(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 2 719 827 A1**

(12) **EUROPEAN PATENT APPLICATION**
published in accordance with Art. 153(4) EPC

(43) Date of publication:
16.04.2014 Bulletin 2014/16

(21) Application number: **12789165.3**

(22) Date of filing: **25.05.2012**

(51) Int Cl.:
E01B 9/00 *(2006.01)* ***E01B 9/38*** *(2006.01)*

(86) International application number:
PCT/ES2012/070386

(87) International publication number:
WO 2012/160238 (29.11.2012 Gazette 2012/48)

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR

(30) Priority: **26.05.2011 ES 201130567**
26.05.2011 ES 201130568

(71) Applicant: **Railtech Sufetra, S.A.**
08901 L'Hospitalet de Llobregat, Barcelona (ES)

(72) Inventor: **VIVES CLAVEL, Juan**
08901 L'Hospitalet de Llobregat (Barcelona) (ES)

(74) Representative: **Carpintero Lopez, Francisco et al**
Herrero & Asociados, S.L.
Alcalá 35
28014 Madrid (ES)

(54) FASTENING ASSEMBLY FOR RAILWAY RAILS AND A METHOD FOR PRODUCING SAID ASSEMBLY

(57) The present invention relates to a fastening assembly for railway rails (7) and method for obtaining same, comprising a base plate (1, 1') comprising an imaginary central axis which is located perpendicular to a rail (7) and at least two end openings (11) located on the central axis suitable for allowing the insertion of anchor bolts (12), where said base plate (1, 1') is a metal plate and has a uniform thickness such that it can be cut by laser cutting means and shaped in a conventional pressing equipment, comprising a raised central section (3) that is aligned with the central axis, flanked by respective side flanges (9). The plate of the invention and the manufacturing process thereof reduce costs and simplify installation of the fastening assemblies.

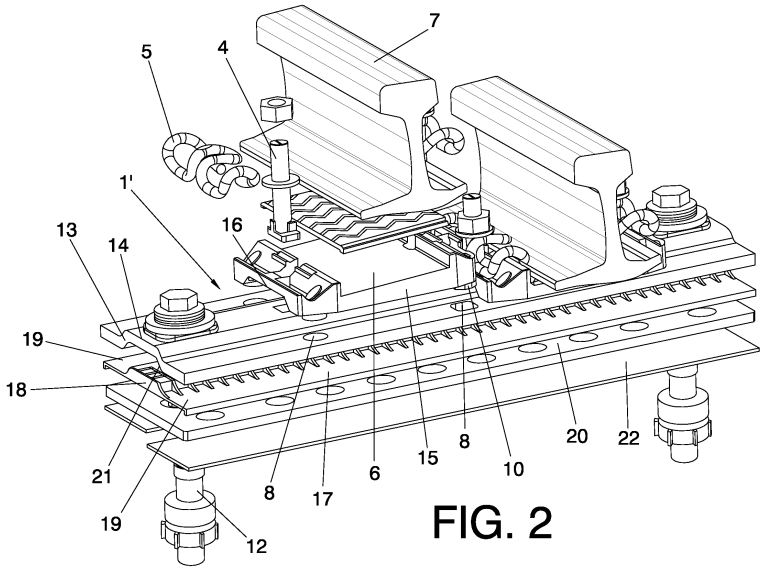

FIG. 2

EP 2 719 827 A1

Description

Field of the Invention

[0001] The present invention applies to railway fastening systems. More specifically, the invention relates to a fastening assembly for railway rails, preferably for sidings in high-speed lines.

Background of the Invention

[0002] Railway siding generally has a structure in which a metal plate is fastened to a cross member. It is necessary to incorporate fastening elements for the rails on the metal plate. Fastenings that fasten only one rail and fastenings that fasten two rails can be distinguished in a siding fastening, in this case the relative position of each of the rails is different in each fastening.

[0003] The fastening elements in a siding are generally formed by flat steel base plates that are 30 mm thick. Said base plates are provided with openings and steel supports provided in the lower portion thereof with respective lugs that are inserted into the respective openings, for subsequently welding the plates and the steel supports to one another. Under these plates and steel supports there is arranged a second assembly consisting of an iron plate having an outer configuration similar to the steel plate, on which rubber parts are incorporated, such that the rubber parts provide the system with the necessary elasticity.

[0004] Therefore, the following operations are required to obtain these base plates for a siding:

- the openings corresponding to the control bushings, through which the bolts fastening the base plate to a cross member are inserted, are marked and machined by means of a machining operation.
- The second step is to mark the position of each rail. To that end, previously shaped, L-shaped metal inserts which will be used for retaining and guiding the different rails are added. To enable housing the mentioned inserts, it is necessary to make an opening on the base plate for subsequently welding the insert to said base plate.
- There are arranged between said L-shaped metal inserts by means of a welding process, other metal inserts responsible for providing the necessary inclination according to each track section or depending on the national regulatory requirements, since the regulations and arrangement are different depending on the country in which the retaining elements are to be used.

[0005] According to the foregoing, it is clearly shown that the process for obtaining and installing the base plates is very costly, slow and inefficient from a production viewpoint, since it involves a large number of operators, as well as the need of using different work tools and machinery, which is further enhanced by the fact that each fastening has a geometry that is different from the rest and must be treated as a unique part for a particular and specific location, considering distances defined between the openings in which the different L-shaped metal inserts must be housed along the siding, i.e., in an individual manner, constantly controlling the machinery for each part and prior to shaping the next part being necessary.

[0006] Therefore, considering the large number of different fastenings that are used in a single siding with the subsequent need of machining a large amount of holes on each steel plate and welding the supports, and the time and material invested in the manufacture of the plurality of parts, it is concluded that the implementation of these railway rail fastening systems is inefficient.

Description of the Invention

[0007] The object of the invention is to overcome these technical problems and to provide a simpler and easier-to-produce fastening assembly for railway rails, as well as a method for obtaining same, that furthermore facilitates installation during the assembly of the retaining elements and the rails.

[0008] Therefore, given that a large number of different fastenings may be used in a single siding, the invention at hand aims to obtain a fastening that is as universal as possible by means of an effective and efficient production process, without the need of machining a large amount of holes on the steel plates and welding the supports, with savings in time and material invested in the manufacture of the plurality of parts, i.e., allowing the automation of the production thereof with the subsequent cost reduction that it entails.

[0009] To that end, the fastening assembly for railway rails comprises a base plate which allows fastening and retaining at least one railway rail. Usually each base plate in a siding retains two rails that are located on either side during point switching, changing the distance of said rails from a cross member to the adjacent one. However, when a certain separation distance is reached, an independent base plate tends to be arranged for each rail instead of a very long double base plate common to both.

[0010] The base plate of the invention comprises an imaginary central axis which, in a position of installation of the fastening assembly, is located perpendicular to at least one rail, given that the other tends to be slightly curved, i.e., the base plate of the fastening assembly is located with the central axis parallel to the cross member on which it is located. The base plate comprises at least two end openings located on the central axis suitable for allowing the insertion of respective anchor bolts of the base plate usually in a cross member.

[0011] According to the invention, the base plate is a metal plate and has a uniform thickness such that it can be cut by laser cutting means and shaped in a conventional pressing equipment, conventional equipment be-

ing understood as equipment commonly used for cutting and shaping metal sheet without needing additional or special resources required for carrying out special cutting and shaping work, for example, in the case of thicknesses greater than 25 mm. The end openings can be obtained by said laser cutting means.

[0012] Likewise, the base plate of the invention comprises a raised central section, which can be obtained by means of shaping in the pressing equipment, that is aligned with the central axis and flanked by respective side flanges. The thickness of the plate is therefore reduced with respect to the plates of the state of the art, such that by curving the central portion of the base plate of the invention by means of shaping, the moment of inertia thereof increases, such that the plate responds much more satisfactorily to the tests than if the plate was completely flat, which allows achieving mechanical characteristics equivalent to those of the plate of the state of the art having greater thickness of the order of 30 mm. The fact that the thickness of the base plate of the invention is much less allows, unlike the plates of the state of the art, automatically cutting said plates, for making a plurality of openings at different positions, for example, in a laser cutting equipment, which could not be performed while maintaining reasonable production costs in the case that the thickness of the plate was 30 mm or higher.

[0013] The possibility of the base plate comprising, for each rail to be fastened and retained, two inner openings located on the central axis is contemplated, such that each pair of inner openings are suitable for allowing the insertion of retaining screws for retaining on both sides a runner of a rail. Advantageously, the base plate according to the fastening assembly of the invention can be cut in a laser equipment, as in the case of the end openings with the advantages that it entails, which furthermore includes the fact that the relative distance between said openings is different in each base plate according to the position thereof in the siding, so automating the implementation by means of a laser cutting equipment allows significantly reducing the manufacture time.

[0014] Likewise, it is contemplated that the base plate comprises, for each rail to be fastened, at least one outer opening located in a side flange, said outer opening being suitable for receiving a projection of an independent element, such as a support element or a seat that can be located between the rail and the base plate, which allows facilitating the placement thereof. Like the inner openings, said outer openings are usually associated with each rail, such that the outer openings have the same advantages mentioned for the inner openings.

[0015] On the other hand, the invention relates to a fastening assembly for railway rails comprising a support plate, which is an element that may be complementary to and suitable for collaborating with the base plate described above, being located between the rail and said base plate. Said support plate allows fastening and retaining a railway rail, for which it has an upper face comprising a flat area suitable for supporting a runner of a rail. The support plate of the fastening assembly of the invention comprises two openings suitable for allowing the insertion of retaining screws for retaining on both sides the runner of the rail, such that according to the invention the support plate has a lower face comprising a recess suitable for receiving a projection of an independent element, which is preferably the raised central section of the base plate, such that immobilizing the support plate and facilitating the placement thereof in its service position is thus achieved.

[0016] Likewise, it is contemplated that the support plate comprises at least one lower projection located on the lower face thereof, where said lower projection is suitable for being housed in an opening of an independent element, such as one of the outer openings of the base plate. A better fastening and a quicker placement of the support plate is thus achieved.

[0017] The invention contemplates that the fastening assembly for railway rails comprises a base plate and a support plate such as those described above, where the recess of the support plate sits on the raised central section of the base plate.

[0018] A second aspect of the invention relates to a method for obtaining a fastening assembly for railway rails such as that described above, comprising the following steps or phases:

- cutting at least one plate according to specific length and width dimensions,
- shaping the central area of the plate until obtaining a raised central section, such that by curving the central portion of the plate, the moment of inertia thereof increases with respect to a flat plate, and
- making openings on said plate by means of a laser cutting equipment.

[0019] Among the advantages provided by said method with respect to the method used today, as described in the background, is the fact that in a single process for all the plates, time and raw material are saved, said process being able to be easily automated.

Brief Description of the Drawings

[0020] For the purpose of aiding to better understand the features of the invention according to a preferred practical embodiment thereof, a set of drawings is attached to the following description in which the following has been depicted with an illustrative character:

Figure 1 shows a perspective view of an embodiment of the fastening assembly of the invention comprising a double base plate, two railway rails being depicted fastened by means of the fastening assembly of the invention, how the different elements of the assembly cooperate with one another is also shown.

Figure 2 shows an exploded perspective view of the

fastening assembly depicted in Figure 1.

Figure 3 shows a bottom perspective view of the double base plate depicted in Figures 1 and 2.

Figure 4 shows a top perspective view of a second embodiment relating to an individual base plate.

Figure 5 shows two perspective views, top view and bottom view, respectively, of a support plate comprising the fastening assembly of the invention.

Detailed Description of the Invention

[0021] The fastening assembly of the present invention comprises a steel plate which acts as a support for the rest of the elements of the assembly and is suitable for withstanding the transverse forces, as well as the uncompensated acceleration due to the actual geometry of the siding to which the fastenings are subjected when a train goes by.

[0022] Figures 1 and 2 show the different elements of the fastening assembly for fastening two rails (7) located on one side of the railway track in a siding. The fastening assembly comprises a double base plate (1'), even though Figure 4 shows a individual base plate (1) which is useful in those areas of the siding in which the separation between the two rails (7) of one and the same side is such that it allows arranging an individual base plate (1) for each rail (7) instead of a double base plate (1') for both rails (7). Likewise, according to a preferred embodiment, the fastening assembly comprises a support plate (6), a seat plate in direct contact with the rail (7) and optionally a pad (20) on a second bottom plastic sheet (22) in the form of a protective plate, also optional, which allows maintaining the entire assembly at the same height if necessary and housing the pad (20), located on the cross member (not depicted). The function of the pad (20) is to ensure that the fastening assembly has the necessary medium rigidity.

[0023] The fastening assembly is completed with retraining clips (5) for retaining the rail (7) which are covered by the support plate (6) having track inclination, retaining screws (4) for retaining the clips (5) on the base plate (1, 1') and anchor bolts (12) acting as eccentricity control means which are inserted once the assembly is mounted on the cross members.

[0024] The base plate (1, 1') is the essential element of the assembly and is formed by an elongated, preferably a rectangular, central body. It can be an individual base plate (1) (Figure 4) or a double base plate (1') (Figures 1-3), the function of which is to retain the assembly of the seat plate, the support plate and to laterally retain the runner of the track.

[0025] The body of the individual base plate (1) has two end openings (11) for the insertion of the anchor bolts (12), two inner openings (2) for the insertion of the retaining screws (4) for retaining the clips (5) and four outer openings (8) the purpose of which is described below. In the case of the double base plate (1'), it has two end openings (11) on the body thereof for anchoring such as in the preceding case, but it has the particularity of being more elongated and suitable for the fastening of two rails (7) instead of only one. It is therefore provided with four inner openings (2) for the screws (4) of the clips (5) and eight outer openings (8), four for each rail (7).

[0026] The base plate (1, 1') comprises an imaginary central axis which, in a position of installation of the fastening assembly, is located perpendicular to the rails (7). According to a preferred embodiment, the base plate (1, 1') is a metal plate and has a uniform thickness in a range of 15-20 mm, such that it can be cut by laser cutting means and shaped in a conventional pressing equipment. The end openings (11), outer openings (8) and inner openings (2) can be obtained by said laser cutting means.

[0027] Likewise, the base plate (1, 1') comprises a raised central section (3) obtained by means of shaping in the pressing equipment that is aligned with the central axis and flanked by respective straight side flanges (9).

[0028] The base plate (1, 1') comprises, for each rail (7) to be fastened, two outer openings (8) located in each side flange (9), said outer openings (8) being suitable for receiving a lower projection (10) of the support plate (6), which allows facilitating the placement thereof. The support plate (6) incorporates, on the lower face thereof close to its end sections, for withstanding the forces in better state, four lower lugs or projections (10) arranged in two on the larger sides (15), for inserting them in the mentioned four outer openings (8) made on the side flanges (9) of the base plate (1, 1'). Similarly, the central section of said support plate (6) has a recess (16) suitable for sitting on the raised central section (3) of the base plate (1, 1').

[0029] The raised central section (3) comprises a straight section (14) the width of which is at least the width of each side flange (9), comprising curved transitions (13) between said raised central section (3) and said side flanges (9). This feature allows that the larger the surface area of the straight section (14) is, the more inertia is obtained and that the base plate (1, 1') bends less during operation.

[0030] The fastening assembly comprises a plastic bottom plate (17) located below the base plate (1, 1'), said bottom plate (17) comprising a raised central section (18) suitable for being tightly fitted under the raised central section (3), and two side flanges (19) suitable for being located below the side flanges (9) of the base plate (1, 1'), in order to achieve a force distribution that is as homogeneous as possible.

[0031] The raised central section (18) of the bottom plate (17) comprises a plurality of ribs (21). The raised central section (18) of the bottom plate (17) is preferably not solid, but is rather formed by ribs (21), to prevent 'voids' during manufacture.

[0032] According to a preferred embodiment, the fastening assembly for railway rails (7) comprises a base plate (1, 1') and a support plate (6) such as those described above, where the recess (16) of the support plate

(6) sits on the raised central section (3) of the base plate (1, 1'), such that the lower projections (10) of the support plate (6) are housed in the outer openings (8) of the base plate (1, 1').

[0033] A second aspect of the invention relates to a method for obtaining a fastening assembly for railway rails such as that described above, comprising the following steps or phases:

- cutting at least one flat metal sheet or plate according to the desired specific length and width dimensions,
- shaping the central area of the plate until obtaining a raised central section, such that by curving the central portion of the plate, the moment of inertia thereof increases with respect to a flat plate, and
- making openings on said plate by means of a laser cutting equipment.

[0034] According to a preferred embodiment, the method of the invention comprises:

- cutting a plurality of plates according to specific length and width dimensions into a section of a railway siding,
- shaping the central area of the plates until obtaining a raised central section, and
- making openings on the plates by means of a laser cutting equipment, such that the location of said openings in each plate is determined by the position of said plate in the siding and by the relative distance between the rails in said position.

[0035] To that end, programming data which defines the positioning of the corresponding openings on the base plate are entered in a laser or water cutting equipment, comprising a laser cutting robot automatically cutting the required parts, these at least two inner openings (2) in the raised central section (3) and at least four outer openings (8) in the side flanges (9) being arranged in two with respect to each side flange (9) of the base plate (1, 1') identifying the exact position for the installation of the support plate (6) sitting on the base plate (1, 1'). Before programming, there is the possibility of shaping two openings (11) close to the ends of the raised central section (3) of the smaller sides of the base plate (1), suitable for the arrangement of the eccentricity control assemblies (12) of the base plate (1, 1') on the cross member (not depicted) arranged below, during installation.

[0036] Among the advantages provided by said method with respect to the method used today, as described in the background, is the fact that in a single process for all the plates, time and raw material are saved, said process being able to be easily automated.

[0037] The process of manufacturing the base plate according to the invention is simple and quicker than the previous processes. By means of the laser cutting operation, as well as press stamping it is possible to eliminate the machining and welding operations necessary for the installation of the fastening systems known until now, which operations are very time consuming and require the use of expensive equipment.

Claims

1. Fastening assembly for railway rails (7) comprising a base plate (1, 1') which allows fastening and retaining at least one railway rail (7), where said base plate (1, 1') comprises an imaginary central axis which, in a position of installation of the fastening assembly, is located perpendicular to at least one rail (7), said base plate (1, 1') comprising at least two end openings (11) located on the central axis suitable for allowing the insertion of respective anchor bolts (12) of the base plate (1, 1'), **characterized in that** the base plate (1, 1') is a metal plate and has a uniform thickness such that it can be cut by laser cutting means and shaped in a conventional pressing equipment, said base plate (1, 1') comprising a raised central section (3) that is aligned with the central axis, flanked by respective side flanges (9).

2. Fastening assembly according to claim 1, wherein the thickness of the base plate (1, 1') is in a range of 15-20 mm.

3. Fastening assembly according to any of the preceding claims, wherein the base plate (1, 1') comprises, for each rail (7) to be fastened and retained, two inner openings (2) located on the central axis suitable for allowing the insertion of retaining screws (4) for retaining on both sides a runner of a rail (7).

4. Fastening assembly according to any of the preceding claims, wherein the base plate (1, 1') comprises, for each rail (7) to be fastened, at least one outer opening (8) located in a side flange (9), said at least one outer opening (8) being suitable for receiving a projection of an independent element.

5. Fastening assembly according to any of the preceding claims, wherein the raised central section (3) comprises a straight section (14) the width of which is at least the width of each side flange (9), comprising curved transitions (13) between said raised central section (3) and said side flanges (9).

6. Fastening assembly according to any of the preceding claims, comprising a bottom plate (17) located below the base plate (1, 1'), said bottom plate (17) comprising a raised central section (18) suitable for being tightly fitted under the raised central section (3), and two side flanges (19) suitable for being located under the side flanges (9) of the base plate (1, 1').

7. Fastening assembly according to claim 6, wherein the raised central section (18) of the bottom plate (17) comprises a plurality of ribs (21).

8. Fastening assembly for railway rails (7) comprising a support plate (6) which allows fastening and retaining a railway rail (7), where said support plate (6) has an upper face comprising a flat area suitable for supporting a runner of a rail (7), said support plate (6) comprising two openings suitable for allowing the insertion of retaining screws (4) for retaining on both sides the runner of the rail (7), **characterized in that** said support plate (6) has a lower face comprising a recess (16) suitable for receiving a projection of an independent element.

9. Fastening assembly according to claim 8, wherein the support plate (6) comprises at least one lower projection (10) located on the lower face thereof, where said lower projection (10) is suitable for being housed in an opening of an independent element.

10. Fastening assembly for railway rails (7) comprising a base plate (1, 1') according to any of claims 1 to 7 and a support plate (6) according to claim 8, where the recess (16) of the support plate (6) sits on the raised central section (3) of the base plate (1, 1').

11. Fastening assembly for railway rails (7) comprising a base plate (1, 1') according to any of claims 4 to 7 and a support plate (6) according to claim 9, where the lower projection (10) of the support plate (6) is housed in an outer opening (8) of the base plate (1, 1').

12. Method for obtaining a fastening assembly for railway rails according to any of the preceding claims, **characterized in that** it comprises the following steps:

- cutting at least one plate according to specific length and width dimensions,
- shaping the central area of the plate until obtaining a raised central section, and
- making openings on said at least one plate by means of a laser cutting equipment.

13. Method according to claim 12 comprising:

- cutting a plurality of plates according to specific length and width dimensions into a section of a railway siding,
- shaping the central area of the plates until obtaining a raised central section, and
- making openings on the plates by means of a laser cutting equipment, such that the location of said openings in each plate is determined by the position of said plate in the siding and by the relative distance between the rails in said position.

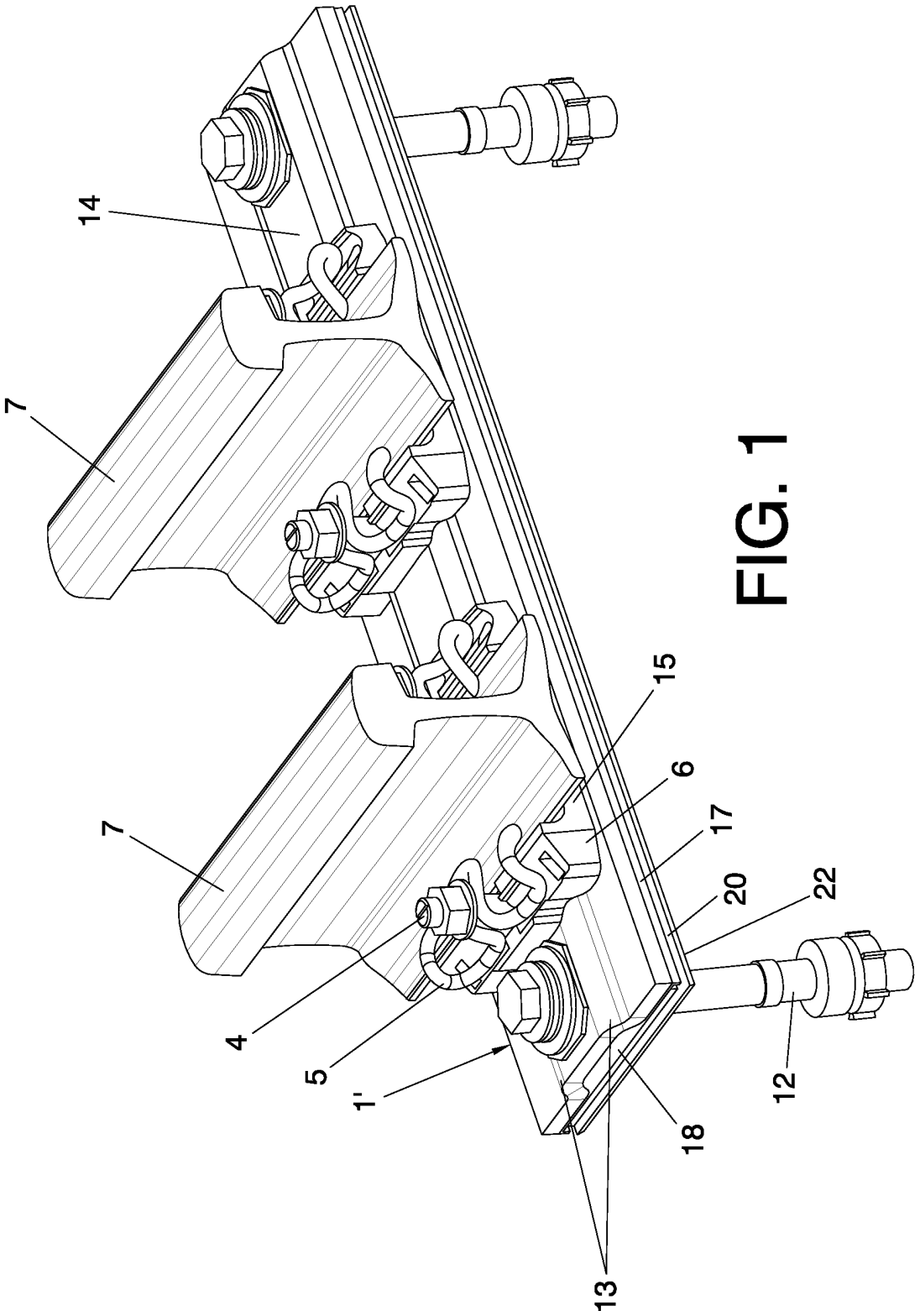

FIG. 1

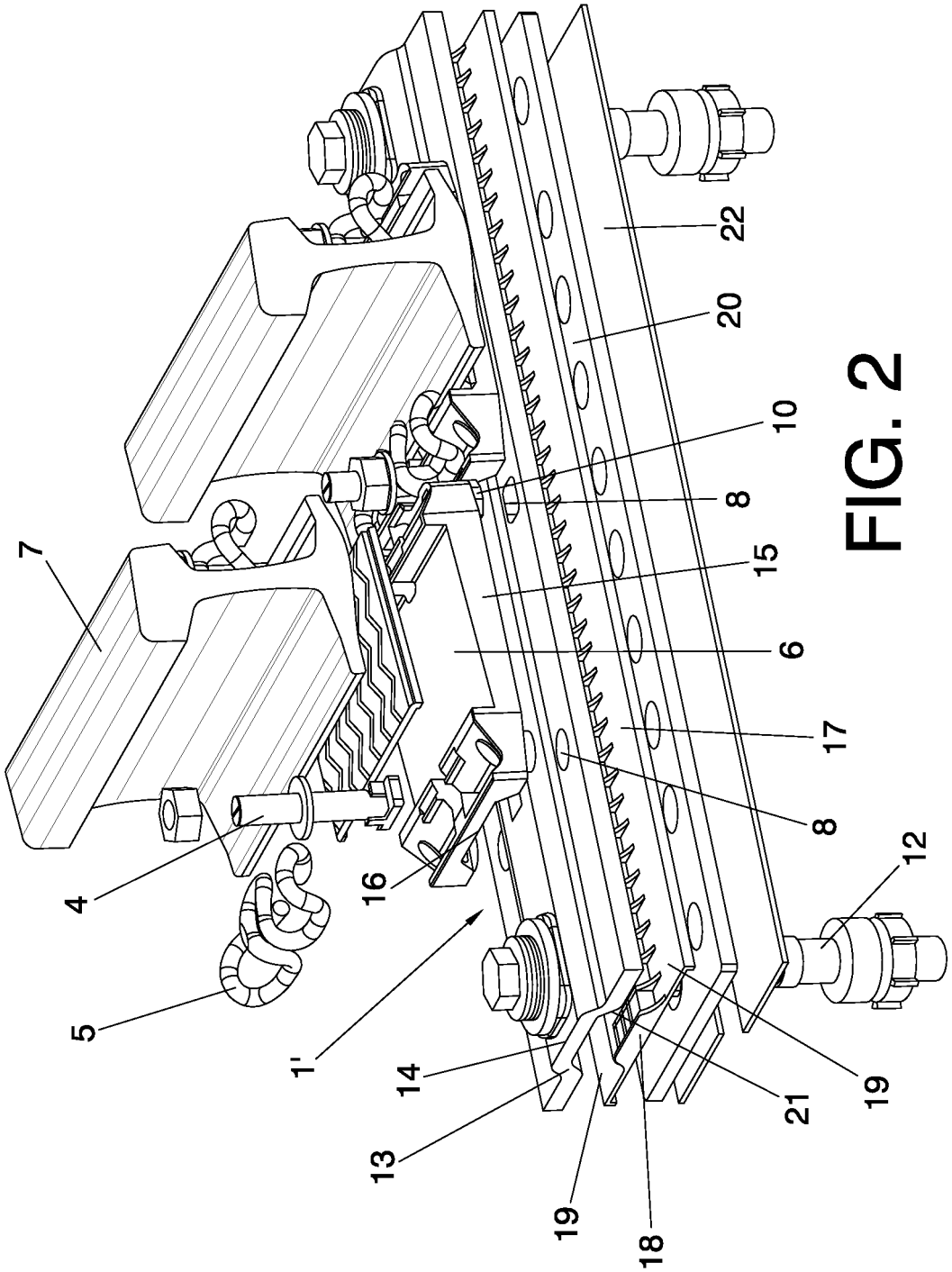

FIG. 2

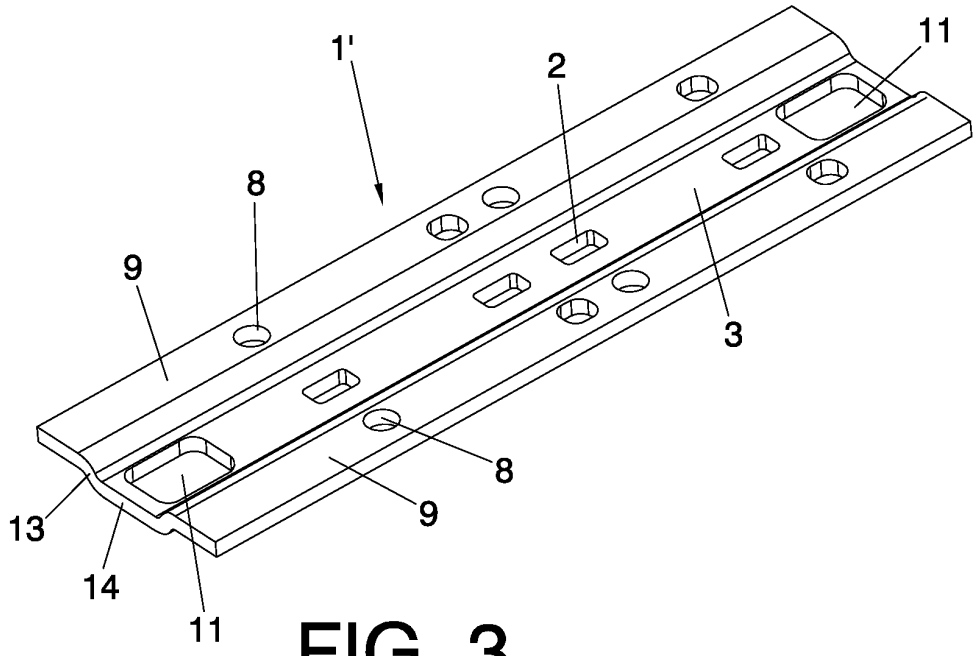

FIG. 3

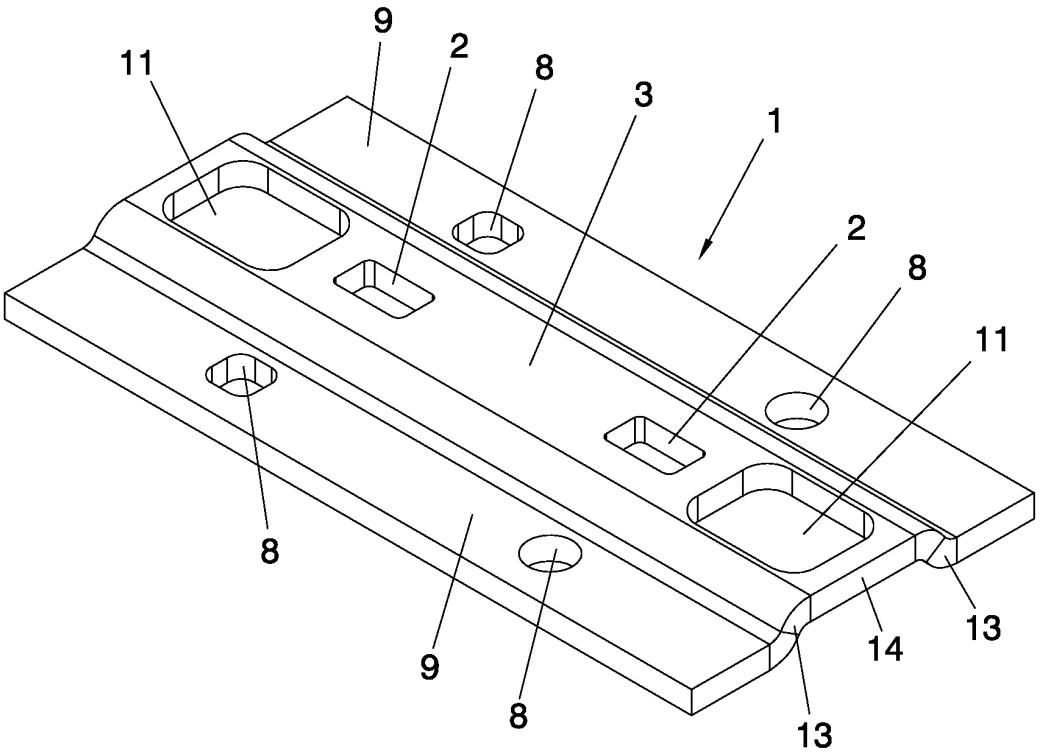

FIG. 4

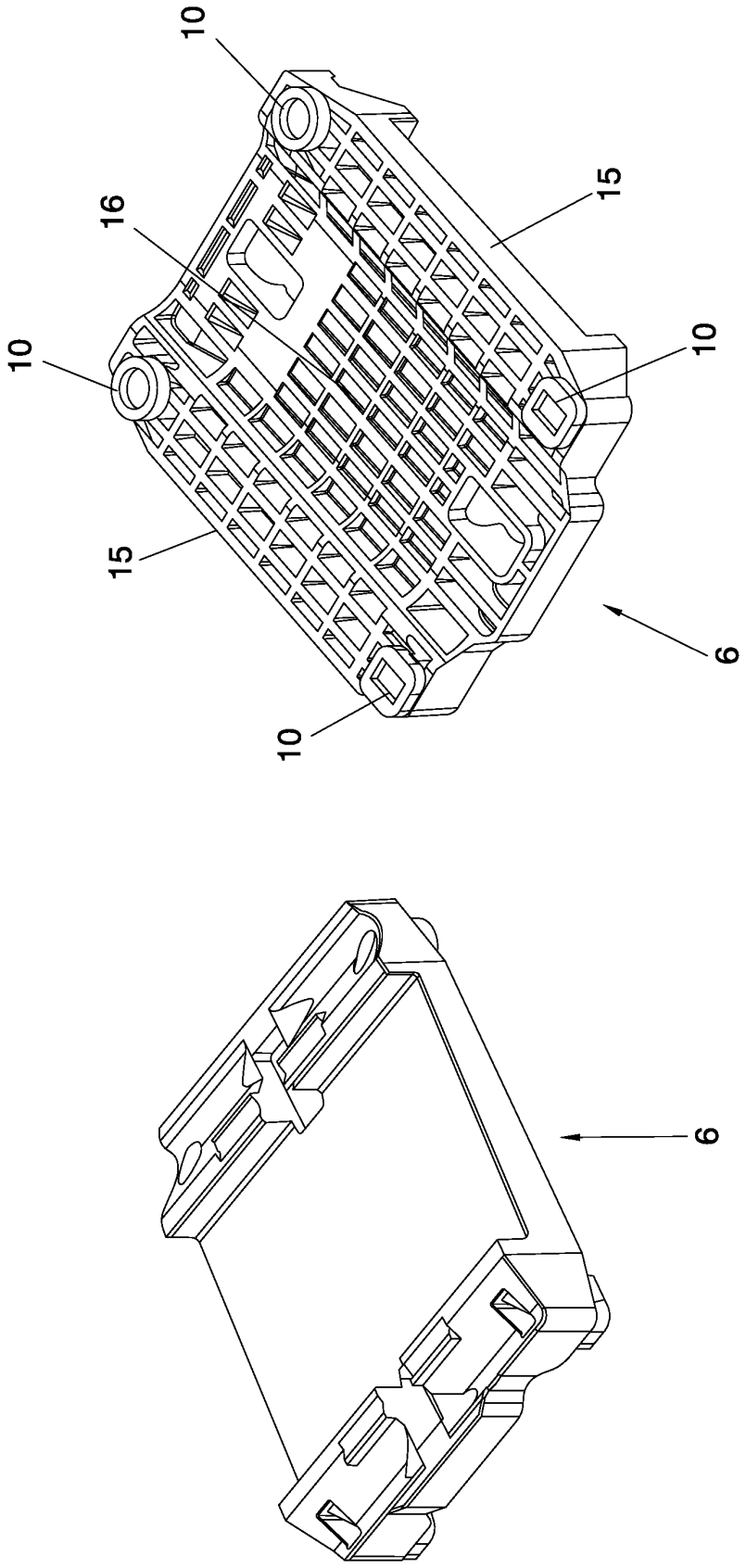

FIG. 5

INTERNATIONAL SEARCH REPORT

International application No.
PCT/ES2012/070386

A. CLASSIFICATION OF SUBJECT MATTER

E01B9/00 (2006.01)
E01B9/38 (2006.01)
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
E01B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPODOC, INVENES, WPI

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	ES 2354900 A1 (MONDRAGON SOLUCIONES S L U ET AL.) 21/03/2011, description; figures.	8-9, 12-13
A		1-7, 10-11
A	US 1036512 A (NAYLOR GEORGE) 20/08/1912,	1-13
A	WO 2008009249 A1 (THYSSENKRUPP GFT GLEISTECHNIK ET AL.) 24/01/2008, description; figures.	1-13
A	CA 2210395 A1 (IGWEMEZIE JUDE O) 01/08/1996, description; figures.	1-13
A	WO 2005106124 A1 (BUTZBACHER WEICHENBAU GMBH ET AL.) 10/11/2005, description; figures.	1-13
A	US 4756477 A (SCHUMAKER JON S) 12/07/1988, description; figures.	1-13

☒ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance.
"E" earlier document but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure use, exhibition, or other means.
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other documents , such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
18/09/2012	**(24/09/2012)**
Name and mailing address of the ISA/ OFICINA ESPAÑOLA DE PATENTES Y MARCAS Paseo de la Castellana, 75 - 28071 Madrid (España) Facsimile No.: 91 349 53 04	Authorized officer I. Rodríguez Goñi Telephone No. 91 3493447

Form PCT/ISA/210 (second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/ES2012/070386

C (continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of documents, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 0408543 A2 (VOEST ALPINE ZELTWEG) 16/01/1991, description; figures.	1-13
A	DE 2718665 A1 (KLOECKNER WERKE AG) 02/11/1978, description; figures.	1-13
A	DE 1115752 B (WALTER SCHUMACHER) 26/10/1961, description; figures.	1-13

Form PCT/ISA/210 (continuation of second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/ES2012/070386

Patent document cited in the search report	Publication date	Patent family member(s)	Publication date
ES2354900 AB	21.03.2011	NONE	
US1036512 A	20.08.1912	NONE	
WO2008009249 A	24.01.2008	DE102006033379 A	31.01.2008
CA2210395 AC	01.08.1996	WO9623107 A	01.08.1996
		AU4382096 A	14.08.1996
		CA2144018 A	07.09.1996
		CA2162349 A	08.05.1997
		EP0803013 A	29.10.1997
		EP19960900222	15.01.1996
		BR9607185 A	11.11.1997
		CN1175987 A	11.03.1998
		US5782406 A	21.07.1998
		AU713004 B	18.11.1999
		RU2156332 C	20.09.2000
		US6305613 B	23.10.2001
		US2002011526 A	31.01.2002
		US6431463 B	13.08.2002
WO2005106124 A	10.11.2005	CA2561433 AC	10.11.2005
		AU2005238185 A	10.11.2005
		AU2005238185 B	07.10.2010
		DE102004021091 A	19.10.2006
		NO20065498 A	28.11.2006
		EP1743072 AB	17.01.2007
		EP20050744916	28.04.2005
		KR20070015446 A	02.02.2007
		KR101013014 B	10.02.2011
		CN101014743 A	08.08.2007
		CN101014743 B	13.04.2011
		US2007246559 A	25.10.2007
		US8033480 B	11.10.2011
		BRPI0510387 A	13.11.2007
		ZA200609854 A	30.04.2008
		RU2372435 C	10.11.2009
		RU2006142097 A	10.06.2008
		AT433522 T	15.06.2009
		HK1097302 A	16.10.2009
US4756477 A	12.07.1988	CA1318898 C	08.06.1993
EP0408543 A	16.01.1991	AU5871190 A	10.01.1991
		CA2020687 A	11.01.1991
		EP19900890207	09.07.1990
		CN1049039 A	06.02.1991
		PT94635 A	31.01.1992
		AU632828 B	14.01.1993
DE2718665 A	02.11.1978	NONE	
DE1115752 B	26.10.1961	NONE	

Form PCT/ISA/210 (patent family annex) (July 2009)