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(54) Ridging device for earthing up the ballast of a railway by vibro-compression.

(57) Ridging device for earthing up the ballast of a railway, wherein the vibro-compression implements (2, 2a) are linked to an implement carrier frame which is connected to a platform (3) by means of vibration-dampings. Platform (3) is provided at the upper side with a member (26) engaging an adjustable jib of a motor crane and at the lower side with a supporting member (4) lying on the rail. Platform (3) supports an oleodynamic motor which rotates by a belt pulley an eccentric flywheel shaft freely rotating on frame (1). The opposed pairs of hammer implements of the known type are driven by oleodynamic cylinders.

Motor and oleodynamic cylinders are operatively connected to the oleodynamic power source of the motor crane. The ridging device can be used as a normal implement with articulated arm, such as a bucket or the like.

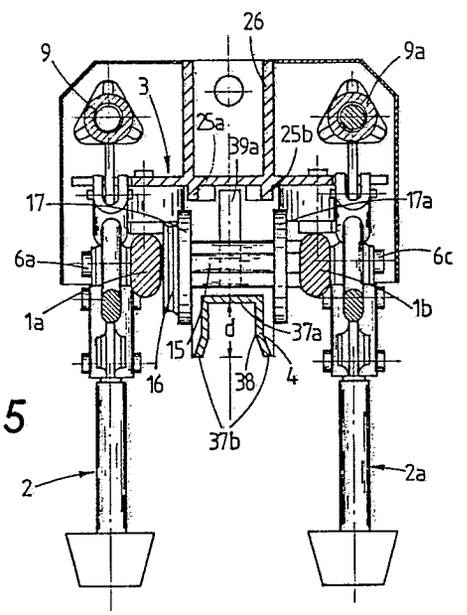

FIG.5

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Description

RIDGING DEVICE FOR EARTHING UP THE BALLAST OF A RAILWAY BY VIBRO-COMPRESSION.

This invention relates to a ridging device for earthing up the ballast of a railway by vibro-compression, such a device being of the type comprising implement assemblies called hammers connected in opposed couples.

As known, earthing up is the treatment of the ballast, which is restricted to the bearing area of the track near the rails, in order to provide an even ground. This treatment is performed so as to restore the consistency of the rail supports, thus re-establishing an uniform support as far as the vertical rigidity is concerned both by filling the gaps under the sinking supports and by crushing the excessively rigid stones.

The earthing up is carried out at present by a car moving on the track and comprising the ridging devices. The hammers of such devices are dipped into the ballast so as to bestride the sleepers up to a depth of 20 cm under the lower plane of the same and are vibrated at a frequency of some tens of cycles per second, thus causing the crushed stones to be rearranged. The hammers are then drawn near each other by a horizontal motion of translation so as to provide the earthing up of the supports by a combined action of compression and vibration. The vibration of the hammers is driven by the motor car, while the dip is driven by a pneumatic system; the approaching of the hammers is generally provided by the rotation of a worm screw or by a similar kinematic motion provided by an oleodynamic drive.

The ridging devices of the above mentioned type are at present installed on very powerful machines. Such machines are able to provide high efficiency to comply with the modern techniques of maintenance, thus tending to associate in the same assembly several operative steps, i.e. besides earthing up also the systematic correction of the level and the alignement of the rails.

This invention does not seek to provide a ridging device to be installed on one of these complex machines but provides an implement which can be used individually or in couples when it is connected to the articulated arm of a socalled railway loader, i.e. a small motor crane mounted on a railway car and provided at the same time with tyres. According to the features of claim 1, in the ridging device of the invention the implements, i.e. the hammers and their driving means, are mounted on a frame connected in turn through vibration-damping supports to a platform which is provided at the upper side with a member engaging the adjustable jib of a railway loader and at the lower side with a supporting member lying on the rail.

The advantages of the invention are self evident. The ridging device according to the invention acts as a common implement such as a bucket or boring machine or the like, which is operatively connected to a loader. From the above it results that the loader can be used to perform other functions when the earthing up has not to be carried out. The use of the ridging device according to the invention does not involves the use of a specific earthing up machine. This is particularly useful when short lengths of ballast have to be earthed up, for exambple where points are provided. Furthermore, the ridging device of the invention is convenient when the user is the owner or responsible for the maintenance of a short railway, for example within a factory or a yard or a big store; in this case, in fact, purchasing a ridging machine of great productivity would provide a considerable locking up of capital in comparison with a very restricted employment. Even if it is a light device and its cost is lower than an equivalent device mounted on a specific ridging machine and although the modalities of use are varying, the effectiveness of the earthing up is essentially the same and the efficiency given in meters per hour of railway track subjected to treatment is near that of specific ridging machines.

These and other features and advantages of the invention will be more readily apparent from the following detailled description of a preferred non-limitative embodiment with reference to the annexed drawing, wherein:

Fig. 1 is a side elevation, partially schematic view of the ridging device according to the invention, the cover being axially sectioned for the sake of clearness;

Fig. 2 is an elevation front view of the ridging device with the partially removed cover;

Fig. 3 is a top plan view of the ridging device, the cover being partially removed;

Fig. 4 is a longitudinal section along the line A-A of Fig. 2;

Fig. 5 is a cross section along the line B-B of Fig. 1;

Fig. 6 is a schematic perspective view showing the ridging device of the invention carried in use by the adjustable jib of a loader;

Fig. 7 is a schematic elevation view showing another application of the ridging device of this invention.

With reference to the drawing, and in particular to Figs. 1 to 5, it is generally designated by 1 and implement carrier frame, by 2, 2a the vibro-compression implement assemblies, by 3 a platform connecting the ridging device to the loader, by 4 a member supported by the rail and by 5 a cover. Implement carrier frame 1 is more clearly shown in Figs. 1, 4 and 5. It can be formed by a metal casting having a rectangular form with two side frames 1a, 1b and two cross members 1c, 1d, both pairs having an oval section.

At both opposed ends of cross members 1c, 1d four hammer carrier arms 7a, 7b, 7c, 7d of two vibro-compression implement assemblies 2, 2a are mounted in pairs opposed to each other and rotating in parallel planes perpendicular to each other and to frame 1 about hinge pins 6a, 6b, 6c, 6d, respectively. As the two implement assemblies 2, 2a are identic, only one of them will be described. Hammer carrier arms 7a, 7b of assembly 2 mounted one facing the

other about hinge pins 6a, 6b are hinged at their upper ends 8a, 8b in respective forks 12a, 12b of casing 10 and of piston rod 11 of an oleodynamic cylinder 9. Implement assembly 2a of hydraulic cylinder 9a has the same arrangement.

Hammers 14a, 14b having enlarged ends in the form of trapezoidal shovels are tightened by bolts at the free ends in the form of coupling sleeves 13a, 13b of each hammer carrier arm 7a, 7b at the opposite sides of pins 8a, 8b with respect to hinge pins 6a, 6b respectively. Hammer carrier arms 7a, 7b of implement assembly 2 are connected besides to oleodynamic drive cylinder 9 also to each other in a known manner by a force distributing rod 14c acting when the hammers are moved to be opened and closed. The hammers are shown in Figs. 1 and 4 with full lines in opened position and with dashed lines in closed position.

Oleodynamic cylinders 9, 9a supplied as described herebelow performs separately the compression function of the two implement assemblies 2, 2a, respectively. A shaft 15 supporting rigidly a pulley 16 is mounted freely rotating about side frames 1a, 1b on implement carrier frame 1 in a central position parallel to cross members 1c, 1d, and two flywheels 17, 17a with eccentric body are mounted at the same distance from the centre of shaft 15. To this end flywheels 17, 17a in the form of a disc have in the surfaces facing each other a cavity essentially corresponding to a circular half crown as shown with 18a for flywheel 17a. The rotation of shaft 15 operated by a pulley and a belt drive described later on confers through the flywheels with eccentric body the vibration to the implement carrier frame and then to the respective implements.

Implement carrier frame 1 is connected to platform 3 by cylindrical vibration damping members of rubber 19a, 19b, 19c, 19d.

Each vibration damper can be formed, as known, of a pair of elastic bodies 20a, 20b coaxially connected by screwed rods 21a, 21b, 21c, the outer rods 21a and 21 being provided with head.

The elastic bodies are delimited by metallic discs 22a, 22b, 22c, 22d and by an outer locking U-member 23. A bracket (24a and 24b in Fig.1) connected, for example by welding, to the outstanding end of the side frames is diametrally mounted in each support between the elastic bodies about the central screwed rod 21b.

Platform 3 is formed of a metallic plate of suitable thickness and of rectangular form with trapezoidal slots 3a, 3b in the longer sides (Fig. 3, 5). A double longitudinal rib 25a, 25b is provided at the lower side of plate 3, while a hollow prismatic engaging member 26 is centrally outstanding. Prismatic member 26 has an inner square cross section and is devoid of upper base; it has coaxial through holes 27a, 27b perpendicular to both opposite walls and parallel to the longer sides of platform 3.

Platform 3 has a further elongated slot 28 suitably provided for a belt. Next to this slot an oleodynamic motor 29 (Fig. 3) is provided, on the shaft of which a pulley 30 (schematically shown in Fig. 1) is mounted. A belt 31 surrounded by a protection member 32 is provided between pulley 30 and pulley 16 integral with flywheel carrier shaft 15.

Both cylinders 9, 9a and oleodynamic motor 29 are supplied through hoses by the oleodynamic power source of the loader and by a distributor not shown, which are located on the loader 44 (Fig. 6). The hoses extend from the distributor to the users, i.e. cylinders and motor, located in the device through a valve assembly 33 connected at the periphery of platform 3. In Fig. 4 these further connection are not shown. In the schematic valve assembly 33 the upper fittings relate to the cylinders, while the lower ones relate to the oleodynamic motor. Platform 3 is perpendicularly elongated downwards both at the front and the back sides (Figs. 2, 4) with plate portions 34a, 34b; a lower supporting member 37 is located longitudinally in a central position and is connected to said vertical portions by means of counterplates 35a, 35b and bolts 36. Supporting member 4 has a reversed U cross section which is lined with a gasket 38 if that is the case. The inner cavity of the U-section is adapted to receive the head of a rail together with other connecting parts between rails.

Furthermore the distance between the bottom 37a and the ends 37b, 37b of the U-section should be greater than the free height of the rail head. Supporting member 4 has at the upper side in an essentially central position two spacers 39a, 39b in the form of two struts directed to platform 3 and having a lower height than the distance between supporting member and platform 3 (Figs. 1, 5), the function of which is that of limiting the elastic deflection of supporting member 4.

Cover 5, preferably of metal sheet, is provided on the connecting plate. Cover 5 has a square opening 40 corresponding to the cavity of prismatic member 26 and next to the latter a longitudinal slot 41 for a latch 42 which can be operated from the outside of the cover by a lever 43 integral with said latch.

In operation, as shown in Fig. 6, the ridging device of the invention is operatively connected to the adjustable jib of the loader 44. The bored head of the latter is introduced with male-female coupling into the hollow and bored prismatic member 26, while latch 42 is introduced through the coaxial holes and suitably locked.

The oleodynamic connection with the hoses are established. Loader 44 located with its car on the rail lifts the ridging device and approaches it to the rail so as to bestride the sleeper. The vibration motion given to the implement carrier frame causes the ridging device to be dipped into the stones until bottom 37a of the supporting member comes in touch with the upper surface of the rail. The lower ends 37b, 37b of the supporting member do not come in touch with other parts of the railway superstructure in order not to cause any damage. Under this condition the hammers are driven to perform their function of compressing stones. After the earthing up of the crushed stones under that sleeper, loader 44 is advanced to the next sleeper in order to repeat the working cycle.

In Fig. 7 there is shown an example of using a pair of ridging devices connected by a cross member 45 allowing the simultaneous ridging operation on both

rails under the same sleeper.

In such a case, the engagement of the cross member of both ridging devices to the adjustable jib of the loader is effected at the central position of the schematic connecting member 46.

Claims

1. Ridging device for earthing up the railway ballast by vibro-compression, said device being of the type comprising implement assemblies in which hammers are connected in opposed couples, characterized in that it comprises an implement carrier frame (1), implement assemblies (2, 2a), a connecting platform (3), a supporting member (4) lying on the rails and a cover (5), the implement carrier frame (1) being formed of cross members (1c, 1d) at the ends of which the implement assemblies (2, 2a) are hinged as well as of side frames (1a, 1b) the ends of which are connected by vibration damping supports (19a, b, c, d) to the overhanging platform (3) which is provided at the upper side with a member (26, 42) engaging the adjustable jib of a motor crane and at the lower side with the supporting member (4) lying on the rail so that during the operation of the vibro-compression implement assemblies (2, 2a) supporting member (4) is kept adjacent to the rail by the adjustable jib of the motor crane associated to platform (3).

2. Ridging device according to claim 1, characterized in that supporting member (4) is an elongated member having a reversed U cross section, the inner cavity of which is wide enough to receive the contour of the rail and other parts outstanding therefrom as well as it has such a depth (d) that the free ends (37b, 37b) of the supporting member (4) are not in touch with other parts of the railway superstructure when the bottom (37a) thereof is in touch with the upper surface of the rail.

3. Ridging device according to claim 1, characterized in that the hammers are carried by hammer carrier arms (7a, b, c, d) which are articulated in opposed couples about hinge pins (6a, b, c, d) to cross members (1c, 1d) connected by force distributing rods (14c, 14c) and driven by oleodynamic cylinders (9, 9a) supplied by the oleodynamic power source of the motor crane.

4. Ridging device according to claim 1, characterized in that the implement carrier frame (1) is provided at the cross position centrally with respect to side frames (1a, 1b) with a freely rotating shaft (15) which is integral with flywheels (17, 17a) having eccentric bodies and a pulley (16) driven through a belt (31) by an oleodynamic motor (29) located on the connection platform (3) and supplied by the oledodynamic power source of the motor crane.

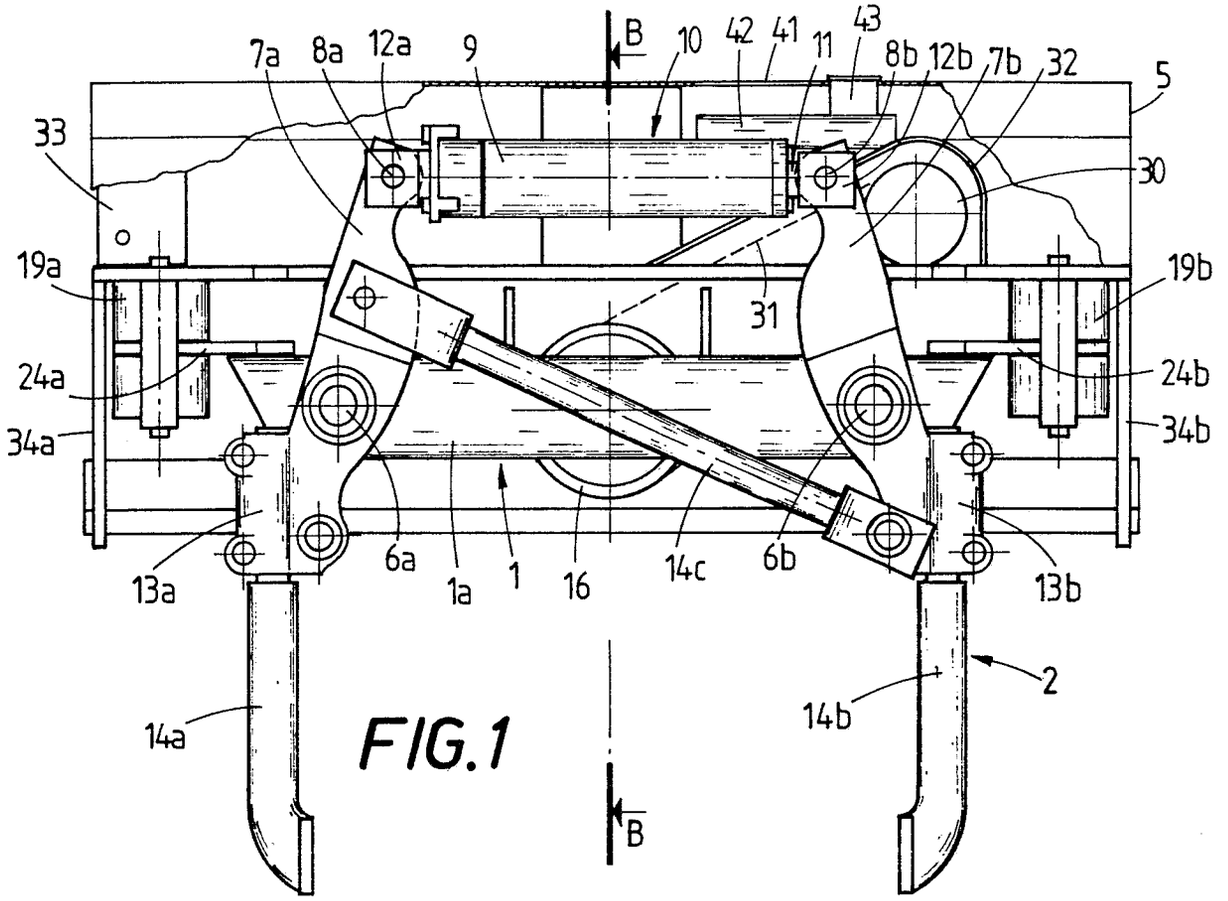

B
7a
8a
12a
9
10
42
41
11
43
8b
12b
7b
32
5
33
30
19a
19b
31
24a
24b
34a
34b
13a
6a
1a
1
16
14c
6b
13b
2
14a
14b
B

FIG.1

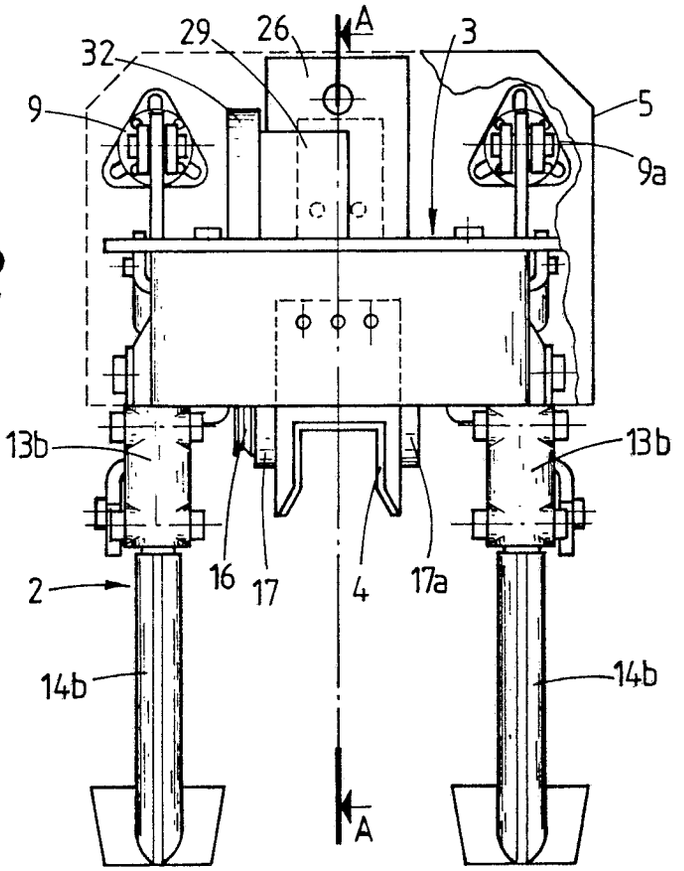

A
29
26
3
32
9
5
9a
13b
13b
16
17
4
17a
2
14b
14b
A

FIG.2

FIG. 3

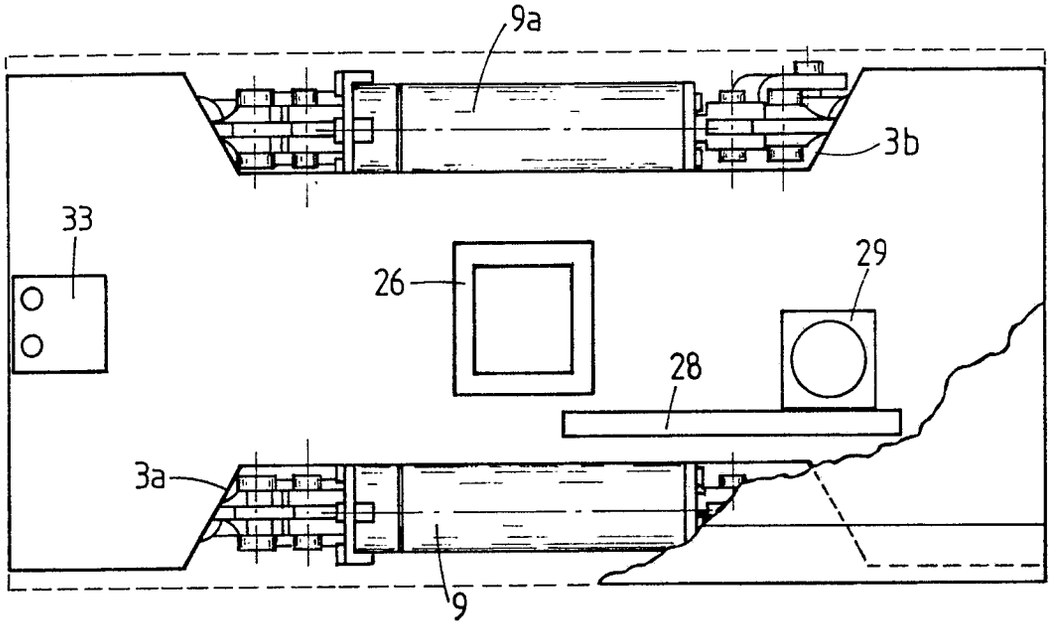
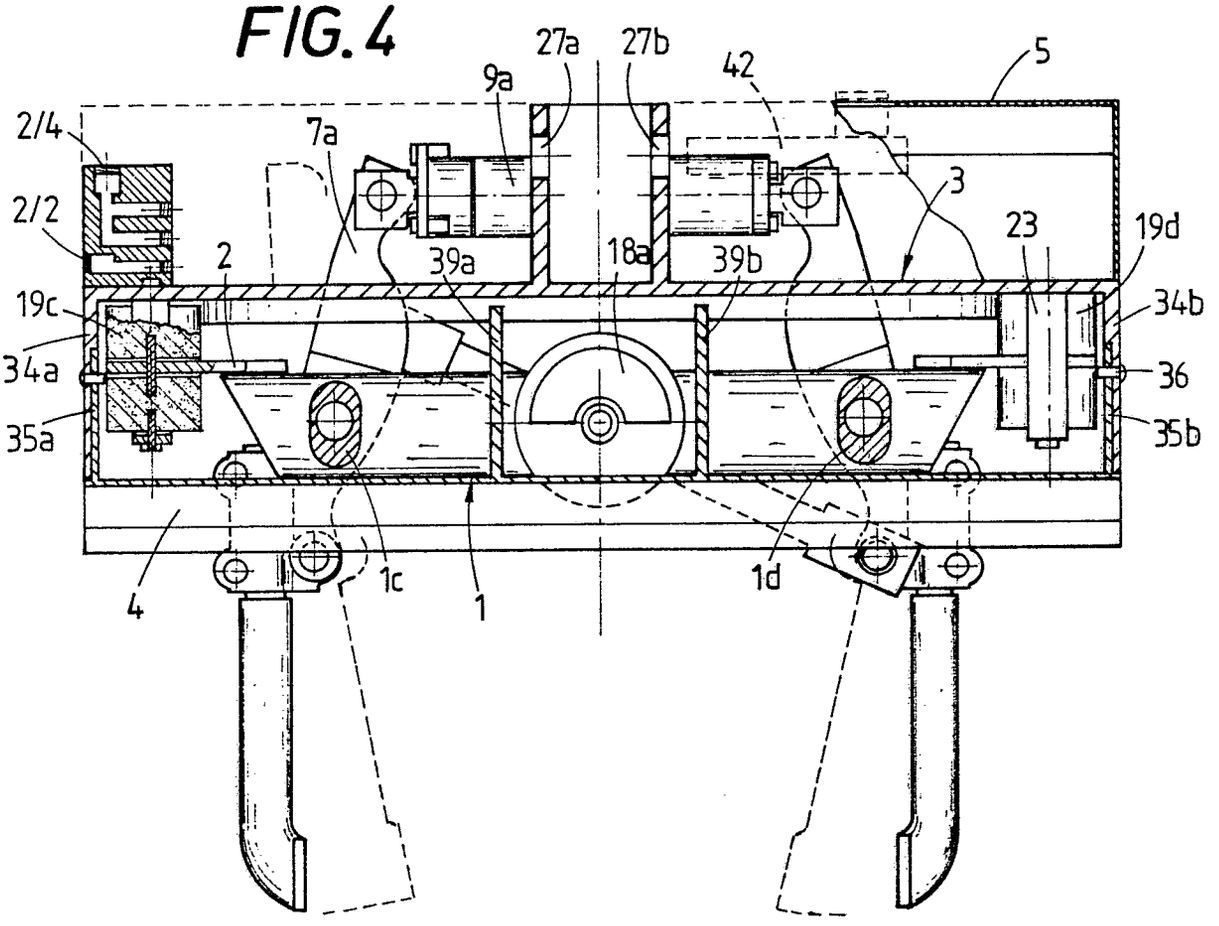

9a
3b
33
26
29
28
3a
9

FIG. 4


27a
27b
42
5
9a
7a
2/4
2/2
2
39a
18a
39b
3
23
19d
19c
34a
34b
36
35a
35b
4
1c
1
1d

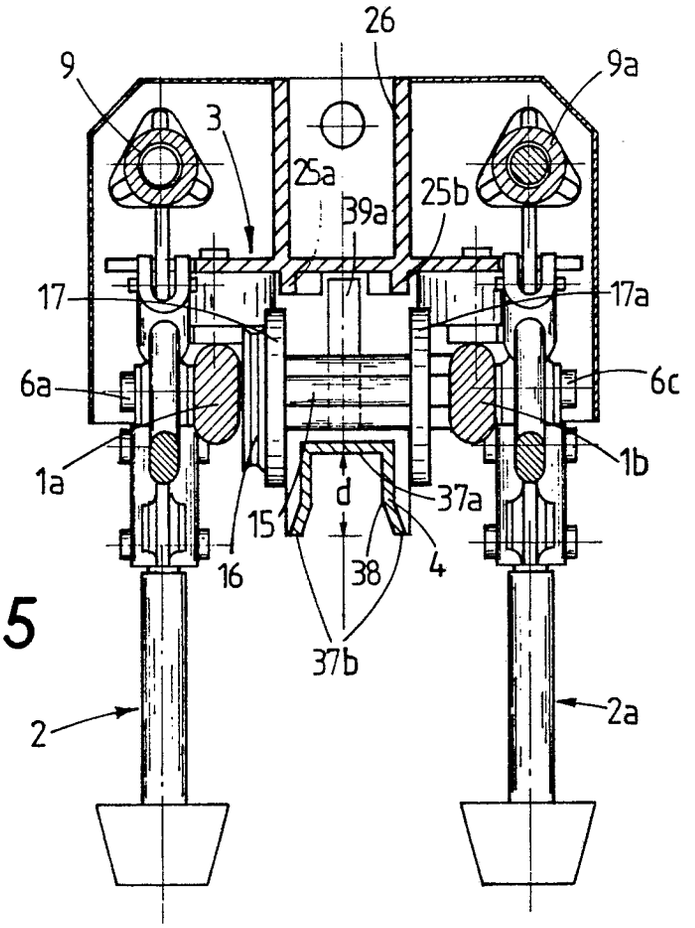


FIG.5

FIG.6

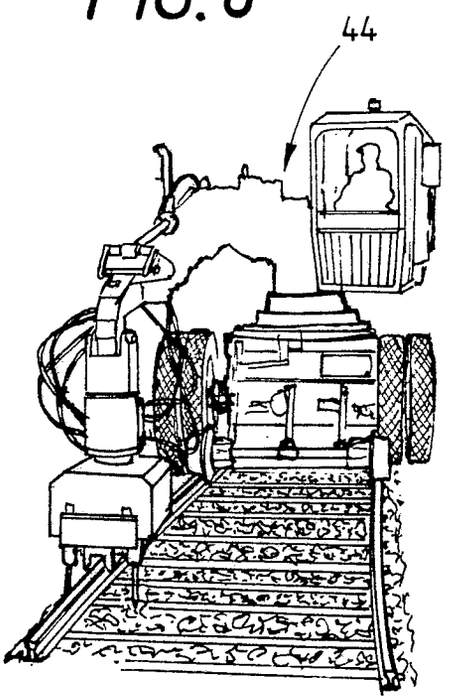
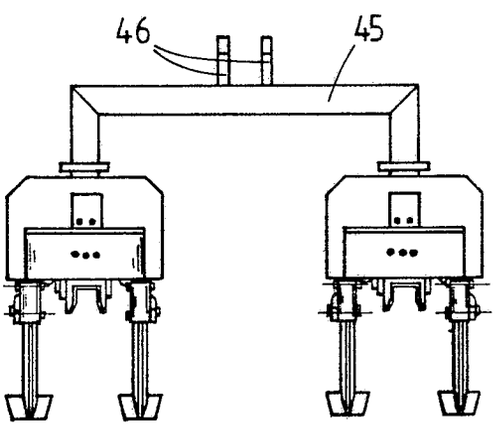


FIG.7



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EUROPEAN SEARCH REPORT

Application Number

EP 88 83 0272

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
X	US-A-3 022 744 (JACKSON) * Whole document * ---	1,3,4	E 01 B 27/16
A	DE-B-1 077 687 (HEITKAMP) * Whole document * ---	1,3,4	
A	DE-B-1 241 474 (WACKER) * Column 2, line 43 - column 8, line 22; figures 1,2 * ---	2	
A	DE-C- 297 721 (APPELHANS) * Page 1, lines 27-67; figures 1,2 * ---	2	
L	US-A-2 899 909 (JACKSON) (As part of US-A-3 022 744 disclosure) -----		

TECHNICAL FIELDS SEARCHED (Int. Cl.4)
E 01 B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	22-09-1988	KERGUENO J.P.D.

CATEGORY OF CITED DOCUMENTS

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