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- (54) Benævnelse: **Pansret køretøj forbundet til et chassis**
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The technical field of the invention is that of the armoured vehicles.

The armoured vehicles conventionally have an armoured body attached to a chassis. The connection between a body and a chassis is usually provided via flexible or rigid attachment studs. The chassis can have a mechanically-welded structure which carries mobility means such as wheels or tracks, as well as transmission members such as bridges and differentials.

The conventional means of attachment by studs have the disadvantage of reducing the cohesion between the body and the chassis when a mine or an improvised explosive device detonates. The detachment of the body from the chassis is detrimental to the passengers of the vehicle, the accelerations transferred to the body indeed becoming too strong.

Furthermore, there is the problem, for the armoured vehicles, of improving the protection of the body without excessively penalising the mass of the vehicle.

It is thus intended, as far as possible, to define bodies the wall thickness of which is reduced. The bodies of armoured vehicles often have a bottom plate having a planar profile extended by two laterally inclined rims.

Indeed, such a shape allows to prevent the radii of curvature from being too small when folding the sheet metal and also allows to confer to the bottom of the body a generally convex profile which increases the resistance of the body to blast effects of mines or improvised explosive devices.

However, there is a risk of breaking of the bottom of the body at the folded areas, especially when the thickness of the body is reduced.

Patent EP1182420 discloses a floor protection for vehicle which comprises a solid plate attached to the body through

side supports which hold the plate at a distance from the floor of the body and allow, in case of mine explosion, to transfer the stresses received by the plate towards the side walls of the body.

5 Such an architecture is conventional and provides the addition of an additional armour below the body without reinforcing the body itself. Besides, this patent is silent on the means allowing to connect the body to a chassis which is neither shown nor localised by this document.

10 The object of the invention is thus to provide a vehicle architecture which allows to increase the resistance of the body without penalising the mass. Another object of the invention is to increase the resistance of the connection between the body and the chassis.

15 The design of the vehicle according to the invention further allows to easily adapt an armoured body to different types of chassis.

 Thus, the invention relates to an armoured vehicle comprising a body a bottom wall of which has a planar profile
20 extended by two laterally inclined rims, the body being connected to a chassis comprising at least two longitudinal side members, the vehicle being characterised in that the connection between the body and the side members is provided by two rows of a plurality of reinforcing pieces, regularly
25 distributed substantially all along the length of the body at each side member, the reinforcing pieces being welded to the body and each comprising a first support surface disposed under the planar profile and a second support surface applied against a lateral rim, attaching means being further provided
30 to connect each row of reinforcing pieces to one of the side members.

 According to an embodiment, the attaching means could have, at each row of reinforcing pieces, at least one middle plate which will be welded below each row of reinforcing

pieces and which will be connected by a removable connecting means to a side member.

Advantageously, the middle plate could be connected to each side member by an interface part welded to the side member, the interface part will be a sheet metal welded at an upper face of the side member and laterally protruding from this side member, the sheet metal being connected to the side member also by stiffening ribs regularly distributed substantially all along the length of the side members.

According to a particular embodiment, the armoured vehicle could have a plate attached below the planar profile of the body.

The plate could extend in width substantially all along the width of the planar profile of the bottom wall, the plate comprising notches for receiving the reinforcing pieces.

Each reinforcing piece could have a horizontal leg having a profile comprising a clearance allowing to disassemble the plate.

The plate could be attached to the planar profile of the body by screwing, the fastening screws being regularly distributed all along the length of the plate.

The vehicle could thus comprise a steel body, the plate being made of aluminum alloy.

The invention will become more apparent upon reading of the following description of particular embodiments, the description being made with reference to the appended drawings in which:

Figure 1 is a cross-sectional schematic view of a vehicle according to a first embodiment of the invention;

Figure 2 is a side view of this vehicle;

Figure 3 is a cross-sectional schematic view of a vehicle according to a second embodiment of the invention;

Figure 4 is a bottom view of the body of this vehicle, with the side members and the middle plate not shown.

When referring to Figure 1, a vehicle 1 comprises a body 2 which is connected to a chassis 3 having at least two longitudinal side members 4.

5 The side members 4 are metal beams having a conventional C-shape. They support the mobility means of the vehicle (bridges, wheels or tracks). These means are not part of the invention, it is thus not necessary to describe them in detail.

10 The body 2 has a bottom wall 2a forming the floor for the cab interior and which has a planar profile. The bottom wall 2a is extended by two laterally inclined rims 2b. The bottom wall 2a and the rims 2b are advantageously made by folding a single steel sheet.

15 The body 2 thus has a convex lower part the rims 2b of which allow to divert the blast when a mine or an improvised explosive device detonates.

According to the invention, the connection between the body 2 and the side members 4 is provided by a plurality of reinforcing pieces 5 which are regularly distributed
20 substantially all along the length of the body 2 above each side member 4. This distribution is particularly visible in figure 2. Thus, there are two rows of reinforcing pieces 5, one row being positioned above each side member 4.

Each reinforcing piece 5 is a steel part in the form of a
25 plate 5. The reinforcing plate 5 has a substantially open L-shaped profile comprising a horizontal leg 5a and an inclined leg 5b. The horizontal leg 5a has a first support surface 6 which is disposed under the planar profile 2a of the body. The inclined leg 5b has a second support surface 7 which is
30 applied against a lateral rim 2b of the body.

The reinforcing pieces 5 are welded to the body 2. The welds are performed along the edges of the legs 5a and 5b.

According to the invention, attaching means are further provided to connect each row of reinforcing pieces 5 to one of the side members 4.

According to an embodiment, the attaching means have, at
5 each row of reinforcing pieces, a middle plate 8.

A middle plate 8 is welded to each reinforcing piece 5 and is positioned below a row of reinforcing pieces 5.

As seen in figures 1 and 2, each side member 4 carries, on its upper face, an interface part 9 which is welded to the
10 side member. This interface part is a sheet metal welded at an upper face of the side member and which laterally protrudes from this side member (see figure 1). The sheet metal 9 is also connected to the side member 4 by stiffening ribs 10 which are regularly distributed substantially all along the
15 length of each side member 4 (see figure 2).

The middle plate 8 is connected to the side member 4 by a removable connecting means which is formed by a series of screws or bolts 11 (only the axes are shown in the figures).

As it is more particularly shown in figure 2, the screws
20 11 are arranged alternately with the reinforcing pieces 5, and there is a screw 11 between each reinforcing piece 5.

It can also be noted in figure 2 that the reinforcing pieces 5 are disposed with a spacing such that, when the body 2 is mounted, they are substantially facing the ribs 10 of the
25 interface part 9.

The connection between the side members 4 and the body 2, thus between the body 2 and the chassis, is particularly rigid. The risks of breaking of the connection during a mine shock are reduced. The chassis and the body are not separated,
30 thus the acceleration transferred to the crew is minimised.

However, the assembly can be disassembled for the operations of maintenance or of retrofit for the vehicle.

Furthermore, the body provided with the reinforcing pieces 5 and the middle plates 8 could be attached on another type of

chassis having side members with different dimensions. It will be sufficient to provide, on the side members, a suitable attaching interface (interface part 9).

5 The invention thus facilitates the design of the armoured vehicles by allowing to adapt a given body to different types of chassis without redesigning the whole vehicle.

Depending on the size of the side members 4, it would be possible not to provide the interface part 9 and to attach the middle plate 8 to the considered side member 4 directly by
10 screwing.

As a variant, it would also be possible not to provide the middle plates 8 and to screw directly the reinforcing pieces 5 to the considered side member 4 (or to the interface part 9). To this end, reinforcing pieces 5 carrying lateral tabs
15 allowing to implement fastening screws will be provided. However, the middle plates 8 allow to complete the stiffening of the connection between the body 2 and the two rows of reinforcing pieces 5.

It can also be noted that the reinforcing pieces 5 provide
20 a support for the body, both at the bottom wall 2a and at the rims 2b. Such a configuration provides the support for the folded lateral rims and improves the mechanical strength of the body with a minimised thickness for the sheet metals forming the bottom of the body (thus with a reduced mass).

25 Figures 3 and 4 show another embodiment of the invention.

This embodiment differs from the preceding one only by the addition of a planar plate 12 providing protection and stiffening, the plate being attached below the planar profile 2a of the body. The plate 12 is made of an aluminium alloy.
30 This plate has the function of stiffening the planar profile 2a of the body (made of steel) at the floor of the body. To this end, a plate 12 with a thickness of 20-30mm, made of an aluminium alloy, could be associated with a steel body the planar profile 2a of which has a thickness of about 10mm. In

figure 3, the plate 12 is cut rearward of the reinforcing pieces 5.

Depending on the desired protection level, the plate 12 could be made of a composite material.

5 As seen in figure 4, the plate 12 extends in length all along the length of the body 2 and in width substantially all along the width of the planar profile 2a of the bottom wall of the body. The plate thus covers the entire gap separating the two side members 4.

10 To allow the placement thereof when the reinforcing pieces 5 are welded, the plate 12 has notches 14 surrounding the reinforcing pieces 5. To allow a subsequent disassembly of the plate 12, the horizontal leg 5a of each reinforcing piece 5 will have a profile comprising a clearance 17 allowing the
15 plate 12 to exit after being unscrewed and despite the presence of the middle plate 8 (see figure 3).

The plate 12 is attached to the planar profile 2a of the bottom wall of the body 2 by screwing, the fastening screws 13a, 13b and 13c are regularly distributed on three rows and
20 all along the length of the plate 12.

As seen in figure 4, screws 13a and 13c are positioned in the vicinity of the edges of the plate 12 and other screws 13b are disposed substantially at a medial axis 15 of the body 2. The lateral screws 13a and 13c are disposed between the
25 reinforcing pieces 5. The screws are thus distributed into several groups, each group being aligned along a direction 16 perpendicular to the medial axis 15 of the body 2. It can be noted that the screws 11 which allow the attachment of the middle plate 8 to the interface part 9 are disposed along the
30 same direction 16 as the screws 13a, 13b and 13c of the same group.

The stiffening of the planar profile 2a of the bottom wall of the body is increased by a regular distribution of the

fastening screws 13a, 13b and 13c along the length and the width of the plate 12.

It is obviously possible to provide an additional armour means which will be attached below the plate 12, between the
5 side members 4. This means could be directly attached on the side members 4.

Krav

1. Pansret køretøj (1) omfattende et karosseri (2), hvis ene bundvæg har en plan profil (2a) forlænget med to skrå sidekanter (2b), karosseriet er forbundet til et chassis omfattende mindst to langsgående sidevanger (4), køretøjet er **kendetegnet** ved, at forbindelsen mellem karosseriet (2) og sidevangerne (4) sikres med to rækker af et antal forstærkninger (5), der er regelmæssigt fordelt over i det væsentlige karosseriets (2) hele længde på højde med hver sidevange (4), forstærkningerne er svejset til karosseriet og hver forstærkning omfatter en første støtteflade (6) anbragt under den plane profil (2a) og en anden støtteflade (7) anbragt mod en sidekant (2b), fastgørelsesmidler (8,11) er i andre henseender tilvejebragte til at forbinde hver række af forstærkninger (5) med en af sidevangerne (4).
2. Pansret køretøj ifølge krav 1, **kendetegnet** ved, at fastgørelsesmidlerne omfatter mindst en mellemliggende plade (8) på højde med hver række af forstærkninger (5), den mellemliggende plade er svejset fast neden under hver række af forstærkninger (5), og den mellemliggende plade er forbundet med en sidevange (4) ved hjælp af et aftageligt forbindelsesmiddel (11).
3. Pansret køretøj ifølge krav 2, **kendetegnet** ved, at den mellemliggende plade (8) er forbundet med hver sidevange (4) ved hjælp af et grænsefladestykke (9), som er svejset til sidevangen (4), grænsefladestykket er en fastsvejset stålplade på højde med en øvre flade på sidevangen (4) og ragende sidelæns ud fra denne sidevange, stålpladen er også forbundet med sidevangen ved hjælp af afstivningsribber (10) regelmæssigt fordelt på i det væsentlige hele sidevangens (4) længde.

4. Pansret køretøj ifølge et af kravene 1 til 3, **kendetegnet** ved, at den omfatter en plade (12) fastgjort neden under karosseriets plane profil (2a).
5. Pansret køretøj ifølge krav 4, **kendetegnet** ved, at pladen (12) strækker sig i bredden over i det væsentlige hele bredden af bundvæggens plane profil (2a), pladen (12) omfatter indsnit (14) til at modtage forstærkningerne (5).
6. Pansret køretøj ifølge krav 5, **kendetegnet** ved, at hver forstærkning (5) omfatter et vandret ben (5a) med en profil omfattende en underskæring (17) tilladende fjernelse af pladen (12).
7. Pansret køretøj ifølge et af kravene 4 til 6, **kendetegnet** ved, at pladen (12) er fastgjort til karosseriets plane profil (2a) ved hjælp af fastskruning, fastgørelsesskruerne (13a, 13b, 13c) er regelmæssigt fordelt på hele pladens (12) længde.
8. Pansret køretøj ifølge et af kravene 4 til 7, **kendetegnet** ved, at det omfatter et karosseri (2) af stål, pladen (12) er en aluminiumlegering.

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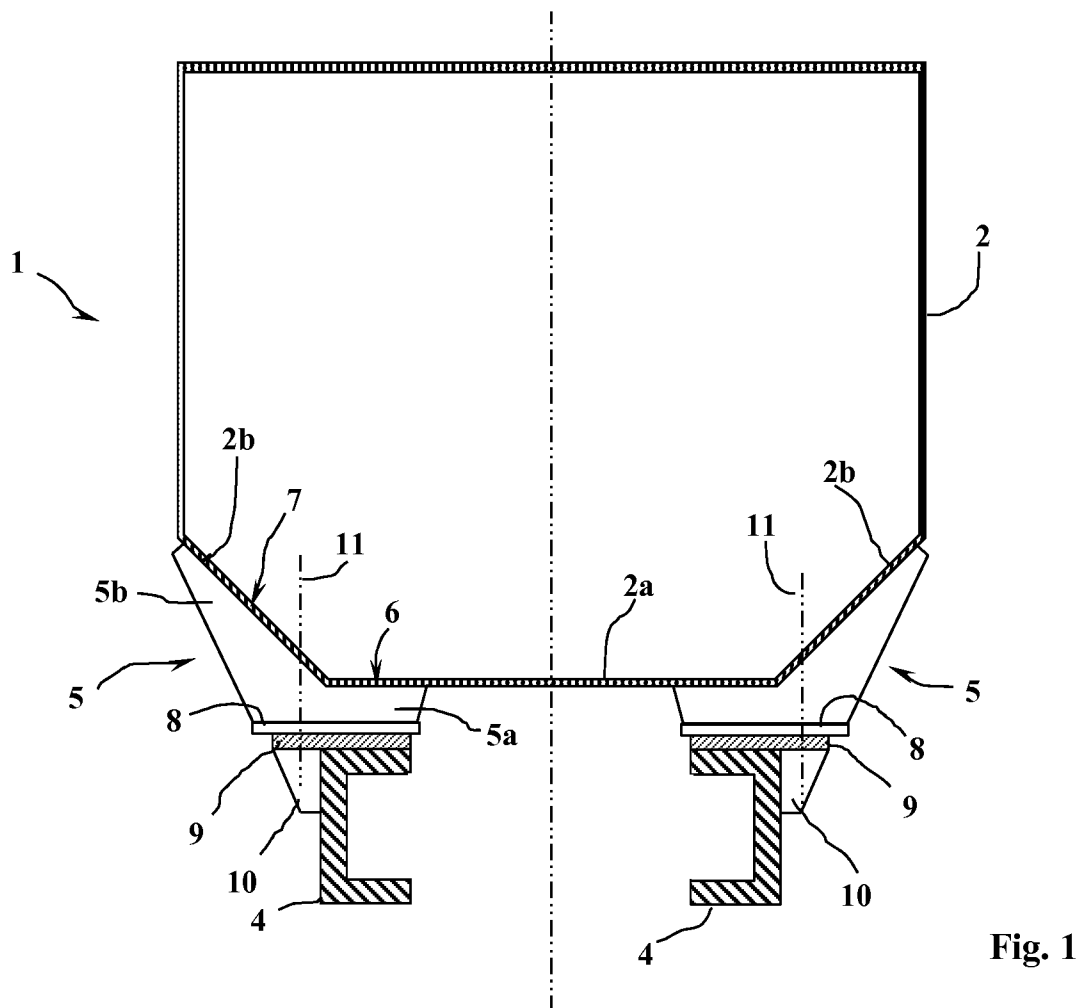


Fig. 1

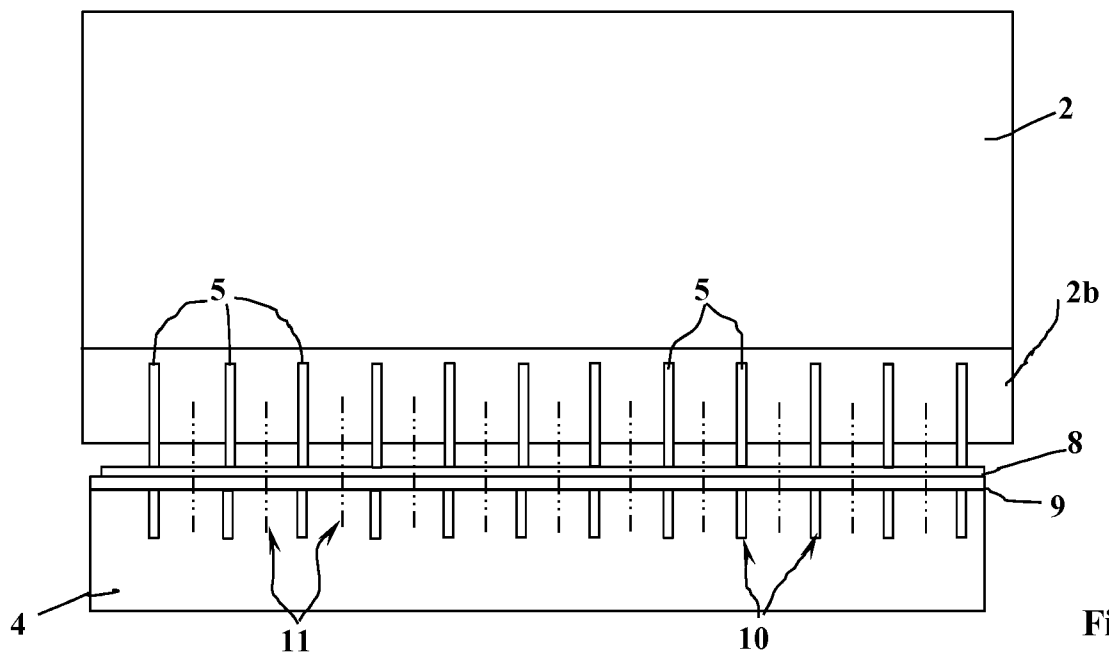


Fig. 2

2/2

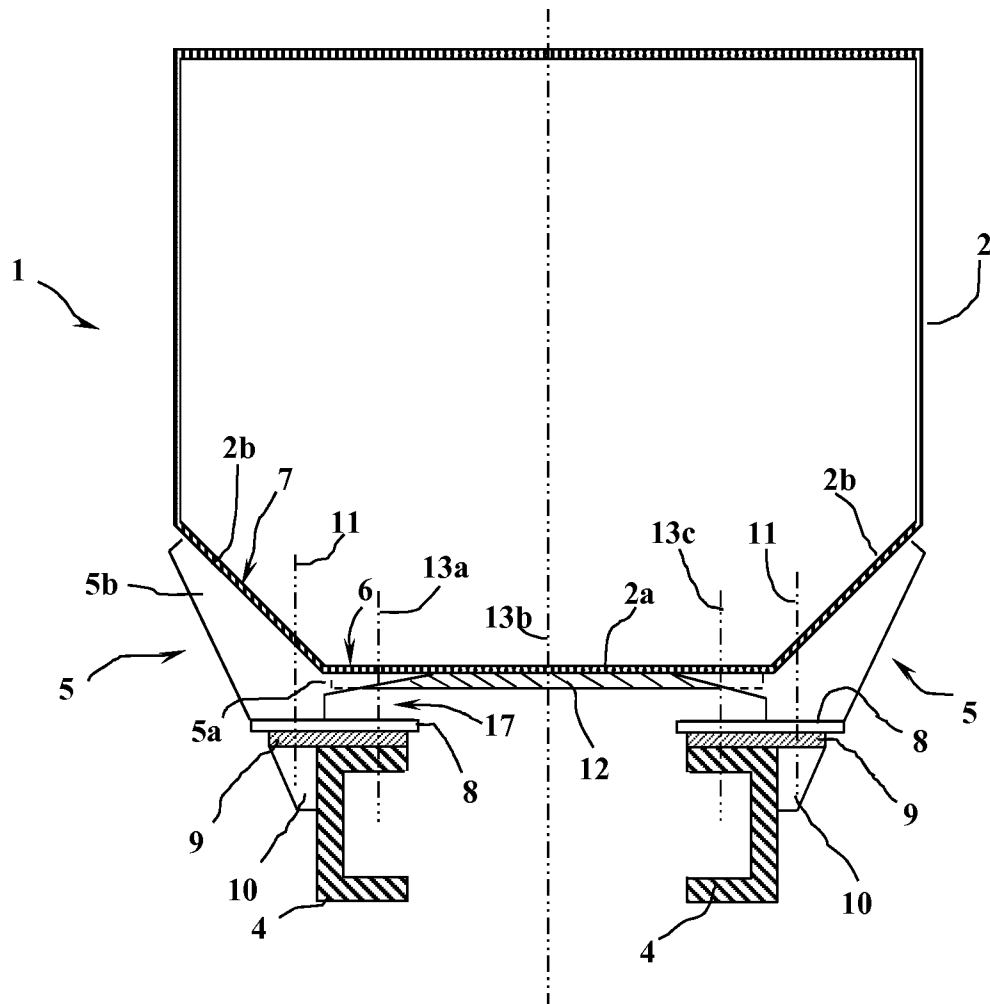


Fig. 3

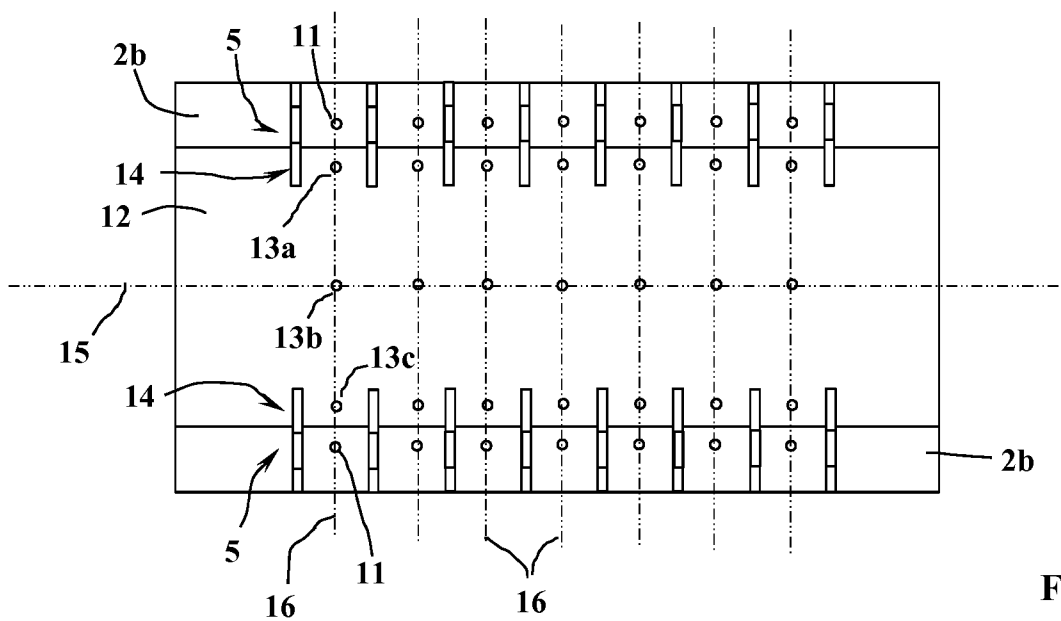


Fig. 4