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(54) **Rail construction**

(57) The invention relates to a rail construction at least comprising one or more sleepers laid on a ballast bed, and one or more rails fixed to the sleepers by means of metal bolt-spring assemblies.

The object of the invention is to provide a solution to the problem of stray current corrosion, and according to the invention the rail construction is characterized in that a shielding element made of an electrically non-conductive material is provided between the spring and the rail.

The use of a shielding element mounted between the spring and the rail prevents induced stray currents flowing away or leaking into the ballast bed via the rails and the bolt-spring assembly. The currents remain in the rails and do not cause any damage to the rail construction and the environment through stray current corrosion.

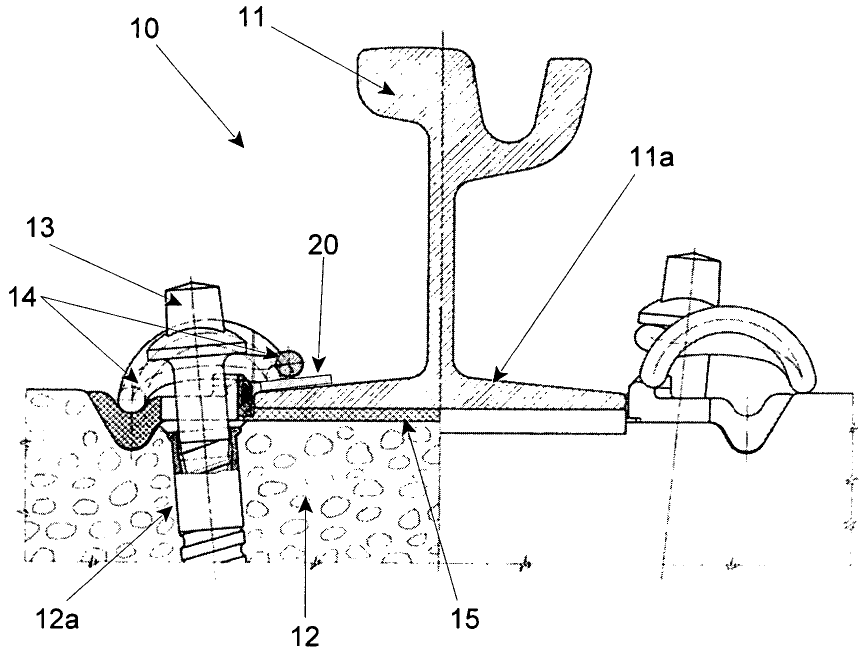

Fig. 1

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Description

[0001] The invention relates to a rail construction at least comprising:

- one or more sleepers laid on a ballast bed, and
- one or more rails fixed to the sleepers by means of metal bolt-spring assemblies.

[0002] The current rail constructions are increasingly used for train, tram and underground railway carriages that are operated at higher speeds. Because of the increased average speed, it is generally no longer possible to brake such carriages solely on the wheels, but active braking also takes place on the electric motors by which the carriages are driven.

[0003] As a result of said active braking on the electric motors, currents are generated or induced, which currents move through the carriage from the electric motor and flow away via the wheels and the rails. Such induced currents are also called stray currents, and said stray currents attack the metal parts of the rail construction by way of stray current corrosion. Furthermore, such stray currents leak into the ballast bed via the bolt-spring assembly, causing disturbances in installations disposed beside the ballast bed.

[0004] The object of the invention is to provide a solution to the above drawbacks, and according to the invention the rail construction is to that end characterized in that a shielding element made of an electrically non-conductive material is provided between the spring and the rail.

[0005] The use of a shielding element mounted between the spring and the rail prevents induced stray currents flowing away or leaking into the ballast bed via the rails and the bolt-spring assembly. The currents remain in the rails and do not cause any damage to the rail construction and the environment through stray current corrosion.

[0006] According to a special embodiment of the invention, the shielding element is made of polyamide, and more in particular said polyamide is a class 6 polyamide.

[0007] According to the invention, in order to prevent damage to the shielding element caused by the loads and stresses that occur in a rail construction, in particular when a train passes, the shielding element is glass fibre-reinforced. It is preferable in that case if the glass fibre content of the shielding element is at least 40%.

[0008] According to a special embodiment, the shielding element is according to the invention configured as a strip which is oriented parallel to the longitudinal direction of the rails. The short end faces of the strip-shaped shielding element may be bevelled, with the bevel angle of the short end face ranging between 60° and 90°, in particular being 65°.

[0009] In another embodiment, the longitudinal end faces of the strip-shaped shielding element may likewise be bevelled, with the bevel angle of the longitudinal end face more specifically ranging between 60° and 90°, in particular being 87°. Because of the bevelled configuration of said end faces, accumulations of dirt can hardly occur, if at all, thus preventing stray currents from leaking away undesirably via said dirt.

[0010] To achieve an improved positioning of the spring on the shielding element, the shielding element is according to the invention provided with recesses, in which at least part of the spring can be received.

[0011] The invention also relates to a shielding element as described in the present application. The invention will now be explained in more detail with reference to a drawing, in which:

Figure 1 is a cross-sectional view of a rail construction according to the invention;
Figure 2 is a top plan view of the rail construction shown in figure 1;
Figure 3 shows an embodiment of a shielding element according to the invention.

[0012] For better understanding of the invention, like parts will be indicated by the same numerals in the description of the figures below.

[0013] Numeral 10 indicates a rail construction comprising a rail 11, which is laid on a sleeper 12 with its base 11a. The sleeper 12 may be a wooden sleeper, but concrete sleepers are increasingly used these days. The sleeper 12 is laid on a ballast bed (not shown) together with a large number of other sleepers, in such a manner that the longitudinal direction of the sleepers 12 is oriented perpendicular to the longitudinal direction of the rails.

[0014] The rail 11 is fixed to the sleeper 12 by means of a bolt-spring assembly 13, 14. The sleeper 12 is to that end provided with several boreholes 12a, into which the bolt 13 can be screwed. The bolt 13 clamps down the spring 14, in such a manner that the spring is supported on the sleeper 12 on the one hand and clamps down a flange of the base 11a on the other hand.

[0015] A drawback of this currently known construction is that any stray currents that may be induced in the rails 11 can be carried away into the ballast bed (not shown) via the base 11 a, the metal spring 14, the metal bolt 13 and the sleeper 12. In the first place, the stray currents thus being carried away lead to so-called stray current corrosion on the spring 14, the bolt 13 and the base 11 a.

[0016] To prevent this, the rail construction 10 is according to the invention provided with a shielding element 20, which is made of an electrically non-conductive material and which must be placed between the spring 14 and the base 11 a. Thus, any stray currents that are induced cannot be carried away to the spring 14 and the bolt 13 via the base 11 a, thus preventing stray current corrosion on said parts and disturbances in (electrical) installations (such as transformer kiosks, etc) that may be disposed along the ballast bed. To prevent any stray currents that may be induced from being directly carried away to the sleeper 12 and the ballast bed (not shown)

via the rails 11, an insulation plate 15 is furthermore provided between the base 11a and the sleeper 12.

[0017] As is clearly shown in the top plan view of figure 2, the spring 14 is supported on the sleeper 12 on the one hand and on the base 11 a of the rails 11 on the other hand. Said supporting of the spring 14 on the base 11 a takes place via the spring ends 14a-14b. It will be understood, however, that also other spring constructions or assemblies may be adapted for use in the present invention.

[0018] The shielding element 20 arranged between the spring 14, more particulary the spring ends 14a-14b, and the base 11a of the rail 11 is configured as an elongated strip in this embodiment, which strip extends parallel to the longitudinal direction of the rails 11.

[0019] Figure 3 is a detail view of the shielding element 20 according to the invention. The shielding element 20 is preferably made of polyamide, which is an electrically non-conductive material. Said polyamide is preferably a class 6 polyamide, so as to realize an improved stray current shielding. Because of the loads to which the rails and the bolt-spring assembly are subjected upon passage of a train it is preferable in a specific embodiment to configure the shielding element as a glass fibre-reinforced element. Functionally, it has been found that if the glass fibre content is at least 40% side, a functionally usable shielding element is realized.

[0020] As shown in figures 2 and 3, the shielding element is preferably configured as an elongated strip-shaped element, whose short end faces 21a-21b are bevelled. The bevel angle α preferably ranges between 60° and 90°, more in particular said bevel angle is 65°. In another embodiment, the longitudinal end faces 22a-22b may likewise be bevelled, in which case the bevel angle β preferably ranges between 60° and 90°, in particular being 87°.

[0021] Said bevelled end faces prevent possible accumulation of dirt, which may otherwise lead to the induced stray currents leaking away to the spring 14 yet via the base 11 a.

[0022] In order to prevent possible shifting of the shielding element 20 as a result of the forces exerted on the rail construction (for example upon passage of a train), the shielding element is according to a special embodiment of the invention provided with recesses 23a-23b, in which the spring ends 14a-14b can be received.

[0023] It is furthermore noted that the invention also relates to a shielding element as described in the present application.

Claims

1. A rail construction at least comprising:

- one or more sleepers laid on a ballast bed, and
- one or more rails fixed to the sleepers by means of metal bolt-spring assemblies, **characterized in that** a shielding element made of an electrically non-conductive material is provided between the spring and the rail.

2. A rail construction according to claim 1, **characterized in that** the shielding element is made of polyamide.

3. A rail construction according to claim 2, **characterized in that** said polyamide is a class 6 polyamide.

4. A rail construction according to any one or more of the preceding claims, **characterized in that** the shielding element is glass fibre-reinforced.

5. A rail construction according to claim 2, **characterized in that** the glass fibre content of the shielding element is at least 40%.

6. A rail construction according to any one or more of the preceding claims, **characterized in that** the shielding element is configured as a strip which is oriented parallel to the longitudinal direction of the rails.

7. A rail construction according to claim 6, **characterized in that** the short end faces of the strip-shaped shielding element are bevelled.

8. A rail construction according to claim 7, **characterized in that** the bevel angle of the short end face ranges between 60° and 90° in particular it is 65°.

9. A rail construction according to any one of the claims 6-8, **characterized in that** the longitudinal end faces of the strip-shaped shielding element are bevelled.

10. A rail construction according to claim 9, **characterized in that** the bevel angle of the longitudinal end face ranges between 60° and 90°, in particular it is 87°.

11. A rail construction according to any one or more of the preceding claims, **characterized in that** the shielding element is provided with recesses, in which at least part of the spring can be received.

12. A shielding element as defined in according to any one or more of the preceding claims.

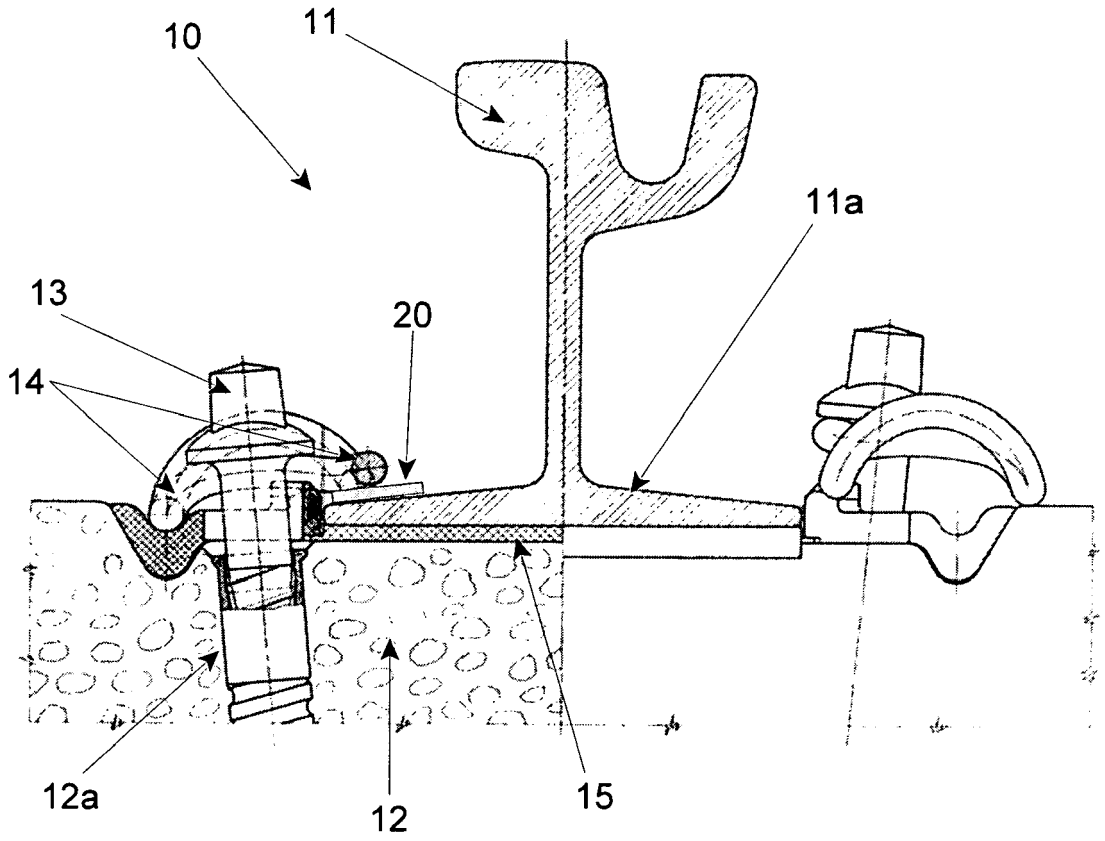

Fig. 1

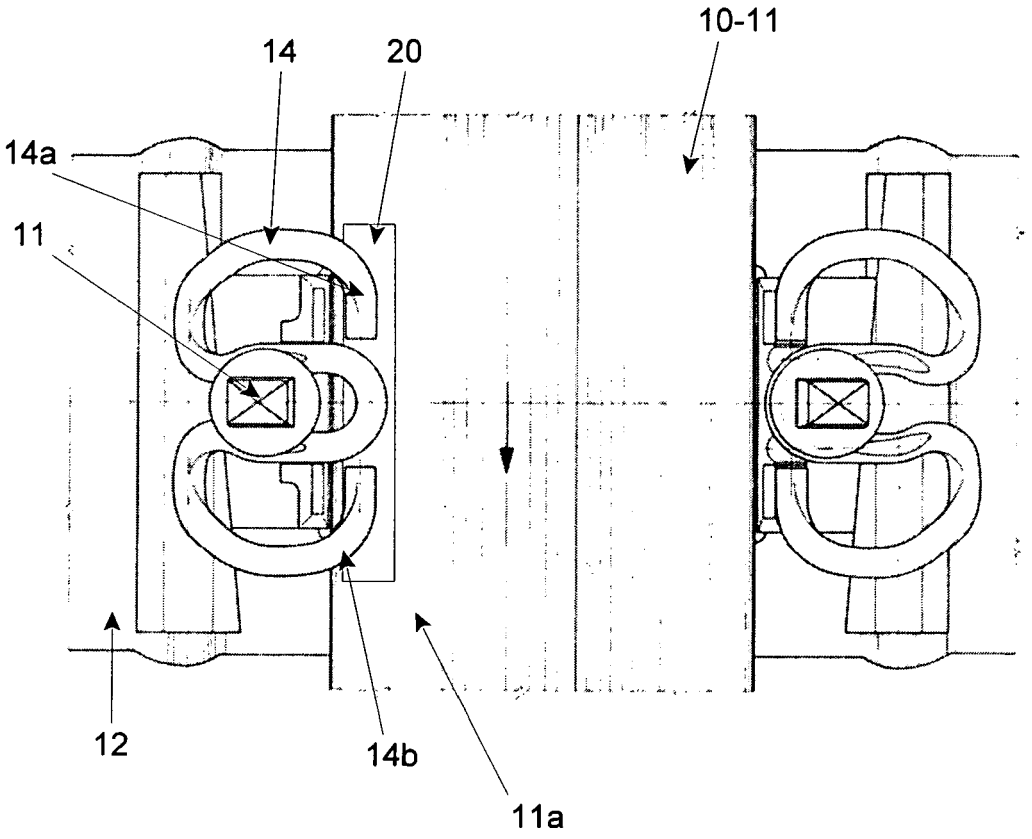

Fig. 2

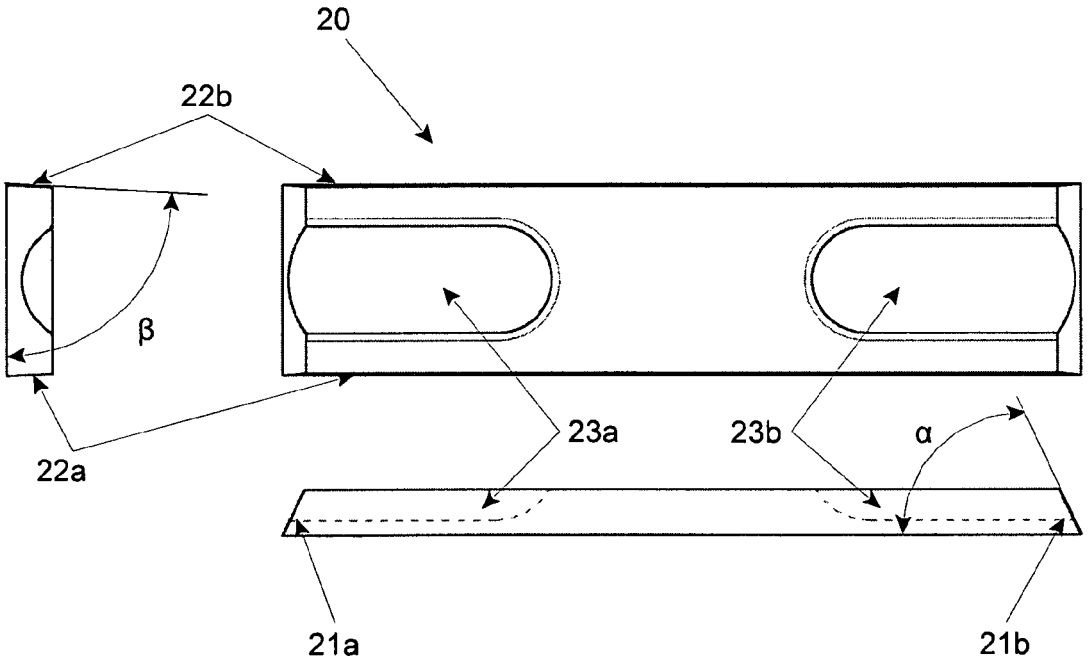

Fig. 3

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EUROPEAN SEARCH REPORT

Application Number
EP 07 07 5868

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	US 6 343 748 B1 (PILESI WILLIAM D [US] ET AL) 5 February 2002 (2002-02-05) * column 3, line 50 - column 4, line 44; figures 3,4a,4b *	1-3,6-12	INV. E01B9/30
X	GB 1 549 623 A (PANDROL LTD) 8 August 1979 (1979-08-08) * page 2, lines 9-56; figures 1-3 *	1-7	
A	US 3 654 219 A1 (BOYER WILLIAM M ET AL) 4 April 1972 (1972-04-04) * column 3, lines 60-65 *	5	

TECHNICAL FIELDS SEARCHED (IPC)

E01B
C08K

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	10 January 2008	Gallego, Adoración

CATEGORY OF CITED DOCUMENTS

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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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10-01-2008

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 6343748 B1	05-02-2002	AU 784204 B2	23-02-2006
		AU 6558901 A	07-03-2002
		CA 2357090 A1	28-02-2002
		MX PA01008756 A	12-08-2004
GB 1549623 A	08-08-1979	NONE	
US 3654219 A1		NONE	

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