

(19)



(11)

EP 2 554 745 B1

(12)

EUROPEAN PATENT SPECIFICATION

(45) Date of publication and mention
of the grant of the patent:
21.06.2017 Bulletin 2017/25

(51) Int Cl.:
E01B 27/10^(2006.01) E01B 27/12^(2006.01)

(21) Application number: **12178881.4**

(22) Date of filing: **01.08.2012**

(54) Machine for reconditioning railway roadbeds

Maschine zur Wiederherstellung von Schienenbahnbetten

Machine permettant la maintenance des plates-formes d'une voie de chemin de fer

(84) Designated Contracting States:
**AL AT BE BG CH CY CZ DE DK EE ES FI FR GB
GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO
PL PT RO RS SE SI SK SM TR**

(30) Priority: **04.08.2011 IT GE20110088**

(43) Date of publication of application:
06.02.2013 Bulletin 2013/06

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Description

[0001] The present invention concerns a machine for reconditioning railway roadbeds.

[0002] As is well-known, machines exist for reconditioning railway roadbeds, comprising an equipped wagon provided with means of temporarily lifting the track of the roadbed under the wagon, and excavation means for removing the ballast of the roadbed under the raised track. This removed ballast is conveyed to screening means to be partially recovered and returned to the reconditioned roadbed. In these machines, the excavating means, usually fitted with an excavating chain, pass under the sleepers for their entire length. The overall width of the excavating chain is somewhat greater, on both sides, than the length of the sleepers and therefore these machines cannot be used where any obstacle, natural or due to construction works, limits the free transverse section of the roadbed, on one or both sides in proximity to the edge of the heads of the sleepers, for example in tunnels, between platforms in stations, on certain bridges and so forth.

[0003] In Italian patent no. 948861 a machine is described for reconditioning railway roadbeds which, besides the means described above, also comprises means for rotating the sleepers, at least partly liberated from the rails, means for passing these sleepers in an oblique position through the gap free of the excavating chain, and means for rotating the sleepers again to their position perpendicular to the rails.

[0004] By means of such a machine described in that patent, it is possible to operate even where there are obstacles, natural and otherwise, which limit the free transverse section of the roadbed.

[0005] However, in reconditioning a railway roadbed, there is often the need to lower the level of the roadbed itself, for example where the tracks run in tunnels. This lowering of the roadbed is necessitated in order to allow particularly bulky railway wagons to pass, for example goods wagons. With the machines described above it is not possible, in the process of reconditioning the roadbed, to also carry out a lowering of the roadbed itself. In addition, the means of lifting and rotating the sleepers described in the aforementioned patent, which substantially comprise bogies running on axles, are very complex and inefficient.

[0006] From GB 2 247 265 A a machine for reconditioning railway roadbeds is known, comprising:

- an equipped wagon provided with means suitable for temporarily lifting the rails of a track,
- excavation means suitable for removing the material of the roadbed and
- means of lifting and rotating at least one sleepers to be released from the rails of the track.

[0007] However, this known machine is not provided with a unit for demolishing the roadbed.

[0008] From DE 43 29 277 A1 an apparatus for loosening and compacting the ballast of track installations by means of vibrating picks is known. This known machine does not incorporate lifting means for both rails and sleepers, nor is it equipped with means for removing the ballast from the trackbed.

[0009] The object of the present invention is therefore the creation of a machine for reconditioning railway roadbeds which allows the performance of special jobs, such as the lowering of the roadbed which is necessary in some cases inside railway tunnels, including in the presence of any rocky layers lying under the ballast, or other normal material for making the roadbed. By means of the present machine, furthermore, it is possible rapidly and efficiently to lift and rotate the sleepers in synergy with the jobs of excavating and lowering the roadbed.

[0010] This object is achieved by the present invention by means of a machine for reconditioning railway roadbeds according to what is claimed in Claim 1.

[0011] Other important aspects of the present machine are stated in the dependent claims.

[0012] Further characteristics and advantages of the present invention will become better understood in the course of the following description, considered in exemplary and non-limiting terms and referring to the attached drawings, in which:

- Fig. 1 shows a first view in lateral elevation of a machine for reconditioning railway roadbeds according to the present invention;
- Fig. 2 shows a second view in lateral elevation of the present machine in an operating phase;
- Fig. 3 shows a plan view of a stretch of railway line on which the present machine is working;
- Fig. 4 shows a view in lateral elevation and partially in section of a rotatable clamp of the present machine, suitable for gripping, lifting and inclining the sleepers of the railway line whose roadbed needs to be reconditioned;
- Fig. 5 shows a plan view and partially in section of a bogie for the rotatable clamp of Fig. 4 to run on;
- Fig. 6 shows a front view, partially in section, of a unit for demolishing the roadbed, provided with a series of pneumatic hammers; and
- Fig. 7 shows a front view and partially in section of a variant embodiment of the demolition unit of Fig. 6.

[0013] With reference to these attached drawings and with particular reference to Fig. 1 thereof, no. 1 indicates an equipped wagon of the present machine for reconditioning railway roadbeds. The wagon 1 comprises at the top a longitudinal beam 2, whose front and rear ends 3 and 4, are supported by corresponding railway axles 5 and 6, or bogies, suitable for running on a track 7 of any railway line. This track 7 consists of a pair of rails 8, of which one is visible in the drawing, joined by a series of sleepers 9 suitably positioned and connected to the rails

8 by suitable removable fixing means 58. The track 7 rests on a roadbed 10 formed of ballast and/or other suitable material. The equipped wagon 1 comprises at its front and rear ends 3 and 4 control cabins 11 and 12. Starting from the front end 3 of wagon 1, the present machine comprises a gripping and lifting device 13 for the rails 8 of the track 7. This device 13 for each of the rails 8 comprises for example a pair of lifting rollers or clamps 14 held solid by an arm 15 connected to actuating means 16 for raising and lowering it, for example linear actuators. The fixed part of these actuating means 16 is connected to the longitudinal beam 2 of wagon 1. To the longitudinal beam 2 is also connected, immediately upline of this lifting device 13 for the rails 8, a unit for demolishing the roadbed, which comprises a row of pneumatic hammers 17 arranged transversely with respect to the track 7. Upline of these pneumatic hammers 17 a rotatable clamp 18 is shown, suitable for gripping an individual sleeper 9, lifting it, inclining it suitably and taking it back to a new position, as we will see more clearly below in the description of the operation of the present machine. This rotatable clamp 18 is connected to an actuator 19 connected at the top to a bogie 20 suitable for running longitudinally inside a box-section support 21 fixed to the longitudinal beam 2 of the wagon 1. On the longitudinal beam 2 a motor unit 22 is installed which activates a device 23 for excavating and collecting the material of the roadbed 10, which is known per se. This device 23 is suitably inclined and comprises an excavating chain, not illustrated, suitable for conveying the material of the roadbed onto a conveyor belt located inside the side-walls of the device. This belt conveys the material removed from the roadbed towards a further conveyor belt 47 which will transfer it to a following wagon, not illustrated, provided with screening means for the excavated material, to eliminate reject material and redistribute the cleaned material recovered by screening. The excavating device 23 is supported on the beam 2 by means of an oscillation pin 24 and by actuating means 25 which allow the inclination to be varied. All the devices described above and provided for on the wagon 1 are illustrated in Fig. 1 in a non-operating position.

[0014] Fig. 4 illustrates the rotatable clamp 18 in detail. This clamp 18 comprises two arms 26 suitable for rotating around a common pin 27 so as to separate and come together to clamp one of the sleepers 9 of Fig. 1. These arms 26 are controlled by an actuator 28. The clamp 18 is connected to a head 29 integral with the movable rod 30 of the actuator 19. This rod 30 runs inside a cylinder 31, forming an annular upper part 32 which rests, by means of a thrust bearing 33, on a support 34 fixed at the bottom to the bogie 20. This cylinder 31 is capable of rotating around a vertical axis with respect to said support 34 and said bogie 20, and roller bearings 35 are provided for this purpose in said support 34. The cylinder 31 is rotated in one direction or the other, and transmits said rotary motion to the arms 26 of the clamp 18, by means of an actuator 36, provided in the bogie 20. This

actuator 36 (see also Fig. 5 in the attached drawings) comprises a cylinder 37 connected at one end and by a rotation pin 38 to a wall of the bogie 20. In this cylinder 37 there runs in one direction or the other a rod 30 connected, at one end and by means of a rotation pin 39, to a lever connected to a head 41 of the cylinder projecting into the bogie 20. This bogie 20 comprises a series of pairs of wheels 42 by means of which it can run along guides 43 formed in the box-section support 21 fixed to the longitudinal beam 2. At least one pair of such wheels, for example wheels 42', are connected to an activating reduction motor 44.

[0015] Fig. 6 illustrates the unit of the present machine for demolishing the roadbed 10. This demolition unit comprises two pneumatic hammers 17 positioned externally to the rails 8 of the track and two pneumatic hammers 17' positioned internally to the rails 8. Each of the pneumatic hammers 17 and 17' is controlled by its own lowering and raising actuator, respectively actuators 45 for the external pneumatic hammers 17 and actuators 45' for the internal pneumatic hammers 17'. Each of the actuators 45 for the external pneumatic hammers 17 comprises a cylinder 46 fixed, by means of suitable supports, to the longitudinal beam 2 of the wagon, and a movable rod 47 connected to the striking mass 48 of the relative pneumatic hammer 17.

[0016] Each of the actuators 45' for the internal pneumatic hammers 17' comprises a cylinder 46' fixed to a bogie 49 running transversely with respect to the longitudinal direction of advancement of the wagon, which is direction S in Fig. 2, and to the longitudinal direction of extension of the rails 8. This bogie 49, which can be similar for example to the bogie for the rotatable clamp described above, is supported by suitable guides 50 integral with the longitudinal beam 2 of the wagon. By means of this transversely movable bogie 49 the internal pneumatic hammers 17' can effectively demolish the stretch of roadbed 10 comprised between the two rails 8. Inside each of the cylinders 46' of each of the actuators 45' runs a rod 47' connected at the bottom to a beam 51 which holds solid the two striking masses 48' of the two internal pneumatic hammers 17'. These pneumatic hammers 17' therefore operate simultaneously and are provided with a central vertical guide made up of a rod 53 connected to the bogie 49 and a cylinder 54 connected to the beam 51. Naturally the number of internal and/or external pneumatic hammers provided in the demolition unit of the present machine could be different from what is illustrated in Fig. 6. It should be noted furthermore that the rails 8 are located in a stretch 55 of railway line with extremely small lateral spaces, for example in proximity to a station platform or in a tunnel.

[0017] Fig. 7 illustrates a variant of the demolition unit of the present machine. The external pneumatic hammers 17 are identical and operate in the same way with respect to what was previously illustrated in Fig. 6. The internal pneumatic hammers 17' however have the relative striking masses connected to each other by an ac-

tuator 52 and each of them is connected at the top to the beam 51 by means of an oscillation pin 57. The cylinders 46' of the two actuators 45' are connected directly to the longitudinal beam 2 of the wagon. To sum up, in this variant the two internal pneumatic hammers 17' manage to operate on the entire width of the roadbed 10 comprised between the rails 8 as a result of their variable inclination, controlled by actuator 52, and of their being fixed with oscillation pins 57 to beam 51.

[0018] We see below the operation of the present machine. During the operations which will be described below, the equipped wagon 1 moves in the direction S of advancement indicated in Fig. 2. When it becomes necessary to recondition a stretch of roadbed, it is first necessary to release the rails 8 from the sleepers 9 by manual removal of the means 58 fixing one to the other: see Figures 2 and 3 in the attached drawings, in which the fixing means 58 have been removed from the sleepers 9' and 9" located in front of the excavating device 23. In Fig. 3, note in particular the side-walls 59 of the device 23 for excavating and collecting the roadbed material, which advantageously have an overall side-to-side dimension which does not exceed the width of the sleepers 9, 9' and 9". This drawing also schematically illustrates the rotatable clamp 18, the group of pneumatic hammers 17 arranged parallel to the sleepers, according to any of the two forms of embodiment shown in Figs. 6 or 7, and the device 13 for gripping and lifting the rails. The actuators 16 of the device 13 are lowered in such a way that the means 14 of gripping the rails 8 are clamping the latter. These actuators are then retracted upwards so that the rails are temporarily raised from the released sleepers 9' and 9". The sleeper 9", situated at a given moment in the reconditioning process immediately in front of excavating device 23, is grasped by the arms 26 of the rotatable clamp 18, lifted from the roadbed 10 and inclined in a suitable manner so that it can be translated backwards past excavating device 23. Having arrived at its new laying position, in which the bogie 20 of the clamp 18 has travelled backwards substantially over the entire distance permitted by the support 21, the sleeper 9" is counter-inclined so as to make it assume once more the position transverse to the rails 8, and laid in the new position. Simultaneously, in the empty space left by the sleeper 9" for the work of excavating device 23, pneumatic hammers 17 and 17', sliding vertically upwards or downwards, penetrate the roadbed for the depth of lowering required. These pneumatic hammers 17 also break up any rock present in the roadbed and this broken-up rock is collected by excavating device 23 along with the ballast from the roadbed. The part of roadbed 10' situated upline of excavating device 23 (again, see Fig. 2) is lowered by the height required and reconditioned, and therefore the sleepers 9 in that part can be refixed to the rails 8. As mentioned above, all the material collected by the excavating device 23 will be transferred by the conveyor belt 47 to screening means provided on a wagon following wagon 1 where the present reconditioning machine

is positioned.

Claims

1. Machine for reconditioning railway roadbeds, comprising an equipped wagon (1) provided with means (13) suitable for temporarily lifting the rails (8) of a track (7), excavation means (23) suitable for removing the material of the roadbed (10) situated under the lifted track (7) and means (18) of lifting and rotating at least one of the sleepers (9', 9") from the rails (8) of the track (7), **characterized in that** it comprises at least one unit for demolishing and lowering the roadbed located, with respect to the direction (S) of advancement of the equipped wagon (1), upline of said means (13) of lifting the rails (8) and downline of said excavation means (23), and comprises a plurality of demolition means (17, 17') suitable for breaking up a certain stretch of roadbed (10), both within and outside the rails (8), said demolition means (17, 17') being suitable for acting in the empty space left by the sleeper (9") to be lifted and rotated by said lifting and rotating means (18), and said sleeper to be carried by said means (18) to a new position upline of the excavation means (23) and on the reconditioned and lowered roadbed (10').
2. Machine according to Claim 1, **characterized in that** said demolition unit comprises at least one pneumatic hammer (17) positioned externally to each of the rails (8) of the track (7) and one or more pneumatic hammers (17') positioned between the rails (8).
3. Machine according to Claim 1, **characterized in that** said demolition means (17, 17') comprise actuators (45, 45') for their lowering and raising, the fixed part (46, 46') of said actuators being integral with the longitudinal beam (2) of the wagon (1).
4. Machine according to Claim 1, **characterized in that** said demolition means (17, 17') positioned both internally and externally to the rails (8), are transversely aligned.
5. Machine according to Claim 2, **characterized in that** said pneumatic hammers (17') internal to the rails (8) comprise means (49, 52, 57) capable of allowing their displacement at least in a transverse direction with respect to the track (7).
6. Machine according to Claim 5, **characterized in that** said pneumatic hammers (17') internal to the rails (8) are connected to a bogie (49) which can run transversely on guides (43) integral with the longitudinal beam (2) of the wagon (1).
7. Machine according to Claim 5, **characterized in that**

the pneumatic hammers (17') internal to the rails (8) are connected by means of relative oscillation pins (58) to a support beam (51) connected by relative actuator means (45') for lowering and raising to the longitudinal beam (2) of the wagon (1).

8. Machine according to Claim 7, **characterized in that** said internal pneumatic hammers (17') are connected to each other by at least one actuator (52) which controls their rotation around said oscillation pins (58) so that they can mutually separate and come together.

9. Machine according to Claim 1, **characterized in that** said lifting and rotating means of at least one sleeper (9") of the rails (8) comprises a rotatable clamp (18) connected by at least one lowering and raising actuator (19) to the longitudinal beam (2) of the wagon (1).

10. Machine according to Claim 9, **characterized in that** said rotatable clamp (18) is connected at the top with a bogie (20) capable of running longitudinally, by suitable activating means (44), on guides (43) integral with the longitudinal beam (2) of the wagon (1).

11. Machine according to Claim 9, **characterized in that** said rotatable clamp (18) comprises at least two arms (26) for gripping the sleeper (9"), connected to each other by an actuator (28) for mutually coming together and separating.

12. Machine according to Claim 9, **characterized in that** said actuator (9) comprises a cylinder (31) connected to two rotation means (30, 37) located in said bogie (20), there being housed in said cylinder (31) a sliding rod (30) to whose ends the arms (26) of the clamp (28) are connected.

13. Machine according to Claim 12, **characterized in that** said cylinder (31) is connected to an end of a lever (40) carrying at its other end a rotation pin (39) to which is connected an end of a rod (30) movable inside a cylinder (37), said cylinder (37) being connected by a rotation pin (38) to a wall of said wagon (20).

Patentansprüche

1. Eine Maschine zur Wiederherstellung von Schienenbahnbetten, welche einen entsprechend ausgerüsteten Waggon (1), der mit Elementen (13) versehen ist, die geeignet sind, die Schienen (8) eines Gleises (7) zeitweilig anzuheben, Ausschachtungselemente (23), die geeignet sind, das Material des Bahnbetts (10) zu entfernen, welches sich unter dem angehobenen Gleis (7) befindet, und Elemente (18) zum

Anheben und Drehen von mindestens einer der Schwellen (9', 9") von den Schienen (8) des Gleises (7), umfasst **dadurch gekennzeichnet, dass** sie mindestens eine Einheit zum Abtragen und Senken des Bahnbetts umfasst, das in Bezug auf die Richtung (S) des Vorschubs des ausgerüsteten Waggons (1) jeweils stromaufwärts den genannten Elementen (13) zum Anheben der Schienen (8) und stromabwärts den genannten Ausschachtungselementen (23) angeordnet ist, sowie eine Vielzahl von Abtragungselementen (17, 17'), welche geeignet sind, eine bestimmte Teilstrecke des Bahnbetts (10) zu demontieren, und zwar sowohl innerhalb wie außerhalb der Schienen (8), wobei die genannten Abtragungselemente (17, 17') geeignet sind, in dem leeren, von der Schwelle (9") hinterlassenen Raum zu arbeiten, um durch die genannten Anhebungs- und Drehungselemente (18) jeweils entsprechend angehoben und gedreht zu werden, und die genannte Schwelle durch die genannten Elemente (18) in eine neue Lage stromaufwärts den Ausschachtungselementen (23) und auf dem wiederhergestellten und abgesenkten Bahnbett (10') gebracht wird.

2. Eine Maschine gemäß Anspruch 1, **dadurch gekennzeichnet, dass** die genannte Abtragungseinheit jeweils mindestens einen Presslufthammer (17), welcher außerhalb jeder einzelnen Schiene (8) des Gleises (7) angeordnet ist, sowie einen oder mehrere Pressluftschlämmer (17'), die jeweils zwischen den Schienen (7) angeordnet sind umfasst.

3. Eine Maschine gemäß Anspruch 1, **dadurch gekennzeichnet, dass** die genannten Abtragungselemente (17, 17') jeweils entsprechende Antriebe (45, 45') für deren Senken und Anheben umfassen, wobei die feststehenden Teile (46, 46') der genannten Antriebe jeweils einteilig mit dem Längsträger (2) des Waggons (1) sind.

4. Eine Maschine gemäß Anspruch 1, **dadurch gekennzeichnet, dass** die genannten Abtragungselemente (17, 17'), welche beide innen und außen an den Schienen (8) angeordnet sind, jeweils quer ausgerichtet sind.

5. Eine Maschine gemäß Anspruch 2, **dadurch gekennzeichnet, dass** die genannten Pressluftschlämmer (17') innen an den Schienen (8) jeweils Elemente umfassen (49, 52, 57), welche in der Lage sind, deren Verschiebung zumindest in einer Querrichtung im Verhältnis zum Gleis (7) zu gestatten.

6. Eine Maschine gemäß Anspruch 5, **dadurch gekennzeichnet, dass** die genannten Pressluftschlämmer (17') innen an den Schienen (8) mit einem Drehgestell (49) verbunden sind, das quer auf Führungen (43) verlaufen kann, die jeweils einteilig mit dem

Längsträger (2) des Waggons (1) sind.

7. Eine Maschine gemäß Anspruch 5, **dadurch gekennzeichnet, dass** die Pressluftschlämmer (17') innen an den Schienen (8) mit Hilfe entsprechender Schwenkzapfen (58) mit einem Halteträger (51) verbunden sind, der wiederum mit entsprechenden Antriebselementen (45') zum Senken und Anheben des Längsträgers (2) des Waggons (1) verbunden ist. 5
8. Eine Maschine gemäß Anspruch 7, **dadurch gekennzeichnet, dass** die genannten inneren Pressluftschlämmer (17') durch mindestens einen Antrieb (52) miteinander verbunden sind, welcher deren Umdrehung um die genannten Schwenkzapfen (58) kontrolliert, so dass sie sich jeweils gegenseitig voneinander trennen und zusammenkommen können. 10
9. Eine Maschine gemäß Anspruch 1, **dadurch gekennzeichnet, dass** das genannte Anhebungs- und Umdrehungselement von mindestens einer Schwelle (9") der Schienen (8) eine drehbare Arretierung (18) umfasst, welche mit Hilfe von mindestens einem Hebe- und Senkantrieb (19) mit dem Längsträger (2) des Waggons (1) verbunden ist. 15
10. Eine Maschine gemäß Anspruch 9, **dadurch gekennzeichnet, dass** die genannte drehbare Arretierung (18) oben mit einem entsprechenden Drehgestell (20) verbunden ist, welches in der Lage ist, längs zu verlaufen, und zwar über entsprechende Antriebselemente (44), auf Führungen (43), die einteilig mit dem Längsträger (2) des Waggons (1) sind. 20
11. Eine Maschine gemäß Anspruch 9, **dadurch gekennzeichnet, dass** die genannte drehbare Arretierung (18) mindestens zwei Arme (26) zum Greifen der Schwelle (9") umfasst, die jeweils miteinander durch einen Antrieb (28) verbunden sind, um sich gegenseitig voneinander trennen und zusammenkommen zu können. 25
12. Eine Maschine gemäß Anspruch 9, **dadurch gekennzeichnet, dass** der genannte Antrieb (9) einen Zylinder (31) umfasst, welcher jeweils mit zwei Umdrehungselementen (30, 37) verbunden ist, die in dem genannten Drehgestell (20) angeordnet sind, wobei in dem genannten Zylinder (31) eine Gleitstange (30) untergebracht ist, mit deren Enden die Arme (26) der Arretierung (28) verbunden sind. 30
13. Eine Maschine gemäß Anspruch 12, **dadurch gekennzeichnet, dass** der genannte Zylinder (31) mit einem Ende eines Hebels (40) verbunden ist, der an seinem anderen Ende einen entsprechenden Drehzapfen (39) trägt, mit dem das Ende einer Stange (30) verbunden ist, welche innen in einem Zylinder (37) bewegt werden kann, wobei der genannte Zy- 35

linder (37) jeweils mit Hilfe eines Drehzapfens (38) mit einer Wand des genannten Waggons (20) verbunden ist.

Revendications

1. Machine pour la maintenance des plates-formes d'une voie de chemin de fer, comprenant un wagon équipé (1) muni de moyens (13) adaptés pour soulever temporairement les rails (8) d'une voie (7), de moyens d'excavation (23) adaptés pour retirer le matériau de la plate-forme (10) située sous la voie soulevée (7) et de moyens (18) pour soulever et faire tourner au moins une des traverses (9', 9'') par rapport aux rails (8) de la voie (7), **caractérisée en ce qu'elle** comprend au moins une unité pour démolir et abaisser la plate-forme située, par rapport à la direction (S) de progression du wagon équipé (1), en amont desdits moyens (13) de soulèvement des rails (8) et en aval desdits moyens d'excavation (23), et comprend une pluralité de moyens de démolition (17, 17') adaptés pour rompre un certain tronçon de plate-forme (10), à la fois à l'intérieur et à l'extérieur des rails (8), lesdits moyens de démolition (17, 17') étant adaptés pour agir dans l'espace vide laissé par la traverse (9'') destinée à être soulevée et tournée par lesdits moyens de soulèvement et de rotation (18), et ladite traverse étant destinée à être portée par lesdits moyens (18) vers une nouvelle position en amont des moyens d'excavation (23) et sur la plate-forme remise en état et abaissée (10'). 40
2. Machine selon la revendication 1, **caractérisée en ce que** ladite unité de démolition comprend au moins un marteau pneumatique (17) positionné extérieurement à chacun des rails (8) de la voie (7) et un ou plusieurs marteaux pneumatiques (17') positionnés entre les rails (8). 45
3. Machine selon la revendication 1, **caractérisée en ce que** lesdits moyens de démolition (17, 17') comprennent des actionneurs (45, 45') pour leur abaissement et leur soulèvement, la partie fixe (46, 46') desdits actionneurs étant solidaire d'une poutre longitudinale (2) du wagon (1). 50
4. Machine selon la revendication 1, **caractérisée en ce que** lesdits moyens de démolition (17, 17'), positionnés à la fois intérieurement et extérieurement aux rails (8), sont alignés transversalement. 55
5. Machine selon la revendication 2, **caractérisée en ce que** lesdits marteaux pneumatiques (17') internes aux rails (8) comprennent des moyens (49, 52, 57) capables de permettre leur déplacement au moins dans une direction transversale par rapport à la voie (7).

6. Machine selon la revendication 5, **caractérisée en ce que** lesdits marteaux pneumatiques (17') internes aux rails (8) sont connectés à un bogie (49) qui peut se déplacer transversalement sur des guides (43) solidaires de la poutre longitudinale (2) du wagon (1). 5

7. Machine selon la revendication 5, **caractérisée en ce que** les marteaux pneumatiques (17') internes aux rails (8) sont connectés au moyen d'axes d'oscillation respectifs (58) à une poutre de support (51) connectée par des moyens actionneurs respectifs (45') pour l'abaissement et le soulèvement à la poutre longitudinale (2) du wagon (1). 10
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8. Machine selon la revendication 7, **caractérisée en ce que** lesdits marteaux pneumatiques internes (17') sont connectés l'un à l'autre par au moins un actionneur (52) qui commande leur rotation autour desdits axes d'oscillation (58) de manière qu'ils puissent mutuellement se séparer et se rapprocher. 20

9. Machine selon la revendication 1, **caractérisée en ce que** lesdits moyens de soulèvement et de rotation d'au moins une traverse (9") des rails (8) comprennent une pince rotative (18) connectée par au moins un actionneur d'abaissement et de soulèvement (19) à la poutre longitudinale (2) du wagon (1). 25

10. Machine selon la revendication 9, **caractérisée en ce que** ladite pince rotative (18) est connectée au sommet avec un bogie (20) capable de se déplacer longitudinalement, par des moyens d'actionnement appropriés (44), sur des guides (43) solidaires de la poutre longitudinale (2) du wagon (1). 30
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11. Machine selon la revendication 9, **caractérisée en ce que** ladite pince rotative (18) comprend au moins deux bras (26) pour saisir la traverse (9"), connectés l'un à l'autre par un actionneur (28) pour se rapprocher et se séparer mutuellement. 40

12. Machine selon la revendication 9, **caractérisée en ce que** ledit actionneur (9) comprend un cylindre (31) connecté à deux moyens de rotation (30, 37) situés dans ledit bogie (20), dans ledit cylindre (31) étant logée une tige coulissante (30) aux extrémités de laquelle sont connectés les bras (26) de pinces (28). 45

13. Machine selon la revendication 12, **caractérisée en ce que** ledit cylindre (31) est connecté à une extrémité d'un levier (40) portant à son autre extrémité un axe de rotation (39) auquel est connectée une extrémité d'une tige (30) mobile à l'intérieur d'un cylindre (37), ledit cylindre (37) étant connecté par un axe de rotation (38) à une paroi dudit wagon (20). 50
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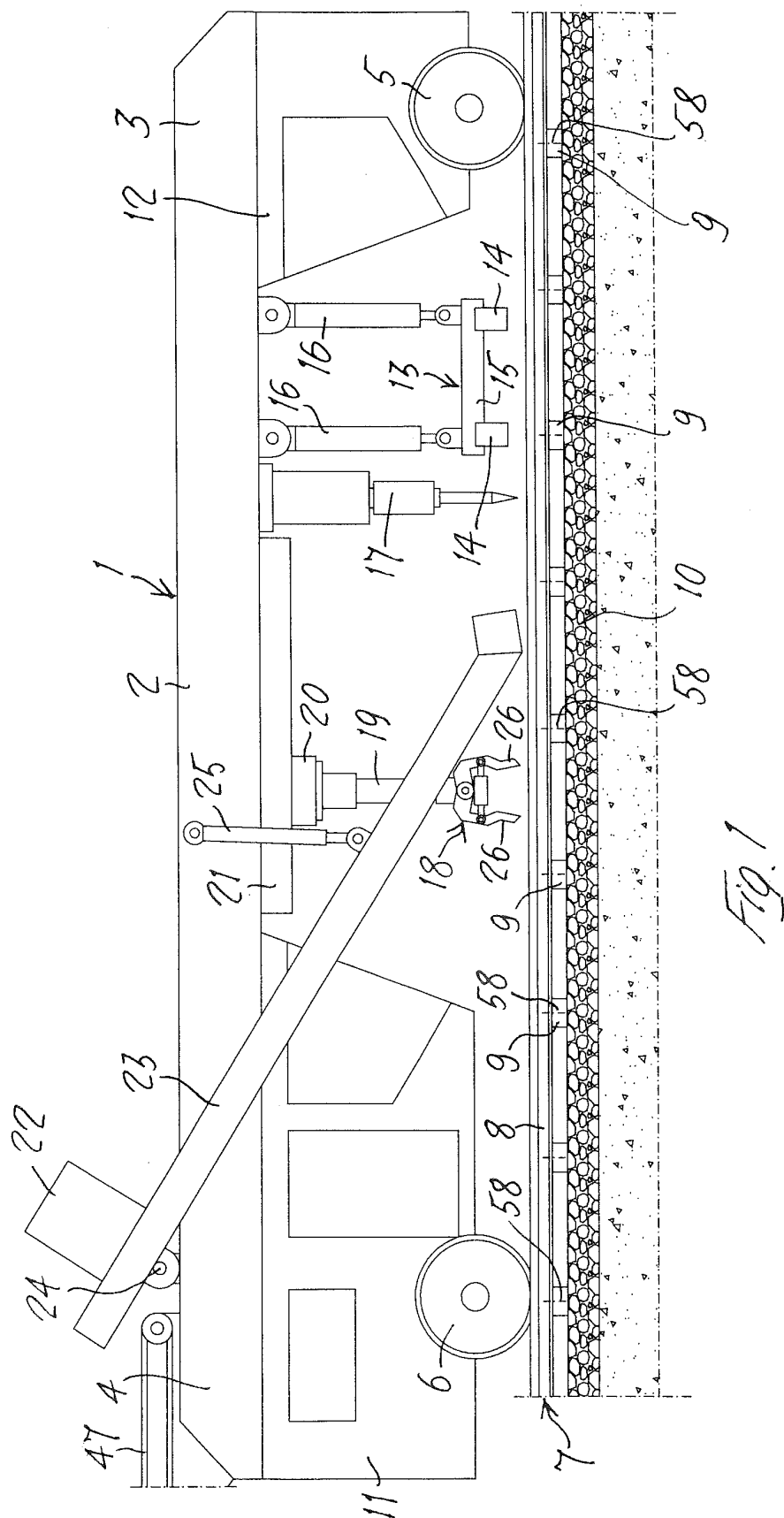
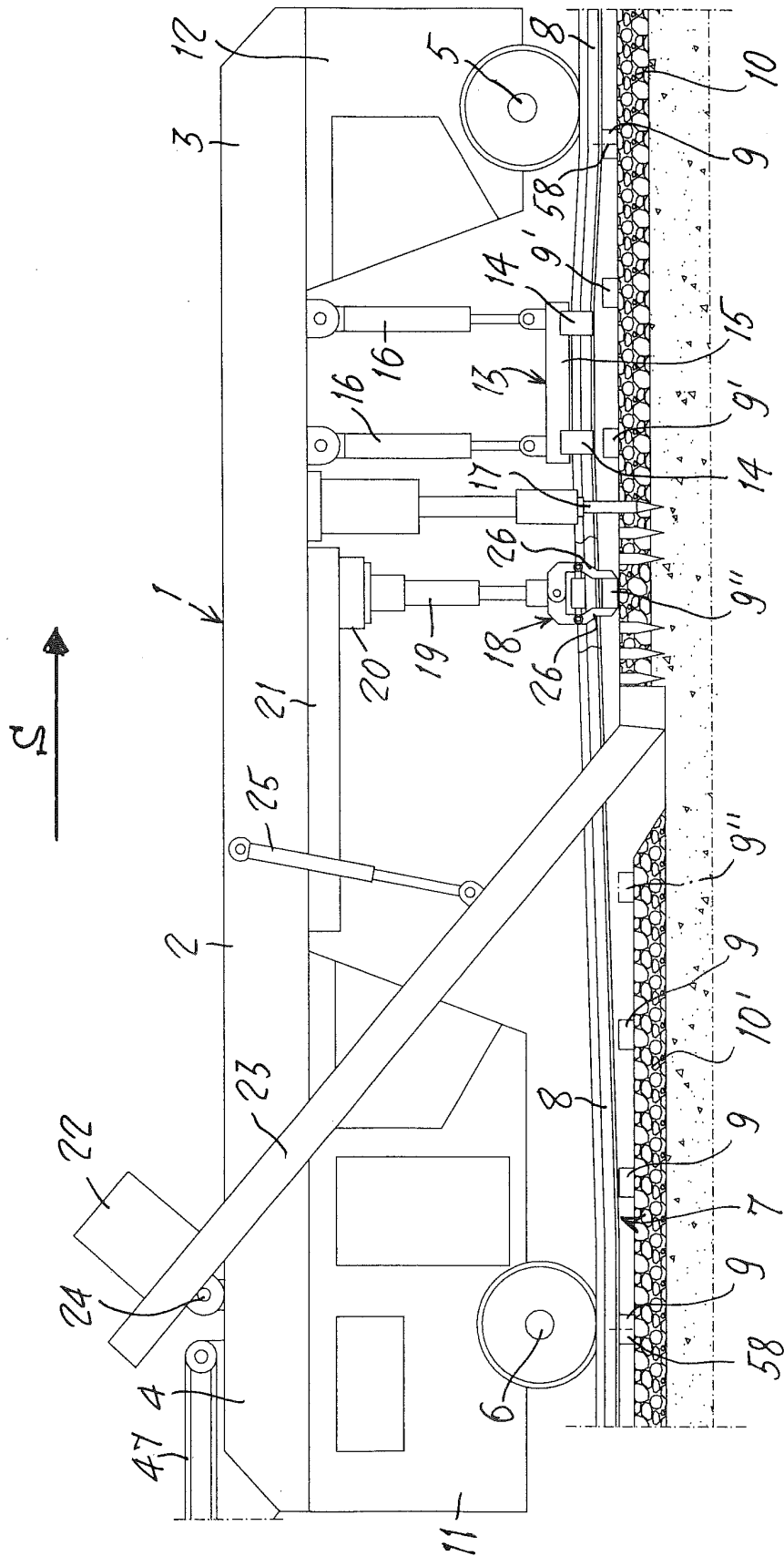
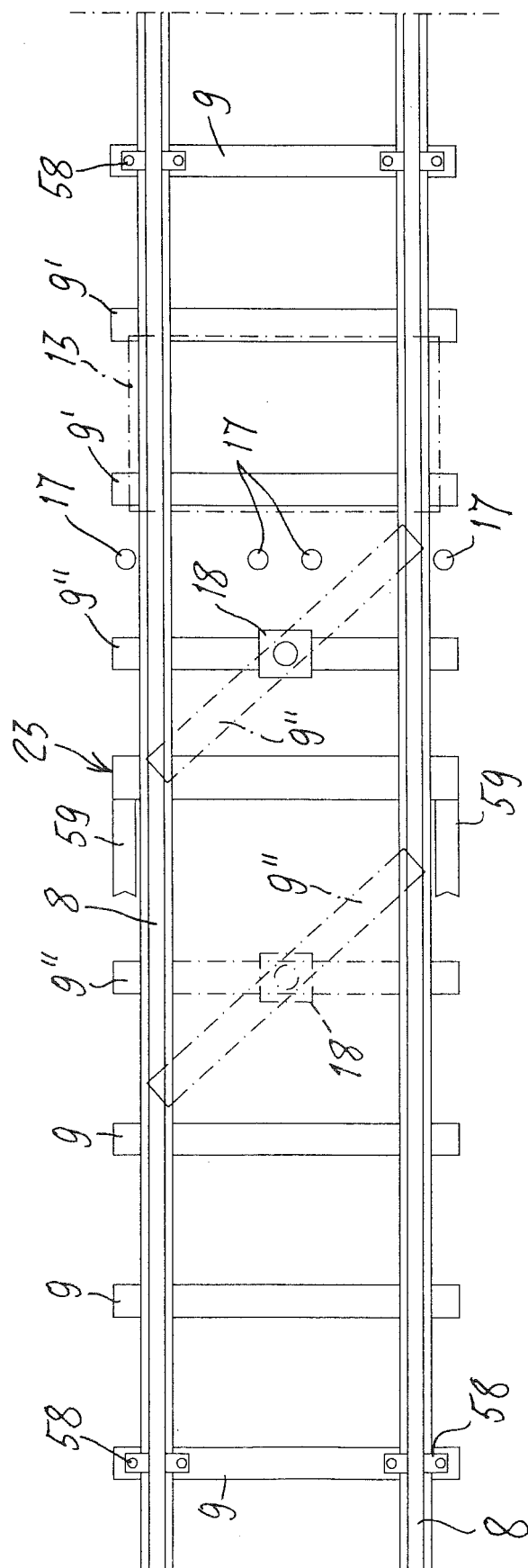
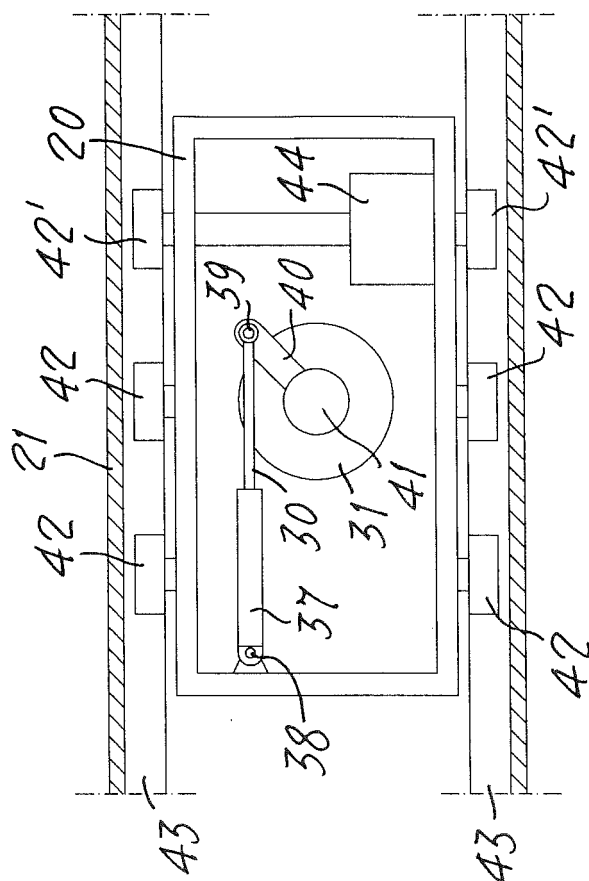
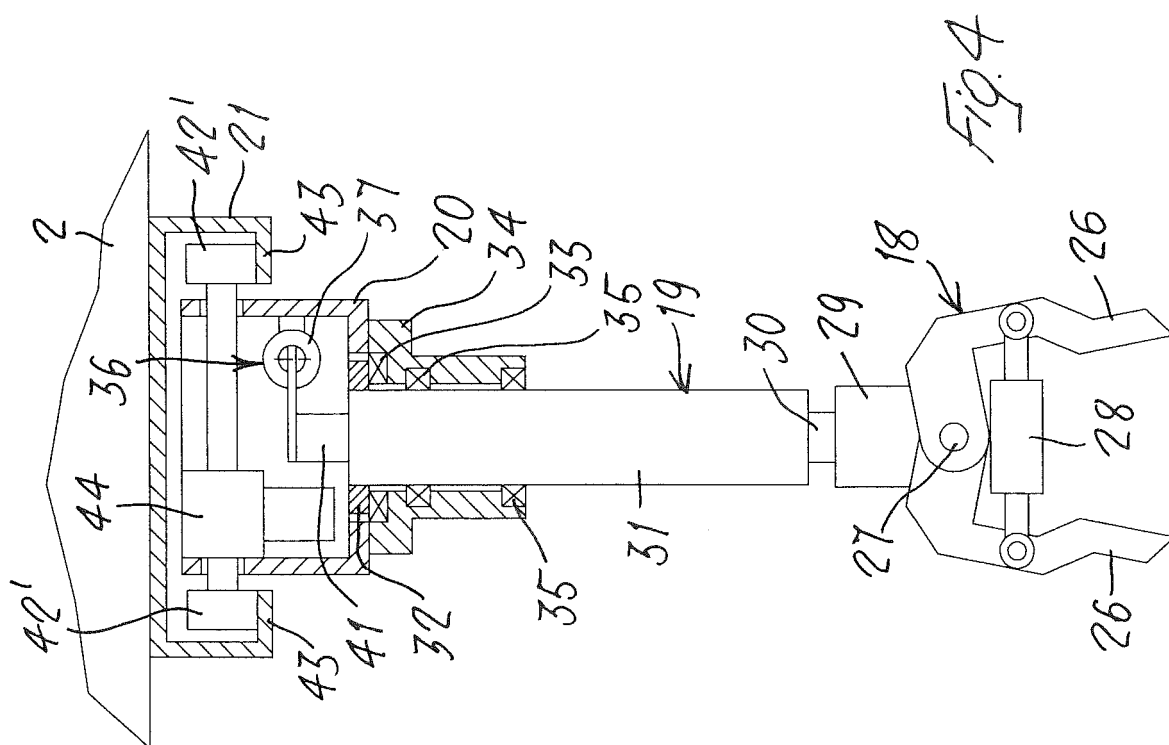
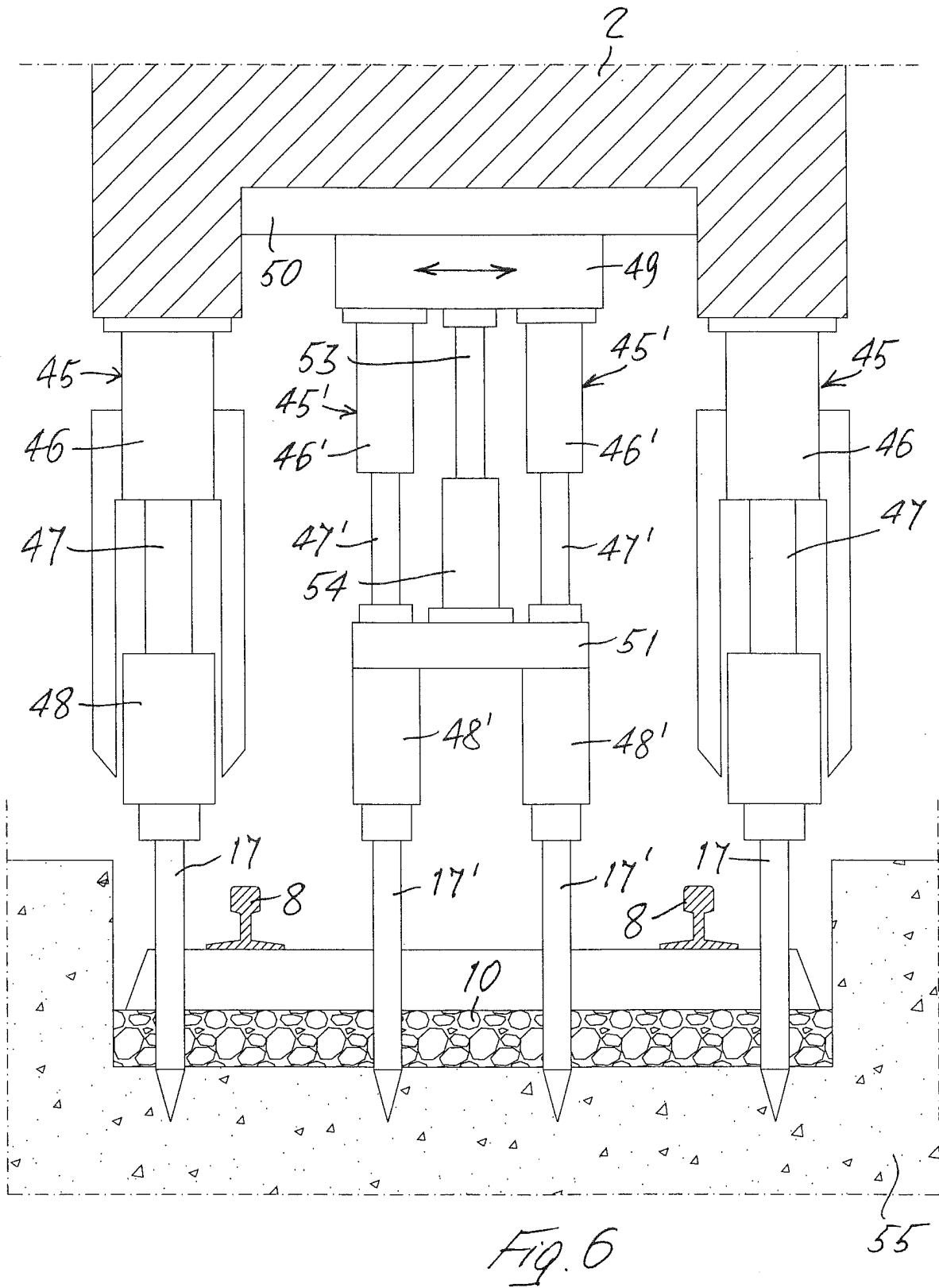


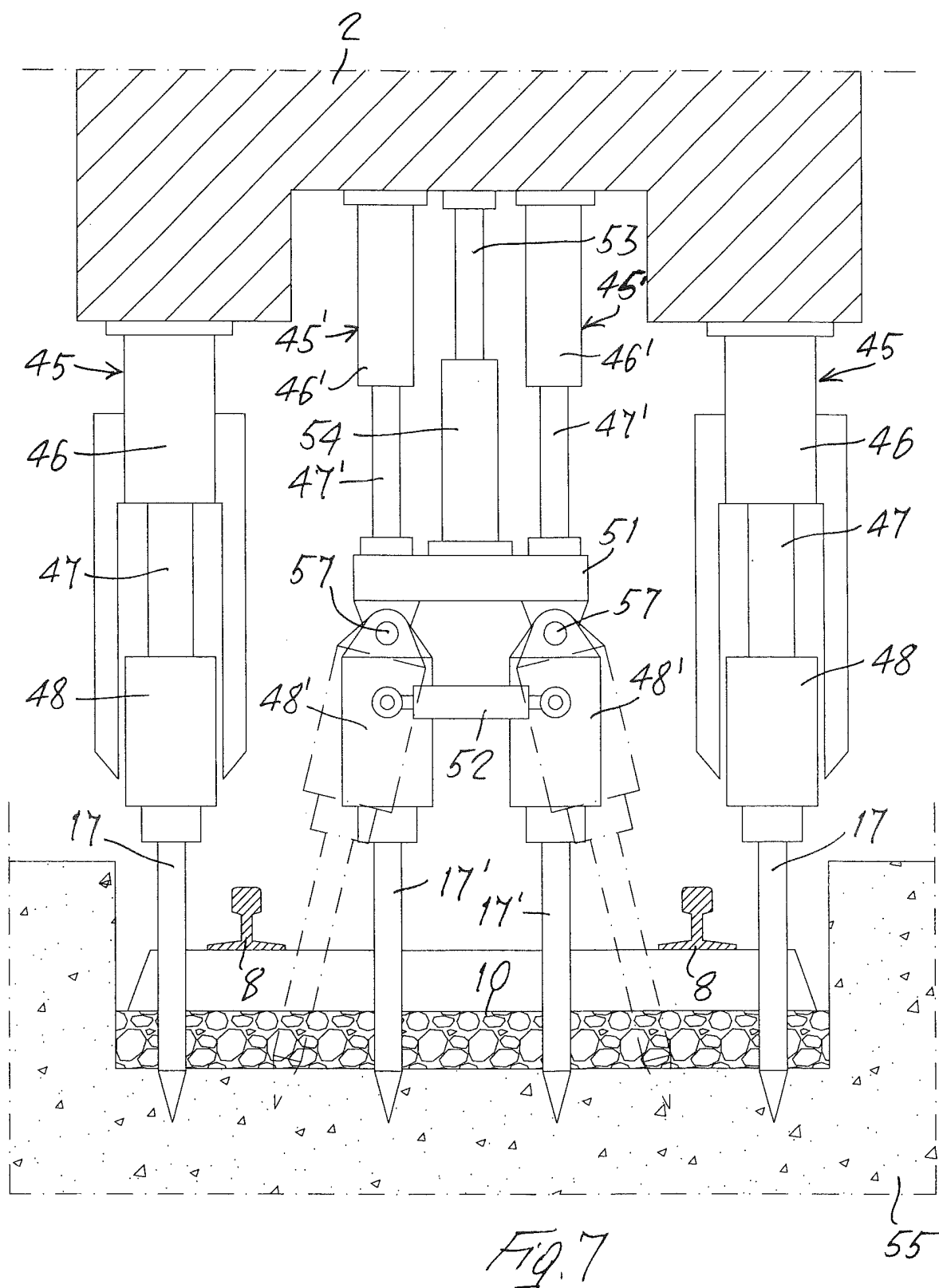
FIG. 1











REFERENCES CITED IN THE DESCRIPTION

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