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(54) **Arrangement arranged on rail traffic route for collecting metal dust**

(57) An arrangement in connection with a magnet (2) used for collecting metal dust generated by rail traffic. The arrangement (1) comprises a collecting surface (3), which is made of a non-magnetic material, and a frame structure (4) to which said collecting surface (3) is fastened. The frame structure (4) is adaptable in connection

with said magnet (2) so that the collecting surface (3) is placed on top of the magnet (2). The thickness of the collecting surface (3) is designed such that the magnetic attraction of the magnet (2) acts on the collecting surface (3) by collecting metal dust.

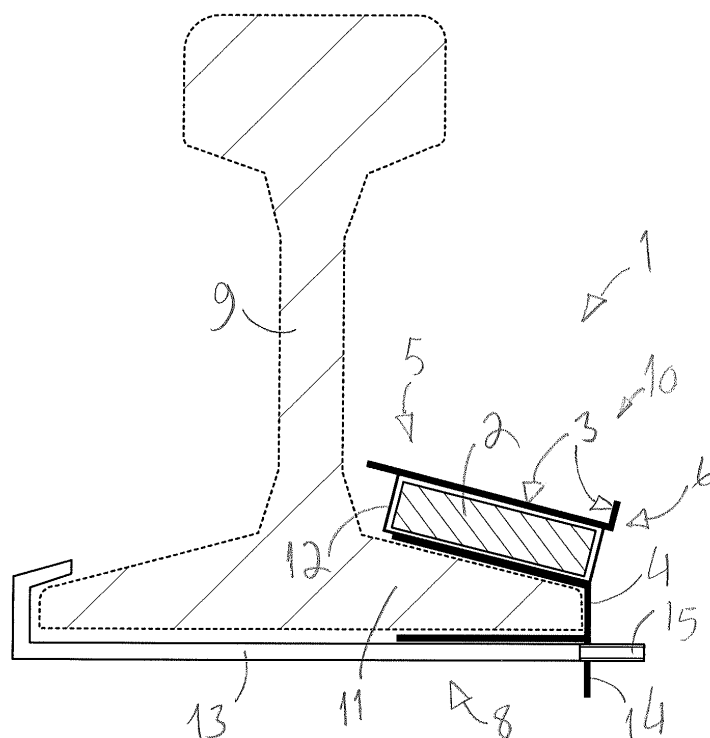


Fig. 1

Description

Background

[0001] The invention relates to an arrangement in connection with a magnet used to collect metal dust generated by rail traffic.

[0002] It is previously known to provide magnets in connection with electrical insulation joints or gaps of track circuits for the purpose of collecting metal dust coming off rails and/or the rolling stock. Metal dust may, after all, cause insulation faults and current leakages on the isolation extensions.

[0003] One of such solutions is disclosed in patent publication NL 1018155. In the described solution, a magnet is fixed with a bolt or similar to a magnet support structure, which secures the magnet to the side of a rail web.

[0004] A problem in the prior art solutions is that the removal of the metal dust from the magnet is very cumbersome.

Brief description

[0005] The inventive arrangement arranged on a rail traffic route for collecting metal dust is characterised by what is disclosed in the characterising part of the independent claim. Other embodiments of the invention are characterised by what is disclosed in the other claims.

[0006] Inventive embodiments are also disclosed in the specification and drawings of this application. The inventive contents of the application may also be defined in ways other than those described in the following claims. The inventive contents may also consist of several separate inventions, particularly if the invention is examined in the light of expressed or implicit sub-tasks or in view of obtained benefits or benefit groups. In such a case, some of the definitions contained in the following claims may be unnecessary in view of the separate inventive ideas. Features of the different embodiments of the invention may be applied to other embodiments within the scope of the basic inventive idea.

[0007] The idea of the invention is that metal dust is not collected on the surface of a magnet, but on a collecting surface arranged on it. The advantage is that the removal of the metal dust becomes easier and faster.

Brief description of the figures

[0008] Some embodiments of the invention are explained in more detail in the accompanying drawings, in which

Figure 1 is a schematic view of an arrangement of the invention, secured to a rail and seen in the direction of the rail,

Figure 2 is a schematic, partially cross-sectional side view of the arrangement of Figure 1,

Figures 3a and 3b are schematic end views of a sec-

ond arrangement according to the invention in different situations,

Figure 4 is a schematic end view of a third arrangement of the invention, and

Figure 5 is a schematic end view of a fourth arrangement of the invention.

[0009] For the sake of clarity, the figures show some embodiments of the invention in a simplified manner. In the figures, like reference numerals identify like elements.

Detailed description

[0010] In the present description, a rail traffic route refers to all traffic routes on which movement takes place guided by rails. Such traffic routes include railways, tramlines, light rails, and underground railways, for instance.

[0011] Figure 1 is a schematic side view of an inventive arrangement secured to a rail and seen in the direction of the rail, and Figure 2 is a side, partly cross-sectional view of the same arrangement.

[0012] Arrangement 1 comprises a collecting surface 3 which is made of a non-magnetic material. The material in question may be, for example, plastic, elastomer, plastic or elastomer composite, or non-magnetic metal, such as non-magnetic stainless steel. In the most advantageous case, such a material is selected to which iron-based metal does not cling magnetically, and even more advantageously, a material that is slippery and smooth.

[0013] Arrangement 1 further comprises a frame structure 4, to which said collecting surface 3 is secured. The frame structure 4 comprises a structure cut out at least approximately in the shape of the profile of the rail foot 11, and fastening means 8 used to fasten arrangement 1 to a rail 9 or a railway sleeper. In the embodiment of Figure 1, the fastenings means 8 comprise a fastening hook 13 and a fastening flange 14. The fastening hook 13 is arranged through an opening, or similar, in the fastening flange 14, and under the rail onto the other side of the rail, where the hook-like end of the fastening hook 13 is arranged around the edge of the rail foot 11. Arrangement 1 can be fixed firmly in place by arranging a nut or similar in a threaded part 15, which is appropriately tightened against the fastening flange 14.

[0014] The frame structure 4 additionally comprises a magnet support structure 10, which adapts the magnet 2 on the top surface of the rail foot 11 so that the top surface of the magnet 2 is mainly projected upward.

[0015] The frame structure 4 may also comprise a magnet casing 12, inside which the magnet 2 is arranged. The magnet casing 12 provides the opportunity for arrangement 1 to use not only a massive magnet piece but also magnetic material in powdery form, for example.

[0016] It should, however, be noted that the fastening means 8 and the frame structure 4 may naturally be implemented differently, too.

[0017] The casing 12 may be made of metal or plastic,

for example. The collecting surface 3 is advantageously arranged on top of the magnet 2 in such a manner that it covers at least the upwards directed surfaces 5 of the magnet 2. In the embodiment shown in Figure 1, the collecting surface 3 extends beyond said surfaces so that it also covers the surfaces of the magnet 2, which are directed mainly sideward.

[0018] According to an idea, the collecting surface 3 extends all the way to the foot or a similar part of the rail 9, so that at least an essentially dustproof contact is established between it and the rail.

[0019] According to an idea, the collecting surface covers all or at least essentially the surfaces of arrangement 1, on which the magnet 2 acts by collecting metal dust.

[0020] The length L for the magnet may be freely chosen. According to an idea, the length of the magnet is of the order of the distance between the sleepers.

[0021] The thickness and material of the collecting surface 3 are so chosen that the magnetic attraction of the magnet 2 acts on the collecting surface 3 by collecting metal dust. In other words, the metal dust will be caught by the collecting surface 3 due to the influence of the magnetic field that the magnet creates.

[0022] The collecting surface 3 may be a simple plane surface. According to another idea, shapes have been formed on the collecting surface 3 to help the removal of metal dust from the rail. In the embodiment shown in Figure 1, the collecting surface 3 comprises a trough 6 at its lower edge.

[0023] The collecting surface 3 is secured rigidly and undetachably to the frame structure 4. The metal dust accumulated on the collecting surface 3 is removed at fixed intervals with a textile cloth or a brush into a bucket or similar container by using pressure medium blowing, such as pressurised water or air, or the like. The trough 6 prevents the metal dust from falling on a rail during the cleaning, and thus enhances the removal of metal dust from the rail.

[0024] Figure 3a is a schematic representation of a second arrangement according to the invention as seen from the end and the collecting surface in its collecting position, and Figure 3b shows the same arrangement with the collecting surface in its emptying position.

[0025] In this arrangement 1, the collecting surface 3 is secured turnably with hinge means 7 in relation to the frame structure 4. When it is desired to clean the collecting surface 3 of the metal dust accumulated on it, it is turned from the position shown in Figure 3a into the position shown in Figure 3b as demonstrated by the arrow K. This way, the metal dust can be "dumped" into a collecting container such as a bucket or the like. After having been emptied, the collecting surface 3 is turned back to its collecting position.

[0026] The hinge means 7 may be implemented with hinges known per se, so they will not be dealt with in any closer detail in this context. It is, however, noted that the hinge means 7 may be implemented with a hinge provided with a hinge pin, or a film hinge of a plastic material,

for example.

[0027] Arrangement 1 may additionally comprise locking means used to lock the collecting surface 3 to the operating position shown in Figure 3a.

[0028] The collecting surface 3 comprises, on its edges that are parallel to the rail, sides 16 that for their part help collecting metal dust. The collecting surface 3, whether fixedly or turnably arranged in relation to the frame structure, or detachably from it, may also comprise sides on all of its edges or have no sides at all.

[0029] Figure 4 is a schematic end view of a third arrangement of the invention. Here, the collecting surface 3 forms a concave shape, in other words, the edges of the collecting surface rise higher than its centre parts. Furthermore, the collecting surface 3 is detachably fastened in relation to the frame structure 4 so that it may be removed from the frame structure 4 to be emptied, which is demonstrated by the arrow R. It should be noted in this context that the collecting surface 3 may be fixedly arranged in relation to the frame structure 4.

[0030] The collecting surface 3 is kept in place in relation to the frame structure 4 by means of fastening protrusions 17. The fastening protrusions 17 are suitably adapted to the shapes of the frame structure 4. The fastening protrusions 17 may be made of, for example, a flexible material whereby, with the aid of appropriate dimensioning, they can be made to press against the shapes of the frame structure 4. Obviously, the functioning of the fastening protrusions 17 may be based on mere form-locking. According to an idea, the fastening protrusions surround the magnet casing 12 in a border-like fashion.

[0031] According to another idea, the collecting surface 3 is secured to the frame structure 4 with fastening means that are quick to open and reclose, such as cotter bolts or the like.

[0032] Figure 5 is a schematic end view of a fourth arrangement of the invention. Here, arrangement 1 is arranged in a magnet solution according to the one set forth in the patent publication NL 1018155, for example.

[0033] The frame structure 4 comprises fastening means used to secure the collecting surface 3 directly to the magnet 2. Said fastening means may comprise, for example, fastening protrusions or other fastening means solutions already described in the above. According to another idea, the collecting surface 3 is secured to a fastening frame 18 of the magnet. The collecting surface 3 may be secured to the magnet 2 or the fastening frame 18 thereof either fixedly, turnably, or detachably. As regards its shape and material, the collecting surface 3 may be in accordance with the description of the above drawings.

[0034] The collecting surface 3 extends all the way to the rail 9, to its head, whereby the accumulation of metal dust onto the collecting surface may be enhanced. The collecting surface 3 may obviously be different, too, in the ways described in connection with the above drawings.

[0035] In some cases, features disclosed in this application may be used as such, regardless of other features. On the other hand, when necessary, features disclosed in this application may be combined in order to provide different combinations.

[0036] To summarize, it may be noted that the arrangement according to the invention is characterised by comprising a collecting surface made of a non-magnetic material, a frame structure to which said collecting surface is secured, said frame structure being adaptable in connection with said magnet so that the collecting surface is placed on the magnet, the thickness of the collecting surface having been designed such that the magnetic attraction of the magnet acts on the collecting surface by collecting metal dust.

[0037] The drawings and the related description are only intended to illustrate the idea of the invention. A person skilled in the art will find it obvious that the invention is not restricted to the above embodiments, which disclose the invention by means of some embodiments, but various modifications and different applications of the invention are possible within the inventive idea defined in the accompanying claims.

Reference numbers

[0038]

- 1 arrangement
- 2 magnet
- 3 collecting surface
- 4 frame structure
- 5 upward projecting surfaces
- 6 trough
- 7 hinge means
- 8 fastening means for fastening to a rail
- 9 rail
- 10 magnet support structure
- 11 rail foot
- 12 magnet casing
- 13 fastening hook
- 14 fastening flange
- 15 threaded part
- 16 side
- 17 fastening protrusion
- 18 fastening frame of magnet

L length of magnet

K turn

R detachment

Claims

1. An arrangement in connection with a magnet (2) used for collecting metal dust generated by rail traffic, **characterised in that** the arrangement (1) comprises

a collecting surface (3) made of a non-magnetic material

a frame structure (4) to which said collecting surface (3) is fastened

the frame structure (4) being adaptable in connection with said magnet (2) so that the collecting surface (3) is placed on top of the magnet (2),

the thickness of the collecting surface (3) having been designed such that the magnetic attraction of the magnet (2) acts on the collecting surface (3) by collecting metal dust.

2. An arrangement as claimed in claim 1, **characterised in that** the collecting surface (3) is made of plastic or a plastic composite.

3. An arrangement as claimed in claim 1 or 2, **characterised in that** the collecting surface (3) is made of a non-magnetic metal, such as non-magnetic stainless steel.

4. An arrangement as claimed in any one of preceding claims, **characterised in that** the collecting surface (3) comprises a trough (6) on its lower edge.

5. An arrangement as claimed in any one of the preceding claims, **characterised in that** the collecting surface (3) forms a concave shape.

6. An arrangement as claimed in any one of preceding claims, **characterised in that** the frame structure (4) is rigidly and undetachably fastened to the collecting surface (3).

7. An arrangement as claimed in any one of claims 1 to 5, **characterised in that** the frame structure (4) is turnably fastened in relation to the collecting surface (3) with hinge means (7).

8. An arrangement as claimed in any one of claims 1 to 5, **characterised in that** the frame structure (4) is detachably fastened in relation to the collecting surface (3).

9. An arrangement as claimed in any one of the preceding claims, **characterised in that** the frame structure (4) comprises fastening means (8) for fastening to a rail (9).

10. An arrangement as claimed in any one of claims 1 to 8, **characterised in that** the frame structure (4) comprises fastening means (8) for fastening to the magnet (2) or a fastening frame (18) of the magnet.

11. An arrangement as claimed in any one of the preceding claims, **characterised by** arranging the magnet (2) in a magnet support structure (10) which arranges the magnet (2) on the top surface of the rail

foot (11) in such a manner that the top surface of the magnet (2) is directed mainly upward.

12. An arrangement as claimed in claim 11, **characterised in that** the magnet support structure (10) comprises a casing (12) inside of which the magnet (2) is arranged, and that the collecting surface (3) is arranged on the outer surface of said casing (12).

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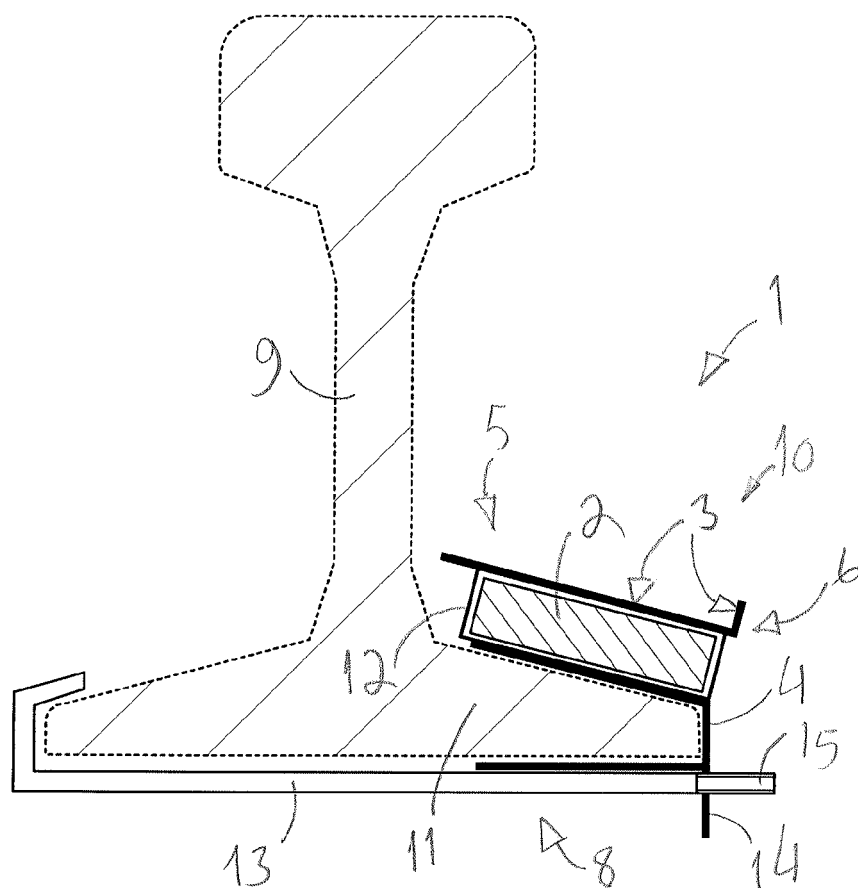


Fig. 1

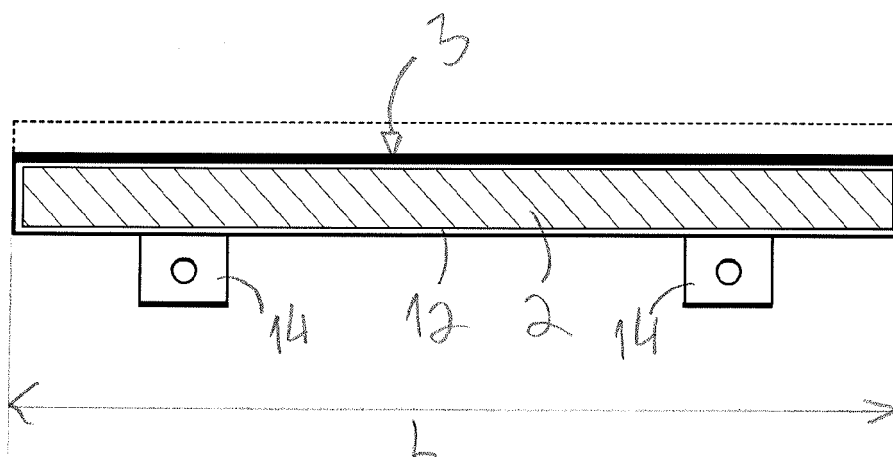


Fig. 2

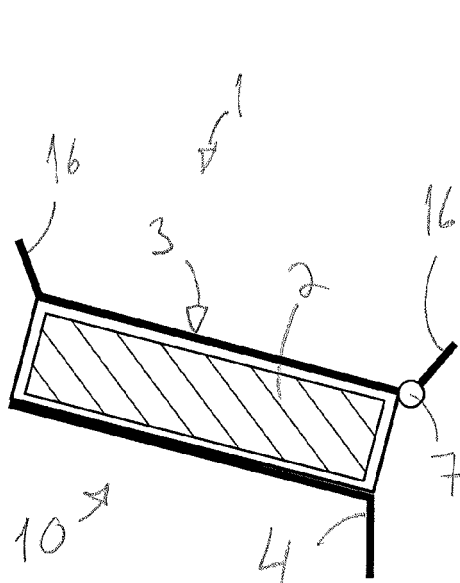


Fig. 3a

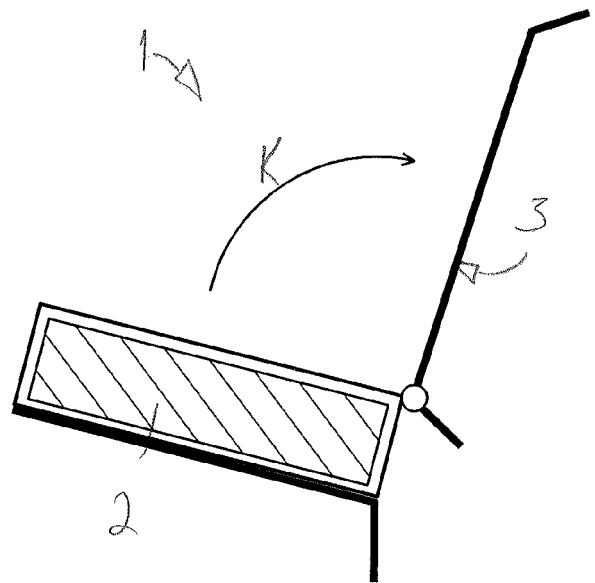


Fig. 3b

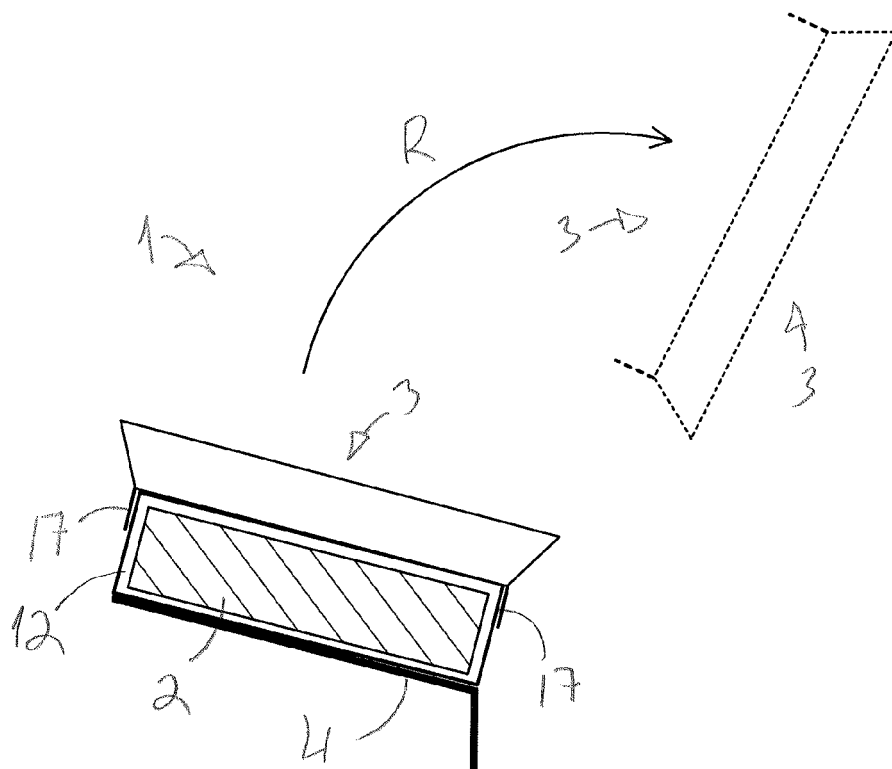


Fig. 4

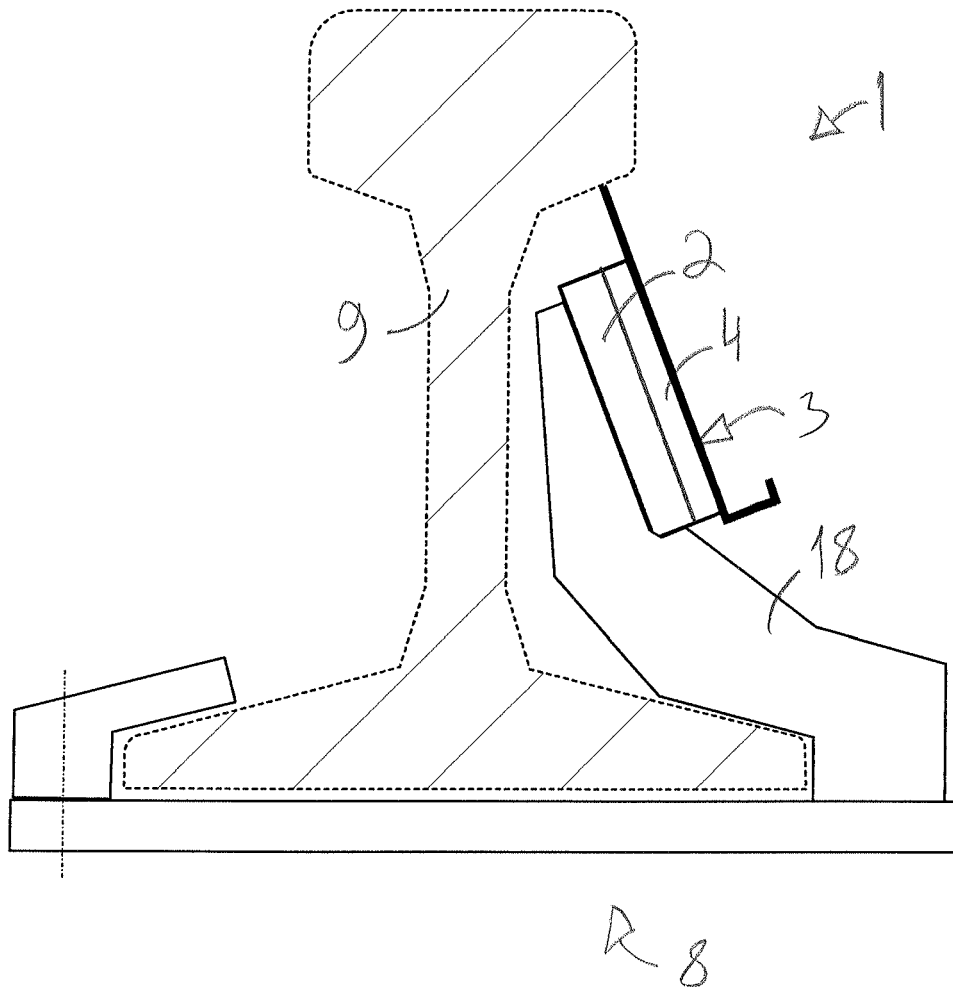


Fig. 5



EUROPEAN SEARCH REPORT

Application Number
EP 14 19 0812

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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 25 February 2015	Examiner Movadat, Robin
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