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(54) Vehicle supporting surface for a level crossing

(57) A vehicle-supporting surface incorporating at least one rail (102). The surface includes first and second panels (106A, 312) of compressible material that are arranged to be fitted together such that a surface of the first panel at least partially abuts a corresponding surface of the second panel. The first and second panels each

include respective interengagable formations (126A, 310) at least partially embedded within them and located at their abutting surfaces. The interengagable formations are configured to at least partially counteract forces resulting from the compression of the panels in the region of the abutment.

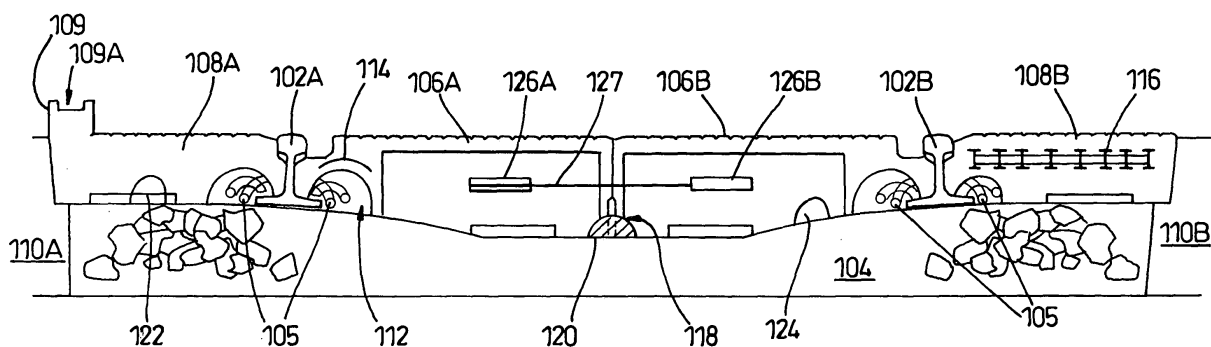


Fig. 1

Description

[0001] The present invention relates to a vehicle-supporting surface incorporating at least one rail.

[0002] A level crossing is an example of a surface that incorporates at least one rail and is also intended to support a vehicle that travels over the surface. Known level crossings are formed of rubber panels designed to abut both sides of a pair of rails, with the upper surfaces of the panels being generally aligned with the tops of the rails to provide a smoother ride for non-rail vehicles that travel over the crossing. There are also proposals for a "rubber road" surface that incorporates at least one rail and is also intended to support a vehicle that travels over it. With a rubber road of this type, cars/automobiles generally follow the same path over the surface as a rail vehicle. Such a rubber road can also be constructed of a plurality of rubber panels.

[0003] The panels in such surfaces are frequently subjected to forces from heavy (rail and non-rail) vehicles that pass over them and so the panels, and the connections between them, need to be robust.

[0004] According to a first aspect of the present invention there is provided a vehicle-supporting surface incorporating at least one rail, the surface including:

first and second panels of compressible material arranged to be fitted together such that a surface of the first panel at least partially abuts a corresponding surface of the second panel,
wherein the first and second panels each include respective interengagable formations at least partially embedded within them and located at their abutting surfaces, the interengagable formations being configured to, when engaged, at least partially counteract forces resulting from the compression of the panels in the region of the abutment.

[0005] One of the formations may include a generally upwardly projecting portion and the other formation can include a generally downwardly projecting portion. The formations may interengage by a portion of one of the formations contacting a surface of the other formation that opposes the abutting surface of the panel of the other formation. A line of contact between the interengaged formations may be generally aligned with a line of contact between the abutting surfaces of the panels. A line of contact between the interengaged formations may intersect a line of contact between the abutting surfaces of the panels.

[0006] In another embodiment, a first said interengageable formation includes a member having a slot, channel or groove and the second said interengageable formation includes a portion that engages with the slot, channel or groove. The portion of the second interengageable formation may be formed so as to limit relative horizontal movement of the interengaged formations.

[0007] At least one of the interengageable formations

may be at least partially located in a recess at the abutting surface of the respective panel. The interengageable formation may be connected to a member (e.g. a rod) that extends from the abutting surface of the panel to an opposing surface of the panel, and another interengageable formation may be connected to the member at the opposing surface. There may be two different types of interengageable formations, a first type being located at one abutting surface of the panel and a second type being located at an opposing surface of the panel.

[0008] The abutting surface of at least one of the panels can be formed with a space for accommodating the projecting formations.

[0009] The formations may be formed of a sheet of rigid material, e.g. steel. At least one of the panels may be moulded with a non-projecting portion of the formation within the panel. The non-projecting portion of the formation may include apertures to allow the panel material to be moulded around the portion.

[0010] In use, the first and second panels may be located between a pair of said rails. The panels may be formed of rubber. A rigid elongate member can be used to connect the formations of an adjacent pair (typically side-by-side) of the panels together.

[0011] A bottom surface of the panel may include a space for accommodating a device for fixing a rail to a ground surface and a portion of the panel generally above the rail fixing space may be fitted with a reinforcing member. The reinforcing member may be in the form of a mesh. The panel may be formed of rubber that is moulded with the reinforcing member within it. The reinforcing member may be formed of material including glass threads.

[0012] A bottom surface of the panel may include a space for accommodating a locating member. The locating member may be formed of glass-reinforced concrete material. The locating member may be semi-cylindrical.

[0013] A lower surface of the panel may include one or more channel for accommodating a device that assists with supporting the panel on an underlying surface. At least one said panel may include a curb-like portion.

[0014] The surface may further include a device for assisting with holding a said rail against a side surface of a said panel. The panel/rail-holding device may include an elongate member that extends between two sides of the panel, the member including a first formation at one end that is configured to fit against a side surface of the panel and a second formation at its opposite end that is configured to fit against a portion of the adjacent rail.

[0015] According to another aspect of the present invention there is provided a panel of compressible material for a vehicle-supporting surface incorporating at least one rail, a lower surface of the panel including a space for accommodating a rail fixing device, wherein a portion of the panel generally above the rail fixing space is fitted with a reinforcing member. The reinforcing member may be in the form of a mesh. The reinforcing member may be formed of material including glass threads. According

to yet another aspect of the present invention there is provided a device for assisting with holding a rail against a panel of compressible material.

[0016] According to a further aspect of the present invention there is provided a panel of compressible material for a vehicle-supporting surface incorporating at least one rail, the panel including a reinforcing member formed of material including glass threads.

[0017] According to yet another aspect of the present invention there is provided a panel of compressible material for a vehicle-supporting surface incorporating at least one rail, a bottom surface of the panel including a space for accommodating a locating member formed of glass-reinforced concrete material. The locating member may be semi-cylindrical.

[0018] According to a further aspect of the present invention there is provided a locating member formed of glass-reinforced concrete material for a panel of compressible material for a vehicle-supporting surface incorporating at least one rail.

[0019] According to another of the present invention there is provided a vehicle-supporting surface incorporating at least one rail, the surface including:

first and second panels of compressible material arranged to be fitted together such that a surface of the first panel at least partially abuts a corresponding surface of the second panel, wherein the panels include interengagable formations projecting from their abutting surfaces that, when engaged, at least partially counteract forces resulting from the compression of the panels in the region of the abutment.

[0020] According to another aspect of the present invention there is provided a method of installing a vehicle-supporting surface incorporating at least one rail, the method including:

fitting first and second panels of compressible material together such that a surface of the first panel at least partially abuts a corresponding surface of the second panel, wherein the panels are fitted together by engaging formations that project from their abutting surfaces, the engagement of the formations at least partially counteracting forces resulting from the compression of the panels in the region of the abutment.

[0021] According to further aspects of the invention there are provided methods of installing a surface including components substantially as described herein. According to another aspect of the invention there are provided interengageable formations for connect panels of compressible material together.

[0022] Whilst the invention has been described above, it extends to any inventive combination of the features set out above or in the following description.

[0023] The invention may be performed in various ways, and, by way of example only, embodiments thereof will now be described, reference being made to the accompanying drawings, in which:-

Figure 1 is a schematic cross-sectional view through an example of an installed vehicle-supporting surface incorporating at least one rail, the surface including a plurality of panels;

Figure 2 is a perspective end view of one of the panels;

Figure 3 is a schematic partial cross sectional view detailing how two of the panels are fitted together, and

Figure 4 is a schematic cross-sectional view through part of another example of the vehicle-supporting surface;

Figure 5 is a schematic perspective view of another example of an installed vehicle-supporting surface comprising panels joined together by a connecting arrangement;

Figure 6 is a cross-sectional view through line D - D' of Figure 5, and

Figure 7 details components of the connecting arrangement of Figure 5.

[0024] Figure 1 shows a pair of rails 102A, 102B having their feet fixed to a lower surface 104 by means of fixing devices 105, such as the known Pandrol Rail Clips, although other appropriate clips/clamps could be used. The rails can have a substantially conventional design suitable for use with railway locomotives or lighter tram vehicles and the opposing surfaces of their heads can be spaced apart by around 1435 mm, or any other suitable distance. The surface 104 may be a wooden/concrete railway sleeper (or another type of member fitted on the underlying ground/foundation surface) or, in some cases, the underlying ground/foundation surface itself.

[0025] A first central rubber panel 106A is fitted adjacent the right-hand side of the left-hand (in the Figure) rail 102A. A second central rubber panel 106B is located between the first panel 106A and the right-hand rail 102B. Each of the panels 106 can have a maximum width of around 743 mm, a length around 1800 mm and a maximum depth of around 226 mm and may be designed with a side surface that is formed to abut the side of an adjacent rail and a lower surface that is formed to rest upon the underlying surface 104. The upper surfaces of the panels are substantially flat and, when installed, are generally level with the upper surfaces of the heads of the rails 102. The shape of the panels may be similar to, for example, components of the HoldFast Heavy Duty Highway Crossings sold by HoldFast Level Crossings Limited of Gloucestershire, United Kingdom.

[0026] A first outer panel 108A is fitted adjacent the left-hand side of the rail 102A. A second outer panel 108B is fitted adjacent the right-hand side of the other rail 102B. A portion of the panel 108A adjacent the rails 102A rests

upon the foot of the rail 102A and on surface 104, whilst the remaining portion of the panel is shown as resting upon surface 110A. It will be appreciated that in some cases, the surface 110A could be part of the same surface 104 that underlies the vehicle-supporting surface created by all the panels. For the purposes of showing another possible configuration, the main portion of the second outer panel 108B is shown as resting on a concrete surface 110B (and not on a portion of a sleeper) with a small portion of the panel 108B adjacent the rail 102A resting on the foot of that rail. Also for the purposes of showing alternative configurations, the outer end of panel 108A is shown having a curb portion 109 protruding upwards from its upper surface. The curb may be included for safety reasons and its upper surface portion can have a channel 109A that can be used for allowing a line (e.g. white) to be painted on the curb.

[0027] Each of the panels 108 can have a maximum width of around 727 mm and a maximum depth of around 159 mm and may be designed with a side surface that is formed to abut the side of an adjacent rail and a lower surface that is formed to rest upon the underlying surface (s). The upper surfaces of the panels are substantially flat and, when installed, are generally level with the upper surfaces of the heads of the rails 102. Again, the shape of the panels 108 may be similar to components of the HoldFast Heavy Duty Highway Crossings. The panels 106, 108 are formed of a compressible material such as rubber, which can include recycled rubber.

[0028] The lower surface of the first central panel 106A includes a space 112 that, in use, accommodates the device 105 that fixes the rail 102A to the surface 104. The space 112 can take the form of a groove (having a generally semicircular cross-section with a radius of around 150 mm) with a curved surface that runs from one end of the panel to its other end. In other panels, the space 112 may not run along the entire length of the panel, but may be located so as to generally surround the intended location of the fixing device 105. Thus, the portion of the panel 106A generally above the space 112 is thinner than other parts of the panel and so is liable to be damaged by vehicles moving over the panel. In order to reduce the risk of such damage, the portion above the space 112 of the panel 106A is fitted with a reinforcing member 114. This not only helps prevent/reduce damage to the portion the panel, but can also allow the size/length of the space 112 to be increased, if desired.

[0029] In one embodiment the reinforcing member 114 is formed of a material including glass threads. The fibreglass member may be in the form of a mesh having a width of around 300 mm and length that generally corresponds to the length of the panel 106, e.g. 1.8 m (although longer panels, e.g. up to around 6m (or longer) may be produced), with the main direction of the mesh being generally parallel to the main direction of the panel. As the upper surface of the space 112 is curved, the mesh 114 may also be curved to generally follow the curve of the surface. The mesh 114 may be fitted within

the rubber panel when the panel is moulded.

[0030] As shown in the Figure, panels other than the first central panel 106A can have spaces for accommodating the fixing devices and at least some of these panels can have similar reinforcing members fitted within portions of the panels generally above the spaces.

[0031] Rails can sink into the underlying ground surface over time, which can cause the rubber panels in level crossings and the like to bend. If the crossing is tamped too high then this can result in a raised ridge in the surface that may pose a trip hazard. In the Figure, the second outer panel 108A, which spans the right-hand rail 102B and the surface 110B, includes a reinforcing member 116. The member 116 is formed of material including glass threads and can take the form of a plurality of I-section elements (when viewed from the end) that are connected together. The member 116 is lighter than conventional concrete reinforcements, but is sufficiently strong to reduce or prevent undesirable bending of the rubber panel. The member 116 may be fitted within the rubber panel when the panel is moulded. It will be understood that panels other than the second outer panel 108B can be formed with similar reinforcing members. The member 116 strengthens the panel 108B and can allow it to tilt when subjected to forces, which can reduce the risk of the damage that occurs when conventional panels bend taking place.

[0032] A groove 118 is formed on the lower surfaces of the central panels 106A and 106B, the midpoint of the width of the groove being substantially aligned with the line of contact between the two panels. The groove 118 has a curved surface and runs from one end of each panel to the other end. The groove 118 is used to locate the panels on a semi-cylindrical locating member 120. The member 120 can have a diameter of around 120 mm and a length (much) greater than the length of the panels. The member 120 will normally be laid at a point on the surface 104 (or on a rubber mat upon the surface) where the line of contact between the panels 106A and 106B is intended to be located. In the example, the member 120 is formed of glass reinforced concrete.

[0033] Other locating members may also be used to fit one or more of the panels 106, 108. For example, a locating member 122 is shown located near the centre of the first outer panel 108A and a locating member 124 can be fitted adjacent the rail fixing space of the second central panel 106B. It will be understood that suitable grooves will be formed along the bottom surfaces of the panels that are intended to fit over such locating members.

[0034] The central panels 106A and 106B are shown with formations 126A and 126B, respectively, that are used to connect the ends of the panels to the ends of further adjacent panels that form the track. Figures 2 and 3 show these formations in more detail (groove 118 is not shown in Figures 2 and 3 for clarity). As can be seen in Figure 2, the formation 126A projects from the end of the panel 106A and there is a depending portion at the

end of the formation. An open rectangular recess 202 is formed at the lower portion of the end such that a ledge portion 204 is formed above the formation 126A. The recess 202 has a depth of around 20 mm and is dimensioned such that a wall portion 206A is formed between the rail fixing device space 112 and the recess and another wall portion 206B is formed at the other end of the recess (at the side of the panel 106A that abuts the panel 106B in Figure 1). The wall/ledge portions can make the end of the panel stronger for contact with the end of an adjacent panel (as described below).

[0035] Figure 3 shows the structure of another example of the formation 126A in more detail (in this example the formation has an upwardly extending end portion). The formation 126A is formed of a rectangular sheet of material (steel in the example, but any rigid material (e.g. metal, alloy or plastic) may be suitable). The sheet includes a flat portion 302A (having a length of e.g. around 250 mm), part of which is embedded within the panel (which is shown partially cut-away in the Figure). The upper surface of the end of portion 302A lies underneath the lower surface of the ledge portion 204 of the panel in the recess 202. The portion 302A is substantially parallel with the lower surface of the panel 126A and is spaced apart from it by around 120 mm. The end of the sheet is formed by portion 306A which depends at an angle of, e.g., around 70° to the horizontal as it projects underneath the ledge portion 204 into the recess 202. Thus, before the panel is fitted, the end of the portion 306A is substantially aligned with the end of the upper ledge portion 204 and there is a space between the wall of the recess 202 and the adjacent surface of the portion 306A.

[0036] The portion 302A of the sheet that is embedded within the panel includes a plurality of apertures 308A. When the panel is moulded the apertures allow the rubber to flow around the sheet and help keep it in place.

[0037] Figure 3 also shows a formation 310 projecting from another rubber panel 312 (shown partially only in the Figure, but it will typically have similar dimensions to the panel 106A) that will be fitted to the end of panel 106A. Formation 310 is also formed of a sheet of rigid material. The sheet includes a flat portion 302B (having a length of e.g. around 250 mm and also having apertures 313), part of which is embedded within the panel 312. The portion 302B is substantially parallel with the lower surface of the panel 312 but is spaced apart from it by around 60 mm. The end of the sheet is formed by a portion 306B that extends upwards at an angle of, e.g., around 70° to the horizontal, as it projects into a recess 314 formed at the end of the panel 312. Before the panel is fitted, the end of the portion 306B is substantially aligned with the end of a ledge portion 318 located above the recess 314.

[0038] It will be noted that the recess 314 of panel 312 has a sloping surface 316 between the top of the recess (that leads to the upper ledge portion 318) and the point on the end surface of the panel 312 from which the formation 310 projects. The angle and location of the sloping

surface 316 generally correspond to the angle and intended location of the depending portion 306A of the formation 126A.

[0039] A formation such as 126A can be located at one end of the panel and the other formation 310 will be located at the end of the panel, to allow end-to-end fitting of a series of panels with corresponding interengagable formations. As well as fitting panels end-to-end, the formations can also be located at a side surface of a panel to allow adjacent panels to be connected together side by side, e.g. panels 106A and 106B of Figure 1. In some embodiments, a rigid elongate member (which can be, for example, a steel rod 127 shown in Figure 1) extends through the rubber panels and can be used to connect the formations 126A, 126B of two side by side panels 106A, 106B together. As well as strengthening the connection between the two panels, this arrangement can mean that any load on the surfaces of the panels is transferred to the rigid element and not just the rubber material of the panels.

[0040] In use, the panel 312 is laid down and then the other panel 126A is positioned adjacent it, with the ledge portion 204 of panel 106A coming into contact with the ledge portion 318 of panel 312. The panels may need to be tilted to allow portion 306A of formation 126A to fit into the recess 314 of the panel 312 (above the projecting portions of formation 310) and portion 306B of formation 310 to fit into recess 202 (below the projection portions of formation 126A). The ledge portions of the two panels will also need to be compressed together. The formation 126A can then contact the other formation 310. As shown in Figure 3, the depending portion 306A (the surface of the portion that is adjacent the end of panel 126B) comes into contact with the generally upwardly oriented portion 306B (the surface of the portion that is adjacent the panel 312). This contact helps counteract forces pushing the panels apart resulting from the compression of the ledge portions, thereby helping keep the two panels in position. The line of contact between the portions of the formations is generally aligned (and notionally intersects) the line of contact between the ledge portions of the two panels.

[0041] Figure 4 shows a section through another example surface and details one of the rails 102B and the panels located either side of it (items in Figure 4 are given the same reference numerals as similar/corresponding items in the earlier Figures).

[0042] Channels 602 are formed/cut in the lower surfaces of the panels 106B and 108B. Each channel 602 runs from one end (facing the viewer in the Figure) of each panel to its opposite end. Each channel accommodates a panel-supporting board 604, which, in the example, takes the form of a corrugated length of aluminium. The supporting boards 604 are particularly useful when the panels 106B, 108B lie on a sleeper 104 that has an uneven surface so that support for the panels is improved. The number and location of channels in each panel can vary, e.g. panel 106B has one channel 602A near its middle, whilst panel 108B has two channels, one

602B near its end that abuts the rail 102B, and the other channel 602C at the opposite end (which only partially accommodates an aluminium board 604C). In an alternative embodiment, instead of open channels 602 and corrugated boards 604, the lower surfaces of the panels 106B, 108B are moulded and fitted with at least one flat/regular board.

[0043] In the example of Figure 4, the foot of the rail 102B is supported by a conventional rail base component 606, which is fixed to the underlying sleeper 104 by means of bolts 607. The rail 102B and base 606 are further fixed to the sleeper by a pair of rail fixing devices 608A, 608B. These devices can be elongate rods (e.g. of steel), each having a generally straight portion leading to a hook-shaped formation at one end. The hook formation of rail fixing device 608A is fitted on top of the foot of the rail 102B and its straight portion passes through apertures in the rail base component 606 into the body of the sleeper 104.

[0044] The hook formation of the other rail fixing device 608B is fitted on top of an elongate member 610 that has been fitted over the foot of the rail. The member 610 is intended to assist with holding the "outer" panel 106B against the rail 102B. The panel/rail-holding member 610 comprises a flat, elongate length or material (e.g. steel) that is bent/formed to comprise a flat central portion 610B having an upstanding portion 610A at one end and a hook-shaped portion 610C at the opposite end.

[0045] In use, the central portion 610B of the panel/rail-holding member 610 is positioned on top of the sleeper 104 (shown set into the top of the sleeper in the Figure for illustration only) and beneath the lower surface of the panel 106B. The length of the central portion 610B generally corresponds to the distance from one side of the panel 106B to the far side end of the foot of the adjacent rail 102C. The width of the panel/rail-holding member 610 can be around 102 mm (4").

[0046] The upstanding portion 610A of the member 610 abuts the side of the panel and is connected to its side surface. The connecting device shown in the example is a coach screw 614, although it will be understood that other types of connecting formations/devices could be used. For example, the upstanding portion 610A could be formed so as to "clip" into (e.g. a bore or other formation) the side surface of the panel 106B.

[0047] The hook-shaped end 610C of the panel/rail-holding member 610 passes through an aperture in the rail base 606 and then fits on top of the foot of the rail 102B, thereby helping fix it on top of the base 606. It will be appreciated that variations to the design of the panel/rail-holding member can be made and that such members can assist with holding a rail against other panels (e.g. panel 108B).

[0048] It will be understood that although substantially symmetrical formations are used in the example shown in the Figures, other arrangements could also be used.

[0049] Referring to Figures 5 and 6, there can be seen schematic illustrations of a pair of rubber panels 106A,

312 that can be used in another embodiment of the surface. For ease of illustration, the panels are shown partially transparent in Figure 5 so that components fitted on/within them can be seen more clearly.

[0050] A portion of the left-hand panel 106A near the centre of its left hand side surface forms a recess 602A. The opposite surface of the panel 106A also includes a substantially identical recess. (As discernable in Figure 5, when viewed from the side, the outline of the recess is generally an isosceles trapezoid and a channel wider than the base of the trapezoid can run end-to-end across the bottom surface of the panel). Leading between the opposing recesses is a straight bore 603A of circular cross-section (around 40 cm diameter in the example). It will be appreciated that the panel can either be formed with such recesses/bores, or they could be cut into the panel. In the example, panels 106A and 312 are substantially identical, which can have manufacturing benefits, but it will be appreciated that this need not always be the case.

[0051] Recess 602A of panel 106A at least partly houses a first connecting formation 608. The formation 608 includes a cylindrical collar 611, one end of which is flanged and is connected to a generally square shaped plate 612. As can best be seen in Figure 7, two opposite sides of the plate 612 are shaped so that they each form a generally U-shaped channel 614, 614' when viewed from above.

[0052] A cylindrical rod 604A (of around 35 cm in diameter in the example) is inserted through bore 603A of panel 106A, with one end of the rod fitting inside collar 611A. The rod and the inner surface of the collar 611A may be threaded to assist with fixing the components together. The other end of the rod 604A is located near the recess at the end of the panel 106A opposite recess 602A. This end of the rod can be fitted with a second connecting formation 608, which will be described below.

[0053] Panel 312 is shown as abutting the right hand side surface of panel 106A. The abutting left hand side surface of panel 312 includes recess 602B that, in use, is substantially aligned with the recess 602A of panel 106A. Recess 602B of panel 312 at least partly houses a second connecting formation 610. The formation 610 includes a cylindrical collar 611B. At one end of the collar 611B there is (connected to or integrally formed) a first disc 622. Spaced apart from the first disc and also connected to/formed on the collar 611B is a substantially identical second disc 624. The space between the first and second discs is such that the first disc can fit within the U-shaped channels 614, 614' of the first connecting formation 310 with the surface of the second disc engaging with the outer surfaces of the channels (as detailed in Figures 6 and 7) so that relative horizontal movement of the first and second connecting formations is restricted. The first disc 622 includes a notch 626.

[0054] In use, a first one of the panels (e.g. 106A) is placed in position on the track. One of the first or second connecting formations is fixed onto an end of the rod

604A (e.g. formation 608 onto the left hand end of the rod) and the rod is then inserted through the panel bore 603A. The free (right hand) end of rod is then located at recess 602A of the panel 106A and the other of the first/second connecting formations (formation 610 in this case) is threaded onto it. The notch 626 can be used to tighten the connection by means of a C-spanner or the like.

[0055] Similarly, another one of the panels (e.g. 312) has a rod inserted through its bore, with one connecting formation 608, 610 of each type being connected to the ends of the rod. In the example, the second connecting formation 608 is located at the left-hand side of the panel 312. The panel 312 is moved so that its left-hand side surface abuts the right-hand side surface of panel 106A and the discs 622, 624 of the connecting formation 608 on the panel 312 engage with the connecting formation 310 of the panel 106A. This engagement takes place as one of the panels slides vertically with respect to the other, thereby securely (but releasably) fixing them together. If needed, one of the connecting formations can be further tightened on the rod to further secure the panels together. It will be appreciated that the interlocking channel/discs arrangement shown is only one example of a set of formations that can be used to releasably fix the panels in a side-by-side arrangement.

[0056] Although the examples illustrated in the diagrams relates to a straight section of track, it will be understood that the panels and other components of the surface can be formed to have dimensions and shapes suitable for incorporating curved sections of rails. It will be also appreciated that the operations described herein can be repeated to fit the surface over any desired length of track. The surface may be used over substantially the entire length of a track or only for particular sections of the track. Figure 1 shows members such as reinforcing members 114 and 108B, engaging formations 126 and locating member 120 being used in a single set of panels. It will be understood that this is for ease of illustration only and all those members need not necessarily be used in the same set of panels.

Claims

1. A vehicle-supporting surface incorporating at least one rail (102), the surface including:

first and second panels (106A, 312) of compressible material arranged to be fitted together such that a surface of the first panel at least partially abuts a corresponding surface of the second panel, wherein the first and second panels each include respective interengagable formations (126A, 310) at least partially embedded within them and located at their abutting surfaces, the interengagable formations being configured to, when en-

gaged, at least partially counteract forces resulting from the compression of the panels in the region of the abutment.

2. A surface according to Claim 1, wherein one of the formations (310) includes a generally upwardly projecting portion (306B) and the other formation (126A) includes a generally downwardly projecting portion (306A).
3. A surface according to Claim 1 or 2, wherein the formations interengage by a portion of one of the formations (126A) contacting a surface of the other formation (310) that opposes the abutting surface of the panel (312) of the other formation (310).
4. A surface according to any one of Claims 1 to 3, wherein a line of contact between the interengaged formations (126A, 310) intersects a line of contact between the abutting surfaces of the panels (106A, 312).
5. A surface according to Claim 1, wherein a first said interengageable formation (608) includes a member having a slot, channel or groove (614) and the second interengageable formation (610) includes a portion (622) that engages with the slot, channel or groove.
6. A surface according to Claim 5, wherein the portion (622, 624) of the second interengageable formation (610) is formed so as to limit relative horizontal movement of the interengaged formations (608, 610).
7. A surface according to Claim 5 or 6, wherein at least one of the interengageable formations (608, 610) is at least partially located in a recess (602) at the abutting surface of the respective panel (106A, 312).
8. A surface according to any one of Claims 5 to 7, wherein a said interengageable formation (608, 610) is connected to a member (e.g. a rod 604) that extends from the abutting surface of a said panel (106A) to an opposing surface of the panel, and another said interengageable formation (610) is connected to the member (604) at the opposing surface of the panel.
9. A surface according to any one of the precedings Claims including two different types of said interengageable formations (608, 610), a first said type being located at one abutting surface of a said panel and a second said type being located at an opposing surface of the panel.
10. A surface according to any one of the preceding Claims, wherein an abutting surface of at least one of the panels (106A, 312) is formed with a space

(202, 314) for accommodating the projecting formations (310, 126A).

11. A surface according to any one of the preceding Claims, wherein at least one of the panels (106A, 312) is moulded with a non-projecting portion (302A) of a said formation (126A) within the panel. 5

12. A surface according to Claim 11, wherein the non-projecting portion (302A) of the formation (126A) includes apertures (308) to allow the panel (106A) material to be moulded around the portion. 10

13. A surface according to any one of the preceding Claims, including a rigid elongate member (127) that connects the formations (126A, 126B) of an adjacent pair (typically side-by-side) of the panels (106A, 106B) together. 15

14. A surface according to any one of the preceding Claims, wherein a bottom surface of a said panel (106A) includes a space for accommodating a device (608) for fixing a rail (102) to a ground surface. 20

15. A surface according to Claim 14, further including a device (610) for assisting with holding a said rail (102B) against a side surface of a said panel (106B), the rail-holding device including an elongate member (610) that extends between two sides of the panel (106B), the member including a first formation (610A) at one end that is configured to fit against a side surface of the panel and a second formation (610C) at its opposite end that is configured to fit against a portion of the adjacent rail (102B). 25
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16. A method of installing a vehicle-supporting surface incorporating at least one rail (102), the method including:

fitting first and second panels (106A, 312) of compressible material together such that a surface of the first panel at least partially abuts a corresponding surface of the second panel, wherein the panels are fitted together by engaging formations (126A, 310) that project from their abutting surfaces, the engagement of the formations at least partially counteracting forces resulting from the compression of the panels in the region of the abutment, wherein the panels are fitted together by engaging formations (126A, 310) at least partially embedded within the panels, the formations being located at the abutting surfaces of the panels, the interengagable formations being configured to, when engaged, at least partially counteract forces resulting from the compression of the panels in the region of the abutment.

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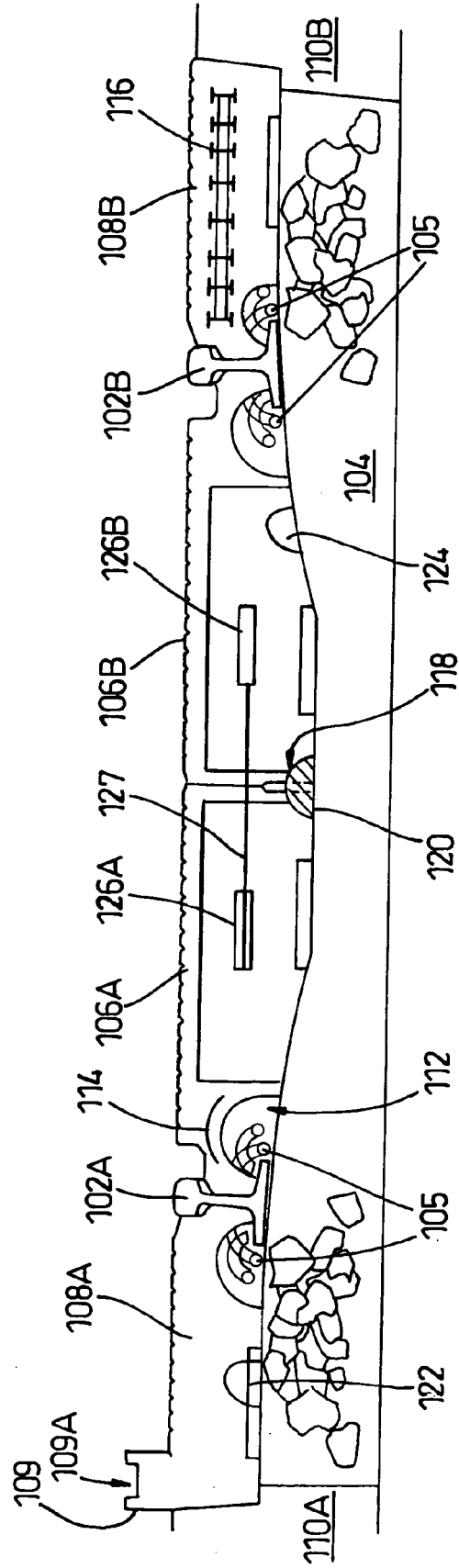


Fig. 1

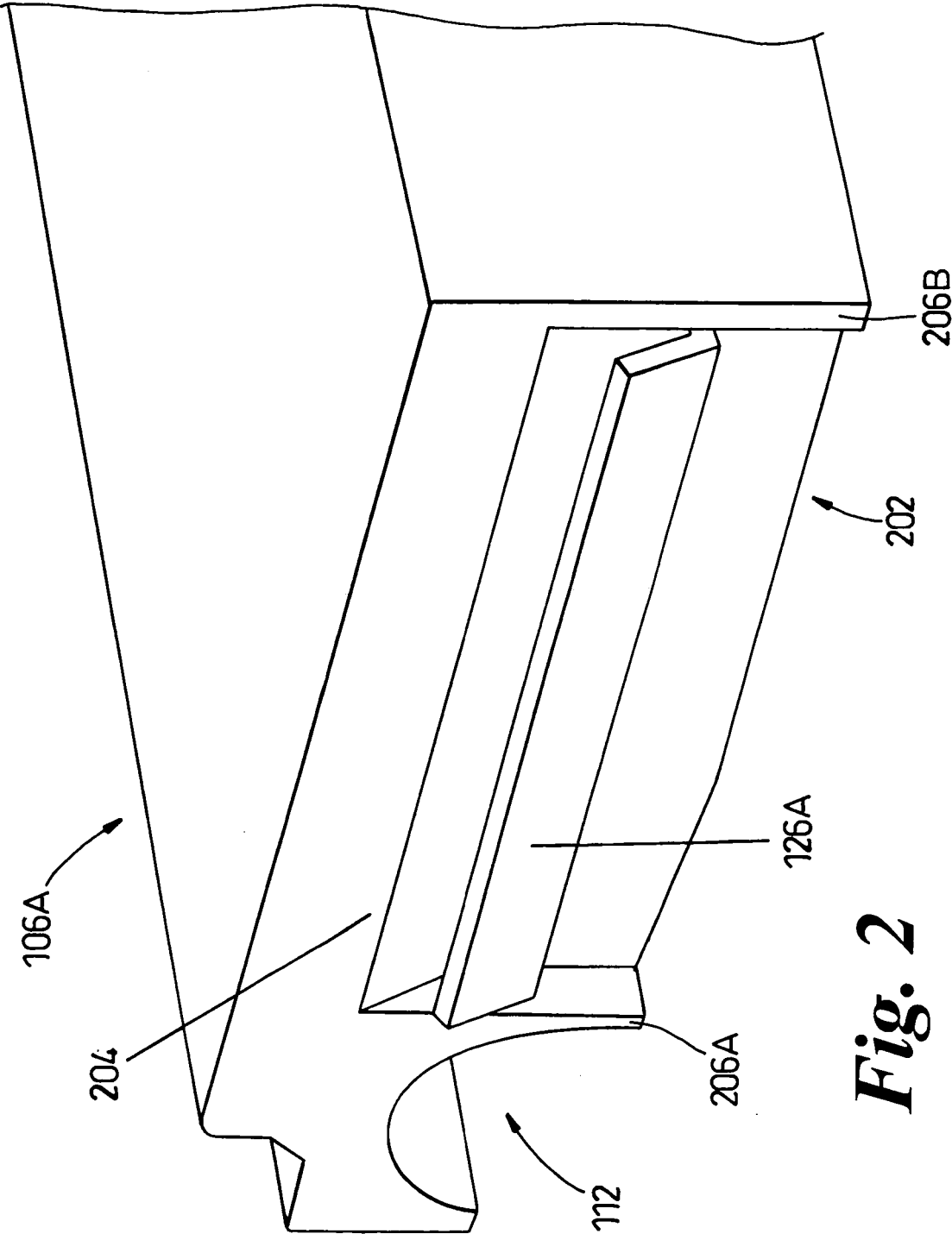


Fig. 2

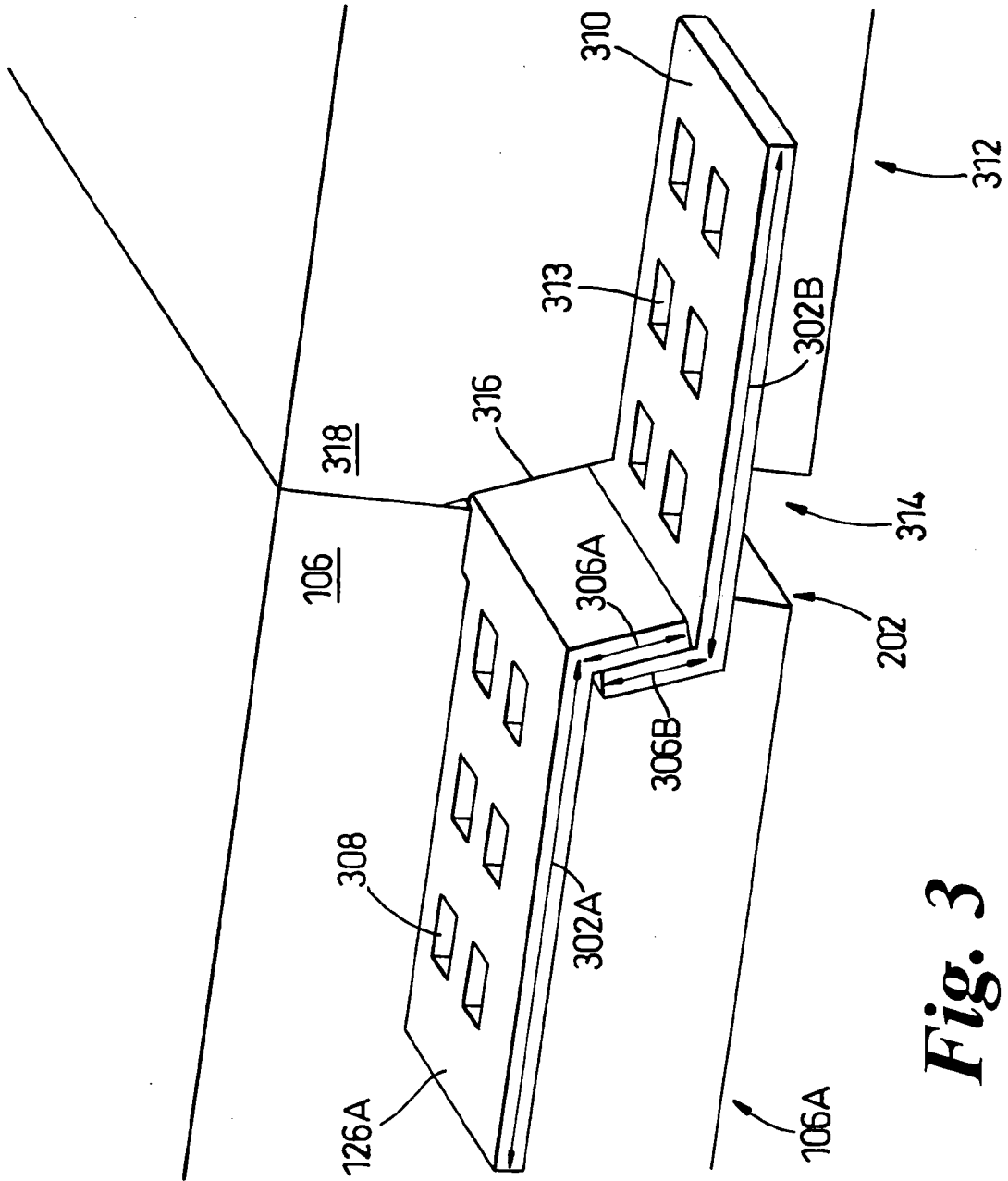


Fig. 3

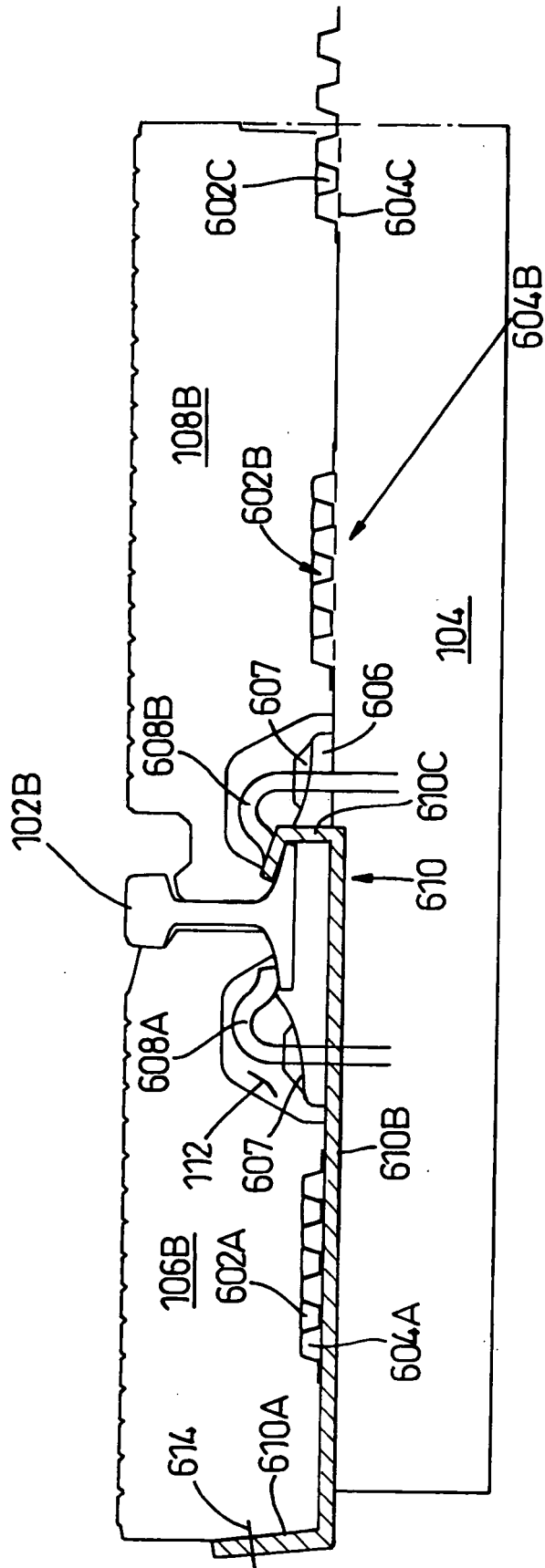


Fig. 4

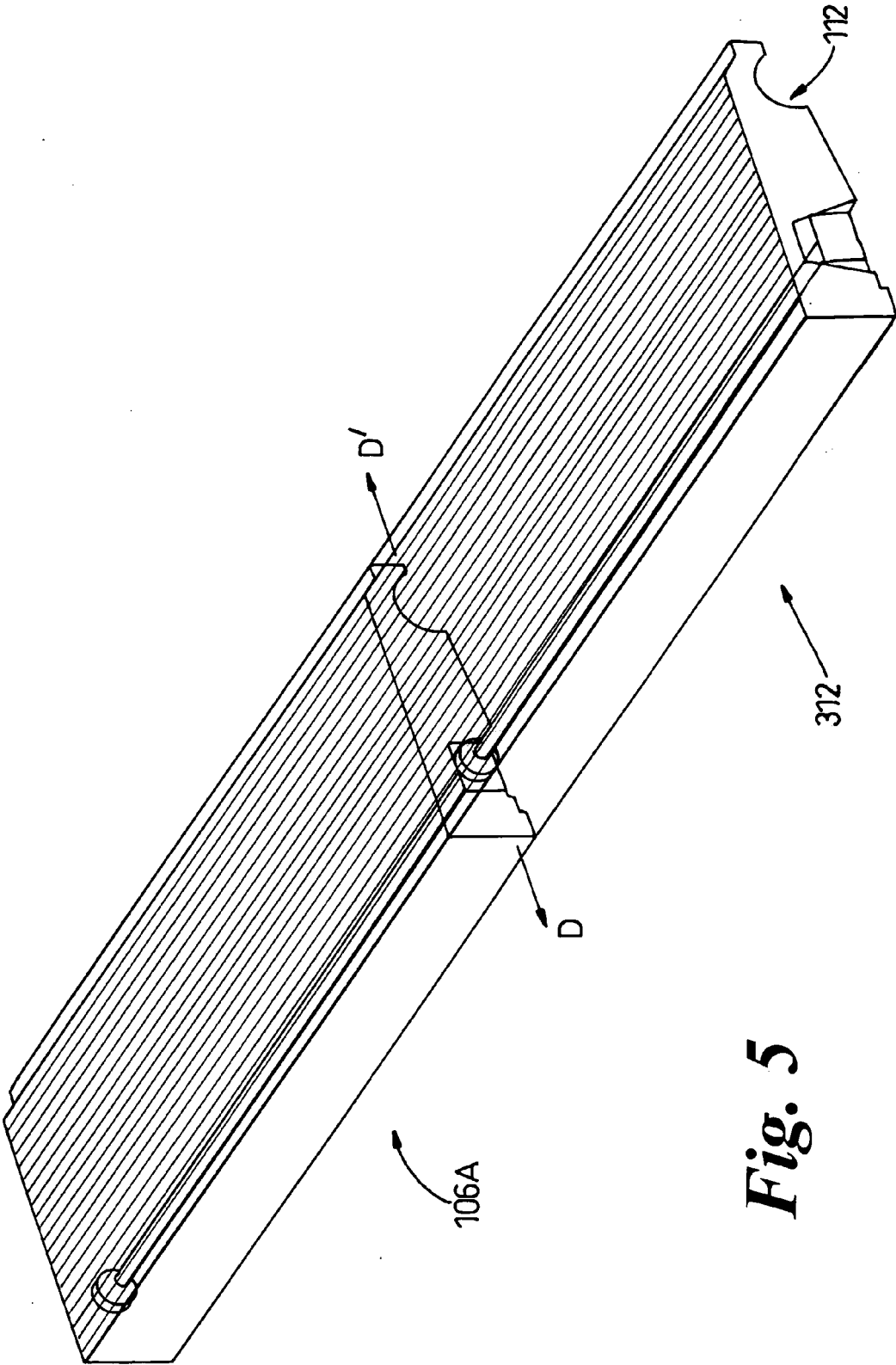
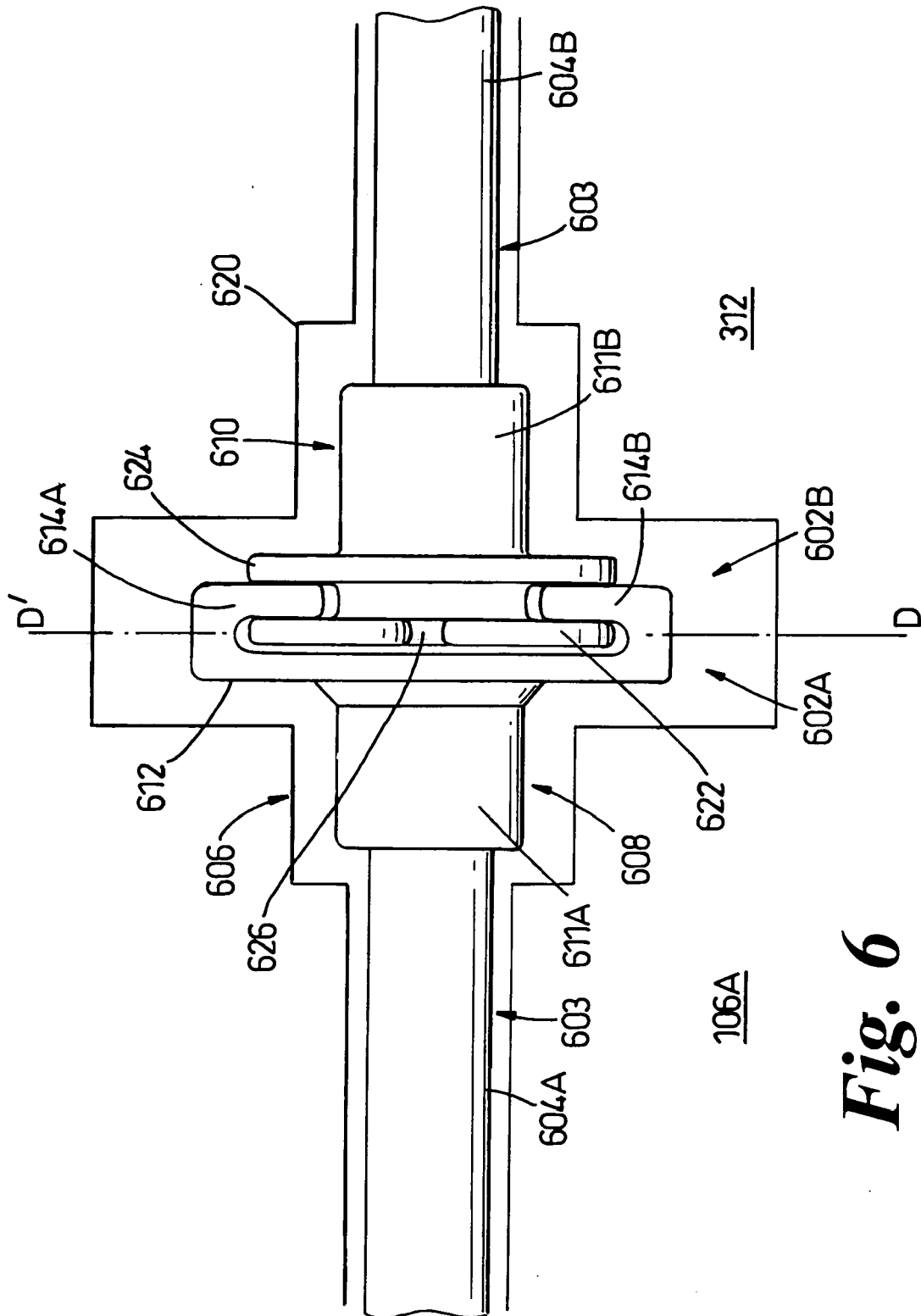


Fig. 5



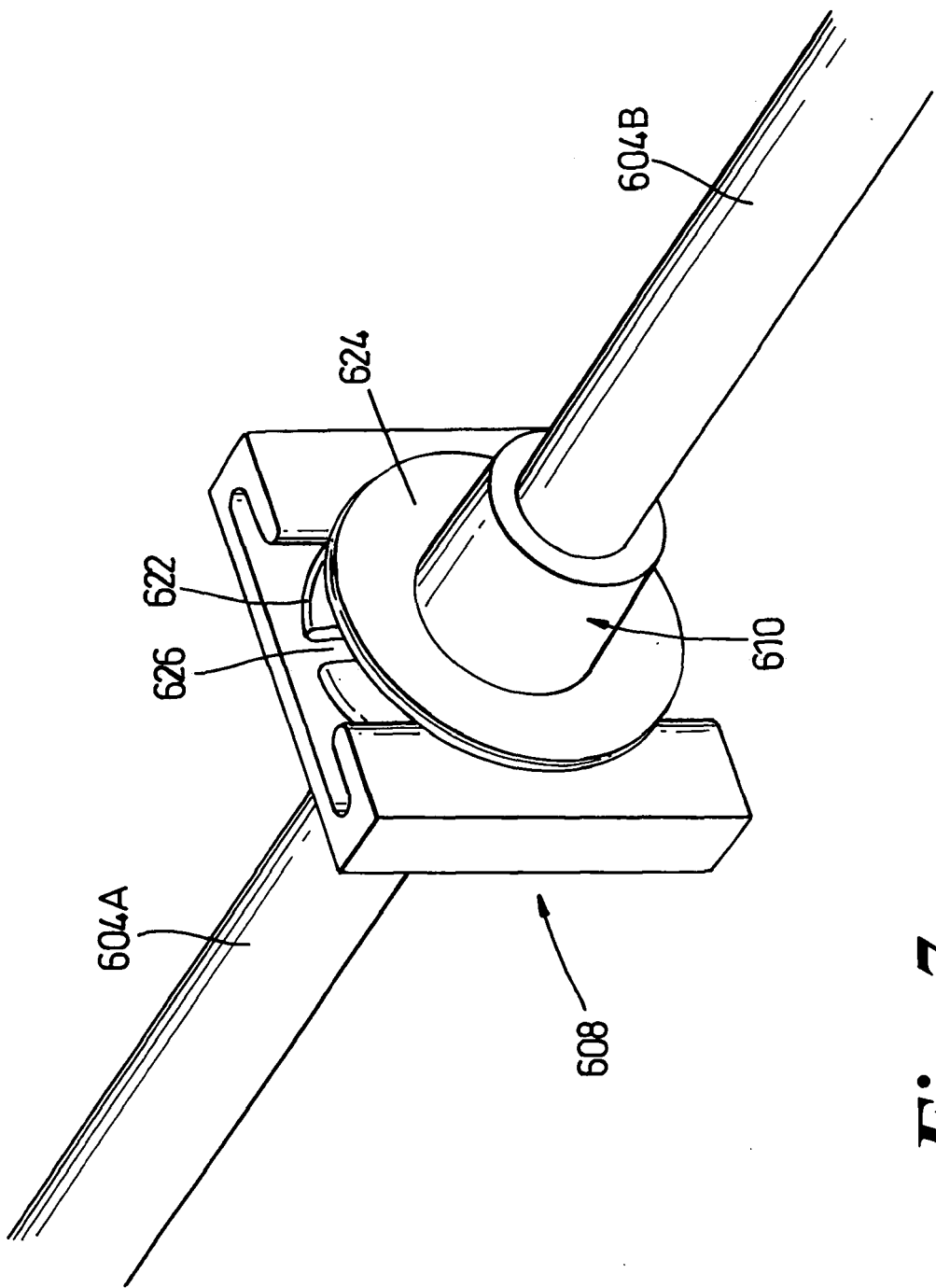


Fig. 7