(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 0 837 189 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
22.04.1998 Bulletin 1998/17

(51) Int. Cl.[6]: **E01F 15/04**, E01F 15/08

(21) Application number: **97117925.4**

(22) Date of filing: **16.10.1997**

(84) Designated Contracting States:
AT BE CH DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE
Designated Extension States:
AL LT LV RO SI

(30) Priority: **17.10.1996 IT UD960199**

(71) Applicant:
Sistema Barriere Stradali S.r.l.
31020 S. Polo di Piave, Treviso (IT)

(72) Inventors:
- **Gasparetto Stori, Leopoldo**
  33170 Pordenone (IT)
- **Serafin, Luigi**
  31047 Fraz. Negrisia (Treviso) (IT)

(74) Representative:
Giugni, Valter et al
PROPRIA
Protezione Proprietà Industriale S.r.L.
Via Mazzini 13
33170 Pordenone (IT)

(54) Metallic safety barrier

(57) Metallic safety barrier employed to delimit the side of the road or as a central traffic divider, the barrier consisting of a plurality of metallic modular elements, which can be associated reciprocally to each other and to the ground (12), the modular elements including a hollow bearing structure (13) associated with transverse stiffening ribs (21) and including at the lower part pockets (15) to house the means (16) which anchor the barrier to the ground (12), the pockets (15) including, in the proximity of the supporting surface, a hollow chamber (23) cooperating with at least the upper part of the anchor means (16), the hollow chamber (23) being at least three times wider than the size of the anchor means (16).

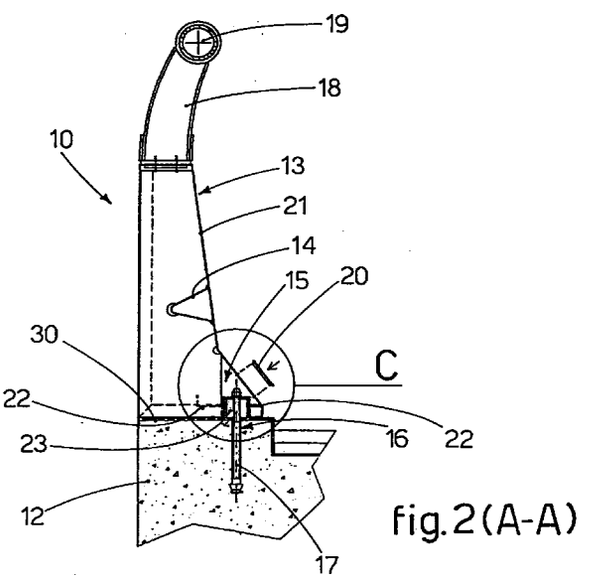

fig.2(A-A)

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Description

FIELD OF APPLICATION

This invention concerns a metallic safety barrier as set forth in the main claim.

The invention is used both as a traffic divider and also as a side element in streets where vehicles pass; it is used particularly to prevent or at least limit the vehicle from leaving the carriageway following accidental detours, thus preventing the vehicle from crossing into the opposite carriageway or from leaving the road.

STATE OF THE ART

The state of the art covers a plurality of barrier elements used on the roads, in particular motorways or freeways, both as elements to separate the carrriageways where the traffic goes in opposite directions, and also as an element to delimit the side of the road.

The state of the art covers, among others, the type of barriers known as "New Jersey", which are made by assembling, in series, modular elements made of concrete, which are made solid with each other and with the surface of the road.

These concrete barriers are extremely resistant, especially because of their conformation which is studied to absorb efficiently the kinetic energy of any vehicle which hits them.

The state of the art also covers metallic barriers which have the same conformation as the concrete type, but are resistant and light which makes them preferable, particularly for use on bridges, viaducts and other structures which require safety means with a limited weight; moreover these metallic barriers have better qualities with regards to assembly, replacement, maintenance, transport, shock absorption, etc.

To prevent or limit the metallic barriers from moving due to an impact caused by a vehicle striking them, they are made solid with the surface of the road or the floor slab of bridges or viaducts with the appropriate anchor means, such as tie bars, screws, nails or similar.

In order to prevent these anchor means from being broken due to the heavy stresses to which they are subjected in the event of any impact from vehicles striking the barrier, the upper part of the anchor means generally cooperates with a hollow chamber included on the surface of the road or on the floor slab of the bridges or viaducts.

The hollow chamber allows the tie bar, when stressed by a particularly violent impact, to bend at the top but not break and therefore the barrier remains anchored to the ground.

In some cases, the hollow chamber is filled with elastic material which gives the hollow chamber a shock-absorber effect which improves the resistance of the tie bars.

A first disadvantage of this solution is that it is long and laborious to make the hollow chambers for the tie bars to bend in.

It may also require particular processing, such as for example core boring, which, if it is made on bridges or viaducts, may weaken the reinforcement of the floor slab and therefore compromise its mechanical resistance.

Moreover, in order to achieve these chambers on the surface of the road, it is necessary to interrupt or divert the flow of traffic, thus causing traffic problems and slow-downs. Furthermore, the temporary removal of the metallic barriers, for example to carry out maintenance work on a specific section of road, lays open the chambers on the road surface, which can cause problems for drivers and compromise their safety.

Another disadvantage of metallic barriers of the type known to the state of the art is that they do not include means suitable to efficiently drain the rain water which accumulates on the surface of the road, which causes considerable risks to drivers in the event of rain, and also the possibility of corrosion of the lower part of the barriers.

The present applicants have designed, tested and embodied this invention to overcome the shortcomings of the state of the art and to achieve further advantages.

DISCLOSURE OF THE INVENTION

The invention is set forth and characterised in the main claim, while the dependent claims describe variants of the idea of the main embodiment.

The purpose of the invention is to provide a barrier for use on the roads which is able to give a high level of safety and strength and particularly to ensure an efficient anchorage to the ground and a high level of shock absorption.

A further purpose is to allow the barrier to be installed easily and quickly, and to allow an equally rapid removal which will leave no traces on the road surface, once cleared, of structural elements or holes which could create problems during normal driving and/or constitute a potential danger for drivers themselves.

The barrier according to the invention consists, in a substantially conventional manner, of a plurality of metallic modular elements which can be connected to each other so as to constitute a continuous barrier.

The modular elements include, at their lower part, at least in correspondence with the transverse stiffening elements, seatings to house the means to anchor the barrier to the ground, such as tie bars, nails, screws or likewise.

According to the invention, inside the barrier and in the proximity of the supporting surface, the seatings include a hollow chamber of a conformation which, when placed in cooperation with the upper part of the anchor means, allows the latter, when subject to stresses caused by violent impacts, to be elastically deformed, at least in their upper part, so as to prevent

them from breaking.

The hollow chamber is made directly during the step when the modular element is being prepared, thus avoiding the need for auxiliary work when the barrier is actually installed.

In one embodiment of the invention, the hollow chamber is defined by a pipe, the size of which is at least three times greater than that of the anchoring tie bar, and which includes at its upper part a closure plate on which the attachment nut of the tie bar rests.

According to a variant, the chamber is filled with elastic material to obtain a better dissipation of the kinetic energy derived from the impact, thus reducing the mechanical stresses to which the anchor means are subjected.

The metallic barrier according to the invention includes at the lower part through apertures which allow the rain water, which otherwise would accumulate on the road, to pass.

According to one solution of the invention, the through apertures are delimited at the upper part by the lower face of the metallic modular elements and at the side by the lower ends of the transverse stiffening elements connected to the ground.

According to another variant, between the surfaces of the barrier which rest on the ground and the ground itself there is a water-tight seal.

ILLUSTRATION OF THE DRAWINGS

The attached figures are given as a non-restrictive example and show some preferred embodiments of the invention as follows:

Fig. 1 shows a partial front view of a safety barrier according to the invention;
Fig. 2 shows a section from A to A of Fig. 1 on a large scale;
Fig. 3 shows the enlarged detail C from Fig. 2;
Fig. 4 shows a variant of Fig. 3;
Fig. 5 shows a section from B to B of Fig. 1 on a large scale.

DESCRIPTION OF THE DRAWINGS

The safety barrier according to the invention consists of a plurality of modular elements 10, one of which is shown partly in Fig. 1, placed adjacent to each other and reciprocally connected to each other and to the ground 12.

In this case, the modular elements 10 include a metallic bearing structure 13 which is hollow inside and equipped with the appropriate longitudinal stiffening elements 14.

The bearing structure 13 includes on the lower part, in correspondence with the transverse stiffening ribs 21, a plurality of pockets 15 to house the means 16 which anchor the barrier to the ground 12, in this case consisting of tie bars 17; the structure 13 also includes, at the upper part, uprights 18 to support modular rods 19 of vertical containment.

The pockets 15, in this case, are guadrangular in section and are equipped with water-tight covers 20.

At the bottom of the pockets 15, inside the bearing structure 13, there is a plate element 22 located in cooperation with a hollow chamber 23 which has a much greater section than that of the tie bar 17 which it must circumscribe; in this way, in the event of violent impacts, the tie bar 17 is able to undergo mechanical deformations without breaking.

In the case shown in Fig. 3, the hollow chamber 23 consists of the inner volume of a cylindrical pipe 24 solidly associated with the plate element 22; the elements 26 to clamp the tie bar 17 cooperate with the upper end 24a of the pipe 24; in this case, the clamping means 26 consist of a metallic plate 27 and a nut 28.

In the variant shown in Fig. 4, the hollow chamber 23 is filled with an elastic element 11, in this case made of rubber, suitable to further dissipate the kinetic energy of the vehicles which hit the barrier and therefore to reduce the mechanical stresses on the anchor means 16.

According to the invention, the lower face of the transverse stiffening ribs 21 acts as a support for the entire safety barrier. It is thus possible to define, in the lower part of the barrier, through apertures 25 between two consecutive stiffening ribs 21 as the shell of the bearing structure 13 is raised from the ground 12 .

This solution allows the rain water 29 to run off the road and be discharged outside, for example, in the appropriate collection areas.

In this case, between the lower face of the stiffening ribs 21 and the ground 12 there is a water-tight seal 30.

Claims

1. Metallic safety barrier employed to delimit the side of the road or as a central traffic divider, the barrier consisting of a plurality of metallic modular elements which can be associated to each other reciprocally and to the ground (12), the modular elements including a hollow bearing structure (13) associated with transverse stiffening ribs (21) and including, at the lower part and inside, pockets (15) to house the means (16) to anchor the barrier to the ground (12), the barrier being characterised in that the pockets (15) include, in the proximity of the supporting surface, a hollow chamber (23) cooperating with at least the upper part of the anchor means (16), the hollow chamber (23) being at least three times wider than the size of the anchor means (16).

2. Safety barrier as in Claim 1, in which the hollow chamber (23) cooperates wth elastic means (11) to dissipate the energy of the impact.

3. Safety barrier as in Claim 2, in which the elastic means (11) comprise an annular element surrounding the upper part of the anchor means (16).

4. Safety barrier as in any claim hereinbefore, in which the hollow chamber (23) is defined by the inner volume of a cylindrical pipe (24).

5. Safety barrier as in any claim hereinbefore, in which the portion of shell of the bearing structure (13) defined between two consecutive stiffening ribs (21) is raised above the level of the ground.

6. Safety barrier as in Claim 5, in which between the stiffening ribs (21) and the ground (12) there is a water-tight seal.

7. Safety barrier as in any claim hereinbefore, which adopts the contents of the description and the drawings.

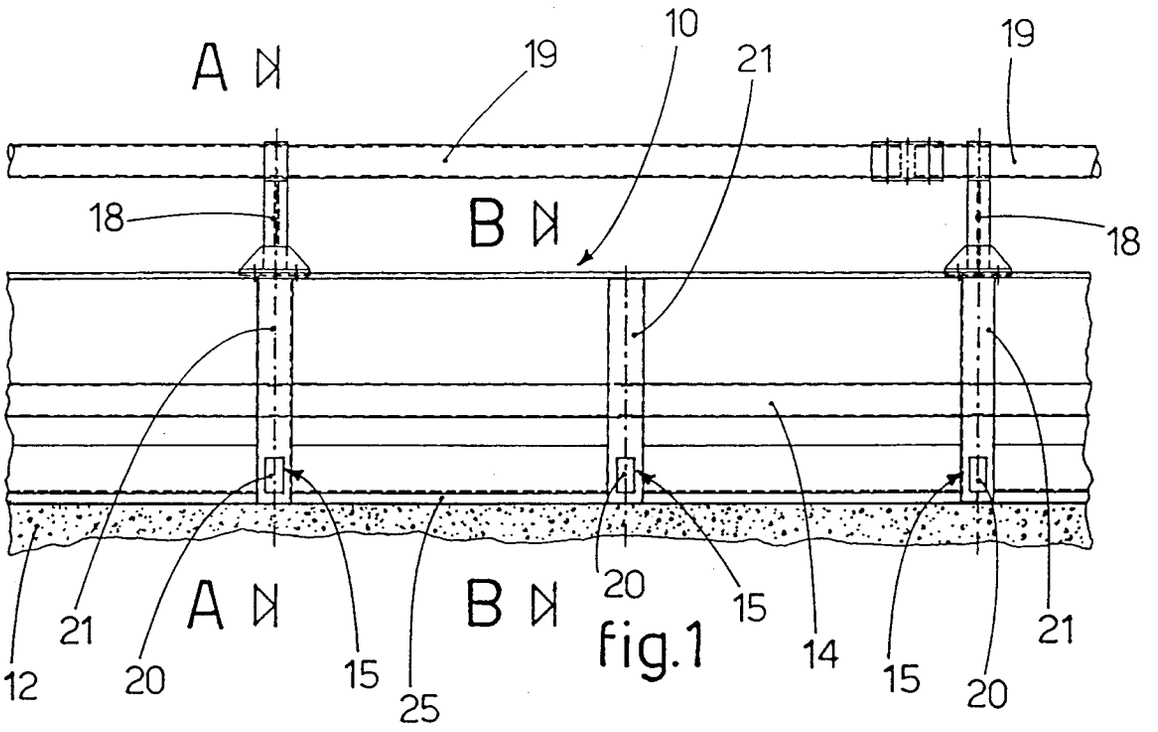
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fig.1

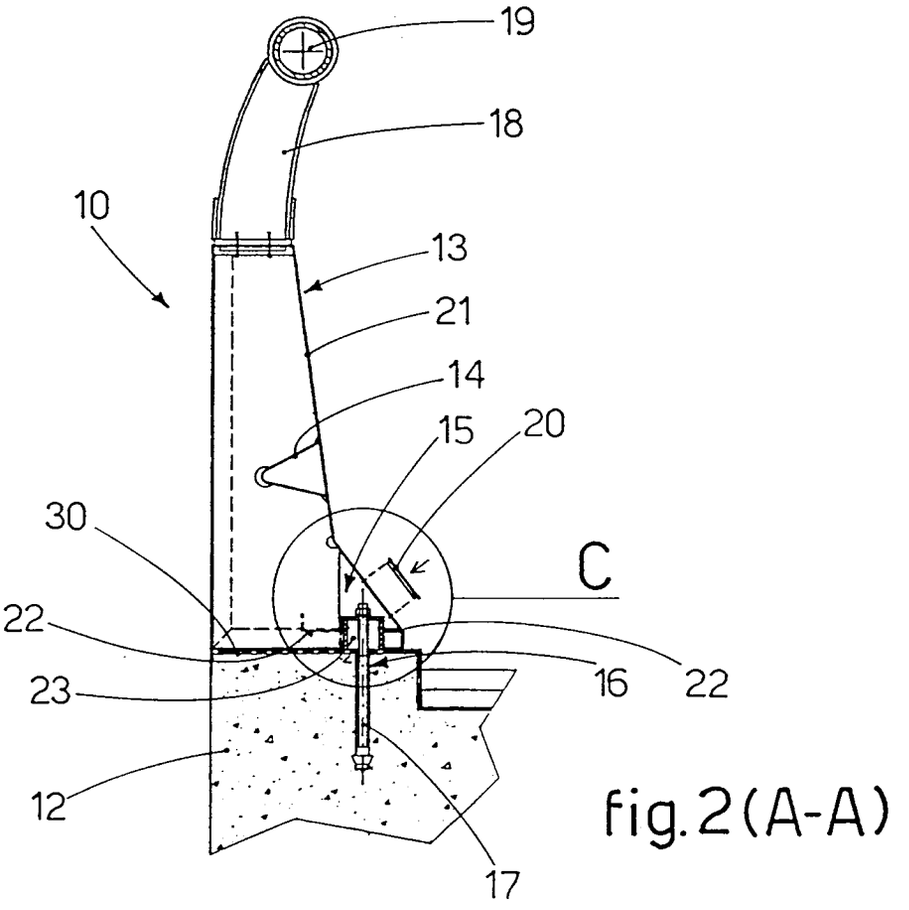
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fig.2(A-A)

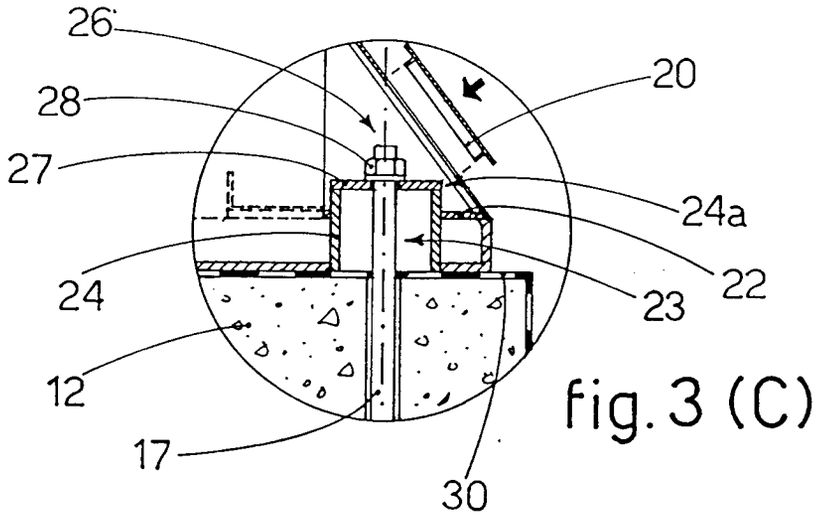

fig. 3 (C)

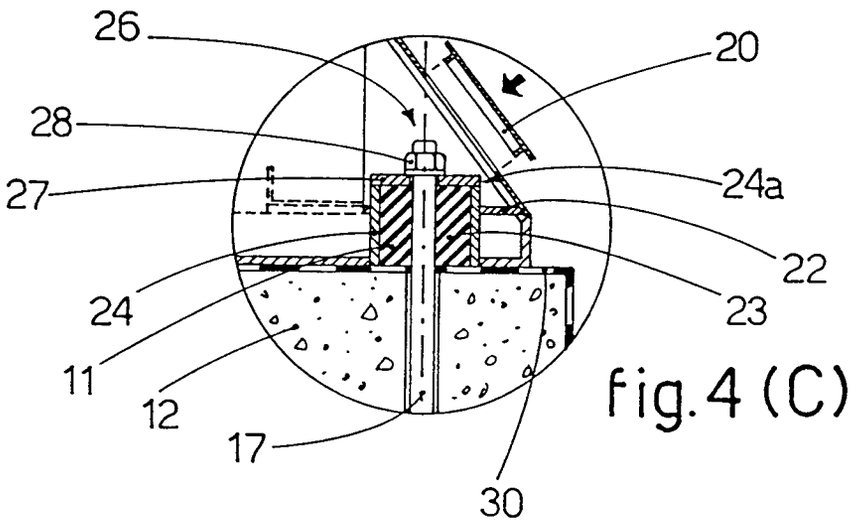

fig. 4 (C)

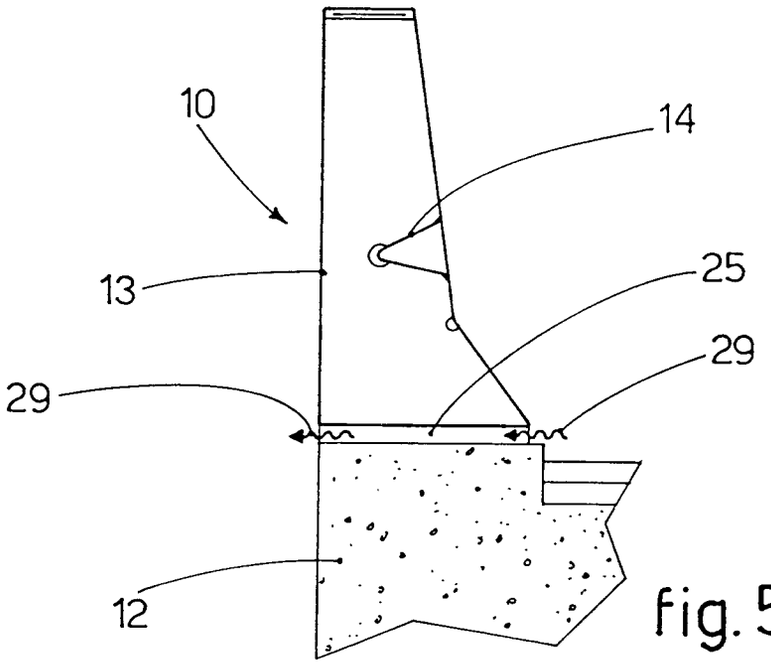

fig. 5 (B-B)

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 97 11 7925

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X	WO 95 03453 A (AUTOSTRADE CONC. & COSTRU.)	1,2,4,5, 7	E01F15/04 E01F15/08
Y	* page 7, line 16 - line 25 *	6	
A	* page 12, line 19 - line 28; figures *	3	
Y	PATENT ABSTRACTS OF JAPAN vol. 014, no. 407 (M-1019), 4 September 1990 & JP 02 157308 A (KYOKUTO KOGEN CONCRETE SHINKO KK), 18 June 1990,	6	
A	* abstract *	1,2,5	

TECHNICAL FIELDS SEARCHED (Int.Cl.6)

E01F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	29 January 1998	Verveer, D

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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