TRUCK CABIN ARMOR

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ABSTRACT

An assembly for protection of a truck’s cabin from landmine blast under the front wheel. The assembly comprises a protective shield formed to fit between the cabin and a front wheel; mounting braces adapted for firm mounting to a portion of a chassis member disposed before or after the front wheel, such as the bumper; and a cantilever with a first end connected firmly to the protective shield and a second end connected firmly to one of the braces. The mounting braces are tightened to each other, e.g. by bolts and nuts so as to be easily mountable and to hold firmly on the chassis member.
TRUCK CABIN ARMOR

FIELD OF THE INVENTION

This invention relates to methods and means for protection of vehicles from landmine blasts, in particular to protection of a truck's cabin by an armored protective shield above the front wheel.

BACKGROUND OF THE INVENTION

Military operations require different types of land vehicles, including trucks. All types of land vehicles may encounter at least three types of explosives: anti-tank mines, anti-personnel mines and shrapnel mines. These mines may be detonated by the pressure of the wheels of the vehicle rolling over them, or by remote detonation. The anti-tank and anti-personnel mines generally rely on pure blast pressure for destructive incapacitating effect. The shrapnel mines, on the other hand, have a lower blast pressure than that characteristic of the anti-tank mines. The shrapnel mines rely primarily on hundreds of flying shrapnel fragments for incapacitation effect. Thus, the underbody of military land vehicles should be protected from both pure blast pressure and flying shrapnel fragments to minimize damage to and deformation of the passenger compartment of the vehicle and thereby minimize the potential for injury to the vehicle occupants. The trucks, as manufactured, do not have the armor or structure to protect occupants from mine blasts.

Several arming systems have been developed for protecting an unarmored vehicle. For example, U.S. Pat. No. 5,663,520 describes a system for protecting a passenger compartment of a High Mobility Multipurpose Wheeled Vehicle (HMMWV) from forces arising from a mine activated by a wheel. The system includes an underbody protective plate structure covering areas of a forward portion of the passenger compartment and a shield structure fabricated on the protective plate structure in front of lower-forward walls of the forward portion. In addition, reinforcing plates extend adjacent the side walls of the forward portion and are connected to the protective plate structure.

Another known system used with trucks is to mount protective structures to the chassis of the vehicle shielding partially the bottom of the cabin facing the front wheels. As shown in FIG. 1, protective shields 1 are mounted to strong chassis members 2 running under the cabin 3 of the truck by means of suitable braces or consoles 4.

SUMMARY OF THE INVENTION

In accordance with the present invention, there is provided a method for protection of a truck's cabin from land-mine blast occurring under one of front wheels of the truck. The truck has a rigid chassis framework including a plurality of members of which at least one has a portion close to truck's periphery in front or behind the front wheels. The method includes:

- providing a protective shield formed to fit between the cabin and one of the front wheels;
- providing a means for mounting the protective shield to that portion of the chassis member; and
- mounting the protective shield to the portion of the chassis member so as to position the shield between the cabin and the front wheel.

Preferably, the portion of the chassis member is accessible from outside the truck and the mounting is performed without dismantling the truck body, inclining the truck or lifting the truck above the ground.

Preferably, the protective shield is mounted to a chassis member transverse to the truck chassis, for example a bumper of the truck, having a portion formed as a free beam-like end for said mounting.

Preferably, the means for mounting allows multiple mounting and dismounting of the protective shield to the portion of the chassis member.

According to another aspect of the present invention, there is provided an assembly for protection of a truck's cabin from land-mine blast. The assembly comprises:

- a protective shield formed to fit between the cabin and a front wheel;
- a mounting means adapted for firm mounting to said portion of the chassis member; and
- a cantilever with a first end connected firmly to the protective shield and a second end connected firmly to the mounting means, the cantilever being formed so as to position the shield between the cabin and the front wheel when the mounting means is mounted to said portion of the chassis member.

Preferably, the mounting means comprises two braces with matching flanges, a first of the two braces being permanently connected to the cantilever. The braces are formed to fit on said portion of the chassis member and to hold firmly thereon when the flanges are tightened to each other, e.g. by bolts and nuts.

The two braces may be permanently connected by a joint so as to allow fitting the braces on the portion of the chassis member and/or removing the braces from the chassis member when the flanges are not tightened to each other.

Preferably, the two braces are Ω (omega)-shaped and constitute two peripheral halves of a split box while the joint is a deformable plate constituting a bottom of the split box.

The chassis member may be a transverse beam with a free (cantilever) end, e.g. the bumper of the truck, and said split box is formed so as to fit on the free end.

The method and the assembly of the present invention offer major advantages in protection of non-armored trucks from land-mine and similar blasts:

- The protective shield assembly may be mounted and dismounted from the truck without lifting the truck off the ground or inclining or capsizing it;
- The mounting procedure does not require any mechanical operations like drilling, cutting or welding on the truck body or chassis;
- The mounting procedure does not require dismantling of the truck body or chassis;
- The mounting and dismounting of the protective shield assembly may be carried out in the field.

BRIEF DESCRIPTION OF THE DRAWINGS

In order to understand the invention and to see how it may be carried out in practice, a preferred embodiment
will now be described, by way of non-limiting example only, with reference to the accompanying drawings, in which:

[0026] FIG. 1 is a schematic perspective view of a truck with a protective shield mounted according to the method of the present invention.

[0027] FIG. 2 is a detailed perspective view of a truck with a protective shield mounted according to the method of the present invention.

[0028] FIG. 3 is a perspective view of the assembly of the present invention; and

[0029] FIG. 4 is a perspective view of the assembly in FIG. 3.

DETAILED DESCRIPTION OF THE INVENTION

[0030] With reference to FIG. 2, there is shown an assembly 10 for protection of a truck's cabin 3 from land-mine blast. The assembly 10 comprises a protective shield 12, a cantilever joint 14 and a coupling 16. The coupling 16 is mounted on a free end of the bumper 18 ahead of truck's front wheel 20. The bumper 18 is part of the truck chassis (not shown).

[0031] With reference to FIGS. 3 and 4, the protective shield 12 has a horizontal part 22 disposed above the wheel 20, an internal sloping part 24 and a rear sloping part 26. The shield is shaped to fit in the space between the wheel 20 and the cabin bottom, in dependence of the specific shape and disposition of the cabin relative to the wheel 20. The shield serves as blast deflector and protection against shrapnel fragments originating from a blast occurring under the wheel. The shield is made of armored plates which may include armor steel sheets, Kevlar layers, ceramics, void spaces, etc. and other designs known per se in the art.

[0032] The cantilever joint 14 comprises two parallel beams 30, with perpendicular brackets 32 welded to one end of the beams 30. The brackets 32 have oval eyes 34 for bolt-and-nut mounting to the shield 12. Alternatively, other methods known in the art may be used for mounting the armor shield to the cantilever joint 14.

[0033] The coupling 16 comprises two omega-shaped braces 40 and 42 with flanges 44 and a plate 46 connecting the two braces. One of the braces, 42, is welded to the beams 30. The coupling 16 thus constitutes a split box with braces 40 and 42 as sides and plate 46 as bottom, which is suitably shaped to fit over the end of the bumper 18 by sliding therein. The coupling 16 is fixed firmly on the bumper 18 by passing bolts 48 through openings 52 in the flanges 44 and tighten them by nuts. It will be appreciated that the braces 40, 42 may be tightened to the bumper 18 due to the elasticity of the plate 46. Alternatively, a hinge or another joint may be used instead of the plate 46, to hold the two braces in place before tightening the bolts.

[0034] It will be appreciated that the protective assembly 10 may be mounted on the bumper using drilled openings or welding but the inventive design allows mounting and dismounting from the truck in the field, without any metalworking operations like drilling, milling, cutting or welding on the truck body or chassis.

[0035] Although a description of specific embodiments has been presented, it is contemplated that various changes could be made without deviating from the scope of the present invention. For example, the cantilever joint and the coupling may be designed in a different way; another accessible member of the chassis may be used for mounting the assembly, etc.

1. A method for protection of a truck's cabin from land-mine blast occurring under one of front wheels of the truck, said truck having a rigid chassis framework including a plurality of members of which at least one has a portion close to truck's periphery in front or behind said front wheels, the method including

   providing a protective shield formed to fit between said cabin and one of said front wheels;

   providing a means for mounting said protective shield to said portion of said chassis member; and

   mounting said protective shield to said portion of said chassis member so as to position said shield between said cabin and said front wheel thereby protecting the cabin from said blast.

2. The method of claim 1, wherein said portion of said chassis member is accessible from outside the truck and said mounting is performed without dismantling the truck body or inclining the truck or lifting the truck above the ground.

3. The method of claim 1, wherein said portion of said chassis member is in front of the wheel.

4. The method of claim 1, wherein said portion of said chassis member is a free beam-like end and said protective shield is mounted to said end.

5. The method of claim 4, wherein said at least one chassis member is a bumper of the truck.

6. The method of claim 1, wherein said means for mounting allows multiple mounting and dismounting of said protective shield to said portion of said chassis member.

7. The method of claim 1, wherein said means for mounting allows mounting of said protective shield to said portion of said chassis member without previous metalworking operations on said portion.

8. An assembly for protection of a truck's cabin from land-mine blast occurring under one of front wheels of the truck, said truck having a rigid chassis framework made of plurality of members of which at least one has a portion close to truck's periphery in front or behind said front wheels, said assembly comprising

   a protective shield formed to fit between said cabin and a front wheel;

   a mounting means adapted for firm mounting to said portion of said chassis member; and

   a cantilever with a first end connected firmly to said protective shield and a second end connected firmly to said mounting means, said cantilever being formed so as to position said shield between said cabin and said front wheel when said mounting means is mounted to said portion of the chassis member.

9. The assembly of claim 8, wherein said mounting means is adapted to be firmly mounted on said portion of the chassis member without metalworking on said portion.

10. The assembly of claim 8, wherein said mounting means comprises two braces with matching flanges, a first of said two braces being permanently connected to said cantilever, said braces being formed to embrace said portion of
the chassis member and to hold firmly thereon when said flanges are tightened to each other.

11. The assembly of claim 10, wherein said mounting means further comprises a joint permanently connecting said two braces so as to allow fitting said braces on said portion of the chassis member and/or removing said braces from said chassis member when said flanges are not tightened to each other.

12. The assembly of claim 11, wherein said two braces are Ω-shaped and constitute two peripheral halves of a split box while said joint is a deformable plate constituting a bottom of said split box.

13. The assembly of claim 12, wherein said chassis member is a transverse beam, said portion is a free end of said beam and said split box is formed so as to fit on said free end.

14. The assembly of claim 13, wherein said transverse beam is a bumper of the truck.

15. The assembly of claim 10, wherein said two braces are adapted for tightening to each other by bolts passing through openings in said flanges.

16. An assembly for protection of a truck's cabin from land-mine blast occurring under one of front wheels of the truck, said assembly comprising

a protective shield formed to fit between said cabin and a front wheel;

a mounting means adapted for firm mounting to chassis of said truck; and

a cantilever with a first end connected firmly to said protective shield and a second end connected firmly to said mounting means, said cantilever extending substantially parallel to the truck motion direction.

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