the possible directions the armour elements 4 can move in during vehicle manoeuvres using the lanyard 9 in this manner. The lanyard 9 can be held in place by a bolt on the body of the vehicle above the mounting position. The other end of the lanyard 9 may be attached to one of four bolts in the armour mounting bracket 3.

[0016] FIG. 2a and FIG. 2b show an alternative embodiment of the invention, wherein an additional elongate member can be used to provide more vertical support to the armour elements and stiffen movement. The elongate members provide more stiffness, especially in the direction of their alignment. FIG. 2a and FIG. 2b show that there is more flexibility in the horizontal axis of the armour elements because the elongate members are aligned vertically. A lanyard can still be used to limit movement if required.

1. An armour mounting system for attaching armour to a vehicle comprising a flexible bracket, the flexible bracket comprising an elongate member extending between vehicle attachment means and armour attachment means wherein the elongate member if resilient such that in use an attached armour element is returned to its initial position after a temporary displacement.

2. An armour mounting system according to claim 1 wherein the elongate member comprises wire rope.

3. An armour mounting system according to claim 1 wherein the elongate member comprises steel rope.

4. An armour mounting system according to claim 2 wherein the elongate member comprises swaged ends.

5. An armour mounting system according to claim 1 wherein the vehicle attachment means and armour attachment means are provided with sockets adapted to receive the ends of the elongate member.

6. An armour mounting system according to claim 1 wherein the flexible bracket comprises a plurality of elongate members aligned in parallel.

7. An armour mounting system according to claim 1 further comprising a lanyard connectable between a vehicle and an armour element to limit the movement of the flexible bracket.

8. An armour mounting system according to claim 7 wherein the lanyard comprises steel wire.

9. An armour mounting system according to claim 1 further comprising a rigid sacrificial bracket connectable between a vehicle and an armour element to limit the movement of the flexible bracket.

10. An armoured vehicle comprising one or more armour mounting systems according to claim 1.

11. (canceled)