

(19)



(11)

EP 2 662 489 A1

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:

13.11.2013 Bulletin 2013/46

(51) Int Cl.:

E01B 9/68 (2006.01)

(21) Application number: **13166921.0**

(22) Date of filing: **07.05.2013**

(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**

Designated Extension States:

BA ME

(30) Priority: **07.05.2012 BE 201200298**

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(54) **Elastic pad to be placed between a rail and a sleeper**

(57) Elastic pad (1) designed to be placed between a sleeper (2) and a rail (3) of a railway, such that the rail (3) rests on the sleeper (2) via the elastic pad (1), whereby

the pad (1) has at least one groove (7) that is V-shaped and whereby the pad, preferably, has a central recess (4) extending crosswise through the pad (1).

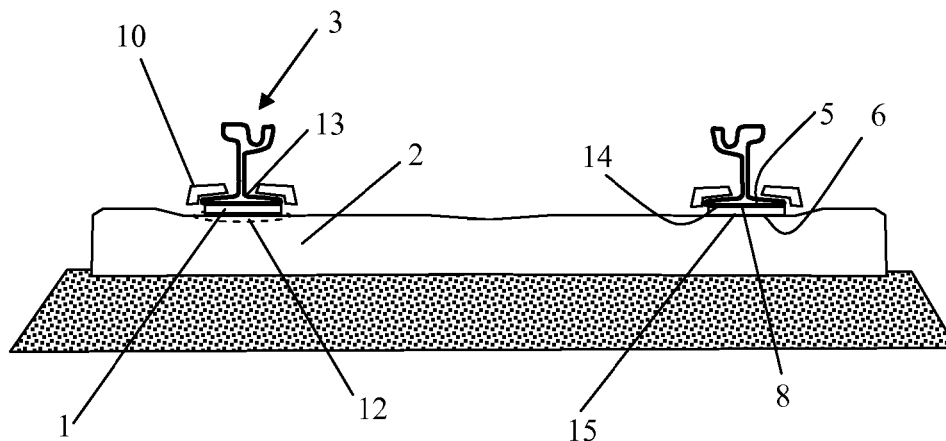


FIG. 1

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Description

[0001] The invention concerns an elastic pad designed to be placed between a sleeper and a rail of a railway, such that the rail rests on the sleeper via the elastic pad. The pad has at least two support surfaces designed to connect to a rail foot of the rail on the one hand, and to the sleeper on the other hand.

[0002] Such an elastic pad is made of elastomers such as for example cork rubber or polyurethane rubber, and it is used in railways for different reasons.

[0003] One of the main reasons is that the rail is acoustically isolated from the substrate and that vibrations, caused by a railway vehicle moving along the rail, are dampened. Further, wear due to contact between the rail and the sleeper is prevented, and the rail is electrically isolated from the sleeper. This elastic pad also provides for a better and fatigue-resistant fastening of the rail to the sleeper and a better load distribution of the forces created by the passage of the railway vehicle to the sleeper and other foundation elements of the railway infrastructure.

[0004] An accelerated aging and degradation of the elastomer is identified in these elastic pads. This degradation is mainly caused by heat as a result of (i) strain energy during the passage of the railway vehicle, (ii) electric voltage differences and (iii) friction due to the thermal expansion of the rails, which are not or difficult to be removed. This is in particular the case for elastic pads with a high stiffness which are used, for example, for railways for railway vehicles with a high axle load. The elastic pad hereby has a centre zone which becomes brittle and extends from the centre to the outer edges of the pad. Due to this accelerated degradation, the elastic pads must be replaced prematurely.

[0005] A possible solution is to provide for example ventilation channels in the elastic pad.

[0006] According to the present state of the art, such elastic pads are already provided with channels, grooves and/or studs, for example to adjust the stiffness of the pad. The shape factor of the pad is hereby altered in order to obtain the desired stiffness. This shape factor is the relation of the surface being loaded to the surface in which expansion or bulging of the elastomer occurs. For these channels, grooves and/or studs make the pad a lot more flexible. In general, the stiffness of the elastic pad decreases by applying said channels, grooves and/or studs. That is because the surface in which expansion or bulging of the elastomer occurs is enlarged, whereas the surface that is being loaded is possibly reduced. Further, the number and size of the channels, grooves and/or studs also have a major influence on the stiffness of the pad. Flat pads behave more stiffly because of their high shape factor than elastomer pads with, for example, studs or rectangular grooves which make the shape factor decrease. As a consequence, known channels, grooves and/or studs are not fit to serve as a ventilation channel if it is not desired to lower the stiffness

of the pad. If these channels, grooves and/or studs are provided, but no decrease in rigidity is desired, the elastomer of the pad will have to be replaced by a much stiffer plastic material to counter a decrease in rigidity due to a shape factor change.

[0007] Elastic pads, in particular flat, relatively stiff elastic pads, are also disadvantageous in that they stick to the bottom side of the rail, which is inconvenient when these pads are to be replaced, and as a result of which these pads may also shift in relation to the sleeper, so that it is difficult to hold them centred above the sleeper.

[0008] The invention aims to remedy this by providing an elastic pad and a method which make it possible to prevent the accelerated ageing and degradation of the pad between the rail and the sleeper. In particular, the invention aims to provide channels, grooves and/or studs in the elastic pad which are fit to serve as ventilation channels, without significantly softening the pad.

[0009] To this aim, the elastic pad has at least one groove as in the appended claims, whereby this groove extends in a support surface of the pad, whereby this groove is V-shaped and has an angle α in its deepest point which is smaller than 90° , preferably smaller than 60° , in particular preferably between 20° and 60° , whereby this angle α has legs having an angle β and γ with the support surface which is larger than 45° , preferably larger than 60° , and in particular preferably between 60° and 80° . The stiffness of the pad is hereby sufficiently high, such that the groove is not or at least not completely compressed when a load is exerted on the pad as a railway vehicle moves over the rail.

[0010] Practically, the groove extends at least as of an outer edge of the pad so as to allow for some air circulation via this outer edge.

[0011] In an advantageous manner, the cross section of said groove forms at least partly a triangle whose three angles α , β and γ are each smaller than 90° .

[0012] In an advantageous manner, the groove has a cross section which narrows as of the support surface towards the deepest point of the groove. Preferably, the support surface, in which the groove extends, comprises at least a bottom surface of the pad which is designed to connect to the sleeper. A groove in the bottom side of the pad thus has a cross section which narrows towards the top side of the pad.

[0013] Further, the groove preferably extends as of an outer edge of the pad to an opposite outer edge of the pad.

[0014] In a very advantageous manner, the elastic pad also has a central recess extending crosswise through the pad from a top side to a bottom side of the pad, whereby at least one groove of the elastic pad extends between the recess and an outer edge of the pad. This recess preferably has a width and a length amounting to 25% to 75% of the width and/or the length of the elastic pad, and in particular preferably amounts to almost 50% of the width of the elastic pad.

[0015] A groove hereby preferably extends at least

from an outer edge to an opposite outer edge, such that this groove crosses the recess.

[0016] The recess may for example be circular and have a diameter which amounts to 25% to 75% of the width and/or of the length of the elastic pad, or which preferably amount to some 50% of the width of the elastic pad.

[0017] The elastic pad may be further provided with side flaps in between which fasteners can be placed which fix the rail to the sleeper, such that the elastic pad is fixed in relation to the fasteners.

[0018] The invention also concerns a method for the construction of a railway with rails resting on sleepers whereby an elastic pad is provided in a fastening zone between the bottom side of the rail foot of the rails and the sleepers, such that this elastic pad connects to the bottom side of the rail foot and the top side of the sleeper, whereby the bottom side of the rail foot is preferably kept free in a central zone in the fastening zone between the rail and the sleeper by providing a central recess in the elastic pad, whereby at least one channel is provided between the central recess and the environment, such that the stiffness of the pad is substantially unaffected.

[0019] Other particularities and advantages of the invention will become clear from the following description of practical embodiments of the method and device according to the invention; the following description is given as an example only and does not limit the scope of the claimed protection in any way; the following reference numbers relate to the accompanying figures.

Figure 1 is a schematic representation of a cross section of a railway with elastic pads between the rails and the sleepers according to an embodiment of the invention.

Figure 2 is a schematic representation of a top view of an elastic pad according to a first embodiment of the invention.

Figure 3 is a schematic representation of a side view of an elastic pad according to figure 2.

Figure 4 is a schematic representation of a detail of a cross section of a groove according to figures 2 and 3.

Figure 5 is a schematic representation of a side view of an elastic pad according to a variant of the embodiment from figure 2.

Figure 6 is a schematic representation of a side view of an elastic pad according to a further variant of the embodiment from figure 2.

Figure 7 is a schematic representation of a cross section of a variant of a groove according to the invention.

Figure 8 is a schematic representation of a top view of an elastic pad according to a fifth preferred embodiment of the invention.

Figure 9 is a schematic representation of a side view of an elastic pad according to figure 8.

Figure 10 is a schematic representation of a top view

of an elastic pad according to a fifth embodiment of the invention.

Figure 11 is a schematic representation of a side view of an elastic pad according to figure 10.

Figures 12, 13 and 14 are schematic representations of top views of variants of an elastic pad according to the invention.

Figure 15 is a schematic representation of a detail of a sleeper with grooves and an elastic pad according to an embodiment of a method of the invention.

[0020] The invention generally concerns an elastic pad for railways. In particular an elastic pad to be placed between the top side of a sleeper and the bottom side of the rail foot of a rail, at the fastening of the rail to the sleeper. Such sleepers can be made for example of concrete, wood, metal or plastic material or combinations thereof. According to the invention, the elastic pad is provided with grooves extending over the support surface of the elastic pad. These grooves are made such that the shape factor of the elastic pad is practically not altered. Further, a recess can be provided extending between the top side and the bottom side of the pad and which is connected to the environment by the grooves when the pad is placed between the sleeper and the rail.

[0021] Figure 1 schematically represents a railway built of sleepers 2 with rails 3 upon them according to an embodiment of the invention. The rails 3 rest on elastic pads 1 which in turn rest on the sleepers 2 in a rail fastening zone 12. This rail fastening zone 12 is a zone of the sleeper 2 in which the rail 3 and the sleeper 2 overlap and in which the rail 3 rests on the sleeper 2. By means of fastenings 10 known as such, the rails 3 in this zone 12 are fixed to the sleepers 2.

[0022] The bottom side 6 of the elastic pad 1 connects almost entirely to the top side 15 of the sleeper 2 whereas the top side 5 of the elastic pad 1 connects almost entirely to the bottom side 14 of the rail foot 13. Between the top side 5 and the bottom side 6 of the pad 1 there is an outer edge 8 of the pad 1. After the pad 1 has been placed between the rail 3 and the sleeper 2, said outer edge 8 remains at least partially free.

[0023] With the railway according to this embodiment of the invention, the fastenings 10 extend next to the elastic pad 1. A part of the outer edge 8 of the elastic pad 1, which runs almost parallel to the longitudinal direction of the rail 3, hereby connects to the fastenings 10. A part of the outer edge 8 of the elastic pad 1, however, which is substantially transverse to the longitudinal direction of the rail 3, remains freely accessible. This is also the part of the outer edge 8 which runs practically parallel to the longitudinal direction of the sleeper 2.

[0024] Possibly, the rail 3 may be additionally provided with a rigid plate between the elastic pad 1 and this rail 3, and/or the sleeper 2 may be additionally provided with a rigid plate between the elastic pad 1 and the sleeper 2, not represented in the figures. This is done for example to protect the elastic pad 1. The rigid plate can be made

of metal or plastic material. Between the elastic pad 1 and the rail 3 may also be provided a foil with studs, whereby the studs are preferably directed to the bottom side 14 of the rail foot 13 so as to prevent the elastic pad 1 from sticking to the bottom side 14 of the rail foot 13, not represented in the figures. Said foil is an anti-adhesive mat which can be glued on the top side 5 of the elastic pad 1 and which may have a textile structure and/or a woven structure. The studs may be for example mushroom-shaped and they preferably have a height of maximally 1 to 2 mm, preferably about 0.1 to 0.2 mm.

[0025] Figures 2 and 3 schematically represent a rectangular elastic pad 1 according to a first embodiment of the invention. The elastic pad 1 has two support surfaces 20. A first support surface 20 comprises a substantially flat rectangular top side 5, represented in figure 2. This top side 5 is designed to connect to the bottom side 14 of the rail foot 13. A second support surface 20 comprises a bottom side 6 of the elastic pad 1 and is practically flat and rectangular as well, and designed to connect to the sleeper 2. The width BK of the elastic pad 1 corresponds practically to the width of the rail fastening zone 12 and/or the width of the rail foot 13 resting on the elastic pad 1. The length LK of the elastic pad 1 corresponds practically to the length of the rail fastening zone 12, crosswise to the sleeper 2. Consequently, the dimensions of the pad 1 practically correspond to the dimensions of the overlap between the rail 3 and the sleeper 2.

[0026] The pad 1 may be provided with flaps 9 designed to extend sidelong, according to the longitudinal direction of the sleeper 2, past the rail fastenings 10. These flaps 9 are preferably provided on either side of the rail fastenings 10 and make sure that the pad 1 in the rail fastening zone 12 is immobilised in relation to the rail fastenings 10 when the rail 3 is fixed with the pad 1 onto the sleeper 2.

[0027] The height HK of the pad 1 corresponds to the height of the outer edge 8 of the pad and preferably amounts to some 4 to 5 mm. This height HK may vary depending for example on the used elastomers and the desired stiffness of the pad 1.

[0028] According to the invention, the pad 1 in this first embodiment is provided with a number of grooves 7 extending in the support surface 20 on the bottom side 6 of the pad 1. In figure 1, the pad 1 has three grooves 7. According to the invention, more or less of such grooves 7 may be provided. The grooves 7 gradually narrow from the bottom side 6 to the top side 5 of the pad 1. In particular, these grooves 7 are V-shaped, as is represented in detail in figure 4.

[0029] Thus, according to this first embodiment, the cross section of the groove 7 is a triangle whose three angles are each smaller than 90° , preferably smaller than 70° . The angle α of this cross section which is situated in the deepest point 18 of the groove 7 is preferably smaller than 60° and preferably amounts to some 40° . The deepest point 18 of the groove 7 corresponds to the place in the groove 7 where the distance to the support surface

6, in which the groove 7 is situated, is the largest. Further, said triangle is preferably an isosceles triangle, such that the angles β and γ between the legs of the angle α and the support surface 6 are practically equal.

[0030] Said grooves 7 hereby have two opposite flat walls 16 and 17 which connect to each other and which, in a deepest point 18 of the groove 7, form an angle α with each other which, according to this first embodiment, preferably amounts to some 40° . Further, the angle β , γ respectively between the support surface 6 and the wall 16, 17 respectively, preferably amounts to some 70° .

[0031] According to this first embodiment, the grooves 7 have a depth DG which is preferably smaller than $1/2$ the height HK of the pad 1. Thus, this depth DG substantially amounts for example to maximally $1/3$ of the height HK of the pad 1. The depth DG of the groove 7 may amount for example to $1/4$ to $1/5$ of the height HK of the pad 1. This depth DG may be for example 1 to 1.5 mm.

[0032] Further, the width BG of the groove 7 is preferably smaller than or equal to the depth DG of the groove 7.

[0033] According to this first embodiment, the grooves 7 are preferably almost parallel to the longitudinal direction of a rail 3 when this rail 3, in an operational condition in a railway, rests on the elastic pad 1. The grooves 7 thus stand crosswise to the sleeper 2.

[0034] Preferably, the distance between two adjacent grooves 7 is larger than the width BG of the grooves 7.

[0035] The grooves 7 extend over the support surface 6 of the pad 1 from an outer edge 8 to an opposite outer edge 8'. A front view of an outer edge 8 according to this embodiment of the invention is represented in figure 3. At this outer edge 8, the grooves 7 lead to the environment via an opening 11.

[0036] The compressibility of the elastomer pad 1 depends on the shape factor of the pad 1. The specific shape of the groove 7 according to the invention makes sure that the stiffness of the pad 1 remains substantially unaffected by the presence of these grooves 7. As the angle α in the deepest point of the groove 7 thereof is smaller than 90° , preferably even smaller than 60° , and due to a gradual narrowing of the groove 7, the pad 1 will gradually stiffen as the elastic pad 1 is compressed when a railway vehicle moves over the railway. When the pad 1 is loaded, there will preferably be practically no bulging of the elastomer in the groove 7. Hence, the shape factor of the pad is substantially unaffected by the presence of the grooves 7 according to the invention.

[0037] Further, also the stiffness of the pad 1 is preferably sufficiently high, such that said groove 7 is not, or at least not entirely compressed when a railway vehicle moves over the rail 3. Thus, preferably, air can always circulate through this groove 7. As a result, the heat can be continuously discharged. These grooves 7 also take care of the removal of moisture.

[0038] A second embodiment of the invention differs from the first embodiment in that the grooves 7 have a cross section in the shape of an equilateral triangle, not represented in the figures.

[0039] A third embodiment of the invention differs from the first and second embodiments in that the support surface 20 forming the top side 5 of the pad 1 is also provided with analogous grooves 7 as represented in figure 5. These grooves 7 in the top side 5 of the pad 1 also prevent the pad 1 from sticking to the bottom side 14 of the rail foot 13. This makes it easier to replace a pad 1. Said problem arises mainly with flat and relatively stiff pads which tend to stick to the rail foot.

[0040] A fourth embodiment of the invention, not represented in the figures, differs from the preceding embodiments in that grooves 7 are only provided in the top surface 5 of the pad 1.

[0041] A fifth preferred embodiment of the invention, represented in figures 8 and 9, differs from the first embodiment in that a recess 4 is provided in the centre of the pad 1. This recess 4 makes sure that the bottom side 14 of the rail foot 13 in the centre of the rail fastening zone 12 remains free.

[0042] According to this fifth preferred embodiment of the invention, the recess 4 is circular. The centre of this circular recess 4 preferably practically corresponds to the intersection of the diagonals of the rectangular pad 1. According to this preferred embodiment, said recess has a diameter DU which amounts to approximately 50 mm. Consequently, the pad 1 is ring-shaped with a circular inner edge 19 and a rectangular outer edge 8. The distance OK between the inner edge 19 and the outer edge 8 preferably amounts to maximally two times the section or also the diameter DU of the recess 4.

[0043] As the pad 1 has a recess 4 in the centre, the load of the rail 3 is more evenly distributed over the entire elastic pad 1.

[0044] Further, grooves 7 are provided as in the first embodiment of the invention. These grooves 7 extend between the recess 4 and the outer edges 8 of the pad 1. A front view of an outer edge 8 according to this preferred embodiment of the invention is represented in figure 9. At this outer edge 8, the grooves 7 lead to the environment via an opening 11. These grooves 7 hereby run practically parallel to the rail 3 resting on said pad 1 when the rail 3 is fastened to the sleeper 2. Hence, the grooves 7 stand crosswise to the sleeper 2. The grooves 7 are formed of V-shaped recesses on the bottom side 6 of the elastic pad 1. Consequently, the cross section of the groove 7 is triangular.

[0045] Conventional elastic pads according to the present state of the art are not provided with a central recess 4 with grooves 7 as described above. The combination of fluid accumulation and concentration of stray electric currents, together with the compression of the elastic pad, result in a degradation of the elastic material of the pad in these conventional elastic pads. This degradation starts in the centre of the pad and extends towards the edges. The properties of these elastic pads are thereby adversely affected in such a way that they need to be replaced prematurely.

[0046] The recess 4 in the elastic pad 1 according to

the invention forms a hollow space in the centre of the rail fastening zone 12. The combination of this hollow space with the grooves 7 between this space and the outer edge 8 of the pad 1 provide for a ventilation and drainage of the fastening zone 12. As a result, accumulation of fluid is prevented. The recess 4 also allows for the removal of stray electric currents to the ground. Further, the combination of the recess 4 and the grooves 7 results in a cooling of the fastening zone 12 when heating occurs for example due to stray electric currents and/or due to an increased compression or friction when railway vehicles move over the railway.

[0047] The recess 4 also functions as an air bellows. The recess 4 hereby forms a bellows which is partially compressed when the rail 3 resting on it is loaded. Thus, air is sent to the environment via the grooves 7. When the rail 3 is relieved again, the pad 1 will expand again and air will be sucked in from the environment. When the rail 3 is loaded, the grooves 7 are preferably not entirely compressed thereby.

[0048] A sixth embodiment of the invention, represented in figures 10 and 11, differs from the first embodiments in that grooves 7 are also provided in the top surface 5 of the pad 1. These grooves 7 stand crosswise to the grooves 7 in the bottom surface 6 of the pad 1.

[0049] The invention also concerns a method for manufacturing a railway whereby an elastic pad 1 is provided with a recess 4 and whereby at least one groove 7 for ventilation and drainage of this recess 4 is provided. These grooves 7 are provided such that the shape factor of the elastomer pad 1 is essentially not altered by the presence of these grooves 7. According to this method, said one or several grooves 7 also connect the recess 4 to the environment when the elastic pad 1 is placed between the sleeper and the rail. To this end, the groove 7 has an opening 11 between the rail foot 13 and the sleeper 2, as represented in figure 15.

[0050] Naturally, the invention is not restricted to the above-described method and device according to the invention.

[0051] Thus, more or less grooves 7 can be provided than those represented in the figures. Thus, for example, the grooves 7 may run over the support surface 20 in a zigzag or wavy manner.

[0052] Thus, the groove 7 may also extend as of the central opening up to a slanting outer edge extending at an angle of for example 45° between an outer edge 8 running parallel to the rail 3 and an outer edge 8 running parallel to the sleeper 2.

[0053] Thus, the elastic pad 1 according to the invention may assume a series of shapes that fall within the scope of the invention, as is also represented for example in figures 5, 6, 12, 13 and 14. Further, also the grooves may assume different shapes that fall within the scope of the invention, as is represented for example in figures 4 and 7. Naturally, the different characteristics of these embodiments can be mutually combined.

[0054] Thus, according to the invention, the elastic ma-

terial of the pad can also be selected such that when the pad is loaded in a railway, the grooves in the pad will be at least partially entirely compressed. This will create a suction effect, as a result of which air is sucked through the grooves.

[0055] Naturally, according to the invention, also other shapes of grooves 7 are possible insofar as for example at least a part of the cross section has the shape of a triangle with an angle α and an angle β as described above for the first embodiment. Thus, the groove 7 may for example have a cross section in the shape of a rectangular with a connecting triangle as represented in figure 7. Thus, the walls of the groove 7 may be slightly bent.

Claims

1. Elastic pad (1) designed to be placed between a sleeper (2) and a rail (3) of a railway, such that the rail (3) rests on the sleeper (2) via the elastic pad (1), whereby the pad (1) has at least a first support surface (20) comprising at least a bottom side (6) of the pad (1) designed to connect to the sleeper (2), whereby the pad (1) has at least a second support surface (20) comprising at least a top side (5) of the pad (1) designed to connect to a rail foot (13) of the rail (3), whereby the elastic pad (1) has at least one groove (7) extending in the first support surface (20) or the second support surface (20), **characterised in that** said groove (7) is V-shaped and has a cross section which, in its deepest point (18), has an angle (α) which is smaller than 90° , preferably smaller than 60° , in particular preferably between 20° and 60° , and whereby said angle (α) has legs forming an angle (β, γ) with the support surface (20), in which the groove (7) extends, which is larger than 45° , preferably larger than 60° , in particular preferably between 60° and 80° , whereby the pad (1) has a sufficiently high stiffness, such that the groove (7) is not or at least not entirely compressed when a load is exerted on the pad (1) as a railway vehicle moves over the rail (3).
2. Elastic pad (1) according to claim 1, whereby said groove (7) extends at least as of an outer edge (8) of the pad (1), such that air can circulate through the groove (7) via the outer edge (8).
3. Elastic pad (1) according to claim 1 or 2, whereby at least a second groove (7) extends in the first support surface (20) or the second support surface (20) of the pad (1) as well.
4. Elastic pad (1) according to any one of claims 1 to 3, whereby the cross section of said groove (7) narrows as of the support surface (20) in which the groove (7) extends to the deepest point (18) of the groove (7).
5. Elastic pad (1) according to any one of claims 1 to 4, whereby the groove (7) extends up to a depth (DG) which amounts to maximally half the height (HK) of the pad (1).
6. Elastic pad (1) according to any one of claims 1 to 5, whereby the groove (7) has a width (BG) which is smaller than two times the depth (DG) of the groove (7), preferably smaller than the depth (DG) of the groove (7).
7. Elastic pad (1) according to any one of claims 1 to 6, whereby the groove (7) provided in the pad (1) runs practically parallel to the longitudinal direction of the rail (3) of a railway when the rail (3), in an operational condition in the railway, rests on the elastic pad (1).
8. Elastic pad (1) according to any one of claims 1 to 7, whereby the groove (7) extends from an outer edge (8) up to an opposite outer edge (8').
9. Elastic pad (1) according to any one of claims 1 to 8, whereby the elastic pad (1) has a central recess (4) extending crosswise through the pad (1) as of the top side (5) to the bottom side (6) of the pad (1), whereby said groove (7) extends between the recess (4) and an outer edge (8) of the elastic pad (1).
10. Elastic pad (1) according to any one of claims 1 to 9, whereby the top side (5) of the pad (1) is provided with an anti-adhesive mat which preferably has a textile structure and/or a woven structure, and which is designed to connect to the bottom side (14) of the rail foot (13).
11. Elastic pad (1) according to any one of claims 1 to 10, whereby the elastic pad (1) is at least partially made of one or several elastomers, selected from recycled rubber, rubber, natural rubber, recycled resin-bonded rubber granules, cork rubber, polyurethane, thermoplastic elastomer (TPE), polyvinyl chloride (PVC) and/or ethylene vinyl acetate (EVA).
12. Method for constructing a railway with rails (3) resting on sleepers (2) whereby, between the sleepers (2) and the bottom side (14) of a rail foot (13) of the rails (3), an elastic pad (1) is provided having a top side (5) connecting at least partially to the bottom side (14) of the rail foot (13) and having a bottom side (6) connecting at least partially to the top side (14) of the sleeper (2), whereby at least one groove (7) is provided in the top side (5) and/or the bottom side (6) of the elastic pad (1), **characterised in that** the groove (7) is provided with an opening (11) in an outer edge (8) of the elastic pad (1) between the rail

foot (13) and the sleeper (2), as a result of which air can circulate through the groove (7), and whereby the shape of the groove (7) is selected such that the elastic pad (1) has a shape factor which remains substantially unaffected by the provision of the groove (7). 5

13. Method according to claim 12, whereby a sufficiently high stiffness is selected for the pad (1), such that the groove (7) is not or at least not entirely compressed when a load is exerted on the pad (1) by a railway vehicle moving over the rail (3). 10
14. Method according to claim 11 or 12, whereby the groove (7) is at least partially provided with a V-shape, whereby the groove (7) has a cross section with an angle (α) in its deepest point (18) which is smaller than 90° , preferably smaller than 60° , in particular preferably between 20° and 60° , and whereby said angle (α) has legs forming an angle (β, γ) with the top side (5) and/or the bottom side (6) which is larger than 45° , preferably larger than 60° , in particular preferably between 60° and 80° . 15 20
15. Method according to any one of claims 12 to 14, whereby the bottom side (14) of the rail foot (13) is kept free in a central zone at a fastening zone (12) between the rail (3) and the sleeper (2) by providing a central recess (4) in the elastic pad (1), whereby at least one groove (7) is provided connecting the central recess (4) to the opening (11). 25 30

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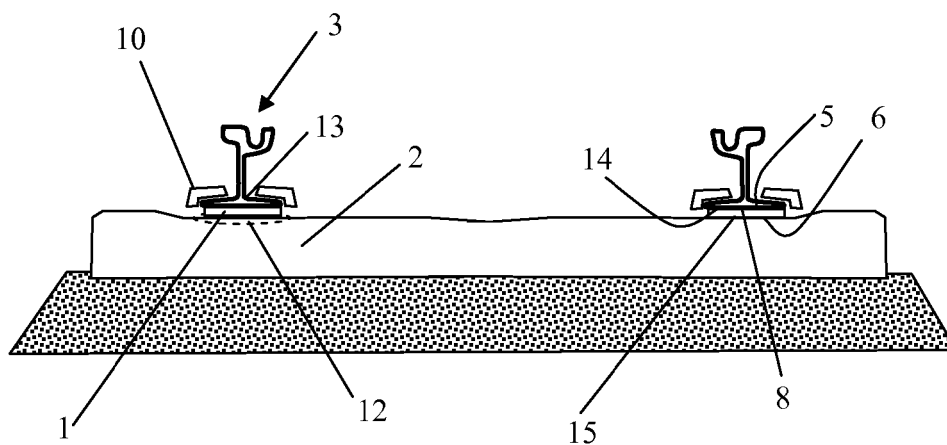


FIG. 1

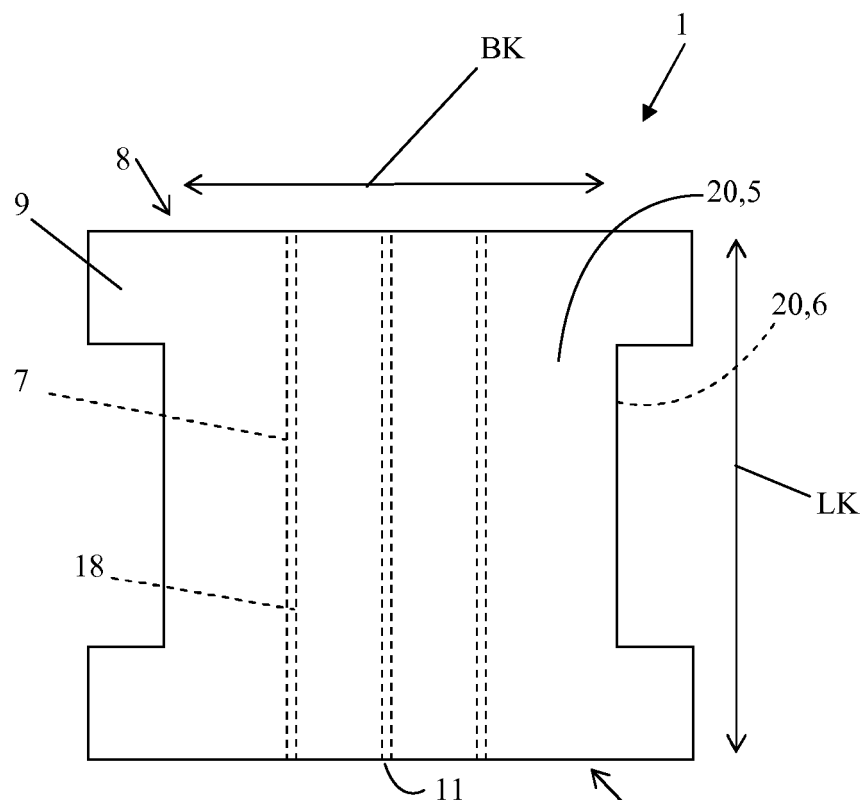


FIG. 2

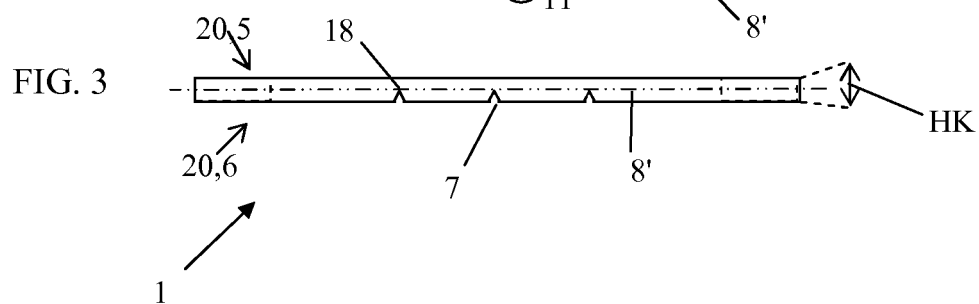
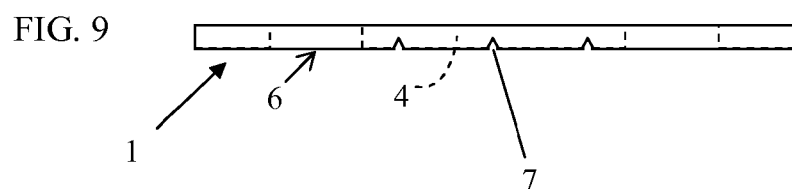
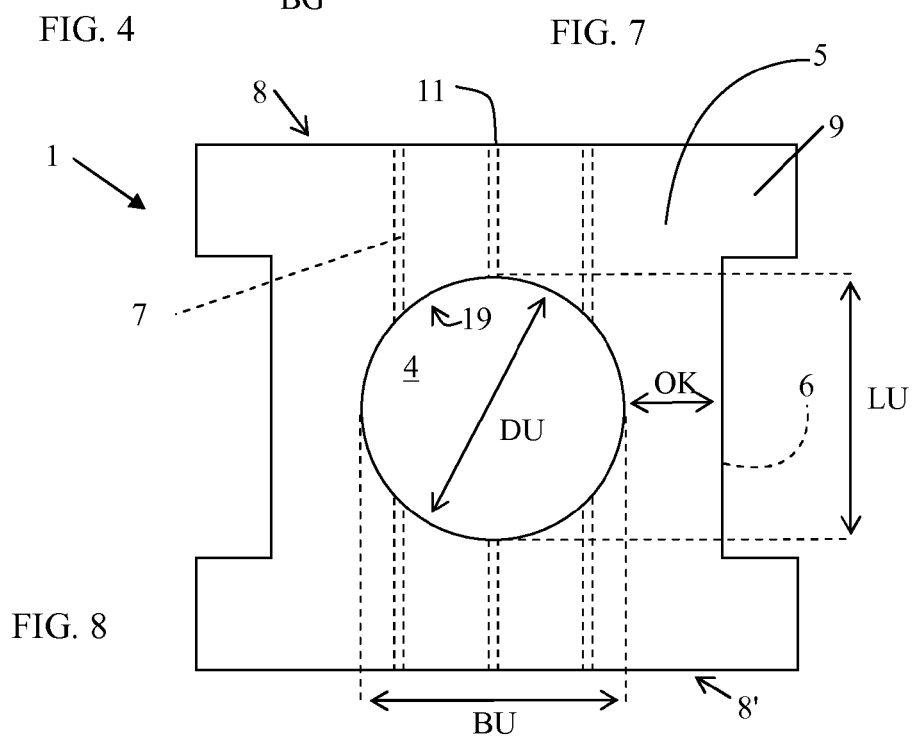
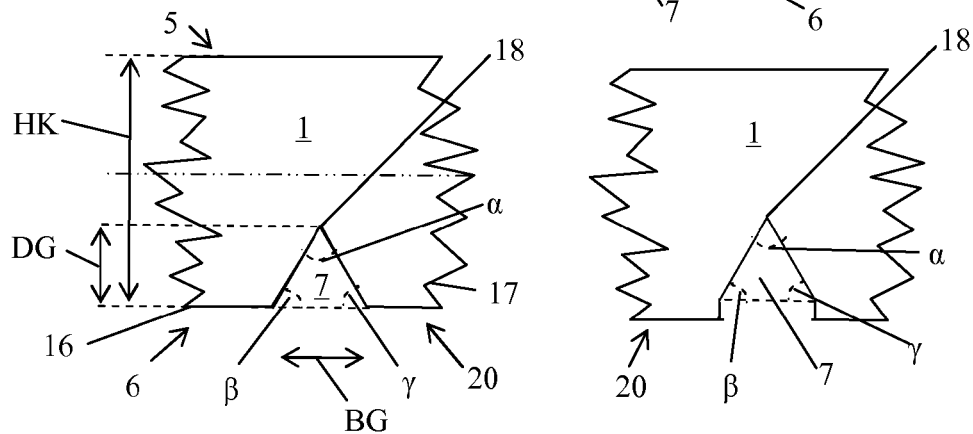
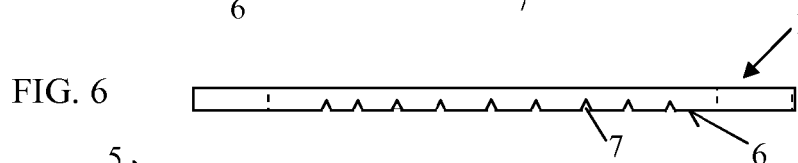
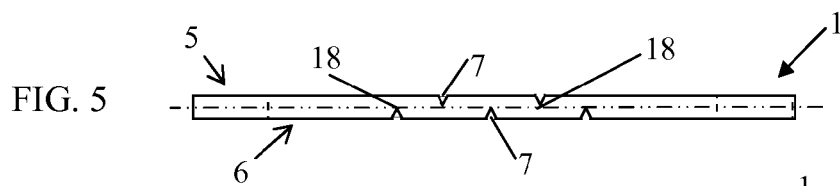


FIG. 3



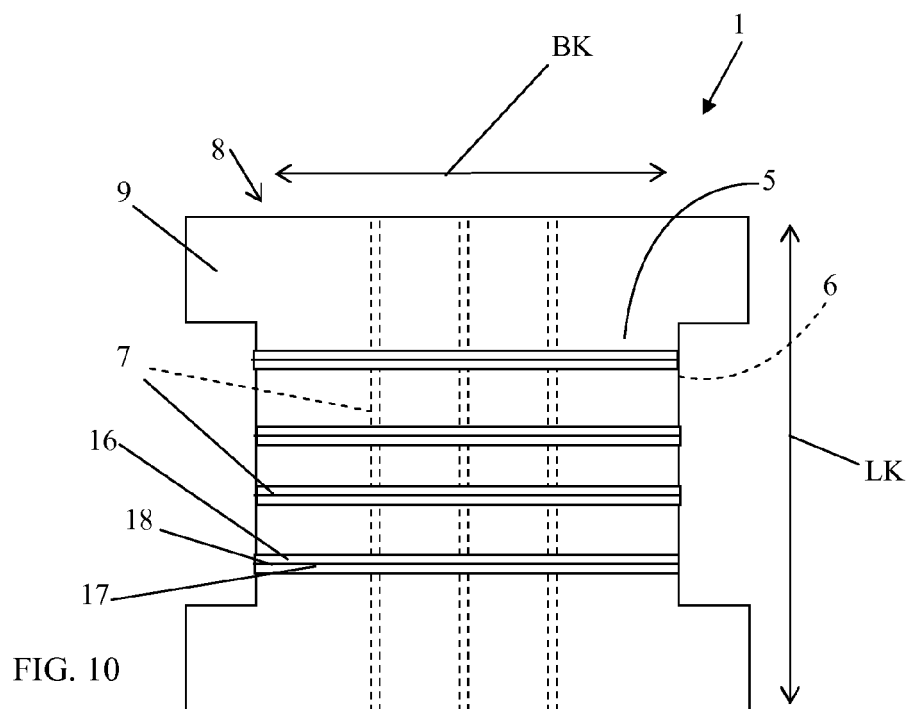


FIG. 10

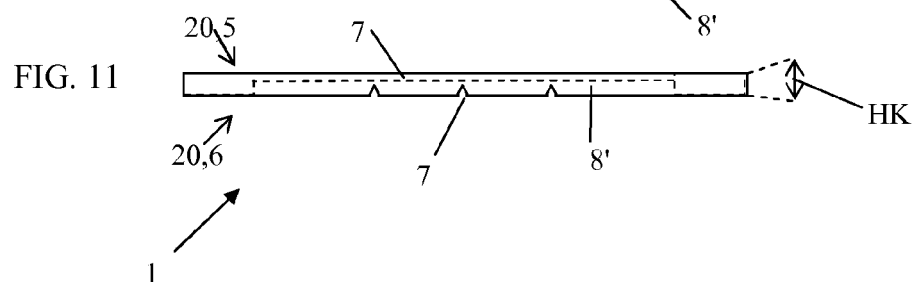


FIG. 11

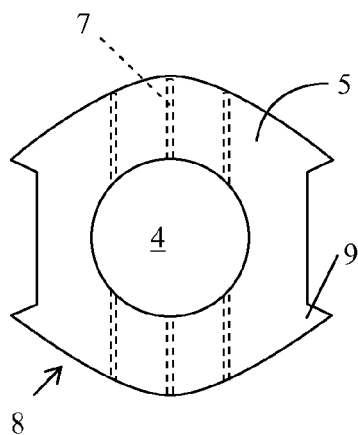


FIG. 12

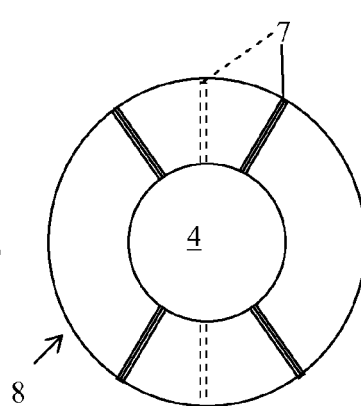


FIG. 13

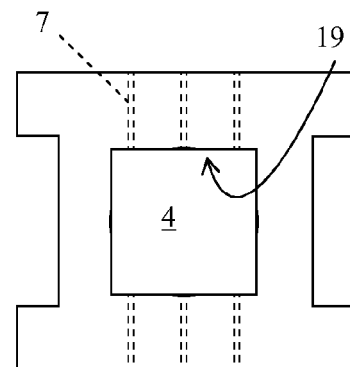


FIG. 14

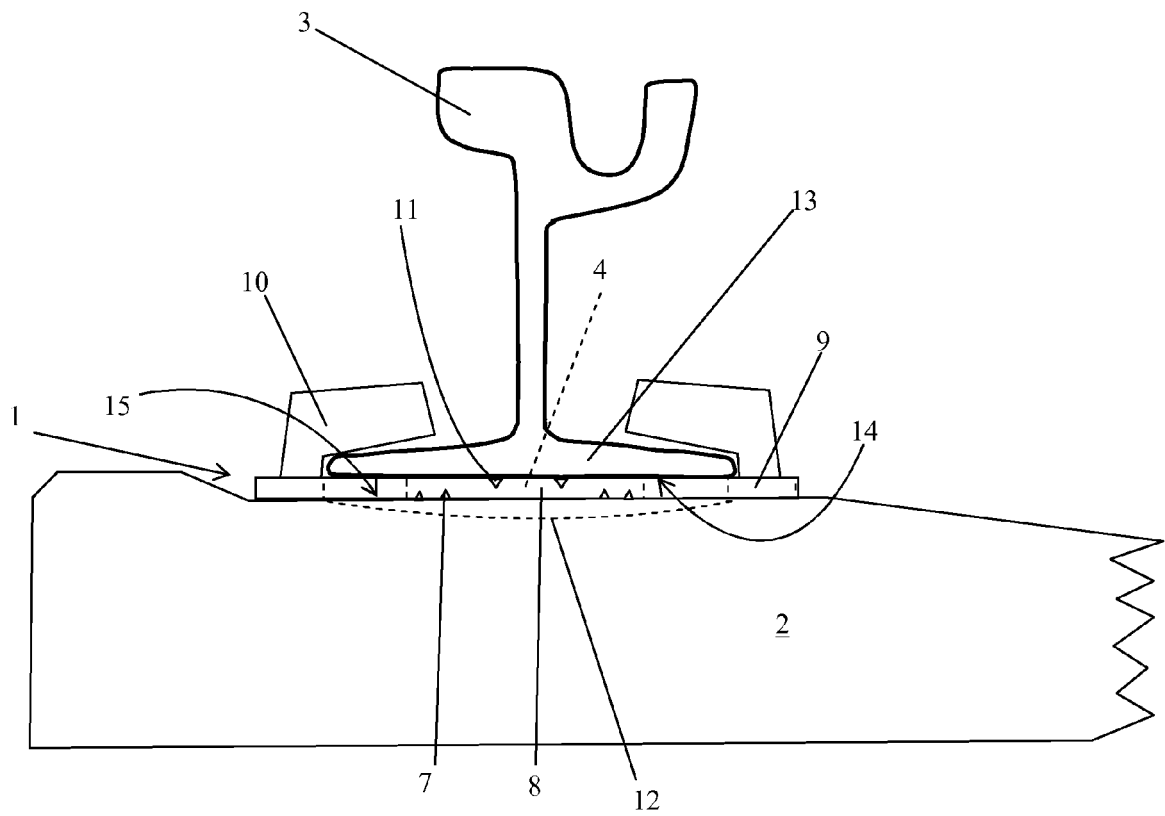


FIG. 15



EUROPEAN SEARCH REPORT

Application Number
EP 13 16 6921

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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			E01B
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
Munich		24 July 2013	Movadat, Robin
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24-07-2013

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