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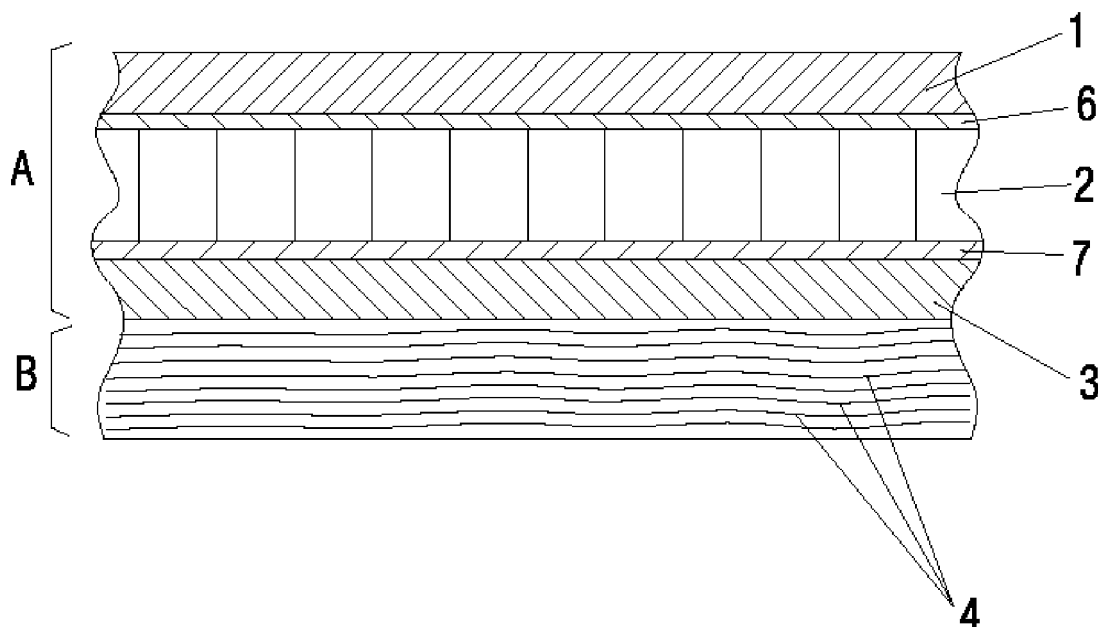
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(54) **IMPROVED FLEXIBLE PROTECTION STRUCTURE**

(57) The invention provides the development of a flexible protection structure to be used for the manufacture of any type of protection panel for terrestrial, naval and aerial vehicles or for protecting clothes for personal

use against impacts of bullet, fragments from explosions, blade arms, etc. contributing a higher degree of flexibility keeping at the same time the same protections characteristic for the user than those known from prior art.

FIG. 1



Description

Object of the invention

[0001] The invention refers to an improved flexible protection structure incorporating substantial innovations and advantages.

[0002] In other terms, the invention provides the development of a flexible protection structure which may be used for the manufacture of any type of protection panel for terrestrial, naval and, aerial vehicles or for protection clothes for personal use against impacts of bullet, fragments of explosions, blade arms, etc. bringing a higher flexibility degree and keeping the same protection characteristics for the user as those known in the state of the art.

Background of the invention

[0003] Nowadays the structures permitting protection against impacts of projectiles from long barrel arms, short barrel arms, as possibly bullets, fragments of explosions, blade arms, etc. are already well known.

[0004] However, the protection structures in use at present are rigid structures or structures with low flexibility, having besides a relatively high weight which difficulties the transport of the structure and the adaptation of the user to the environment in case of personal protections. These kinds of protections are not capable to support various impacts on a reduced surface, specially at low temperatures.

[0005] The applicant is the owner of a utility model describing a protection structure to solve the above stated problems, which characteristics are defined in the preamble of claim 1.

Description of the invention

[0006] The present invention has been developed with the object to provide a very flexible protection structure to solve the above mentioned drawbacks, moreover contributing at the same time other additional advantages which will be evident from the annexed description.

[0007] Therefore, it is an object of the invention to provide an improved, very flexible protection structure, particularly for the manufacture of protection panels for terrestrial, naval and aerial vehicles or protection clothes for personal use against impacts from bullets, fragments of explosions, blade arms or similar of the type comprising: a first block having a first external layer to receive an impact on the structure, a second layer arranged in the interior part of the external layer and formed by a plurality of ceramic parts united together and a third more internal layer made of a ballistic material which serves as support for the second layer and that together with the first layer permits a lower fragmentation of said plurality of ceramic parts, and a second block appropriate to retain the impact element and to prevent the penetra-

tion of the same, embodying a plurality of ballistic material laminates. Particularly, the structure is characterised in that each of the laminates of the second block is coated on its front and rear surfaces with a layer of flexible plastic, gliding material.

[0008] Said laminates may be made out as well from a ballistic material which has received in both of its surfaces a flexible water proof and gliding material by means of an immersion bath or by an application by pistol painting, atomization or similar.

[0009] Thanks to these characteristics, a smooth gliding is possible between the laminates forming part of the second block, so that it contributes a higher degree of flexibility in respect to the structures known in the state of the art. In this way, the protection structure is adapted to the form of the body in the case of a personal protection device, this latter being arranged to improves the manoeuvrability of the user wearing such structure, being only necessary to apply a slight pressure between the two opposed borders of the structure, of an approximated amount of 2-3 kilograms to provoke the bending until the opposed borders come together.

[0010] Preferably, the flexible, plastic and gliding material which has been mentioned is formed by a film of polyethylene in a first case or by a synthetic resin in a second case, also flexible and gliding.

[0011] In a specially preferred embodiment of the invention it is foreseen to arrange a layer of an elastic adhesive material between the first external layer and the second layer forming part of the first block and another layer of elastic adhesive material located between the second layer and the third layer forming part of the first block.

[0012] This described structure has as well the advantage that when receiving an impact in the front surface of the same, it turns rigid and hinders that the structure may bend towards the interior, so that it contributes a higher resistance in the sense of the impact and the direction of the projectile.

[0013] With the characteristics and assembly of this structure, it permits to receive multiple impacts, such as 5 or 6 impacts on a surface of 700 cm², at an ambient temperature comprised between -25°C and 60°C.

[0014] Other characteristics and advantages of the protection structure which is the object of the present invention will be evident from the description of a preferred, but non limitative embodiment which will be shown as a non limitative example in the annexed drawings, in which:

Brief description of the drawings

[0015]

Figure 1. - It shows a diagrammatic view of a cross section of a portion of the protection structure according to the present invention; and

Figure 2. - It shows a diagrammatic front view of the layer for deformation, fragmentation and deviation of the path of the projectile or menace, provided on the ceramic parts.

Description of a preferred embodiment

[0016] According to the annexed figures of drawings, an embodiment is shown of an improved flexible protection structure aimed at the manufacture of protection panels for terrestrial, naval and aerial vehicles or protection clothes for personal use against impacts of bullets, fragments of explosions, blade weapons or similar which adopts the configuration of multiple layers as to be derived from the next description.

[0017] Said structure comprises a first block (A) having a first external layer (1) to receive the impacts directed to the structure, a second layer (2) arranged in the interior in respect to the first external layer, formed by a plurality of ceramic parts bound together and a third more internally arranged layer (3) of a ballistic material which serves as support for the second layer and together with the external layer (1) results in a lower fragmentation of said plurality of ceramic parts and a second block (B) which is adequate to permit the retention of the impact element preventing the penetration of the same, having said block a plurality of sheets (4) superimposed one to the other and made out of a ballistic material of a known type.

[0018] Each of the sheets (4) of the second block (B) is coated by its front and back surfaces with a layer of a gliding flexible and plastic material, so that in a bending action of the protection structure, each of the sheets (4) glides smoothly in respect to an adjacent sheet. Preferably, the above mentioned gliding flexible material consists in a polyethylene film.

[0019] Also, in an alternative embodiment, said sheets may be made out from a ballistic material to which a water proof flexible product has been applied in both of its surfaces by means of an immersion bath or by application by means of a painting pistol, atomization or similar.

[0020] As may be appreciated more clearly from figure 2, the ceramic parts may consist in flat bodies (5) of reduced thickness which have a hexagonal outline, so that this layer acquires a degree of flexibility in one sense due to the above described configuration of the structure.

[0021] In a particularly preferred embodiment of the invention, a first layer of an elastic adhesive material (6) is located between the first external layer (1) and the second layer (2) forming part of the first block and an additional layer of elastic adhesive material (7) which is located between the second layer (2) and the third layer (3) forming part of the first block (A).

[0022] The details, size, dimension and other accessory elements, as well as the materials employed in the manufacture of the protection structure of the invention will have the possibility to be substituted by other technically equivalent not departing from the essentiality of the invention nor from the scope of the same as defined

by the following claims.

Claims

1. Improved flexible protection structure, particularly for the manufacture of protection panels for terrestrial, naval or aerial vehicles and/or protection clothes for personal use against impacts from bullets, fragments of explosions, blade weapons or similar, comprising:

a first block (A) having a first external layer to receive the impacts from the structure, a second layer arranged in the interior of the first external layer formed by a plurality of ceramic parts bound together and a third more internal layer of a ballistic material which serves as a support for the second layer; and

a second block (B) appropriate to retain the impact element and to prevent its penetration, provided of a plurality of ballistic material sheets, **characterised in that** each of the sheets of the second block are coated by its front and back surfaces with a layer or covering of flexible plastic and gliding material so that in a bending action of the structure each sheet will glide in respect to an adjacent sheet.

2. Improved flexible protection structure, according to claim 1, **characterised in that** the flexible and gliding material comprises a polyethylene film.

3. Improved flexible protection structure, according to claim 1, **characterised in that** the flexible and gliding material is a water proof resin.

4. Improved flexible protection structure, according to claim 1, **characterised in that** the covering of plastic flexible and gliding material is applied on the sheet by means of an immersion bath or pistol painting, atomization or similar.

5. Improved flexible protection structure, according to claim 1, **characterised in that** it has a layer of an adhesive elastic material located between the first external layer and the second layer which form part of the first block.

6. Improved flexible protection structure, according to claim 1, **characterised in that** it has a layer of elastic adhesive material located between the second layer and the third layer forming part of the first block.

FIG. 1

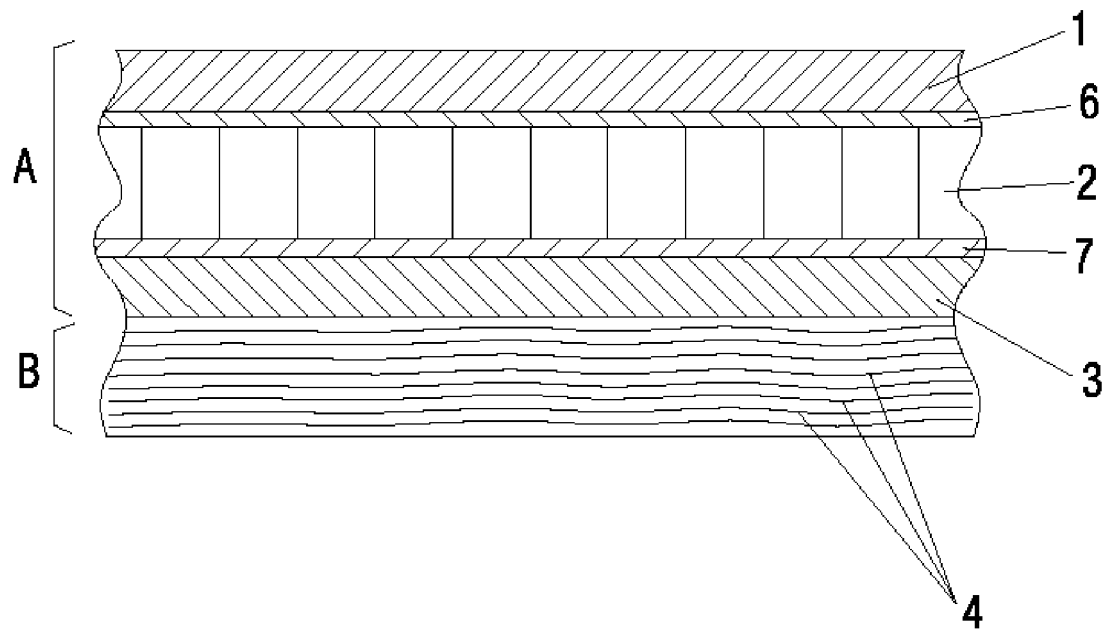
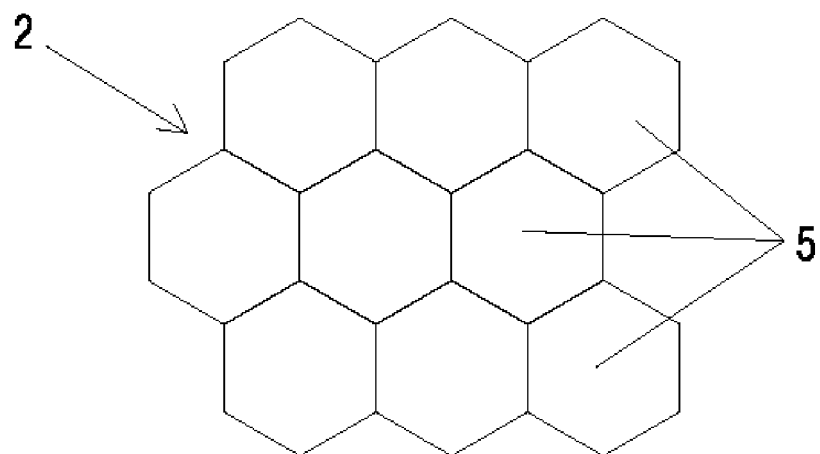


FIG. 2



INTERNATIONAL SEARCH REPORT

International application No.
PCT/ES2011/070881

A. CLASSIFICATION OF SUBJECT MATTER

See extra sheet

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
F41H, B28B, B32B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPODOC, INVENES

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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Y	WO 2006096981 A1 (MED ENG SYSTEMS INC ET AL.) 21/09/2006, paragraphs[0005, 0007, 0024 - 0031, 0035, 0070, 0072, 0073, 0094]; figures 1 - 8, 10 - 13.	1-6
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☒ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents:	"I" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A" document defining the general state of the art which is not considered to be of particular relevance.	
"E" earlier document but published on or after the international filing date	
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"O" document referring to an oral disclosure use, exhibition, or other means.	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other documents , such combination being obvious to a person skilled in the art
"P" document published prior to the international filing date but later than the priority date claimed	"&" document member of the same patent family

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INTERNATIONAL SEARCH REPORT

International application No.

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C (continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of documents, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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A	US 2011008592 A1 (CITTERIO GIORGIO ET AL.) 13/01/2011, paragraphs[0001, 0003, 0006 - 0010, 0013, 0018, 0023, 0025, 0031, 0032, 0034, 0036, 0042, 0045, 0056-0061]; figures 1, 2.	1-6
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EP 2 682 707 A1

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

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CLASSIFICATION OF SUBJECT MATTER

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B32B5/22 (2006.01)

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