

(19)



(11)

EP 3 795 750 A1

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:

24.03.2021 Bulletin 2021/12

(51) Int Cl.:

E01F 13/02 (2006.01)

(21) Application number: **20196515.9**

(22) Date of filing: **16.09.2020**

(84) Designated Contracting States:

**AL AT BE BG CH CY CZ DE DK EE ES FI FR GB
GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO
PL PT RO RS SE SI SK SM TR**

Designated Extension States:

BA ME

Designated Validation States:

KH MA MD TN

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(30) Priority: **23.09.2019 IT 201900016979**

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(54) **SAFETY BASE FOR REDUCING DANGEROUSNESS OF MOVABLE PEDESTRIAN BARRIER ELEMENTS OF KNOWN TYPES AND METHOD FOR PERFORMING THE MODIFICATION**

(57) A base for pedestrian barrier elements comprising a central body from which at least two feet transversally protrude, comprising rotational coupling means suitable

for driving said feet into rotation between a first projecting working position and a second flattened idle position.

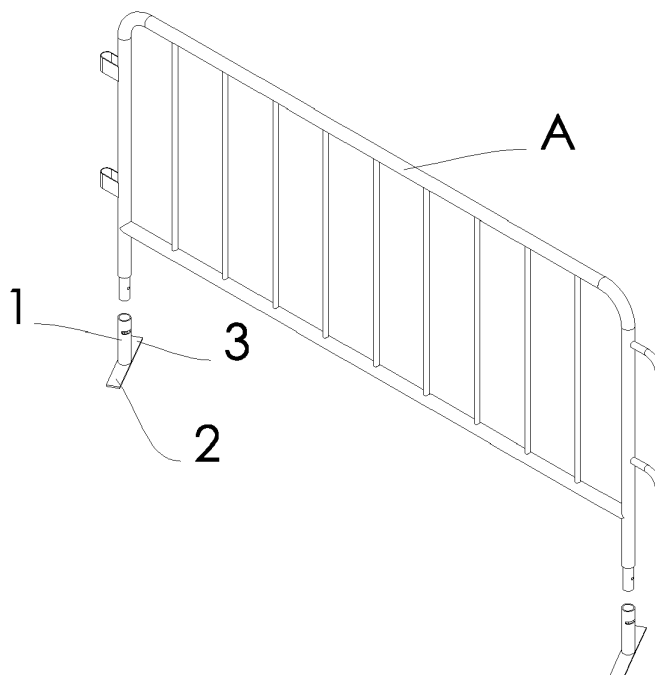


FIG. 4

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Description

Technical field

[0001] The present invention belongs to the sector of movable barrier elements, in particular to the sector of those barrier elements which are used on a temporary basis to regulate, convey, or completely prevent the passage of persons; for example, in the case of events that draw a large audience.

[0002] More specifically, the scopes of the present invention are a device and a method for modifying barrier elements of known types, so as to zero, or at least reduce, their dangerousness in case of fall.

Present status of the art

[0003] Movable barrier elements formed of a vertical parapet featuring a substantially rectangular shape, resting on at least two bases, each of which is shaped as an overturned "V", are of general use for a long time in order to regulate the passage of persons in otherwise open areas.

[0004] Every base comprises two inclined feet, which project transversally and whose ends touch the ground; a vertical axis hole is present in the central portion of the base of these barrier elements, suitable for slidingly receiving internally thereto a respective vertical pin which protrudes below from the vertical parapet.

[0005] Often, but not always, this pin is nothing but an extension of the vertical side edge of the parapet; usually it is a tubular element featuring a circular cross section, less often it features a polygonal cross section.

[0006] The parapet of these barrier elements is usually made from a metal, with a tubular perimetric edge and several elements internal to the edge, the purpose of the latter being that of rendering the parapet impervious to persons; typically there are a plurality of vertical elements internally to the rectangular perimetric edge, their ends being integrally connected to the upper horizontal edge and to the lower horizontal edge respectively.

[0007] The connection of the pin internally to the hole of the stand is a reversible one and makes it possible to easily remove the bases from the parapets, for example in order to make transportation and storage of the barrier elements easier.

[0008] Usually the barrier elements of this type include longitudinal connection means which reversibly join them to each other, in order to form a continuous line of barrier elements suitable for delimiting longer sections of the longitudinal development of a single barrier element; usually the means used to longitudinally connect the barrier elements are located in correspondence with the side edges of the vertical parapets.

[0009] This kind of barrier elements of known types is easy to transport, but it resulted to be very dangerous for people should a barrier element overturn and fall to the ground under the thrust of pedestrians.

[0010] As a matter of fact, the ends of the tubular elements that form its two feet are cut obliquely with respect to their longitudinal axis in order to improve the stability of each individual base. In other words, the feet are inclined with respect to the ground and their ends are cut according to a horizontal plane, parallel to the ground; it follows that the ends of the base are pointed, with an angled cut, a so-called salami slice or flute beak cut.

[0011] This configuration which, on one hand, improves the stability of the barrier element, is very dangerous should it fall down because, whenever the parapet touches the ground, the end of a foot of every base is unavoidably facing upwards and might cause major injuries to a pedestrian, should he/she fall thereon; this latter circumstance is very likely to occur in the case of crush, when the crowd throngs and pushes against the barrier element up to making it fall down.

[0012] The problem related to the dangerousness of barrier elements upon overturning was dealt with in GB2500607, which proposes base feet featuring rounded points, which do not terminate in a cut, but rather in a closed hemisphere. It is a solution featuring a number of evident disadvantages, including, amongst others, the increased cost deriving from being obliged to perform a cut orthogonal to the axis of the tubular body that forms the tooth, to realize a metal hemisphere and finally to weld the edge of the hemisphere to the perimeter of the cutting section of the ends of the foot.

[0013] Also, should the barrier element fall down, the end of the foot of the base is anyway facing upwards and, even though it does not end in a sharp point, it is nonetheless a point that is harmful, should anybody fall thereon.

[0014] International patent application WO2018153466 discloses a barrier element featuring foldable legs; each leg comprises three portions which can change from a compact configuration, wherein the different portions are substantially flattened one against the other, to a triangular raised position, which provides a greater stability. It is evidently a very complex and intricate configuration, expensive to implement and much subject to stopping dead during its operation; also, it is a solution aiming at implementing a barrier element that an operator can fold and close to reduce space occupation during transportation and storage, but it is not a barrier having the purpose of automatically closing in case of fall, whichever is the direction from which a thrust comes.

[0015] U.S. patent application US2006/231820 describes a barrier element with bases capable of partially rotating about the pin; every base comprises a tubular central body, from which two feet project. The tubular central body enters the inside of the pin of the barrier element which it is coupled with, thanks to the a bolt passing through a slot present in the central body itself, whose ends are shaped in such a way as to prevent the through bolt from rotating once the latter reaches the end of its rotation. In particular, the cross section of said slots is

greater at the ends, so that the bolt goes down and reaches a lower position, thus causing a corresponding vertical displacement of the pin of the barrier element, hence the barrier element shall be lifted first in order for it to rotate in the reverse sense.

Objects and summary of the invention

[0016] The base for barrier elements and the method according to the present invention aim at providing a system for rendering the known barrier elements of the described type harmless, should they be brought down to the ground; in particular, an object of the present invention is to automatically prevent the presence of harmful points facing upwards in the case of an overturning, which might cause very severe injuries to those people who might fall thereon.

[0017] Another object of the present invention is to provide a base that can be installed under the parapets of barrier elements already in use, and a method for performing a simple replacement of a traditional base with a base that is capable of changing from an open working configuration to a closed idle configuration, thanks to the movement of a very limited number of component parts and simultaneously makes the barrier element little bulky during transportation and storage.

[0018] A no less important object of the present invention is to provide a base that allows for a barrier element to be safely brought down under the action of thrusts exerted on any of the side of the parapet.

[0019] A further object of the barrier element according to the present invention is to provide a method that allows to quickly modify barrier elements of known types, so as to make them harmless in case of overturning.

[0020] These objects and others, which will be apparent to those skilled in the art upon looking at the figures and reading the following text, are achieved by using a base comprising a central body (1), from which at least two feet (2, 3) protrude, and comprising internally thereto a vertical axis cavity (11), shaped in such a way as to slidably receive internally thereto a corresponding vertical pin (B), of a type projecting below from the parapet of barrier elements of known types (A); in particular, the base for movable barrier elements according to the present invention comprises rotational coupling means suitable for driving the teeth (2, 3) into rotation between a first projecting working position and a second flattened idle position, which takes place whenever the barrier element falls down to the ground. In the latter position, the movable barrier element of a known type, after being modified according to the present teaching, will not present any longer sharp ends of feet facing upwards, which are very harmful for a person who falls thereon, but the ends of the teeth will lay in a horizontal plane parallel to the ground, without creating harmful situations and reducing space occupation as much as possible. The scope of protection of the present invention also comprises a method that allows to transform barrier elements

of known types into security barrier elements, by removing their base of a traditional type with a base as described in this document.

Brief description of the drawings

[0021]

Figure 1 and **Figure 2** show a perspective view of a barrier element formed of a parapet (A), of a known type, and two different embodiments of the base respectively; in both embodiments, the figures show the feet (2, 3) and the pin (B) which protrudes below from the side edges of the vertical parapet (A).

Figure 3 shows a magnified view of the base of the first embodiment shown in figure 1, and in particular the cavity (11) which slidably receives internally thereto the pin (B) which projects below from the parapet (A).

Figures 4, 5, and 6 show a parapet of a known type (A) resting on two bases, in a perspective view wherein the parapet (A) is disconnected from the bases, a perspective view wherein the pins of the parapet engage the cavity of the bases, and a top view respectively.

Figures 7 and 8 show a barrier element of a known type raised in the working position and laid on ground after a fall, respectively; note how the transversal feet of the known base (C), which point upwards, are harmful.

Detailed description of an embodiment of the invention

[0022] The principle of the invention summarized above can be implemented according to different embodiments, depending on the specific characteristics of the barrier element of a known type to be modified.

[0023] If the pins (B) that project below from the parapet (A) of the barrier element of a known type features a circular cross section, then, in a simple and practical embodiment, the central body (1) of the base defines a cylindrical cavity (11), internally to which the pin (B) is slidably engaged according to a vertical axis and retains the capability of rotating about said axis.

[0024] In this embodiment, two feet (2, 3) diametrically go out from the central body of the base, and are integrally connected to the central body itself.

[0025] In the first projecting working position, the base is placed in such a way that the feet (2, 3) are transversal with respect to the vertical plane of the parapet, so that, should the barrier element fall down, it will be the weight of the latter to provoke a rotation of the base until the feet reach the second flattened idle position and will lay on the ground, without creating any elements that are harmful for those who fall down to the ground above the fallen down barrier element, because of the crush.

[0026] Reversible retention means are adopted to be

able to rise the barrier element without making the bases disconnect from the parapet (A), which prevent the base from slipping off, while allowing a partial reciprocal rotation thereof.

[0027] Figures 1, 3, 4, 5, and 6 show a configuration wherein said anti-slip-off means comprise a bolt, not shown in the figures, the screw of which crosses both the pin (B) of the barrier element and two circumferential slots (4) defined on the central body (1) of the base for one quarter of the circumference and diametrically opposed to each other, so as to allow for a partial rotation of the base about the pin (B), but not its slipping off.

[0028] In a particularly effective embodiment, the slots (4) are defined for an angle less than one quarter of the circumference, for example for an angle ranging from one quarter to one sixth; the latter configuration is shown in figure 6 and facilitates the rotation of the base should the barrier element fall down, thus preventing the risk of stopping dead.

[0029] Conversely, if the pins (B) of the parapet (A) are of a polygonal cross section type, it is necessary to adopt a second embodiment wherein the vertical cavity (11) defined internally to the central body (1) of the base also features a polygonal internal cross section, so as to receive the pin (B) internally thereto, but not such as to allow the latter to rotate about its own vertical longitudinal axis.

[0030] In this second embodiment of the security base according to the present invention, the two feet (2, 3) are hinged to the central body (1), according to a horizontal longitudinal axis, and rotate in a vertical plane orthogonal to the vertical plane defined by the parapet (A); however, further configurations are possible which remain within the scope of the same inventive concept, even though the feet close by rotating about non horizontal axes.

[0031] In the simplest embodiment, the rotation of the feet between the two extreme positions takes place independently and is completely free; however, other embodiments are possible wherein, in order to make the feet change from the working position to the idle position, it is necessary to overcome the resistance offered by appropriate retention means such as, for example, one or more magnets.

[0032] In this second embodiment too, perforations are provided in the central body (1) of the base to receive a screw, the function of which is to prevent the pin protruding below from the parapet from accidentally sliding and to prevent it from slipping off the cavity defined in the central body (1).

[0033] For this purpose, it is possible to use a through screw, which crosses both the central portion of the base and the pivot received by it internally thereto; a threaded nut makes then it impossible for the screw to slip off; the screw and the nut are shown in figure 2.

[0034] Note that the weight of the parapet (A) can be discharged onto the bases alternatively, thanks to the presence of appropriate shoulders, or ledges, as shown in figures 1, 2, and 3, or thanks to said retention means

which, besides performing the function of preventing the base from slipping off, should the barrier element be raised, are also used to transfer the load of the parapet to the bases.

Claims

1. A base for pedestrian barrier elements comprising a central body (1), from which at least two feet (2, 3) transversally protrude and internally to which a vertical axis cylindrical cavity (11) is defined, shaped in such a way as to slidably receive internally thereto a corresponding vertical pin (B) of a type projecting below from the vertical parapet (A) of barrier elements of known types, while leaving it free to rotate about its own vertical axis, so that said feet (2, 3) are rotationally movable between a first projecting work position and a second flattened idle position, **characterized in that** it comprise anti-slip-off means which prevent said pin (B) from longitudinally sliding internally to said cavity (11); said anti-slip-off means comprising two slots (4) defined in said central body (1) according to a substantially circumferential pattern and diametrically opposed to each other, associated with a longitudinal element which crosses both said slots (4) and said pin (B), thus preventing the latter from slipping off and simultaneously allowing for a free rotation internally to said cavity (11) about a vertical axis, said slots (4) being shaped in such a way as to never prevent said longitudinal element from rotating about the vertical axis.
2. The base according to the previous claim 1, **characterized in that** said cavity (11) features an inner circular cross section **and in that** said feet (2, 3) are integrally connected to said central body (1) and project therefrom in opposed positions with respect to its longitudinal vertical axis.
3. The base according to claim 2 **characterized in that** said two feet (2, 3) diametrically project from said central body (1).
4. The base according to any of the previous claims **characterized in that** each of said slots (4) develops over an arch of circumference ranging from one sixth to one quarter.
5. The base according to any of the previous claims **characterized in that** said longitudinal element is a bolt, whose screw crosses both the pin (B) of the barrier element and said two opposed slots (4) defined in the central body (1) of the base.
6. A method for modifying pedestrian barrier elements of known types comprising the following steps:

- a) removing the existing bases from the corresponding vertical pins (B) engaged by them;
b) slidably engaging each of said pins (B) in the cavity (11) defined in the central body (1) of a base according to any of the previous claims.

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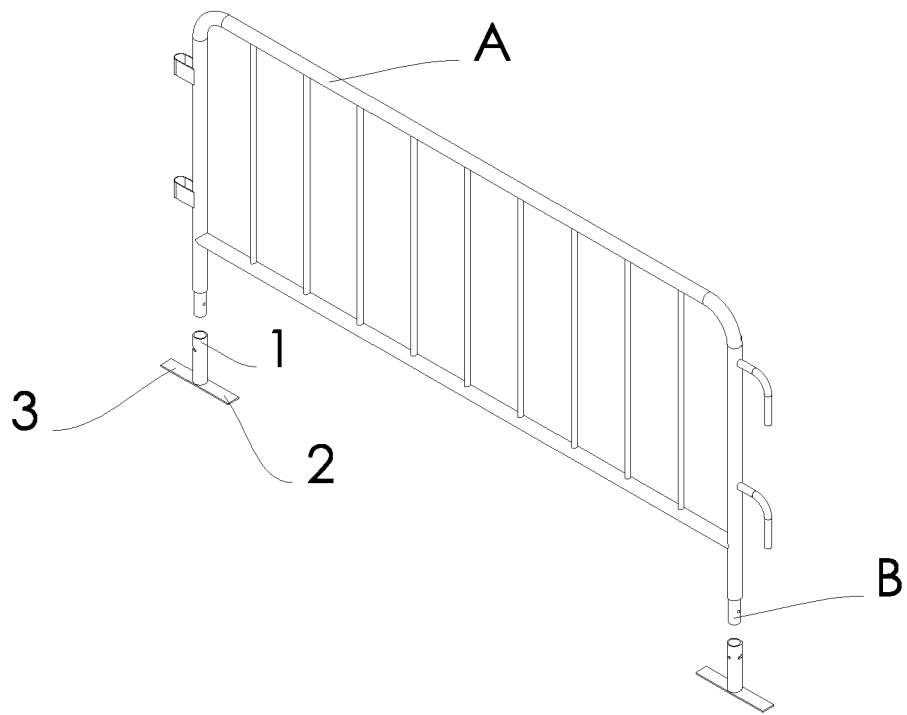


FIG. 1

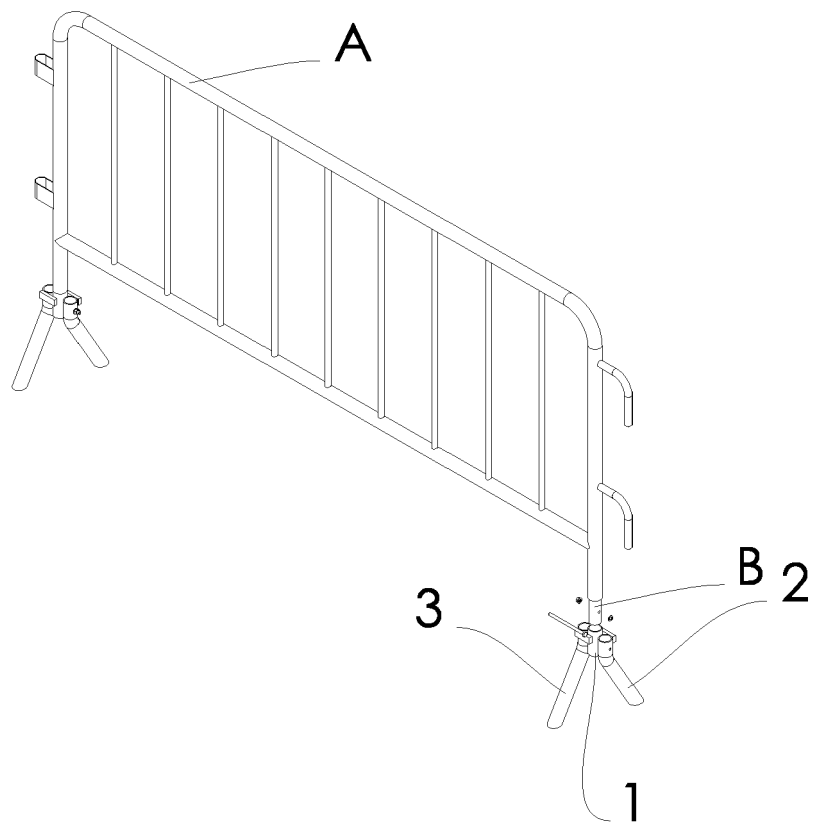


FIG. 2

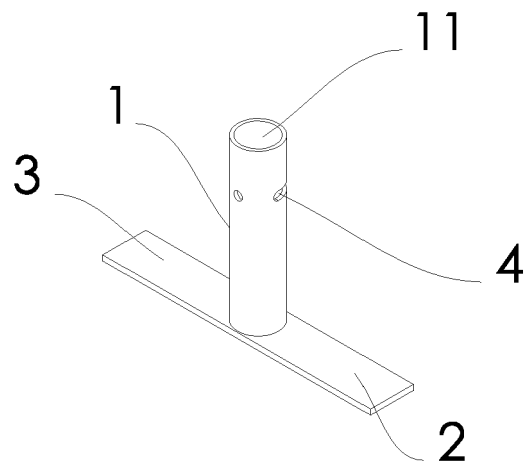


FIG. 3

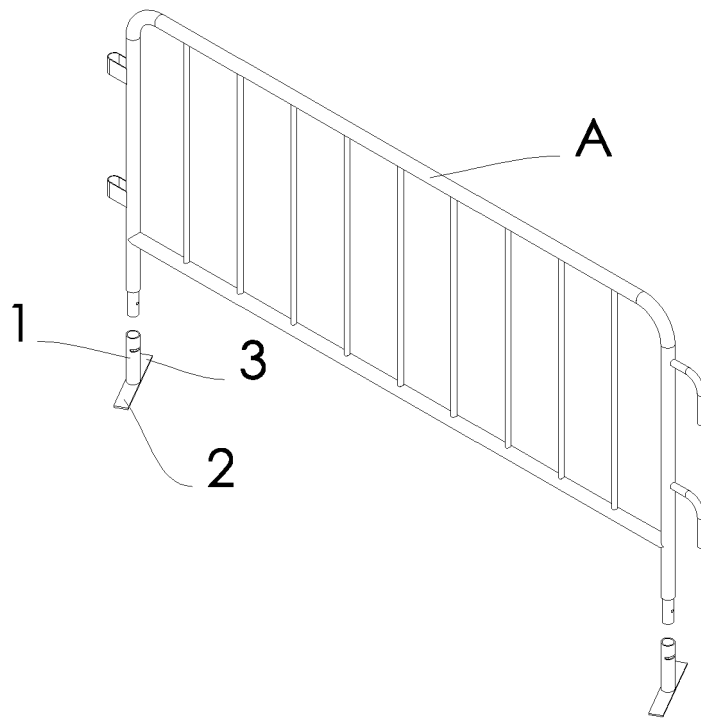


FIG. 4

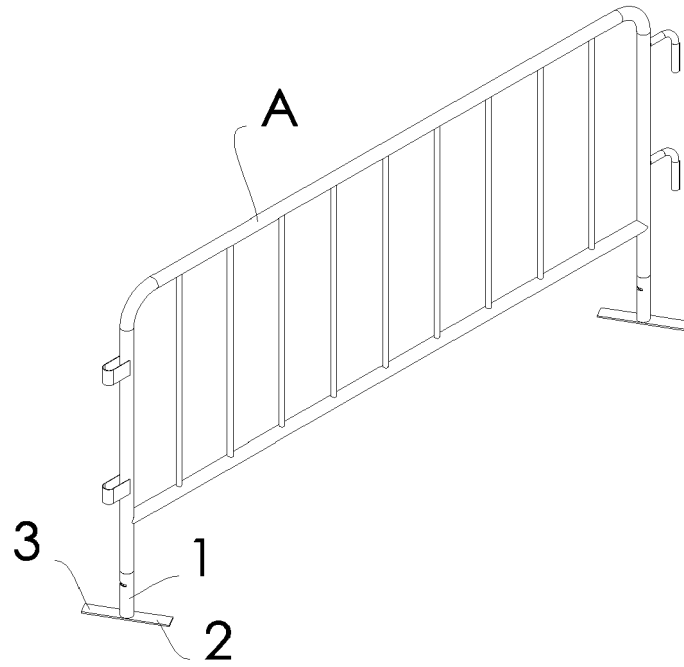


FIG. 5

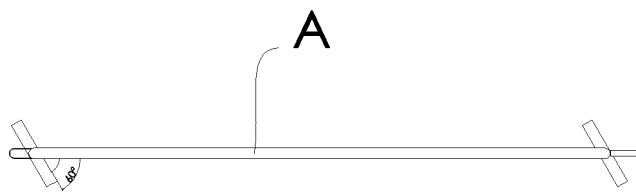


FIG. 6

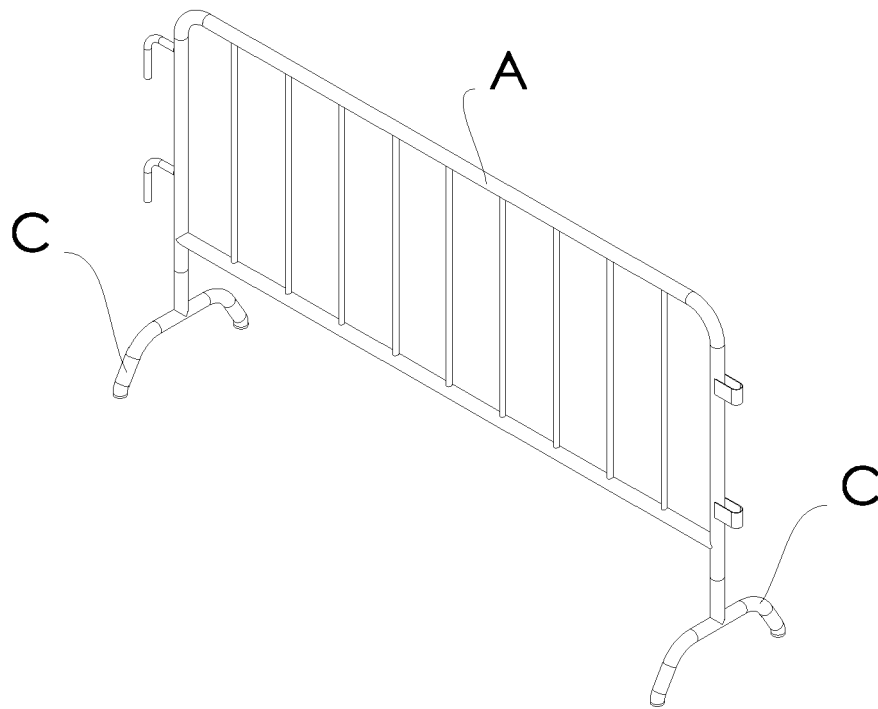


FIG. 7

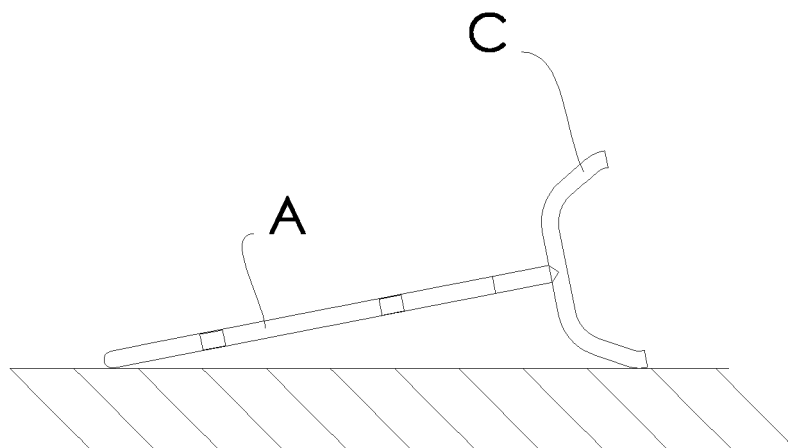


FIG. 8



EUROPEAN SEARCH REPORT

Application Number
EP 20 19 6515

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X	US 2006/231820 A1 (BILBY MURRAY [US]) 19 October 2006 (2006-10-19) * the whole document *	1-6	INV. E01F13/02
A	FR 2 744 145 A1 (BRICAUD JEAN PAUL [FR]) 1 August 1997 (1997-08-01) * page 7, lines 19-30; figures 1-6 *	1-6	
A	DE 297 14 769 U1 (KWASNY SIEGFRIED [DE]) 9 October 1997 (1997-10-09) * page 3, lines 11-31; figures 1,2 *	1-6	
			TECHNICAL FIELDS SEARCHED (IPC)
			E01F
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 19 January 2021	Examiner Flores Hokkanen, P
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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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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