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(54) RAIL ACOUSTIC ATTENUATOR DEVICE

(57) The present invention relates to an acoustic attenuator device for rail and tram tracks able to eliminate or reduce considerably the noise due to the vibrations of the rail upon the train passage.

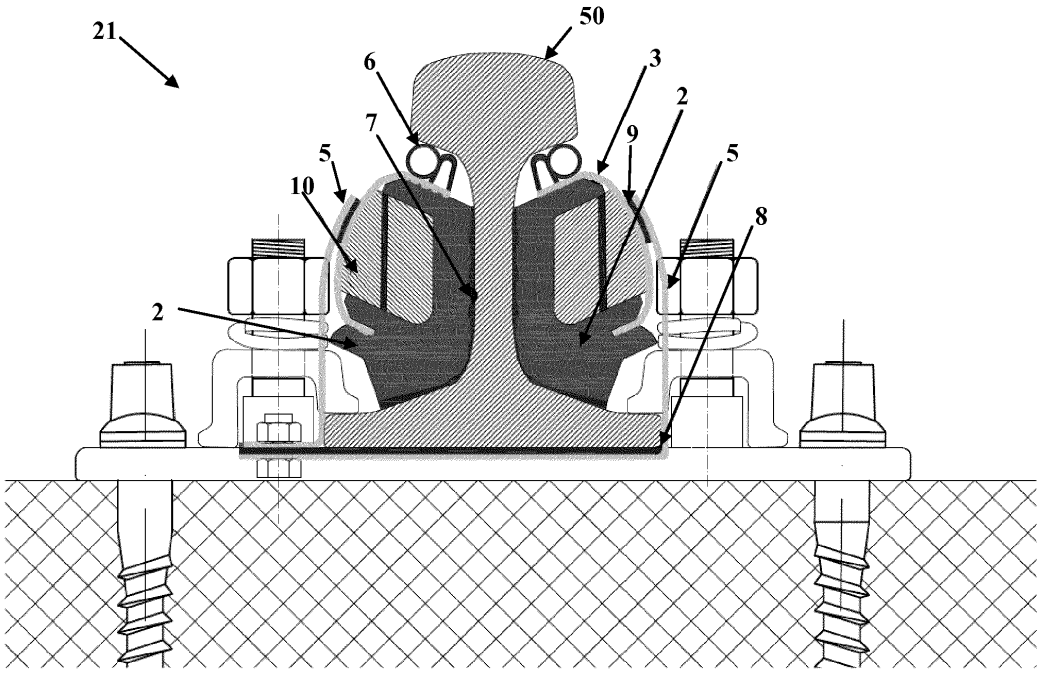

FIG. 8

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Description

[0001] The present invention relates to an acoustic attenuator device for rail and tram tracks.

[0002] The acoustic pollution, as it is well known, is an extremely felt problem, and is particularly important even and above all near railway lines. Several countries provide suitable laws for containing and lowering the noise caused by the transit of the trains.

[0003] Upon the passage of a train, an important noise component, due to the vibration of the rails, is added to the mechanical noise caused by the motion of the train itself.

[0004] The object of the present invention is to intervene on this noise component with the purpose of eliminating it or at least reducing it considerably.

[0005] It is believed that such object can be achieved by means of an attenuation device as defined in the independent claim Nr. 1.

[0006] Additional features of the present invention are defined in the corresponding dependent claims.

[0007] The invention tends to contain such phenomenon, at least partially, by intervening directly on one of the noise sources, the rails. This kind of devices, applied to the rails and able to attenuate the sound level, are currently available on the market, but it does not seem that up to now they have guaranteed noteworthy results. However, they are discontinuous systems, wholly different from the one which is described herein.

[0008] One of the advantages of such system consists in the continuous mode for installing on rail, allowing to operate the single attenuator elements consecutively, without any interruption therebetween, as the section of the assembled product allows positioning it even at the joints for fastening the rails on the sleepers.

[0009] Other advantages, together with the constructive features and the use modes of the present invention, will result evident from the following detailed description of preferred embodiments thereof, shown by way of example and not for limitative purposes.

[0010] The figures of the enclosed drawings will be referred to, wherein:

- figures 1 and 2 relate to a first embodiment of the present invention;
- figure 3 is a sectional view of the device of figure 2;
- figures 4A and 4B show a rubber profile of the present invention;
- figures 5 and 6 relate to a second embodiment of the present invention;
- figure 7 is a sectional view of the device of figure 6; and
- figure 8 is a sectional view of a device according to a third embodiment of the present invention.

[0011] The present invention will be described hereinafter by referring to the above-mentioned figures.

[0012] The purpose which one wants to achieve is a clean lowering of the noise level, by intervening directly on the rails.

[0013] Generally, a device implemented according to the present invention comprises a box-like profile obtained from assembling a rubber structural element 2 having a substantially "C"-like section and a rear wall shaped so as to adhere on a corresponding wall 51 of a stem of the rail 50.

[0014] The device further comprises a closing metal profile 3, opposed to the rubber element 2, closing the open side of the "C" of the rubber element itself.

[0015] The device according to the present invention is then positioned with continuity along the rail 50, without any interruption, nor at the sleepers supporting the rail.

[0016] In this way, an acoustic cavity 4 is implemented, continuous along the side of the rail 50, capable of absorbing and keeping inside thereof part of the sound energy and dissipating the remaining part at the ground level.

[0017] The device can be arranged symmetrically on both sides of the rail 50, so as to maximize the effect thereof.

[0018] The rubber used in the production of the profile 2 derives from recycling and, in turn, it is recyclable; the life cycle of the product is then wholly eco-sustainable. The recycled profile 2, constituted by granules of different and not vulcanized elastomers, has the advantage of absorbing better the kinetic energy produced by the rail vibrations.

[0019] The metal profile 3, according to the present invention, can be profitably implemented in steel sheet and/or having holes with suitable diameter in relation to the different frequencies to be attenuated. The calculation of the holes' diameter is to be considered within the comprehension of a person skilled in the art and therefore a detailed description thereof will not be provided.

[0020] By way of example, the device can be constituted by 1-m long routes, placed in the following order (which is repeated then along the rail):

- route with sheet having drilling diameter of 3 mm;
- route with sheet having drilling diameter of 5 mm;
- route with sheet having drilling diameter of 8 mm.

[0021] The production process is simple, and the materials can be easily found on the market. The rubber structural element 2, for example, can be produced by moulding with injection press.

[0022] As it can be seen in figure 4A, the rubber element 2 can have a surface contacting the rail having a working (bush-hammering) so as to implement a plurality of empty spaces contributing to the acoustic absorption.

[0023] The holed sheets 3 are suitably shaped for the specific use.

[0024] The section of the sheets 3, from the outer portion of the box, can be both straight, as in the first em-

bodiment shown in figures 1 to 4B, and curved, as in a second embodiment shown in figures 5 to 7 and in a third embodiment of figure 8. The selection of the section shape will depend upon the direction and the type of the sound frequencies to be attenuated.

[0025] According to one of the embodiments (figure 8), between the rubber structural element 2 and the wall 51 of the rail stem, a layer made of isolating material 7 is provided, for example elastic silicone, to improve the contact between the two elements.

[0026] The device is then fastened by means of brackets 5, preferably made of spring stainless steel, as visible in figures 2, 3, 6, 7 and 8.

[0027] Advantageously, according to some embodiments, the fastening brackets 5 (visible for example in figure 3 and in figure 7) are isolated from the closing metal profile 4 by means of rubber thickening elements 9, in order to prevent electric continuity between rail and sheet.

[0028] The installation requests necessarily very short time, as one works with limited interruption of the railway line subjected to the intervention.

[0029] Figure 8 relates to a third embodiment of a device according to the present invention. In particular, according to such embodiment, the acoustic cavity, at least partially, can be filled up with sound absorbent material 10, for example polyester fibre.

[0030] The device can further comprise an elastic membrane 7 between the rail and the rubber element of the attenuator, contributing to increase the bond between rail and attenuator and consequently the capability of dampening vibrations. Such membrane can be implemented starting from a liquid composition, preferably added with rubber micro-powder.

[0031] Still, additionally, the device, according to some embodiments thereof, can provide an additional absorption element 6, placed outside, between the metal profile 3 and the rail itself.

[0032] The present invention has been sofar described with reference to preferred embodiments thereof. It is to be meant that the technical solutions implemented in the preferred embodiments described herein by way of example could advantageously be combined therebetween, to create other embodiments, belonging to the same inventive core and however all within the protection scope of the herebelow reported claims.

Claims

1. An acoustic attenuator device (1, 11, 21) for rail (50), comprising a rubber element (2) adapted to be positioned with continuity adjoining a wall (51) of the stem of the rail (50), and a holed metal sheet profile (3) opposed to said rubber element (2) so as to define a cavity (4) capable of absorbing at least part of the sound energy.

2. The device according to claim 1, wherein said rubber element (2) has a substantially "C"-shaped profile.

3. The device according to claim 1 or 2, wherein said rubber element (2) is made up with granules of elastomers with different granulometry and not vulcanised.

4. The device according to one of the preceding claims, wherein said metal sheet profile (3) has holes with different diameter, in relation to the different frequencies to be attenuated.

5. The device according to one of the preceding claims, wherein said metal sheet profile (3) has a linear or curved sectional profile.

6. The device according to one of the preceding claims, further comprising an element made of elastic silicone, to be interposed between said rubber element (2) and said rail.

7. The device according to one of the preceding claims, further comprising brackets (5) made of stainless steel for fixing the device on the rail.

8. The device according to rail 7, comprising rubber thicknesses for isolating said brackets (5) from said metal sheet profile (3).

9. The device according to one of the preceding claims, adapted to be mounted with continuity along the two sides of the rail, both in the routes between the sleepers and at the sleepers.

10. The device according to one of the preceding claims, wherein said cavity (4), at least partially, is filled up with sound absorbent material.

11. The device according to claim 10, wherein said sound absorbent material comprises polyester fibres.

12. The device according to one of the preceding claims, further comprising an elastic membrane which can be positioned between said rail (50) and said rubber element (2).

13. The device according to claim 10, wherein said membrane is implemented starting from a liquid composition, preferably added with rubber micro-powder.

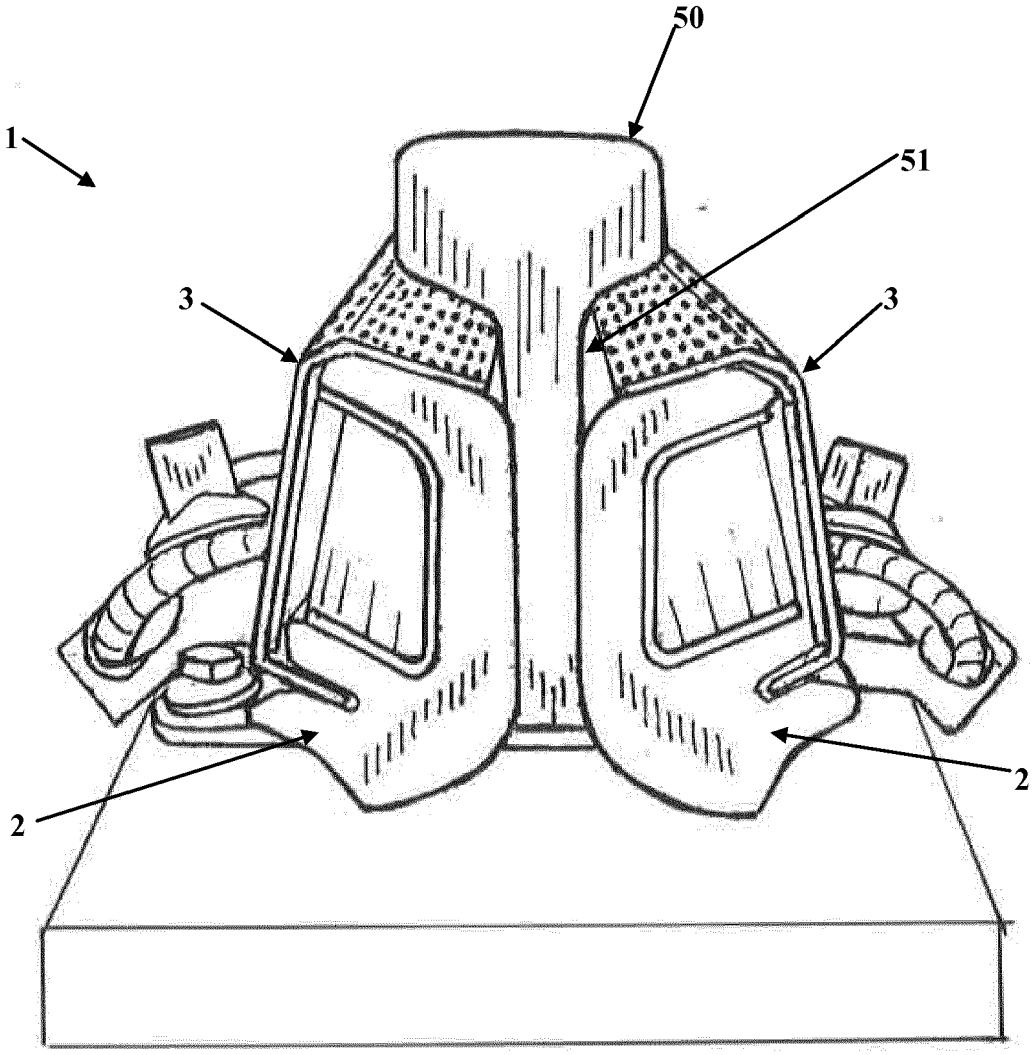

FIG. 1

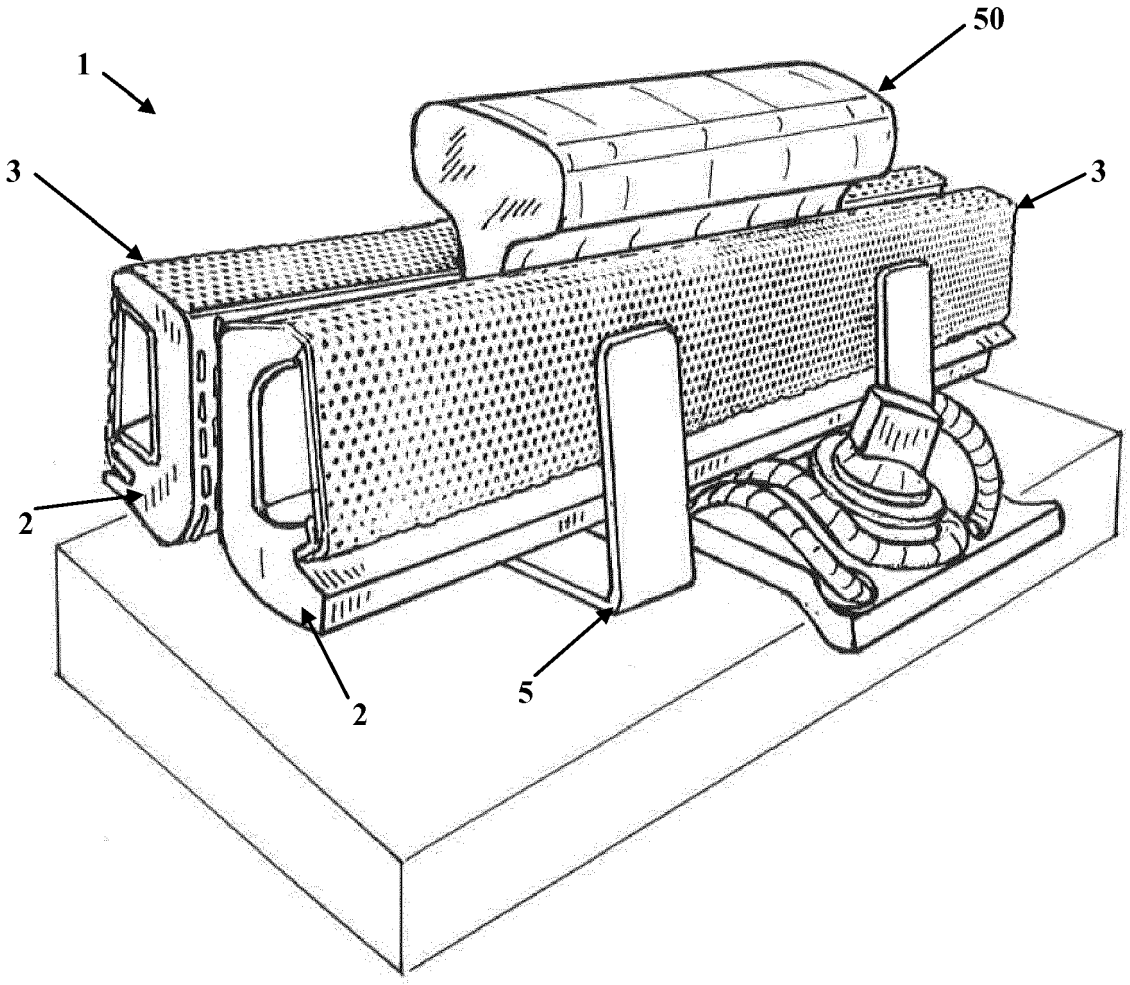

FIG. 2

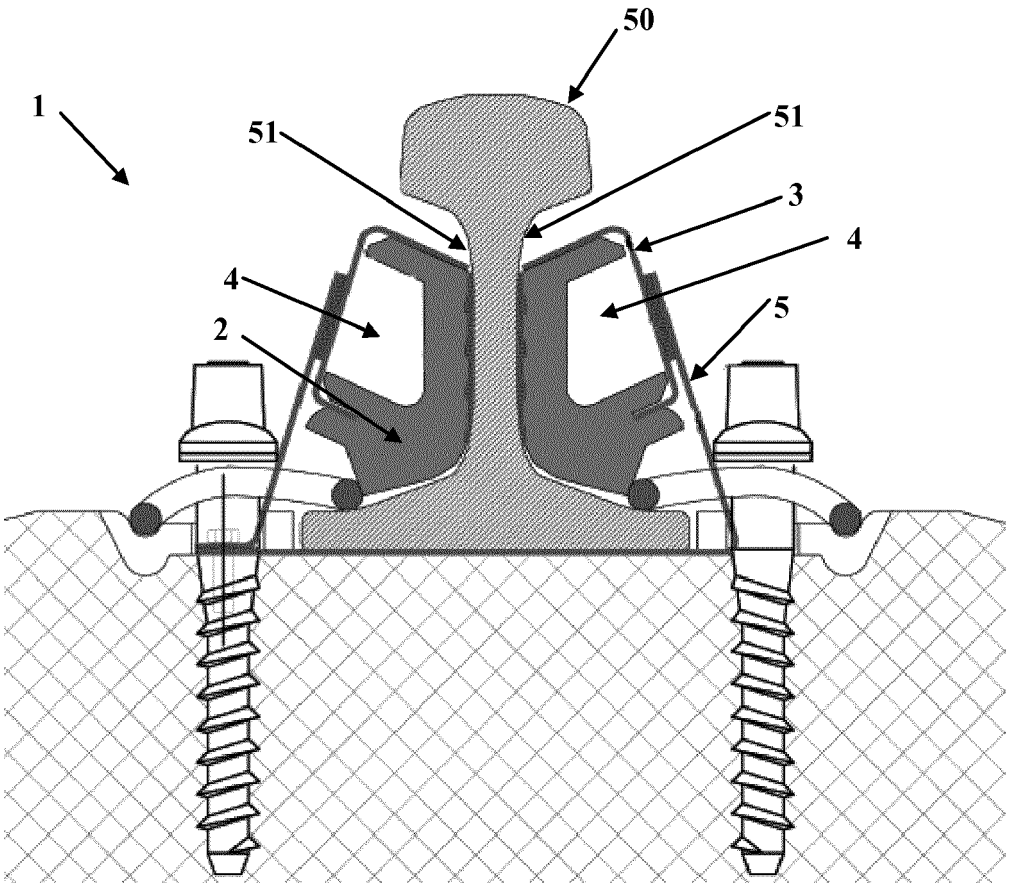

FIG. 3

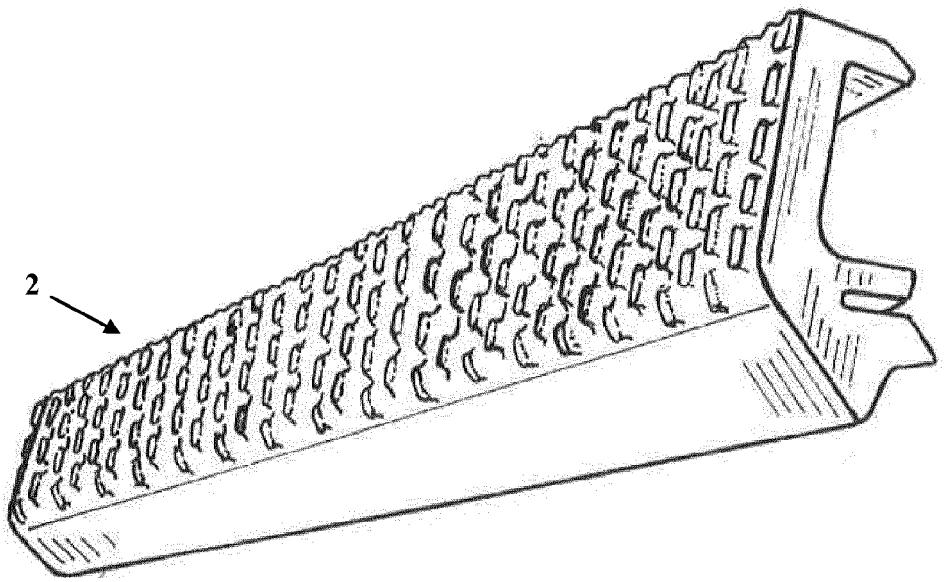

FIG. 4A

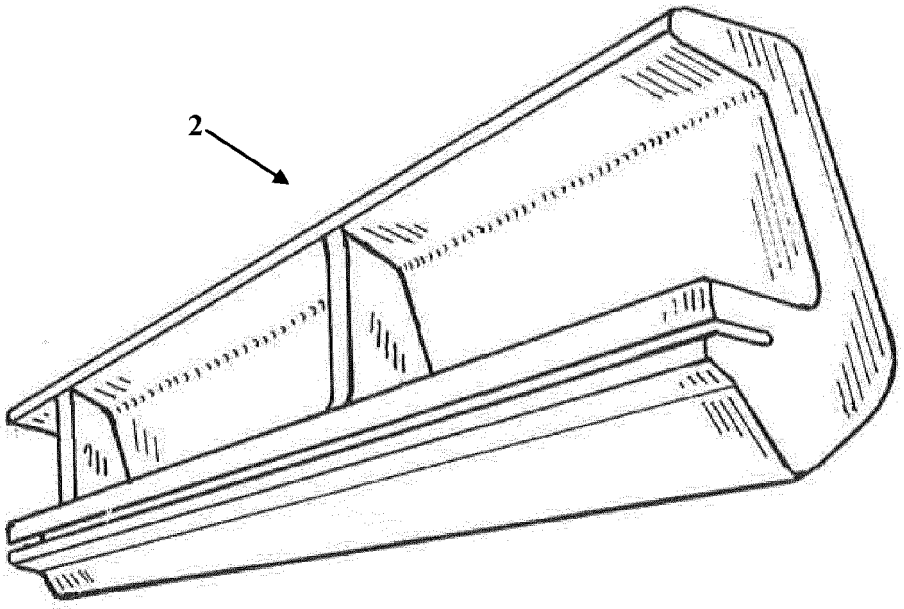

FIG. 4B

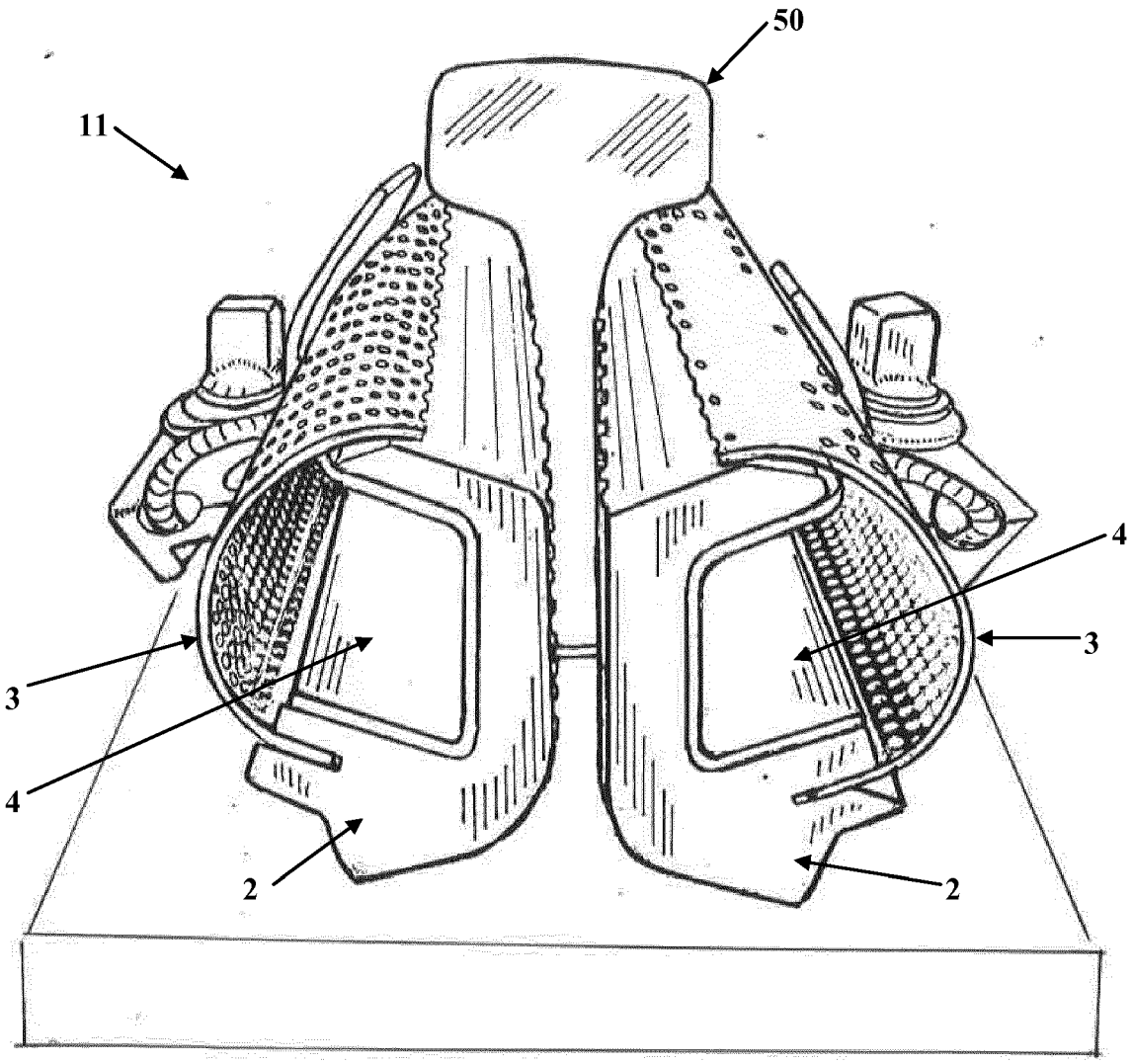

FIG. 5

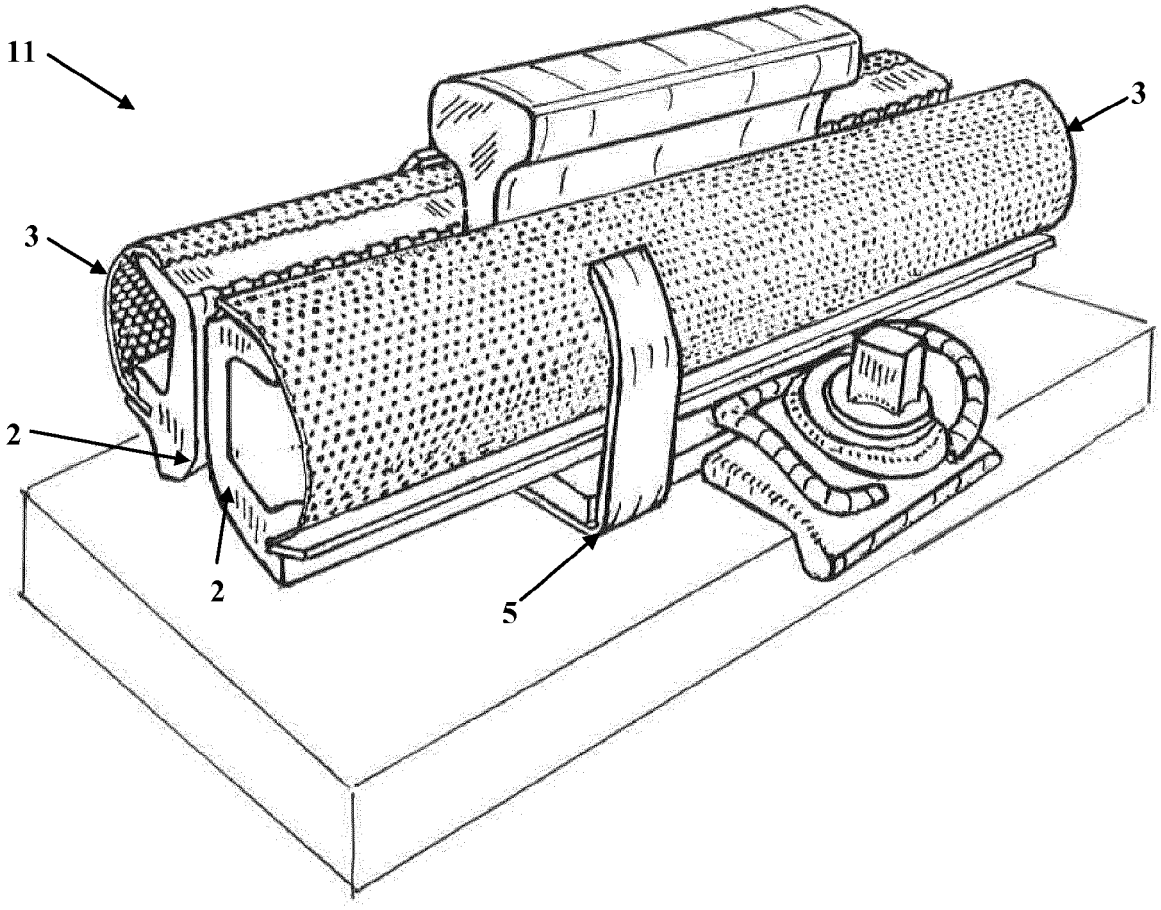

FIG. 6

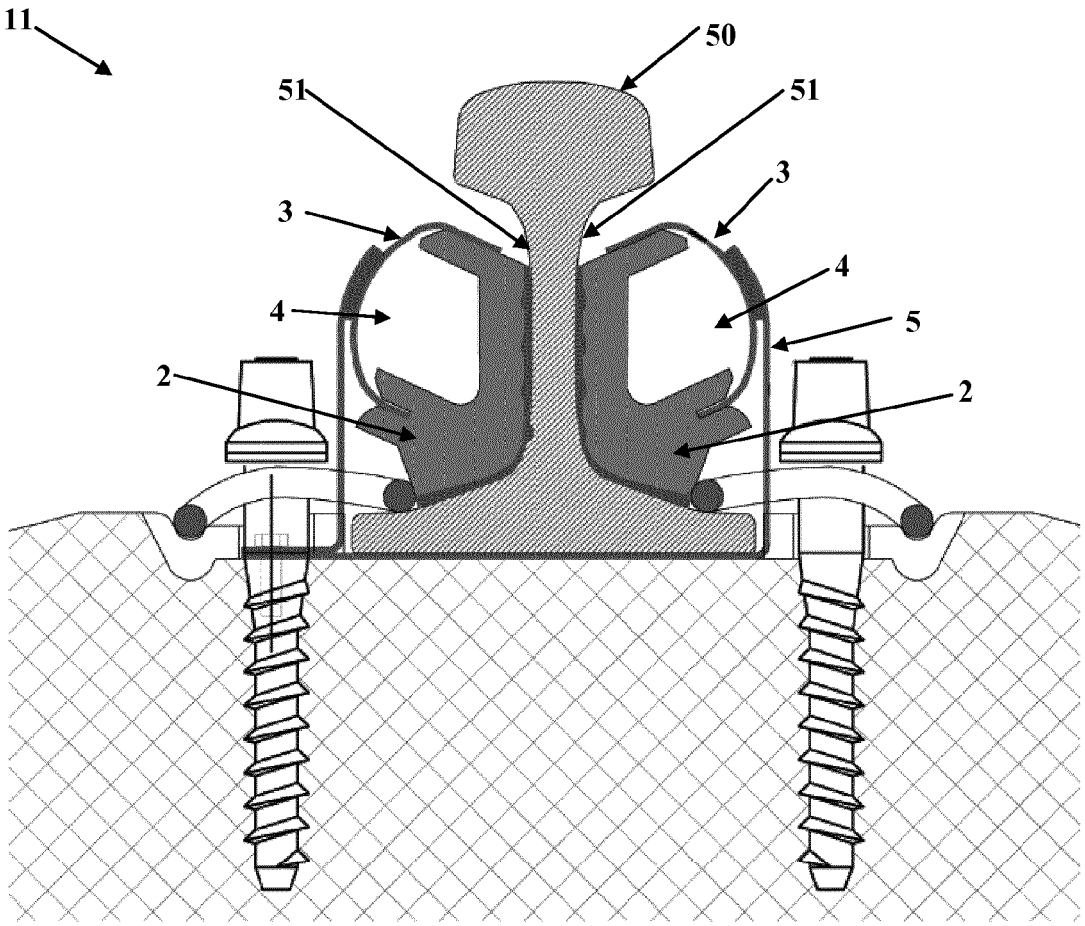

FIG. 7

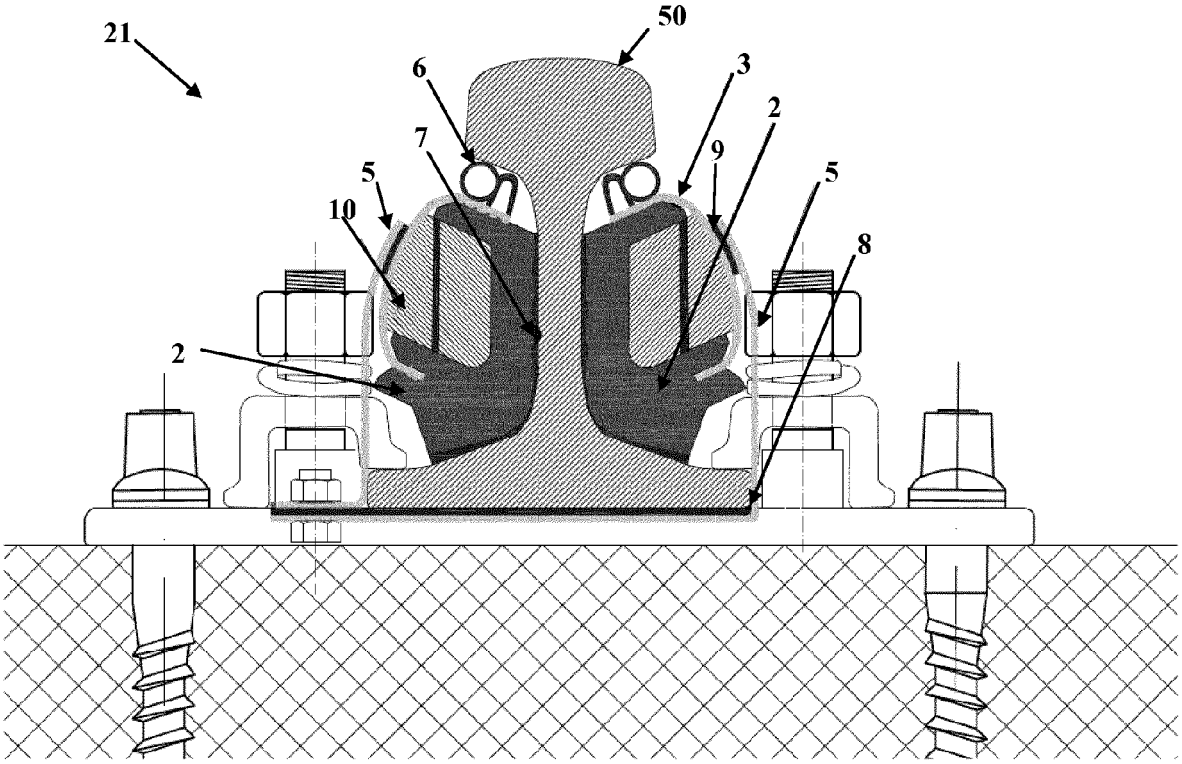

FIG. 8

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EUROPEAN SEARCH REPORT

Application Number
EP 15 16 7139

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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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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	24 September 2015	Bream, Philip

CATEGORY OF CITED DOCUMENTS

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