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(54) **ROAD SAFETY BARRIER**

(57) Road safety barrier belonging to the type of barriers that are mounted along road shoulders and outer edges to serve as protective elements and it is configured by a plurality of vertical poles to which the upper w-beam is affixed above and the corresponding lower support element is affixed below to allow assembling the protective woven mesh element to this structure but at a distance from the plurality of vertical poles, said structure com-

prising support elements (4) inferior to the vertical poles (2), a mesh which different longitudinal areas are woven in different warp densities that is then secured between the w-beam (3) and the lower support elements (4), washers (10) and fixing plates (9) made from ABS or polyamide which serve to secure the woven mesh (5) to the w-beam and the lower support elements (4) and additionally act as energy absorbing elements.

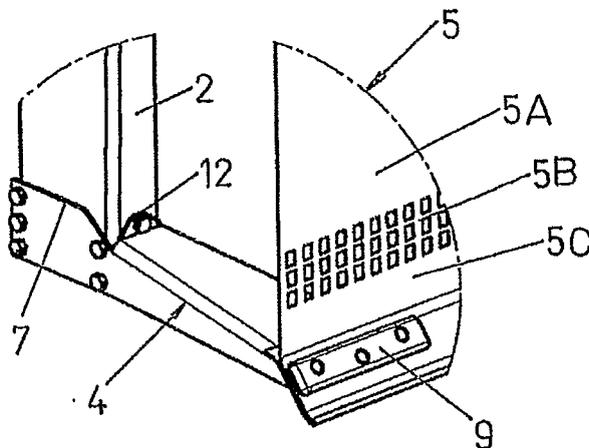


Fig. 5

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Description**OBJECT OF THE INVENTION**

[0001] The following invention, as expressed in the title of the present descriptive report, refers to a security barrier for road safety belonging to the type of barriers that are mounted along road shoulders and outer edges to serve as protective elements, in which the protective woven mesh element is installed so it remains at a certain distance from the plurality of vertical poles to which the w-beam is affixed, said protective woven mesh displaying longitudinal areas or bands having different warp densities obtaining a central elastic area intended to minimize impact-caused damage to the extent of prevent it.

[0002] The intended purpose is that in case of accidents mostly involving motorbike and bicycle riders, they are prevented from hitting the metal poles or the guard rails while the structure absorbs in addition the force of the impact without causing harm to the person involved in the accident.

[0003] In addition, both the poles to which the w-beam are affixed to and the spacer element lack cutting edges in order to minimize damage to the person impacting them during a potential accident.

FIELD OF APPLICATION

[0004] The present specification describes a road safety barrier to be mounted along road shoulders and edges that is particularly suited to prevent accident-caused damages to motorbike and bicycle riders.

BACKGROUND OF THE INVENTION

[0005] As it is the general knowledge, the protective elements installed along the shoulders and edges of roads in case of potential accidents have evolved with time, so that the first protective elements to be considered will be masonry built protective elements.

[0006] Elements comprising reinforced concrete poles anchored to the ground to hold protective metal mesh elements will also be considered.

[0007] Road protection barriers comprising a series of metal poles between which profile-defined guard rails are mounted will also be addressed in the present report.

[0008] As it is also generally well known, these road safety barriers fulfill their purpose adequately in terms of acting as stopper elements, but occasionally their presence may aggravate the consequences of an accident if the persons involved do impact them

[0009] In this sense in certain situations, such as those involving protective barriers comprising metal poles and profiles, this type of barriers may make more severe the consequences of an accident, mainly when the persons involved are motorbike and bicycle riders, because when these riders impact them they often suffer very severe cuts as a consequence.

[0010] This is due to the person impacting the rigid elements of the barrier, and in some instances these elements are cutting components that do not palliate the force of the impact because they lack elastic elements that would absorb said impact force.

[0011] This situation has promoted an awareness directed to building barriers intended to not only decreasing accidents but also to minimize the consequences of said accidents. In this regard we can consider different documents such as patents of invention ES 2174718 and ES 2277775. Patent of invention ES 2174718 refers to an "*anti-exit and collision barrier*" comprising a series of support poles anchored to the ground between which a plate of textile material is stretched and affixed to the support poles by means of a fixing plate and corresponding screw that secure the textile plate to the support pole. A guard rail is additionally installed in between the support poles in an upper position.

[0012] The object of said invention has an additional disadvantage caused by the lower edge of the textile mesh not being secured to the structure and therefore if a person was to be catapulted against it during an accident any of his or her limbs could go through it.

[0013] Additionally the textile mesh involved does not comply with "Level 1" of the certification procedure according to current legislation - UNE Standards 135900-1 and 135900-2 - that specify that in case of accident no harm must come to the person involved.

[0014] The second document, patent of invention ES 2277775 refers to an "*road safety barrier for motorbike and bicycle riders*" in which spacing support elements are secured to the lower portion of the vertical poles - in relation to a spacing arm- to which the w-beam are secured by means of welding a U-shaped fixing plate to the appropriate support element to achieve the desired configuration in which the textile band is then secured between the w-beam and the lower support elements.

[0015] In this manner, in the event of the textile band being impacted it would be the corresponding lower support element the element that would receive the force of the impact causing it to raise as it gyrates around the welding line but without absorbing any of the forces thus caused, and therefore, although damage is minimized it is not prevented.

[0016] The elements that secure the textile band do not absorb any of the impact forces either when an impact occurs, and therefore the consequences of the impact, although minimized, do not prevent damages.

[0017] Another consideration is that the lower support element may only be affixed to vertical support poles having a C-sectioned profile.

[0018] In addition, this road safety barrier system is only applicable to the BNSA-120 type barriers.

DESCRIPTION OF THE INVENTION

[0019] The present report describes a road safety barrier belonging to the type of barriers that are mounted

along road shoulders and outer road boundaries to serve as protective elements, configured by a plurality of vertical poles to which the guard rail or w-beam is affixed on the upper part and the corresponding elements for supporting the protective mesh that will span the poles are installed in the lower part, thus allowing the protective mesh element to be installed on the plurality poles but at a certain distance from them in such a manner that the safety barrier then comprises the following:

- A series of supporting elements placed inferiorly to the vertical poles and configured by a die cut plate fitted with folding lines that define a couple of side wings for affixing the plate to the corresponding vertical pole;
- A woven mesh having different warp densities in the various longitudinal areas that it comprises and that is affixed to the structure between the w-beam and the lower support elements, and configures two different non-elastic bands, a lower and an upper one, with a central elastically-controlled elastic area contained between the two matching perforated bands that absorbs the impact, and;
- ABS or polyamide washers and fixing plates to affix the elastic woven mesh component to the w-beam and to the lower support elements respectively, said washers and fixing plates acting both as fastening elements and as energy absorption elements.

[0020] The lower support elements placed between the pair of side wings used to fasten the element to the corresponding vertical pole configure a lug that is affixed to the frontal part of the vertical pole when assembling said lower support element.

[0021] In this manner, during impact, the lower support elements transmit the force of impact to the corresponding vertical pole to which they are affixed to, thus absorbing the energy of impact and minimizing the potential damage.

[0022] In addition, said support elements may be affixed to poles having any section, even circular sections.

[0023] The protective woven mesh having different warp densities for the different longitudinal areas that is secured between the w-beam and the lower support bodies is woven with high tensile strength polyester threads having different masses (PED), a thread binding component, Teflon, a sliding product and PVC coating.

[0024] The polyester threads having different masses to be used in a preferred embodiment will be 3300 Dtex (Decitex) and 6600 Dtex (decitex).

[0025] The upper area or band defined in the protective woven mesh has two subareas with different warp densities.

[0026] In a preferred embodiment the density of the polyester threads having different masses to be used will be the following: 13.8 threads/cm in the central elastic area; 4.82 threads/cm in the perforated areas or bands; 9.07 threads/cm in the lower area or band and 13.8

threads/cm and 9.07 threads/cm respectively for the two upper subareas A and C.

[0027] The thread binding component comprises a tafeta-derived amalgam substance used to obtain a structured deformation. The thread binding component can achieve different degrees of deformation depending on the various areas or bands defined in the protective mesh.

[0028] The sliding product serves to aid the impacting body into gliding on the structure to prevent abrasion injuries, while the PVC coating prevents the woven mesh from UV-ray caused deterioration.

[0029] The lower section of the protective woven mesh bends in a 30 mm swath at the point where it is secured to the tilted frontal face of the lower support elements of the vertical poles, and this bottom fold is then secured by means of self-threading screws passing through the respective fixing plates that are of a generally rectangular shape and have rounded edges. This configuration prevents any limb from an impacting person to go through the lower side of the protective woven mesh. Also, the double thickness of the protective woven mesh at the anchoring points makes for greater structural reliability.

[0030] To form the continuous barrier the successive sections of protective woven mesh that configure it overlap by a 150 mm width that is welded to materialize the joining section in relation to the corresponding vertical pole.

[0031] In short, the barrier as describe is capable of achieving, in compliance with current legislation, "level 1" of the certification procedure according to current legislation - UNE Standards 135900-1 and 135900-2 - which specifies that in case of accident no harm must come to pass.

[0032] In addition, the proposed system may be fitted to any type of car or motorbike contention barrier system.

[0033] In order to complement the following descriptive section and to contribute a better understanding of the characteristics of the invention, a set of drawings has been included in the present descriptive report. The figures are intended as illustrative but not limiting of the most characteristics details of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0034]

Figure 1. Shows a perspective view of a section of the road safety barrier in which it can be observed how the elastic woven mesh is installed on the vertical poles but leaving a space between them.

Figure 2. Shows a frontal view of the road safety barrier section shown in the previous figure.

Figure 3. Shows a frontal view of a section of the protective woven mesh. The folded swath at the anchoring points in the lower part is represented by a discontinuous line, also shown is the elastic area delimited by two perforated longitudinal areas or bands

externally delimited by matching inelastic bands.

Figure 4. Shows a detail frontal view of the area where two mesh sections are joined together by means of their overlapped edges that are then welded to form the joint, always in relation to a vertical pole.

Figure 5. Shows a view of detail A of figure 1 showing the means used to secure the mesh to the lower support element of a vertical pole to which the w-beam is secured.

Figure 6. Shows a side view of the road safety barrier where the means to secure the protective woven mesh used between the lower support element and the w-beam can be seen.

Figure 7. Shows a view of detail B as shown on the previous figure in which it can be seen how the protective woven mesh is joined to the lower support element of the corresponding vertical pole.

Figure 8. Shows a view of detail C as shown in figure 6 in which it can be seen how the protective woven mesh is joined to the w-beam.

Figure 9. Shows a perspective view of the fixing plate through which the protective woven mesh is affixed to the lower support element of the corresponding vertical pole by means of the corresponding screws.

Figure 10. Shows a perspective view of the washer through which the protective woven mesh is affixed to the w-beam secured to the corresponding vertical pole by means of the corresponding screws.

Figure 11. Shows a plan view of the development of the die cut plate used to configure the lower support element of the corresponding vertical pole.

Figure 12. Shows a perspective view of the lower support element below the corresponding vertical pole.

Figure 13. Shows view of the various longitudinal areas or bands having different warp densities as defined in the protective woven mesh.

DESCRIPTION OF A PREFERRED EMBODIMENT

[0035] Using as reference the information pertaining to the figures described above and the parts as numbered, it can be seen how road safety barrier 1 belongs to the type of barriers that are installed as protecting elements along road shoulders and outer limits of roads. Said system is configured by a plurality of vertical poles 2 in between which the upper w-beam 3 is mounted and to which the corresponding lower support element 4 is fastened to allow assembling in between them a protective mesh 5.

[0036] The supports elements 4 installed at the lower part of vertical poles 2 are configured from a die cut plate 6 fitted with a series of folding lines 11 that define a pair of side wings 7 which purpose it to affix the plate 6 to the corresponding vertical pole 2 by elongating frontally according to a general trapezoidal section.

[0037] In addition in between the pair of side wings 7

for affixing the lower support element 4 a lug 12 is defined. This element is affixed during assembly to the frontal part of the corresponding vertical pole 2.

[0038] In this manner, when impacted, lower support elements 4 transmit the force of impact to the corresponding vertical pole 2 absorbing the energy of the impact.

[0039] Said support elements 4 may be affixed to poles having any section, even circular sectioned poles.

[0040] Two non-elastic bands, 5C and 5D corresponding respectively to the upper and lower bands and a central elasticity-controlled elastic area 5A are defined in the woven mesh 5 that is stretched between the w-beam 3 and the lower support elements 4. These areas or bands absorb the impacts, and it can be observed how the central area 5A is delimited by the corresponding perforated longitudinal bands 5B which have different warp densities.

[0041] The upper area 5D is further divided into two subareas having different warp densities. The lower subarea has the same density as the elastic central area or band 5A and the density of the upper subarea is the same as that of the lower area or band 5C.

[0042] Additionally, the lower part of area 5C in the protective woven mesh 5 folds in a 30 mm wide swath "d" at the point where it is affixed to the frontal tilted face 8 of lower support elements 4 of vertical poles 2 by means of self-threading screws that go through the respective fixing plates 9 which have rounded edges and are made of ABS or polyamide so they can absorb the impact energy. Folding the mesh at the anchoring points of the support elements 4 improves its reliability.

[0043] Both washers 10 and fixing plates 9 that serve to secure the elastic woven mesh 5 to the upper w-beam 3 and to the lower support elements 4, respectively, are made in ABS or polyamide in order to act as energy absorption elements as well as affixing elements.

[0044] The woven mesh 5 that is stretched between the w-beam 3 and the lower support elements 4 is composed of high tensile strength polyester threads (PED) having different masses, a thread binding substance, teflon, a sliding product and PVC coating.

[0045] In a preferred embodiment the polyester threads having different masses that configure the mesh 5 to be used will be 3300 Dtex (Decitex) and 6600 Dtex (decitex).

[0046] The upper area or band 5D defined in the protective woven mesh 5 has two subareas, A and C, having different warp densities.

[0047] In a preferred embodiment the density of the different areas will be the following: 13.8 threads/cm in the central elastic area; 4.82 threads/cm in the perforated areas or bands; 9.07 threads/cm in the lower area or band, and 13.8 threads/cm and 9.07 threads/cm respectively for the two upper subareas A and C.

[0048] The polyester thread's binding component comprises a taffeta-derived amalgam used to obtain the structured degree of deformation necessary to not exceed the impact force values described in UNE standards

135900-1 and 135902. The thread binding material delivers different degrees of deformation for the different areas of the mesh 5.

[0049] In this manner and according to figure 13 the deformation achieved by the thread binding element in the various longitudinal sections embodied in the protective woven mesh 5 are as follows: in the central elastic area A and in subarea A of the upper section 5D the binding material has a moderate degree of deformation, area B has a high deformation binding material and the binding material used in the lower section of C and the upper subarea of C on the upper part of 5D delivers a low degree of deformation.

[0050] The purpose of the chemical sliding product is to aid the impacting body into gliding on the structure to prevent abrasion injuries, while the PVC coating prevents the woven mesh from UV ray-caused deterioration.

[0051] The successive sections of protective woven mesh 5 that configure the continuous barrier 1 overlap by a 150 mm width "D" and are welded to materialize the joining section in relation to the corresponding vertical pole 2.

[0052] As it has already been mentioned before, the lower support element 4 of vertical poles 2 is configured from a die cut plate 5 fitted with the corresponding folding lines so that said lower support element 4 side wings 7 for affixing the plate to the corresponding vertical pole 2 that elongate frontally according to a general trapezoidal section having rounded edges and topped by a small tilted plane 8 relative to which one side of the protective elastic mesh 5 is installed while the opposite side is affixed to the w-beam 3.

[0053] The side of the lower part of the protective mesh 5 affixed to the tilted frontal face 8 of the lower support element 4 of vertical support elements 2 folds, as already noted, in a 30 mm swath and it is secured with screws that go through the fixing plates 9 which have a general rectangular shape and rounded edges. Said fixing plates 9 have three through orifices for the corresponding self-threading crews, which heads are lodged in a recess machined to that effect.

[0054] The protective mesh 5 is affixed to the w-beam 3 in the upper part of the structure by means of the corresponding screws that go through respective washers 10 that have a general circular shape and rounded edges and a through orifice so the mesh remains, practically, in a vertical position and affixed by spaced from the vertical poles 2 so that in case of accident the consequences of the motorbike or bicycle rider impacting the protective mesh are minimized since the protective mesh 5 is the element that absorbs the impact.

[0055] It can also be noted that the purpose of the two bands of longitudinal orifices defined in protective mesh 5 delimiting the elastic central area 5C is to evacuate water and the Teflon component prevents other elements, such as ice, from adhering to it.

[0056] The lower support elements 4, the w-beam 3 and the protective mesh 5 may be made in reflectant

material to act as passive signaling devices.

[0057] In addition, the described barrier can be installed on any type of contention barrier intended for passenger cars and motorbikes, which is a significant advantage over other systems.

[0058] In summary, it can be stated that the components of the proposed barrier (element inferior to the vertical poles, protective woven mesh, washers and fixing plates used to secure the mesh) are energy-absorbing elements that constitute a non-rigid barrier that absorbs the impact energy without harming the person involved in the accident.

[0059] Although only one particular embodiment of the invention has been represented and described, any expert in the field can introduce modifications and substitute any technical characteristic for other, technically equivalent, features depending on the requirements particular to each situation and still remain within the protection scope defined by the following claims.

Claims

1. SECURITY BARRIER FOR ROAD SAFETY of the type of barriers that are installed as protective elements along road shoulders and outer edges, configured by a plurality of vertical poles in between which the guard rail or w-beam is affixed on the upper part and the corresponding elements for supporting the protective mesh that will span the poles are installed in the lower part, thus allowing the protective mesh element to be installed at on the plurality of poles but leaving space between mesh and poles, **characterized in that** the safety barrier (1) comprises the following:

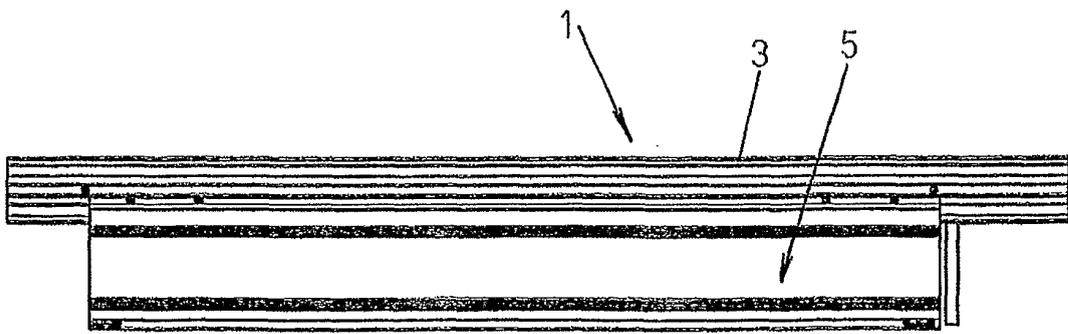
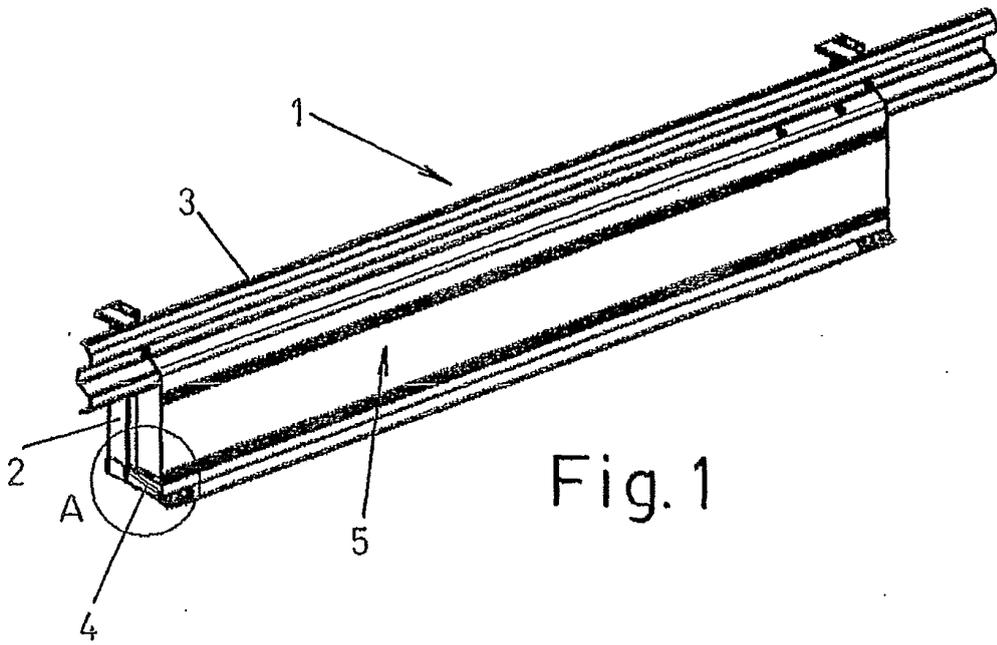
a. a series of supporting elements (4) placed below the vertical poles (2) and configured by a die cut plate (6) fitted with folding lines (11) that define a couple of side wings (7) for affixing the plate to the corresponding vertical pole (2) and that elongate frontally according to a generally trapezoidal section;

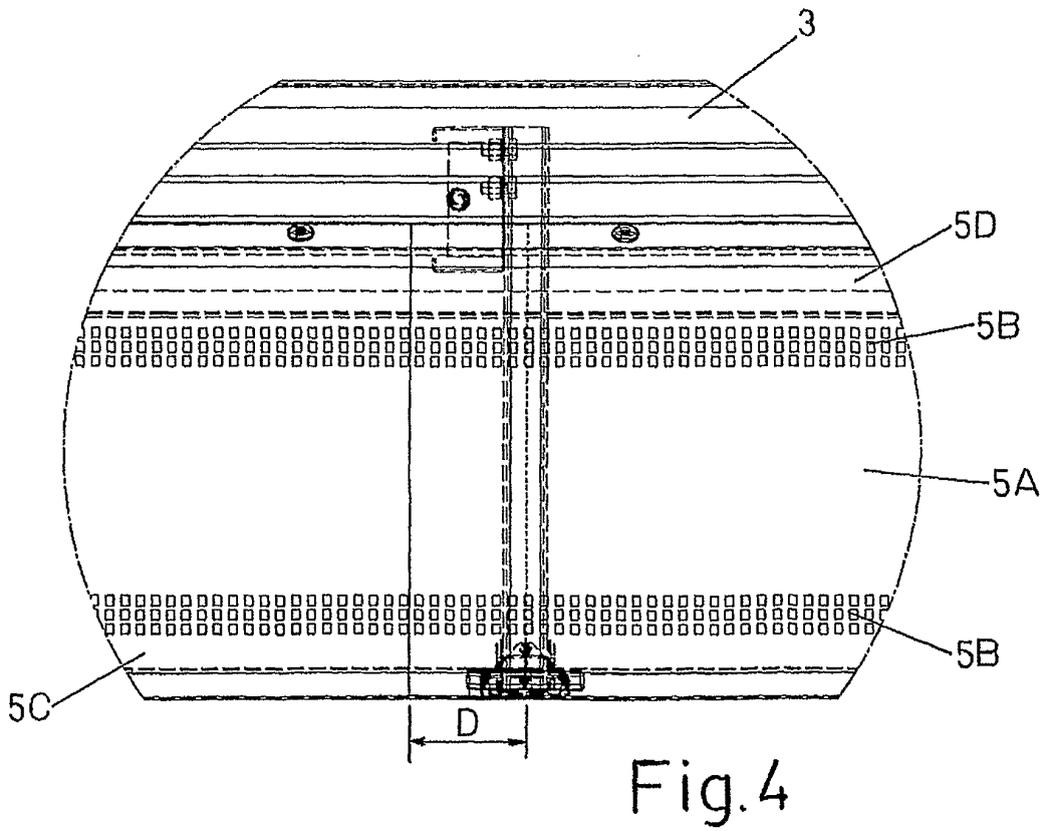
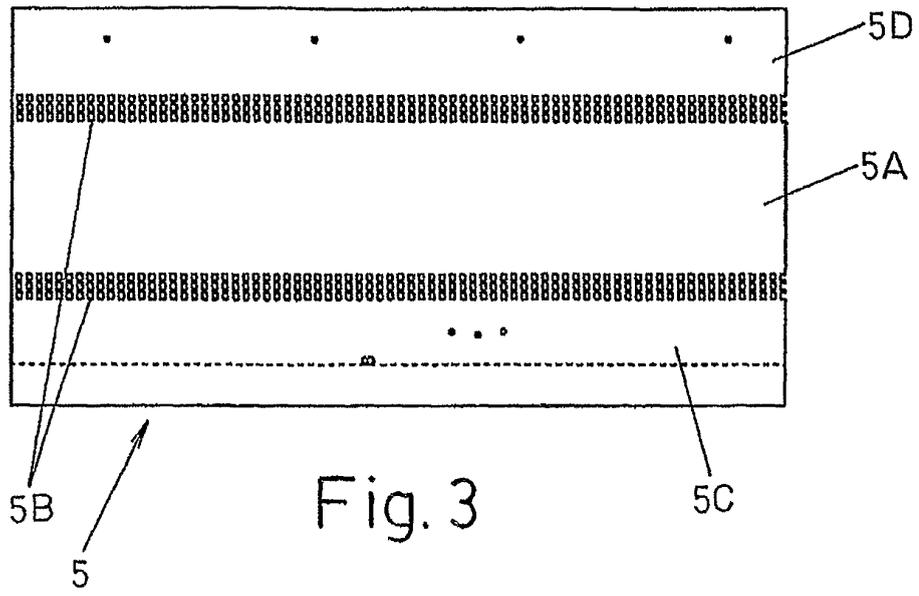
b. a woven mesh having different warp densities in the various longitudinal areas that configure it which is affixed to the structure between the w-beam (3) and the lower support elements (4), there being two differentiated non-elastic bands (5C and 5D) in the mesh (5), a lower and an upper one, and a central elastically-controlled elastic area (5A) contained between corresponding perforated longitudinal bands (5B), and;

c. ABS or polyamide washers (10) and fixing plates (9) which serve to affix the woven mesh (5) component to the w-beam (3) and to the lower support elements (4) respectively, said washers (10) and fixing plates (9) acting both as fas-

- tening and energy absorption elements.
2. SECURITY BARRIER FOR ROAD SAFETY according to claim 1 **characterized in that** in between the pair of side wings (7) affixing components of the lower support elements (4) a lug (12) is configured to be secured to the frontal face of the vertical pole (2) during the assembly. 5
 3. SECURITY BARRIER FOR ROAD SAFETY according to claims 1 and 2 **characterized in that** when impacted the lower support elements (4) transmit the resulting force to the corresponding vertical pole (2) absorbing the impact energy. 10
 4. SECURITY BARRIER FOR ROAD SAFETY according to claim 1 **characterized in that** the different longitudinal bands or areas of the woven mesh (5) secured between the w-beam (3) and the lower support elements (4) have different warp densities and the mesh (5) comprises polyester threads of different masses and high tensile strength (PED), a thread binding component, Teflon, a product to aid sliding and PVC coating. 15
20
 5. SECURITY BARRIER FOR ROAD SAFETY according to claims 1 and 4 **characterized in that** the mass of the polyester threads is 3300 Dtex and 6600 Dtex respectively. 25
30
 6. SECURITY BARRIER FOR ROAD SAFETY according to claim 1 **characterized in that** the warp density of the central elastic area (5A) is of 13.8 threads/cm ; of 4.82 threads/cm in the perforated areas or bands (5B); of 9.07 threads/cm in the lower area or band (5C) and of 13.8 threads/cm and 9.07 threads/cm respectively for the two upper subareas (A and C). 35
 7. SECURITY BARRIER FOR ROAD SAFETY according to claims 1 and 4 **characterized in that** different thread binding components are applied to the weft according to the different deformation requirements needed by the different areas or bands of woven mesh (5) to which is applied. 40
45
 8. SECURITY BARRIER FOR ROAD SAFETY according to claims 1 and 7 **characterized in that** the thread binding component applied to the central elastic area (5A) and the lower subarea of the upper section (5D) of the mesh (5) has a moderate deformation function, the thread binding element applied to the perforated bands (5B) has a high deformation function, and the binding element applied to the lower band (5C) and to the upper subarea of the upper band (5F) has a low deformation function. 50
55
 9. SECURITY BARRIER FOR ROAD SAFETY according to claim 1 **characterized in that** the lower section

of the protective woven mesh (5) that is affixed to the tilted frontal face (8) of the support elements (4) inferior to the vertical poles (2) folds in a 30 mm swath that is then secured by means of screws that go through the respective fixing plates (9) having rectangular shape and rounded edges.





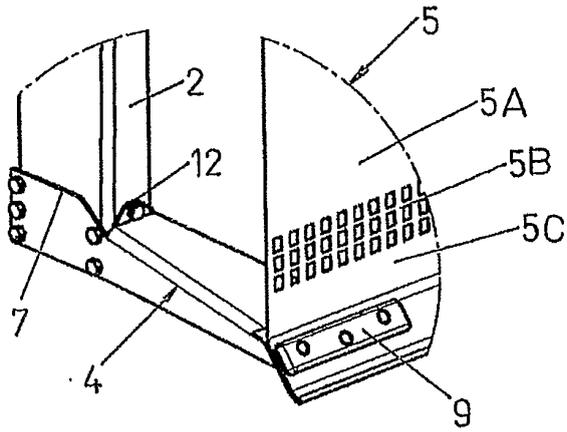


Fig. 5

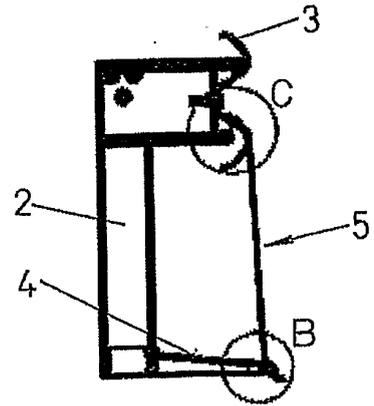


Fig. 6

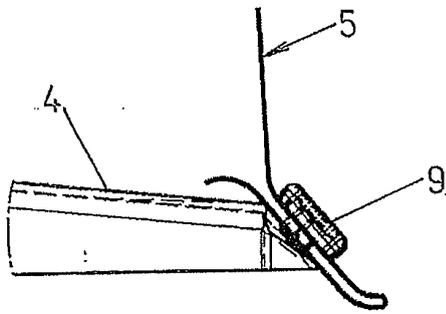


Fig. 7

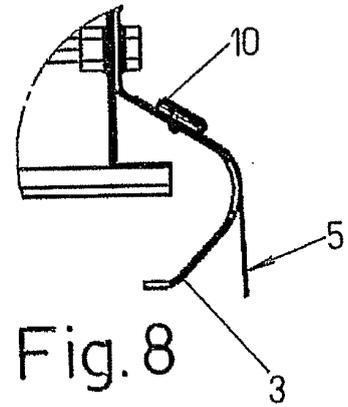


Fig. 8

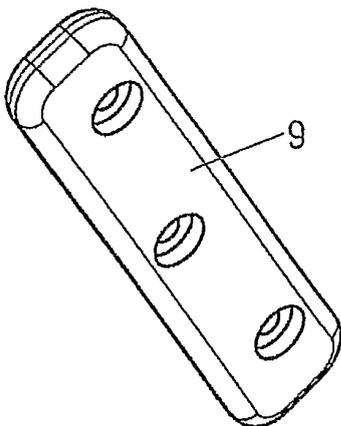


Fig. 9

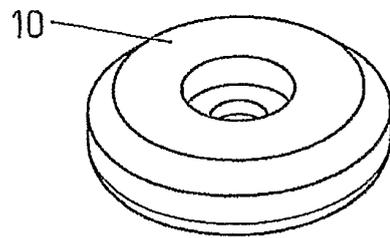
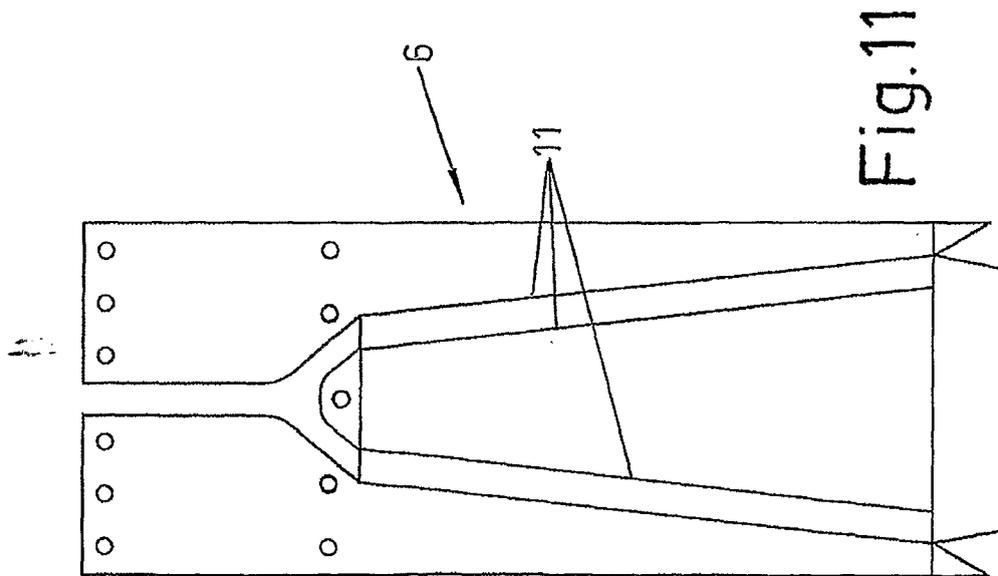
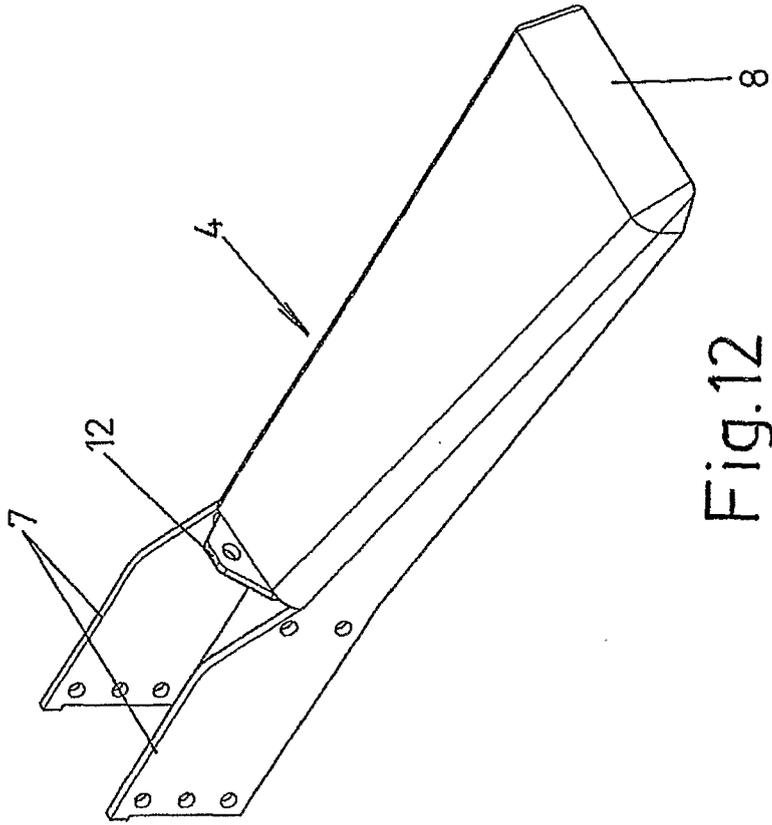


Fig. 10



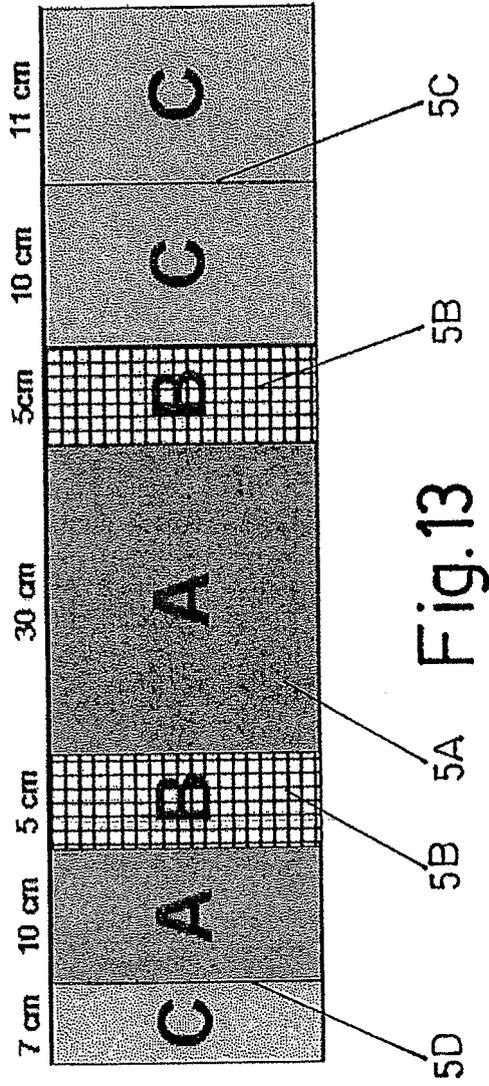


Fig.13

INTERNATIONAL SEARCH REPORT

International application No.
PCT/ES 2009/000152

A. CLASSIFICATION OF SUBJECT MATTER				
E01F 15/06 (2006.01)				
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) E01F				
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) INVENES,EPODOC				
C. DOCUMENTS CONSIDERED TO BE RELEVANT				
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.		
Y	ES 2277775 A1 (PROTECCION SISTEMAS BASYC S L) 16.07.2007, the whole document.	1-9		
Y	ES 2259569 A1 (LONCAR S L) 01.10.2006, the whole document.	1-9		
A	FR 2549915 A1 (MATERIEL & EQUIPMENTS TEC) 01.02.1985, abstract; figures.	1		
A	US 2007009342 A1 (FIGGE et al.) 11.01.2007, abstract; figures.	1		
<input type="checkbox"/> Further documents are listed in the continuation of Box C. <input checked="" type="checkbox"/> See patent family annex.				
* Special categories of cited documents: <table border="0" style="width:100%"> <tr> <td style="width:50%"> "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) "O" document referring to an oral disclosure use, exhibition, or other means "P" document published prior to the international filing date but later than the priority date claimed </td> <td style="width:50%"> "T" 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 "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 "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 "&" document member of the same patent family </td> </tr> </table>			"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) "O" document referring to an oral disclosure use, exhibition, or other means "P" document published prior to the international filing date but later than the priority date claimed	"T" 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 "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 "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 "&" document member of the same patent family
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Date of the actual completion of the international search 16 June 2009 (16.06.2009)		Date of mailing of the international search report (14/07/09)		
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