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(54) **REMOVABLE INSULATING DEVICE FOR GROOVED RAILS OF URBAN RAILWAY TRACKS**

(57) Removable insulating device for grooved rails, intended to insulate a grooved rail (200) of the type used in laying tracks for trams and arranged in an urban track, for insulation from external conditions. The device prevents the need for adhesives, which enables the removal and introduction thereof in a vertical direction. Flanges or additional protruding areas prevent it from moving free-

ly or leaving the rail in a situation of use, but with the help of tools, said protruding areas can be acted upon in order to remove it when necessary, without needing to perform lateral eliminations of the track cladding, as well as the reinsertion of the device on the track after finishing said work.

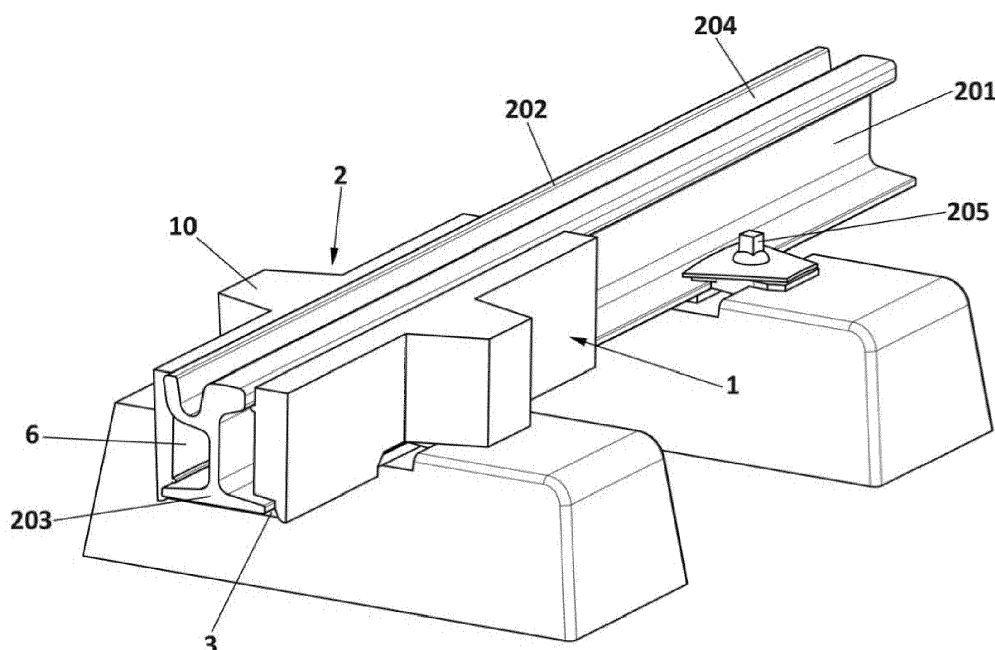


FIG. 4

Description

OBJECT OF THE INVENTION

[0001] The present invention falls under the technical field of track superstructures especially adapted for trams on paved roads, as well as under the field of protectors for the track, and in particular it relates to an insulating device for grooved rails of railway tracks located in urban areas, which are easily removable and insertable during maintenance and repair operations of said rails.

BACKGROUND OF THE INVENTION

[0002] The superstructure of the track for the circulation of trams, light rails and other means of collective passenger transport that run on rails and on the surface in urban areas, it is the element that supports the direct loads of the mobile material and thus suffers considerable and inevitable wear over time, fundamentally due to the passage of the trains.

[0003] For this reason, the functional natures of the rail-tie assembly and all the associated elements thereof, constituents in assembly of said superstructure, are diminished, thus requiring the alteration or even substitution thereof at certain times. As a consequence of this repair work, the option of substituting said elements with parts that achieve a higher degree of compliance of the functional requirements is considered, at the same time reducing the manufacturing, installation and repair costs thereof.

[0004] The lines of the aforementioned collective transport means are generally fully located in urban fabric, mainly in the roads, and either share space with other vehicles, or operate in a segregated manner with respect to the road surface. This insertion implies the need to suitably integrate the track platform into the road spaces, such that they are compatible among each other and that there is the least possible interference.

[0005] The rails of the track have to be inserted into the pavement in order to enable that crossings with road surfaces for vehicles can be crossed by the latter without difficulty, and moreover, in the areas without crossings, they must be inserted in order to enable pedestrians to cross and create a better image, by placing a cladding made of diverse materials.

[0006] The rail used for the tracks inserted in an urban area is known as a grooved rail, which includes a check rail to guarantee the free space that the flange of the railway wheel requires as it runs. The geometry thereof enables paving on both sides of the rail and thus enables the circulation of road vehicles. The groove in the inner side of the rail is intended for the flange of the wheels of the tram or light rail.

[0007] The insertion of the grooved rail into the pavement requires measures to be taken in terms of insulation thereof with respect to the surroundings in order to prevent the propagation of residual electrical currents to-

wards the outside, partially absorbing the vibration and noise created by the rolling of the trams, as well as to keep it separate from the surrounding cladding. To do so, the rail is wrapped on the entire contour thereof, except for the rolling surface, with a device made of a material with insulating capacities.

[0008] Generally, the most common solutions consist of prefabricated devices made of rubber elastomer, as well as in the device creation by means of in situ pouring of elastomeric polyurethane in fluid state, with which the rail is embedded in a layer of the elastomer.

[0009] The prefabricated devices made of rubber elastomer are commercialized in several different models in order to be adapted to various rail profiles. As a general rule, a current device (100) wraps the entirety of the rail (200) except for the rolling surface and is made up of a plurality of parts (101, 102, 103) that may be linked to each other, as seen in the attached figure 1, which relates to the current state of the art.

[0010] The parts (101,102,103) wrap around the rail (200) along the entire length thereof, except for the fastening area, since that is the point on which the rail (200) rests on the bearing plate, which in turn rests on the tie or slab. Laterally, the parts (101,102,103) of the device (100) wrap around the rail (200) along the entire length thereof, with the exception of the fastening area, where it is interrupted and only covers the top half thereof, since the fastening is situated on the bottom half.

[0011] When maintenance work is performed on the grooved rail, such as for example the reloading of a rail by means of welding, in order to return it to the original profile thereof after suffering wear, it is essential to heat the rail to a high temperature, which is normally performed with a flame coming from burning gas.

[0012] Consequently, it is necessary to remove the insulating device from the rail in order to heat it in its entirety, as well as to prevent deformations in the device, which due to being made of rubber can be altered at the high temperatures to which it is subjected.

[0013] The removal of a standard model of an insulating device must be done laterally, and it requires a partial elimination of the cladding of the platform to be carried out, since without this it is not possible to remove it, with the consequent increase in cost, execution deadlines and possible outages and delays in the service.

DESCRIPTION OF THE INVENTION

[0014] The object of the invention consists of a removable insulating device for grooved rails of urban railway tracks, the geometry of which facilitates the removal thereof and subsequent vertical placement on a grooved rail, thus preventing the need to eliminate claddings and, consequently, facilitating maintenance work, reducing the costs thereof and speeding up the deadlines, while at the same time complying with the necessary functional requirements.

[0015] The device comprises elements that may be

linked to each other and can be coupled to the grooved rail, said elements preferably being made by means of molding a ground rubber and resin mixture. Said elements are a head profile, a grooved profile, intended to be arranged facing the head profile with the rail interposed between both of them, and a lower sheet, intended to be arranged in a position underneath the rail.

[0016] The head profile and the grooved profile are very similar conceptually but they differ in the dimensions thereof since they must adapt to each of the respective sides of the grooved rail, which is not symmetrical. The lower sheet of the device is the only element that does not need to be removed before the maintenance tasks, since it barely suffers from the effect of the increase in rail temperature, given that the running rail heats up less since it is farther away, and furthermore it does not constitute any sort of obstacle for the heating operation, due to being situated under the rail.

[0017] The device simply rests on the rail, without the need for any type of sealant, glue or similar adhesive, which enables the removal and introduction thereof in a vertical direction. Flanges or additional protruding areas prevent it from moving freely or coming out of the rail in a situation of use, but with the help of tools, said protruding areas can be acted upon in order to remove it when necessary

[0018] The incorporation of an upper layer of cladding is likewise envisaged with the object of sealing the joint seals and preventing the inlet of water and waste. In a preferred embodiment, said layer is made of polyurethane elastomer.

[0019] Thus, the insulating device facilitates removal at any time in order to carry out maintenance or replacement work, without needing to perform lateral eliminations of the track cladding, as well as the reinsertion on the rail after finishing the aforementioned work. It must be noted that the fact that the cladding elimination operations are very laborious and expensive, both from an economical and an environmental point of view, since they consist of eliminating concrete, with the resulting energy and machinery costs, as well as the generation of environmental and noise pollution and the creation of debris and waste that are expensive to eliminate.

[0020] Likewise, it maintains the functional qualities of current devices in terms of electrical, acoustic and vibration insulation. From an economical point of view, it entails considerable savings, both in the aforementioned maintenance operations as well as in the device itself, since it contains a smaller amount of material.

DESCRIPTION OF THE DRAWINGS

[0021] As a complement to the description being made, and for the purpose of helping to make the characteristics of the invention more readily understandable, in accordance with a preferred example of practical embodiment thereof, said description is accompanied by a set of drawings constituting an integral part thereof which, by way

of illustration and not limitation, represent the following:

Figure 1.- Shows a front view of a transverse cross section of an insulating device according to the referenced state of the art.

Figure 2.- Shows an exploded perspective view of the removable insulating device, in which the main constituting elements thereof can be seen.

Figure 3.- Shows a perspective view of the mounted device.

Figure 4.- Shows a perspective view of the device linked to a grooved rail.

Figure 5.- Shows a perspective view of the device linked to a grooved rail, with a track cladding applied.

PREFERRED EMBODIMENT OF THE INVENTION

[0022] What follows is a detailed description, with the help of the figures referenced above, of an exemplary embodiment of the object of the present invention.

[0023] The removable insulating device for grooved rails of urban railway tracks that is described is intended to be linked to a grooved rail (200) of the type used in the laying of tracks for trams, light rail or similar means of transportation in urban environments, in order to prevent the transmission of electrical currents, noises and vibrations between the rail and the surrounding environment.

[0024] The grooved rail (200) comprises a head side (201) and a grooved side (202), lateral and opposite each other, a lower foot (203) and a slot defined in the upper face thereof, referred to as a groove (204) intended to house a flange of the wheels of the moving vehicle. The grooved rail (200) is linked to the road surface by means of through screws (205) perpendicular to the wings of the foot (203).

[0025] The device, in turn, shown in figures 2 and 3, is made up of a head profile (1), linkable to the head side (201) of the grooved rail (200), a grooved profile (2), linkable to the grooved side (202), and a lower sheet (3), intended to be arranged in a position below the foot (203), linking the head profile (1) and the grooved profile (2) to each other by the respective lower ends thereof.

[0026] The head profile (1) and the grooved profile (2) have an essentially similar geometry, although they differ slightly in the dimensions of some of the elements thereof, given that they must adapt to the characteristics of each of the sides of the grooved rail (200).

[0027] As can be seen in the attached figures, each profile (1,2) comprises a body with an essentially polygonal geometry, said body having an inner face (4) intended to face the grooved rail (200), and an outer face (5), intended to be oriented towards the outside.

[0028] The inner face (4) comprises a vertical flat area (6) in the lower end of which a longitudinal housing (7) is defined, which can be coupled in the foot (203) of the grooved rail (200), while, extending out from the vicinity of the upper end of said vertical flat area (6), are flanges

(8) for fitting with the head side (201) for the case of the head profile (1), or with the grooved side (202) for the case of the grooved profile (2).

[0029] The inner face (4) also comprises a cavity (9) defined in the vertical flat area (6) intended to house the heads of the screws (205) for fastening the grooved rail (200) to the road surface.

[0030] In turn, extending out from the outer face (5) of each of the respective profiles (1,2) is a protruding area (10) intended to immobilize the device on the rail (200) as well as facilitate the vertical removal thereof if necessary, for example in order to carry out maintenance and repair operations, in this way also being able to access the fastening screw (205).

[0031] The lower sheet (3), as has been already indicated, is arranged below the foot (203) of the grooved rail (200) and is linked to the respective lower housings (7) of the head profile (1) and of the grooved profile (2).

[0032] In figure 4, the device is seen linked to the grooved rail (200), in an assembly phase prior to the installation of the track cladding. Said cladding is already in figure 5, in which the external appearance that the device has is seen, in which the protruding areas (9) enable the handling of the device without needing to remove the cladding.

[0033] Additionally, the incorporation of an upper cladding layer made of polyurethane elastomer is envisaged, which is not represented in the attached figures, in order to seal the joint seals and prevent the inlet of water and other waste.

Claims

1. A removable insulating device for grooved rails of urban railway tracks, intended to insulate a grooved rail (200) arranged in an urban track for insulation from external conditions, in which the grooved rail (200) comprises:

- a head side (201) on one lateral,
- a grooved side (202), opposite the head side (201),
- a lower foot (203) equipped with lateral wings,
- a groove (204) defined in an upper face of the grooved rail (200), and
- screws (205) perpendicular to the wings of the foot (203) for fastening the grooved rail (200) to the road surface,

the insulating device being **characterized in that** it comprises:

- a head profile (1), linkable to the head side (201),
- a grooved profile (2), linkable to the grooved side (202), and
- a lower sheet (3) perpendicularly linked to the

lower ends of the head profile (1) and to the grooved profile (2), lower sheet (3) intended to be arranged in a position below the foot (203),

wherein both the head profile (1) and the grooved profile (2) comprise a body with an essentially polygonal geometry that comprises:

- an inner face (4) intended to face the grooved rail (200), inner face (4) which comprises a vertical flat area (6) wherein the following are defined:

- a longitudinal housing (7), which can be coupled in the foot (203),
- flanges (8) which can be coupled to the head side (201) in the case of the head profile (1), or with the grooved side (202) in the case of the grooved profile (2), and
- a cavity (9) intended to house the heads of the screws (205) for fastening the grooved rail (200) to the road surface, and

- an outer face (5), intended to be oriented towards the outside of the grooved rail (200), out of which extends a protruding area (10) intended to immobilize the profile (1,2) on the rail (200) as well as to facilitate the vertical removal thereof.

2. The insulating device according to claim 1, **characterized in that** the housing (7) is located in a lower edge of the vertical flat area (6).

3. The insulating device according to claim 1, **characterized in that** the flanges (8) are located in the proximity of an upper edge of the vertical flat area (6).

4. The insulating device according to claim 1, **characterized in that** the protruding area (10) is located opposite the cavity (9).

5. The insulating device according to claim 1, **characterized in that** it is made by means of molding a ground rubber and resin mixture.

6. The insulating device according to claim 1, **characterized in that** it incorporates an upper cladding and sealing layer.

7. The insulating device according to claim 6 **characterized in that** the layer is made of polyurethane elastomer.

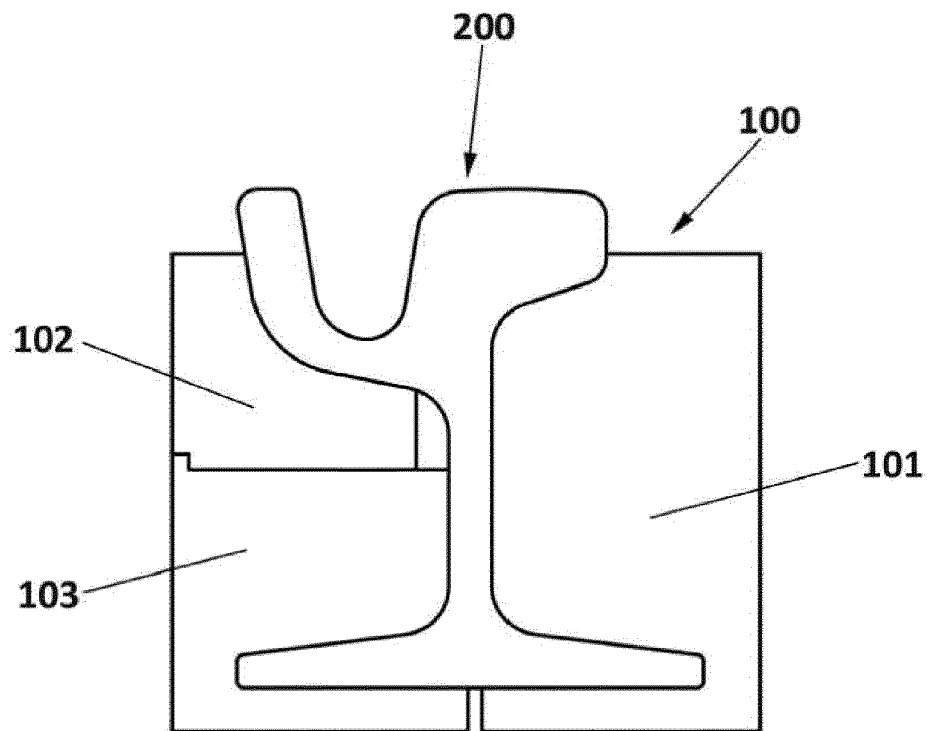


FIG. 1
STATE OF THE ART

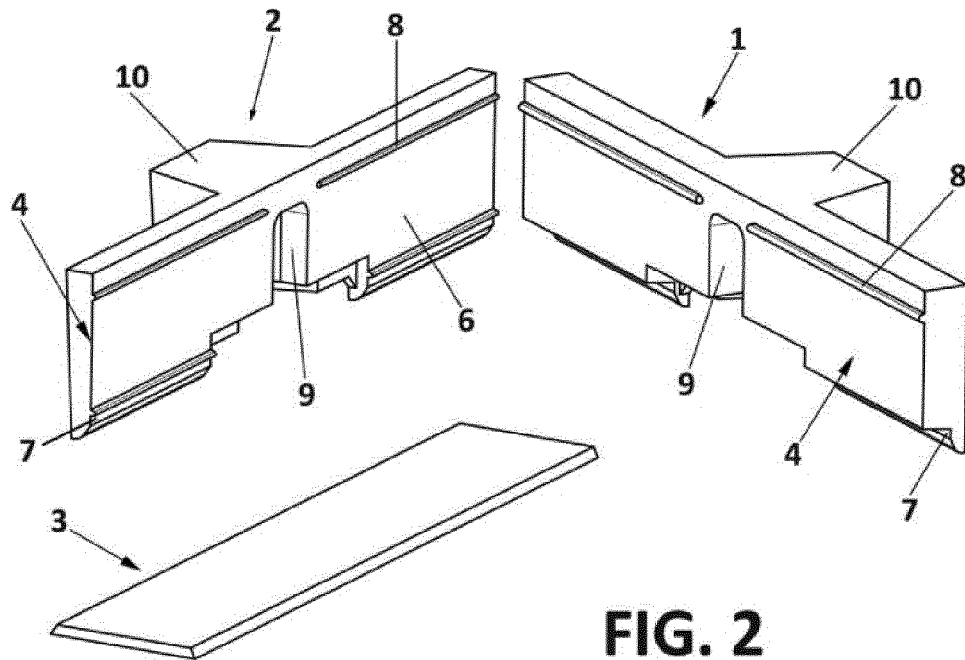


FIG. 2

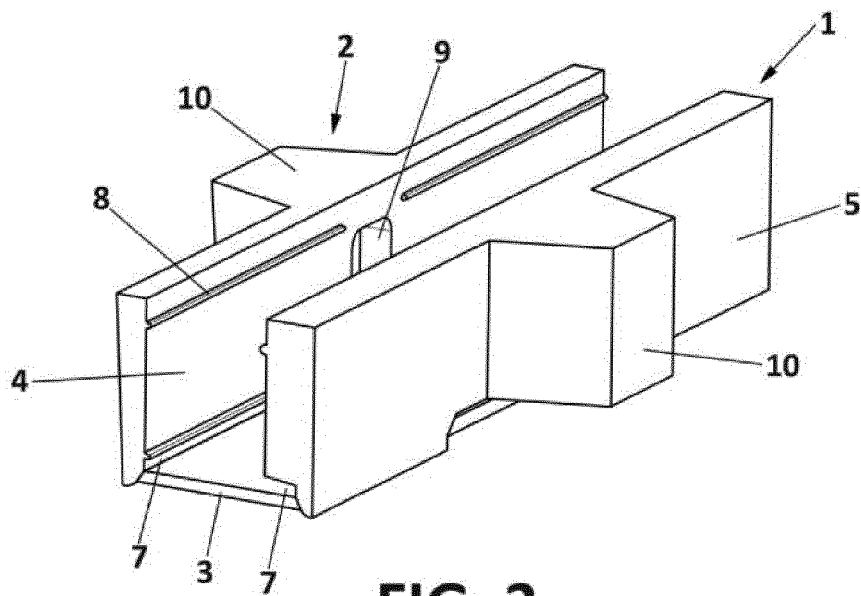


FIG. 3

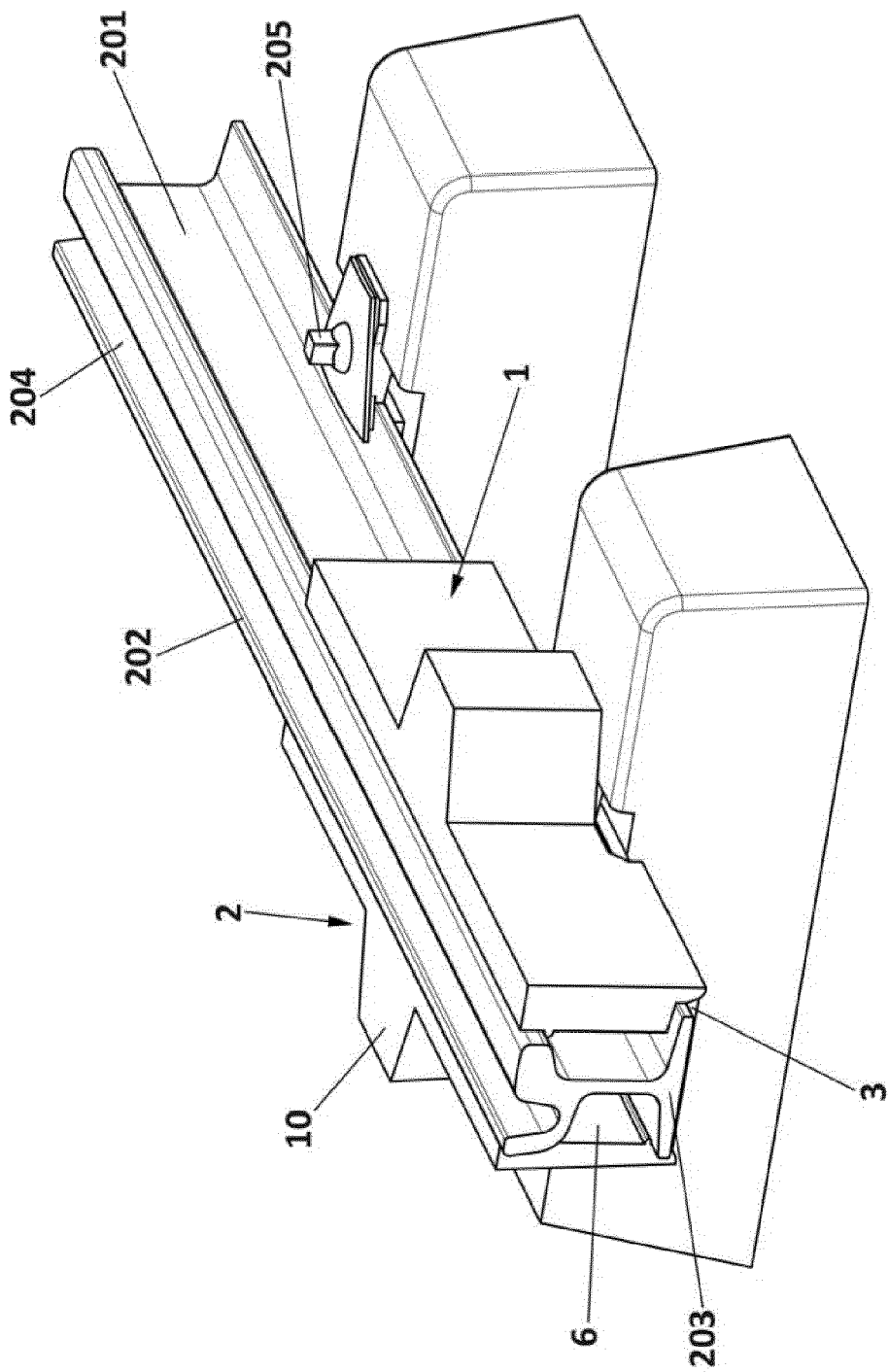


FIG. 4

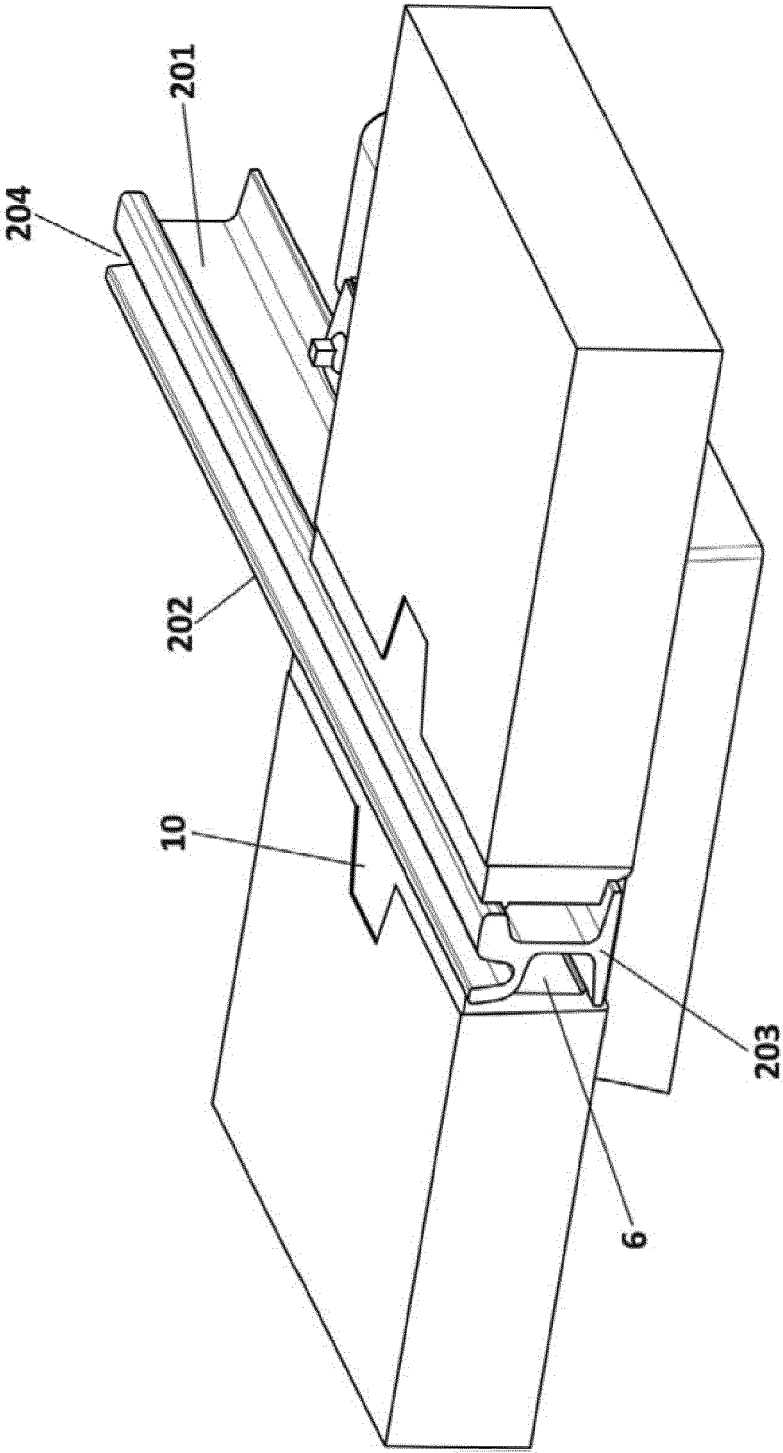


FIG. 5



EUROPEAN SEARCH REPORT

Application Number
EP 17 19 7154

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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			TECHNICAL FIELDS SEARCHED (IPC)
			E01B E01C
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 18 April 2018	Examiner Movadat, Robin
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 17 19 7154

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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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18-04-2018

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82