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(54) **System of active ballistic protection**

(57) A system of active ballistic protection formed by at least a panel (1) comprising at least two external metallic layers (2,3) between which a layer of energetic material (4) is inserted **characterized in that** said energetic material is obtained from a weakened detonating material.

terial (4) is inserted **characterized in that** said energetic material is obtained from a weakened detonating material.

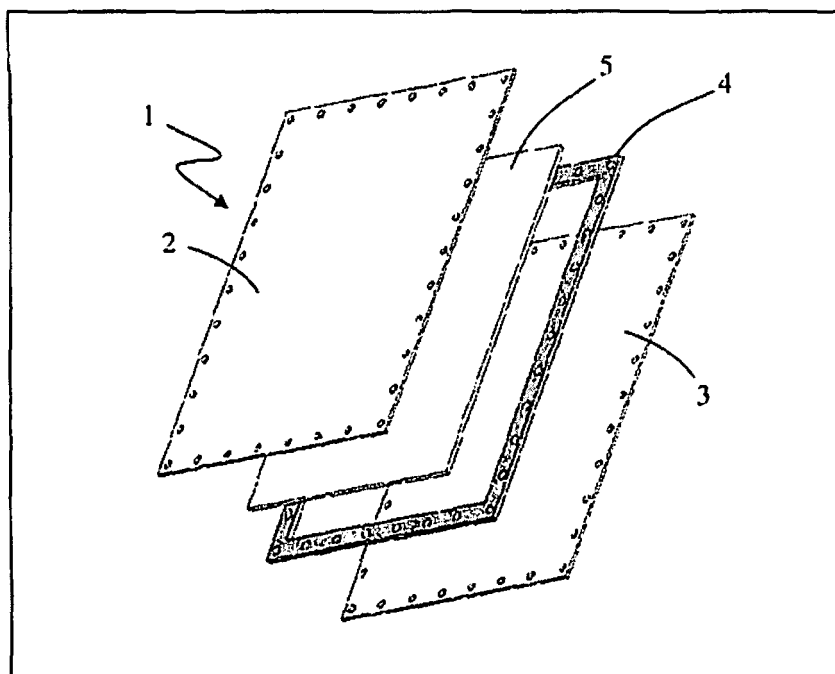


Fig. 1

Description

[0001] The present invention refers to a system of active ballistic protection.

[0002] In particular, the present invention refers to a system of active ballistic protection, also called active armour usable for the protection of armoured vehicles or for fixed stations which can be subject to attacks with firearms.

[0003] The typical configuration of reactive armours is constituted by front and rear stratifications which have the purpose of mechanically opposing to the menace and by an intermediate stratification which has the purpose of accelerating the most external screen. The energy characterization of the intermediate stratification can be subdivided into three main categories.

[0004] In a first category the energetic layer is constituted by explosive; this configuration is the most efficient reactive armour.

[0005] In a second category the intermediate energetic layer is constituted by energetic material which has not the capacity of detonating, this category has an efficacy lower than the first one.

[0006] In the third category the intermediate layer is constituted by non-energetic material which, depending on its chemical-physical characteristics, is able to accelerate the most external layer of the reactive sandwich, but has less efficiency than the others.

[0007] The present invention proposes to realize a system of active ballistic protection formed by at least two external metallic layers among which it is inserted at least a reactive layer which, when reached by metal or other material which penetrates into one of the external layers, reacts by increasing its thickness in the direction of advancement of the penetrating material, thus increasing the protective capacity of the external metallic layers.

[0008] The behavior of the reactive layer is obtained through the use of a weakened detonating material.

[0009] An aspect of the present invention refers to a system of active ballistic protection having the characteristics of the attached claim 1.

[0010] Other characteristics of the panel are contained into the subsequent depending claims.

[0011] Other purposes and advantages of the present invention will appear clear from the following description and from the attached drawings, provided as exemplary and non-limiting, wherein:

- figure 1 schematically shows an exploded view of a panel of the system of active ballistic protection according to the present invention;
- figure 2 shows an embodiment of the system according to the present invention provided with two panels parallel to each other and inclined with respect to the direction of the menace.

[0012] With reference to the abovementioned figures, the system according to the present invention can be

used as reinforcement and armour-plating panel for vehicles or for fixed stations.

[0013] The kind of menace from which the system gives protection is a menace brought by material which is sent at high speed in direction of the station to be protected. Normally, this is melted or semi-melted metallic material constituted by projectiles fired by rocket launchers or similar firearms, or shaped charge jets, generated by static blasts.

[0014] The system according to the present invention comprises at least a panel 1 formed by at least two external metallic layers 2 and 3 between which a layer of energetic material 4 is inserted, for example a weakened detonating material. The weakened detonating material has the characteristic of "reacting" by expanding, once the menace, for example the projectile, has perforated an external layer.

[0015] The two metallic layers of the sandwich are preferably constituted by two plates having lateral size and thickness of 2 mm.

[0016] For containing the sheet of energetic material, the two plates are preferably separated by a frame 5 for example of nylon along the entire rim. The assembly is provided with passing holes in order to assemble it.

[0017] A suitable energetic material according to the present invention is the explosive PBX N109, as basic energetic material from which it is possible to obtain the weakening by eliminating the content of aluminum and by diminishing the percentage of RDX with respect to the inert ligands, for example polyurethanic ligands. A suitable percentage of RDX is comprised between 30% and 50%, preferably 40%.

[0018] In figure 2 it is shown a system comprising two panels arranged parallel to each other separated one from the other by means of a spacer element 6. The panels are inclined with respect to the direction of the menace and arranged inside a metallic box body 7. A suitable inclination angle of the panels is comprised between 20° and 40°, preferably 30°.

[0019] In the same way, a different number of panels can be used with a different geometric arrangement, and furthermore there can be present other passive elements.

Claims

1. System of active ballistic protection formed by at least a panel (1) comprising at least two external metallic layers (2,3) between which a layer of energetic material (4) is inserted **characterized in that** said energetic material is obtained from a weakened detonating material.
2. System according to claim 1, wherein a suitable energetic material is the explosive PBX N109, as basic energetic material from which obtaining the weakening.

3. A system according to claim 1, wherein the weakening is obtained by eliminating the content of aluminum and by diminishing the percentage of RDX with respect to the inert ligands. 5
4. System according to claim 3, wherein a suitable percentage of RDX is comprised between 30% and 50%, preferably 40%. 10
5. System according to claim 1, comprising two panels (1) arranged parallel to each other separated one from the other by means of a spacer element (6), said panels being inclined with respect to the direction of the menace. 15
6. System according to claim 1, wherein a suitable inclination angle of the panels is comprised between 20° and 40°, preferably 30°. 20
7. System according to claim 5, wherein the panels are arranged inside a metallic box body (7). 25
8. System according to claim 5, wherein further passive elements are present between the panels. 30

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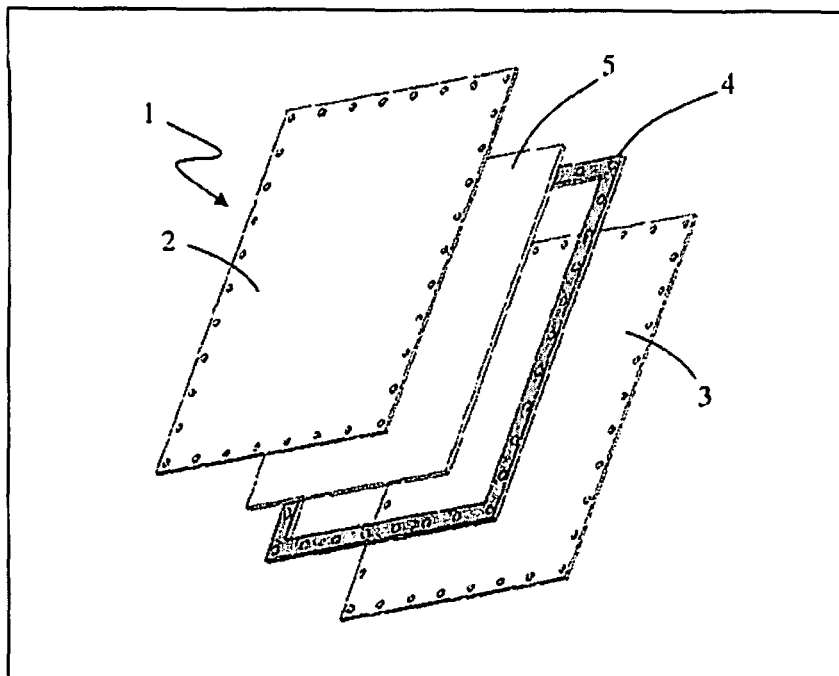


Fig. 1

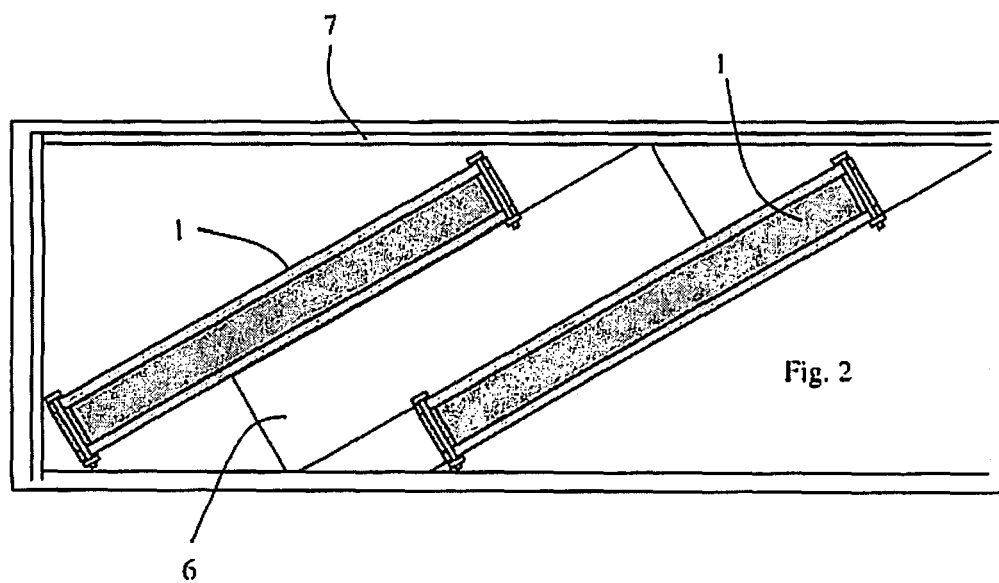


Fig. 2



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Application Number
EP 10 16 5405

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The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 31 August 2010	Examiner Gex-Collet, A
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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EPO FORM 1503 03/82 (P04/C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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