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(54) **SINGLE-PROFILE CONCRETE BARRIER**

(57) The present invention relates to a new type of concrete safety barrier that is executed in situ, which is a barrier with an asymmetrical configuration with respect to a cross section, i.e., of those called double-profile barriers, which is used as a safety feature on roads and highways hosting road traffic, although it can be used as a guarding or delimiting feature for other activities. This barrier, compared to others known in this industrial sector, is characterised in that it is configured to be able to be executed in situ on a safety dwarf wall already arranged on the road, so it is not required, when executing the barrier, having to first remove the existing dwarf wall to subsequently execute a barrier again.

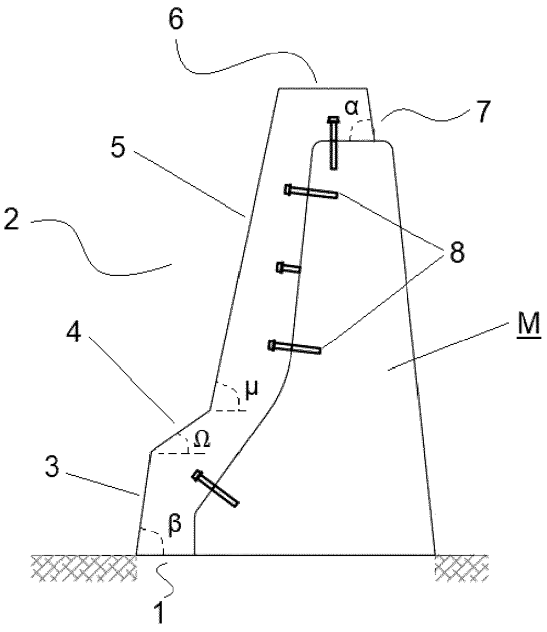

FIG.1

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Description

Field of the invention

[0001] The present invention relates to a new type of concrete safety barrier that is executed in situ, which is a barrier with an asymmetrical configuration with respect to a cross section, i.e., of those called double-profile barriers, which is used as a safety feature on roads and highways hosting road traffic, although it can be used as a guarding or delimiting feature for other activities. This barrier, compared to others known in this industrial sector, is characterised in that it is configured to be able to be executed in situ on a safety dwarf wall already arranged on the road, so it is not required, when executing the barrier, having to first remove the existing dwarf wall to subsequently execute a barrier again.

[0002] The field of application of the present invention is the civil construction sector, and focusses on the execution and maintenance work of linear working sites, and more specifically it falls within the different safety elements executed in situ.

State of the art

[0003] Concrete barriers are safety elements that are well known in the civil construction sector, and the main function of which is to absorb the kinetic and potential energy transmitted when a moving vehicle collides with same, so that said barrier safety element in turn contains the vehicle and prevents it from jumping onto another road, causing even greater damage. Another use thereof is that of delimiting the directions of circulation, although they can be used as a guarding or delimiting feature for other construction activities.

[0004] Within this typology of safety barriers, different types can be distinguished, such as mobile and fixed barriers, those made of plastic material of different colours able to be filled with water or sand, or those made of concrete. The present invention focusses on fixed concrete barriers, and more specifically on those executed in situ and those commonly known as New Jersey barriers, i.e., continuous longitudinal barriers, which do not have male-female joint systems. Within this type of barriers, double-profile barriers and single-profile barriers are known, where the double ones have a symmetrical cross section, while the single ones have an asymmetrical cross section. By way of example, that which is disclosed in document ES1203788U is known, where a single-profile barrier with asymmetrical inclined lateral faces is described the configuration of which allows improving the performance of the barrier against impacts.

[0005] Taking into account the existing background in the state of the art, it can be understood that premanufactured New Jersey type concrete barriers have advantages over those executed in situ because they have the possibility of incorporating different elements that improve the performance of the set and because their cross sections and therefore their volumes of concrete and steel are smaller. However, the technical problem that arises when carrying out paving work on roads and highways is well known, whether it is maintenance work, patching or comprehensive reconditioning of the pavement in a segment, and where in these segments there is already a dwarf wall or safety barrier previously executed in situ on said pavement.

[0006] This problem consists of the fact that, when laying the new pavement to fix the road, the original safety dwarf wall that was already placed in situ, is lower than the new pavement, so, when the pavement is raised, this original wall loses effectiveness against possible impacts from vehicles circulating on the new road surface. Faced with this problem, there is no other solution currently known other than removing the original dwarf walls and re-execute a new barrier in situ on the new pavement.

[0007] Taking this technical problem into account and considering that there is no solution that does not require the removal of the original dwarf wall built in situ, the present invention consists in executing a concrete barrier over the original dwarf wall, so that the removal of said original dwarf wall is not required, and wherein the configuration of the new barrier allows the volume of concrete to be reduced without affecting its performance as a vehicle containment system.

[0008] Therefore, the present invention solves the technical problem of avoiding having to remove the safety dwarf walls executed in situ on a road when reconditioning work of the pavement of said road is to be done.

Explanation of the invention

[0009] The concrete barriers executed in situ, i.e., by means of a sliding formwork continuously and linearly in the same work site area, can be of two types, single or one-sided profile barriers, and double or two-sided profile barriers. The present invention consists of a single-profile concrete barrier, of the type commonly known as New Jersey, for use on roads and vehicle circulation areas, and which is preferably usable for lateral areas on roadways, bridges and viaducts, where double or two-sided barriers are not recommended.

[0010] This concrete barrier is asymmetric from the cross-sectional point of view, while it is longitudinally continuous. Going into the particularity of the cross section, the barrier is defined by a base that rests on the seating ground, a discontinuous and inclined wall comprising a lower facing, an intermediate step and an upper facing, an upper face and a rear face closing the set, wherein these faces and walls are supported on the dwarf wall originally executed in situ.

[0011] In this sense, for a correct formation of the barrier cross section and the correct operation of the barrier, the invention is characterised in that it comprises:

a base with a width of at least 100 mm; that gives continuity to the base of the original dwarf wall;

a discontinuous wall comprising a lower facing with an inclination (β) with respect to the horizontal between 77° and 89°; an intermediate facing having an inclination (Ω) with respect to the horizontal between 28 and 40°; an upper facing having an inclination (μ) with respect to the horizontal between 70° and 85°; and that is arranged on an external face of the original dwarf wall;
an upper face with a width of between 110 mm and 195 mm; and
a rear closing wall, having an angle (α) with respect to the horizontal between 70 and 90°; which starts from the upper face and closes with the upper face of the original dwarf wall, i.e.,
the base, the discontinuous wall, the upper face and the rear wall cover external faces of an already existing dwarf wall on the seating ground, the height of the dwarf wall being lower than the height of the discontinuous wall, i.e., the height of the concrete barrier.

[0012] Going into a greater degree of detail, and preferably but in a non-limiting manner, the dimensions of a cross section of said barrier are such that:

the base has a width of at least 100 mm;
the discontinuous wall comprises a lower facing having a height of between 180 mm and 240 mm, and an inclination (β) with respect to the horizontal comprised between 77° and 89°; an intermediate facing having a height comprised between 65 and 95 mm, and an inclination (Ω) with respect to the horizontal comprised between 28 and 40°; an upper facing having a height comprised between 590 and 680 mm and an inclination (μ) with respect to the horizontal comprised between 70° and 85°; and
an upper face which is flat with a width of between 110 mm and 195 mm; and
a rear closing wall, which starts from the upper face and closes with the upper face of the already existing dwarf wall, and which has an angle (α) with respect to the horizontal comprised between 70 and 90°.

[0013] To improve the connection between the concrete barrier and the existing dwarf wall, the invention may be characterised by comprising a plurality of anchors distributed on the external faces of the dwarf wall and, therefore, are embedded in the core of the barrier, such that these anchors, which are preferably steel screws of at least 8 mm in diameter and at least 70 mm in length, are embedded in the wall for at least 50 mm. In order to improve said reinforcement between the dwarf wall and the barrier, these anchors are distributed in a staggered manner on said external faces of the wall.

[0014] As previously mentioned, the concrete barrier is asymmetrical from the cross-sectional point of view, while it is longitudinally continuous. In this sense, the barrier comprises a plurality of water passages longitudinally located at intervals of at least 3 metres, therefore, the barrier comprises a plurality of retraction joints in segments of at least 3 metres, and wherein these water passages have preferably minimum dimensions of 250 mm wide by 70 mm high.

[0015] This barrier configuration is characterised in that, compared to any other type of barrier or known safety element, it has a differentiated cross section and in that it is based on using and embedding a dwarf wall previously executed on said road. In this sense, the dimensions and angles previously indicated ensure correct functioning of the set, and have the advantage of reducing the volume of concrete in this type of barrier typology and ensuring satisfactory results in coach launching tests and in light vehicle launching on all occasions, i.e., it allows obtaining good levels of containment and stability, as well as the height and the structure thereof provides same with a correct stability against vehicle overturning. Furthermore, this type of barrier allows same to be located in any area of an infrastructure and for any type of infrastructure, such as viaducts, bridges and road sides.

[0016] In a possible embodiment of the invention, the concrete is of the HA type with a resistance of at least HA-30; wherein the consistency is of the type S, P or B; and the I+F type environment; the cement required is a CEM II 42.5 type.

[0017] Finally, it must be taken into account that, throughout the description and claims, the term "comprises" and its variants are not intended to exclude other technical features or additional elements, such as the type of concrete or the dosage thereof, or the type of sliding formwork or equivalent means required for the in situ execution of this barrier.

Brief description of the drawings

[0018] In order to complete the description and to help a better understanding of the features of the invention, a set of two figures is presented wherein the following is represented by way of illustration and not limitation:

Figure 1 shows a cross sectional view of the safety barrier object of the present invention.
Figure 2 shows the free perspective view of the concrete safety barrier object of the present invention executed linearly.

Detailed description of an embodiment of the invention

[0019] As can be seen in the previous figures, one embodiment of the invention consists of a single-profile concrete safety barrier, which is executed in situ and which is characterised in that a cross section covers an external face of a dwarf wall (M) previously executed in situ, and comprising

a base (1) with a width of 108 mm; that gives conti-

nuity to the base of the original dwarf wall;
a discontinuous wall (2) comprising a lower facing (3) having a height of 200 mm and an inclination (β) with respect to the horizontal of 82°; an intermediate facing (4) having a height of 80 mm, and an inclination (Ω) with respect to the horizontal of between 35°; an upper facing (5) having a height of 620 mm and an inclination (μ) with respect to the horizontal of 77°; an upper face (6), which is flat, and has a width of 170 mm; and
a rear closing wall, having an angle (α) with respect to the horizontal of 82°; which starts from the upper face and closes with the upper face of the original dwarf wall;
so that the base (1), the discontinuous wall (2), the upper face (6) and the rear wall (7) cover external faces of a wall (M), the height of the dwarf wall (M) being less than the height of the discontinuous wall (2), i.e., the height of the discontinuous wall (2) or height of the concrete barrier object of the invention is greater than the height of the dwarf wall (M).

[0020] As can be seen in said section, to improve the connection between the body of the safety barrier and the dwarf wall originally executed in situ, the dwarf wall (M) includes a plurality of anchors (8) distributed on its external faces and which are embedded in the core of the barrier.

[0021] Finally, a figure can also be observed showing the concrete safety barrier object of the present invention executed linearly, and wherein said barrier comprises a plurality of water passages (9) longitudinally located at intervals of at least 3 metres.

Claims

1. A single-profile concrete barrier, which is a barrier executed in situ on a road with a cross section with an asymmetrical configuration; which is **characterised in that** the faces of a cross section cover external faces of a dwarf wall (M) previously executed in situ on the said road, and wherein said cross section comprises:

   a base (1) with a width of at least 100 mm; that gives continuity to the base of the dwarf wall (M);
   a discontinuous wall (2) comprising a lower facing (3) with an inclination (β) with respect to the horizontal comprised between 77° and 89°; an intermediate facing (4) having an inclination (Ω) with respect to the horizontal between 28 and 40°; an upper facing (5) having an inclination (μ) with respect to the horizontal between 70° and 85°; and that is arranged on an external face of the dwarf wall (M);
   an upper face (6) with a width of between 110 mm and 195 mm; and
   a rear closing wall (7), which has an angle (α) with respect to the horizontal comprised between 70 and 90°; which starts from the upper face (6) and closes with the upper face of the dwarf wall (M); and
   wherein the height of the discontinuous wall (2) is greater than the height of the dwarf wall (M).

2. The single-profile concrete barrier, according to claim 1, wherein the lower facing (3) having a height comprised between 180 mm and 240 mm; the intermediate facing (4) has a height comprised between 65 and 95 mm; and the upper facing (5) has a height between 590 and 680 mm.

3. The single-profile concrete barrier, according to claim 1, where the upper face (6) is flat.

4. The single-profile concrete barrier, according to claim 1, wherein the dwarf wall (M) comprises a plurality of anchors (8) distributed on its outer faces that are embedded in the core of the barrier.

5. The single-profile concrete barrier, according to claim 4, wherein the anchors (8) are distributed in a staggered manner.

6. The single-profile concrete barrier, according to claim 4, wherein the anchors (8) are steel screws of at least 8 mm in diameter and at least 70 mm in length, said anchors being embedded in the dwarf wall (M) for at least 50 mm.

7. The single-profile concrete barrier, according to the preceding claims, which is **characterised in that** it has a plurality of water passages (9) longitudinally located at intervals of at least 3 metres.

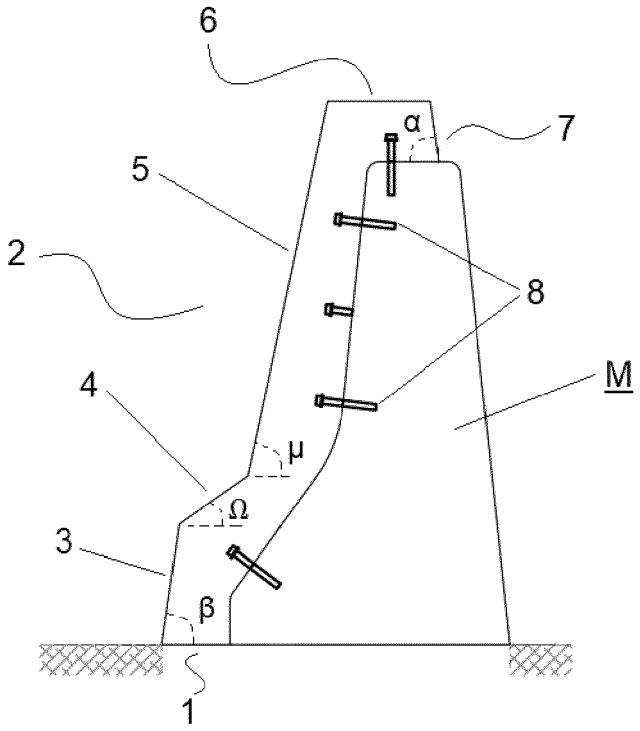

FIG.1

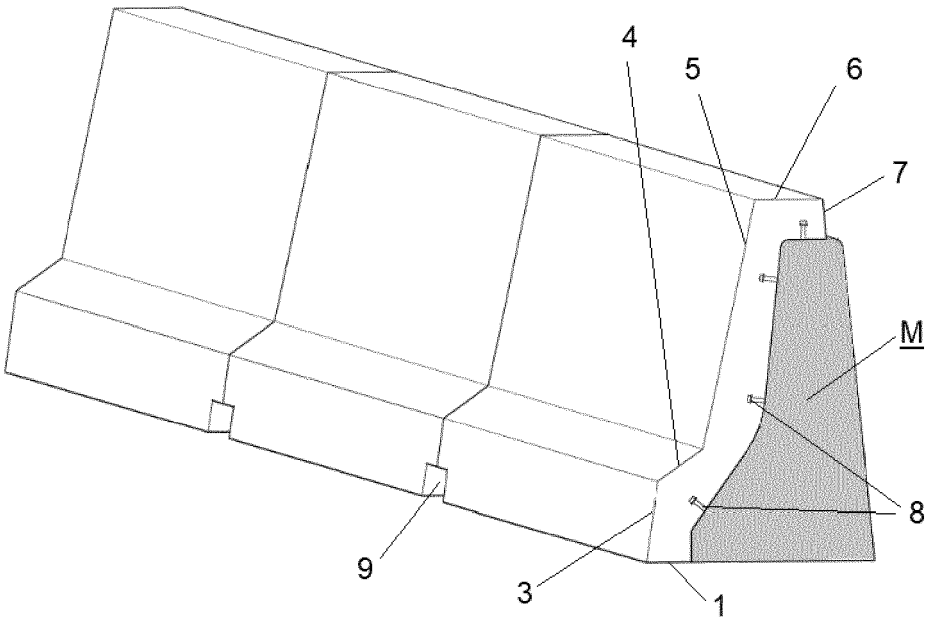

FIG.2

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EUROPEAN SEARCH REPORT

Application Number
EP 23 38 2859

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	CN 205 100 117 U (UNIV CHONGQING JIAOTONG ET AL.) 23 March 2016 (2016-03-23)	1-6	INV. E01F15/08
Y	* paragraph [0002] * * paragraph [0027] - paragraph [0037]; figure 1 *	7	
X	CN 110 616 659 A (GUANGZHOU TAIYU TECH DEVELOPMENT CO LTD) 27 December 2019 (2019-12-27)	1-3	
Y	* paragraph [0002] * * paragraph [0008] * * paragraph [0034] - paragraph [0036] * * paragraph [0048] - paragraph [0049]; figures 1, 2 *	7	
X	CN 105 442 445 A (BEIJING HUALUAN TRAFFIC TECH CO LTD; SHANDONG HI-SPEED COMPANY LTD) 30 March 2016 (2016-03-30)	1-3	
Y	* paragraph [0009] * * paragraph [0035]; figure 12 *	7	
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Y	* figures 4a-4c *	7	
X	ES 2 112 109 A1 (CASTELLOT MARCOS FEDERICO [ES]) 16 March 1998 (1998-03-16)	1-3	
Y	* figure 2 *	7	

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	12 February 2024	Giannakou, Evangelia

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 23 38 2859

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12-02-2024

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ES 2112109 A1	16-03-1998	NONE	

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

REFERENCES CITED IN THE DESCRIPTION

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