

Description

[0001] The invention lies within the field of railways which are designed for electric traction with an overhead wire.

[0002] Such railways are in general use and are provided at regular intervals of, for example, several tens of metres with gantries which extend across the superstructure made up of sleepers and rails in order to bear the overhead wire system.

[0003] The overhead wire gantries rest in this case with their columns on concrete foundation blocks which are fitted to both sides of the railway and reach into the earthwork body and the weight of which, in practice, amounts to a few tonnes.

[0004] It is important that the two foundation blocks of each overhead wire gantry are secured against yielding under the influence of the load applied to the superstructure by the rolling stock. To this end, it is known to connect the foundation blocks one to the other by one or more tension rods, which run transversely through the earthwork body, beneath the level of the ballast bed bearing the sleepers with the rails.

[0005] In practice, the tension rod connections between the foundation blocks hamper large-scale maintenance works which must occasionally be done, especially if too much soil (sand) from the earthwork body has penetrated into the ballast bed consisting of stone chippings or gravel, so that this ballast bed can no longer function optimally. For the said maintenance works, machines are used which penetrate so deeply into the earthwork beneath the ballast bed that they come easily into contact with the tension rods between the foundation blocks. The tension rods are consequently generally removed, so that the connection between the foundation blocks of a gantry is completely broken and the foundation blocks can start to yield.

[0006] The object of the invention is to offer a solution to the abovementioned problem.

[0007] To this end, according to the invention a method is provided for stabilizing a foundation block for a column of an overhead wire gantry in a substructure of a railway having an earthwork and a ballast bed, which method is characterized in that near the block at least one ground anchor is driven obliquely into the earthwork beneath the ballast bed, which ground anchor is fixed to the block.

[0008] The method according to the invention thus provides for an anchorage of the individual foundation blocks by means of ground anchors which remain outside the reach of the machinery to be used in future maintenance works. The method according to the invention thus offers a permanent solution.

[0009] For the realization of the method according to the invention, no significant excavations are necessary, so that the (supply) cables which are generally present next to the railway in the ground are left undisturbed.

[0010] An advantage of the method according to the

invention is, moreover, that it can be applied without any need to interrupt the traffic over the railway in question. In addition, the method according to the invention offers the possibility of returning a block which has yielded back to its place, independently from the opposite block, by developing a certain pressure when fixing the ground anchor to the block, whereby the block is drawn towards the railway.

[0011] It will be evident that the method allows the elimination of the known tension rods between mutually opposing foundation blocks. The method could also, however, be used to connect foundation blocks (still) joined together by tension rods in a more stable manner to the substructure of the railway.

[0012] In a possible embodiment, next to a foundation block, preferably on both sides, a ground anchor is driven obliquely downwards into the earthwork beneath the ballast bed, which ground anchor is fixed by a fastening structure to the block.

[0013] In another possible embodiment, a hole is made in the block from the side, through which hole a ground anchor is driven into the earthwork beneath the ballast bed, after which the anchor is fixed on the block. In a variant of this solution, a foundation block is used which is provided in advance with the hole for the ground anchor.

[0014] Preferably, a screw anchor is used as the ground anchor, having an anchor rod and, at its distal end, a screw blade body.

[0015] Preferably, an injection screw anchor is used, in which an injection material is injected into the earthwork for further improved anchorage.

[0016] The invention further relates to a gantry for an overhead wire system above a railway.

[0017] Further characteristics and advantages of the invention are explained in greater detail below with reference to the drawing, in which:

Fig. 1 shows a diagrammatic cross section through one half of a double-track railway designed for electric traction, which double track is provided with a gantry having a foundation block stabilized according to the invention, and

Fig. 2 shows a diagrammatic representation of a double track provided with a gantry and with foundation blocks stabilized according to the invention, and

Figs. 3a, 3b show in front view, respectively the cross section A-A in Figure 3a, the fastening structure and the ground anchor belonging to a foundation block of Figure 2.

[0018] In Figure 1 the reference numeral 1 refers to an earthwork, 2 to the ballast bed composed of stone chippings, gravel or the like, 3 to a sleeper supported in the ballast bed 2, whilst 4 denotes the rails mounted on the sleeper 3.

[0019] Reference numeral 5 indicates a foundation

block, the foot portion of which reaches into the body of the earthwork 1 and the uppermost portion of which juts just through the ballast bed 3. Resting on the block 5 is a column 6 of an overhead wire gantry (not represented in greater detail).

[0020] In the prior art, provision is made for the block 5 to be connected by means of a tension rod to the opposite foundation block (not represented in greater detail) for a column of the gantry on the other side of the railway. In Figure 1, this tension rod is indicated diagrammatically by dashed lines.

[0021] According to the embodiment of the invention shown in Figure 1, each block 5 is separately anchored in the substructure by means of the screw anchor denoted by 7.

[0022] The screw anchor 7 has an anchor rod 7a, which is provided with a screw blade body 7b. The anchor rod 7a is here extended via a connecting sleeve 8 by an extension rod 8a.

[0023] In order to be able to introduce the anchor 7, in this embodiment a hole 13 which is directed obliquely inwards and downwards is first made in the (concrete) block 5 by means of a known drilling tool. The screw anchor 7 can subsequently be fitted in the ground in a known manner using a known turning tool. As soon as the anchor 7 has been brought to the desired depth, the proximal end portion 9 of the anchor rod 7a or extension rod 8a, which proximal end portion juts out of the block 5 at the top, is fixed by means of a so-called anchor bracket 10 and a tightening nut 11. The proximal anchor rod or extension rod end is provided for this purpose with a screw thread.

[0024] If so desired, the anchor 7 can be realized as a screw injection anchor, in which case the anchor rod 7a or the extension rod(s) 8a are of hollow construction and the anchor rod 7a, for example at locations between the successive screw blade windings of the screw blade body 7b, is provided with injection openings. As a result of these injection openings, a stabilizing mortar can then be injected into the substructure. In that case, the anchor 7 ends up lying embedded in a ground body strengthened by the mortar, which ground body is denoted by 12 in Figure 1.

[0025] Finally, the space in the hole 13 around the anchor 7 can be filled with a suitable material.

[0026] In Figure 2, the reference numeral 20 refers to the substructure of the rails 21 of two mutually adjoining tracks. The substructure 20 comprises an earthwork and, on top of this, a ballast bed in which sleepers are placed with the rails 21 mounted thereon.

[0027] In Figure 2 an overhead wire gantry 23 can further be recognized, having vertical columns 24 erected on both sides of the tracks. The columns 24 each stand on a heavy concrete foundation block 25.

[0028] Beside each block 25, two ground anchors 27 are driven obliquely into the earthwork beneath the ballast bed, after which the two ground anchors 27 are fixed by a fastening structure to the block 25 in a manner to

be explained in greater detail. In this example, the anchors 27 lie at an angle of approximately 30° to the horizontal.

[0029] In this example, the ground anchors 27 are of such a length that the ground anchors 27 of the mutually opposing blocks 25 cross and even run on to beneath the track beside the other block 25.

[0030] In view of the fact that the ground anchors 27 run along the block 25, the block 25 does not need to be provided with holes as previously described with reference to Figure 1.

[0031] An example of the fastening structure used is shown in Figures 3a, 3b.

[0032] In Figure 3a a transverse girder 28 can be recognized, which is fixed by suitable bolts to the concrete block 25. The transverse girder 28 juts out of the block 25 at both ends and is provided at each end with a ground anchor support 29.

[0033] The support 29 comprises a supporting plate 30 provided with a hole for the ground anchor 27. The relevant end of the ground anchor 27 is provided with screw thread and with a nut 31 screwed thereon. Tightening of the nut 31 brings it up against the supporting plate 30 and the ground anchor 27 is able to be tensioned.

[0034] The described solution involving two ground anchors 27 per block 25 provides a very expedient stabilization of the block 25 relative to the substructure. It is also, of course, conceivable, in combination with a fastening structure to the block, to use only one ground anchor or just more than two ground anchors.

[0035] The ground anchors 27 are in this example screw injection anchors 27, an injection of grout having taken place over the length L-grout.

[0036] It will be evident that the inventive concept is also applicable to gantries in which the foundation block is unitary with the column, for example where the column is made of concrete and the block is cast on.

Claims

1. Method for stabilizing a foundation block (5; 25) for a column (6; 24) of an overhead wire gantry in a substructure of a railway, which substructure comprises an earthwork and a ballast bed, **characterized in that** near the block (5; 25) at least one ground anchor (7; 27) is driven obliquely into the earthwork beneath the ballast bed, which ground anchor is fixed to the block.
2. Method according to claim 1, in which beside the block a ground anchor (27) is driven into the earthwork beneath the ballast bed, which ground anchor is fixed by a fastening structure (28, 29, 30) to the block.
3. Method according to claim 1, in which a hole (13) is

made in the block (5) from the side, through which hole a ground anchor is driven into the earthwork beneath the ballast bed, after which the anchor is fixed to the block.

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4. Method according to one or more of the preceding claims, in which the anchor has a proximal end jutting out of the block and the anchor is fixed by that proximal end to the block.

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5. Method according to one or more of the preceding claims, in which the ground anchor (7; 27) is a screw anchor, having an anchor rod with, at its distal end, a screw blade body.

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6. Method according to one or more of the preceding claims, in which the anchor is an injection anchor (7; 27) and a stabilizing mortar is injected into the earthwork.

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7. Gantry for an overhead wire system above a railway having an earthwork and a ballast bed, which gantry has one or more columns which are each supported on a foundation block erected next to the railway, **characterized in that** beside the block at least one ground anchor is driven obliquely into the earthwork beneath the ballast bed, which ground anchor is fixed to the block.

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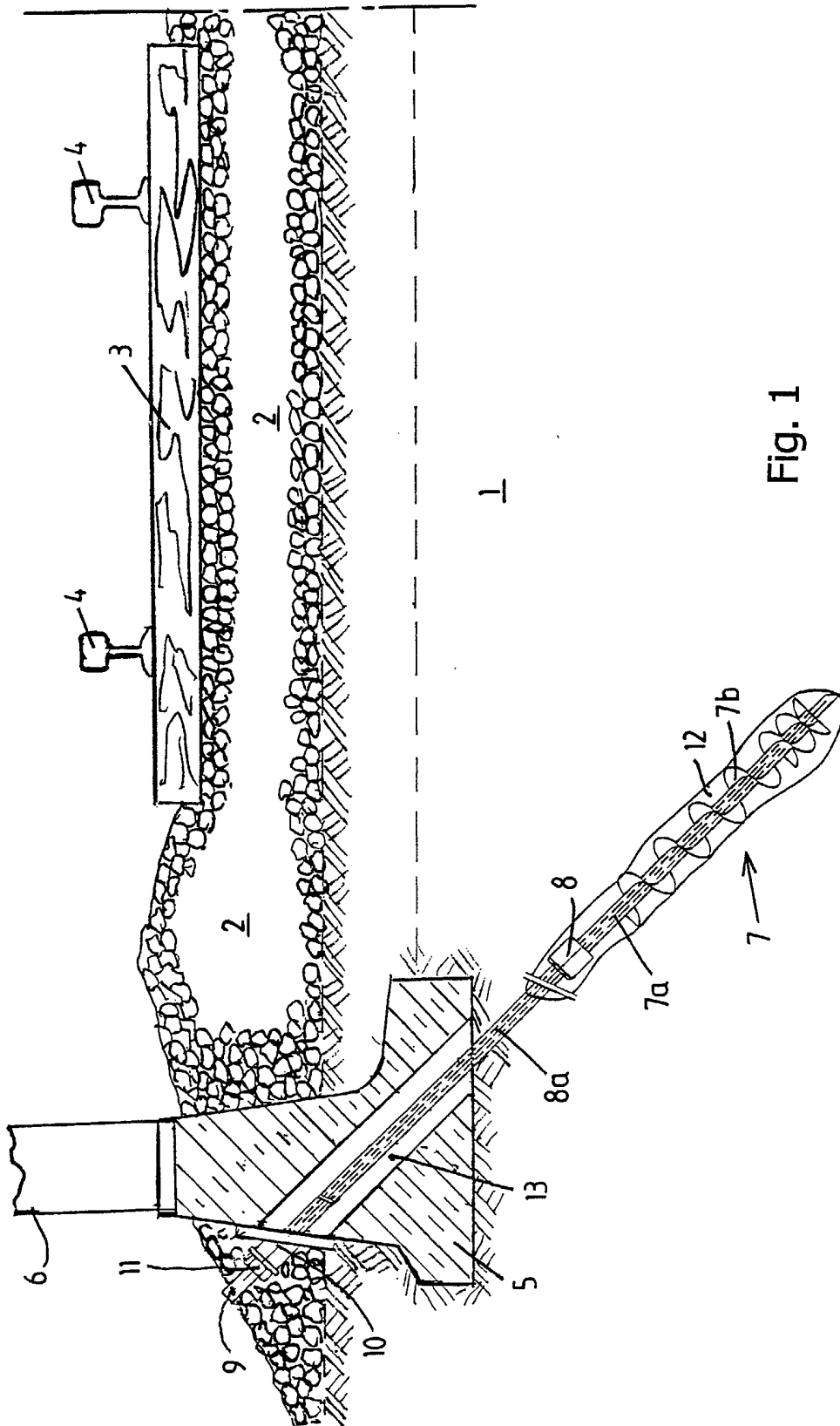
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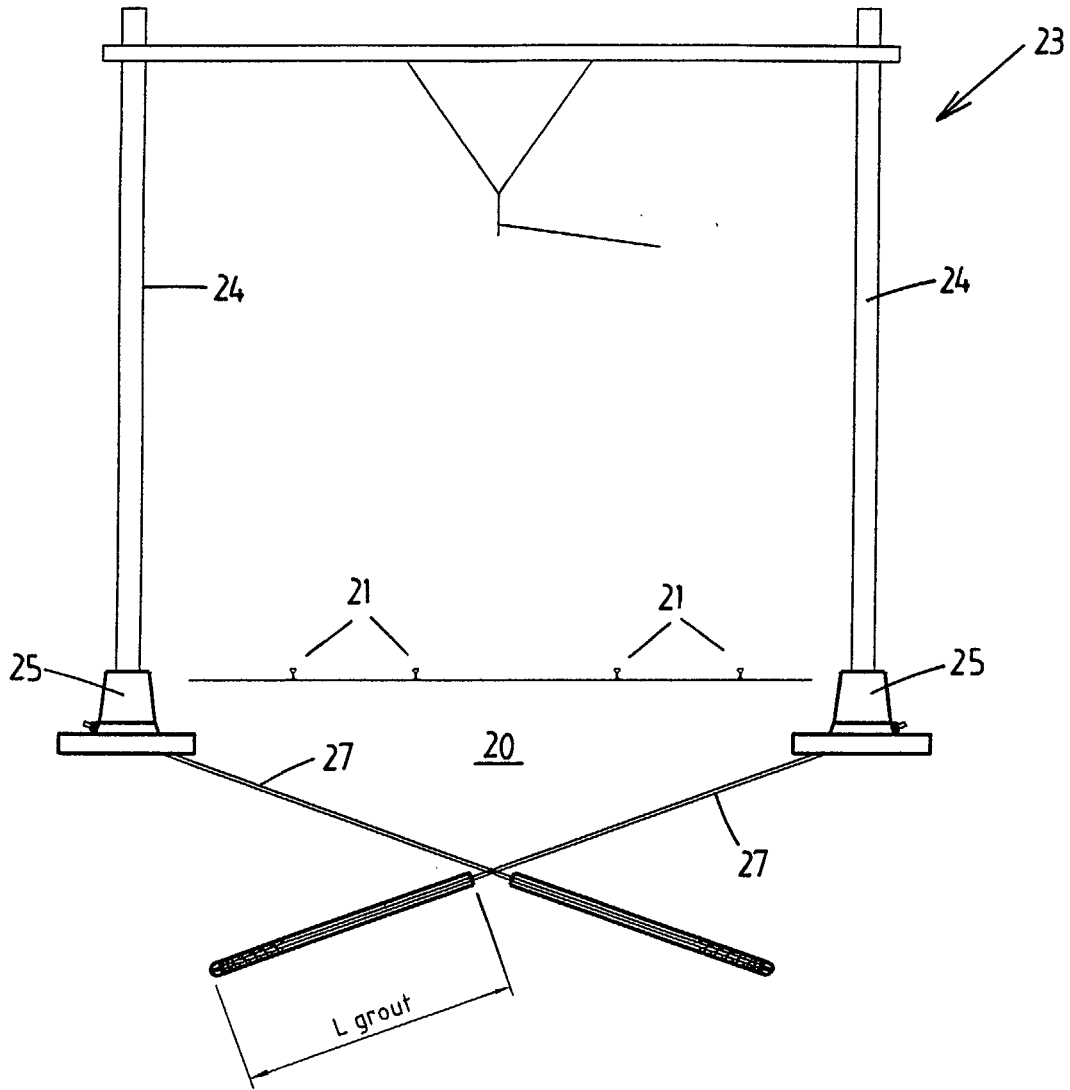


Fig. 2

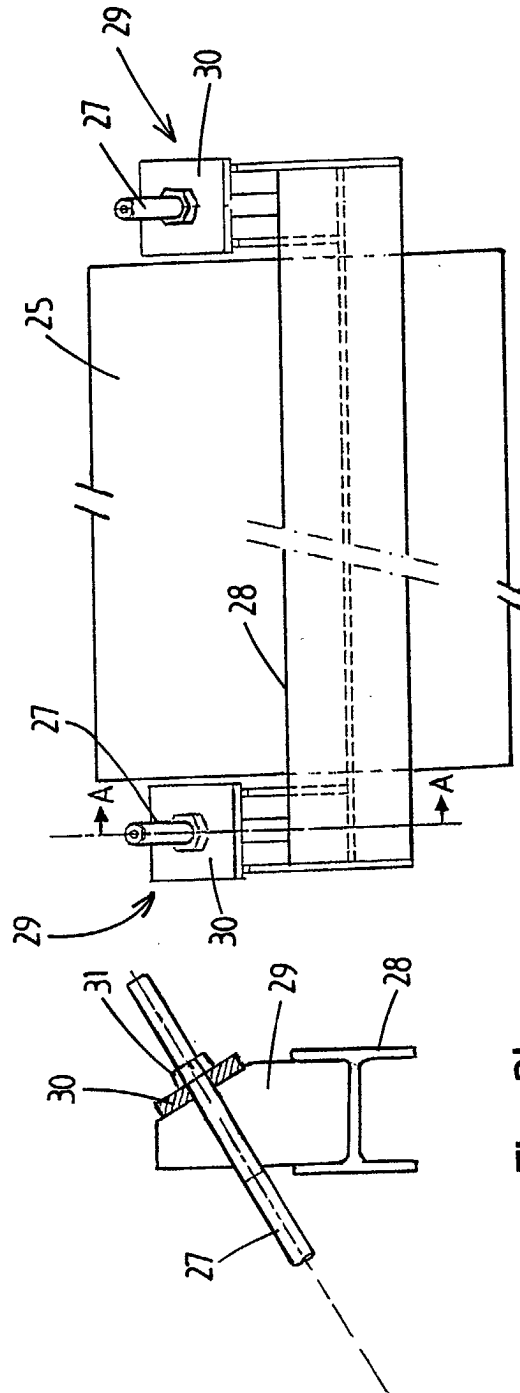


Fig. 3a

Fig. 3b