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(11)

EP 1 693 515 A1

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:

23.08.2006 Bulletin 2006/34

(51) Int Cl.:

E01B 11/54^(2006.01)(21) Application number: **06075397.7**(22) Date of filing: **20.02.2006**

(84) Designated Contracting States:

**AT BE BG CH CY CZ DE DK EE ES FI FR GB GR
HU IE IS IT LI LT LU LV MC NL PL PT RO SE SI
SK TR**

Designated Extension States:

AL BA HR MK YU(30) Priority: **21.02.2005 NL 1028350****24.06.2005 NL 1029336**(71) Applicant: **Volker Rail Nederland BV****4131 NJ Vianen (NL)**

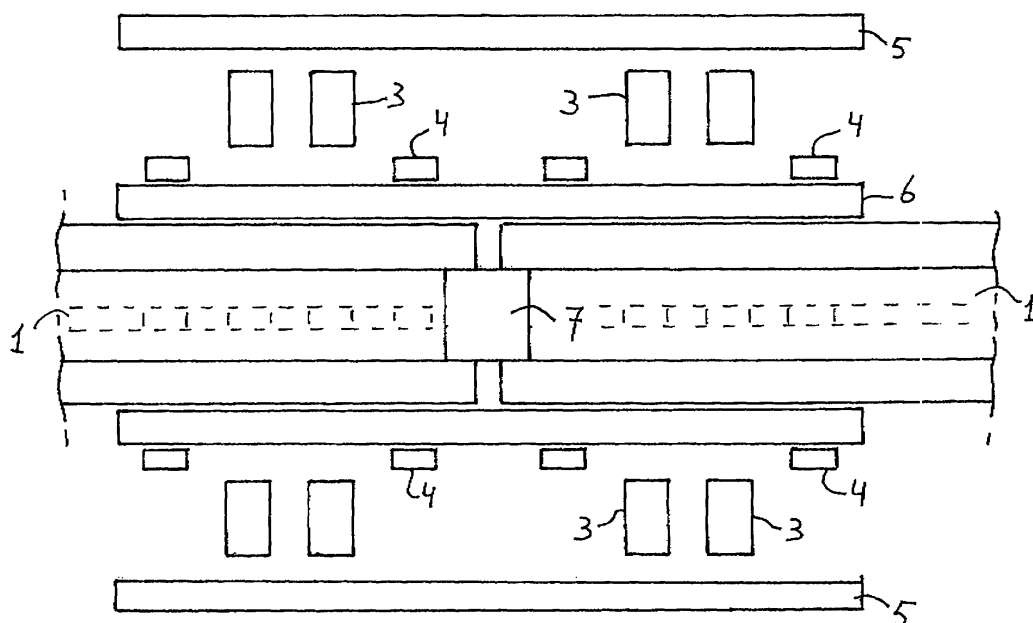
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(74) Representative: **Assendelft, Jacobus H.W.****Keukenhofdreef 20****2161 AZ Lisse (NL)****(54) Railway element with isolated joint**

(57) Rail adapted to bear a running wheel of a train and having an ES-joint, which is filled with a separate, pre-fabricated fill element (7) of which at least the contact face has at least one of grindability, hardness, stiffness and strength at least substantially equal to that of the rail, such that the running wheel of a train is supported by said fill element and the fill element fills the gap such that a running wheel experiences substantially no irregularity

during passage. The gap measures at least 50 or 60 mm, and the fill element (7) completely fills the gap leaving interstices of 2 mm at the most. The fill element comprises galvanically isolating material of ceramic or stone like or composite material or wood. The mutually facing ends of the rail at both sides of the gap extend away from each other in the upward direction since the gap (2) gently widens in upward direction and the fill element (7) has a shape identical with the shape of the gap (2).

**Fig 1****EP 1 693 515 A1**

Description

[0001] The invention is concerned with a train, tram or metro track, particularly a part of a rail thereof with mutually galvanically separated parts, such as an electrically separated weld joint or another splice between two in mutual extension provided rails, also known as ES-joint. The invention is also concerned with keeping a railway free from disturbances.

[0002] The invention is hereafter illustrated by way of the application to an ES-joint. The invention is however not limited to this field of application, but is e.g. also suited for other parts that bear a running wheel of a train.

[0003] The object is a substantially larger gap between at least a part of the rails that are in mutual extension and mutually galvanically separated, compared to the typical ES-joint, wherein said gap is at least partly filled with a separate, pre fabricated fill element. Preferably said larger gap is present at least at the level of the running face or check face over which or along which, respectively, the running wheel or its wheel flange, respectively, of the train runs. The dimension of the gap is preferably measured according to the shortest horizontal distance between the in mutual extension running rails of the ES-joint.

[0004] Preferably said gap measures between at least 10 mm or at least 20 mm or at least 30 mm, e.g. at least about 50 or 60 mm such that vandalism as source of disfunctioning can be eliminated. Also the sensibility to iron chips decreases substantially. E.g. the gap is larger than the diameter of a typical steel bicyclebellcap which by way of a practical joke is typically put on top of the ES-joint.

[0005] The fill element fills the space preferably such that a running wheel of the train experiences substantially no irregularity when passing the ES-joint. Preferably the fill element is therefore designed such that at the ES-joint the running face for the running wheel of the train is substantially free from interstices that are allowed to be e.g. 2 mm wide at the most. Thus the fill element preferably connects substantially gap or space free to the in mutual extension running rails of the ES-joint.

[0006] The fill element contains preferably galvanic isolating material. It is e.g. completely made of galvanic isolating material, e.g. ceramic (e.g. oxides of Zn, Si or Al) or stone like of composite material or wood (e.g. POK or Azobe). As an alternative it can at one or more sides, e.g. one or more of the longitudinal ends facing the rails of the ES-joint, the running face and the check face, have a surface covering of galvanic isolating material. The fill element e.g. contains a core of a material, e.g. steel, and a (e.g. at all sides) envelope of galvanic isolating material. The fill element can contain a reinforcement.

[0007] The fill element is preferably shaped or mounted in the ES joint such that it can bear the vertical or horizontal load of a running wheel of the train. It can therefore directly bear on the sub surface, e.g. sleeper or other foundation part of the railway. Or the fill element carries

the wheel load directly over to the adjacent rail, e.g. because the rail extends below a part of the fill element.

[0008] The fill element is preferably sufficient shape and wear resistant such that it behaves like a piece of steel rail. Preferably it has a hardness at least substantially equal to that of run out steel of rail quality. Preferably it can be ground such that it needs no different operation during grinding of rails that are already in use for some time. Therefore the fill element contains preferably substantially no fibres or at the most sufficient short fibres.

[0009] The fill element has preferably a shape similar to the shape or geometry of the rail, at least in relation with the rail head or the parts thereof that are in contact with the running wheels of the train.

[0010] According to another aspect the object is to make of the known ES joint the separately fabricated, galvanically isolating fill piece in the gap of no more than 4 mm or 6 mm between the in mutual extension running rails, such that it has at least one of grindability, hardness, stiffness and strength at least substantially equal to that of the rails, such that the problem of cantilevering of the rails is solved since for the first time the running wheel of the train is supported by the fill piece- Thus the existing fill piece of polymer material is replaced by a fill piece containing e.g. ceramic (e.g. oxides of Zn, Si or Al) or stone like or composite material or wood (e.g. POK or Azobe). The fill piece can be completely made of the relevant material, or be made of a core piece of a material, e.g. steel, and a (e.g. at all sides) envelope of galvanically isolating material.

[0011] The ES-joint is e.g. of the type as disclosed in US-A-5,503,331 or NL-A-1012078. EP-A-0.242.350 is also cited. Possible designs of the ES-joint are shown in top view in CN-A-1.172.879.

[0012] As a rule, the ES-joint has two parallel coupling strips at both sides of the web of the rail, wherein each coupling strip are mounted to the webs of both in mutual extension running rails. If the coupling strip is galvanically conveying, e.g. made of steel, it is galvanically isolating mounted to the rails, e.g. by using of an isolating (glue) layer between the coupling strip and the web of the rail and in isolating bushes received mounting bolts. If the coupling strip is galvanically isolating, e.g. of polymer material, galvanically isolating attention for the mounting is not required.

[0013] The rails of the ES-joint end at a mutual horizontal distance, and as a rule the gap is filled with galvanically isolating material.

[0014] To be able to support the running wheel of the train in the area of the fill element as good as somewhere else along the track, the mutual facing longitudinal ends of the rails of the ES-joint are shaped such that they move away from each other in upward direction.

[0015] The enclosed drawing shows a non-limiting example of the invention. Fig. 1-3 show an exploded top, side and end view, respectively.

[0016] As shown, from the position below the rail head 1, each rail is bevelled in upward direction in longitudinal

direction of the track, such that the gap 2 in upward direction gently widens. The fill element has a shape identical to the shape of the gap 2.

[0017] Galvanically isolating, e.g. ceramic shear pins 3 and rings/bushes 4. Bolts will extend through the bushes 4 and will project with their ends beyond the metal web plates 5 at both sides of the rail web. The bolts function as clamping means to clamp the web plates 5 through the galvanically isolating isolation plates 6 against the rail web. The shear pins 3 contribute to the load transfer of the normal and pulling loads between the rail ends to be connected. They contribute to the load transfer between a rail end and a web plate 5. The pins 3 and bushes 4 run through the rail web.

[0018] Any convenient number of ceramic shear pins 3 and bushes 4 is possible, e.g. or three in stead of the illustrated two of each on both sides of the gap 2 between the rail ends. Also each mutual positioning different from the illustration is possible (i.e. each time two shear pins 3 between two isolating bushes 4).

[0019] The pins 3 can be received in blind drilled holes in the web plates 5, debouching towards the rail. The web plates 5 have possibly through drilled holes receiving the pins 3. Another mounting of the pins to the web plates 5 is also possible. It is also feasible, to use a longer pin 3 than shown, which is fixed at both web plates 5.

[0020] In an alternative variant based on this embodiment, the ceramic isolator 7 is replaced by an alternative galvanic isolator in the gap 2, e.g. a plastic isolator such as known from the prior art. The shape of the gap can also differ. All described or in the drawing shown features provide in isolation or arbitrary combination the subject of this invention.

Claims

1. Railway element adapted to bear a running wheel of a train, such as a rail (1) or check face, and wherein, at the level of the contact face contacting the running wheel or the flange thereof, there is a gap (2), such as an ES-joint, which is filled with a separate, prefabricated fill element (7) of which at least the contact face has at least one of grindability, hardness, stiffness and strength at least substantially equal to that of the railway element, such that the running wheel of a train is supported by said fill element and the fill element fills the gap such that a running wheel experiences substantially no irregularity during passage.
2. Element according to claim 1, wherein the gap (2) measures at least 10 or 20 or 30 mm, e.g. at least about 50 or 60 mm, and/or the fill element (7) completely fills the gap leaving interstices of 2 mm at the most.
3. Element according to claim 1 or 2, wherein the fill

element comprises galvanically isolating material, preferably ceramic (e.g. oxides of Zn, Si or Al) or stone like or composite material or wood (e.g. POK or Azobe), and/or a core of a material, e.g. steel, and a (e.g. at all sides) envelope of galvanically isolating material and possibly a reinforcement.

4. Element according to any of claims 1-3, wherein the fill element (7) is shaped or mounted in the gap such that it can bear the vertical or horizontal load of the running wheel of the train, for which it immediately bears onto the sub surface, e.g. sleeper or other foundation part of the railway, or transfers the wheel load directly to the adjacent rail, e.g. since the rail (1) extends below a part of the fill element.
5. Element according to any of claims 1-4, wherein the mutually facing ends of the railway element at both sides of the gap extends away from each other in the upward direction since the gap (2) gently widens in upward direction and the fill element (7) has a shape identical with the shape of the gap (2).
6. Element according to any of claims 1-5, wherein the fill element (7) is sufficient shape or wear resistant such that it behaves like a piece of steel rail and/or has a hardness at least substantially equal to that of run out steel of rail quality and/or can be ground.
7. Element according to any of claims 1-6, with the gap bridging, longitudinally extending bridging parts (5) which are, via isolating parts (6), mounted to the rail (1) by galvanically isolating, e.g. ceramic, shear pins (3) and rings/bushes (4).
8. Fill element (7) for a railway element according to any of claims 1-7.

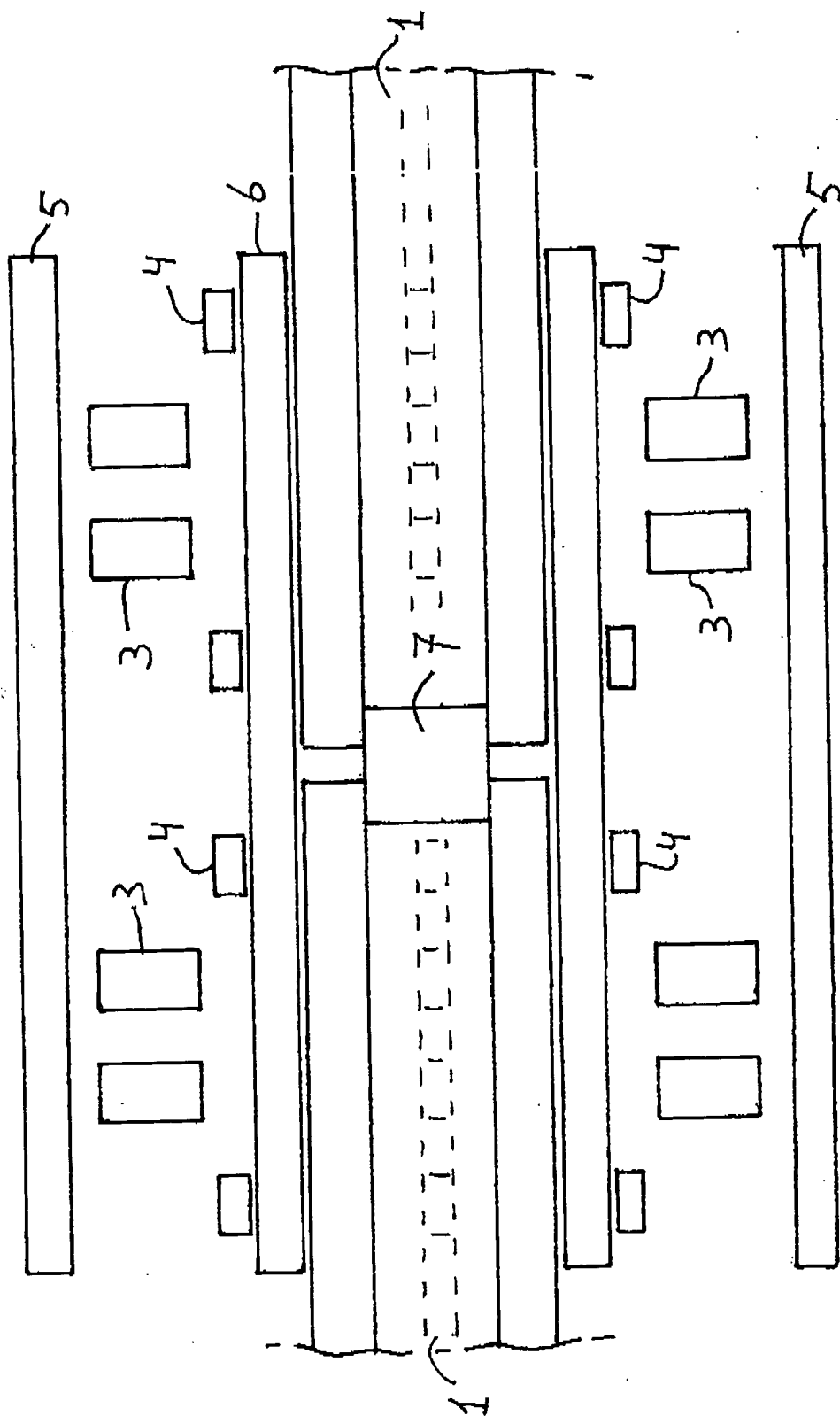


Fig 1

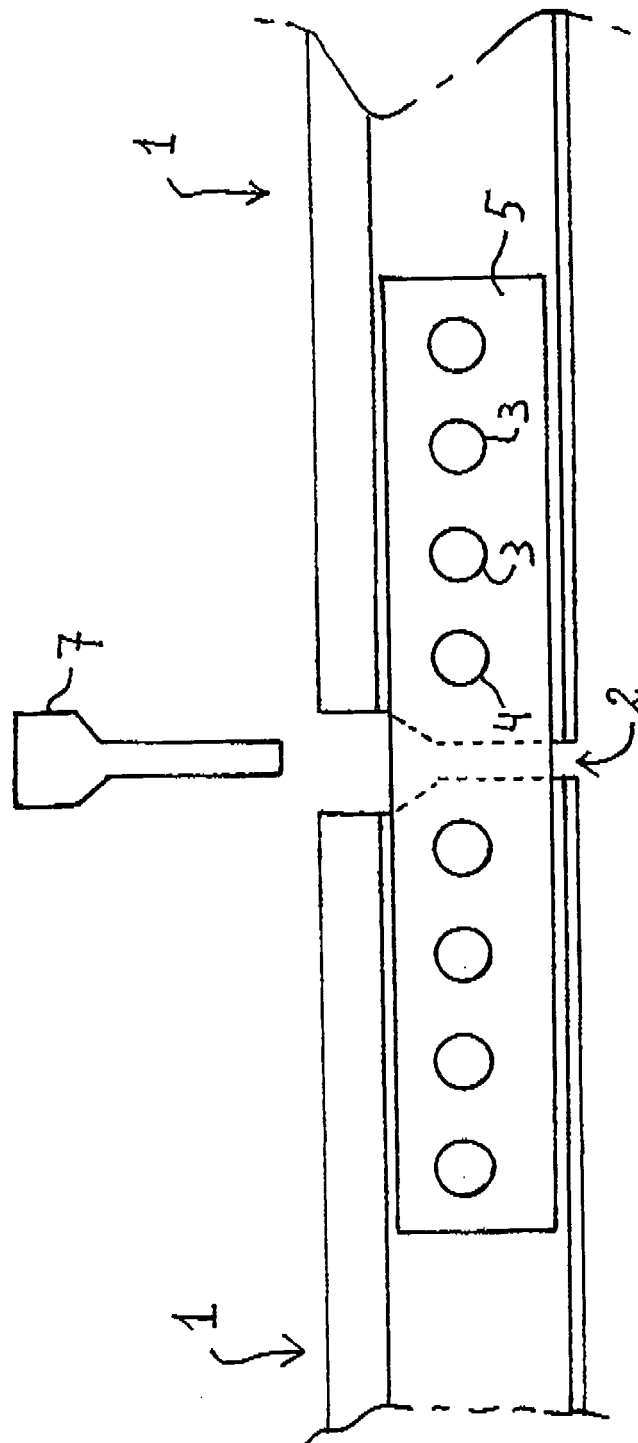
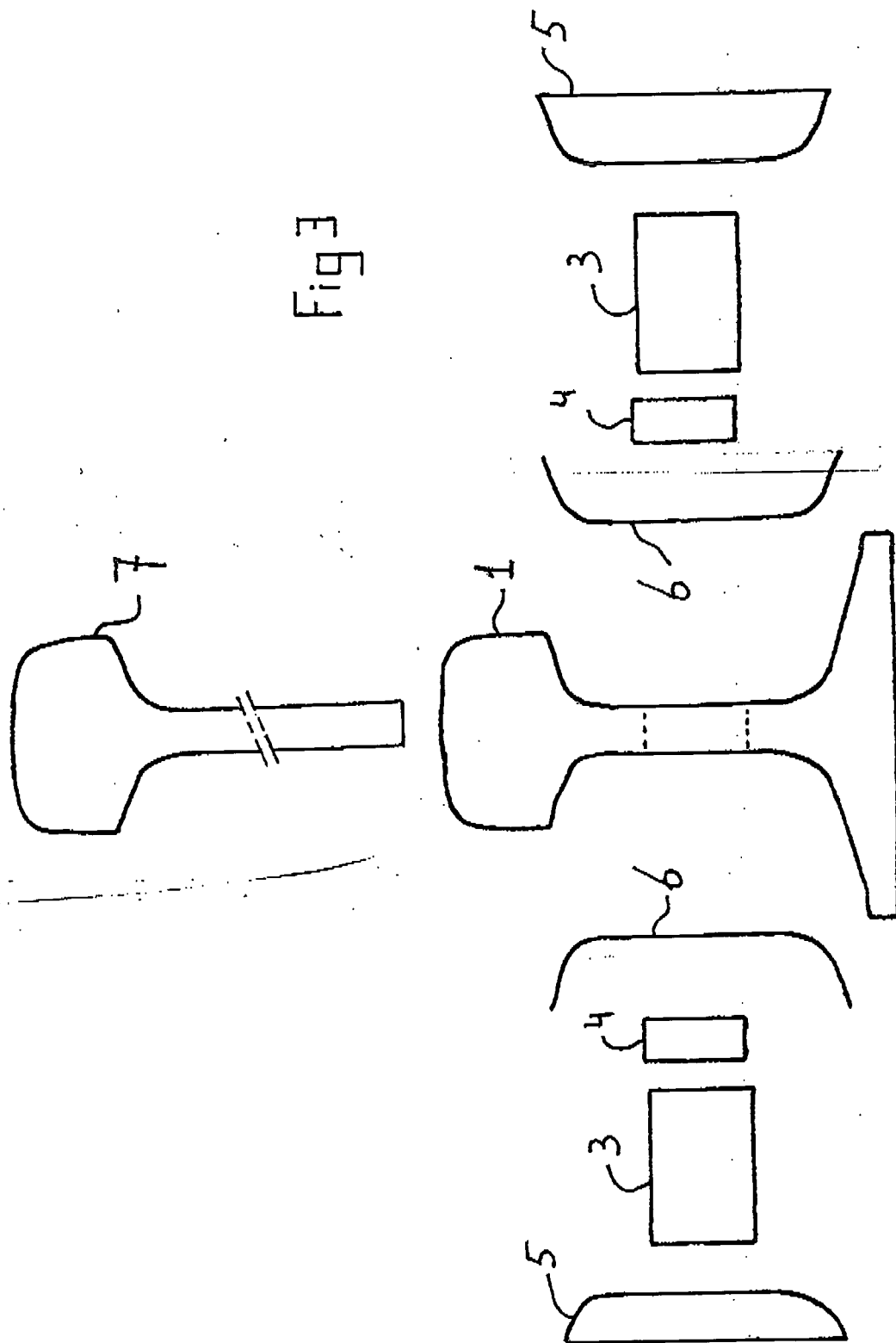


Fig 2





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PARTIAL EUROPEAN SEARCH REPORT

Application Number

which under Rule 45 of the European Patent Convention EP 06 07 5397 shall be considered, for the purposes of subsequent proceedings, as the European search report

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
D,X	US 5 503 331 A (URAMSON, JR. ET AL) 2 April 1996 (1996-04-02) * abstract; figure 1 * * column 4, lines 50,51 * * claim 2 *	1-4,6,7	INV. E01B11/54
A	----- EP 1 164 222 A (BALFOUR BEATTY PLC) 19 December 2001 (2001-12-19) * abstract; figure 1 * * column 6, lines 12,13 * * figure 3 *	5	
X	----- WO 03/048456 A (EDSALL, KEVIN, FRANCIS) 12 June 2003 (2003-06-12) * page 5; figure 1 *	1-4,6,7	
A	----- US 4 773 590 A (DASH ET AL) 27 September 1988 (1988-09-27) * column 4, lines 14-36; figures 1-4 *	5	
X	----- US 4 773 590 A (DASH ET AL) 27 September 1988 (1988-09-27) * column 4, lines 14-36; figures 1-4 *	1-4,6,7	TECHNICAL FIELDS SEARCHED (IPC)
			E01B
INCOMPLETE SEARCH			
The Search Division considers that the present application, or one or more of its claims, does/do not comply with the EPC to such an extent that a meaningful search into the state of the art cannot be carried out, or can only be carried out partially, for these claims. Claims searched completely : Claims searched incompletely : Claims not searched : Reason for the limitation of the search: see sheet C			
Place of search		Date of completion of the search	Examiner
Munich		9 May 2006	Fernandez, E
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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EPO FORM 1503 03.82 (P04C07)



Claim(s) searched completely:
1-7

Claim(s) not searched:
8

Reason for the limitation of the search:

The subject-matter of claim 8 is not clearly defined in terms of its structural features (Article 84 EPC). The wording of this claim implies a large number of possible embodiments and materials, which are not supported by the description.

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 06 07 5397

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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09-05-2006

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 5503331	A	02-04-1996	CA 2156754 A1	24-02-1997
EP 1164222	A	19-12-2001	NONE	
WO 03048456	A	12-06-2003	NONE	
US 4773590	A	27-09-1988	NONE	