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(54) **ROAD GUARDRAIL WITH MOTORCYCLIST-PROTECTION BARRIER**

LEITPLANKE MIT MOTORRADFAHRERSCHUTZBARRIERE

GLISSIÈRE DE SÉCURITÉ ROUTIÈRE AVEC BARRIÈRE DE PROTECTION DE MOTOCYCLISTES

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Description

[0001] The present invention relates to an assembly comprising a road guardrail with a motorcyclist-protection barrier.

[0002] In recent years, more and more attention has been paid to the risks of motorcyclists when driving on the road.

[0003] An especially critical issue is related with the structure of traditional guardrails because said devices are mostly formed of a shaped metal ribbon supported by a plurality of strong metal posts at a certain height from the ground.

[0004] In case of fall from the motorcycle, the motorcyclist is likely to slide towards the guardrail, entering the narrow space comprised between the metal ribbon and the ground, with a high risk of severe injury because of the strong impact.

[0005] As a matter of fact, the impact and the compression may cause a severe trauma, especially in case of impact with one of the posts that support the guardrail.

[0006] In order to reduce the consequences of such a problem, guardrails have been provided with a second metal ribbon disposed in parallel position under the "main" first metal ribbon, substantially at the height of the ground, in order to close the free space where motorcyclists may enter in case of accident.

[0007] However, the motorcyclist-protection barriers of the prior art are empirical and unable to fully comply with the requirements of motorcyclists in terms of physical safety.

[0008] In fact, the impact surface with the motorcyclist's body is too rigid and totally unable to absorb the energy of the impact.

[0009] In other instances, guardrails have a front section provided with "sharp" ribs or fixing bolts with projecting heads that can violently penetrate the motorcyclist's body or helmet.

[0010] EP1455020 discloses a motorcyclist-protector barrier for a road guardrail comprising a bracket suitable for being fixed to a vertical post of a guardrail. Such a bracket comprises:

- a vertical upper portion suitable for being fixed to the post of the guardrail;
- a lower portion with "C"-shaped configuration suitable for embracing the post of the guardrail; and
- an intermediate portion for joining the vertical upper portion with the lower portion.

[0011] Said intermediate portion of the bracket has a substantially omega-shaped configuration that has elastic flexibility properties under compression, in such a way to absorb the energy of the impact of the motorcyclist's body because of its capability to be deformed as a bellows after such an impact.

[0012] However, because of a similar configuration of the intermediate portion of the bracket, the impact sur-

face of such a motorcyclist-protector barrier offers some resistance to flexural deformation.

[0013] IT MC20090071 A1 discloses an assembly comprising a road guardrail and a motorcyclist-protection barrier according to the preamble of claim 1.

[0014] The purpose of the present invention is to disclose a an assembly comprising a road guardrail and a motorcyclist-protection barrier suitable for being mounted on traditional guardrails and capable of solving all the aforementioned drawbacks of the prior art, reducing the risks of injury for motorcyclists who suffer a violent impact against said barrier.

[0015] In particular, the purpose of the present invention is to disclose an assembly comprising a road guardrail and a motorcyclist-protection barrier with a higher flexural deformation than the barriers of the prior art.

[0016] An additional purpose of the present invention is to disclose an assembly comprising a road guardrail and a motorcyclist-protection barrier provided with a progressively increasing flexural deformation.

[0017] The invention is defined by the features of claim 1

[0018] For the sake of clarity, the description of the invention continues with reference to the appended drawings, which have a merely illustrative, not limiting value, wherein:

- Fig. 1 is a partially exploded axonometric view that shows a section of a guardrail equipped with a motorcyclist-protection barrier;
- Fig. 2 is a side view of the motorcyclist-protection barrier and of the accessory means used to mount the motorcyclist-protection barrier in one of the posts of the guardrail;
- Fig. 3 is an axonometric view of a first embodiment of the laminated bracket used for mounting the motorcyclist-protection barrier;
- Fig. 4 is an axonometric view of a second embodiment of said laminated bracket;
- Fig. 5 is the same as Fig. 2, except for the fact that it refers to an alternative mounting solution of the motorcyclist-protection barrier.

[0019] With reference to the Figures, firstly, it must be noted that the motorcyclist-protection barrier (SM) is installed on traditional guardrails in the free space that is normally provided between the guardrail and the ground.

[0020] Reference is made to guardrails formed of multiple consecutive ribbon-like corrugated metal panels (G) supported in horizontal position by a plurality of vertical posts (P) fixed to the ground on the side of a carriageway.

[0021] With reference to said consolidated technology, it must be noted that the adjacent ends of two consecutive ribbon-like corrugated metal panels (G) are normally fixed on the surface of one of said posts (P).

[0022] The motorcyclist-protection barrier (SM) is obtained by sequentially mounting a plurality of ribbon-like panels (1) with an innovative corrugated profile; it being

provided that such a barrier (SM) is supported in the vertical posts (P) of the guardrail by means of innovative brackets (2).

[0023] With reference to Fig. 2, when seen in cross-section, said panel (1) has a broken line profile with three identical ribs (1a, 1b, 1c) disposed in the direction of the carriageway and alternated with two identical grooves (1d, 1e); it being provided that the profile of said ribs (1a, 1b, 1c) and of said grooves (1d, 1e) is an isosceles trapezium.

[0024] In particular, the consecutive sections of said broken line profile of the panel (1), which define said ribs (1a, 1b, 1c) and said grooves (1d, 1e), are configured in such a way to originate an identical obtuse angle, preferably an angle of 137° , between the two consecutive sections.

[0025] With reference to Fig. 2, it can be noted that:

- the upper rib (1a) is formed of a head section (1a'''), from the ends of which a first inclined wing (1a') and a second inclined wing (1a'') branch off in symmetrical position towards the back;
- the intermediate rib (1b) is formed of a head section (1b'''), from the ends of which a first inclined wing (1b') and a second inclined wing (1b'') branch off in symmetrical position towards the back;
- the lower rib (1c) formed of a head section (1c'''), from the ends of which a first inclined wing (1c') and a second inclined wing (1c'') branch off in symmetrical position towards the back;
- the first groove (1d) is formed of a bottom portion (1d') comprised between said second wing (1a'') of the upper rib (1a) and the first wing (1b') of the intermediate rib (1b);
- the second groove (1e) is formed of a bottom portion (1e') comprised between the second wing (1b'') of the intermediate rib (1b) and the first wing (1c') of the lower rib (1c).

[0026] Said ribbon-like panel (1) is provided in each one of its longitudinal ends with six slots with horizontal axis, namely:

- a first pair of slots (A1, A2) in horizontally aligned position is provided in said first wing (1a') of the upper rib (1a)
- a second pair of slots (A3, A4) is provided in symmetrical position relative to the first pair of slots (A1, A2) in said second wing (1c'') of the lower rib (1c)
- a first individual slot (A5) is provided on the bottom portion (1d') of the first groove (1d) in intermediate position between said two slots (A1, A2) of the pair provided in the first rib (1a)
- a second individual slot (A6) is provided on the bottom portion (1e') of the second groove (1e) in symmetrical position relative to the first individual slot (A5).

[0027] Moreover, it must be noted that although the preferred embodiment of said panel (1) is the one provided with said three ribs (1a, 1b, 1c) alternated with said two grooves (1e, 1d), an embodiment of said panel (1) with a different number of ribs, which are regularly alternated with said grooves, is possible.

[0028] Also in such a case, however, the upper rib is to be provided with said pair of slots (A1, A2) in correspondence of its first wing, whereas the lower rib is to be provided with said pair of slots (A3, A4) in correspondence of its second wing.

[0029] As mentioned, a specific metal bracket (2) has been devised for mounting the motorcyclist-protection barrier according to the invention (SM), said bracket (2) having an elastically flexible laminated structure provided with a shaped profile and suitable for being fixed on a vertical post (P) of the guardrail in the direction of the carriageway.

[0030] With reference to Fig. 2, when seen after installation in a sectional view with a longitudinal plane, said bracket (2) comprises a vertical upper portion (2a) suitable for being fixed to a vertical post (P) of a guardrail, and a lower portion (2c) inclined towards the center of the carriageway relative to the perpendicular by an angle (α_1). In particular, said lower portion (2c) of the bracket is suitable for being spaced from said post (P) and is elastically flexible, in such a way to act as a fit-in shelf.

[0031] The lower portion (2c) of the bracket (2) is joined at the base of the upper portion (2a) with the interposition of an intermediate section (2b) inclined towards the center of the carriageway relative to the perpendicular by an angle (α_2) higher than the inclination angle (α_1) of the lower portion (2c).

[0032] Because of such a configuration of the bracket (2), the motorcyclist-protection barrier according to the invention is capable of progressively withstanding the impact of a motorcyclist's body. In fact, after such an impact, the bracket (2) will initially offer a reduced resistance, immediately determining a high deformation of the lower portion (2c) of the bracket, and will successively offer a progressively higher resistance when the intermediate section (2b) of the bracket is deformed.

[0033] Said vertical upper portion (2a) is provided with means used for fixing the bracket (2) to a post (P), whereas said lower portion (2c) is provided with means used for fixing a motorcyclist-protection barrier (B), as illustrated below.

[0034] As shown in Fig. 3, in a first case, said means provided on the upper portion (2a) of the bracket (2) for fixing to the post (P) consist in a through hole (20) or alternately in a pair of through holes (21) in vertically aligned position (shown with a broken line); it being provided that all said holes (20, 21) are provided on the longitudinal central line of said upper portion (2a) of the bracket (2).

[0035] As shown in Fig. 4, in a second case, the means for fixing to a post (P) consist in a horizontal slot (22) that extends for half of the width of the upper portion (2a) of

the bracket (2) starting from one of the longitudinal edges.

[0036] The means for fixing said motorcyclist-protection barrier (SM) consist in two slots with vertical axis (23a, 23b) in aligned position in the longitudinal central line of the lower portion (2c) of the bracket (2).

[0037] After illustrating the configuration of said panel and of said bracket (1 and 2), their cooperating modes and advantages in terms of physical protection of a motorcyclist are described.

[0038] With reference to Fig. 2, it must be noted that the installation of the motorcyclist-protection barrier (SM) provides for mounting a bracket (2) on the front of each one of said traditional vertical posts (P).

[0039] To that end, the upper portion (2a) of said bracket (2) is fitted and fixed against the side of the post (P) facing the carriageway, in intermediate position between the vertical ending edges of two ribbon-like panels (G) of the traditional guardrail, which are suitable for being fixed on the post (P).

[0040] According to a preferred embodiment of the present invention, the fixing of said bracket (2) to the post (P) is obtained by means of a fixing bolt (B) with horizontal direction, which is capable of being sequentially inserted through said circular hole (20) provided on said upper portion (2a) of said bracket (2), and through a similar hole provided on the post (P) and for being finally locked in position by means of a tightening nut (D).

[0041] Successively, two consecutive ribbon-like corrugated panels (1) are fixed in said lower portion (2c) of the bracket (2).

[0042] In particular, as shown in Fig. 1, the end of a first ribbon-like corrugated panel (1) is fitted against said lower portion (2c) of the bracket (2); then, the end of a second ribbon-like corrugated panel (1) is exactly overlapped and finally the two panels (1) are stabilized and fixed on said bracket (2).

[0043] The two ribbon-like corrugated panels (1) are overlapped and fixed by means of a first pair of fixing bolts (B) and of a second pair of fixing bolts (B).

[0044] In particular, the first pair of said fixing bolts (B) is suitable for sequentially penetrating the first pairs of slots (A1, A2) of said two ribbon-like corrugated panels (1), when said first pairs (A1, A2) are exactly aligned, and for being firmly fixed by means of a pair of tightening nuts (D).

[0045] The second pair of said fixing bolts (B) is suitable for sequentially penetrating the second pairs of slots (A3, A4) of said two ribbon-like corrugated panels (1), when said second pairs are exactly aligned, and for being firmly fixed by means of a pair of tightening nuts (D).

[0046] Finally, the two ribbon-like corrugated panels (1) in overlapped position are fixed on the front of said lower portion (2c) of the bracket (2) by means of two additional fixing bolts (B), namely a first fixing bolt suitable for sequentially penetrating said first slots (A5) of the two overlapped panels (1) and the first slot (23a) provided on the lower portion (2c) of the bracket (2), and a second fixing bolt suitable for sequentially penetrating said sec-

ond individual slots (A6) of the two overlapped panels and the second slot (23b) provided on the lower portion (2c) of the bracket (2); it being finally provided that also said fixing bolts (B) are stabilized in said positions by means of tightening nuts (D).

[0047] Also in such a case, the enlarged heads of the six fixing bolts (B) used for mounting the motorcyclist-protection barrier (SM) do not project dangerously from the substantially vertical plane that contains the three head sections (1a'', 1b'', 1c'') of the ribs (1a, 1b, 1c).

[0048] Moreover, the provision of said two slots with vertical axis (23a, 23b) on the lower portion (2c) of the bracket (2) - instead of two circular holes - is justified by the fact that the provision of said slots with vertical axis (23a) permits to adjust the height of the motorcyclist-protection barrier (B) with respect to the ground.

[0049] Furthermore, the embodiment of the bracket (2) of Fig. 4, namely the one provided with said horizontal slot (22) in correspondence of its first portion (2a), can be mounted also on more traditional guardrails wherein one of the ribbon-like corrugated panels (G) is directly fixed on the front of the post (P) by means of a fixing bolt.

[0050] In such a case, for the installation of the bracket (2), it is simply necessary to loosen the fixing bolt in such a way to create a space between the ribbon-like corrugated panel (G) and the post (P), "discovering" an intermediate section of the threaded stem of the fixing bolt.

[0051] In view of the above, the upper portion (2a) of the bracket (2) can be inserted "laterally" between the ribbon-like corrugated panel (G) and the post (P), in such a way that said section of the threaded stem of the fixing bolt can be exactly inserted in said horizontal slot (22) of the bracket (2).

[0052] Naturally, after such an operation, the fixing bolt can be tightened again with its nut, in such a way to definitely lock the upper portion (2a) of the bracket (2) between the ribbon-like corrugated panel (G) and the post (P) that are brought again in mutual contact.

[0053] The advantages of the road guardrail with motorcyclist-protection barrier of the invention, which is obtained by assembling multiple panels and brackets (1 and 2), are described hereinafter.

[0054] Firstly, it must be noted that said motorcyclist-protection barrier (SM) can progressively absorb the energy of the impact of a motorcyclist's body because it is capable of gradually rotating backwards in a controlled way, in the direction of the posts (P) of the guardrail, because of the structure and the configuration of said brackets (2).

[0055] Moreover, it must be noted that said upper portion (2a) of each bracket (2) is firmly fixed against the front surface of a post (P), whereas the intermediate portion (2b) and the lower portion (2c), which is suitable for actually supporting the barrier (SM), are devoid of constraints.

[0056] Likewise, it must be noted that because of its laminated structure and elastic deformation property, the bracket (2) tends to operate like an elastic contrast ele-

ment with respect to the backward thrust exerted against the motorcyclist-protection barrier (SM), in correspondence of its two intermediate and lower portions (2b, 2c) that are devoid of constraints; it being also capable of generating a spontaneous return of the motorcyclist-protection barrier (SM) when the impact force ends.

[0057] In particular, said alternate "backward-forward" rotation of the motorcyclist-protection barrier (SM) is performed with respect to an axis of transverse rotation (x-x) parallel to the motorcyclist-protection barrier (SM), substantially disposed in the connection point between the upper portion (2a) and the intermediate portion (2b) of each bracket (2).

[0058] Advantageous characteristics of the invention are the result of the special structure and configuration of said ribbon-like corrugated panel (1) used for the motorcyclist-protection barrier (SM).

[0059] Advantageously, the sectional profile of said panel (1) favors the non-traumatic guided sliding movement of the helmet of the motorcyclist who hits the barrier with a non-perpendicular impact angle, along said barrier (SM).

[0060] It can be otherwise said that, in such a case, the convex profile of the helmet tends to "be inserted" in the concave profile of either one of said grooves (1d, 1e) of the ribbon-like corrugated panel (1), thus preventing an uncontrolled movement of the helmet, and consequently of the motorcyclist's head, and avoiding an excessive stress for the neck and head vertebral joint.

[0061] More precisely, because of the specific geometry of the ribbon-like corrugated panel (1), the moment of inertia (J_y) of the panel (1), with respect to its neutral vertical axis y, is especially capable of combining resistance and deformation, thus improving safety, by using a steel sheet for the building industry (with minimum yield strength $R_{e_{min}} = 350$ Mpa) with 1 mm thickness.

[0062] Because of the low thickness of the steel sheet, on one hand, the ribbon-like corrugated panel (1) is especially lightweight (with a considerable saving on production costs) and, on the other hand, it can be obtained with continuous hot galvanized sheet metal, without the need for an additional hot galvanizing treatment to increase protection against corrosion.

[0063] Moreover, because of its geometry, the ribbon-like corrugated panel (1) suffers a plastic deformation in the point of impact with the motorcyclist that tends to flatten and compress the surface of the panel (1), thus increasing the surface and, most of all, the vertical height, with the double effect of restraining the motorcyclist's body and additionally closing all passages between the lower edge of the motorcyclist-protection barrier (SM) and the ground.

[0064] As mentioned, the additional advantage of the sectional profile of the ribbon-like corrugated panel (1) is related with the fact that the bolts used for fixing the two panels (1) in overlapped position to the lower portion (2c) of the bracket (2) are not inserted in the top of one of said three ribs (1a, 1b, 1c), that is to say in a position wherein

the heads of said bolts would project from the impact surface of the panel (1), with the risk of creating dangerous "point-like" traumas of the motorcyclist's body.

[0065] With reference to Fig. 2, it must be noted that the heads of the two fixing bolts (B) used for fixing the two overlapped panels (1) are disposed in non-frontal positions, whereas the heads of the two fixing bolts (B) used for fixing the motorcyclist-protection barrier (SM) to the brackets (2) are disposed on the bottom of the grooves (1d, 1e).

[0066] Finally, with reference to Fig. 5, it must be noted that the road guardrail with motorcyclist-protection barrier according to the invention (SM) can be also mounted in a different way.

[0067] According to such a solution, a traditional spacer (DS) for guardrails is mounted on the front of said bracket (2), which is already disposed against the post (P), said spacer (DS) being of the type used when the ribbon-like corrugated panels (G) of the guardrail are disposed in forward position, instead of being directly fixed to said post (P).

[0068] In such a case, the bracket (2) is fixed to the post (P) by means of the same pair of fixing bolts (B) in vertically aligned position used to fix the spacer (DS) to the post (P).

[0069] For such a case, it is necessary to use the embodiment of the bracket (2) provided in the upper portion (2a) with said pair of holes (21) in vertically aligned position, suitable for being crossed by the same pair of fixing bolts used for fixing the spacer (DS) with the front surface of the post (P). Alternatively, a bracket (2) such as the one of Fig. 4 may be used, as long as it is provided with two slots (22) disposed at a different height.

[0070] In such a case, the bracket (2) must be "laterally" inserted between the spacer (DS) and the post (P), in such a way that said slots (22) receive the threaded stems of the two fixing bolts (B) used for fixing the spacer (DS) with the post (P).

Claims

1. Road guardrail with motorcyclist-protection barrier; wherein said road guardrail comprises:

- a plurality of vertical posts (P) fixed to the ground on the side of a carriageway, and
- multiple consecutive ribbon-like corrugated metal panels (G) supported in horizontal position by said plurality of vertical posts (P); and said motorcyclist-protection barrier (SM) comprises:
 - a bracket (2) comprising an upper portion (2a), and a lower portion (2c) that is inclined by an angle (α_1) relative to the perpendicular and acts as a shelf; said lower portion (2c) of the bracket (2) being elastically flexible and spaced from said post (P); said lower portion (2c) being pro-

vided with one or more slots (23a, 23b);
 - two ribbon-like corrugated panels (1) suitable for being mounted in a horizontal sequence together with identical panels, said ribbon-like corrugated panels (1) being provided in cross-section with a broken line profile formed of multiple ribs (1a, 1b, 1c) that are directed towards the center of the carriageway and alternated with grooves (1d, 1e); wherein said panels (1) are provided at each longitudinal end with upper and lower openings (A1, A2, A3, A4) for the insertion of fixing bolts (B) fixing a said panel (1) to the end of the other identical panel, and with intermediate openings (A5, A6) for the insertion of fixing bolts (B) fixing said two panels (1) in overlapped position in said slots (23a, 23b) provided on the lower portion (2c) of said bracket (2); wherein said intermediate openings (A5, A6) for the insertion of fixing bolts (B) are disposed in said corrugated panels (1) in such a position that the heads of said fixing bolts (B) inserted in said intermediate openings (A5, A6) are not disposed in forward position in the direction of the carriageway with respect to said ribs (1a, 1b, 1c) of the corrugated panels;

characterized in that

the upper portion (2a) of the bracket (2) is disposed in contact and fixed to said vertical post (P) of the road guardrail;
 said ribs (1a, 1b, 1c) and said grooves (1d, 1e) of the corrugated panels have a profile of an isosceles trapezium with obtuse angles;
 said upper and lower erreh openings (A1, A2, A3, A4) for the insertion of fixing bolts (B) are disposed in said corrugated panels (1) in such a position that the heads of said fixing bolts (B) inserted in said end openings (A1, A2, A3, A4) are not disposed in forward position in the direction of the carriageway with respect to said ribs (1a, 1b, 1c) of the corrugated panels.

2. The road guardrail and motorcyclist-protection barrier assembly of claim 1, wherein said upper portion (2a) of the bracket (2) is provided with fixing means (20, 21, 22) for fixing to the vertical post (P) of the guardrail.

3. The road guardrail and motorcyclist-protection barrier assembly of claim 1 or 2, wherein said ribbon-like corrugated panels (1) comprise:

- an upper rib (1a) formed of a head section (1a'''), from the ends of which a first inclined wing (1a') and a second inclined wing (1a'') branch off in symmetrical position towards the back;
 - an intermediate rib (1b) formed of a head sec-

tion (1b'''), from the ends of which a first inclined wing (1b') and a second inclined wing (1b'') branch off in symmetrical position towards the back;

- a lower rib (1c) formed of a head section (1c'''), from the ends of which a first inclined wing (1c') and a second inclined wing (1c'') branch off in symmetrical position towards the back;

- a first groove (1d) formed of a bottom portion (1d') comprised between said second wing (1a'') of the upper rib (1a) and the first wing (1b') of the intermediate rib (1b);

- a second groove (1e) formed of a bottom portion (1e') comprised between the second wing (1b'') of the intermediate rib (1b) and the first wing (1c') of the lower rib (1c).

4. The road guardrail and motorcyclist-protection barrier assembly according to one of the preceding claims:

- wherein said upper and lower openings (A1, A2, A3, A4) provided on the corrugated panels (1) for the insertion of fixing bolts (B) for fixing to a similar panel (1) consist in:

- a first pair of slots (A1, A2) that are horizontally aligned and provided in said first wing (1a') of the upper rib (1a)
- a second pair of identical slots (A3, A4) in symmetrical position relative to the first pair of slots (A1, A2), which are provided in said second wing (1c'') of the lower rib (1c)

- and wherein said intermediate openings (A5, A6) provided on the corrugated panel (1) for the insertion of fixing bolts (B) for fixing to the lower portion (2c) of said bracket (2) consist in:

- a first individual slot (A5) provided on the bottom portion (1d') of the first groove (1d) in intermediate position between said two slots (A1, A2) of the pair that is obtained in the first rib (1a)
- a second individual slot (A6) provided on the bottom portion (1e') of the second groove (1e) in symmetrical position relative to the position of the first individual slot (A5).

5. The road guardrail and motorcyclist-protection barrier assembly according to one of the preceding claims, wherein the amplitude of the obtuse angles in the isosceles trapezium profile of said ribs (1a, 1b, 1c) and of the grooves (1d, 1e) of said ribbon-like corrugated panel (1) is 137°.

6. The Road guardrail and motorcyclist-protection barrier assembly according to one of the preceding

claims, wherein said ribbon-like corrugated panel (1) is made with a sheet steel having a thickness of 1 mm and a minimum yield strength of $Re_{min} = 350$ Mpa.

7. The Road guardrail and motorcyclist-protection barrier assembly according to one of the preceding claims, wherein said lower portion (2c) of the bracket (2) is joined at the base of said upper portion (2a) with the interposition of an intermediate portion (2b); wherein said lower portion (2c) is inclined towards the center of the carriageway and the intermediate portion (2b) is inclined with respect to the perpendicular, towards the center of the carriageway, by an angle (α_2) with higher amplitude than the inclination angle (α_1) of the lower portion (2c).
8. The Road guardrail and motorcyclist-protection barrier assembly according to any one of claims 2 to 7, wherein said fixing means used for fixing to the post (P) provided in the upper portion (2a) of the bracket (2) consist in a slot with horizontal axis (22) that cuts said upper portion (2a) for approximately half of its width starting from one of the longitudinal edges.
9. The Road guardrail and motorcyclist-protection barrier assembly according to any one of claims 2 to 7, wherein said fixing means used for fixing to the post (P) provided in the upper portion (2a) of the bracket (2) consists in a circular hole (20) obtained in the longitudinal center line of said upper portion (2a).
10. The Road guardrail and motorcyclist-protection barrier assembly according to any one of claims 2 to 7, wherein said fixing means used for fixing to the post (P) provided in the upper portion (2a) of the bracket (2) consists in a pair of circular holes (21) that are vertically aligned along the longitudinal center line of said upper portion (2a).
11. The Road guardrail and motorcyclist-protection barrier assembly according to one of the preceding claims, wherein said openings for the insertion of fixing bolts (B) provided in said lower portion (2c) of the bracket (2) consist in a pair of slots with vertical axis (23a, 23b) aligned along the longitudinal center line of said lower portion (2c).

Patentansprüche

1. Leitplanke mit Schutzbarriere für Motorradfahrer;

wobei die Leitplanke Folgendes umfasst:

- eine Vielzahl von vertikalen Pfosten (P), die an den Rändern einer Fahrbahn am Boden befestigt sind, und

- mehrere aufeinanderfolgende, bandförmige, gewellte Metallplatten (G), die durch eine Vielzahl von vertikalen Pfosten (P) in horizontaler Position gehalten werden; und

die Schutzbarriere für Motorradfahrer (SM) umfasst:

- einen Träger (2), der einen oberen Abschnitt (2a) und einen unteren Abschnitt (2c) umfasst, der in einem Winkel (α_1) in Bezug auf die Vertikale geneigt ist und als Konsole fungiert; wobei der untere Abschnitt (2c) des Trägers (2) elastisch flexibel ist und von dem Pfosten (P) beabstandet ist; wobei der untere Abschnitt (2c) mit einem oder mehreren Schlitzen (23a, 23b) versehen ist;

zwei bandförmige gewellte Platten (1), die dazu geeignet sind, in einer horizontalen Sequenz zusammen mit identischen Platten montiert zu werden, wobei die bandförmigen gewellten Platten (1) im Querschnitt gesehen mit einem unterbrochenen Linienprofil versehen sind, das aus mehreren Rippen (1a, 1b, 1c) gebildet ist, die zur Mitte der Fahrbahn gerichtet sind und sich mit Nuten (1d, 1e) abwechseln; wobei die Platten (1) an jedem längslaufenden Ende mit oberen und unteren Öffnungen (A1, A2, A3, A4) zum Einstecken von Befestigungsbolzen (B) zur Befestigung der Platte (1) an dem Ende der anderen identischen Platte und mit Zwischenöffnungen (A5, A6) zum Einstecken der Befestigungsbolzen (B) zur Befestigung der zwei Platten (1) in überlappender Position in den Schlitzen (23a, 23b) versehen sind, die im unteren Abschnitt (2c) des Trägers (2) vorgesehen sind; wobei die Zwischenöffnungen (A5, A6) zum Einstecken der Befestigungsbolzen (B) in den gewellten Platten (1) in einer Position so angeordnet sind, dass die Köpfe der Befestigungsbolzen (B), die in den Zwischenöffnungen (A5, A6) eingesteckt sind, in Bezug auf die Rippen (1a, 1b, 1c) der gewellten Platten nicht in einer in Fahrtrichtung weiter vorgeschobenen Position angeordnet sind;

dadurch gekennzeichnet, dass

der obere Abschnitt (2a) des Trägers (2) im Kontakt mit dem vertikalen Pfosten (P) der Leitplanke angeordnet und befestigt ist, die Rippen (1a, 1b, 1c) und die Nuten (1d, 1e) der gewellten Platten ein stumpfwinkliges, gleichschenkliges Trapezprofil aufweisen; wobei die oberen und unteren Öffnungen (A1, A2, A3, A4) zum Einstecken der Befestigungsbolzen (B) in den gewellten Platten (1) in einer Position so angeordnet sind, dass die Köpfe der

- Befestigungsbolzen (B), die in den Endöffnungen (A1, A2, A3, A4) eingesteckt sind, in Bezug auf die Rippen (1a, 1b, 1c) der gewellten Platten nicht in einer in Fahrbahnrichtung weiter vorgeschobenen Position angeordnet sind. 5
2. Anordnung aus Leitplanke mit Schutzbarriere für Motorradfahrer nach Anspruch 1, wobei der obere Abschnitt (2a) des Trägers (2) mit Befestigungsmitteln (20, 21, 22) zur Befestigung an dem vertikalen Pfosten (P) der Leitplanke versehen ist. 10
3. Anordnung aus Leitplanke mit Schutzbarriere für Motorradfahrer nach Anspruch 1 oder 2, wobei die bandförmigen gewellten Platten (1) Folgendes umfassen: 15
- eine obere Rippe (1a), die aus einem Kopfabschnitt (1a'') gebildet ist, aus dessen Enden sich ein erster geneigter Flügel (1a') und ein zweiter geneigter Flügel (1a'') in zueinander symmetrischer Position nach hinten abzweigen; 20
 - eine Zwischenrippe (1b), die aus einem Kopfabschnitt (1b'') gebildet ist, aus dessen Enden ein erster geneigter Flügel (1b') und ein zweiter geneigter Flügel (1b'') in zueinander symmetrischer Position nach hinten abzweigen; 25
 - eine untere Rippe (1c), die aus einem Kopfabschnitt (1c'') gebildet ist, aus dessen Enden ein erster geneigter Flügel (1c') und ein zweiter geneigter Flügel (1c'') in zueinander symmetrischer Position nach hinten abzweigen; 30
 - eine erste Nut (1d), die aus einem Bodenabschnitt (1d') gebildet ist, der sich zwischen dem zweiten Flügel (1a'') der oberen Rippe (1a) und dem ersten Flügel (1b') der Zwischenrippe (1b) befindet; 35
 - eine zweite Nut (1e), die aus einem Bodenabschnitt (1e') gebildet ist, der sich zwischen dem zweiten Flügel (1b'') der Zwischenrippe (1b) und dem ersten Flügel (1c') der unteren Rippe (1c) befindet. 40
4. Anordnung aus Leitplanke mit Schutzbarriere für Motorradfahrer nach einem der vorstehenden Ansprüche: 45
- wobei die oberen und unteren Öffnungen (A1, A2, A3, A4), die auf den gewellten Platten (1) zum Einstecken der Befestigungsbolzen (B) zur Befestigung einer ähnlichen Platte (1) vorgesehen sind, aus Folgendem bestehen: 50
 - einem ersten Paar von horizontal ausgerichteten Schlitzten (A1, A2), das an dem ersten Flügel (1a') der oberen Rippe (1a) vorgesehen ist, 55
 - einem zweiten Paar von identischen
- Schlitzten (A3, A4) in symmetrischer Position in Bezug auf das erste Paar von Schlitzten (A1, A2), das an dem zweiten Flügel (1c'') der unteren Rippe (1c) vorgesehen ist,
- und wobei die Zwischenöffnungen (A5, A6), die auf der gewellten Platte (1) zum Einstecken der Befestigungsbolzen (B) zur Befestigung des unteren Abschnitts (2c) des Trägers (2) vorgesehen sind, aus Folgendem bestehen:
- einem ersten Einzelschlitz (A5), der auf dem Bodenabschnitt (1d') der ersten Nut (1d) in einer Zwischenposition zwischen den zwei Schlitzten (A1, A2) des Paares vorgesehen ist, das an der ersten Rippe (1a) erhalten ist
 - einem zweiten Einzelschlitz (A6), der auf dem Bodenabschnitt (1e') der zweiten Nut (1e) in symmetrischer Position in Bezug auf die Position des ersten Einzelschlitzes (A5) vorgesehen ist.
5. Anordnung aus Leitplanke mit Schutzbarriere für Motorradfahrer nach einem der vorstehenden Ansprüche, wobei die Breite der stumpfen Winkel in dem gleichschenkligen Trapezprofil der Rippen (1a, 1b, 1c) und der Nuten (1d, 1e) der bandförmigen gewellten Platte (1) 137° beträgt.
6. Anordnung aus Leitplanke mit Schutzbarriere für Motorradfahrer nach einem der vorstehenden Ansprüche, wobei die bandförmige gewellte Platte (1) aus einem Stahlblech mit einer Dicke von 1 mm und einer Mindeststreckgrenze von $R_{e_{min}} = 350$ Mpa hergestellt ist.
7. Anordnung aus Leitplanke mit Schutzbarriere für Motorradfahrer nach einem der vorstehenden Ansprüche, wobei der untere Abschnitt (2c) des Trägers (2) an der Basis des oberen Abschnitts (2a) unter Einfügung eines Zwischenabschnitts (2b) verbunden ist; wobei der untere Abschnitt (2c) zur Mitte der Fahrbahn geneigt ist und der Zwischenabschnitt (2b) in Bezug auf die Vertikale zur Mitte der Fahrbahn in einem Winkel (α_2) geneigt ist, der eine größere Breite als der Neigungswinkel (α_1) des unteren Abschnitts (2c) aufweist.
8. Anordnung aus Leitplanke mit Schutzbarriere für Motorradfahrer nach einem der Ansprüche 2 bis 7, wobei die Befestigungsmittel zur Befestigung an dem Pfosten (P), der in dem oberen Abschnitt (2a) des Trägers (2) vorgesehen ist, aus einem Schlitz mit horizontaler Achse (22) bestehen, der den oberen Abschnitt (2a) ungefähr über die Hälfte seiner Breite, ausgehend von einer der Längskanten schneidet.

9. Anordnung aus Leitplanke mit Schutzbarriere für Motorradfahrer nach einem der Ansprüche 2 bis 7, wobei die Befestigungsmittel zur Befestigung an dem Pfosten (P), der in dem oberen Abschnitt (2a) des Trägers (2) vorgesehen ist, aus einem kreisförmigen Loch (20) bestehen, das auf der längslaufenden Mittellinie des oberen Abschnitts (2a) erhalten ist. 5
10. Anordnung aus Leitplanke mit Schutzbarriere für Motorradfahrer nach einem der Ansprüche 2 bis 7, wobei die Befestigungsmittel zur Befestigung an dem Pfosten (P), der an dem oberen Abschnitt (2a) des Trägers (2) vorgesehen ist, aus einem Paar von kreisförmigen Löchern (21) bestehen, die vertikal entlang der längslaufenden Mittellinie des oberen Abschnitts (2a) ausgerichtet sind. 10 15
11. Anordnung aus Leitplanke mit Schutzbarriere für Motorradfahrer nach einem der vorstehenden Ansprüche, wobei die Öffnungen zum Einstecken der Befestigungsbolzen (B), die in dem unteren Abschnitt (2c) des Trägers (2) vorgesehen sind, aus einem Paar von Schlitzfenstern mit vertikaler Achse (23a, 23b) bestehen, die entlang der längslaufenden Mittellinie des unteren Abschnitts (2c) ausgerichtet sind. 20 25

Revendications 30

1. Glissière de sécurité avec barrière de protection pour motocyclistes ; 30
- où ladite glissière de sécurité comprend : 35
- une pluralité de poteaux verticaux (P) fixés au sol aux bords d'une chaussée ;
 - plusieurs panneaux métalliques en forme de ruban ondulé (G) consécutifs, soutenus en position horizontale par ladite pluralité de poteaux verticaux (P) ; et 40
- ladite barrière de protection pour motocyclistes (SM) comprend : 45
- une bride (2) comprenant un segment supérieur (2a) et un segment inférieur (2c), qui est incliné par rapport à la verticale d'un angle (α_1) et fonctionnant en tant que tablette ; 50
 - ledit segment inférieur (2c) de la bride (2) étant flexible de manière élastique et éloigné du susdit poteau (P) ; ledit segment inférieur (2c) étant doté d'une ou de plusieurs ouvertures (23a, 23b) ; 55
 - deux panneaux en forme de ruban ondulé (1), aptes à être mis en oeuvre avec des panneaux identiques dans une séquence

horizontale, lesdits panneaux en forme de ruban ondulé (1) adoptant, si vus en section transversale, un profil en ligne brisée formé de plusieurs nervures (1a, 1b, 1c) orientées vers le centre de la chaussée et alternées à des rainures (1d, 1e) ; où lesdits panneaux (1) présentent, en correspondance de chaque extrémité longitudinale, des ouvertures supérieures et inférieures (A1, A2, A3, A4) pour l'introduction de boulons de fixation (B) pour la fixation dudit panneau (1) avec l'extrémité de l'autre panneau identique, et des ouvertures intermédiaires (A5, A6) pour l'introduction de boulons de fixation (B), pour la fixation des deux panneaux (1) superposés, dans les ouvertures (23a, 23b) prévues sur le segment inférieur (2c) de ladite bride (2) ;

où lesdites ouvertures intermédiaires (A5, A6) pour l'introduction de boulons de fixation (B) sont disposées, dans lesdits panneaux en forme de ruban ondulé (1), sur une position telle que les têtes des susdits boulons de fixation (B) enfilées dans lesdites ouvertures intermédiaires (A5, A6) n'occupent pas, par rapport aux susdites nervures (1a, 1b, 1c) des panneaux en forme de ruban ondulé, une position en saillie dans la direction de la chaussée ;

caractérisée en ce que

le segment supérieur (2a) de la bride (2) est disposé en adhérence et fixé au dit poteau vertical (P) de la glissière de sécurité, lesdites nervures (1a, 1b, 1c) et lesdites rainures (1d, 1e) des panneaux ondulés ont un profil en forme de trapèze isocèle avec des angles obtus ; lesdites ouvertures supérieures et inférieures (A1, A2, A3, A4) pour l'introduction de boulons de fixation (B) sont disposées dans lesdits panneaux ondulés (1) sur une position telle que les têtes des susdits boulons de fixation (B) enfilées dans lesdites ouvertures d'extrémité (A1, A2, A3, A4) n'occupent pas, par rapport aux susdites nervures (1a, 1b, 1c) des panneaux ondulés, une position en saillie dans la direction de la chaussée.

2. Ensemble glissière de sécurité et barrière de protection pour motocyclistes selon la revendication 1, où ledit segment supérieur (2a) de la bride (2) est doté de moyens de fixation (20, 21, 22) pour la fixation au poteau vertical (P) de la glissière de sécurité.
3. Ensemble glissière de sécurité et barrière de protection pour motocyclistes selon la revendication 1 ou 2, où lesdits panneaux en forme de ruban ondulé (1) comprennent :

- une nervure supérieure (1a) formée d'une section de tête (1a''), des extrémités de laquelle se déploient vers l'arrière une première aile inclinée (1a') et une seconde aile inclinée (1a''), symétriques entre elles ;
 - une nervure intermédiaire (1b) formée d'une section de tête (1b''), des extrémités de laquelle se déploient vers l'arrière une première aile inclinée (1b') et une seconde aile inclinée (1b''), symétriques entre elles ;
 - une nervure inférieure (1c) formée d'une section de tête (1c''), des extrémités de laquelle se déploient vers l'arrière une première aile inclinée (1c') et une seconde aile inclinée (1c''), symétriques entre elles ;
 - une première rainure (1d) formée d'une section de fond (1d') comprise entre la susdite seconde aile (1a'') de la nervure supérieure (1a) et la première aile (1b') de la nervure intermédiaire (1b) ;
 - une seconde rainure (1e) formée d'une section de fond (1e') comprise entre la susdite seconde aile (1b'') de la nervure intermédiaire (1b) et la première aile (1c') de la nervure inférieure (1c).
4. Ensemble glissière de sécurité et barrière de protection pour motocyclistes selon l'une des revendications précédentes :
- où lesdites ouvertures supérieures et inférieures (A1, A2, A3, A4) prévues sur les panneaux ondulés (1) pour l'introduction de boulons de fixation (B) pour la fixation à un panneau analogue (1) consistent en :
 - une première paire de ces fentes (A1, A2) alignées horizontalement, prévue en correspondance de la susdite première aile (1a') de la nervure supérieure (1a),
 - une seconde paire de fentes identiques (A3, A4), symétrique à la première paire (A1, A2), prévue en correspondance de la susdite seconde aile (1c'') de la nervure inférieure (1c),
 - et où lesdites ouvertures intermédiaires (A5, A6) adoptées sur le panneau ondulé (1) pour l'introduction de boulons de fixation (B) pour la fixation au segment inférieur (2c) de ladite bride (2) consistent en :
 - une première fente individuelle (A5) prévue sur la section de fond (1d') de la première rainure (1d) en position intermédiaire aux deux susdites fentes (A1, A2) de la paire réalisée en correspondance de la première nervure (1a)
 - une seconde fente individuelle (A6) prévue sur la section de fond (1e') de la seconde rainure (1e) en position symétrique à celle de la susdite première fente individuelle (A5).
5. Ensemble glissière de sécurité et barrière de protection pour motocyclistes selon l'une des revendications précédentes, où l'amplitude des angles obtus au sein du profilé à trapèze isocèle adopté par les susdites nervures (1a, 1b, 1c) et rainures (1d, 1e) du susdit panneau en forme de ruban ondulé (1) est de 137°.
6. Ensemble glissière de sécurité et barrière de protection pour motocyclistes selon l'une des revendications précédentes, où le susdit panneau en forme de ruban ondulé (1) est réalisé avec une tôle en acier d'une épaisseur de 1 mm et une limite d'épuisement minimum de $Re_{min} = 350$ Mpa.
7. Ensemble glissière de sécurité et barrière de protection pour motocyclistes selon l'une des revendications précédentes, où le susdit segment inférieur (2c) de la bride (2) est relié à la base du susdit segment supérieur (2a) avec l'interposition d'un segment intermédiaire (2b) ; où le susdit segment inférieur (2c) est incliné vers le centre de la chaussée et le segment intermédiaire (2b) est incliné par rapport à la verticale, vers le centre de la chaussée, d'un angle (α_2) ayant une amplitude majeure par rapport à l'amplitude de l'angle (α_1) d'inclinaison du segment inférieur (2c).
8. Ensemble glissière de sécurité et barrière de protection pour motocyclistes selon l'une quelconque des revendications de 2 à 7, où le susdit moyen de fixation au poteau correspondant (P) prévu en correspondance du segment supérieur (2a) de la bride (2) consiste en une fente ayant axe horizontal (22) qui coupe ledit segment supérieur (2a) pour environ la moitié de sa largeur à partir d'un des bords longitudinaux.
9. Ensemble glissière de sécurité et barrière de protection pour motocyclistes selon l'une quelconque des revendications de 2 à 7, où le susdit moyen de fixation au poteau correspondant (P) prévu en correspondance du segment supérieur (2a) de la bride (2) consiste en un trou circulaire (20) réalisé au centre de la ligne longitudinale du susdit segment supérieur (2a).
10. Ensemble glissière de sécurité et barrière de protection pour motocyclistes selon l'une quelconque des revendications de 2 à 7, où le susdit moyen de fixation au poteau correspondant (P) prévu en correspondance du segment supérieur (2a) de la bride (2) consiste en une paire de trous circulaires (21) alignés à la verticale le long du centre de la ligne lon-

gitudinale du susdit segment supérieur (2a).

11. Ensemble glissière de sécurité et barrière de protection pour motocyclistes selon l'une des revendications précédentes, où les susdites ouvertures pour la pose en oeuvre de boulons (B) prévues en correspondance du susdit segment inférieur (2c) de la bride (2) consistent en une paire de fentes ayant axe vertical (23a, 23b) alignées le long du centre de la ligne longitudinale du susdit segment inférieur (2c).

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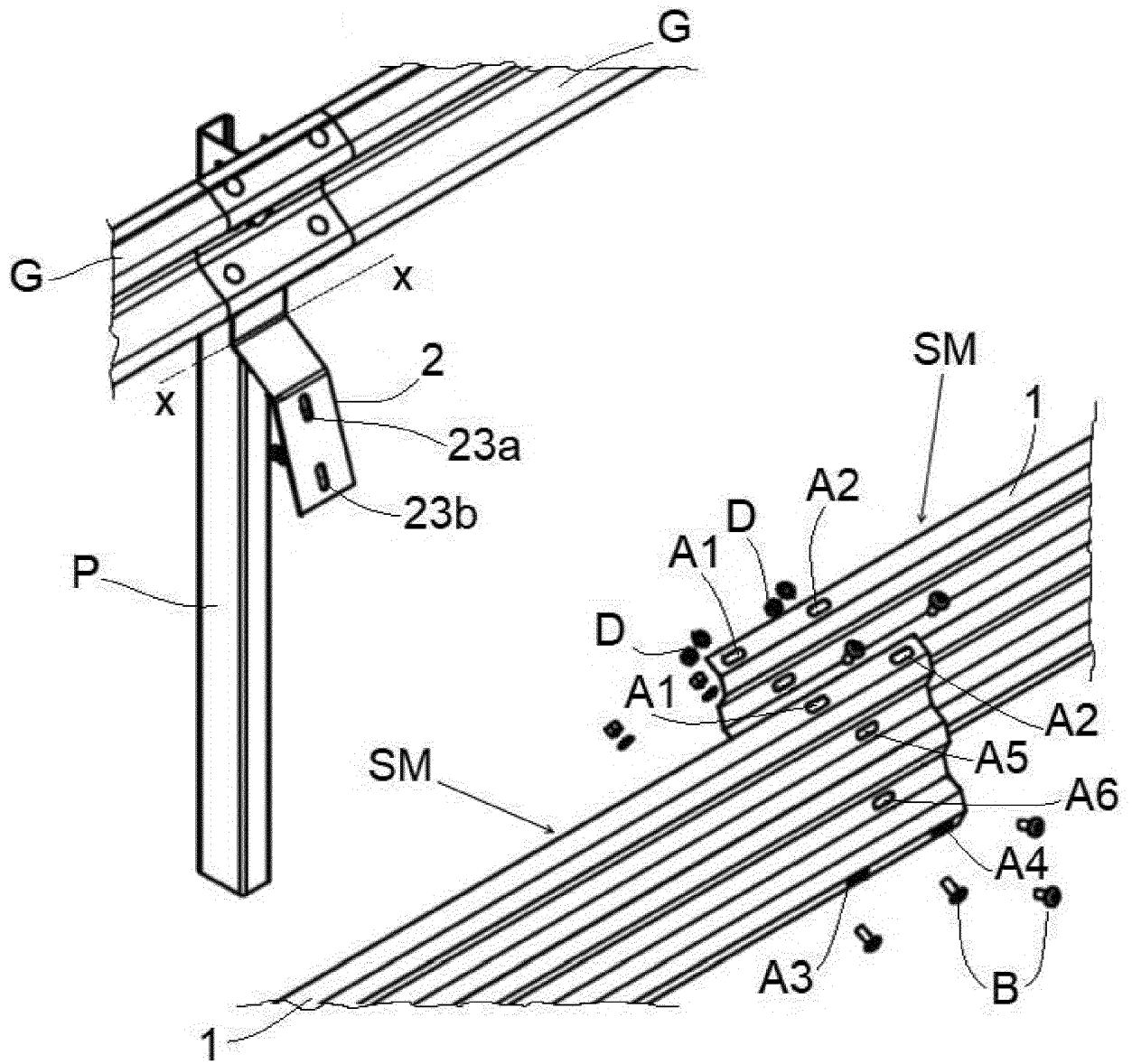
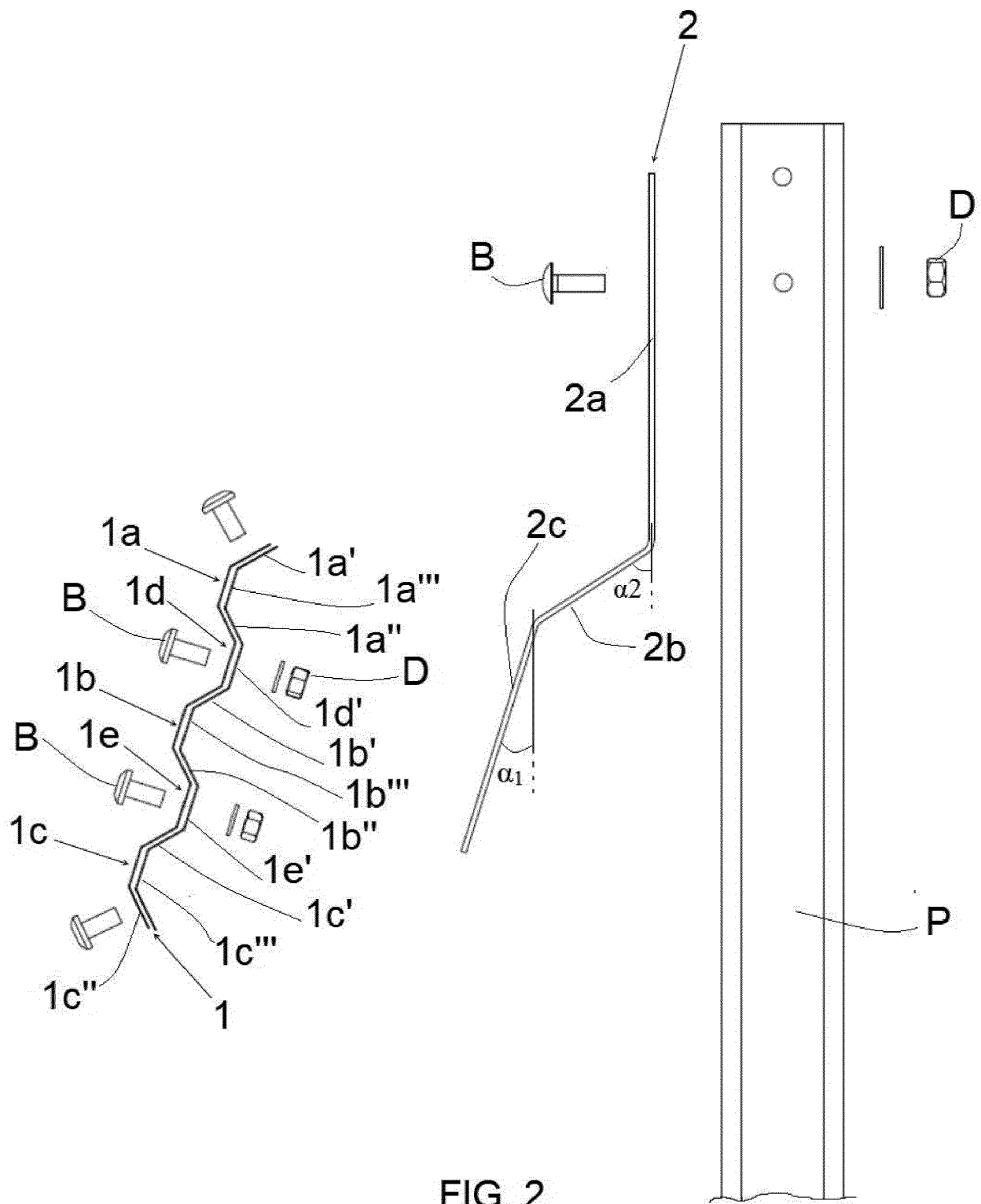
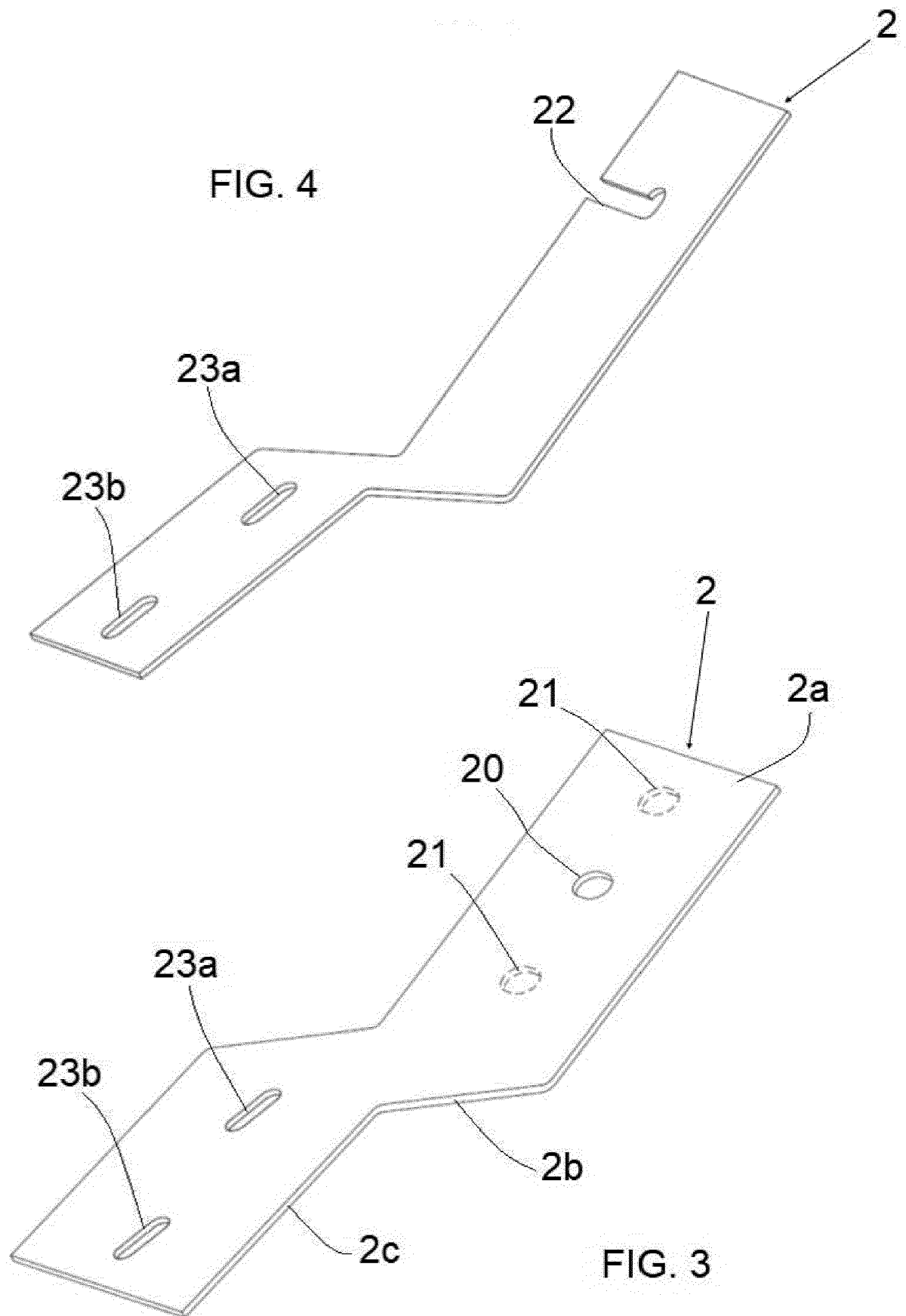


FIG. 1





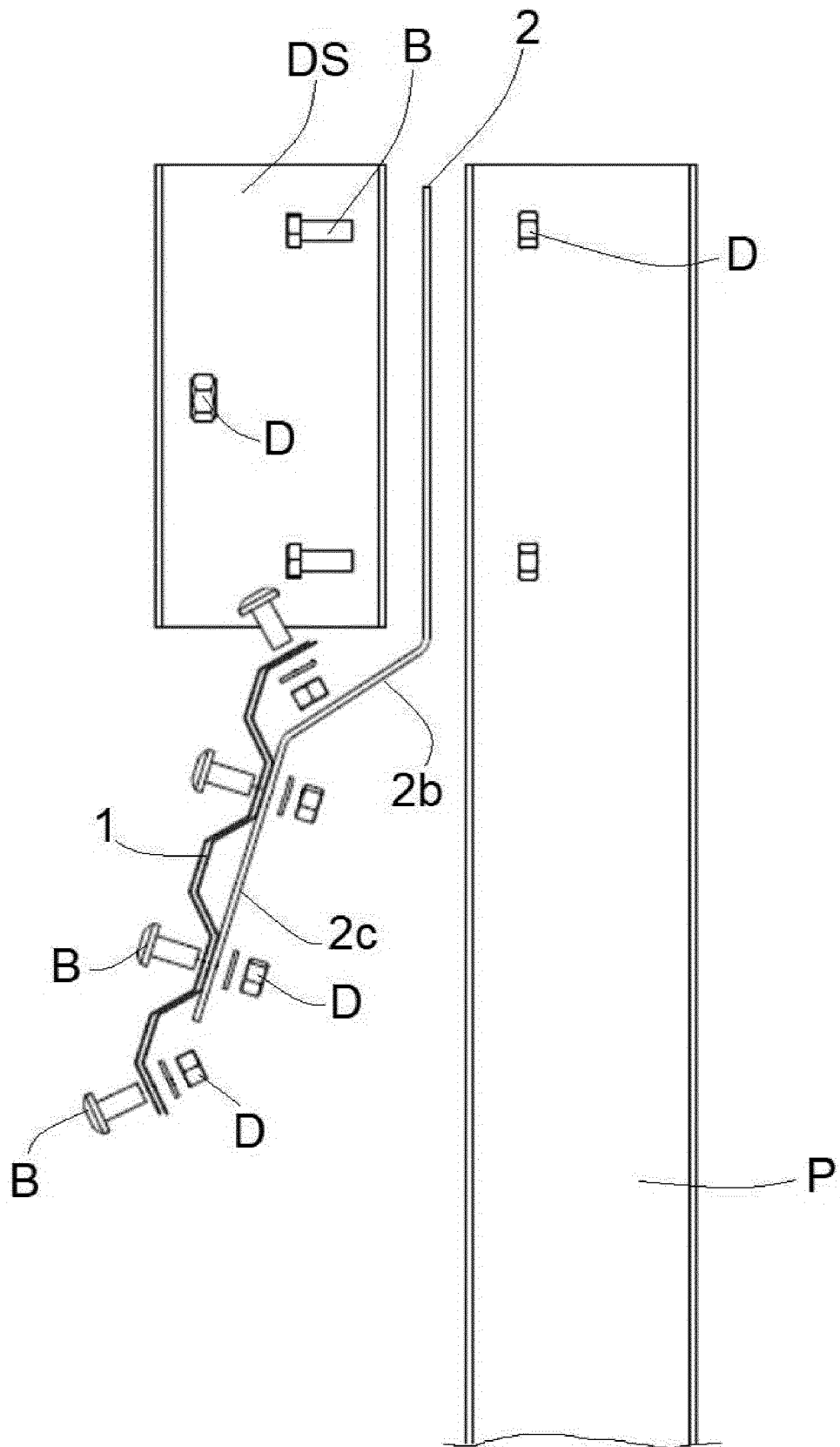


FIG. 5

REFERENCES CITED IN THE DESCRIPTION

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