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(71) Applicant *(for all designated States except US)*: KALINIČ, PRAHA, SPOL. S.R.O. [CZ/CZ]; Sokolovská 56, 186 00 Praha 8 (CZ).

(72) Inventor; and

(75) Inventor/Applicant *(for US only)*: KALINIČ, Štefan [SK/SK]; Chočská 1532/13, 026 01 Dolný Kubín (SK).

(74) Agent: KRATOCHVÍL, Václav; Bic Čvut, Horská 3, 128 03 Praha 2 (CZ).

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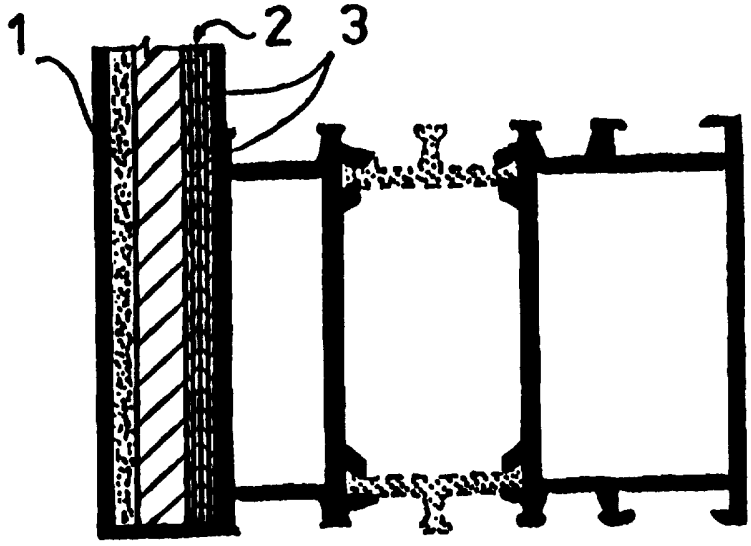
With international search report.

Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.

(54) Title: BULLETPROOF CONSTRUCTION ELEMENT

(57) Abstract

The invention relates to the bulletproof construction element, suitable in particular as a metal opening filler for the construction industry. This element is based on the use of at least first layer (1) and second layer (2) of different materials. The material used for the first layer (1) on the side of the incoming bullet, which has the function of spreading the pressure caused by the impact of a bullet to a larger area, is harder than 25 HRC, and the second layer (2), having the hardness of 20 - 40 % of the first layer (1), is formed of at least one panel (3) thinner than the first layer (1). At least one panel (3) is made of another material which absorbs and/or accumulates energy of the impact mostly by a flexible deformation.



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Bulletproof construction element.

Technical field

The invetion concerns a bulletproof construction element, in a particular a metal opening filler, suitable in the construction industry.

Background of the invention

Until now, bulletproof elements known for use in the construction industry, especially as construction opening fillers are based on materials which absorb the energy of the oncoming bullet. This energy is usually absorbed in such a way that there is no volume deformation of the bulletproof material. Usually these materials are special alloys. Existing bulletproof elements are composed of one or several layers of materials absorbing energy.

Until now, two basic concepts have been used in bulletproof frame constructions. In the first case, a hollow space, created in the construction profile, is filled with sufficiently strong material made of steel alloys. In the second case, a massive belt, made of special aluminium alloy, is integrated into the system or is fixed onto it.

These bulletproof construction elements are costly, because the material used is expensive, its availability is limited, and its actual production is relatively complicated. To attain the required safety, the bulletproof construction element must be very thick. This limits construction design, and further considerations are necessary with respect to the large mass of the used material, and the resulting extensive weight of the entire construction element.

Sumary of the invention

These disadvantages can be to a large extent eliminated by using the bulletproof construction element, suitable in particular as a metal opening filler for the construction industry, according to this invention. This element is based on the use of least two layers of different materials. The material used for the first layer on the side of the incoming bullet, which has the function of spreading the pressure caused by the impact of a bullet to a larger area, is harder than 25 HRC. The second layer, having the hardness of 20 - 40% of the first layer, is formed of at least one panel thinner than the first layer. At least one panel of the second layer is made of another material which absorbs and/or accumulates energy of the impact mostly by a flexible deformation. The first layer can be made of a ferrite harder than 45 HRC.

Between the first layer and the second layer, there is at least one more secondary layer softer than the material in the first layer and harder than the material second layer.

In the case that there are more panels in the second layer, at least one other material, which has different characteristic of absorption and/or accumulation of impact energy than the materials used in panels of the second layer, is used.

The first layer can be composed of several smaller segments.

Panels in the second layer can be made of low-carbon steel or composed of layered materials form fiberglass or carbon-based materials.

The bulletproof construction element made according to this invention is less expensive than existing available products. The bulletproof resistance can be increased by changing the thicknessof layers, panels and secondary layers, in classes M1 to M5 according to DIN 52290. Another advantage of this realization lies in its lower weight, and because of the use different materials, more compilicated shapes of construction elements can be produced. For example, low-carbon steel, used for the second layer, is not expensive, while its mechanical characteristics are saticfactory, both for its use as a bulletproof material, and its workability. Required characteristics can be reached by combination and changes in the number of secodary layers while conforming to eventual requirements for certain outside dimensions of the construction. In cases of uneven construction profiles, smaller segments can be used in the first layer. Metal opening fillers made this way do not disturb the outside appearance.

Brief description of the drawings

The bulletproof construction element will be described in more details on examples of a specific realization of an opening filler. Cross-section of the side view in Fig.1. shows one possible realization of this invention. Fig.2 and Fig.3 show cross-setion of the side view of other possible variation of the bulletproof element and Fig.3 show cross-setion of the side view of else other possible variation of the bulletproof element.

Detailed description of the preferred embodiments

The example of a bulletproof element for opening filler consists of first layer 1 and second layer 2,

made of different materials. The first layer 1 material, which is in the direction of the oncoming impact, has the hardness of 35 HRC, and is 7 mm thick. The second layer 2 has the hardness of 10 HRC, had consists of four panels 3, each 1.2 mm thick. These panels 3 are made of low-carbon steel sheet metal.

The first layer 1 causes enlargement of the area transmitting energy onto the second layer 2. This second layer 2 acts as a spring which accumulates energy from an area several times larger than is the cross-section area of the bullet. This way, the energy of impact of the bullet on the second layer 2 of the bulletproof element is several times smaller.

Another possible realization has a secondary layer 4 made of a material in the hardness of 20 HRC, inserted between the first 1 layer and second layer 2. This design of the construction element showed better bulletproof resistance according to DIN 52290 then the one in the previous example.

Another possible realization has one insert 5 made of layered fiberglass material between the panels 3 and the second layer 2.

Another realization which is not included in this drawing, the first layer 1 and a second layer 2 which consist form only one profiled panel 3.

In one realization, not included in this drawing, the first layer 1 of the bulletproof construction element is composed of several smaller segments. This type of design is suitable for example in using sintered carbides, natural materials and materials with similar characteristics.

Besides the materials already mentioned, the first layer 1 can be made of steel alloys, ceramics, glass, special plastic, etc. Layer panels 3 of the second layer 2 can be made of metal, layered material on the basis of carbon fibers, the combination thereof, etc.

Industrial applicability

The bulletproof construction element of this technical design can be used particularly in the construction industry as an opening filler.

Ve claim:

C L A I M S

1. The bulletproof construction element, suitable in particular as a metal opening filler for the construction industry, c h a r a c t e r i s e d in that this element is based on the use of least first layer (1) and second layer (2) of different materials, the material used for the first layer (1) on the side of the incoming bullet, which has the function of spreading the pressure caused by the impact of a bullet to a larger area, is harder than 25 HRC, and the second layer (2), having the hardness of 20 - 40% of the first layer (1), is formed of at least one panel (3) thinner than the first layer (1), while at least one panel (3) is made of another material which absorbs and/or accumulates energy of the impact mostly by a flexible deformation.

2. The bulletproof construction element according to claim 1, c h a r a c t e r i s e d in that between the first layer (1) and the second layer (2), there is at least one more secondary layer (4) softer than the material of the first layer (1) and harder then the material of the panels (3) of the second layer (2).

3. The bulletproof construction element according to claim 1 or 2, c h a r a c t e r i s e d in that between panels (3) of the second layer (2), the least one other insert (5), which has different characteristic of absorption and/or accumulation of impact energy than the materials used in panels (3) of the second layer (2), is used.

4. The bulletproof construction element according to claim 1, 2 or 3, characterised in that the first layer (1) is composed of several smaller segments.

5. The bulletproof construction element according to claim 1, 2, 3 or 4, characterised in that the panels (3) in the second layer (2) are be made of low-carbon steel or composed of layered materials form fiberglass or carbon-based materials.

6. The bulletproof construction element according to claim 1, 2, 3, 4 or 5, characterised in that the first layer (1) is made of a ferrite harder than 45 HRC.

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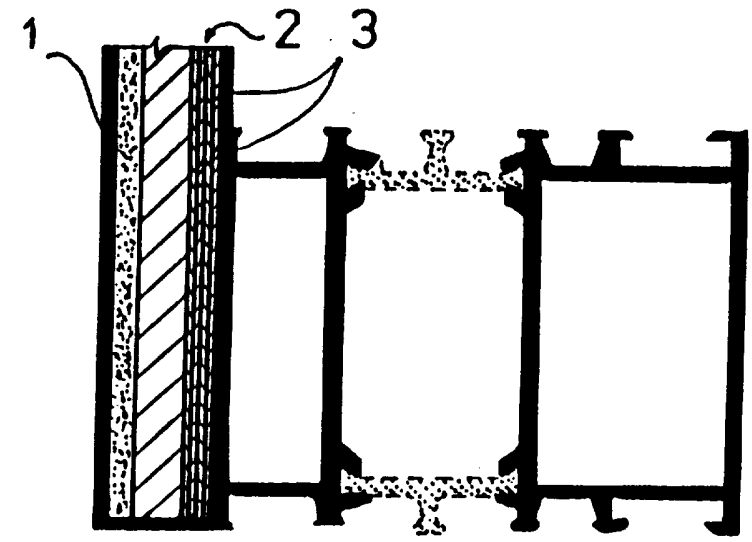


Fig. 1

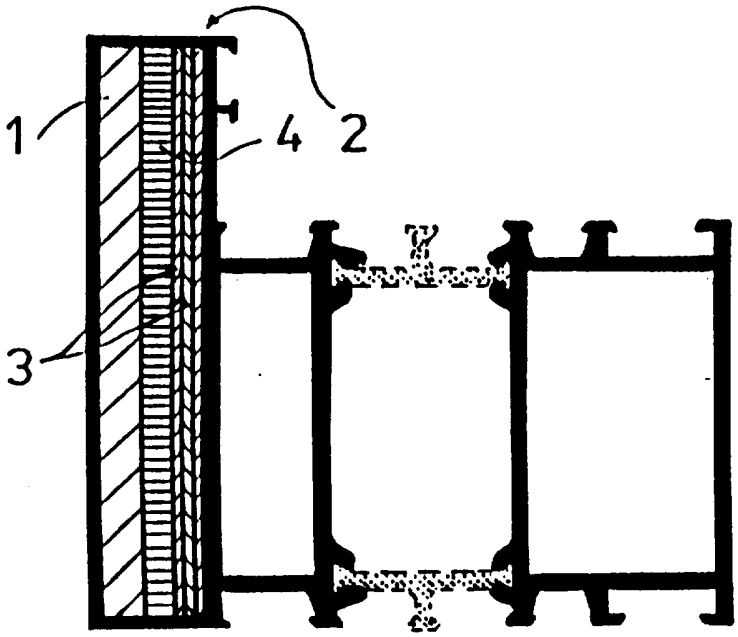


Fig. 2

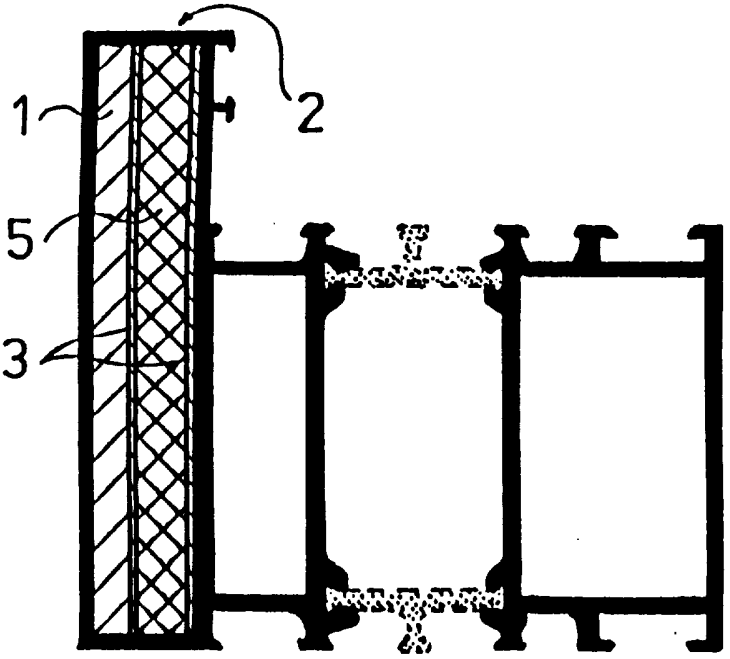


Fig. 3

INTERNATIONAL SEARCH REPORT

Inter nal Application No
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A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 F41H5/04

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)
IPC 6 F41H

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C. DOCUMENTS CONSIDERED TO BE RELEVANT

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[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
11 April 1996	25. 04. 96

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