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(54) **Mounting assembly for a rail**

(57) Mounting assembly for mounting a rail to a concrete foundation of a railbed, wherein the mounting assembly comprises a mounting part on which the rail sits, and at least two plugs to be accommodated in the concrete foundation, wherein the plugs are provided with an internal channel for accommodating a screw which is screwed into the plug from above through a mounting

opening in the mounting part, wherein the plug has a first coupling member and the mounting part has a second coupling member for cooperation with the first coupling member, wherein the cooperating coupling members constitute a form lock that blocks rotation of the plug relative to the mounting part about the centre line of the internal channel.

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Description

BACKGROUND OF THE INVENTION

[0001] The invention relates to a mounting assembly for mounting a rail to a concrete foundation of a railbed. Several mounting assemblies are used distributed along the length of the rail for securing the rail to the concrete foundation. The concrete foundation keeps the rails properly positioned.

[0002] A railbed with a concrete foundation is used for tram tracks, wherein apart from the tram other road traffic should also be able to pass the railbed without being hindered by the rails. For that purpose a concrete upper layer and a thinner asphalt layer in which the rails are recessed, are disposed over the concrete foundation.

[0003] A known mounting assembly comprises a mounting part on which the rail sits, and two anchor bolts with a broadened head and thread which with the head downwards and the thread upwards are poured into the concrete foundation. After the concrete has hardened the threads protrude from the concrete foundation through holes in the mounting part. Tensioning clamps are placed over the threads which clamps engage onto the foot of the rail. The tensioning clamps are secured by means of nuts that are tightened around the threads.

[0004] The concrete foundation has a lifespan of over 60 years. On sections of tracks that are loaded lightest, namely the straight sections of track outside the stops, the rails have an average lifespan of 30 years. In bends where the rails are laterally loaded by the wheels, and at stops where the tram wheels exert traction forces and braking forces on the rails, the rails have a much shorter lifespan of 6 years on average. After the lifespan the rails are replaced entirely. When replacing the rails the asphalt layer and the concrete upper layer are broken away using a wrecking hammer so that the threads of the anchor bolts are exposed again.

[0005] In principle the nuts can be unscrewed when replacing the rails so that the tensioning clamps come off again. Due to the violence of the wrecking hammer however, they may have been damaged and the threads and the nuts often have been exposed to a corrosive environment for many years. The anchor bolts that were embedded thus cannot be reused anymore. As the anchor bolts can no longer be removed from the concrete foundation due to the broadened head, the concrete foundation also needs to be fully demolished whereas its technical lifespan has by no means been reached yet. Building up a new concrete foundation and thus an entirely new railbed, results in a long disruption of tram services. Sufficient hardening of the new concrete foundation needs to be waited for in order to prevent that the anchor bolts that were embedded while pouring will rotate along with the nut.

[0006] It is an object of the invention to provide a mounting assembly for mounting a rail to a concrete foundation with which during the first construction of the con-

crete layer the rails can soon be secured to the hardening concrete.

[0007] It is an object of the invention to provide a mounting assembly for mounting a rail to a concrete foundation, with which rails, that are successive over time, can be mounted to the same concrete foundation.

[0008] It is an object of the invention to provide a mounting assembly for mounting a rail to a concrete foundation of which the components in the concrete foundation can be reused.

SUMMARY OF THE INVENTION

[0009] According to one aspect the invention provides a mounting assembly for mounting a rail to a concrete foundation of a railbed, wherein the mounting assembly comprises a mounting part on which the rail sits, and at least two plugs to be accommodated in the concrete foundation, wherein the plugs are provided with an internal channel for accommodating a screw which is screwed into the plug from above through a mounting opening in the mounting part, wherein the plug has a first coupling member and the mounting part has a second coupling member for cooperation with the first coupling member, wherein the cooperating coupling members constitute a form lock that blocks rotation of the plug relative to the mounting part about the centre line of the internal channel.

[0010] The mounting assembly according to the invention can temporarily be suspended from a rail with the plugs oriented downward. Said rail can be positioned over a basis of the concrete foundation to be poured. After pouring the concrete foundation the plugs sit in the hardening concrete. The form lock prevents the plugs from rotating along with the screw to be screwed in from above. The screws are for instance collar-sleeper screws having a square head that are screwed in mechanically. As a result the screws can already be tightened from the moment the concrete has a sufficient initial hardening for securing the mounting assembly with the rail thereon. Said initial hardening is much lower than the hardening required for counteracting that the known anchor bolts that were embedded while pouring, rotate along. As a result the railbed can be finished immediately after the initial hardening. When the rail needs to be replaced the screws can be unscrewed from the plugs from above. The plugs and thus the concrete foundation, can be reused for another rail, wherein optionally only the properly accessible mounting part needs to be replaced.

[0011] In one embodiment at the lower side facing the plug, the second coupling member comprises a slot below the mounting opening, wherein at the upper side facing the mounting part, the first coupling member comprises a first broadening extending into the slot, wherein transverse to the centre line the first broadening has a noncircular contour. Due to the noncircular contour rotation of the plug relative to the mounting part is blocked within the slot.

[0012] In one embodiment thereof the slot is elongated and has two parallel inner surfaces, wherein the first broadening has two parallel outer surfaces for abutting the inner surfaces. Due to the outer surfaces abutting the inner surfaces a firm form lock is effected that may be free of play.

[0013] In one embodiment at the lower side facing away from the mounting part the plug is provided with a second broadening. The second broadening constitutes an anchoring of the plug deep into the concrete foundation, as a result of which already at the initial hardening, the concrete foundation is amply capable of withstanding the tensile forces exerted by the screws.

[0014] In one embodiment thereof, transverse to the centre line, the second broadening has a noncircular contour, so that in addition to the form lock with the mounting part it is also counteracted within the concrete foundation that the plugs rotate along.

[0015] In one embodiment the second broadening has an anchoring surface facing the mounting part and being transverse to the centre line. In that way it can be counteracted that the concrete foundation ruptures along the plugs.

[0016] In one embodiment the plug has a straight bush having a circle-cylindrical smooth outer surface up to the second broadening. The concrete will then hardly adhere to the plugs and the plugs are free to make a short stab in the hardening concrete without consequences to the later retaining force. As a result it is possible to allow trams to drive slowly over the rails although the concrete foundation has not yet hardened and the screws are not yet tightened.

[0017] In one embodiment the plugs are made of synthetic material, preferably polyamide.

[0018] In one embodiment the mounting part comprises a mounting member for supporting the rail and a separate underlying plate below the mounting member, wherein the underlying plate is provided with the second coupling members. After exposing the old concrete foundation, for instance by breaking the old concrete upper layer away, a selection can be made which of these components can be reused for securing a new rail.

[0019] In one embodiment thereof the underlying plate comprises a straight and smooth undersurface for partial accommodation in the concrete foundation. The straight and smooth undersurface leaves a flat recess in the concrete foundation in which later on an identical or slightly smaller underlying plate can easily be fitted.

[0020] In one embodiment the underlying plate is made of synthetic material, preferably polyamide.

[0021] In one embodiment the mounting assembly comprises shape-retaining auxiliary pieces between the mounting part and the heads of the screws which keep the heads at a fixed distance from the mounting part, wherein at the lower side the screws extend into the plugs and keep the coupling members in coupling cooperation. The auxiliary pieces are temporarily used to keep the coupling cooperation intact when the mounting assembly

is suspended from the rail. Due to the fixed distance between the head and the mounting part the screws need not be screwed fully into the plug. Said temporary mounting is easily formed and released again by hand.

5 **[0022]** In one embodiment thereof the auxiliary pieces engage onto the foot of the rail, so that they simultaneously ensure the temporary suspension from the rail, which is ended when removing the auxiliary pieces.

10 **[0023]** In one embodiment thereof the foot of the rail comprises two opposite end edges and the mounting part and the auxiliary pieces jointly confine the end edges, so that a sideward shifting of the mounting assembly relative to the rail is counteracted.

15 **[0024]** In one embodiment the auxiliary pieces are provided with a passage for the screw, wherein the passage towards the rail is opened for sideward insertion of the auxiliary piece towards the rail. The auxiliary piece can thus easily be placed and subsequently be removed again, without the rail being a hindrance.

20 **[0025]** In one embodiment the mounting part comprises a straight undersurface for supporting the foot of the rail, wherein the auxiliary pieces are provided with a straight support surface for the head which surface extends parallel to the undersurface.

25 **[0026]** In one embodiment the mounting part comprises a straight undersurface for supporting the foot of the rail, wherein beyond the foot of the rail the straight undersurface merges into concave lowerings, wherein the auxiliary pieces are provided with a convex lower side fitting in the concave lowerings. The form fit ensures a properly secured, temporary positioning of the auxiliary pieces relative to the mounting part.

30 **[0027]** In one embodiment the auxiliary pieces comprise auxiliary bushes around the screws which bushes at the upper side abut the heads of the screws and which at the lower side abut the mounting part, wherein at the lower side the screws extend into the plugs and keep the coupling members in coupling cooperation. The auxiliary bushes can be temporarily disposed for ensuring the coupling cooperation of the coupling members while the mounting assembly is still suspended over the basis of the concrete foundation to be poured. The auxiliary bushes ensure that the screws only need to be partially screwed in. This can be done manually.

35 **[0028]** In one embodiment the mounting part is provided with an auxiliary clamp for engagement onto the rail, wherein the coupling assembly is capable of being suspended from the rail.

40 **[0029]** According to a second aspect the invention furthermore provides a mounting assembly for mounting a rail to a concrete foundation of a railbed, wherein the mounting assembly comprises a mounting part on which the rail sits, and at least two plugs to be accommodated in the concrete foundation, wherein the plugs are provided with an internal channel for accommodating a screw which is screwed into the plug from above through a mounting opening in the mounting part, wherein at the lower side facing away from the mounting part the plug

is provided with a broadening, wherein transverse to the centre line the broadening preferably has a noncircular contour.

[0030] With the plugs oriented downward, the mounting assembly according to the invention can temporarily be suspended from a rail. Said rail can be positioned over a basis of the concrete foundation to be poured. After pouring the concrete foundation the plugs sit in the hardening concrete. The broadening with uncircular contour prevents that the plugs start rotating along with the screw to be screwed in from above. As a result the screws can already be tightened from the moment the concrete has sufficient initial hardening for securing the mounting assembly having the rail thereon. When the rail needs to be replaced the screws can be unscrewed from the plugs from above. The plugs and therefore the concrete foundation, can be reused for another rail, as opposed to the known anchor bolts that have been embedded, for which the entire concrete foundation needs to be broken away.

[0031] According to a third aspect the invention furthermore provides a method for building a railbed by means of a mounting assembly for mounting a rail to a concrete foundation of the railbed, wherein the mounting assembly comprises a mounting part on which the rail sits, and at least two plugs to be accommodated in the concrete foundation, wherein the plugs are provided with an internal channel for accommodating a screw which is screwed into the plug from above through a mounting opening in the mounting part, wherein the plug has a first coupling member and the mounting part has a second coupling member for cooperation with the first coupling member, wherein the cooperating coupling members constitute a form lock that blocks rotation of the plug relative to the mounting part about the centre line of the internal channel, wherein the method comprises the laying of a sand layer, positioning the rail over the sand layer, suspending the mounting part from the rail, wherein the plugs are downwardly oriented towards the sand layer, pouring the concrete foundation so that the plugs are accommodated therein, and tightening the screws into the plugs from above when the concrete foundation has acquired its initial hardening but not yet its final hardening.

[0032] Said initial hardening is much lower than the hardening required for counteracting that the known anchor bolts that were embedded while pouring, rotate along. In that way the construction of the railbed can be finished immediately following initial hardening.

[0033] In one embodiment thereof the mounting assembly comprises shape-retaining auxiliary pieces between the mounting part and the heads of the screws which keep the heads at a fixed distance from the mounting part, wherein at the lower side the screws extend in the plugs and keep the coupling members in coupling cooperation, wherein the method comprises the pouring of the concrete foundation with the auxiliary pieces around the screws, and removing the auxiliary pieces prior to tightening the screws into the plugs from above.

[0034] The auxiliary pieces are temporarily disposed

to ensure the coupling cooperation of the coupling members while the mounting assembly is still suspended over the basis of the concrete foundation to be poured. The auxiliary bushes ensure that the screws only need to be partially screwed in. This can be done manually.

[0035] The aspects and measures described in this description and the claims of the application and/or shown in the drawings of this application may where possible also be used individually. Said individual aspects may be the subject of divisional patent applications relating thereto. This particularly applies to the measures and aspects that are described per se in the sub claims.

SHORT DESCRIPTION OF THE DRAWINGS

[0036] The invention will be elucidated on the basis of a number of exemplary embodiments shown in the attached drawings, in which:

Figure 1 shows an isometric side view of a railbed in which a rail on a mounting assembly according to a first embodiment of the invention is accommodated;

Figure 2 shows an isometric side view of a partially exploded part of the mounting assembly according to figure 1;

Figure 3 shows an isometric bottom view of the part of the mounting assembly according to figure 2;

Figure 4 shows an isometric side view of the tram rail and the mounting assembly in a preparatory stage of constructing the railbed;

Figure 5 shows an exploded view of a mounting assembly for the rail according to a second embodiment of the invention; and

Figure 6 shows an isometric view of the mounting assembly according to figure 5 in mounted condition.

DETAILED DESCRIPTION OF THE DRAWINGS

[0037] Figure 1 shows a railbed 1 of which parts have been cut out in the figure in order to show the final stage of its construction. The railbed 1 comprises a compacted and levelled sand layer 10 and on top of it a concrete foundation 11. A tram track has been accommodated in the railbed 1 of which track only one rail 20 is shown in figure 1. The rails 20 are connected to each other by means of distributed steel transverse-rods. If the railbed 1 is located in a street, when finishing the railbed 1 a concrete upper layer 12 which is approximately 13 centimetres thick and a thinner asphalt layer 13 which is approximately 7 centimetres thick, are disposed on the concrete foundation 11 of which asphalt layer the top surface is flush with the top side of the rails 20 so that other traffic can also drive over the railbed 1. Between the concrete foundation 11 and the upper layer 12 a thin separation layer 14 is disposed as a result of which the upper layer 12 can separately be broken away from the foundation 11.

[0038] The rails 20 have a foot 21 mounted to mounting assemblies 30 according to a first embodiment of the invention that are regularly distributed along the length, and only one of which is shown in figure 1. Figures 2 and 3 show exploded views of the mounting assembly 30. Figures 5 and 6 show a mounting assembly 230 according to a second embodiment of the invention. The embodiments will be further elucidated below.

[0039] As also shown in figure 3 the mounting assembly 30 comprises a rectangular underlying plate 31 of synthetic material, in this example polyamide (nylon). Parallel to each other the flat underlying plate 31 comprises a straight and smooth upper surface 32 and a straight and smooth undersurface 33. In the underlying plate 31 two continuous circular holes 34 are formed, which at the lower side merge into wider, recessed slots 35 having a rounded rectangular contour.

[0040] The mounting assembly 30 furthermore comprises two identical synthetic plugs 40, in this example made of polyamide. The plugs 40 comprise a straight bush 41 having coarse internal thread 45, a broadening 42 at the upper side, the broadening having two parallel levellings 43 that fit within the long sides of the recessed slots 35, and a spout 44 fitting in the circular holes 34 of the underlying plate 31. At the lower side the plugs 40 comprise an anchor 47 in the shape of a broadening having a straight undersurface 48 at the lower side, two parallel levellings 49 at the sides, and two anchoring surfaces 50 at the upper side which extend perpendicular to the longitudinal direction of the plugs 40.

[0041] As shown in figures 1 and 3 the mounting assembly 30 comprises a synthetic mounting member 60, in this example made of polyamide. The mounting member 60 comprises an elongated straight bearing surface 61, which for the larger part is covered by a flat cork rubber 80. At the ends the bearing surface 61 merges into a lowering 62 for accommodation of a synthetic wedge 90, in this example made of polyamide. Over its entire length the lowering 62 has a constant concave cross-section. The mounting member 60 is provided with supports 63 extending above the bearing surface 61 for sideward support of the wedge 90. The mounting member 60 is solid or, in order to save on material, hollow on the inside and filled with a honeycomb structure which is open at the lower side facing the underlying plate 31.

[0042] The mounting assembly 30 comprises two guide members 100 placed at the ends of the bearing surface 61, the guide members having a U-shaped passage 101 to two continuous holes 64 that are in line with the holes 34 in the underlying plate 31. At the side facing the outside, the guide members 100 are provided with wedge-shaped part for cooperation with the wedge 90. The foot 21 of the rail 20 contacts the cork rubber 80 and is secured thereto using tensioning clamps 110 that by means of resilient outer ends engage onto the upper side of the foot 21. The position of the tensioning clamps 110 can be set by sliding the wedge 90 relative to the guide member 100. The tensioning clamps 110 are each se-

cured and pre-biased using collar-sleeper screws 120 that are inserted through the tensioning clamps 110, the guide member 100 and the holes 34 in the underlying plate 31 and are tightened in the plugs 40. The collar-sleeper screw 120 comprises a head 121 having a square upper side and a circular collar engaging onto the tensioning clamps 110. The collar-sleeper screw 120 furthermore comprises a smooth rod section 122 and an external thread 123 having a coarse pitch corresponding with the internal thread 45 in the plugs 40.

[0043] Figures 5 and 6 show a mounting assembly 230 according to a second embodiment of the invention. The parts corresponding with the first embodiment are provided with the same reference numbers in the figures. Below the differences from the first embodiment are discussed.

[0044] The mounting assembly 230 comprises two identical synthetic plugs 240, in this example made of polyamide. The plugs 240 comprise a straight bush 241 having the coarse internal thread 45, the broadening 42 at the upper side, the broadening having two parallel levellings 43 that fit within the long sides of the recessed slots 35, and a spout 44 fitting in the circular holes 34 of the underlying plate 31. The plugs 240 comprise a straight cylindrical circumferential wall in which an external thread 246 in the shape of a groove that is recessed relative to the smooth circumferential wall. On the external thread 246 a synthetic anchor 247 is screwed, in this example made of polyamide. The anchor 247 has a hexagonal circumferential surface 249 and at the lower side is closed by means of a straight lower wall 248.

[0045] The mounting assembly 230 comprises a separate, shape-retaining auxiliary piece 330 made of synthetic material with which the mounting assembly 230 can temporarily be suspended from the rail 20. The auxiliary piece 330 comprises a straight undersurface 331 for abutting the straight bearing surface 61 of the mounting member 60, and along it a concave fitting member 332 that merges into a straight end surface 333. The fitting member 332 and the straight end surface 333 jointly have a cross-section that is constant over the length and fit free of play in the lowering 62 and against the projecting supports 63 in order to enter into a form fit therewith. The undersurface 331 merges into a parallel and raised engagement surface 334 for abutting the foot 21 of the rail 20, thus confining the end edge 22.

[0046] The auxiliary piece 330 is provided with a curved inner wall 335 bounding a U-shaped recess 336. The recess extends through the undersurface 331 up to the fitting member 332. At the upper side the inner wall 335 forms a straight support surface 337 extending parallel to the undersurface 331.

[0047] Figure 4 shows the mounting assembly 30 according to a first embodiment in a preparatory stage of constructing the railbed 1, prior to the situation as shown in figure 1. The mounting assembly 30 is assembled and temporarily attached to the foot 21 of the rail 20 by means of auxiliary clamps that are not further shown and engage

on either side of the rail 20 onto the upper surface of the foot 21 and that are screwed onto the bearing surface 61 of the mounting member 60 in order to keep the foot 21 firmly pressed into the cork rubber 80. The collar-sleeper screws 120 are inserted into a temporary synthetic auxiliary bush 130 and subsequently only partially tightened in the plugs 40. In this example the auxiliary bush 130 is made of PVC. The auxiliary bush 130 is shape-retaining in the longitudinal direction. Inserting and tightening can be effected using manual power. The auxiliary bushes 130 then press on the guide members 100 and keep the guide members 100, the mounting member 60 and the underlying plate 31 on top of each other free of play. With the broadening 42 at the upper side the plugs 40 are kept free of play in the recessed slots 35 at the lower side of the underlying plate 31. As a result the mounting assembly 30 forms one unity free of play, that in the desired final arrangement is able to hang from the foot 21 of the rail 20.

[0048] In the preparatory stage as shown in figure 4 the sand layer 10 has been laid, compacted and levelled. Concrete slabs 152 having concrete blocks 151 thereon have been placed on the sand layer 10. Atop the concrete blocks 151 adjustment wedges 153 have been placed on which the rails 20 sit. The parts of the mounting assemblies 30 have been brought into the above-mentioned bond free of play by means of the temporary auxiliary bushes 130. The mounting assemblies 30 with the plugs 40 are freely suspended over the sand layer 10. The rails 20 have been accurately brought at the desired final height by means of the adjustment wedges 153.

[0049] Subsequently the concrete foundation 11 is poured as shown in figure 1. The upper surface of the concrete foundation 11 sits at the level of the heads of the blocks 151 and the bearing plates 31 are halfway sunk into the concrete foundation 11. After sufficient initial hardening of the concrete foundation 11, the collar-sleeper screws 120 including the temporary auxiliary bushes 130 are unscrewed so that the rails 20 can locally be lifted in order to remove the adjustment wedges 153. Subsequently the wedges 90 and the tensioning clamps 110 are placed. Finally the collar-sleeper screws 120 without the auxiliary bushes 130 are mechanically screwed into the plugs 40 until the tensioning clamps 110 are at the desired pre-bias. For that purpose a set screwing moment is used. If the railbed 1 is located in a street, synthetic protective covers that are not shown are furthermore secured over the tensioning clamps 110 and arranged over the concrete foundation 11 the separation layer 14, the concrete upper layer 12 and the asphalt layer 13. The concrete then remains free from the rail 20 by sticking a layer of foam band 15 to it.

[0050] Due to the pressure of time, the concrete foundation 11 only just has sufficient initial strength in order to remain in the final bond when tightening the collar-sleeper screws 120. That is why the plugs 40 have been inserted into the underlying plate 31 rotation-fixedly in order to prevent that they rotate along in the hardening

concrete. It is even possible for trams to ride over the rails 20 even before the initial strength has been achieved, as the weight of the trams will still be borne by the adjustment wedges 153. The rails possibly being pushed in locally, which leads to a small stab of the plugs 40 in the concrete, only results in the broadening 47 at the lower side of the plugs 40 being inserted deeper over the stab and returning again without causing damage to the concrete along the straight bushes 41. As a result sufficient concrete remains present above the broadening 47 in order to take the tensile force of the collar-sleeper screws 120 in the end.

[0051] Figure 6 shows the mounting assembly 230 according to the second embodiment in the preparatory stage of constructing the railbed 1. The mounting member 60 with the cork rubber 80 thereon is placed under the foot 21 and two auxiliary pieces 330 with the fitting members 332 have been laid in the lowerings 62. The collar-sleeper screws 120 have been inserted into the plugs 240 through the U-shaped recesses 336 and tightened by hand until the heads 121 firmly abut the straight support surface 337. The whole thus is suspended from the rail 20 free of play. After the poured concrete foundation 11 has acquired sufficient initial hardening the collar-sleeper screws 120 are partially unscrewed so that the auxiliary pieces can be removed from the rail 20. After placing the tensioning clamps 110 the collar-sleeper screws 120 are finally mechanically screwed into the plugs 240 until the tensioning clamps 110 are at the desired pre-bias.

[0052] The lifespan of a straight rail at a distance from a stop is approximately 30 years. Rails in bends and at stops wear much faster than that and have a lifespan of for instance only 6 years, as a result of which they need to be replaced more often. When replacing the rails 20 in a street a hydraulic wrecking hammer will break away the concrete upper layer 12 and the asphalt layer 13 as a result of which the heads 121 of the collar-sleeper screws 120 below the synthetic protective covers become accessible again. After unscrewing the collar-sleeper screws 120 the rails 20 can be removed and be replaced by new rails 20.

[0053] Depending on the violence required for breaking the concrete upper layer 12 and the asphalt layer 13 away, parts of the mounting assembly 30, 230 can be replaced during reconstruction. In particular the underlying plate 31, that is partially sunk into the concrete foundation 11, can be replaced by one having a smaller perimeter fitting well within the remaining lowering in the concrete foundation 11. The lowering can then be cleaned beforehand using for instance a leaf blower or high-pressure sprayer. In all cases the plugs 40 are left behind in order to be reused. By means of the underlying plate 31 they have been kept out of the demolition violence. As a result new mounting holes for repair plugs do not need to be drilled into the concrete foundation 11 or the entire concrete foundation 11 does not need to be broken away.

[0054] The plugs 40, 240 and the auxiliary pieces 330 of the first embodiment and the second embodiment can be used independent from each other and thus are interchangeable. For instance the auxiliary piece 330 of the second embodiment can be used in combination with the plugs 40 of the first embodiment.

[0055] The above description is included to illustrate the operation of preferred embodiments of the invention and not to limit the scope of the invention. Starting from the above explanation many variations that fall within the spirit and scope of the present invention will be evident to an expert.

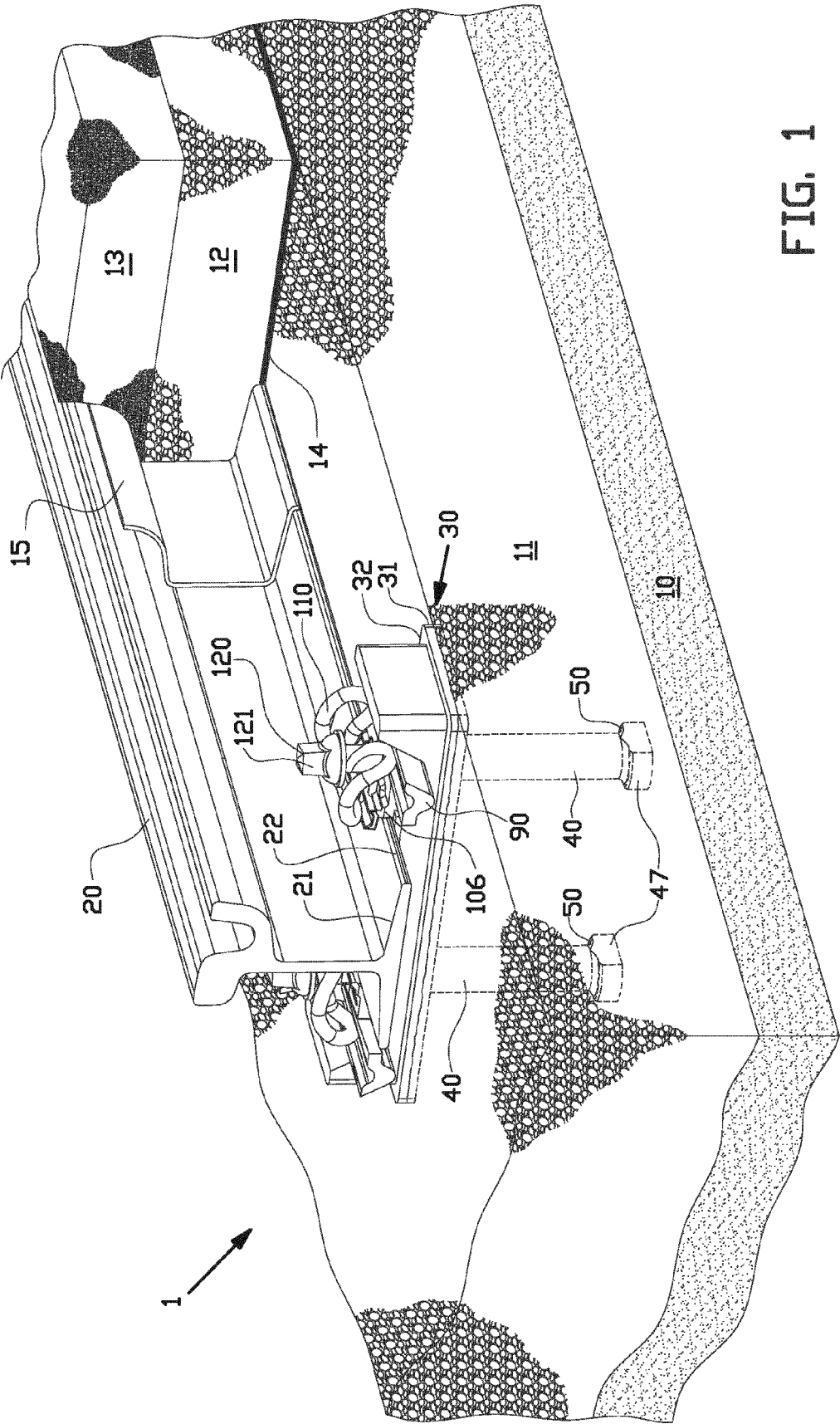
Claims

1. Mounting assembly for mounting a rail to a concrete foundation of a railbed, wherein the mounting assembly comprises a mounting part on which the rail sits, and at least two plugs to be accommodated in the concrete foundation, wherein the plugs are provided with an internal channel for accommodating a screw which is screwed into the plug from above through a mounting opening in the mounting part, wherein the plug has a first coupling member and the mounting part has a second coupling member for cooperation with the first coupling member, wherein the cooperating coupling members constitute a form lock that blocks rotation of the plug relative to the mounting part about the centre line of the internal channel.
2. Mounting assembly according to claim 1, wherein at the lower side facing the plug, the second coupling member comprises a slot below the mounting opening, wherein at the upper side facing the mounting part, the first coupling member comprises a first broadening extending into the slot, wherein transverse to the centre line the first broadening has a noncircular contour, wherein the slot preferably is elongated and has two parallel inner surfaces, wherein the first broadening has two parallel outer surfaces for abutting the inner surfaces.
3. Mounting assembly according to any one of the preceding claims, wherein at the lower side facing away from the mounting part the plug is provided with a second broadening, wherein transverse to the centre line the second broadening preferably has a noncircular contour.
4. Mounting assembly according to claim 3, wherein the second broadening has an anchoring surface facing the mounting part and being transverse to the centre line.
5. Mounting assembly according to claim 3 or 4, wherein the plug has a straight bush having a circle-cylindrical

smooth outer surface up to the second broadening.

6. Mounting assembly according to any one of the preceding claims, wherein the mounting part comprises a mounting member for supporting the rail and a separate underlying plate below the mounting member, wherein the underlying plate is provided with the second coupling members, wherein the underlying plate preferably comprises a straight and smooth undersurface for partial accommodation in the concrete foundation.
7. Mounting assembly according to any one of the preceding claims, wherein the mounting assembly comprises shape-retaining auxiliary pieces between the mounting part and the heads of the screws which keep the heads at a fixed distance from the mounting part, wherein at the lower side the screws extend into the plugs and keep the coupling members in coupling cooperation.
8. Mounting assembly according to claim 7, wherein the auxiliary pieces engage onto the foot of the rail, wherein the foot of the rail preferably comprises two opposite end edges and the mounting part and the auxiliary pieces jointly confine the end edges.
9. Mounting assembly according to claim 7 or 8, wherein the auxiliary pieces are provided with a passage for the screw, wherein the passage towards the rail is opened for sideward insertion of the auxiliary piece towards the rail.
10. Mounting assembly according to any one of the claims 7-9, wherein the mounting part comprises a straight undersurface for supporting the foot of the rail, wherein the auxiliary pieces are provided with a straight support surface for the head which surface extends parallel to the undersurface.
11. Mounting assembly according to any one of the claims 7-10, wherein the mounting part comprises a straight undersurface for supporting the foot of the rail, wherein beyond the foot of the rail the straight undersurface merges into concave lowerings, wherein the auxiliary pieces are provided with a convex lower side fitting in the concave lowerings.
12. Mounting assembly according to any one of the claims 7-11, wherein the auxiliary pieces comprise auxiliary bushes around the screws which bushes at the upper side abut the heads of the screws and which at the lower side abut the mounting part, wherein at the lower side the screws extend into the plugs and keep the coupling members in coupling cooperation.

13. Mounting assembly for mounting a rail to a concrete foundation of a railbed, wherein the mounting assembly comprises a mounting part on which the rail sits, and at least two plugs to be accommodated in the concrete foundation, wherein the plugs are provided with an internal channel for accommodating a screw which is screwed into the plug from above through a mounting opening in the mounting part, wherein at the lower side facing away from the mounting part the plug is provided with a broadening, wherein transverse to the centre line the broadening has a noncircular contour.
14. Method for building a railbed by means of a mounting assembly for mounting a rail to a concrete foundation of the railbed, wherein the mounting assembly comprises a mounting part on which the rail sits, and at least two plugs to be accommodated in the concrete foundation, wherein the plugs are provided with an internal channel for accommodating a screw which is screwed into the plug from above through a mounting opening in the mounting part, wherein the plug has a first coupling member and the mounting part has a second coupling member for cooperation with the first coupling member, wherein the cooperating coupling members constitute a form lock that blocks rotation of the plug relative to the mounting part about the centre line of the internal channel, wherein the method comprises the laying of a sand layer, positioning the rail over the sand layer, suspending the mounting part from the rail, wherein the plugs are downwardly oriented towards the sand layer, pouring the concrete foundation so that the plugs are accommodated therein, and tightening the screws into the plugs from above when the concrete foundation has acquired its initial hardening but not yet its final hardening.
15. Method according to claim 14, wherein the mounting assembly comprises shape-retaining auxiliary pieces between the mounting part and the heads of the screws which keep the heads at a fixed distance from the mounting part, wherein at the lower side the screws extend in the plugs and keep the coupling members in coupling cooperation, wherein the method comprises the pouring of the concrete foundation with the auxiliary pieces around the screws, and removing the auxiliary pieces prior to tightening the screws into the plugs from above.



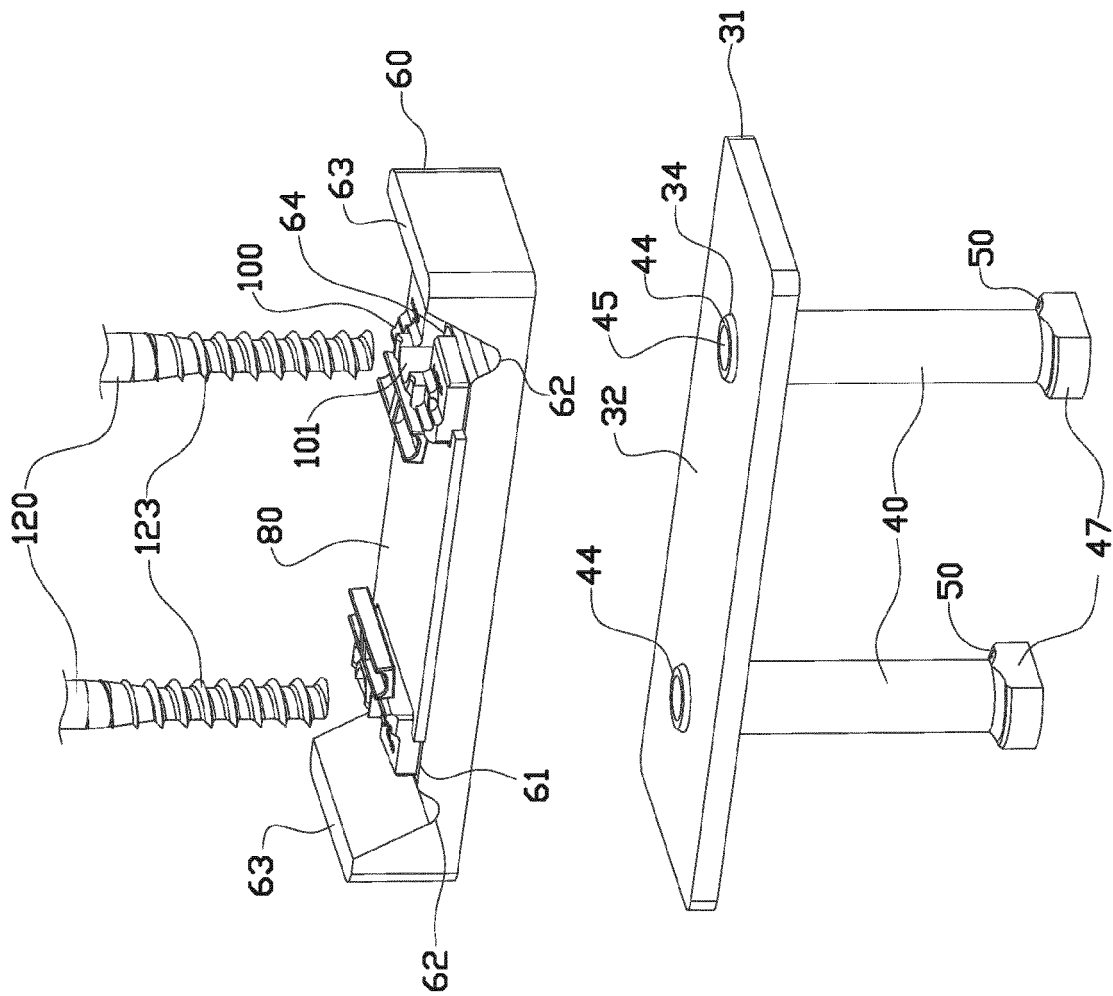


FIG. 2

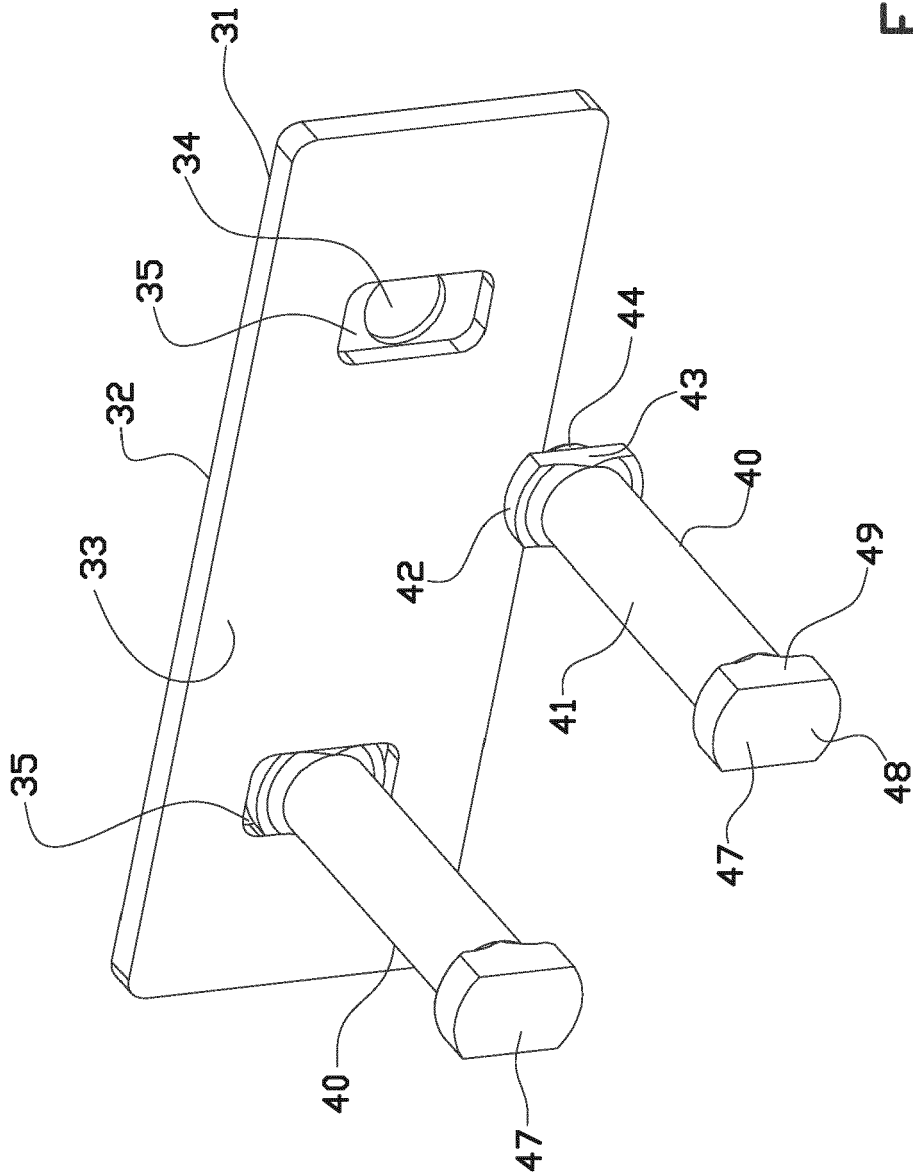


FIG. 3

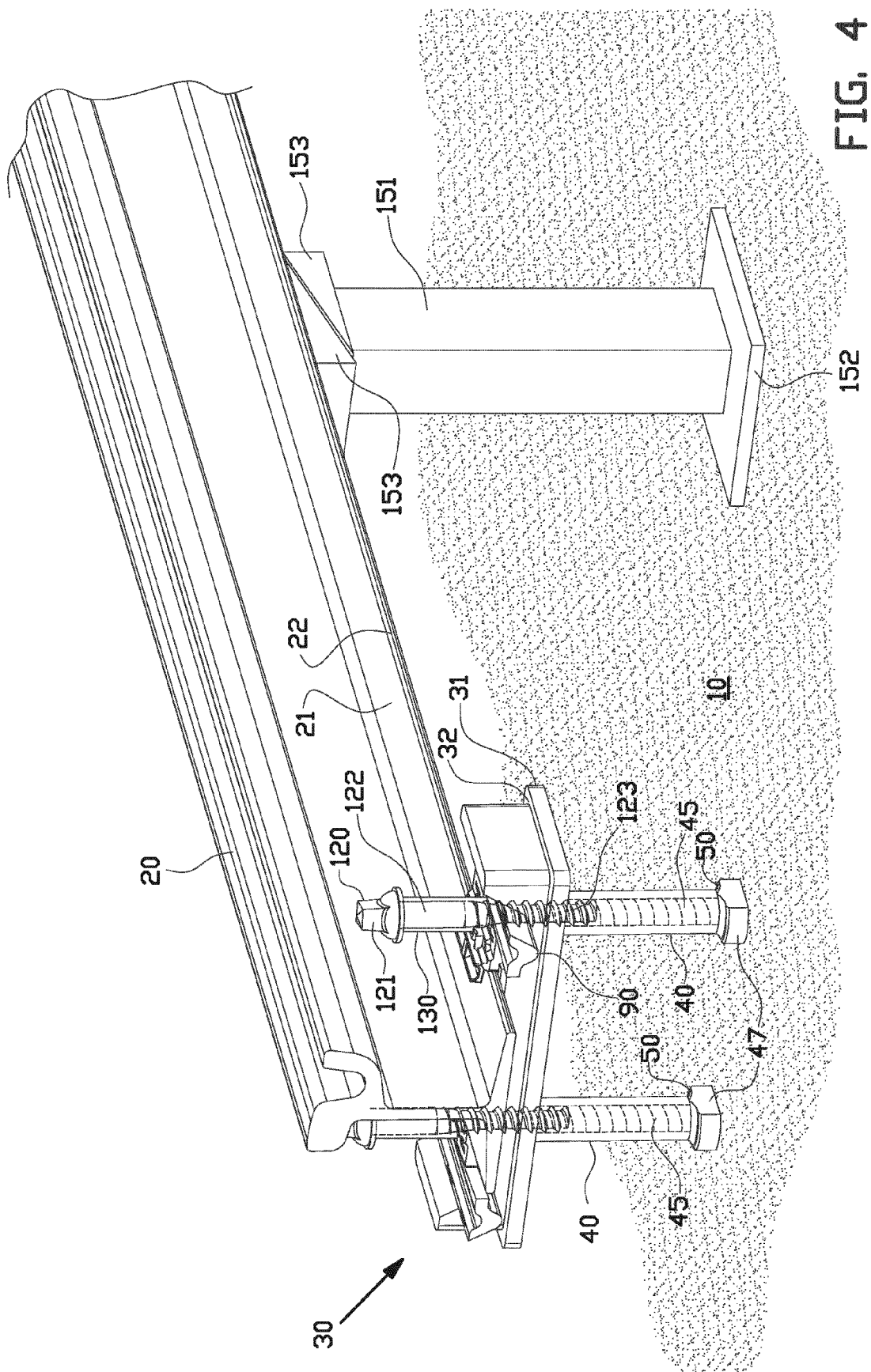


FIG. 4

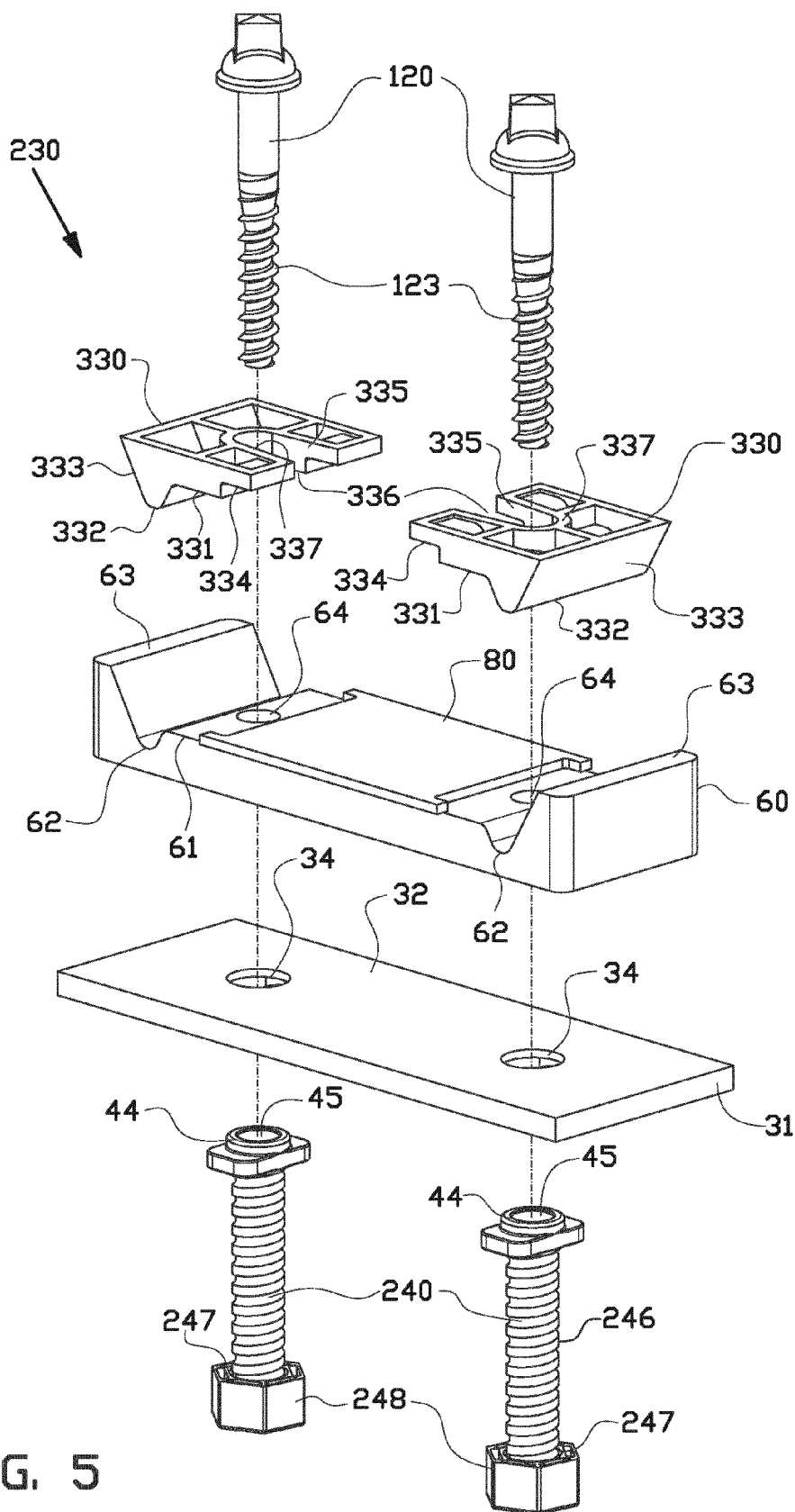


FIG. 5

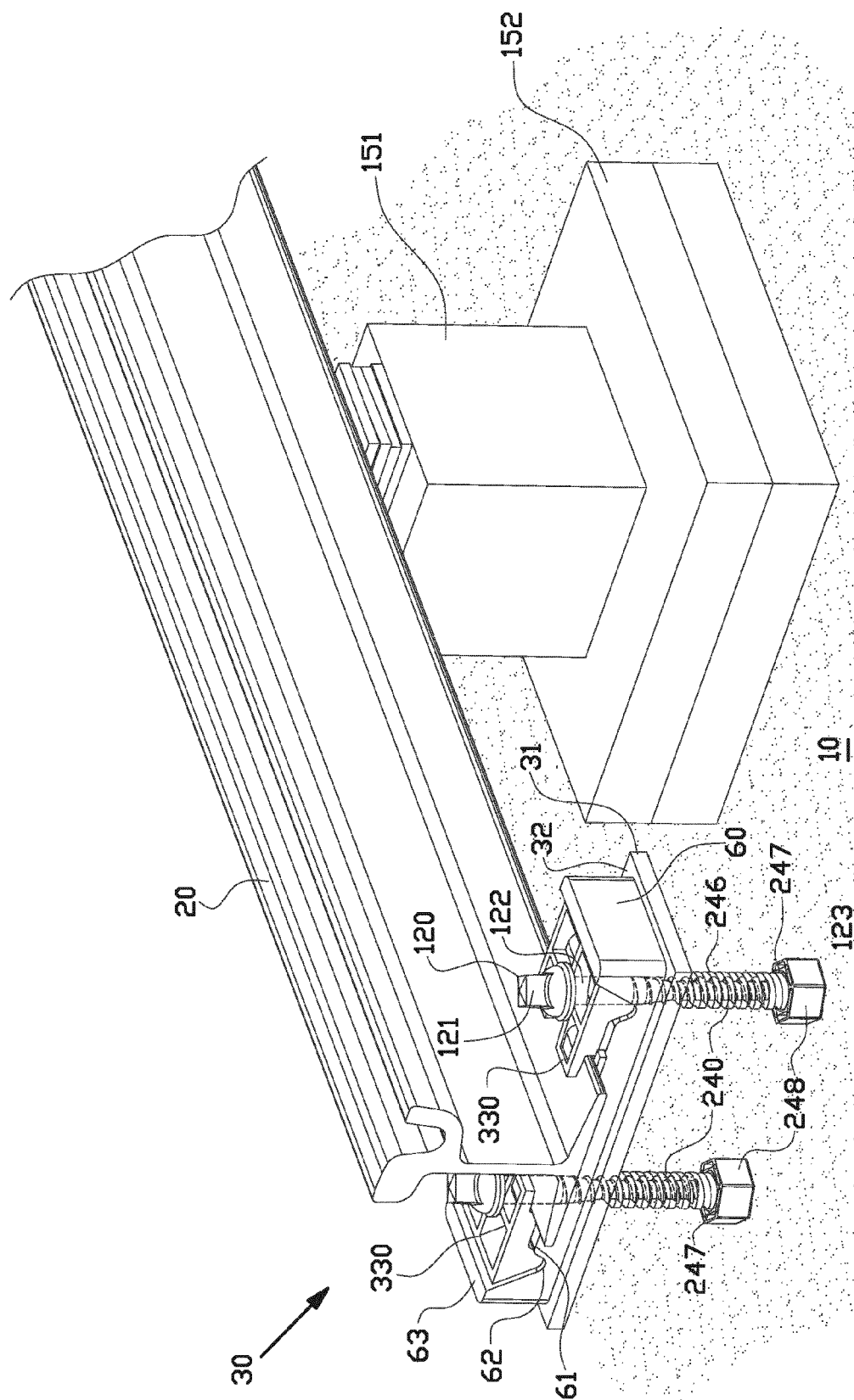


FIG. 9



EUROPEAN SEARCH REPORT

Application Number
EP 14 18 6010

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	EP 1 709 249 A1 (WIRTHWEIN AG [DE]) 11 October 2006 (2006-10-11)	1,6,14	INV. E01B9/18
A	* the whole document *	2-5, 7-13,15	E01B9/38
			TECHNICAL FIELDS SEARCHED (IPC)
			E01B
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 12 February 2015	Examiner Schwertfeger, C
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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