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(54) BALISE PROTECTION

(57) A balise (1) protection, in particular the balise (1) protection for communication with a railway vehicle arranged in the space between the rails of a railway track, which includes at least one upwardly rising upwardly curved covering part (2) arranged in the direction of travel of the railway vehicle, with the upwardly curved covering part (2) connected to a covering channel (3), in which the balise (1) is arranged.

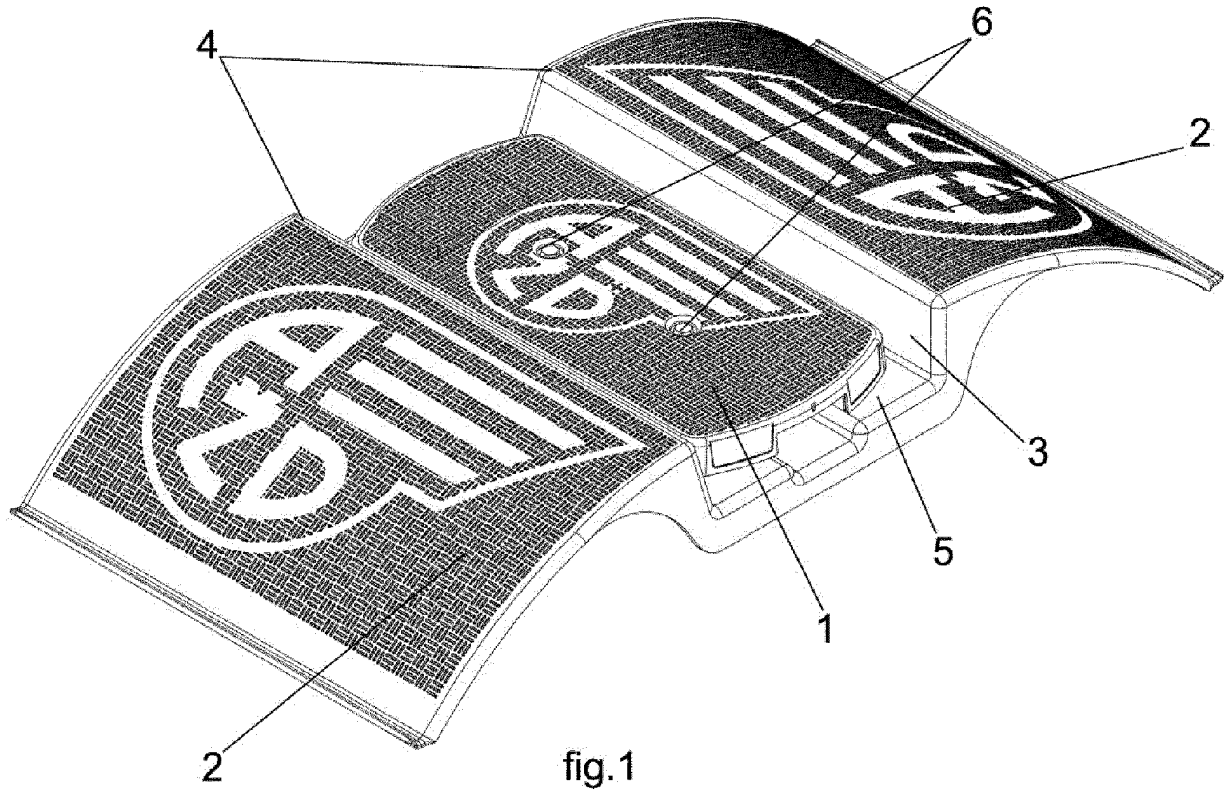

fig.1

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Description

Technical Field

[0001] The invention relates to balise protection, specifically to balise protection for communication with a railway vehicle mounted in the space between the rails of a railway track.

State of the Art

[0002] At present, it is known that the ETCS railway system uses a balise designated as an ETCS Eurobalise as one of the basic means of transferring information from the trackside equipment to the rolling stock. This balise is located between the rails. Between the rails, however, the balise is exposed to an increased risk of mechanical damage or destruction by hanging objects and falling ice from rail vehicles, flying gravel thrown by rail vehicles, etc. This can lead to damage to the balise and thereby to a reduction of the availability of information transmitted from individual balises to the rail vehicle, due to their malfunctions. Subsequently, this can also cause a possible reduction in the operability of the entire ETCS system. Additionally, replacing destroyed balises is quite expensive.

[0003] The arrangement of balises in the space between the rails of a railway track, without special protection, is known for example from the patent documents EP3369861 A1 and KR 101273202 B1.

[0004] In view of the above, various types of mechanical protection are added to the balises to protect the balises from mechanical damage. This is often insufficient, because the protections used are easily damaged not only in the above-mentioned ways, but also, for example, by simply stepping on and thereby destroying the protection by a person or animal that happens to be in the area where the balise is placed. This disrupts the function of the balise's protection, and the balise itself is then directly threatened with destruction.

[0005] The main disadvantage of the current state of the art is that the balises are not sufficiently protected and therefore a considerable number of them are damaged and eventually destroyed.

[0006] The goal of the invention is to design a balise protection that will adequately protect the balise itself, while the protection itself will be highly resistant to damage, both in the above-mentioned ways from passing rail vehicles and also by other environmental influences, while at the same time it will be simple to manufacture and therefore inexpensive.

Principle of the Invention

[0007] The mentioned shortcomings are largely eliminated and the objectives of the invention are fulfilled by the protection of a balise, in particular the protection of a balise for communication with a railway vehicle fixed in the space between the rails of a railway track, according to the invention, characterised by that it contains at least one upwardly rising upwardly curved covering part arranged in the direction of travel of the rolling stock, with the upwardly curved covering part being connected to a covering channel in which the balise is arranged. The advantage is that the overall construction and especially the shape of the covering part ensure increased resistance both against damage to the protection itself and, above all, safely protect the balise covered in the covering channel. Another advantage is that if a moving object collides at speed with the balise protection, thanks to the shape of the covering part, the moving object will bounce off and fly aside at a safe distance from the balise when it hits the covering part.

[0008] It is to advantage if the covering channel connects to the covering part at its highest point, and this highest point is placed higher than the top surface of the balise. This ensures perfect overlapping of the channel with the balise.

[0009] It is also to advantage if at least one covering part and the covering channel form a single unit. This ensures sufficient resistance in the event of an impact.

[0010] It is also very advantageous if the balise protection contains two covering parts arranged in the direction of movement of the railway vehicle, with the covering parts being connected to the covering channel. The advantage is that the balise is thus protected against the movement of dangerous objects when the railway vehicle moves in any direction.

[0011] Furthermore, it is to advantage if the balise is attached to the bottom of the covering channel. This ensures that the balise is set in a safe place.

[0012] It is also to advantage when the balise is simultaneously attached to the bottom of the covering channel and to the surface of the railway track. This ensures a stable position of the entire balise protection with the balise.

[0013] According to one variant, the surface of the railway track for attaching the balise with protection is, to advantage, the track superstructure. In this case, it is advantageous if a cross bar is arranged between the balise and the bottom of the covering channel, which is further arranged below the rails. The cross bar can be attached under the rails, or it can be fixed under the bolts attaching the rails to the sleeper. The balise protection is pressed by the cross bar against the track superstructure, whereby the balise protection is firmly set in the designated place.

[0014] According to the second variant, the surface of the railway track for attaching the balise with protection is a railway sleeper. In this case, it is to advantage if at least one spacer plate is arranged between the balise and the railway sleeper. And at the same time, it is to advantage if at least one spacer pad is arranged between the balise and the bottom of the covering channel. The balise protection is again firmly set in the designated place.

[0015] In both variants, it is also to advantage if the

balise is attached to the bottom of the covering channel and to the surface of the railway track by at least one connecting means.

[0016] It is very advantageous if the covering part is made as flexible, and in the most advantageous variant the covering part is made of a layered composite material. This increases impact resistance and at the same time, when struck by a flying object, it deflects the object to a safe height to fly over the balise without damaging it.

[0017] The main advantage of the balise protection according to the invention is that it provides safe protection of balises against a direct hit or hooking by loose objects hanging from passing rail vehicles, such as a loose air hose, a loose coupling, etc. The balise protection will safely absorb such a blow from a free-hanging object and thanks to the curved surface of the covering part, the object slides beyond the protection of the balise or bounces off it. The shaped design also enables easy and quick mounting on balise fastening systems. The shape of the balise protection design is also sufficiently flexible and strong, with this being verified by testing that it resists the impact of objects hanging freely or falling from the railway vehicles very well, even at high speeds of these vehicles, with the tests being carried out at a speed of 160 km/h. Another advantage is that the balise protection is very easy to install, reducing the installation time at the rail tracks. This is very advantageous because the installation is cheaper and, above all, safer due to the reduction of the time spent by workers at the rail tracks.

Overview of the Figures

[0018] The invention will be explained in more detail with the help of drawings, in which fig. 1 shows a three-dimensional view of the assembled balise protection in the design for attaching to a railway sleeper, fig. 2 shows an exploded three-dimensional view of the balise protection in the design for attaching to a railway sleeper, fig. 3 shows a three-dimensional view of the assembled balise protection in the design for attachment between rails, and fig. 4 shows an exploded three-dimensional view of the balise protection in the design for attachment between rails.

Examples of the Performance of the Invention

Example 1

[0019] A protection of a balise 1 for communication with a rail vehicle (fig.1, fig.2), which is arranged in the not-illustrated space between the rails of the railway track, containing two upwardly rising upwardly curved covering parts 2 arranged in the direction of travel of the rail vehicle. To the upwardly curved covering part 2 at its highest place 4 is connected the covering channel 3, in which the balise 1 is arranged. As a variant, the protection of the balise 1 for one-way operation may contain only one covering part 2.

[0020] The covering parts 2 are designed as being flexible.

[0021] The covering parts 2 and the covering channel 3 form one indivisible unit, while being made of a layered composite material, which is fibreglass composite.

[0022] The balise 1 is simultaneously attached by two connecting means 6, which are mounting bolts, through the holes 10 in the bottom 5 of the covering channel 3, to the surface of the railway track, which is a railway sleeper.

[0023] Arranged between the balise 1 and the bottom 5 of the covering channel 3, are two spacer pads 7.

[0024] Arranged between the balise 1 and the railway sleeper is a spacer plate 9.

Example 2

[0025] The protection of the balise 1 for communication with a rail vehicle (fig.3, fig.4), which is arranged in the not-illustrated space between the rails of the railway track, contains two upwardly rising, upwardly curved covering parts 2 arranged in the direction of travel of the rail vehicle. To the upwardly curved covering part 2 at its highest place 4 is connected the covering channel 3, in which the balise 1 is arranged. As a variant, the protection of the balise 1 for one-way operation may contain only one covering part 2.

[0026] The covering parts 2 are designed as being flexible.

[0027] The covering parts 2 and the covering channel 3 form one indivisible unit, while being made of a layered composite material, which is fibreglass composite.

[0028] The balise 1 is simultaneously attached by two connecting means 6, which are mounting bolts, to the cross bar 8, which is further arranged with its not shown ends under the not shown rails. These connecting means 6 pass through the holes 10 in the bottom 5 of the covering channel 3 and ensure the protection of the balise 1 against unwanted longitudinal or transverse movement.

[0029] The cross bar 8 presses the protection of the balise 1 against the surface of the railway track, which is the track superstructure.

Industrial Application

[0030] The balise protection, according to the invention, can be used as protection of a balise for communication with a railway vehicle, especially as balise protection in the ETCS (European Train Control System) system, against direct impact or hooking by loose objects hanging from passing rail vehicles.

List of Reference Marks

[0031]

1	balise
2	covering part
3	covering channel

4 the highest place
5 the bottom of the covering channel
6 connecting means
7 spacer pad
8 cross bar
9 spacer plate
10 holes

Claims

1. A balise protection, specifically the balise protection of a balise (1) for communication with a railway vehicle arranged in the space between the rails of a railway track, **characterised by that** it contains at least one upwardly rising curved covering part (2) arranged in the direction of travel of the railway vehicle, with the upwardly curved covering part (2) being connected to a covering channel (3), in which the balise (1) is arranged.

2. The balise protection, according to claim 1, **characterised by that** the covering channel (3) is connected to the covering part (2) at its highest point (4).

3. The balise protection according to either one of claims 1 and 2, **characterised by that** at least one covering part (2) and the covering channel (3) form a single unit.

4. The balise protection, according to any one of claims 1 to 3, **characterised by that** it contains two covering parts (2) arranged in the direction of movement of the rail vehicle, with the covering parts (2) being connected to the covering channel (3).

5. The balise protection according to any one of claims 1 to 4, **characterised by that** the balise (1) is attached to the bottom (5) of the covering channel (3).

6. The balise protection, according to any one of claims 1 to 5, **characterised by that** the balise (1) is simultaneously attached to the bottom (5) of the covering channel (3) and to the surface of the railway track.

7. The balise protection, according to claim 6, **characterised by that** the surface of the railway track is the track superstructure.

8. The balise protection, according to claim 6, **characterised by that** the surface of the railway track is a railway sleeper.

9. The balise protection, according to any one of claims 5 to 8, **characterised by that** the balise (1) is attached to the bottom (5) of the covering channel (3) and to the surface of the railway track by at least one connecting means (6).

10. The balise protection according to any one of claims 5 to 9, **characterised by that** between the balise (1) and the bottom (5) of the covering channel (3) at least one spacer pad (7) is arranged.

11. The balise protection, according to any one of claims 5 to 9, **characterised by that** between the balise (1) and the bottom (5) of the covering channel (3), a cross bar (8) is arranged which is further arranged under the rail tracks.

12. The balise protection according to any one of claims 8 to 10, **characterised by that** between the balise (1) and the railway sleeper, a spacer plate (9) is arranged.

13. The balise protection according to any one of claims 1 to 12, **characterised by that** the covering part (2) is made to be flexible.

14. The balise protection according to any one of claims 1 to 13, **characterised by that** the covering part (2) is made of a laminated composite material.

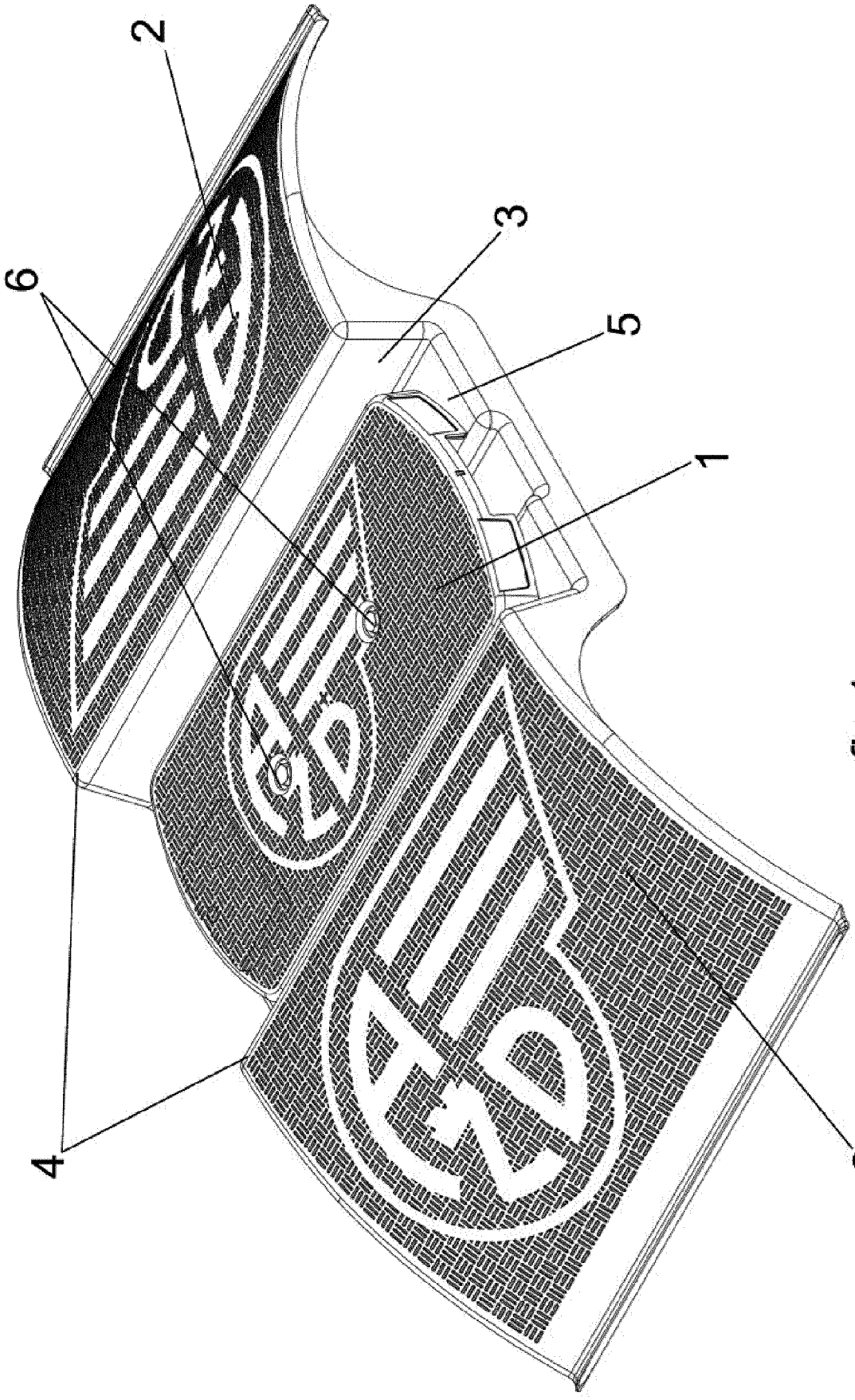

fig.1

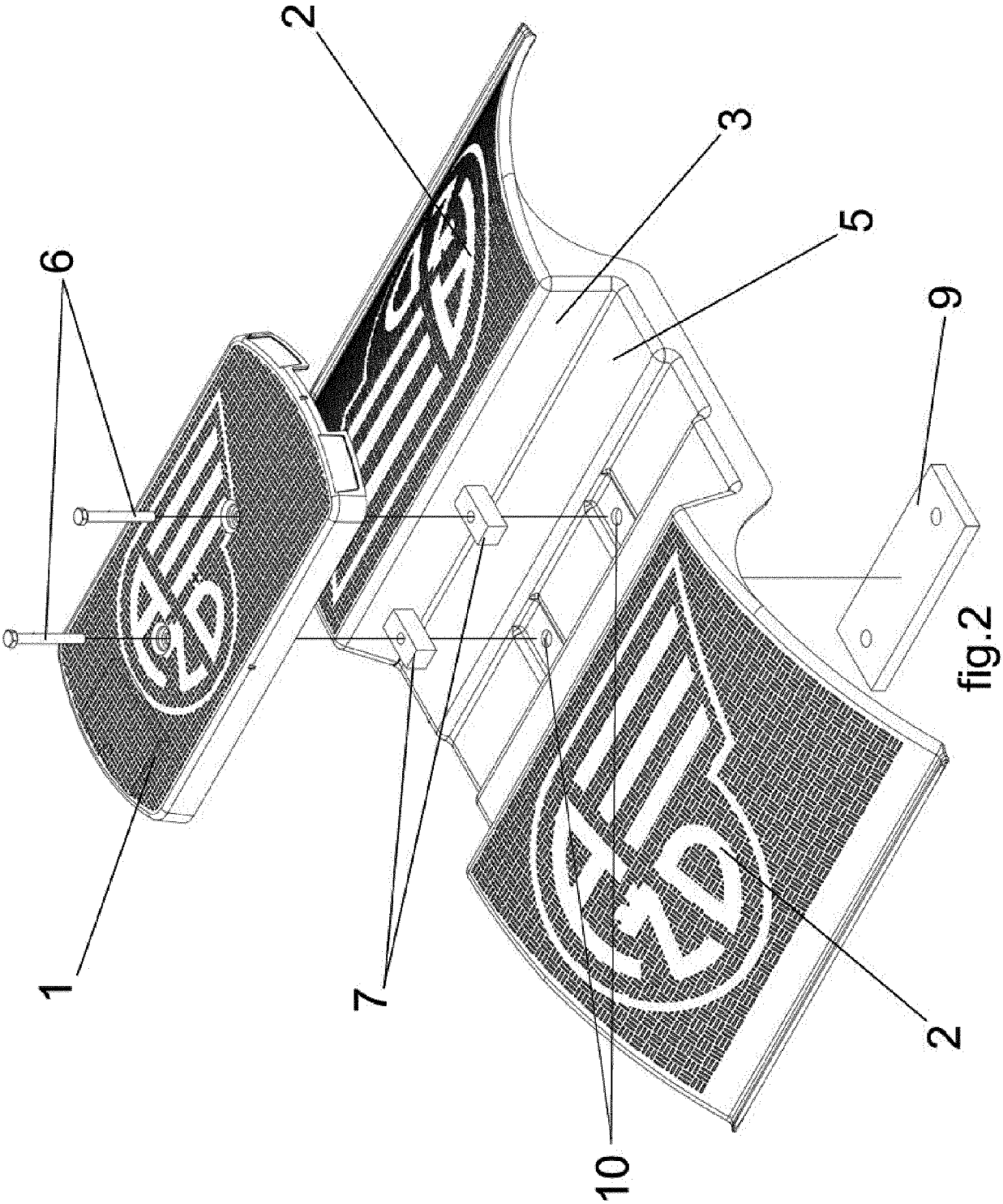

fig.2

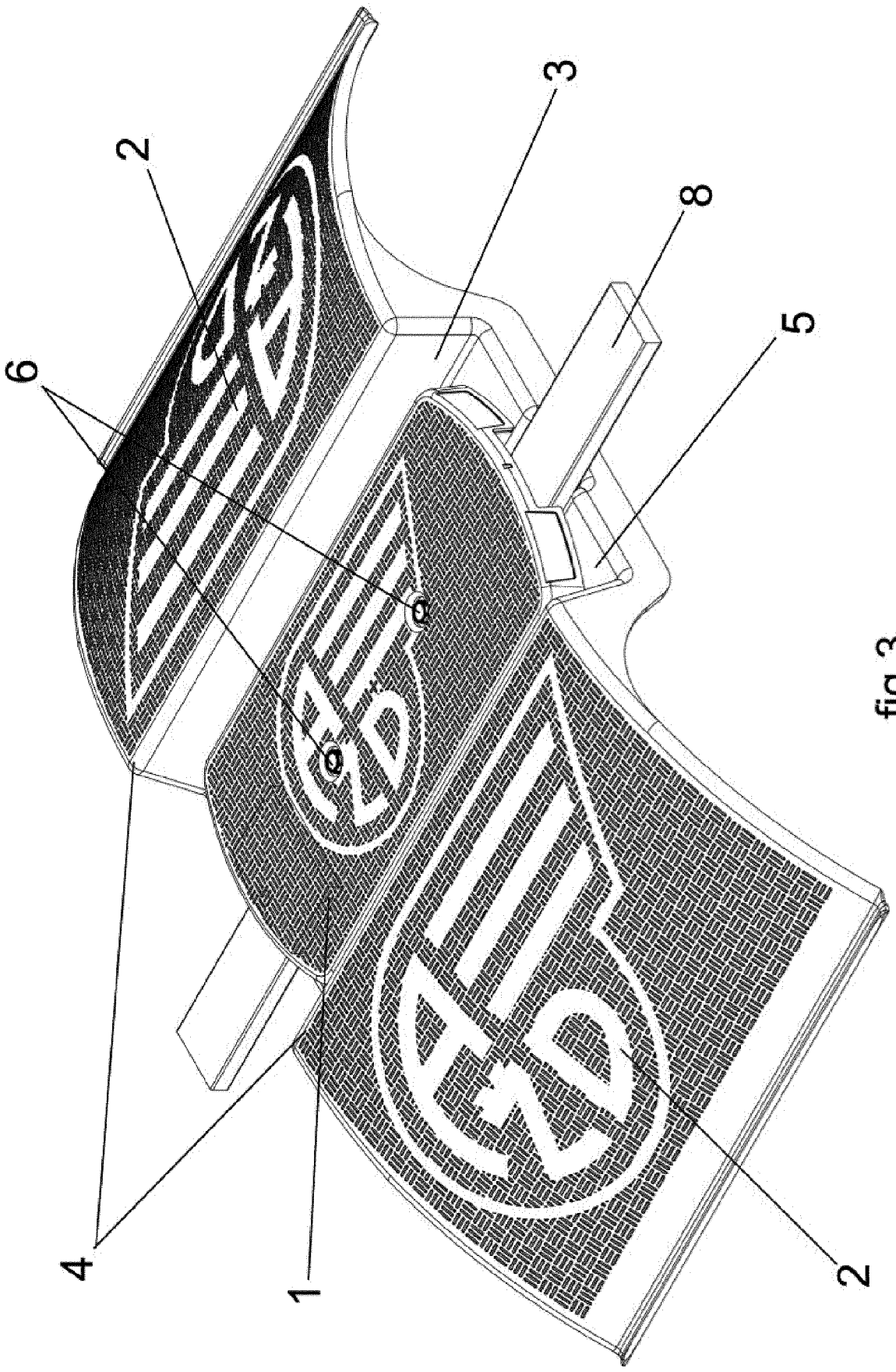

fig.3

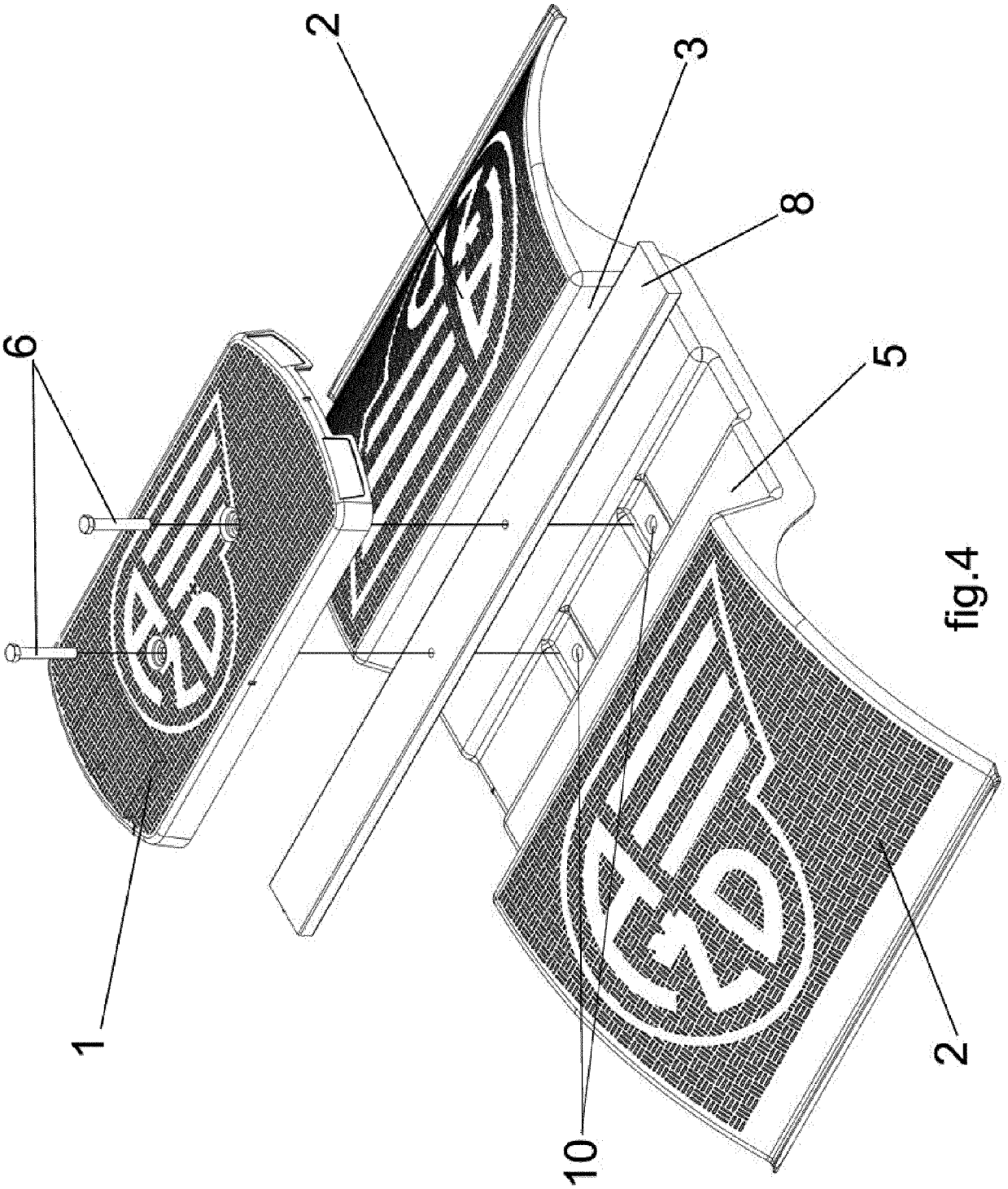

fig.4

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EUROPEAN SEARCH REPORT

Application Number
EP 24 02 0123

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 110 576 882 A (SHENYANG RAILWAY SIGNAL CO LTD) 17 December 2019 (2019-12-17) * figure 1 * * the whole document *	1-14	INV. E01B26/00 B61L3/12 B61L27/20
A	EP 3 437 954 B1 (GIFAS ELECTRIC GES M B H [AT]) 17 June 2020 (2020-06-17) * figures 1-4 * * the whole document *	1-14	
A	AT 17 766 U1 (PANDROL VORTOK LTD [GB]) 15 February 2023 (2023-02-15) * figures 1-3 * * the whole document *	1-14	
A	CN 203 460 882 U (BEIJING JIAODA SIGNAL TECHNOLOGY CO LTD) 5 March 2014 (2014-03-05) * figures 1-6 * * the whole document *	1-14	
A	CN 110 576 881 A (SHENYANG RAILWAY SIGNAL CO LTD) 17 December 2019 (2019-12-17) * figure 1 * * the whole document *	1-14	TECHNICAL FIELDS SEARCHED (IPC) E01B B61L

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	24 September 2024	Klein, A

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24-09-2024

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
CN 110576882 A	17-12-2019	NONE	
EP 3437954 B1	17-06-2020	AT 520246 A1	15-02-2019
		EP 3437954 A1	06-02-2019
AT 17766 U1	15-02-2023	NONE	
CN 203460882 U	05-03-2014	NONE	
CN 110576881 A	17-12-2019	NONE	

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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- EP 3369861 A1 **[0003]**
- KR 101273202 B1 **[0003]**