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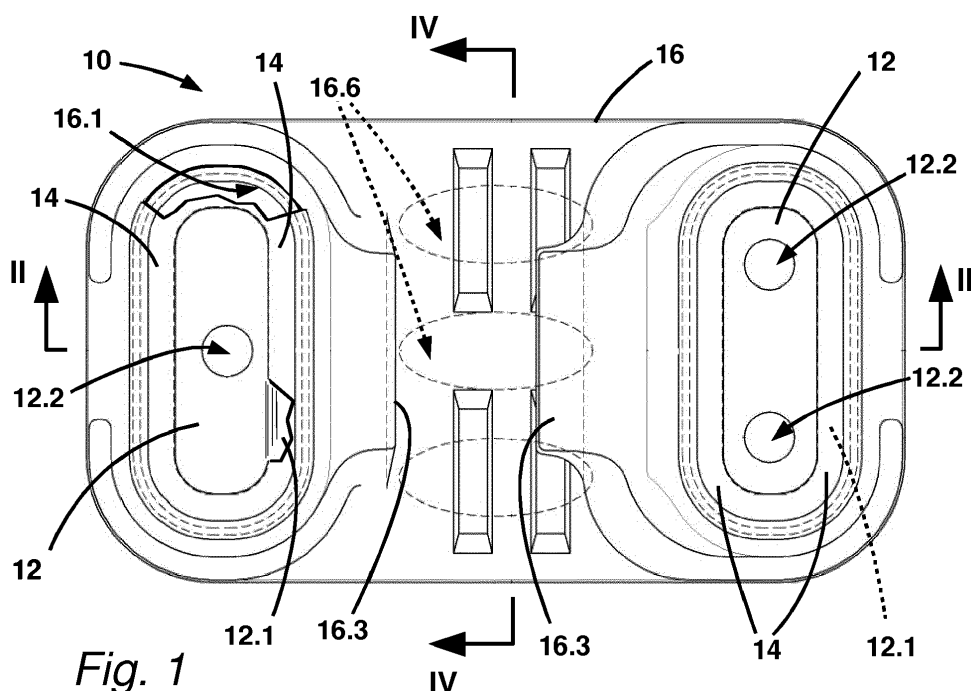
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(54) MOUNTING DEVICE

(57) A vehicle rail mounting device (10) is provided for mounting a vehicle rail (20) on a rail substrate (22). The device includes two spaced apart base formations (12.1) forming part of base components (12) which are to be supported on the substrate. Two elastomeric bearing elements (14) are provided, to be disposed on the base formations. A rail mount (16) is provided for mounting the rail thereon. The rail mount has seating formations (16.2) to enable the rail mount to be disposed on the

bearing elements when these are disposed on the base formations. The elastomeric bearing elements are mutually independent, allowing them to be made from materials having different stiffnesses to each other, thus allowing for different resistances to head roll depending on which direction head roll inducing forces are applied to the rail. The base formations and bearing elements can be on two opposite sides of the rail, enabling the positioning of the rail at a low height.

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Description

FIELD OF THE INVENTION

[0001] The present invention relates to vehicle rail mounting device for mounting a vehicle rail, such as a train rail, on a rail substrate, such as a ground surface.

BACKGROUND TO THE INVENTION

[0002] In the railway industry, it is desirable to reduce vibrations and resultant noise caused by train wheels rolling on railway tracks. Historically, the vibrations of a moving train have been transmitted through the rails to the supporting substrate, which may, for example, be a formed concrete ground surface.

[0003] A known device for facilitating the reduction of such transmitted vibrations and noise includes a top plate, an elastomeric element, and a bottom frame. The elastomeric element is disposed on the bottom frame and the top plate is seated on the elastomeric element. The elastomeric element assists to isolate the top plate and bottom frame from each other vibration-wise.

[0004] The top plate typically includes rail-securing formations for anchoring clips or other suitable attachment means to attach the rail to the upper plate.

[0005] In order to achieve the desired and required stability for the mounted rail, the lower frame is required to be positioned such that, when the rail is mounted on the device, the lower frame extends or passes underneath the rail. Thus, the elastomeric element and top plate also pass under the rail. A primary disadvantage of the known product, as a result of this positioning, is that it restricts the extent to which height of the rail can be minimised.

[0006] In addition, as the elastomeric element is inherently resilient, and as the forces in the gauge and field directions during movement of a train typically differ from each other (with the gauge forces being higher than the field forces), known elastomeric elements do not lend themselves to achieving optimal resistive forces for resisting those gauge and field forces.

[0007] It is an object of the present invention to overcome or ameliorate the disadvantages of the prior art or to provide an alternative thereto.

[0008] In this specification, unless the context indicates otherwise, a reference to a vehicle is a reference to a vehicle adapted to travel along and be guided by rails.

SUMMARY OF THE INVENTION

[0009] According to an aspect of the invention, there is provided a vehicle rail mounting device for mounting a vehicle rail on a rail substrate, the device including:

two spaced apart base formations, the base formations forming part of at least one base component which is adapted to be supported on the substrate; two independent elastomeric bearing elements,

each of the bearing elements being adapted to be disposed on a respective one of the base formations; and

a rail mount, adapted for a vehicle rail to be mounted thereon, the rail mount having seating formations configured for the rail mount to be disposed on the bearing elements when the bearing elements are respectively disposed on the base formations.

[0010] In a preferred embodiment of the invention, each of the bearing elements is bonded to a respective one of the base formations.

[0011] In a preferred embodiment of the invention the at least one base component includes two separate base components.

[0012] In a preferred embodiment of the invention the at least one base component includes at least one attachment formation to facilitate attachment of the at least one base component to the rail substrate. Then, preferably, when the at least one base component includes two separate base components, each of the base components includes at least one attachment formation to facilitate attachment of the respective base component to the rail substrate.

[0013] Preferably, each attachment formation includes a bolt hole. In one preferred embodiment, the bolt holes are elongated to permit positional adjustment of the bolt holes relative to the substrate.

[0014] In a preferred embodiment of the invention, each of the base formations includes an outer perimetral surface, and each of the bearing elements is adapted, when disposed on a respective one of the base formations, to extend around the respective outer perimetral surface of the respective base formation.

[0015] In a preferred embodiment of the invention, when the rail mount is disposed on the bearing elements and the bearing elements are respectively disposed on the base formations and the at least one base component is seated on the substrate, the rail mount is configured so as to leave a gap between the rail mount and the substrate.

[0016] Then, preferably, each of the bearing elements includes a respective extension portion which is configured to extend beneath the rail mount, within the gap.

[0017] In a preferred embodiment of the invention, the rail mount includes rail connectors for connecting the rail to the rail mount.

BRIEF DESCRIPTION OF THE DRAWINGS

[0018] Preferred embodiments of the invention will now be described, by way of example only, with reference to the accompanying drawings in which:

Figure 1 is a partly cut-away top view of a train rail mounting device according an embodiment of the invention;

Figure 2 is a section view along line II-II in Figure 1, and also shows part of a railway rail and train wheel;

Figure 3 is a right end view of the device as shown in Figure 1;

Figure 4 is a section view of the device along line IV-IV in Figure 1;

Figure 5 is a top view of a train rail mounting device according to another embodiment of the invention, and shows part of a train rail;

Figure 6 is a section view along line VI-VI in Figure 5;

Figure 7 is a top view of a train rail mounting device according to yet another embodiment of the invention, and shows part of a train rail; and

Figure 8 is a section view along line VIII-VIII in Figure 7.

DETAILED DESCRIPTION

[0019] Referring to the drawings, there is shown a train rail mounting device 10. The device 10 includes a pair of base components 12, a pair of elastomeric bearing elements 14, and a rail mount 16.

[0020] While the mounting device 10 is for a rail for a vehicle in the form of a train, in other embodiments the vehicles may be other forms of vehicles adapted to travel along rails.

[0021] Each base component 12 elongated in shape as shown, and has a base formation constituted by outer walls 12.1 which taper outwardly in a downward direction, as best seen in Figure 2.

[0022] In addition, one of the base components 12 is provided with a single bolt hole 12.2, while the other of the base components has two such bolt holes. It will be appreciated that in other embodiments, the base component 12 shown in Figure 1 with one bolt hole 12.2 may have two bolt holes, while the other base component has one bolt hole, or both base components may each have two bolt holes 12.2.

[0023] The rail mount 16 defines a pair of elongated apertures 16.1, substantially complementary in shape to that of the base formations 12.1, making allowance for the presence of the elastomeric bearing components 14, as will be described further below.

[0024] In addition, the rail mount 16 includes a pair of rail attachment formations 16.3, each of which, in the present embodiment, is constituted by a bracket. The brackets 16.3, define, between them, a rail receiving space 18, for receiving a train rail 20, which is shown schematically in dashed lines, in Figure 2.

[0025] The elastomeric bearing components 14 are each of continuous, elongated shape, with inner and outer surfaces 14.1, which are complementary to, and thus

adapted for being disposed on - and, depending on the particular embodiment, also bonded to - the base formations 12.1 of the base components 12, and aperture-facing surfaces 16.2 of the rail mount 16 at the respective elongated apertures 16.1.

[0026] As can best be seen in Figure 2, each of the elastomeric bearing elements 14 is formed with an upper portion 14.2, these portions being adapted to facilitate bonding to respective shoulder portions 16.4 of the rail mount 16, adjacent to the respective elongated apertures 16.1.

[0027] In addition, each of the elastomeric bearing components 14 includes a lower, extension portion 14.3 which can serve as a pressure pad, as discussed further below.

[0028] When the device 10 is in an assembled form, the elastomeric bearing elements 14 are disposed on, and bonded to, the respective base components 12, with the inner surfaces 14.1 of the bearing elements being in contact with the base formations constituted by the outer walls 12.1 of the respective base components 12.

[0029] In addition, the rail mount 16 is disposed on the two elastomeric bearing elements 14, such that the aperture-facing surfaces 16.2 are in contact with the bearing elements, and the upper portions 14.2 of the bearing elements extend around the complementarily shaped shoulder portions 16.4 of the rail mount, as best seen in Figure 2.

[0030] Also as best seen in Figure 2, the device 10 is adapted to be supported on a railway substrate 22, which, depending on the particular embodiment, is a ground surface or similar surface, suitable for supporting railway lines, such as a formed concrete surface or slab.

[0031] With the device 10 supported on the substrate 22 in this manner and the rail mount 16 being disposed on the bearing elements 14 as described above, there is a gap 24 between the rail mount and the substrate.

[0032] The extension portion 14.3 of each of the bearing elements 14 extends within the gap 24, so as to engage with a respective lower face 16.5 of the rail mount 16.

[0033] The device 10 can be used, together with a multitude of similar devices, for supporting railway lines 20, in the conventional manner as would be understood by a person skilled in the art.

[0034] In particular, a train rail 20, as shown schematically in dashed lines in Figure 2, can be received within the rail receiving space 18, and suitable locking elements, such as standard rail securing clips, restraints, or the like, designated by reference number 26, and as shown schematically in dashed lines in Figure 2, as would be understood by a person skilled in the art, can be used to secure the rail in place.

[0035] The device 10 can be secured to the substrate 22 by means of suitable bolts or similar attachment means, the positions of which are schematically shown in dashed lines, and referenced 28, in Figure 2.

[0036] The rail mount 16 is also provided with three

oval recesses 16.6, to lighten the casting of which the rail mount is comprised, and to assist in reducing shrinkage or porosity, and increase casting integrity, during the manufacture of the mount.

[0037] The rail 20 is used for supporting train wheels 30 in the conventional manner, as shown schematically in dashed lines in Figure 2. It will be appreciated that, as a train (not shown) moves along the rail 20, not only does the train apply vertically downward force to the rails 20 as a result of the weight of the train and its contents, but also applies lateral forces in the outward and inward directions, as shown by the arrows A and B, respectively, in Figure 2, as a result of engagement, including frictional engagement, between the wheels 30 and rail 20, and as a result of the movement of the train, over undulating terrain, and also around bends.

[0038] Depending on the particular purpose for which the train will be used, the outward force A will typically be greater than the inward force B.

[0039] As the vertically downward force, as well as outer and inner forces in the directions A and B, are applied via the train wheels 30 to the rail 20, these forces are transmitted from the rail to the rail mount 16, from the rail to the elastomeric bearing elements 14, and then via the elastomeric bearing elements to the base components 12. This results in varying degrees of compression of the bearing elements 14, depending on the particular force being applied at any one time.

[0040] However, because the forces applied to the two elastomeric bearing elements 14 may differ between those elements, especially due to the difference between the outward forces in the direction A and inward forces in the direction B, it is desirable, in certain preferred embodiments, for the stiffness of one of the bearing elements 14 to be greater than that of the other bearing element. This is enabled due to the two bearing elements 14 being completely separate and independent from each other.

[0041] Indeed, based on typical expected usage, the desired stiffness characteristics of each of the two bearing elements 14 can be carefully determined and selected to achieve suitable lateral stability of the rail 20, and to control the amount of rail head roll (lateral deflection of the head of the rail) that occurs in operation.

[0042] In particular, the hardness of the rubber or other elastomeric material of the bearing elements 14 and their geometry (including size and exact at-rest shape) can be selected to obtain desired individual and relative stiffness characteristics.

[0043] It will be appreciated that, in use, there will be occasions when greater than usual forces are applied by the wheels 30 of the train to the rail 20, which can cause greater deformation and deflection of the elastomeric bearing elements 14 than usual.

[0044] To prevent, or at least minimise, the chance of undesirable contact between the lower faces 16.5 of the rail mount 16 and the substrate 22, the extension portions 14.3 of the bearing elements 14 are provided, in order to

engage the substrate and thus serve as resiliently compressive barriers between the rail mount 16, in particular its lower faces 16.5, and the substrate.

[0045] It will also be apparent, especially from Figures 1 and 2, that the base components 12, and the elastomeric bearing elements 14, are disposed on opposite lateral sides of the rail 20, and therefore do not extend beneath the rail. As a result of this configuration, the invention, in preferred embodiments, lends itself to positioning the rail mount 16, or at least portions the rail mount that will be engaged by the rail 20, at a lower height than can typically be achieved in prior art rail support devices, in which the components corresponding to the base components 12 and bearing elements 14 of the present invention, would extend beneath the rail.

[0046] This can be particularly useful in cases where there are limitations on the maximum available heights for rails, such as in certain underground public transport facilities.

[0047] The positioning of the bolt holes 12.2 is such that the base components 12 can have compact footprints.

[0048] The device 10 can be designed such that the bolts (at the positions 28) that can be used for securing the base components 12 to the substrate 22 can be off-the-shelf items. In addition, the ability to attach the base components 12 to the substrate 22 by way of the bolts enables the establishing of a frictional grip between the base components, and hence the device 10 as a whole, and the substrate.

[0049] Referring to Figures 5 and 6 there is shown a rail mounting device 10.1 according to another embodiment of the invention, in which features corresponding to those described above are indicated by similar reference numerals.

[0050] The device 10.1 includes mounting brackets 34 for the attachment of securing clips 26 (not shown) which are used to restrain a train rail 20, as shown in dashed lines in Figure 5, in a similar fashion to the clips (or other forms of restraints) 26 referred to above.

[0051] The device 10.1 is asymmetric in that the base component 12 and bearing element 14 on one side of the rail 20 are disposed in a diagonally opposite relationship to the corresponding features on the other side of the rail, while the same also applies to the mounting brackets 34 on the two opposite sides of the rail. Thus, the relative position of the base component 12 and bearing element 14 on the one hand, and mounting bracket 34 on the other hand, on one side of the rail 20, is reversed relative to the relative position of those components on the other side of the rail.

[0052] On each side of the rail 20, the respective mounting bracket 34 is disposed adjacent to the base component 12 and bearing element 14 on that side of the rail in a relative position which is substantially parallel to the direction in which the rail extends, as shown in Figure 5. As a result, the overall width of the device 10.1 from left to right as shown in Figure 5 is less than it would

have been if it had a configuration similar to that of the embodiment of Figures 1 to 4, with the base components 12 and bearing elements 14 on the one hand, and the mounting brackets 34 on the other hand, all arranged in line, symmetrically about the rail 20.

[0053] Referring to Figures 7 and 8 there is shown a rail mounting device 10.2 according to yet another embodiment of the invention, in which features corresponding to those described with reference to Figures 5 and 6 are indicated by similar reference numerals.

[0054] The device 10.2 is symmetrical in that the base component 12 and bearing element 14 on the one hand, and mounting brackets 34, on the other hand, on one side of the rail 20, are disposed in a linear configuration, and symmetrically, with respect to those on the other side of the rail.

[0055] Although the invention is described above with reference to specific embodiments, it is not limited to those embodiments but may be embodied in different forms within the scope of the claims.

Claims

1. A vehicle rail mounting device (10) for mounting a vehicle rail (20) on a rail substrate (22), the device being **characterised in that** is includes:

two spaced apart base formations (12.1), the base formations forming part of at least one base component (12) which is adapted to be supported on the substrate;

two independent elastomeric bearing elements (14), each of the bearing elements being adapted to be disposed on a respective one of the base formations; and

a rail mount (16), adapted for the vehicle rail to be mounted thereon, the rail mount having seating formations (16.2) configured for the rail mount to be disposed on the bearing elements when the bearing elements are respectively disposed on the base formations.

2. A vehicle rail mounting device (10) according to claim 1 wherein the rail mount (16), bearing elements (14) and base formations (12.1) are configured such that, when the rail mount is disposed on the bearing elements and the bearing elements are respectively disposed on the base formations, when the vehicle rail (20) is mounted on the rail mount, the base formations and the bearing elements are disposed on two opposite sides of the rail.

3. A vehicle rail mounting device (10) according to claim 1 or claim 2 wherein one of the elastomeric bearing elements (14) has a first stiffness and the other one of the elastomeric bearing elements has a second stiffness which is different to the first stiff-

ness.

3. A vehicle rail mounting device (10) according to claim 1 or claim 2 wherein each of the bearing elements (14) is bonded to a respective one of the base formations (12.1).

3. A vehicle rail mounting device (10) according to claim 1 or claim 2 wherein the at least one base component (12) includes two separate base components.

4. A vehicle rail mounting device (10) according to claim 1 or claim 2 wherein the at least one base component (12) includes at least one attachment formation (12.2) to facilitate attachment of the at least one base component to the rail substrate (22).

5. A vehicle rail mounting device (10) according to claim 3 wherein each of the base components (12) includes at least one attachment formation (12.2) to facilitate attachment of the respective base component to the rail substrate (22).

6. A vehicle rail mounting device (10) according to claim 4 or claim 5 wherein the or each attachment formation (12.2) includes a bolt hole.

7. A vehicle rail mounting device (10) according to claim 5 or claim 6 wherein the or each bolt hole (12.2) is elongated to permit positional adjustment of the or each bolt hole relative to the substrate (22).

8. A vehicle rail mounting device (10) according to any one of claims 5 to 7 wherein each of the base formations (12) includes an outer perimetral surface (12.1), and each of the bearing elements (14) is adapted, when disposed on a respective one of the base formations, to extend around the respective outer perimetral surface of the respective base formation.

9. A vehicle rail mounting device (10) according to any one of the preceding claims wherein, when the rail mount (16) is disposed on the bearing elements (14) and the bearing elements are respectively disposed on the base formations (12.1) and the at least one base component (12) is seated on the substrate (22), the rail mount is configured so as to leave a gap (24) between the rail mount and the substrate.

10. A vehicle rail mounting device (10) according to claim 9 wherein each of the bearing elements (14) includes a respective extension portion 14.3) which is configured to extend beneath the rail mount (16), within the gap.

11. A vehicle rail mounting device (10) according to

anyone of the preceding claims wherein the rail mount (16) includes rail connectors (26) for connecting the rail (20) to the rail mount.

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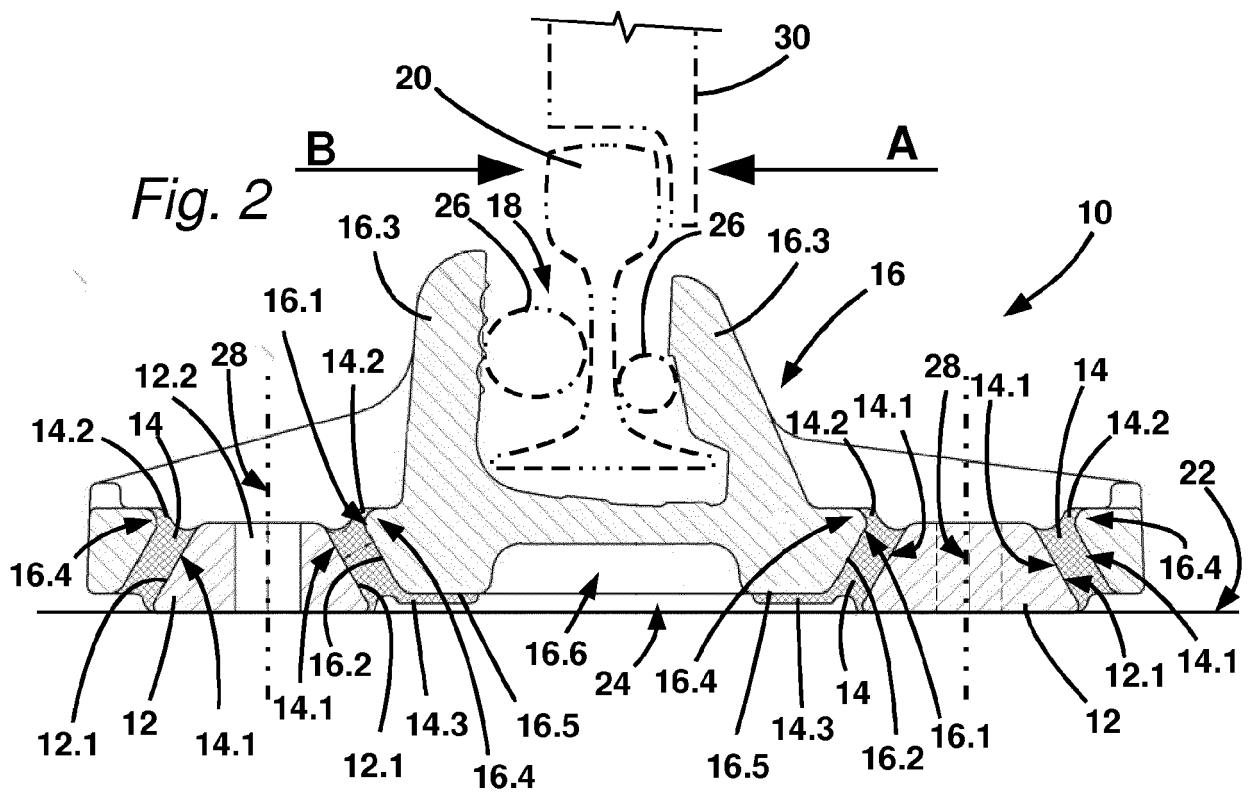
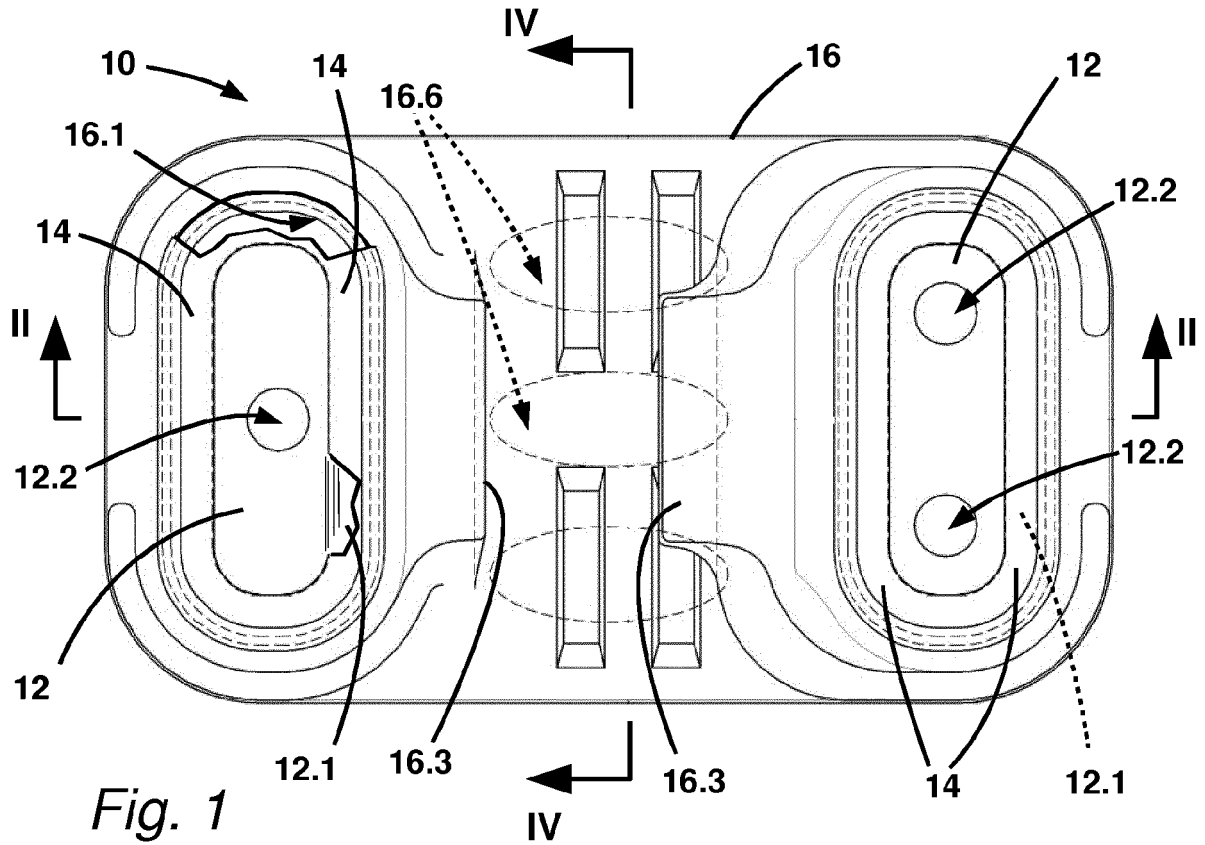


Fig. 3

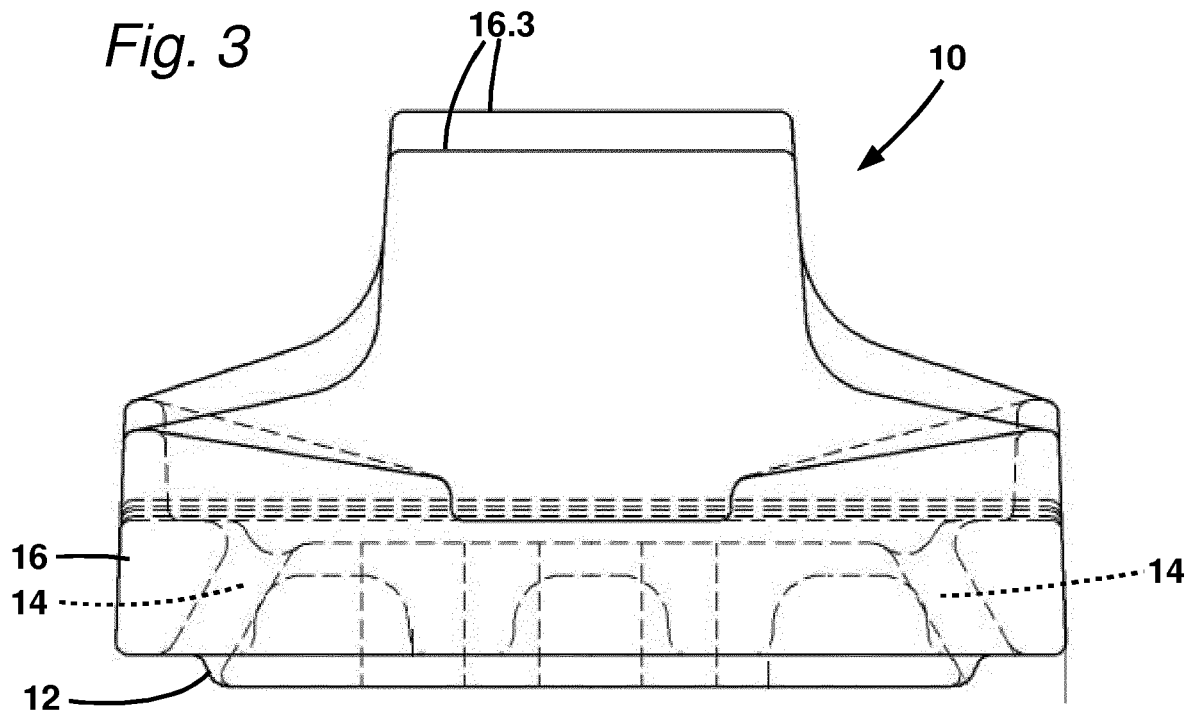
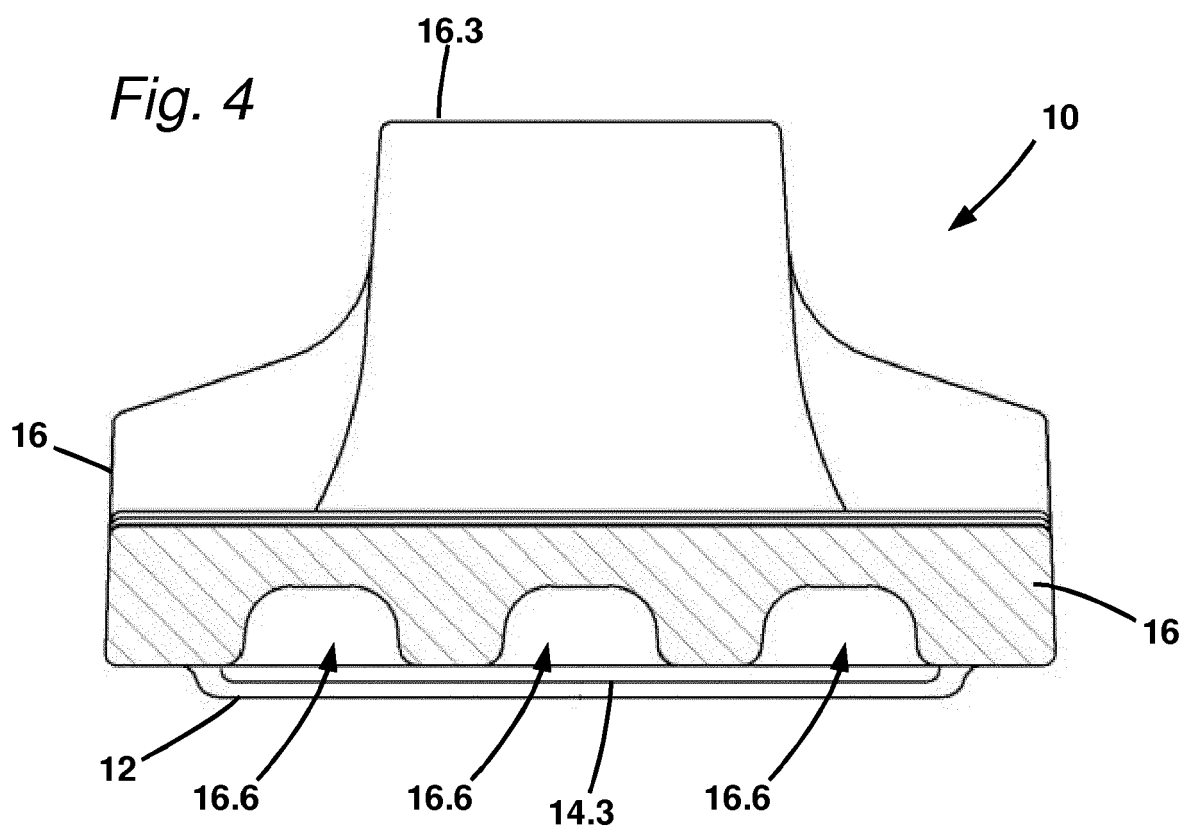
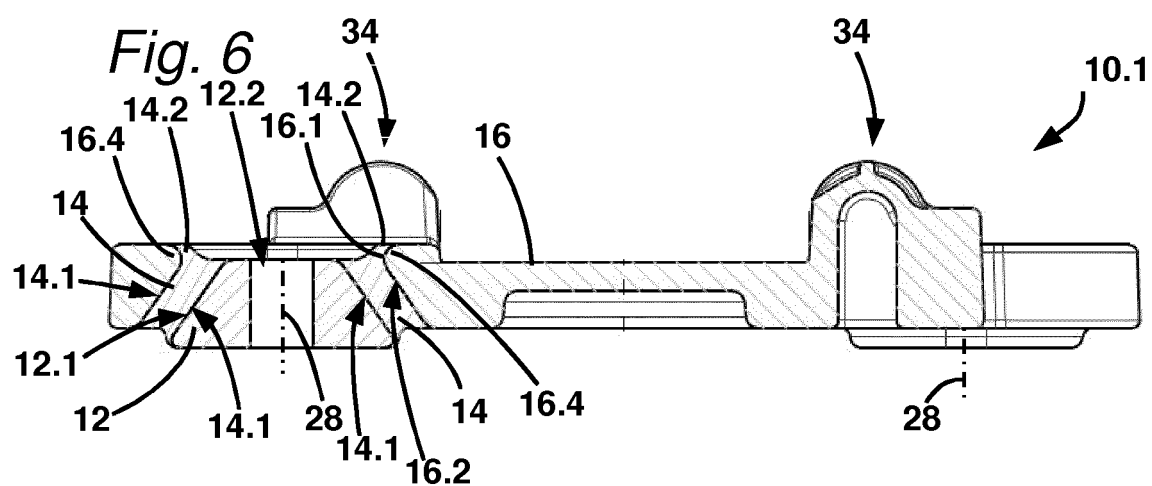
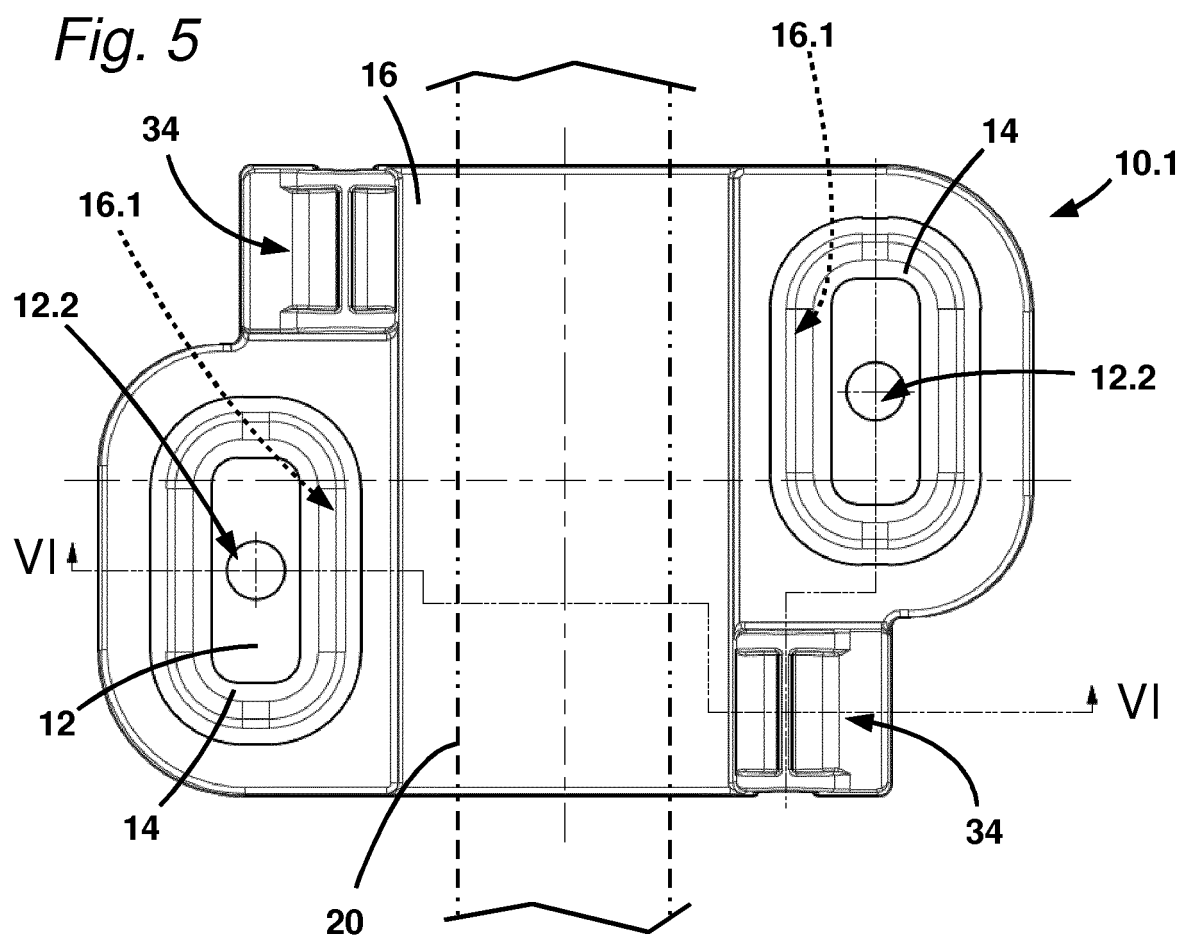
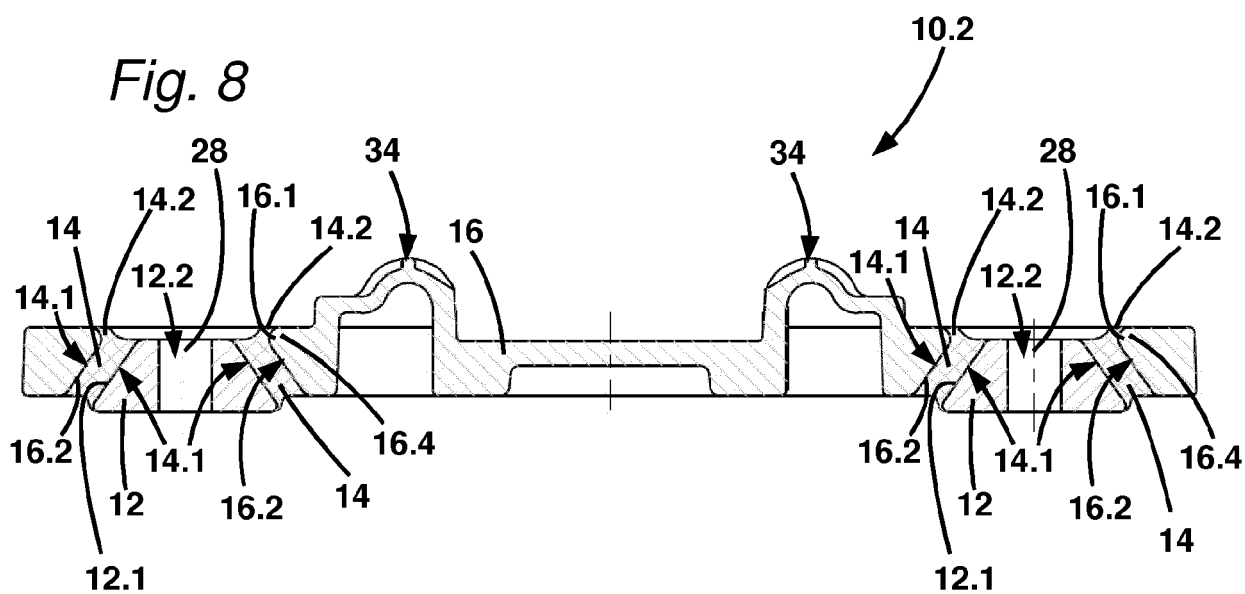
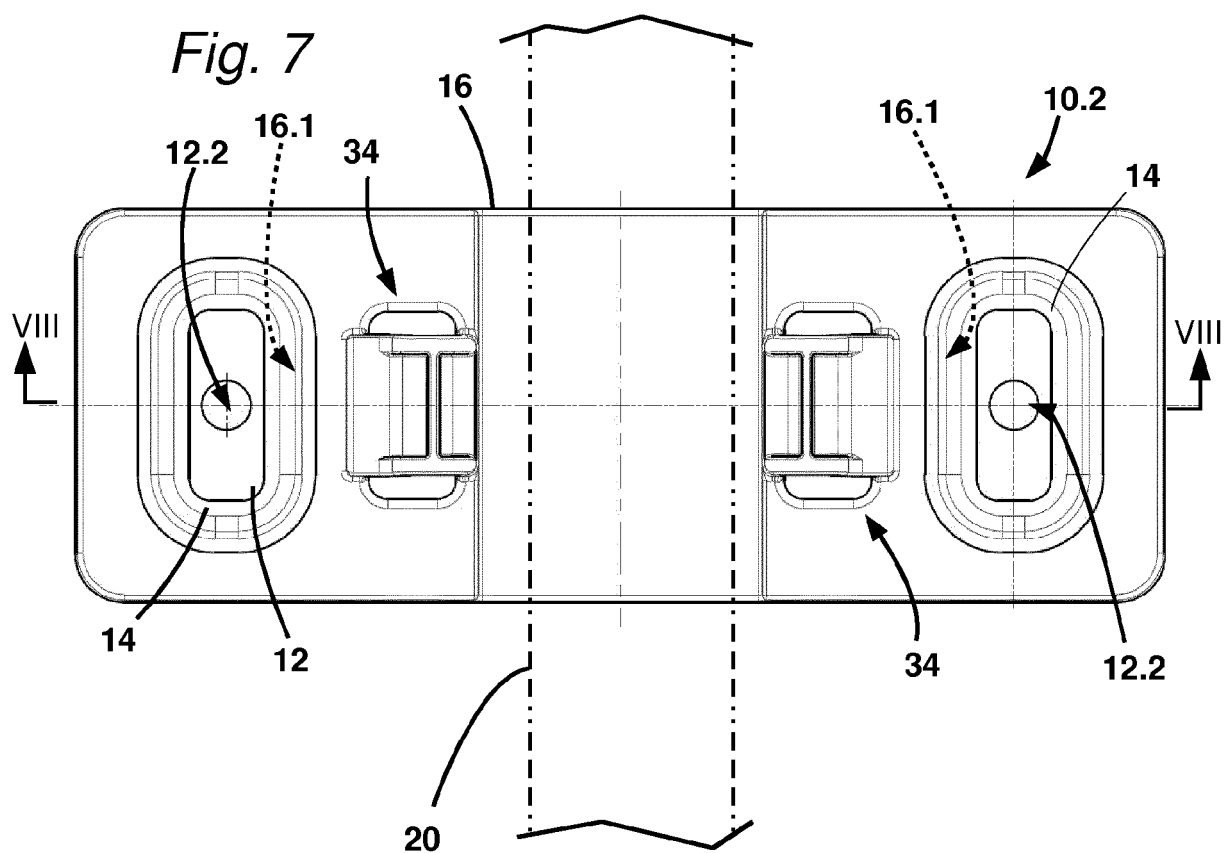


Fig. 4









EUROPEAN SEARCH REPORT

Application Number
EP 18 17 9400

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Place of search Munich		Date of completion of the search 8 November 2018	Examiner Movadat, Robin
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**ANNEX TO THE EUROPEAN SEARCH REPORT
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