

Protection member for a protection device and a vehicle with such a device.

TECHNICAL FIELD

The invention relates to a protection device for protection against so called
5 RSV-grenades according to the preamble of claim 1. The invention also
relates to a motor vehicle.

BACKGROUND ART

Light and heavy armoured military vehicles, non armoured military vehicles
10 and civilian vehicles and other objects being in areas subjected to warfare
risk being exposed to armoured bulkhead by means of grenades with
directional explosive strength, so called RSV-grenades or RPGs (Rocket
Propelled Grenades).

There are different ways of protecting oneself against RSV-grenades. One
15 way of protecting oneself against RSV-grenades is to provide such vehicles
with protection devices comprising a grid configuration with profile element
arranged to affect the electric detonation release arrangement of such a
grenade by means of short-circuiting. A problem is that the lower portion of
the vehicle in connection to tracks/wheels remains unprotected.

20 US2625859 shows a protection device for an armoured car consisting of a
number of cylinders suspended in a frame around the entire armoured car,
the cylinders covering the area between the ground and the track skirts and
protects the lower portion of the vehicle against incoming missiles.

Such a solution is relatively clumsy and heavy and risks obstructing
25 accessibility of the vehicle due to the heavy and rigid cylinders, which also
risk colliding with each other. This type of solution also gives stresses in

joints and these will thus to a greater extent be torn off during drive in difficult terrain and therefore causes damages to the remaining protection.

OBJECTS OF THE INVENTION

- 5 An object of the present invention is to provide a protection device for protection against missiles and splinter which improves protection performance and facilitates good accessibility.

SUMMARY OF THE INVENTION

- 10 These and other objects, apparent from the following description, are achieved by a protection device, a protection member and a motor vehicle which are of the type stated by way of introduction and which in addition exhibits the features recited in the characterising clause of the appended claims 1, 12 and 13. Preferred embodiments of the protection device are
15 defined in appended dependent claims 2-11 and 14.

- Specifically an object of the invention is achieved by a protection device for a military vehicle comprising, in a drapery configuration, at least along the respective vehicle side, arranged to a position close to the ground, hanging down discrete protection members for protection against missiles, wherein
20 said discrete protection members comprise a wire element, wherein said wire elements are arranged at a distance from each other.

- Hereby is facilitated both damping of IR-signature and protection against incoming missiles at the same time as the traction ability of the vehicle is not affected to any appreciable extent. Further it is facilitated to reduce
25 distribution out from the vehicle of dust torn up from the ground by means the vehicle during drive. Consequently protection performance is hereby improved at the same time as the risk of being detected is decreased.

According to an embodiment of the protection device said drapery configuration comprises mainly a layer of hanging down wire elements. Hereby the risk of the wire elements getting entangled in each other or in another way affecting each other is reduced. Further assembly becomes
5 easier and the device lighter than if more than one layer would be used.

According to an embodiment of the protection device said hanging down wire elements are essentially mutually parallel and arranged at a predetermined distance from each other. Hereby prevention of incoming missiles is facilitated when the distance is the same and adapted for the like.

10 According to an embodiment of the protection device said hanging down wire elements are essentially metallic, preferably shaped of steel. Hereby a sufficient rigidity for preventing incoming missiles is obtained at the same time as a certain flexibility is facilitated due to the wire construction such that accessibility is facilitated.

15 According to an embodiment of the protection device said predetermined distance is adapted to increased IR-signature influence. Hereby is facilitated to damp the IR-signature which results in detection of IR-searching missiles or corresponding IR-detecting members being rendered more difficult.

According to an embodiment of the protection device the respective hanging
20 down discrete member is suspendedly arranged by means of a cable clip configuration. Hereby simple and efficient suspension and attachment is facilitated. According to a variant the cable clip configuration is arranged to be attached by means of a screw joint at a rail arranged at the vehicle.

According to an embodiment of the protection device the respective hanging
25 down discrete members are fixedly connectably suspendedly arranged. Hereby the members, i.e. the respective wire element is not allowed to swing in any direction, but are kept rigid in the upper portion where it is attached such that protection against incoming missiles is further improved.

According to an embodiment of the protection device at least said wire element is arranged to be covered by means of a casing. Hereby damping of the IR-signature is further improved as the casing having a thermal inertia is affected to a lesser extent by e.g. sun beams, such that IR-damping is optimized. The casing may also be arranged such that it covers the lower portion and thus prevents the wires from fraying during drive in e.g. rocky terrain.

According to an embodiment of the protection device said casing has wing portions arranged to run along the respective wire element and project in a direction towards adjacent wire element. Hereby is facilitated to essentially cover the space formed between the wire elements 30 by means of said wing portions 42, 44 such that the IR-signature is further damped wherein thermal signature adaptation may be optimized at the same time as

According to an embodiment of the protection device said predetermined distance lies in the range 20-100 mm, preferably 60-80 mm. hereby protection against incoming missiles is optimized such that e.g. so called RSV-grenades may be squeezed between two adjacent wires and affect the electric detonation release arrangement of such a grenade by means of short-circuiting.

According to an embodiment of the protection device said wire element has a diameter in the range of 10-30 mm, preferably 12-20 mm. Hereby a sufficiently rigid wire for preventing incoming missiles is obtained at the same time as certain flexibility is obtained for good accessibility and damping of thrown up dust.

According to the invention the object is obtained with a member for protection against missiles for military vehicles intended to be comprised by a drapery configuration comprising a number of such members hanging down at a distance from each other to a position close to the ground, wherein said members comprise a wire element.

BRIEF DESCRIPTION OF THE DRAWINGS

A better understanding of the present invention will be had upon the reference to the following detailed description when read in conjunction with the accompanying drawings, wherein like reference characters refer to like parts throughout the several views, and in which:

Fig. 1 schematically illustrates a side view of a protection member according to an embodiment of the present invention;

Fig. 1b schematically illustrates a front view of the protection member in fig. 1a;

Fig. 1c schematically illustrates a cross sectional view A-A of the protection member in fig. 1b;

Fig. 1d schematically illustrates a perspective view of the protection member in fig. 1;

Fig. 2a schematically illustrates a side view of a set of the protection members according to fig. 1a forming a protection device according to the present invention;

Fig. 2b schematically illustrates a protection view of the set of protection member in fig. 2a;

Fig. 3a schematically illustrates a side view of a set of protection members of the present invention forming a protection device according to an embodiment of the present invention;

Fig. 3b schematically illustrates a perspective view of the set of protection member in fig. 3a;

Fig. 4 schematically illustrates a perspective view of the protection members in fig. 3a attached to a fastening device; and

Fig. 5 schematically illustrates a perspective view of a motor vehicle with a protection device according to the present invention.

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DETAILED DESCRIPTION

Fig. 1a-d schematically show different view of a protection device according to an embodiment of the present invention.

10 The protection member 1 is intended to be comprised in a drapery configuration of a protection device for protection against missiles, which drapery configuration is constituted by a set of protection member 1 arranged in connection to the lower portion of the vehicle at least along the respective vehicle side to a position close to the ground at a distance from each other hanging down.

15 The protection member 1 has an elongated rod-like configuration with an upper end 10 and a lower end 12.

In the upper end 10 of the protection member 1 a fastening member 20 in the shape of a cable clip 20 is arranged for attaching the protection member 1 in connection to the vehicle. According to a variant the cable clip configuration
20 20 is arranged to be attached to a rail arranged along the lower portion of the respective side of the vehicle, wherein the protection member 1 is fixedly locked by means of a screw joint, which is illustrated in fig. 4 for an embodiment of the present invention.

25 The protection member 1 comprises a wire element 30. The wire element 30 is essentially metallic: The wire element 30 is preferably shaped of steel which is rigid and resistant to missiles. The wire element 30 is preferably composed of twisted metallic thread.

The wire element 30 is dimensioned such that an incoming missile may be prevented at least by being squeezed between two adjacent wire elements 30, wherein the wire element 30 has a certain thickness and rigidity.

- 5 The wire element 30 is further dimensioned such that drive of the vehicle also in terrain is not jeopardized/obstructed, wherein the wire element 30 has a certain flexibility/bending stiffness and is of a certain length, the wire element 30 being intended to protect the lower portion of the vehicle, of a tracked vehicle, the lower portion of the track assembly.
- 10 Further the wire element 30 is according to a variant dimensioned and intended to be arranged such that a certain IR-damping effect is obtained.

Further the wire element 30 is according to a variant dimensioned and intended to be arranged to damp thrown up dust caused during drive of the vehicle.

- 15 According to an embodiment said wire element 30 has a diameter D in the range of 10-30 mm, preferably 12-20 mm. The length of the wire element 30 is adapted to the dimensions of the vehicle. According to an embodiment said wire element 30 has a length in the range of 30-70 cm. The wire element 30 may be of any suitable length depending on size and shape of the vehicle.
- 20 The protection device 1 further comprises a casing 30 arranged to cover said wire element 30. Said casing 40 has IR-damping properties. Said casing 40 has a thermal inertia. Said casing 40 has a composition with material properties resulting in thermal inertia. With thermal inertia is intended IR-damping properties in that the casing 40 is affected to a lesser extent by e.g.
- 25 sun beams and consequently does not change temperature depending on e.g. sun beams and/or heat generated from the vehicle but maintains to a greater extent the temperature of the surrounding. According to a variant the casing 40 is composed of a rubber material.

Said casing 40 has opposing wing portion 42, 44 projecting from and being arranged to run along the side of the wire element 30. The casing 40 consequently comprises a first wing portion 42 arranged project radially from one side of the wire element 30 and a second 44 arranged to project radially from the opposing side. The first and second wing portion 42, 44 are consequently aligned with each other in a plane.

According to this embodiment said casing 40 is formed by a first casing part 40a and a second casing part 40b. The first and second casing part 40a, 40b have an intermediate portion 43a, 43b and side portions 42a, 42b, 44a, 44b running along the respective long side of the intermediate portion.

The intermediate portion 43a of the first casing portion 40a is arranged to surround half the circumference of the wire element 30 forming a semicircle, wherein the side portions 42a, 44a are arranged to project from the semicircular intermediate portion 43a surrounding half the circumference of the wire element 30.

Correspondingly the intermediate portion 43b of the second casing portion 40b is arranged to surround half the circumference of the opposing half of the wire element 40 forming a semicircle, wherein the side portion 42b 44b are arranged to project from the intermediate portion 43b and abut the projecting side portions 42a, 44a of the first casing portions 40a.

Hereby the side portions 42a, 42b, 44a, 44b of the first and second casing part 40a, 40b of the casing 40 said wing portions 42, 44, 42, 44. This results in a simple and cost efficient way of constructing casings 40 with wing portions 42, 44 about the wire element of protection members 1. According to a variant each opposing side portion 42a, 42b, 44a, 44b is adhered with suitable adhesive.

The protection member 1 has an upper area 14 I which the cable clip configuration 20 is arranged to be attached. The protection member 1 further has a lower area 16.

Fig. 2a and 2b schematically illustrate different views of a set of protection members 1 according to fig. 1a forming a protection device II / part of a protection device according to the present invention.

5 The set of protection members 1 forms a drapery configuration of a protection device II for protection against missiles, which drapery configuration is intended to be arranged in connection to the lower portion of the vehicle at least along the respective vehicle side. The set of protection members are intended to be arranged hanging down to a position close to the ground such that the wire elements 30 are hanging down at a distance
10 from each other.

By said wing portions 42, 44 of the respective casing 40 it is facilitated with maintained distance between the wire elements 30, facilitating optimal prevention of incoming missiles, to essentially cover the side of the vehicle along which the set of protection members 1 is arranged such that IR-
15 damping is optimized.

By said wing portions 42, 44 of the respective casing 40 is facilitated to cover the side of the vehicle along which the set of protection is arranged such that throwing up of dust is damped substantially.

20 The first wing portion 42 of a casing 40 of a protection member 1 is arranged to be adjacent to the second wing portion 44 of a casing of an adjacently hanging protection member 1, wherein the distance X1 between the adjacent protection members 1, i.e. the distance X1 between the end of the first wing portion 42 facing the adjacently hanging protection member 1 and the end portion of end of the second wing portion 44 facing the first wing portion 42 is
25 substantially smaller than the distance X2 between the respective wire element 30 arranged in the respective casing 40.

Fig. 3a and 3b schematically illustrate different views of a set of protection members 2 of the present invention forming a protection device II according to an embodiment of the present invention.

The protection member according to the embodiment in fig. 3a and 3b differs from the protection member 1 according to the embodiment in fig. 1a-d and 2a-b among other in that the casing 140 is arranged to surround the wire element 30 by means of a fully covering tubular casing 140 without wing portions.

The casing 140 according to this embodiment has I accordance with the casing 40 according to the embodiment described in connection to fig. 1a-d a thermal inertia for improved damping of IR-signature.

The cable clip configuration 20 comprises a sleeve 50 arranged externally in the upper portion.

The protection member 2 comprises a hat configuration 60 surroundingly arranged externally to the casing 140 in the lower portion arranged to cover also the lower end in order to thus prevent fraying of the wire element 30 during drive in e.g. rocky terrain. According to a variant the hat configuration 60 is arranged to surround the lower end and the end area of the protection member 2 attached by means of clamping joint.

The hat configuration has according to an embodiment a diameter D1 exceeding the space of protrusion s being formed in tracked vehicles with tracks having track plates being attached by means of bolt causing said protrusions along the track. Hereby is avoided by the dimension of the hat configuration during spring action when the protection members risk to touch that the protection member ends up between said protrusions.

The wire element 30 of the respective protection member has the same properties as the wire element 30 according to fig. 1a-d and 2a-b and consequently improved protection against missiles, damping of IR-signature and damping of dust thrown up during drive.

The protection device II according to this embodiment thus facilitates improved protection against missiles, damping of IR-signature and damping of dust thrown up during drive.

Fig. 4 schematically illustrates a perspective view of the protection member in fig. 3a attached to a fastening device. The fastening device comprises a rail 70 intended to be arranged essentially horizontally along a lower portion of the respective side of a vehicle. The rail 70 has a track 72 in which protection members 2 are intended to be attached. Hereby the fastening member 20 in the shape of the cable clip configuration 20 of the respective protection member 20 is arranged to be attached in the rail 70, wherein the respective protection member 2 is arranged to be locked by means of a screw joint 74. The protection members I according to the embodiment in fig. 1a-2, 2a-b are according to an embodiment attached in a corresponding way to a rail 70.

Fig. 5 schematically illustrates a vehicle 100 according to an embodiment of the present invention. The exemplified vehicle 100 is constituted by a heavy armoured tracked vehicle in the form of an armoured car. The vehicle 100 may also be constituted by a wheeled vehicle. The vehicle 100 may be constituted by an articulated vehicle. The vehicle 100 may be constituted by a heavy armoured military vehicle, a light armoured military vehicle, a non-armoured vehicle or a civil vehicle.

The vehicle 100 according to fig. 5 has a vehicle body 110 and tracks 120 for propulsion of the vehicle 100. The vehicle 100 comprises a protection device I; II according to the present invention.

The protection device I; II according to the embodiments mentioned above for protection against missiles, e.g. so called RSV-grenades, comprises a drapery configuration with a set of essentially mutually parallel, at a distance from each other along the respective vehicle side arranged to a position close to the ground hanging down discrete protection members comprising

wire elements as is apparent from the embodiment described with reference to fig. 1a-d, 2a-b, 3a-b.

Said discrete member are also according to a variant arranged mutually parallel, at a distance from each other along the front side and/or rear side of
5 the vehicle 100.

Said hanging down wire elements according to the embodiments above are according to an embodiment arranged to affect the electric detonation release arrangement of an RSV-grenade by means of short-circuiting, i.e. prevent initiation of the directional explosive strength of impacting RSV-
10 grenades. Said wire elements 30 are according to this embodiment arranged at a distance from the vehicle 100 such that the detonation release arrangement of the RSV-grenade gets to be short-circuited before the grenade impacts with the vehicle 100.

As is apparent from fig. 2a and fig. 3a adjacent wire elements 30 of said
15 protection device I; II according to an embodiment forms a minimum space X2 which is smaller than the largest thickness of the grenade at said the electric detonation release arrangement.

The protection device I; II by the set of hanging down protection members 1, 2 forms a drapery configuration or a veil configuration or a curtain
20 configuration.

Instead of a hat configuration surroundingly arranged in the lower area of the protection device for preventing fraying of the wire element 30 during drive in e.g. rocky terrain the sleeve itself could be arranged to surround and cover also the lower end portion of the wire element 30 in order to thus prevent
25 fraying of the wire element 30.

Instead of cable clip configuration for attachment and locking of the respective protection member at the vehicle any suitable fastening member for attaching the respective protection member could be used.

Above fastening of respective protection members has been described wherein the protection member is arranged to be fixedly connected/locked in connection to the vehicle. According to an alternative variant the respective protection member is turnably fixedly arranged to its upper portion such that it
5 is allowed to be turned about an axle transverse to the longitudinal direction of the vehicle with desired inertia but is locked from movement transversal to the longitudinal direction for constituting obstacle to incoming missiles.

The foregoing description of the preferred embodiments of the present invention has been provided for the purposes of illustration and description. It
10 is not intended to be exhaustive or to limit the invention to the precise forms disclosed. Obviously, many modifications and variations will be apparent to practitioners skilled in the art. The embodiments were chosen and described in order to best explain the principles of the invention and its practical applications, thereby enabling others skilled in the art to understand the
15 invention for various embodiments and with the various modifications as are suited to the particular use contemplated.

CLAIMS

1. A protection device (I; II) for a military vehicle comprising, in a drapery configuration, at least along the respective vehicle side, arranged to a position close to the ground, hanging down discrete protection members (1; 2) for protection against missiles, **characterised in that** said discrete protection members comprise a wire element (30), wherein said wire elements are arranged at a distance from each other.
2. A protection device according to claim 1, wherein said drapery configuration comprises mainly a layer of hanging down wire elements (30).
3. A protection device according to claim 1 or 2, wherein said hanging down wire elements (30) are essentially mutually parallel and arranged at a predetermined distance (X2) from each other.
4. A protection device according to any of claims 1-3, wherein said hanging down wire elements (30) are essentially metallic, preferably shaped of steel.
5. A protection device according to claims 3 or 4, wherein said predetermined distance (X2) is adapted to increased IR-signature influence.
6. A protection device according to any of claims 1-5, wherein the respective hanging down discrete member (1; 2) is suspendedly arranged by means of a cable clip configuration (20).
7. A protection device according to any of claims 1-6, wherein the respective hanging down discrete members (1; 2) are fixedly connectably suspendedly arranged
8. A protection device according to any of claims 1-7, wherein at least said wire element (30) is arranged to be covered by means of a casing (40) with thermal inertia.

9. A protection device according to claim 8, wherein said casing (40) has wing portions (42, 44) arranged to run along the respective wire element (30) and project in a direction towards adjacent wire element (30).

10. A protection device according to any of claims 3-9, wherein said
5 predetermined distance (X2) lies in the range 20-100 mm, preferably 60-80 mm.

11. A protection device according to any of claims 1-10, wherein said wire element (30) has a diameter (D) in the range of 10-30 mm, preferably 12-20 mm.

10 12. A protection member (1; 2) for protection against missiles for military vehicles intended to be comprised by a drapery configuration comprising a number of such protection members (1; 2) hanging down at a distance from each other to a position close to the ground, wherein said members comprise a wire element, wherein said wire elements are arranged at a distance from
15 each other of said drapery configuration.

13. A vehicle (100) comprising a protection device (I; II) according to any of claims 1-11.

14. A vehicle according to claim 13, wherein said vehicle (100) is constituted by a tracked vehicle.