

12

EUROPEAN PATENT APPLICATION

21 Application number: 80102091.8

51 Int. Cl.³: **E 01 B 11/54**

22 Date of filing: 18.04.80

30 Priority: 18.04.79 NL 7903024

71 Applicant: **Edilon B.V., Nijverheidsweg 23, NL-2031 CN Haarlem (NL)**

43 Date of publication of application: 29.10.80
Bulletin 80/22

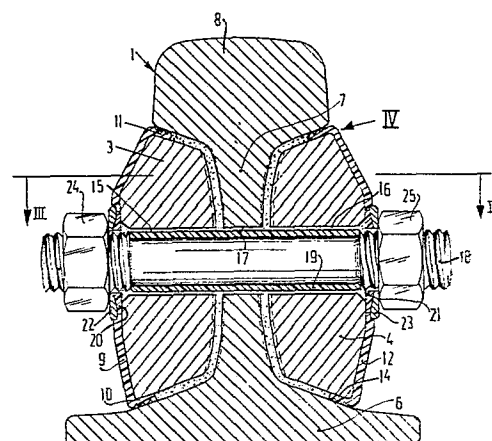
72 Inventor: **Eisses, Jacob Albertus, Haydenlaan 4, NL-3723 KH Bilthoven (NL)**

84 Designated Contracting States: **AT DE FR GB NL**

74 Representative: **Siedsma, Antonius et al, OCTROOIBUREAU ARNOLD & SIEDSMA Isartorplatz 5, D-8000 Munich 2 (DE)**

54 **Electrically insulating connection between the ends of two rails.**

57 Electrically insulating connection between the ends of two rails by means of two steel fish plates (3, 4) clamped against the rail ends on either side by clamping means, a cold-hardening plastics paste being provided between the fishplates and the rail and each fishplate on the side remote from the rails being provided with an electrically insulating shell (9, 12), consisting of one or more parts and which engages around the top and bottom of the fishplate, the thickness of the shell edge portion engaging around the fishplate corresponding in the clamped condition with the thickness of the layer of plastic paste.



EP 0 017 995 A1

Edilon B.V. of Haarlem

-1-

Electrically insulating connection between the ends of two rails

This invention relates to an electrically insulating connection between the ends of two rails by means of two steel fishplates clamped against the rail ends on either side by clamping means, a cold-hardening plastics paste being provided
5 between the fishplates and the rails.

In the known construction used previously, the edges of the fishplates are provided with slots into which are placed rods to enable the connection to be tensioned before the paste sets, as a result of the fishplates resting against
10 the rails via the rods. In such cases the rods also seal off the space in which the paste is disposed. The disadvantage of these slots, however, is that the fishplate cross-section is weakened and fatigue fracture or permanent deformation may occur in the fishplate at the place where the rails are
15 connected. Another disadvantage is that the slots have to be formed by mechanical after-treatment, with increased risk of

-2-

breakage of the fishplates. These disadvantages are all the greater in the case of connections in a modern continuous rail of unlimited length. Temperature differences then give rise to considerable compression and tensile stresses in the rails, and these have to be transmitted via the fishplates. Rail joints are also increasingly more heavily loaded by the increasing axle loading of rail vehicles. If heavier rail profiles are used in order to take greater axle loads, the longitudinal forces occurring as a result in the continuous rail are again increased considerably because they are proportional to the area of the cross-section of the rail profile.

The object of this invention is to provide an insulating connection without any weakening of the fishplates while the connection can be tensioned before the paste hardens, so that the rail can be used.

According to the invention, on the side remote from the rails each fishplate is provided with an electrically insulating shell, which consists of one or more parts and which engages around the top and bottom of the fishplate, the thickness of the shell edge portion engaging around the fishplate coinciding, in the clamped condition, with the thickness of the layer of plastics paste. In this case the shell portions engaging around the fishplate edges form the support surface for the fishplates. The shells can be fitted very easily if the fishplates are so shaped that the edges of the shells engage around the fishplate edges, or in or around a profiled portion of the fishplate with a snap action. If the insulating shell has horizontal portions, it may be desirable to fix these parts to the fishplate, e.g. by gluing or melting.

According to the invention, the shell edge portions engaging around the fishplate may have on the outside a profiling which is deformable under clamping pressure. This gives a good contact against the rails on deformation of the profiling. It also improves sealing so that no paste can escape at these edge portions. In some case it may be advantageous to use a wedge-shaped tooth profiling, the height of

-3-

the teeth gradually decreasing towards the edge.

According to the invention, shells may be provided with rigid annular washers of insulating material to take the clamping forces at the places where the clamping means
5 pass through the shells. This gives complete insulation without the disadvantage of excessive local loading of the shells. The shells with the annular washers ensure that there is no electrical creep path on the outside of the fishplates.

According to the invention, the annular washers
10 may consist of the same basic material as the paste and engage with ample clearance around the clamping means. Consequently, the rings form a unit with the hardened paste, and since there is ample clearance the clamping means can always be fitted through the fishplates and the corresponding holes
15 in the rails even in the event of varying temperatures during assembly.

According to the invention, the clamping means may comprise screwthreaded members and nuts, the screwthreaded members may be provided with an insulating covering of the
20 same basic material as the paste and the annular washers. Consequently, the fishplates are subjected to the same loading on both sides of the rail, with accurate control of the loading. As a result of the described construction of the insulating covering, the covering will also form a unit with
25 the hardened paste and with the annular washers. The covering can be pressed tight around the clamping means.

In a preferred embodiment of the invention, the clamping means may have a smaller diameter at the insulating covering. The diameter of the holes in the rails can then be
30 as small as possible.

To take the very considerable forces described herein before as a result of the longitudinal forces in the rail and the loading due to the vehicles running over the rails, it would be necessary - in the absence of special
35 steps - to use very long fishplates in order to obtain a large adhesion surface and considerable shearing resistance. A large number of clamping means would have to be used and more holes than absolutely necessary would have to be drilled in the

rails. The provision of holes in in fact restricted to a minimum for strength purposes. Another disadvantage in that case would be that very large insulating shells would have to be used to enable the fishplates to be properly sealed. To maintain usable sizes for the insulating shells, according to the invention, the steel fishplates may have slight longitudinal corrugations on the side adjacent the rail. The use of shallow corrugations does not give any appreciable weakening of the fishplate and yet resistance to loading in the longitudinal direction of the rails is much better.

According to the invention, the surfaces of the rail web adjacent the fishplates may also be provided with slight longitudinal corrugations. These corrugations can readily be applied because the surface to which the paste is applied must in any case be cleaned to remove rolling skin and other irregularities.

In one advantageous embodiment, the corrugations in the rail web and in the fishplate may have the same length and a trough in one corrugation is situated opposite a crest of the other corrugation. A constant paste layer thickness can then be obtained with maximum shearing resistance.

The invention will be explained in detail in the following description of one exemplified embodiment with reference to the drawing wherein:

Figure 1 is a side elevation of a rail joint,
Figure 2 is a section on the line II-II in Figure 1 to an enlarged scale,

Figure 3 is a horizontal section of the joint shown in Figure 1 in section on the line III-III in Figure 2,

Figure 4 shows the detail IV from Figure 2 to an enlarged scale,

Figure 5 shows another embodiment of the detail VI from Figure 2,

Figure 6 shows still another embodiment of the detail IV from Figure 2.

Two rails 1 and 2 are interconnected by fishplates 3 and 4. A washer 5 in the shape of a rail profile is disposed between the ends of the rails 1 and 2. As will be seen from

-5-

figure 2, the rail 1 consists of a rail foot 6, a web 7 and a head 8. A shell 9 of insulating material engages by the edge portions 10 and 11 around the bottom and top of the fishplate 3. A shell 12 of corresponding construction is disposed on the fishplate 4. Shell 12 has edge portions 13 and 14 which engage around the top and bottom edges of the fishplate 4. The edge portions 10, 11 and 13, 14 bear against the rail foot 6 and rail head 8 with a deformable profiling. A screwthreaded member 18 extends in figure 2 through holes 15 and 16 in the fishplate 3 and 4 and a hole 17 in the web 7. A covering 19 of insulating material is disposed around the screwthreaded member. It fits with some clearance in the holes 15, 16 and 17. At the screwthreaded member 18 the shells 9 and 12 have an opening containing an annular washer 20 and 21 respectively, which is rigid and made of insulating material. Rings 22 and 23 bear on the rings 20 and 21 to support the nuts 24 and 25 on the screwthreaded member 18 in order to press the fishplates against the rail 3. When the nuts 24 and 25 are tightened, the profiled edge portions 10, 11, 13 and 14 of the shells 9 and 12 undergo deformation, thus providing a seal between the shells 9 and 12 and the rail foot 6 and head 8. A cold-hardening paste 26 is provided in the space left free between the fishplates 3 and 4 and the rail 3 and in the space around the covering 19 and the screwthreaded member 18 and after hardening this forms a unit with the rings 22 and 23 and the covering 19, since these parts are made from the same basic material. The paste 26 adheres to the steel fishplates 3 and 4, and to the rail 3. As will be seen from figure 3, on the side adjacent the rail web 7, the fishplates 3 and 4 have a corrugation 27 which extends in the longitudinal direction of the rails while similar corrugations 28 are provided on the web of the rails 2 and 3. The troughs of the corrugations 26 may be situated opposite the crests of the corrugations 28. This gives very considerable resistance to shearing, because the connection between the layer 26 and the metal parts is not defined simply by the holding power. The use of screwthreaded members gives the same loading on both sides of the connection. This gives a very good insulating effect while mechanically

-6-

there is no weakening of the fishplates or the rails. The corrugations 27 and 28 are shallow and extend gradually so that here again there is no inadmissible weakening. In one practical embodiment, the height of the corrugations is, 5 for example, 1 mm, the corrugation length is 50 mm and the thickness of the layer 26 is 3 mm. Figure 4 shows the part 13 of the shell 12 to an enlarged scale. Here the profiling has been given the form of teeth 29. The height of the teeth 23 decreases gradually towards the edge of the 10 part 13. Figure 5 shows a slightly different embodiment. The edge portion 13 has a protuding part 30 which cooperates through snap action with a depressed part 31 in the top of the the fish plate 4. In Figure 6 the same effect is obtained by giving the top of the fishplate 4 a protuding part 32 and the edge 15 portion 13a depressed part 33.

-1-

Electrically insulating connection between the ends of two rails

CLAIMS

1. An electrically insulating connection between the ends of two rails by means of two steel fishplates clamped against the rail ends on either side by clamping means, a cold-hardening plastics paste being provided between the fishplates and the rails, characterised in that on the side remote from the rails each fishplate is provided with an electrically insulating shell, which consists of one or more parts and which engages around the top and bottom of the fishplate, the thickness of the shell edge portion engaging around the fishplate coinciding, in the clamped condition, with the thickness of the layer of plastics paste.
2. A connection according to claim 1, characterised in that the shell edge portions engaging around the fishplate have on the outside a profiling which is deformable under clamping pressure.
3. A connection according to claim 2, characterised in that the shells are provided with rigid annular washers of insulating material to take the clamping forces at the places where the clamping means pass through the shells.
4. A connection according to claim 3, characterised in that the annular washers consist of the same basic material as the paste and engage with ample clearance around the clam-

-2-

ping means.

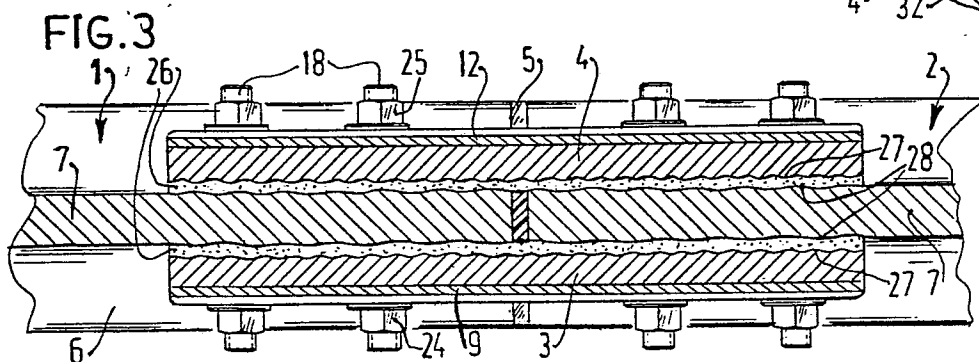
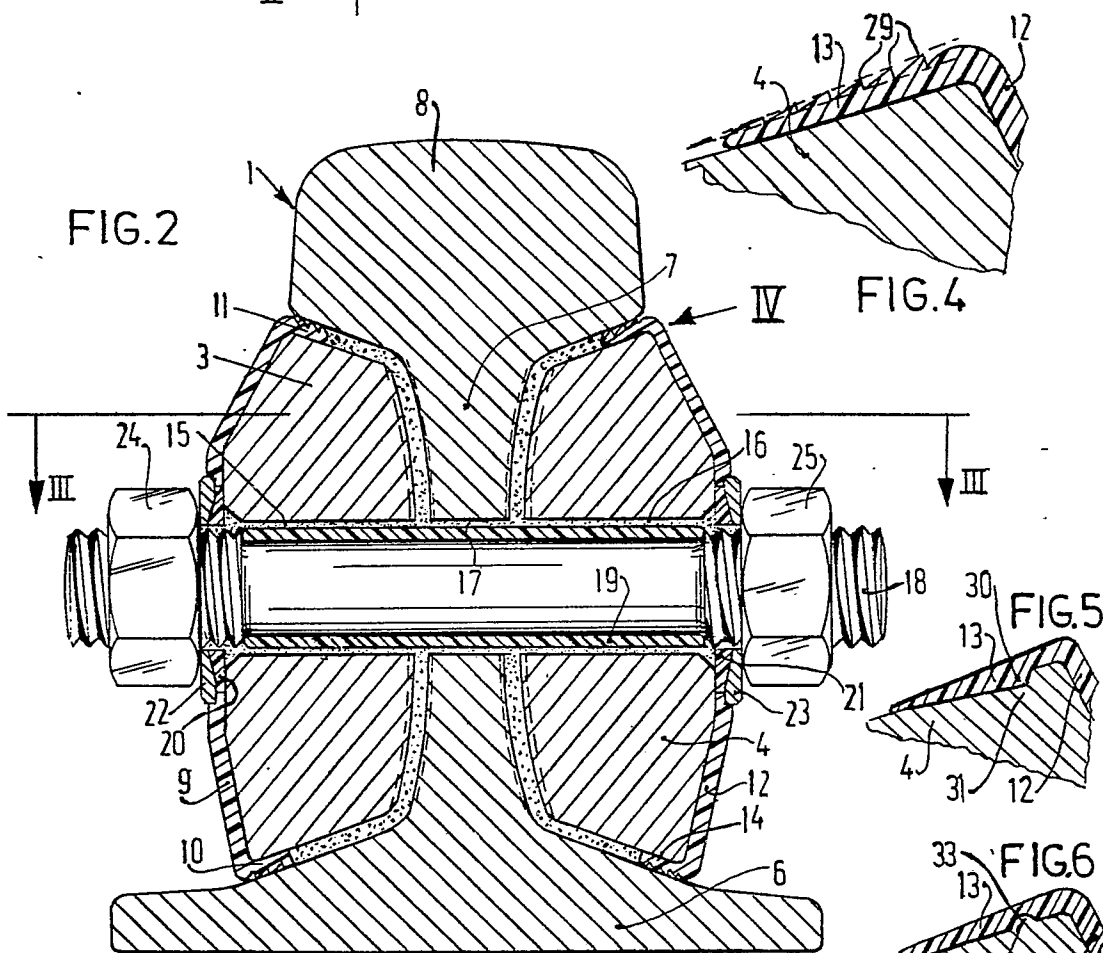
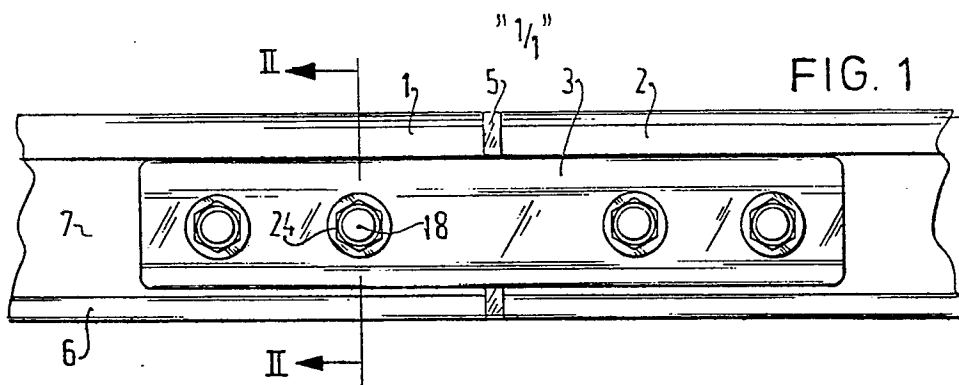
5 5. A connection according to claim 4, characterised in that the clamping means comprise screwthreaded members and nuts, the screwthreaded members being provided with an insulating covering of the same basic material as the paste and the annular washers.

6. A connection according to claim 5, characterised in that the clamping means have a smaller diameter at the insulating covering.

10 7. A connection according to one or more of the preceding claims, characterised in that the steel fishplates have slight longitudinal corrugations on the side adjacent the rail.

15 8. A connection according to claim 7, characterised in that the surfaces of the rail web adjacent the fishplates are also provided with slight longitudinal corrugations.

20 9. A connection according to claim 8, characterised in that the corrugations in the rail web and in the fishplate have the same length and a trough in one corrugation is situated opposite a crest of the other corrugation.



0017995



European Patent
Office

EUROPEAN SEARCH REPORT

Application number

EP 0 179 995

DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int. Cl. 3)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
	FR - A - 1 303 247 (LEUNA-WERKE) * Page 2, left-hand column, last paragraph; right-hand column, paragraph 1; figure 2 *	1,5	E 01 B 11/54
	--		
	US - A - 3 335 953 (HAMILTON) * Column 2, line 61 - column 3, line 15; column 3, lines 44,45; figure 1 *	1,3	
	--		
	DE - B - 1 241 473 (CLOUTH) * Column 6, lines 26-39; figures 1,3 *	1,5	TECHNICAL FIELDS SEARCHED (Int.Cl. 3)
	--		
	US - A - 3 381 892 (EISSES) * Column 1, lines 12-35 *	1	B 60 M 5/00 E 01 B 11/54 11/44
	--		
	US - A - 1 683 432 (ZIMMERMAN) * Page 1, lines 51-71; figure 3 *	1,3,5	
	--		
	DE - B - 1 240 545 (KLOCKNER) * Column 1, lines 20-43; column 2, lines 40-52; figure 2 *	1,3,5	CATEGORY OF CITED DOCUMENTS
	--		
	GP - A - 248 143 (PREVLIS INDUS. T.F.E.S.) * Page 5, lines 32-91, figures 2-4 *	1,3,5	X: particularly relevant A: technological background O: non-written disclosure P: intermediate document T: theory or principle underlying the invention E: conflicting application D: document cited in the application L: citation for other reasons

☒ The present search report has been drawn up for all claims			☐ member of the same patent family, corresponding document
Place of search	Date of completion of the search	Examiner	
1000	10-06-1988	J. P. 1000	