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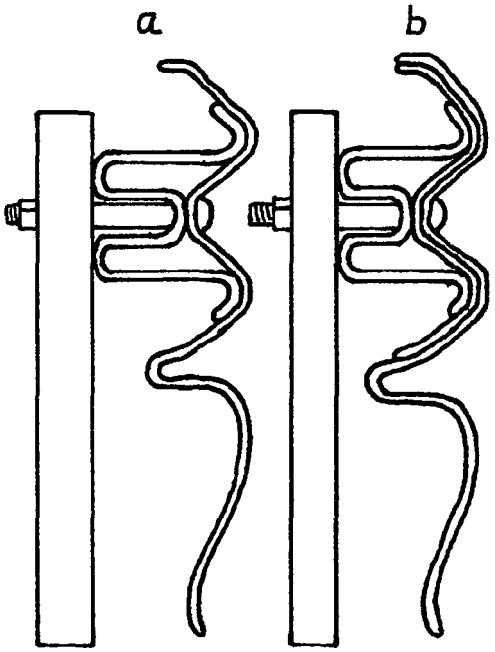
(54) Spoiler for crash barriers

(57) A spoiler for a crash barrier which is integrated into the horizontal beam of the crash barrier construction or which is attached to this horizontal beam. This spoiler is designed to specifically absorb the impact of motorcyclists and small objects, due to its geometry and material choice. This spoiler can be fitted with several features such as tubes or piping, temperature visualisation, measurement of and warning for deformation and breakage as well as temporary or permanent visual signage.

Fig. 1



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Description

Field of application

[0001] This invention is applied in the field of traffic safety where it mainly improves the safety of motorcyclists.

Brief description of figures

[0002]

1. Figure 1: A side view of a crash barrier construction, at the fixing point to the vertical support posts. Figure 1a shows an integrated construction where the complete profile is made out of one single part. Figure 1b shows an assembled construction, where the spoiler is attached to the horizontal beam.
2. Figure 2: A representation of a possible execution to which a tube or piping can be attached, using clips.
3. Figure 3: A representation of a possible execution of a fixation system to permanently or temporarily attach the spoiler to the top of the horizontal beam.
4. Figure 4: Side views of possible spoiler geometries.

Current know-how

[0003] A current crash barrier construction consists of horizontal beams which are attached to vertical support posts. The beam has a specific shape or profile which gives it sufficient rigidity and resistance to deformation. The way in which the horizontal beam is attached to the vertical support posts determines in part the total energy which can be absorbed upon impact. To offer sufficient resistance and thereby prevent moving vehicles to exit the road, these constructions are often made from steel.

[0004] The current and most frequently used design consists of a steel W-shaped beam which is attached with steel bolts to the vertical support posts, also made from steel. These vertical posts have a cross section in the shape of an I, Z, C or an O.

[0005] If a motorcyclist exits the road and slides at high speed towards the crash barrier, he can be either get caught in between the ground and the horizontal beam or impact against a vertical support post. Research of the European Community's Directory General for Energy and Transportation, in collaboration with FEMA (Federation of European Motorcyclists Associations) shows that 10 to 15% of all fatalities amongst motorcyclists that collide against a crash barrier, are due to the impact with this hard and sharp construction, in which the impact with the vertical posts is most problematic.

[0006] Several recent research projects have led to a number of improvements in this matter. A first solution is to add a second horizontal beam or a horizontal structure underneith the already present horizontal beam. This prevents the motorcyclist from getting stuck underneith the horizontal beam and it also prevents any direct contact with the vertical support posts. A second solution is to surround the vertical support posts with shock absorbing material. In both solutions, the elements which are added to the crash barrier construction are attached to the vertical support posts.

Description of the invention

[0007] The subject of this invention is a crash barrier construction which offers an improved level of safety for motorcyclists. The construction consists of an upper part, which currently fulfills the function of road restraint for vehicles, and a lower part which has to absorb the impact of motorcyclists and small objects. The upper and lower part can be integrated as one and the same element (1) or they can be assembled from two different elements to form one construction (2). The lower part will further on be called the spoiler.

[0008] Because of the fact that the horizontal beam of the current crash barriers has a high resistance to deformation, the spoiler needs to be designed and executed in such a way that less energy is required to deform it. In doing so, a more heterogenous resistance to deformation is incorporated into the construction.

[0009] This can be achieved by the geometry of the spoiler and by ensuring a certain distance between the spoiler and the vertical support posts to allow that sufficient energy is absorbed in this deformation before the spoiler hits the vertical support posts. The spoiler is therefore not attached to the vertical support posts, but rather to the horizontal beam. The shock absorption of the spoiler is determined by the choice of material of which it is made and the geometry of the spoiler's profile.

[0010] The area between the horizontal beam and the spoiler has the function of a hinge. The energy absorption is determined by the material choice for the construction, the geometry of the spoiler (4), the geometry of the hinge and the distance between the spoiler and the vertical support posts. The spoiler can be perforated to save weight and to allow wind and light to pass through, which can respectively prevent sand and dirt build-up along the construction and improve safety at night.

[0011] In case the spoiler is an integral part of the crash barrier construction, it can be made from the same material by adjusting the profile of the beam to incorporate the spoiler (1a). This can be done by reducing the thickness in the area of the spoiler. If the spoiler is attached to the horizontal beam, it can be made from a different material. The connection can be made by giving the upper part of the spoiler a fitting profile which perfectly fits the already present horizontal beam. In this case, the spoiler can be attached using bolts in the middle of the horizontal beam, which is facilitated by the current presence of holes in these areas. The upper part of the spoiler can be attached to the horizontal beam using clips (3), which greatly facilitates the assembly of the total construction.

[0012] Differences in elevation of the road surface can cause the distance between the ground and the spoiler to vary. To ensure the efficiency of the spoiler in these locations, a provision can be made which makes the spoiler adjustable in heigth. Vertical grooves with a rear-mounted small spoiler can be used to achieve this goal. The rear-mounted spoiler can then be lowered in these places where the difference between the ground and the spoiler is greater.

[0013] The choice of suitable materials is large. These spoilers can be made from metal, using the currently available metal processing methods used to make the current crash barriers. The spoiler can be made from various possible polymers such as polyurethane or polydicyclopentadiene, which can be transformed into the spoilers by way of reaction injection molding, either in virgin form or reinforced by fillers such as fibers. Because of the relatively low demands for impact resistance and stiffness, as compared to non deformation applications, a large scope of fiber reinforced polymers can also be used for this application, like polyesters and epoxies as well as a number of thermoplastic materials like ABS, polypropylene, polyethylene and combinations of thermoplastic materials. The Moldable Fabric Technology by Milliken can also be used for this application. This is a 100% polypropylene composite which can be molded in the desired geometry of the spoiler. The transformation of these materials to finished spoilers can be done with the currently available transformation techniques. Because of the designed simplicity of the spoiler and the absence of undercuts, mold design is simple.

[0014] Several facilities can be incorporated into the spoiler. Firstly, a facility can be incorporated to attach a tube or pipe to the back of the spoiler (2). This can be a tube which holds electrical wires or a - possibly microperforated - pipe which contains a liquid (herbicide, antifreeze, and so on). Secondly, a facility can be incorporated to visually show whether the ambient temperature is below a certain value. This can be a digital sensor, an electrical system with bimetal or a mechanical system with floating indicator based on the temperature-dependency of the density of liquids. Thirdly, the spoiler can have visual signalisation. By means of holes and bolts, or inserts, this signalisation can be attached to the spoiler. Fourthly, a device can be incorporated into the spoiler to register and/or visualize a certain deformation of break of the spoiler. This can be achieved by incorporating a double wire or special resistors. These will respectively give an alert when the wires are cut or will measure the deformation based on the property that the resistance of a wire is dependent on its length (Pouillet's Law). Any signal generated by this system can be transmitted to a control station.

Claims

1. A spoiler **characterized by** the fact that it is an integral part of the horizontal beam of a crash barrier construction or which is attached to that horizontal beam, without being connected to the vertical support posts of that crash barrier construction. The spoiler has an incorporated living hinge, which is continuous and present over its total length and which is an intrisic part of its design and which connects the flexible lower part to the rigid or fixed upper part of the spoiler.

2. A spoiler for a crash barrier construction **characterized by** the fact that it can be made out of metal or polymer materials and contains an optionally perforated vertical plain and which can be given any practical design geometry.

3. A spoiler for a crash barrier construction **characterized by** a feature to attach at least one tube or pipe.

4. A spoiler for a crash barrier construction **characterized by** a feature to remotely detect whether the spoiler has been submitted to significant deformations or has been broken.

5. A spoiler for a crash barrier construction **characterized by** a feature to visualize the ambient temperature.

6. A spoiler for a crash barrier construction **characterized by** a feature which enables the lower part to be adjustable in height.

7. A spoiler for a crash barrier construction **characterized by** a feature to attach temporary or permanent signage.

Fig. 1

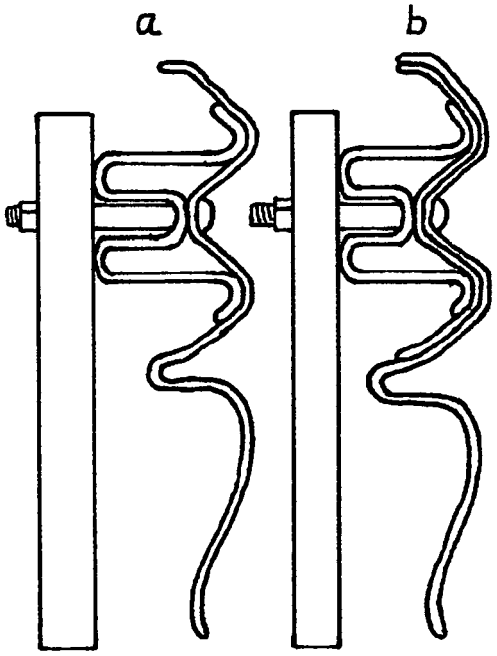


Fig. 2

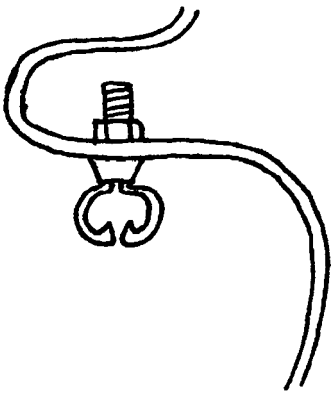


Fig. 3

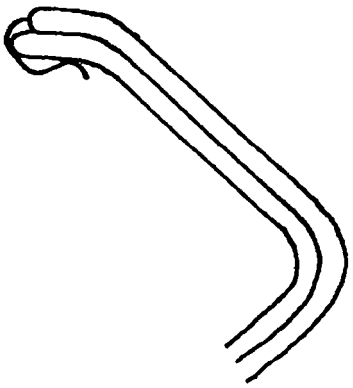
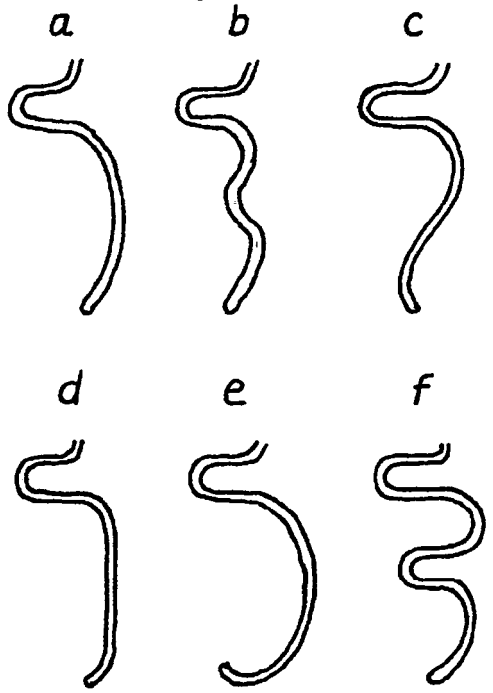


Fig. 4



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EUROPEAN SEARCH REPORT

Application Number
EP 05 44 7218

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	FR 2 848 578 A (POMERO CLAUDE ALIX GEORGES) 18 June 2004 (2004-06-18) * the whole document *	1-7	E01F15/04
A	FR 2 714 405 A (MAILLET JEAN) 30 June 1995 (1995-06-30) * the whole document *	1	
A	FR 2 752 255 A (PAYS LILIANE DORIVAL) 13 February 1998 (1998-02-13) * the whole document *	1	
A	FR 2 792 958 A (HSIUN RONG CORPORATION) 3 November 2000 (2000-11-03) * the whole document *	1	

TECHNICAL FIELDS SEARCHED (IPC)

E01F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	31 January 2006	Geivaerts, D

CATEGORY OF CITED DOCUMENTS

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31-01-2006

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82