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(54) **DEVICE FOR SECURING A SLEEPER**

(57) The invention relates to a system for securing sleepers in a ballastless track formed by a base plate, sleepers and an interposed elastic intermediate plate, wherein the sleeper body (13) comprises at least one through-hole (12), and the base plate comprises the corresponding blind holes (16) in which a securing pin (17) is embedded, to which a guide rod (22) that can be inserted in the through-hole (12) is joined, via which the sleeper is secured to the base plate in such away that no additional pretensioning is added to that caused by the positioning of the sleeper thereon, and only a certain amount of vertical movement is permitted, forming a disassemblable assembly of the securing elements and the sleepers.

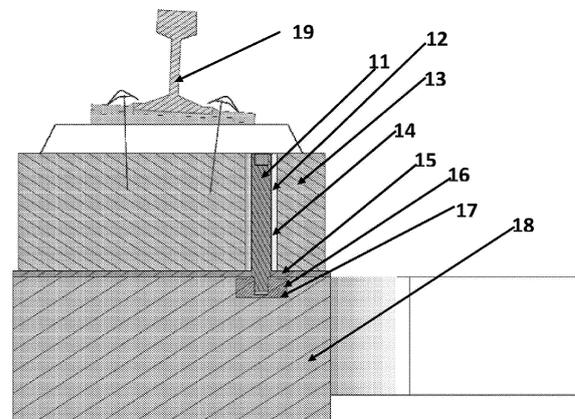


FIGURE 1

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Description

OBJECT

[0001] The present invention refers to a device that fixes a sleeper, which is used to seat the tracks of a railway on it, for ballastless track.

State of the art

[0002] Railway sleepers for concrete slab track, which are fastened to the concrete slab of the railway track and to the track by means of through bolts are known in the state of the art.

[0003] Railway sleepers are transverse or longitudinal components comprising the means of retaining the track rails on the body of a reinforced concrete sleeper.

[0004] Concrete slab tracks are subjected to increased mechanical stress due to the increasing pressure of the vehicle axles and their speeds, which have tended to increase in recent times.

[0005] Thus, speeds of over 200km/h are reached for passenger transport and speeds of 120km/h for freight transport. In addition, in order to guarantee the lifespan of the concrete slab track infrastructure, there must be some vertical mobility, i.e. an elastically deformable body must be placed under the track.

[0006] The service life of the deformable body must be increased by preventing concrete sleepers from sliding sideways on the concrete base plate if an excessively flexible inter-plate is located under the sleeper.

SUMMARY

[0007] The present invention aims to resolve one or more of the drawbacks outlined above by means of a fixing device for the sleeper body as defined in the claims.

[0008] A fixing device from a sleeper to a base plate of a railway track where an inter-plate is located between the sleeper body and the base plate according to a configuration in overlapping layers; where the sleeper body comprises at least one through hole; the base plate comprises at least one blind hole in which an anchor bolt is embedded; the fixing device can be inserted into the through hole in order to be immobilized in a detachable way by the anchor bolt in the installation position of the slab track; without subjecting the inter-plate to an additional pretension to which the inter-plate is subjected when the sleeper body is placed on the base plate.

[0009] The bolt is firmly locked and prevented from moving into the corresponding blind hole.

[0010] The fixing device includes a guiding rod for positioning the sleeper body on the base plate in the slab track installation position; and an immobilizing end that works mechanically with the anchor bolt to fix the sleeper body in the slab track installation position. The rod and end of the fixing device pass through the inter-plate.

[0011] The fixing device also includes a head included

in the through hole without protruding from the upper plane of the sleeper body in the slab track installation position.

[0012] The guiding rod can be inserted into a sleeve that internally lines the through hole in the slab track position. The immobilizing end is threadable into an internal thread of the anchor bolt such as a locking nut, in the installation position of the slab track.

[0013] The inside diameter of the through hole sleeve is larger than the diameter of the fixing device stem, which allows the through hole to be aligned with the anchor bolt to ensure the fixing device force is centred on the anchor bolt. In this way, the fixing device is only applied in the direction of traction and twisting of the fixing device is avoided.

[0014] However, the head of the fixing device has a diameter that is substantially equal to the diameter of the sleeve of the through hole, so that the head is locked and immobilized to make small lateral displacements according to a diameter of the head inside the sleeve of the through hole, but allows limited vertical displacements of the sleeve with respect to the head and stem of the fixing device in the installation position of the slab track.

[0015] The body of the sleeper comprises at least two through holes arranged close to each free outer side, i.e. the sleepers are arranged in a row one after another on the inter-plate.

[0016] Therefore, the outer right and left side of the sleeper row are free. Through holes can be arranged in an inclined axis with respect to an axis parallel to an edge of a free outer side of the sleeper body; for example, the inclined axis cuts two non-contiguous vertices of the sleeper body obliquely.

[0017] The sleeper body consists of at least two rail track retention devices designed to retain the rails on the reinforced concrete sleeper body. The means of retention are embedded in the corresponding recesses of the sleeper body from the upper plane to the lower plane of the sleeper body. The rail retention media are also aligned in a row.

[0018] The inter-plate is made of elastic material such as an elastomer, being arranged between the sleeper and the base plate in a layered or sandwich configuration, so that when the sleeper body exerts an original pretension, a function of the weight of the sleeper, and the fixing arrangement, by fixing the sleeper body to the base plate in the installation position of the slab track, it does not increase the original pre-tension of the sleeper body. That is to say, the sleeper body exerts an additional pressure to the original pretension when a train carriage passes over it.

[0019] Consequently, the sleeper body describes a sliding vertical movement, limited elastic travel, from a resting position, corresponding to the installation position of the slab track, to a working position, relative to the passage of a train carriage on the rail tracks, and vice versa. That is to say, the time that the sleeper body is in working position is a function of the frequency of passing

trains on the railway.

[0020] The fixing device provides an elastic, resistant and economic fastening or retention to the sleeper, which requires a reduced number of pieces and whose assembly is simple and precise with no specialization.

[0021] The fixing arrangement provides an elastic retention whose elasticity is due both to the nature of the inter-plate and to the sliding retention system of the sleeper body in the slab track installation position. The sleeper is firmly retained and, at the same time, the retention is elastic.

[0022] The slab track comprises at least one portion of base plate, one inter-plate and at least one sleeper body installed in a configuration of overlapping layers fixed in the slab track installation position by means of the fixing device.

[0023] The slab track comprises non-moving parts such as the base plate and the fixing device, and moving parts of reduced amplitude such as the inter-plate and the sleeper body.

BRIEF DESCRIPTION OF THE FIGURES

[0024] A more detailed explanation of the device according to the embodiments of the invention is given in the description below, based on the attached figures in which:

figure 1 shows an elevated view of a plate track in a layered configuration, from bottom to top, base plate, inter-plate, sleeper body, rail track,

figure 2 shows in a profile view a fixing device in the slab track installation position,

figure 3 shows a perspective view of the slab track where the fixing device has been disassembled to remove the sleeper body from the slab track installation position, and

figure 4 shows a plan view of the slab track in the installation position.

DESCRIPTION

[0025] In relation to figures 1 and 2, where a slab track is shown that includes, in a vertical or sandwich layered arrangement, a base plate 18 or seat plate, lower layer, an elastic inter-plate 15, intermediate layer, a sleeper 13 in longitudinal form according to the longitudinal axis of a rail 19 of the rail track, and a sleeper 13 fixing device 11, which anchors it to the base plate 18 of the slab track.

[0026] The sleeper body 13 comprises at least one through hole 12 lined with a sleeve. The base plate 18 comprises at least one blind hole 16 in which an anchor bolt 17 is embedded, so that the anchor bolt 17 is firmly locked and prevented from moving inside the blind hole 16.

[0027] The fixing device 11 can be inserted into the sleeve of the through hole 12; the fixing device 11 being immobilised but can be detached by the anchor bolt 17 in the installation position of the slab track.

5 **[0028]** Therefore, inter-plate 15 is not subject to an additional pretension in the slab track installation position; i.e. inter-plate 15 is subject to an original pretension depending on the weight of the sleeper body 13 when it is positioned above inter-plate 15, which, in turn, is positioned on the base plate 18.

10 **[0029]** The fixing device 11 comprises a guide rod 22 for positioning the sleeper 13 on the base plate 18 in the slab track installation position; and an immobilizing end 23 that works mechanically with the anchor bolt 17 to fix the sleeper 13 in the slab track installation position.

15 **[0030]** The fixing device 11 also comprises a head 21 in the through-hole 12 which does not protrude to the upper plane of the sleeper 13 in the slab track installation position.

20 **[0031]** The guiding rod 22 can be inserted into the sleeve lining the through hole 12 in the slab track installation position. The immobilizing end 23 is threadable into the internal thread of the anchor bolt 17 as is a retaining lock nut, in the slab track installation position.

25 **[0032]** The inside diameter of the through hole sleeve 12 is larger than the diameter of the guide rod 22, which allows the through hole sleeve 12 to be aligned with the anchor bolt 17.

30 **[0033]** However, the head 21 of fixing device 11 has a diameter substantially equal to the diameter of the sleeve of the through-hole 12, so that head 21 is held immobilized inside the sleeve of through hole 12 in the slab track installation position.

35 **[0034]** Railway sleeper 13 comprises at least two through holes 12 arranged close to each free outer side of the sleeper, i.e. sleepers 13 are arranged in a row one after another on the inter-plate. Therefore, the outer right and left side of the row are free.

40 **[0035]** In connection with figure 4, the through holes 12 can now be arranged in an inclined axis with respect to an axis parallel to an edge of a free outer side of the sleeper 13; for example, the inclined axis cuts to two non-contiguous vertices of sleeper 13 obliquely.

45 **[0036]** Railway sleeper 13 comprises at least two rail 19 retention devices designed to retain rails 19 on the reinforced concrete sleeper 13. The means of retention are embedded in the corresponding recesses of sleeper 13 from the upper plane to the lower plane of the sleeper. The track retention media are also aligned in a row.

50 **[0037]** The inter-plate 15 is made of elastic material such as an elastomer, being arranged between the sleeper 13 and base plate 18 in a layered or sandwich configuration, in such a way that the sleeper exerts an original pre-tension, a function of the weight of the sleeper and the fixing arrangement 11, when fixing the sleeper 13 on the base plate 18 in the slab track installation position, and it does not increase the original pre-tension of the sleeper 13. That is to say, the sleeper 13 exerts an ad-

ditional pressure to the original pretension when a train carriage passes.

[0038] Consequently, sleeper 13 describes a vertical sliding movement from a resting position, corresponding to the slab track installation position, to a working position, relative to the passage of a train car on the rails 19, and vice versa. That is to say, the time that the sleeper 13 is in a working position is a function of the frequency of trains passing on the rail track.

[0039] Fixing device 11 provides an elastic, resistant and economic fixing or retention to sleeper 13, which requires a reduced number of pieces and whose assembly is simple and precise with no specialization.

[0040] The fixing arrangement 11 provides an elastic retention whose elasticity is due both to the nature of the inter-plate 15 and to the sliding retention system of the sleeper 13 in the slab track installation position. The sleeper 13 is firmly retained and, at the same time, the retention is elastic.

[0041] The slab track comprises at least one portion of base plate 18, one inter-plate 15 and at least one sleeper 13 installed in a configuration in overlapping layers fixed in the slab track installation position by means of the fixing device 11.

[0042] The slab track comprises non-moving parts such as base plate 18 and fixing device 11, and small moving parts such as the inter-plate 15 and sleeper 13. The amplitude of the vertical displacement can be adjusted by increasing the thickness or width of the inter-plate layer 15.

[0043] In connection with figure 3, sleeper 13 is now laterally removable in the event of failure of the base plate 18 seat, for example. The longitudinal sleepers are the same, which guarantees their interchangeability. The fixing device 11 does not transmit pressure to the body of the sleeper 13; it is firmly anchored to the base plate 18.

Claims

1. **A fixing device** from a sleeper (13) to a base plate (18) of a slab track where an inter-plate (15) is located between the sleeper body (13) and the base plate (18) **characterized in that** the sleeper body (13) comprising at least one through hole (12); the base plate (18) comprising at least one blind hole (16) in which an anchor bolt (17) is embedded; the fixing device (11) which can be inserted into the through-hole (12) in order to be immobilized in a detachable way by the anchor bolt (17) in the slab track installation position; without subjecting the inter-plate (15) to an additional pretension to which the inter-plate (15) is subjected when the sleeper body (13) is placed on the base plate (18).
2. **Device** in accordance with claim 1; **characterized in that** the fixing device (11) comprising a guiding rod (22) for positioning the sleeper body (13) on the

base plate (11) in the slab track installation position; and an immobilising end (23) which works mechanically with the anchor bolt (17) for fixing the sleeper body (13) in the slab track installation position.

3. **Device** according to claim 1; **characterized in that** the fixing device (11) comprising a head (21) which can be inserted into the through hole (12) without protruding from the upper plane of the sleeper body (13) in the slab track installation position.
4. **Device** according to claim 2; **characterized in that** the guiding rod (22) can be inserted into a sleeve that internally lines the through hole (12) in the slab track installation position.
5. **Device** according to claim 2; **characterized in that** the immobilizing end (23) is threadable in an internal thread of the anchor bolt (17) in the slab track installation position.
6. **A slab track** of rails (19) for railways; **characterized in that** the slab track comprises at least a portion of base plate (18), an inter-plate (15) and at least one sleeper body (13) installed in a configuration in overlapping layers fixed in position of installation of the slab track by means of a fixing device (11) according to claims 1 to 5.

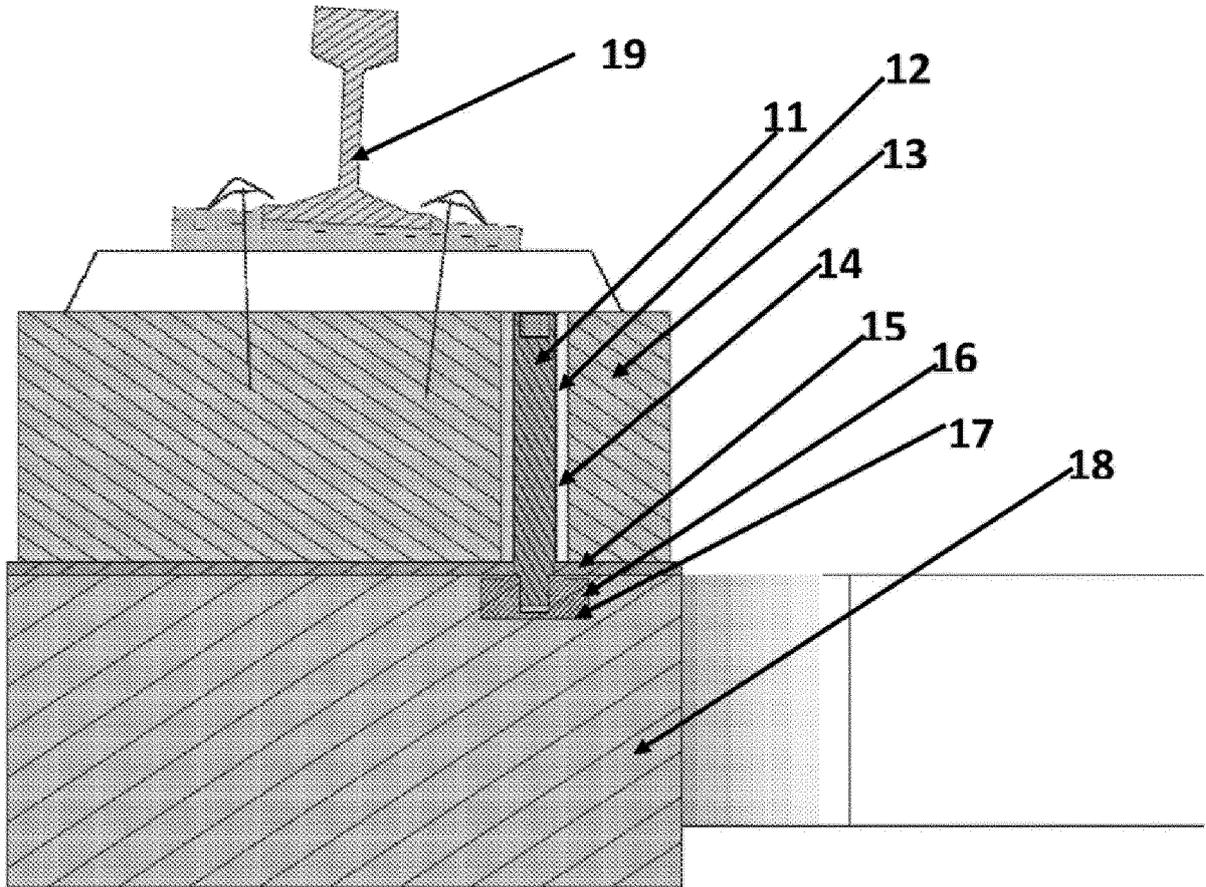


FIGURE 1

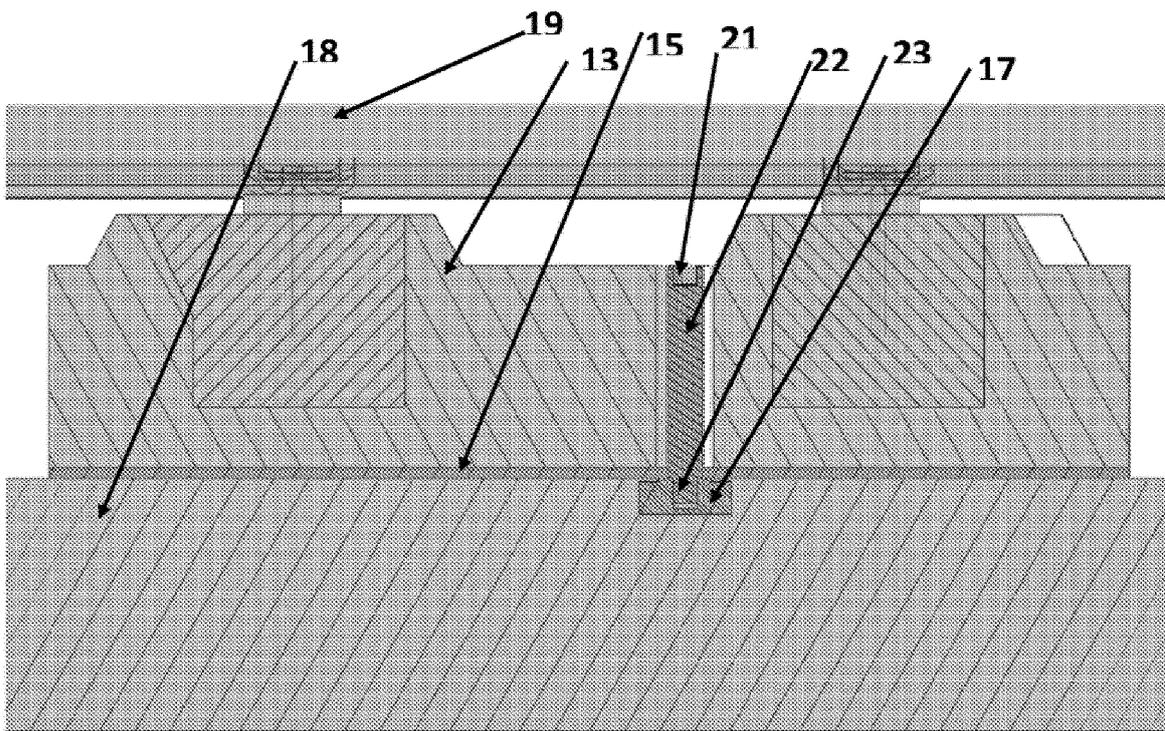


FIGURE 2

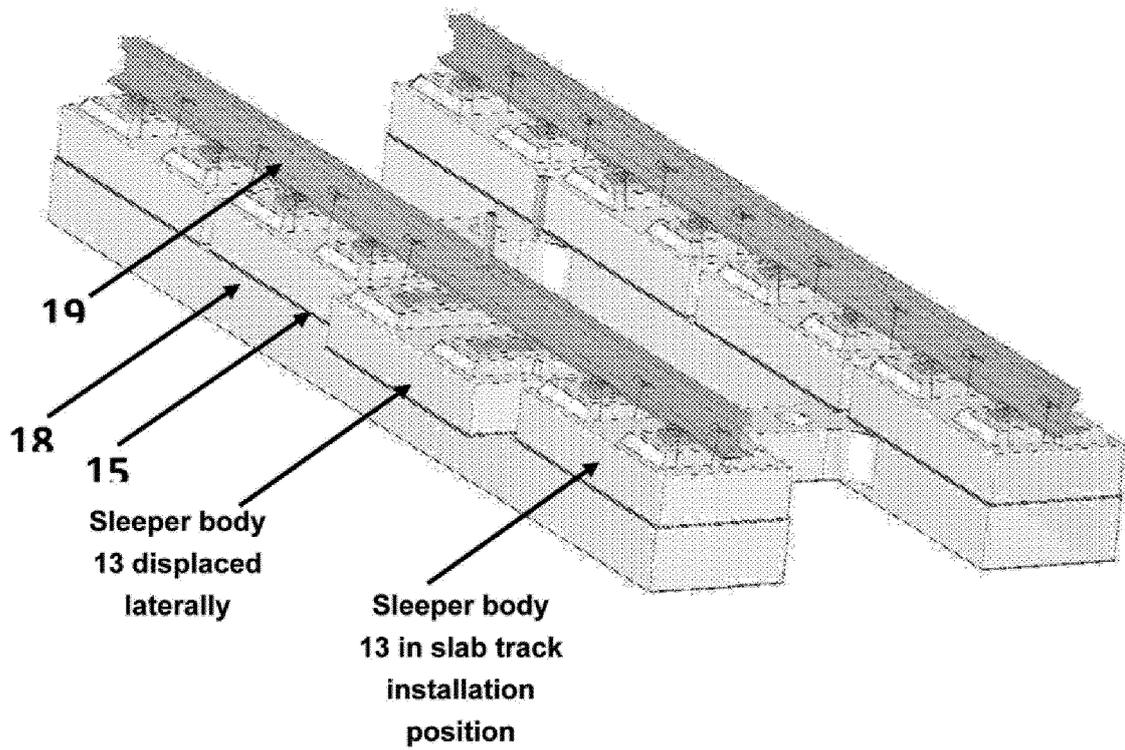


FIGURE 3

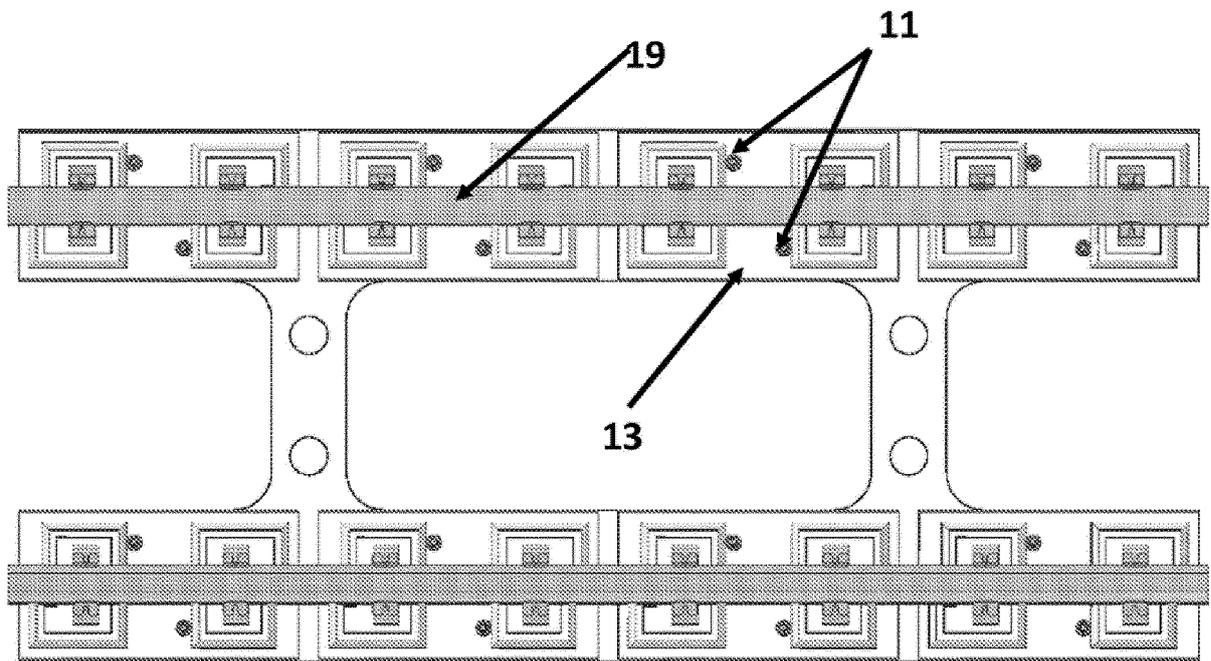


FIGURE 4

INTERNATIONAL SEARCH REPORT

International application No.
PCT/ES2017/070140

5	A. CLASSIFICATION OF SUBJECT MATTER		
	<i>E01B1/00</i> (2006.01) <i>E01B3/40</i> (2006.01) According to International Patent Classification (IPC) or to both national classification and IPC		
10	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		
15	Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) EPODOC, INVENES		
	C. DOCUMENTS CONSIDERED TO BE RELEVANT		
20	Category*	Citation of document, with indication, where appropriate, of the relevant passages	
		Relevant to claim No.	
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25	X	WO 2016129001 A1 (VIANINI SPA) 18/08/2016, page 9, line 14 - page 11, line 14; figures 1, 15-18	1-4
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30	A	US 5435486 A (GERLACH RUDOLF ET AL.) 25/07/1995, column 1, line 57 - column 2, line 19; figures.	1-6
35			
40	<input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C.		<input checked="" type="checkbox"/> See patent family annex.
	* Special categories of cited documents:	"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	
	"A" document defining the general state of the art which is not considered to be of particular relevance.		
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45	"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)	"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	
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50	Date of the actual completion of the international search 25/09/2017	Date of mailing of the international search report (28/09/2017)	
55	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 R. Puertas Castaños Telephone No. 91 3498509	

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INTERNATIONAL SEARCH REPORT

International application No. PCT/ES2017/070140
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INTERNATIONAL SEARCH REPORT

International application No.

Information on patent family members

PCT/ES2017/070140

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