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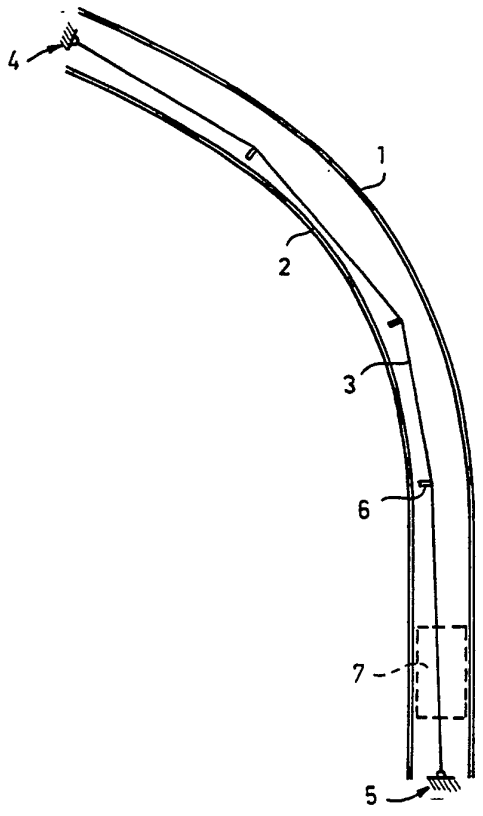
(54) Title: A DEVICE FOR DISPLACING RAILWAY CARRIAGES

(57) Abstract

A device for displacing railway carriages, in which device a chain (3) fastened at both ends to the track and positioned between the rails (1, 2) form a displacing element (3). Traction means consist of a tractor (7) moving along the track. The tractor displaces itself by means of a power device and a chain sprocket connected thereto, simultaneously displacing railway carriages connected thereto along the rails (1, 2) in the desired direction. The tractor (7), driven by a hydraulic pump rotated by a combustion motor and a hydraulic motor connected to the pump, is controlled by remote control means.



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# A device for displacing railway carriages

The invention relates to a device for displacing railway carriages along a track, comprising a long, flexible transmission element extending substantially longitudinally of the track; power means; and control means; the displacing device being arranged to act between a fastening point fixed relative to the track and the railway carriages, and the power means being arranged to displace the railway carriages towards said fixed fastening point by pulling from the transmission element in its longitudinal direction.

The displacement of railway carriages on railway yards and along tracks in industrial areas, particularly along blind tracks, can be carried out by means of conventional engines or shunting engines. In practice, however, this is unreasonably expensive, and therefore attempts have been made to develop other alternatives for the displacement of carriages. Such alternatives include a carriage displacement equipment which comprises power means operated by a hydraulic motor and secured to a platform cast on the ground beside the track; an idler wheel positioned similarly at a desired displacement distance from the power means; and, if the track is curved at this particular point, a required number of vertical turning rolls. The power means comprise two wire drums operated by the hydraulic motor. The carriages are drawn by a draw wire provided with a fixing hook. The draw wire extends from one drum around the turning rolls on the side of the track via the idler wheel and further along the same path back on to the other wire drum. A drawback of this solution is that the wire required for the displacement of the carriages is rather thick and stiff. It is also liable to damage as it has to

bend around rolls and drums and particularly when it is exposed to a force tending to bend it abruptly into an angle. The breaking of a single wire strand causes the wire to be broken within a short period of time so that it cannot be used nor repaired. In addition, the wire is chafed against the ground, which wears it down and causes damages. A further drawback of the invention is that the mounting of the equipment requires massive platforms cast of concrete, which causes high costs. Still another drawback is that the torque created for the wire drums by the hydraulic motors is constant, so that the traction force exerted on the wires decreases correspondingly when the wire drums are filled up, with the result that the ability of the equipment to displace carriages is degraded. The solution can be applied to two adjacent tracks, provided that the tracks are straight, whereas it is impossible to displace the equipment from one track to another without constructing requisite platforms, which is unreasonably expensive to carry out. Furthermore, the wire used in the transmission is liable to damage under various mechanical strains, and it cannot be repaired but the whole wire has to be replaced with a new one. Also, the equipment is dangerous in use as it moves along the side of the track and may do damage to persons working around the track.

The object of the present invention is to provide an equipment which is easy and simple to mount and the operation of which does not require laborious foundation engineering and construction of concrete footings. In case of damage, the transmission means can be repaired. Further, the traction force remains substantially constant throughout the pulling process. Finally, the equipment of the invention can be displaced on to another track in a relatively simple way

without any greater foundation laying. This is achieved according to the invention in a such way that the transmission element is a chain at least one end of which is arranged to be fastened fixedly with respect to the track, and that the power means is a tractor movable along the track and connectable to pull itself and the carriages by means of the chain.

The basic idea of the invention is that a chain mounted fixedly at the ends with respect to the track is used in place of a movable wire, whereby the transmission means pull themselves and the railway carriages along the track from the chain. First, the fixed chain is not chafed against the ground so that damage is avoided, respectively. Second, workers moving around the track are not exposed to danger as the chain is positioned between the tracks nor do the transmission means put them in danger. Third, the position of the chain between the tracks makes it possible to transmit the traction power from the power means to the carriages in a simple way using conventional carriage pulling means.

The invention will be described in greater detail in the attached drawings, wherein

Figure 1 is a schematical view of an equipment according to the invention when mounted on a railway track;

Figure 2 is a schematical side view of the power means and the tractor in the equipment according to the invention;

Figure 3 is a schematical view of one embodiment for passing the chain through the drive mechanism of the equipment according to the invention; and

Figure 4 shows one embodiment for supporting the chain and for keeping it substantially in the

middle of the track within curved sections of the track.

Figure 1 shows a curved track comprising rails 1 and 2. A chain 3 is positioned between the rails so as to roughly follow the shape of the rails. The chain 3 is secured at the ends thereof to fastening points 4 and 5 on platforms supported on the track or possibly constructed separately. In order to make the chain substantially follow the shape of the track, suitably spaced sideward supports 6 are provided along the track so as to prevent the displacement of the chain 3 in the transverse direction of the track beyond a predetermined distance from the centre of the track at each particular support. A tractor 7 for the equipment, designated by broken lines, rests on the rails 1 and 2. The tractor is arranged to displace itself by pulling from the chain 3 in either direction by transmission means 8 to be described below. The tractor 7 further comprises connection means 9 for connection to the railway carriages for displacing them.

When a railway carriage standing on the track is to be displaced, the tractor 7 is connected thereto, whereafter the tractor is pulled from the chain by means of its power means in either direction until the carriage is at the desired location. Then the tractor 7 is detached from the carriage and displaced away from it.

Figure 2 shows schematically in a side view the tractor 7, standing on wheels 9 resting on the rails 1 and 2 similarly as a railway carriage. The power means 8 comprising a motor 12 and a drive mechanism is provided between the wheels 7 of the tractor 7 relatively close to the surface of the ground. The drive mechanism comprises a chain sprocket 13 connected to a hydraulic motor; idler wheels 14 extending in the

direction of the chain being provided on both sides of the chain sprocket. The chain 3 passes from under the idler wheel 14 between the idler wheel and the chain sprocket 13, whereafter it goes around the chain sprocket above it and further out from between the other idler wheel 14 and the chain sprocket 13 around the idler wheel and so that it again extends in the longitudinal direction of the track. The tractor 7 further comprises a combustion motor 15, a fuel tank 16 for the combustion motor, a hydraulic pump driven by the combustion motor 15, a tank for hydraulic oil, means 17 for steering the tractor, a radio antenna for controlling the steering means by a remote control means, and a warning light. When displacing railway carriages, the combustion motor of the tractor can be started by means of radio control means known per se (not shown), whereafter the tractor is connected by means of the steering means so as to move in the desired direction. When the tractor 7 starts to move, the hydraulic motor rotates the chain sprocket 13, simultaneously pulling the chain 3 in either direction. As the chain 3 is fixed at its ends, it cannot move, whereby the tractor pulls itself along the rails 1 and 2 from the chain 3. Since the chain 3 is highly flexible due to the movement between its rings, it can be easily controlled and passed through the drive mechanism. During the displacement of the tractor along the track, the drive mechanism controls the chain so that it passes along the central line between the rails. When the supports 6 of the chain within the curved section of the track are mounted slightly aside from the central line of the track, the drive mechanism does not touch the supports, but the chain is displaced away from the support when the tractor passes the support. This, of course, requires

that the ends of the chain are not fixed so that the chain is tightly stretched but the chain is slack to some extent.

Figure 3 is a schematical top view of the embodiment of Figure 2 for passing the chain through the drive mechanism of the equipment according to the invention. It shows transmission means 8 comprising a chain sprocket 13 rotated by a motor 12 and idler wheels 14 and guide rolls 19 and 20 for the chain.

Figure 4 shows one embodiment for supporting the chain and keeping it substantially in the middle of the track within a curved track section. The figure shows from the side a holder 6 comprising a support portion 21 attached to an underlying flange 22. A projection 23 is provided at the upper edge of the support portion for preventing the chain 3 from sliding over the edge of the support portion when stretched by the tractor. As shown in Figure 1, the holders 6 are mounted slightly towards the centre of curvature and and aside from the central line of the track, so that it allows the chain 3 to rise up to the level of the drive mechanism when the tractor 7 passes it. Correspondingly, since the chain portion after the tractor 7 is slack, it is again lowered on to the ground past the support.

The invention has been described above by way of example and it is in no way restricted to this example. The tractor can be constructed in various ways and it can be used by applying remote control in various ways although it is likewise possible that the operator rides on the tractor. The traction machinery or the drive mechanism alone can be detachable and of module construction so that when the tractor is provided with transmission means for transmitting the traction force of the motor to the wheels of the trac-

tor, the module-construction drive mechanism can be simply detached, e.g., by snap action means, and the tractor can be driven away from the rails or displaced on to another rail which similarly comprises a chain and a similar module-construction drive mechanism to be attached to the tractor. The chain can be passed through the drive mechanism in various ways, depending on the required traction force and the locking requirement depending thereon. The tractor can be arranged to operate so that if no control signal is received from the remote control means within a prescribed time, the tractor stops and interrupts the pulling of the railway carriages or its movement by itself until a new control signal is received. When using the equipment on a blind track, a cabin can be mounted at the end of the blind track for the tractor. The cabin is provided with terminals for charging the accumulator required for driving the machinery of the tractor and for keeping the hydraulic oil warm at subzero temperatures, whereby the tractor can be driven into the cabin after completed work so that the terminals are automatically connected to the tractor at a predetermined point at its end. The chain supports within the curved track sections may be of various kinds as long as they allow the drive gear to pass them along the chain. The drive mechanism can be mounted rotatably about either vertical or horizontal axes, depending on available space and the support of the chain. The ends of the chain can be fastened to the track at a fastening point either on the rails or the sleepers, or if really heavy sequences of carriages are to be pulled, on anchoring platforms formed on the ground. The tractor can be fastened to the carriage by means of fasteners engageable with the conventional pulling means of the carriages or other

suitable connection means, and the carriages can be displaced by the tractor both by pushing and by pulling.

Claims:

1. A device for displacing railway carriages along a track, comprising a long, flexible transmission element (3) extending substantially longitudinally of the track; power means (7); and control means (17), the displacing device being arranged to act between a fastening point fixed relative to the track and the railway carriages, and the power means (7) being arranged to displace the railway carriages towards said fixed fastening point by pulling from the transmission element (3) in its longitudinal direction, c h a r a c t e r i z e d in that the transmission element (3) is a chain (3) at least one end of which is arranged to be fastened fixedly with respect to the track, and that the power means is a tractor (7) movable along the track and connectable to pull itself and the carriages by means of the chain (3).

2. A device according to claim 1, c h a r a c t e r i z e d in that both ends of the chain (3) are mounted at mutually spaced fastening points (4, 5) between rails (1, 2) forming the track, and that the tractor (7) comprises transmission means (8) positioned between the rails (1, 2) and operated by a power device (15) for pulling the tractor by means of said power device (15) towards either fastening point.

3. A device according to claim 2, c h a r a c t e r i z e d in that the chain 3 is supported within curved track sections by sideward supports (6) positioned at a distance from the central line of the track towards the centre of curvature of the track, said supports keeping the chain in such a shape that it substantially follows the shape of the track and allowing the displacement of the chain (3) towards the central line of the track.

4. A device according to claim 2 or 3, c h a r a c t e r i z e d in that the transmission means (8) comprise a hydraulic motor (12) and a drive mechanism (13, 14) operated by said motor.

5. A device according to any of the claims 2 to 4, c h a r a c t e r i z e d in that the drive mechanism (13, 14) is a separate unit easy to detach and easy to attach.

6. A device according to any of the preceding claims, c h a r a c t e r i z e d in that the control means (17) comprise remote control means for controlling the displacing device.

FIG. 1

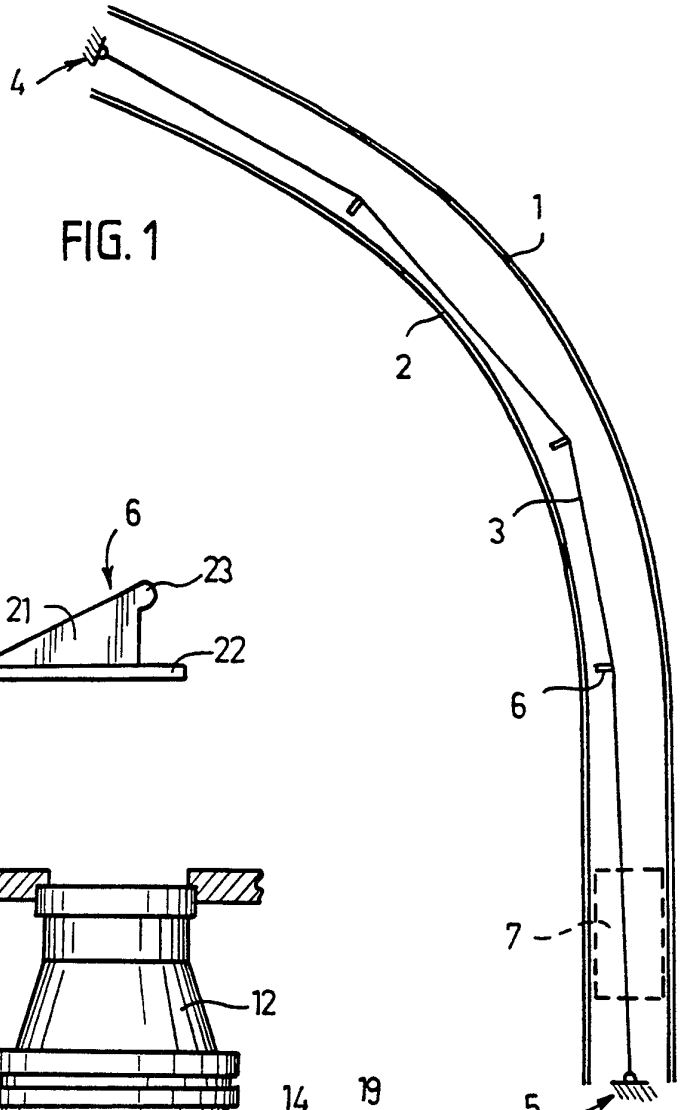



FIG. 4

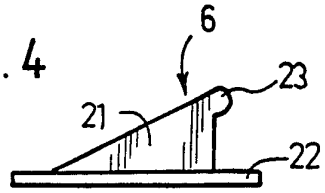



FIG. 3

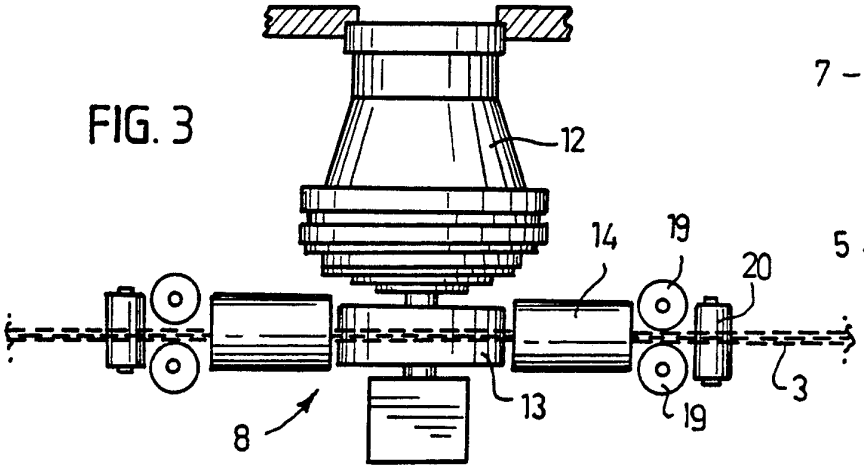
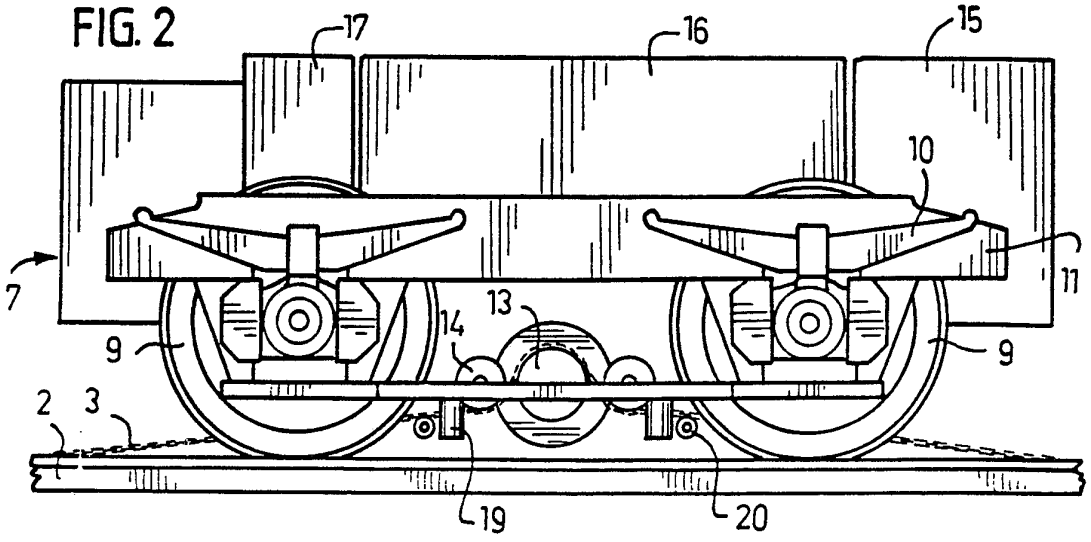



FIG. 2



# INTERNATIONAL SEARCH REPORT

International Application No PCT/FI89/00093

**I. CLASSIFICATION OF SUBJECT MATTER** (if several classification symbols apply, indicate all) [6]

According to International Patent Classification (IPC) or to both National Classification and IPC 4

B 61 J 3/06

**II. FIELDS SEARCHED**

**Minimum Documentation Searched** [7]

| Classification System | Classification Symbols |
|---|---|
| IPC 4 | B 61 J |
| US Cl | 104, 105 |

**Documentation Searched other than Minimum Documentation to the Extent that such Documents are included in the Fields Searched** [8]

SE, NO, DK, FI classes as above

**III. DOCUMENTS CONSIDERED TO BE RELEVANT** [9]

| Category * | Citation of Document, [11] with indication, where appropriate, of the relevant passages [12] | Relevant to Claim No. [13] |
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| A | DE, A, 737 066 (KÖRBER) 5 July 1943 | 1 |
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| A | DE, A, 2 327 004 (RHEINER MASCHINENFABRIK WINDHOFF AG) 28 November 1974 | 1 |
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