Jan. 31, 1967 J. A. BICK 3,301,198

DEVICE FOR LEVELLING TRACK

Filed Dec. 2, 1964

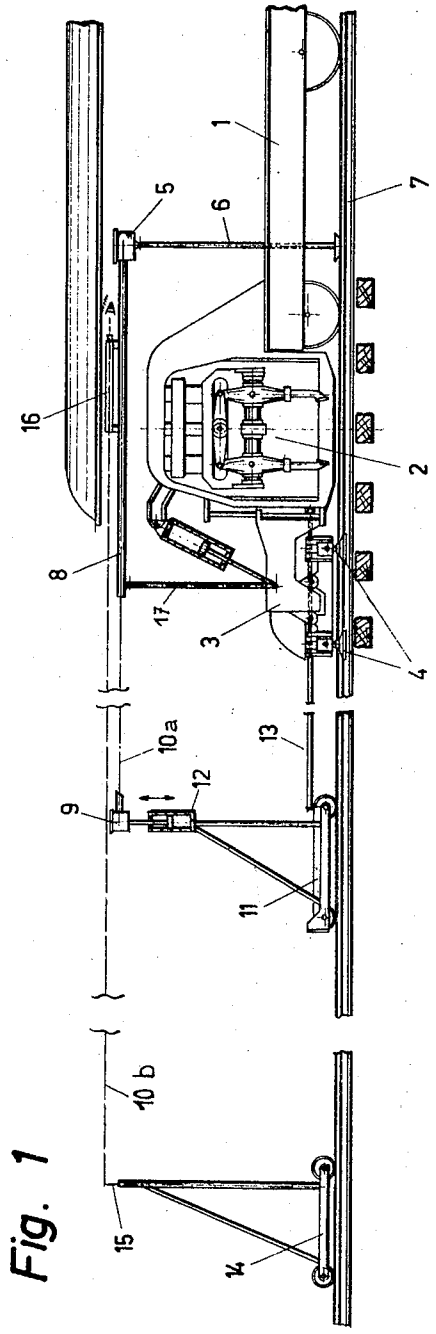

Fig. 1

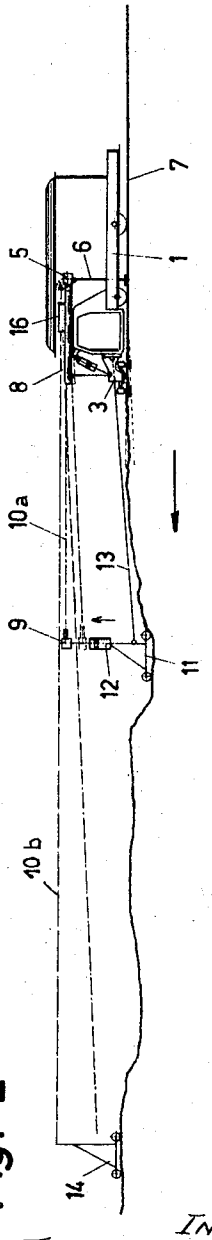

Fig. 2

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United States Patent Office 3,301,198 Patented Jan. 31, 1967

3,301,198

DEVICE FOR LEVELLING TRACK

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Filed Dec. 2, 1964, Ser. No. 415,333
Claims priority, application Switzerland, Dec. 9, 1963, 15,054/63
7 Claims. (Cl. 104—7)

The present invention relates to a method of and device for levelling track using a wheeled track lifting machine, e.g. of a levelling packer, an advance trolley located in front of the said machine in the direction of travel, and a reference line extending between the machine and the advance trolley represented e.g. by a pencil of rays, a wire or the like.

Such devices have stood the test of time and can be applied according to various methods either by continuously moving the advance trolley along with the track lifting machine or by leaving the said trolley in one position while the track lifting machine advances through sections finally to reach the trolley.

In the latter case, correction of the elevation of the end of the reference line located on the trolley may be performed without particular difficulty, or correction is superfluous if the advance trolley is placed on so-called elevated points of the track in stages, the elevation of the said points coinciding with the theoretical elevation. In contradistinction, in applying the former method it is difficult to ensure correct alignment of the moving reference line which is parallel to the theoretical position of the track if the advance trolley is continuously moved along with the track lifting machine; a special operator will either be required on the advance trolley who continuously corrects the elevation of his end of the reference line in accordance with data previously established, or a certain inaccuracy must be allowed which is caused by inaccurate elevations of the advance trolley, an approximate correction of the track level being admitted.

The errors in the reference line caused by a locally inaccurate level of the advance trolley moved concomitantly, however, may often be quite considerable and necessitate a second passage of the track levelling machine, which naturally renders the method substantially more costly.

The present invention is designed to eliminate the disadvantages of the prior method of levelling track using a wheeled track lifting machine and an advance trolley arranged in front of the same in the direction of operation, a reference line extending between the said machine and the said trolley. The method according to this invention is characterized by the fact that a second reference line is provided besides the first reference line between the machine and a station located in front of the advance trolley, the deviation of the first reference line from the second reference line being determined and the elevation of the end of the first reference line located on the advance truck being checked.

The device according to this invention for the performance of this method comprises a wheeled track lifting machine, preferably a levelling packer, an advance trolley arranged in front of the said machine in the direction of operation and connected to the same, means to provide a reference line between the machine and the advance trolley and members designed to determine the deviation of the track direction from the reference line. The device according to the present invention is characterized by a further station arranged in front of the advance trolley in the direction of operation and provided with means to give a second reference line between the machine and the

said station, by measuring devices designed to determine the deviation of the first reference line from the second reference line and by adjusting members for the means forming the end of the first reference line located on the advance trolley.

The invention will now be disclosed in greater detail with reference to an embodiment represented in FIGS. 1 and 2 of the drawing in which:

FIG. 1 is an embodiment of a device operating in accordance with the method according to the present invention, and

FIG. 2 is a diagrammatic view of the operation of the method.

Referring now more particularly to FIG. 1, the device operating according to the present method comprises a levelling packer **1** with the packing tool units **2** and the swivelled and hydraulically raisable track lifter **3** comprising the track clamp **4**. Such levelling packers being known in the art, a more detailed description may be dispensed with.

Arranged on the levelling packer **1** is a receiver **5** sensitive, by way of example, to pencils of light, infrared rays, ultrashort high-frequency waves or other types of waves and, respectively corpuscular rays. This receiver **5** is located at a prescribed distance from the top edge of the rail to be lifted, the said position being defined by the frame **6**. The receiver **5** according to FIG. 1 is designed as a receiver for light rays and provided with a tube **8** serving as a sighting device into the light rays **10***a* transmitted by the transmitter **9** will fall if the tube **8** is arranged coaxially with the said beam **10***a* which here represents the first reference line. As the tube **8** rests on the rail **7** to be lifted via a frame **17**, the position of the tube **8** is dependent on the inclination of the rail **7** relatively to the reference line **10***a*. In the event that the rail **7** is inclined relatively to the reference line **10***a* between the points defined by the frames **6** and **17**, the said inclination may be reduced by raising the front portion of the rail in the direction of travel by means of the clamp **4** and the rail lifter **3** until the tube **8** is placed coaxially with the reference line **10***a*.

The transmitter **9**, which is an optical light source in the present case, is located on the advance trolley **11** and its elevation can be corrected by means of a device **12** which may be hydraulically operated. The advance trolley **11** may be rigidly coupled to the levelling packer **1** via a linkage **13** so as to be moved forward along with the machine in the direction of operation, i.e. from right to left in FIG. 1.

Located in front of the advance trolley **11** in the direction of operation is the station **14** which is here provided with a level indicating mark **15**. This mark **15** corresponds, in respect of its elevation, to that of a sighting device **16** provided on the machine, which may, by way of example, be designed as a telescopic sight equipped with cross hairs and mounted on the tube **8** in such a manner that the sighting axis and the tube are parallel.

With the present method, the operator on the levelling packer **1** can check, as soon as the machine reaches a spot of the rail to be corrected and prior to effecting the correcting operation, whether or not the advance trolley **11** is located at a substantially correct level. In FIG. 2, which greatly exaggerates the path of the rail **7**, the advance trolley **11** is located, by way of example, in a depression of the rail. In this case, if the rail lifting machine **3** were to raise the rail until the tube **8** is placed coaxially with the reference line **10***a*, only an unsatisfactory degree of rail levelling would be obtained. On the other hand, the present method enables the operator on the packer **1** to determine, by means of the aiming or sighting device **16**, whether the height indicating mark

15 registers with the cross hairs in the said aiming device 16, which will be the case only if the first reference line 10*a* is parallel with the second reference line 10*b* since the axes of the tube 8 and of the sighting device 16 are arranged in parallel. If the height indicating mark 15 of the station 14 is outside the cross hairs of the sighting device 16, the remote-controlled adjusting device 12 may be actuated in order to adjust the position of the transmitter 9 until the height indicating mark 15 appears in the cross hairs of the sighting device 16 after the tube 8 has been adjusted to the new position of the first reference line 10*a*. In that case, the first and second reference lines 10*a* and 10*b* respectively will be in parallel relationship and the correction of the rail 7 may be effected by aligning the rail 7 parallel with the second reference line 10*b*.

The present method thus enables the elevation of the advance trolley 11 on which the end of the reference line 10*a* serving for the correction of the track is located to be checked at all times and deviations in its elevation to be corrected. The front station 14 being located at a considerably greater distance from the track lifting machine 1 than the advance trolley 11, any noticeable deviation of the elevation of the said advance trolley 11 from the predetermined elevation can be immediately recognized and corrected before using the reference line 10*a* ending on the said advance trolley as a means for correcting the track. Checking of the correct elevation of the advance trolley 11 is thus performed, in the method according to this invention, by determining from the machine the angular deviations of the track direction from the first reference line 10*a* on the one hand and, at the same time, its angular deviation from the second reference line 10*b* on the other, This is rendered possible because the two reference lines 10*a* and 10*b* possess a common end point on the machine 1 and because the sighting axis of the measuring device (receiver 5 and tube 8) serving to determine the inclination of the track direction relative to the first reference line 10*a* is parallel with the sighting axis of the sighting device 16 for the second reference line 10*b*. It thus becomes possible at the same time to determine, after raising the track and reducing its inclination relative to the first reference line 10*a* to a predetermined value, the residual inclination or angular deviation of the first reference line 10*a* relative to the second reference line 10*b*. By influencing the elevation of the end of the first reference line 10*a* located on the advance trolley 11, by way of example by raising or lowering the optical transmitter 9 by means of the remote-controlled device 12, the inclination of the first reference line 10*a* relative to the second reference line 10*b* can be affected and reduced to a predetermined value, which enables the inclination of the track relative to the first reference line 10*a* to be reduced to a predetermined residual deviation by means of the rail lifting machine 3.

The device above disclosed with reference to FIGS. 1 and 2 is naturally only one embodiment. If desired, the advance trolley may naturally be designed without a rigid connection with the levelling machine and be placed on the track at a certain distance in the direction of operation in front of the machine. The two reference lines 10*a* and 10*b* then enable an error, if any, in the elevation of the optical transmitter 9 located on the advance trolley 11 to be readily detected and corrected. Preferably, the two

reference lines 10*a* and 10*b* are defined by optical means, but the present method is not limited therto since other technical means may be employed for the purpose, provided that it is ensured that the reference lines extending from the remote station 14 and from the advance trolley 11 respectively possess a common end point on the levelling machine 1. Again, the devices designed to detect the inclination of the track relative to the reference line 10*a* disclosed with reference to FIG. 1 may be replaced by other suitable technical means.

What is claimed is:

1. A device for levelling tracks comprising a wheeled track lifting machine, preferably a levelling packer, an advance trolley (11) located in front of the said machine in the direction of operation and connected therewith, means (5, 9) designed to provide a reference line (10*a*) between the machine and the advance trolley and members (8) for the determination of the deviation of the track direction from the reference line (10), characterized by a further station (14) located in front of the advance trolley in the direction of operation provided with means (15) designed to create a second reference line (10*b*) between the said machine and the said station.

2. A device according to claim 1 characterized by the fact that measuring members (16) are provided which are designed to determine the deviation between the first (10*a*) and the second (10*b*) reference line.

3. A device according to claim 1 characterized by the fact that an optical sighting device (16) is provided on the track lifting machine (1) and a level indicating mark (15) on the remote station (11).

4. A device according to claim 1 characterized by the fact that preferably remote-controlled adjusting members (12) are provided for the means (9) defining the end of the first reference line (10*a*) located on the advance trolley (11).

5. A device according to claim 1 characterized by sighting means (5, 8, 17) designed to determine the inclination of the track to be levelled relative to the first reference line (10*a*), the sighting axis of the said means being parallel with the sighting axis of a sighting means (16) for the second reference line (10*b*).

6. A device according to claim 1 characterized by the fact that a height indicating mark (15) is provided on the remote station (14), the said mark being capable of being sighted by a telescopic sighting device (16) located on the levelling machine (1), that a tube (8) with an optical receiver (5) at one end is mounted in axially parallel relationship on the said sighting means (16), the said tube (8) always being parallel with the track (7) to be levelled, and that an optical transmitter (9) is mounted on remote-controlled adjusting means (12) of the advance trolley (11), the said transmitter being designed to energize the receiver (5) as soon as visual connection is established through the tube (8) between the transmitter (9) and the receiver (5).

7. A device according to claim 1 in which the means designed to provide a reference line and the means designed to create a second reference line comprise wires.

No references cited.

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