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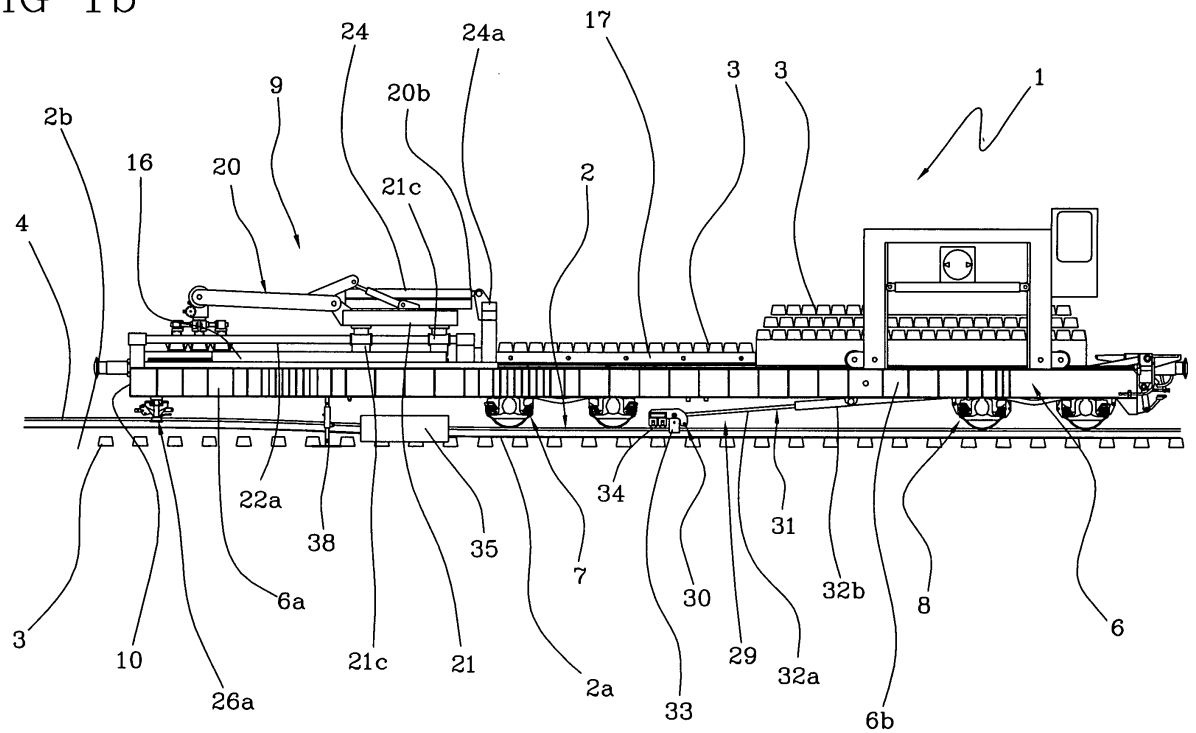
(54) A wagon for laying railways tracks

(57) A wagon (1) for laying railway tracks (2) comprises: a supporting frame (6) with a leading bogie (7) and a trailing bogie (8), both engaged under the frame (6) and mobile on a section (2a) of track already formed; pick up means (9) located on the frame (6) to place at least one sleeper (3) between the rails (4) of a section (2b) of track not yet formed; at least one lifting part (26a) for lifting the rails off the ballast and attached to the frame (6) at its front end. The pick up means (9) are positioned on a front portion of the frame (6a) above the section (2b) of track not yet formed and extending between the leading bogie (7) and a front end (10) of the frame.

FIG 1b



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Description

[0001] The present invention relates to a wagon for laying railway tracks of the type comprising the characteristics described in the preamble to claim 1.

[0002] Railway tracks are usually laid by placing the sleepers (transversal supports) under the respective rails. In this way, the sleepers which may be made of wood, concrete, asbestos cement or metal, form a strong frame on top of the ballast, which supports the two rows of rails and to which the rails are rigidly fixed, maintaining their distance from one another.

[0003] The sleepers are laid using road - rail loaders or rail loaders set up to lift the rails previously placed on the ballast, and seat the sleepers under the rails. Once the sleepers have been laid, the rails are connected to the sleepers with special fastenings.

[0004] As is known, there are railway wagons which run on tracks already formed for working on a track not yet formed adjacent to and parallel with the track on which said wagon runs. Said wagons have a first mechanical arm with a pick up part which can engage with the rails of the track to be formed to lift the rails. In this way, a second mechanical arm grips the sleepers stored on the wagon and places them under the rails lifted by the first arm. In this way, the sleepers are placed one by one under the rails, suitably distanced and then connected to the respective rails.

[0005] However, such railway wagons have an important disadvantage. As indicated above, the railway wagons operate on two tracks, consequently interrupting an entire section of railway. As well as the track to be formed being unusable, the adjacent track is occupied by the wagon.

[0006] To overcome this disadvantage railway wagons are used which can travel on the track to be formed. In particular, wagons of this type can travel on a section of the track already formed and work on the remaining section of track not yet formed (see patents US 3 691 957 and US 3 638 577).

[0007] Such railway wagons are also equipped with an arm able to pick up the sleepers and place them under the rails lifted by special grippers located under the wagon.

[0008] Such railway wagons are also equipped with movement means located under the wagon and resting on the ballast in the section of track not yet formed.

[0009] The movement means usually consist of tracked bogies which rest on the ballast, supporting a front section of the wagon. In this way, the wheels of the railway wagon can travel up to the section of track formed, that is to say, up to a section in which the sleepers have already been laid under the rails. The front zone of the wagon in which the mechanical arm operates is supported by the tracked bogie resting on the ballast in a zone where the sleepers have not yet been laid. Moreover, the tracked bogie is suitably motorised so as to gradually move the entire railway wagon forwards as the sleepers are laid in position.

[0010] Yet even such railway wagons have important disadvantages.

[0011] A first disadvantage is the fact that the movement of the tracked bogie damages the ballast on which the sleepers rest. It should be noticed that the ballast consists of a layer of crushed stone, which is therefore yielding and easily deformed. As a result, the uneven pressure and traction of the tracked bogie on the ballast redistribute the crushed stone, creating a bumpy surface. Therefore, the sleepers are laid on a ballast that is not flat with the imaginable consequences in terms of safety.

[0012] Moreover, another disadvantage is the extremely complex structure of the railway wagon due to the inevitable use of the tracked bogie designed to support the front portion of the wagon.

[0013] Finally, patent DE 10 90 698 describes a wagon equipped to fit the sleepers under the rails which are detached from the railway ballast.

[0014] The aim of the present invention is, therefore, to provide a wagon for laying railway tracks which can work directly on the track to be formed and at the same time keep the ballast intact while laying the sleepers.

[0015] Another aim of the present invention is to provide a wagon for laying railway tracks which has a simple structure.

[0016] These aims and others, which are more apparent in the description below, are achieved by a wagon for laying railway tracks comprising the characteristics described in claim 1 and in the claims dependent on claim 1.

[0017] Further features and advantages are more apparent in the detailed description of a preferred, non-limiting embodiment, of a wagon for laying railway tracks in accordance with the present invention.

[0018] This description is made with reference to the accompanying drawings, provided purely by way of example and, therefore, without limiting the scope of the invention, and in which:

- Figures 1a - 1h are side views of a wagon made in accordance with the present invention during different operating steps for the formation of a railway track;
- Figures 2a, 2b are schematic top plan views of a construction detail of the wagon illustrated in Figures 1a - 1h, with some parts cut away to better illustrate others;
- Figures 3a, 3b are schematic side elevation views of a construction detail of the wagon illustrated in Figures 1a - 1h, with some parts cut away to better illustrate others;
- Figures 4a - 4d are schematic top plan views of another construction detail of the wagon illustrated in Figures 1a - 1h, with some parts cut away to better illustrate others;
- Figure 5a is a schematic top plan view of sleeper pick up means attached to the wagon illustrated in

Figures 1a - 1h, with some parts cut away to better illustrate others;

- Figure 5b illustrates a construction detail of the means illustrated in Figure 5a;
- Figures 6a - 6c are front elevation views of the wagon illustrated in Figures 1a - 1h in three different operating conditions, with some parts cut away to better illustrate others; and
- Figure 7 is a front elevation view of a construction detail of the wagon in accordance with the present invention.

[0019] With reference to the accompanying drawings, the numeral 1 denotes as a whole a wagon for laying railway tracks.

[0020] In particular, the wagon 1 consists of a railway vehicle set up to travel on a track 2 and designed to place a plurality of sleepers 3 under rails 4 already laid on ballast 5 (not illustrated in the accompanying drawings in which it corresponds to the zone under the sleepers). In greater detail, the wagon 1 travels on the track 2 at a section 2a of track already formed and places the sleepers 3 on a section 2b of track not yet formed consecutive to the section 2a of track formed.

[0021] The wagon 1 comprises a supporting frame 6 having a leading bogie 7 and a trailing bogie 8, both engaged under the frame 6.

[0022] The frame 6, of the known type and therefore not described in detail, has a mainly flat shape and is a supporting structure for the bogies 7, 8 and the parts which lay the sleepers 3.

[0023] The bogies 7, 8 are also of the known type widely used in railway vehicles and have a supporting structure 7a, 8a supporting relative wheels 7b, 8b which run on the rails 4. In this way, the wagon 1 can travel, on its own if motorised or driven by a locomotive (not illustrated), on the section 2a of track already formed.

[0024] The wagon 1 also comprises pick up means 9 located on the frame 6 for placing at least one sleeper 3 under the rails 4 of the section 2b of track not yet formed. As illustrated in Figures 1b to 1h, the pick up means 9 are located on a front portion 6a of the frame 6 positioned above the section 2b of track not yet formed.

[0025] In detail, at least in the wagon operating condition, the front portion 6a of the frame 6 is between the leading bogie 7 and a front end 10 of the frame 6. It should also be noticed that, when the wagon 1 is ready to place the sleepers 3 under the rails 4 (Figures 1b - 1h), the front end 6a of the frame 6 is suspended over the ballast 5 on which the track 2 extends.

[0026] In particular, it should be noticed that, in the preferred embodiment of the present invention, when the wagon 1 is in the transport condition, in which it travels on a section 2a of track already formed (Figure 1a), the leading bogie 7 is close to the front end 10; whilst in the condition in which the wagon is ready to lay the sleepers 3, the bogie 7 is distanced from the front end 10.

[0027] In greater detail, the wagon 1 has movement means 11 attached to the frame 6 and operatively engaged with the leading bogie 7 to move the leading bogie 7 between a first position in which it is close to the front end 10 of the frame 6 (Figure 3a), and a second position in which it is distanced from the front end 10 to form the front portion 6a (Figure 3b).

[0028] It should be specified that the movement means 11 for the leading bogie 7 may consist of any part designed to move the bogie 7 along a direction parallel with the longitudinal extension of the frame 6 and the track 2.

[0029] In a preferred embodiment illustrated in detail in Figures 2a, 2b, 3a and 3b, the movement means 11 consist of a rotary shaft 12 attached to a motor 13 and pivoting at the supporting frame 6.

[0030] The shaft 12 turns about an axis perpendicular to the longitudinal extension of the frame 6 in two directions of rotation to roll onto itself two transmission parts 14a, 14b which each connect the rotary shaft 12 to the supporting structure 7a of the leading bogie 7. Advantageously, both of the transmission parts 14a, 14b consist of a flexible cable or belt, passing through a series of return rollers 15 suitably arranged.

[0031] In detail, one end of the first transmission part is connected to a point A of the frame 6 close to the second position of the bogie 7 (see in particular Figures 3a and 3b). The first transmission part 14a is then returned by a first roller 15a engaged under the supporting structure 7a until it engages around the shaft 12.

[0032] Figures 2a and 2b show how the second transmission part 14b has a first end fixed to the shaft 12 and then extends to a second roller 15b at the first position of the bogie 7. The second roller 15b then returns the second transmission part to a third roller 15c engaged with the supporting structure 7a, on the opposite side to the first roller 15a. Finally, the second end of the second transmission part 14b is connected to a point B of the frame 6 also close to the first position of the bogie 7.

[0033] In this way, rotation of the shaft 12 allows the supporting structure 7a and as a result the entire leading bogie 7 to be moved away from/towards the shaft 12 and the front end 10 of the wagon.

[0034] Figures 2a, 2b, 3a, 3b show how, when the shaft 12 turns clockwise the second transmission part 14b is wound around the shaft 12 whilst the first transmission part 14a is unwound. In this way, the leading bogie 7 is moved towards its first position. In contrast, when the shaft 12 turns anti-clockwise, the first transmission part 14a is wound up and the second transmission part 14b is unwound. As a result, the leading bogie 7 is moved to the second position.

[0035] It must also be emphasised that, with suitable devices, the two transmission parts 14a, 14b may also be substituted by a single transmission part with its ends fixed to points A and B and wound around the shaft 12.

[0036] The supporting frame 6 also has a rear portion 6b opposite and adjacent to the front portion 6a. As is better illustrated in Figures 1a - 1h, the rear portion 6b supports a plurality of sleepers 3 prepared for laying on

the ballast 5.

[0037] In greater detail, the front portion 6a and the rear portion 6b respectively have a first and a second feed device 16, 17 for moving the sleepers 3 on the frame 6 forwards.

[0038] In detail, the first feed device 16 is mobile along the front portion 6a to carry at least one sleeper 3 to the front end 10 (Figures 4a - 4d).

[0039] The second feed device 17 has a sleeper storage zone 17a in which the sleepers 3 accumulate, and a transport zone 17b in which the sleepers 3 are fed to the first feed device 16 (Figure 1).

[0040] The transfer of the sleepers from the storage zone 17a to the transport zone 17b is guaranteed by a bridge crane device 17c of the known type therefore not illustrated in detail (Figure 1).

[0041] Advantageously, the transport zone 17b has a pilgrim step feed device, a conveyor belt or another technically equivalent part (all of which are not illustrated in detail, since they are of the known type), designed to place at least one sleeper 3 on the first feed device 16.

[0042] In the preferred, non-limiting embodiment illustrated, the feed device feeds the sleepers 3 on the first device 16 in groups of three.

[0043] In this way, in each operating cycle the first feed device 16 receives three sleepers 3 at a time positioned transversally to the longitudinal extension of the frame 6.

[0044] In particular with reference to Figures 4a - 4d, it should be noticed that the first feed device 16 comprises a carriage 18 which slides along the front portion 6a between a loading position in which it is close to the second feed device 17 (Figures 4a, 4b) and an unloading position in which it is alongside the front end 10 (Figures 4c, 4d).

[0045] In greater detail, the carriage 18 consists of a framework 18a with suitable wheels (not visible) which run on longitudinal guides 18b extending along the longitudinal extension of the front portion 6a.

[0046] The carriage 18 is preferably moved by a linear actuator 18c, for example a pneumatic piston connected to the frame 6 and acting on a pantograph structure 18d. The pantograph structure 18d engages with the carriage in such a way that, following the thrust/traction of the actuator 18c, the pantograph multiplies the motion and transmits it to the carriage 18, moving the carriage away from/towards the rear portion 6b.

[0047] The carriage 18 also has three supporting elements 19, operatively engaged with the framework 18a and each designed to support a sleeper 3.

[0048] The supporting elements 19 have respective sliding means 19a for moving the elements 19 on the framework 18a towards and away from one another. In this way, the supporting elements 19 are brought alongside one another in the carriage loading position (Figures 4a, 4b) and distanced from one another in the unloading position (Figures 4c, 4d). In the embodiment illustrated, the sliding means 19a comprise two actuators 19b each fixed between two different supporting elements 19.

[0049] As is better illustrated in the accompanying drawings 1a - 1h, the pick up means 9 comprise a mobile arm 20 located above the first feed device 16, and having a pick up head 39. The arm 20 is mobile between a first position in which the head 39 can pick up the sleepers 3 positioned on the carriage 18 in the unloading position (Figures 1a, 1b), and a second position in which it projects at least partially in front of the frame 6 to place the sleepers 3 under the rails 4 (Figures 1d - 1g). The pick up means 9 also comprise a carrier element 21 which runs along at least a first guide 22a extending along the front portion 6a, and carries the arm 20. Advantageously, as illustrated in the top view in Figure 5a, the carrier element 21 runs along two first guides 22a, parallel with the longitudinal extension of the frame 6. The first guides 22a also allow the carrier element 21 to run above the first device 16 (Figures 1a - 1h).

[0050] The connection between the carrier element 21 and the first guides 22a is guaranteed by special bushings 21c integral with the carrier element 21 and slidably mounted on the first guides 22a.

[0051] It should also be noticed that, in a prudential embodiment, the bottom of the carrier element 21 may be fitted with wheels 21a of the known type and therefore not described in detail, operatively engaged in second guides 22b so that it runs on the second guides 22b. However, usually either the first guides 22a only or the second guides 22b only are present.

[0052] Figure 5b is a detailed view of a wheel 21a attached to the second guide 22b. It should be noticed that at least one second guide 22b also has a coupling element 22c, extending along part of the second guide 22b and having a substantially "C"-shaped profile in cross-section. The coupling element 22c is connected to the frame 6 and has an undercut attached to an auxiliary wheel 21b alongside the rear wheel 21a. In this way, the auxiliary wheel 21b runs on the undercut, always keeping the wheel 21a attached to the second guide 22b.

[0053] The arm 20 is mounted on the carrier element 21 which is mobile between a first position in which it is close to the rear portion 6b (Figure 1a), and a second position in which it is close to the front end 10 (Figures 1d - 1g).

[0054] As is better illustrated in Figure 5a, the arm 20 may advantageously consist of two parallel rods 20c having a rear end pivoting at the carrier element 21.

[0055] In a preferred embodiment, the rods 20c are each moved by a pneumatic piston 20e connected between the carrier element 21 and an intermediate portion of the rods. In this way, the rods are mobile in a vertical plane above the front portion 6a of the frame and in front of the front end 10.

[0056] The front ends of the rods 20c are connected to one another by a transversal bar 20d on which the head 39 is mounted. The pick up head 39, in turn, comprises a plurality of grippers 23 each of which can engage with a sleeper 3 located on the carriage 18.

[0057] The pick up means 9 also have at least one actuator 24 (two in the accompanying drawings), with a

first end 20a fixed to the carrier element 21 and a second end 20b connected to the frame 6, designed to make the carrier element 21 run on the guides 22a, 22b. It should be noticed that the actuator 24 engages with the frame 6 by means of an upright 24a projecting above the first conveyor device 16.

[0058] Moreover, the connection between the head 39 and the arm 20 is guaranteed by a sliding element 25 slidably mounted on the transversal bar 20d (Figure 6a - 6c).

[0059] Thanks to the sliding element 25, if the sleepers 3 must be placed in a position that is off-centre relative to the rails 4 (for example when the track curves), the head 39 can be moved sideways as illustrated in Figures 6a and 6c, to position the sleepers 3 correctly relative to the rails 4.

[0060] As indicated above, the head 39 has a plurality of grippers 23, preferably three grippers 23 of the known type, each set up to grip/release the respective sleeper 3. As is better illustrated in Figure 5a, the grippers 23 are attached to a rotation part 26, also of the know type and so not described and illustrated in detail.

[0061] The rotation part 26 allows the grippers 23 to be rotated about a vertical axis to angle the grippers 23 between a pick up and release position, in which the sleepers 3 have their longitudinal extension perpendicular to the longitudinal extension of the track 2 (see Figures 1a - 1c and 1f - 1h), and a transit position in which the sleepers 3 are positioned parallel with the longitudinal extension of the track 2 (see Figures 1d, 1e) and can be inserted vertically between the two rails 4.

[0062] As illustrated in Figures 5a, 6a - 6c, the grippers 23 are offset from one another (in particular those relative to the central sleeper 3 are shifted towards the ends of the relative sleeper 3).

[0063] Moreover, as illustrated in Figure 1g, the grippers 23 can move relative to one another between a position in which they are close together (Figures 1b - 1f) and a position in which they are distanced from one another (Figure 1g).

[0064] It should also be specified that, in the arm 20 second position in which it projects above and outside the wagon 1 (see in particular Figure 1d), the coupling element 22c always keeps the carrier element 21 attached to the second guides 22b, preventing possible deformation/damage to the first guides 22a. Indeed, in the condition in which the arm 20 projects outside the wagon 1, the weight of the sleepers 3 may tend to tip the carrier element 21 forwards. In this situation, the coupling element 22c (see Figure 5b) always keeps the respective wheels 21a (only the rear wheels in the accompanying drawings) attached to the second guides 22b.

[0065] The wagon 1 also comprises a lifting part 26a attached to the frame 6 at the front end 10. The lifting part 26a operates on the rails 4 to lift them and is vertically mobile between a retracted position in which it is distanced from the ballast 5 and an extended position in which it is close to the ballast 5.

[0066] In greater detail, the lifting part 26a consists of two pick up portions 27, more clearly visible in Figures 6a - 6c, distanced from one another and each able to engage with a respective rail 4. Each pick up portion 27 is designed to lift the respective rail 4 off the sleepers 3 already laid, in a section under the front portion 6a.

[0067] In even greater detail, each pick up portion 27 has two wheels 28 rotating about their own axes and each supported by a rotary support 28a. The rotary supports of each pick up portion 27 are attached to a pneumatic piston (not visible) which moves the entire pick up portion 27 vertically.

[0068] The rotary support 28a of each wheel 28 can be suitably moved to turn about an axis parallel with the longitudinal extension of the track 2. In this way, the rotary supports 28a of each pick up portion 27 can rotate about the respective axis to move the wheels 28 towards/away from one another and engage/release the relative rail 4.

[0069] Advantageously, when the lifting part 26a is in the extended position the wheels 28 of each pick up portion 27 are moved towards one another to grip the respective rail 4. Once clamped on the rail 4, the wheels 28 illustrated in the accompanying drawings have axes of rotation which converge with one another under the pick up portion 27.

[0070] In this situation, if the lifting part 26a is moved to the retracted position, the rails 4 are detached from the sleepers 4 and lifted towards the frame 6.

[0071] Moreover, as the entire wagon 1 moves on the section 2a of track already formed, the wheels 28 run on the respective rail 4, keeping it raised.

[0072] As illustrated in Figures 6a - 6c, the lifting part 26a can also move transversally to the track to follow the rails 4, similarly to the pick up head 39.

[0073] The wagon 1 also comprises forward movement means 29 for precisely moving the wagon 1 along the track 2 when the leading bogie 7 is in the second position.

[0074] In particular, in the embodiment illustrated, the forward movement means 29, advantageously housed under the rear portion 6b between the leading bogie 7 and the trailing bogie 8, have at least one anchoring element 30 which can be selectively coupled to a respective rail 4, and a return part 31 engaged with the frame 6 and attached to the anchoring element 30.

[0075] Even more specifically, the return part 31 has a traction element 32 with a first end 32a attached to the anchoring element 30 and a second end 32b opposite the first end 32a attached to the frame 6. Advantageously, the traction element 32 consists of a pneumatic piston which can extend and retract to vary the distance between the anchoring element 30 and the frame 6.

[0076] In other words, the traction element 32 is mobile between a first position in which the respective ends 32a, 32b are distanced from one another (Figures 1b - 1f), and a second position in which the ends 32a, 32b are close to one another (Figure 1h).

[0077] The anchoring element 30 consists of a con-

necting gripper 33 for gripping the rail 4.

[0078] The wagon is moved forward during track construction operations by extending the traction element 32 (with the gripper 33 released and the wagon braked), coupling the gripper 33 to the rail and retracting the traction element 32 (after disengaging the wagon brake) (Figure 1h). In this way, the wagon moves forwards by a predetermined distance (which is always the same) corresponding to the stroke of the traction element 32.

[0079] The anchoring element 30 also has a sliding element 34 consisting of an idle wheel which runs along the rail 4. In this way, when the grippers 33 release the rail 4, the anchoring element 30 can run along the rail 4 during extension of the traction element 32 (Figure 1b).

[0080] Therefore, advantageously, during track 2 forming operations, and in particular between the steps of laying one group of sleepers (three sleepers) and the next, the wagon 1 can be moved forwards without using a locomotive.

[0081] The wagon 1 also has an aligner device 35 which can be mounted under the frame 6 and is schematically illustrated in Figures 1b - 1h and 7. The aligner device 35 consists of a shaft 36 supporting two wheels 36a which run on the rails 4 (see in particular Figure 7) and rigidly attached to an actuator 37. The actuator 37 has two arms 37a projecting from opposite sides of the actuator 37 and mobile with a to and fro motion along a direction that is substantially horizontal and parallel with the sleepers 3. The actuator 37 preferably consists of a pneumatic piston supporting, at the outer end of the projecting arms 37a, two vertical shoulders 37b perpendicular to the direction of movement of the arms 37a.

[0082] The sleepers 3 are aligned by moving the aligner device 35 over the sleepers to be aligned with the shoulders 37b widened outwards then returning the shoulders inwards. In this way, the sleepers laid by the arm 20 can be aligned with one another and relative to the rails 4.

[0083] The wagon 1 may also be equipped with a stabiliser element 38 for the leading bogie 7, to prevent bogie 7 oscillations about a longitudinal axis (oscillations possible due to the elastic suspensions supporting the wheels 7b).

[0084] The stabiliser device may be attached either directly to the bogie 7 (solution not illustrated) or under the frame 6 to engage with the ballast 5 as illustrated in the accompanying drawings.

[0085] In the embodiment illustrated (Figures 6a - 6c), the stabiliser element 38 has two cylinders 38a projecting at the sides of the frame 6 and under the frame 6. These cylinders 38a are vertically mobile in such a way that they are detached from the ballast 5 during wagon 1 movement (Figure 1a), and rest on the ballast 5 during static sleeper 3 laying steps.

[0086] It should be noticed that the cylinders allow the frame 6 to be stabilised and are positioned at the front portion 6a projecting cantilever style. Moreover, it should also be noticed that the cylinders 38a are engaged at the sides of the track 2 without affecting the area of the ballast 5 on which the sleepers 4 rest.

[0087] The wagon 1, described above in mainly structural terms, allows the sleepers to be positioned under the rails 4 in the section 2a of track not yet formed, gradually moving forwards on the track 2.

[0088] Following the operating steps illustrated in Figures 1a - 1h the wagon is brought into the travel condition until the end of the section 2a of track 2 already formed (Figure 1a).

[0089] In this initial step, three sleepers 3 may be positioned on the carriage 18 in the unloading position, according to the sleeper 3 transport method described above. The sleepers 3 are also suitably spaced to allow the grippers 23 to grip the sleepers 3.

[0090] Then the leading bogie 7 is moved to the second position, in which it is distanced from the front end 10 (Figure 1b). In this step, the lifting part 26a grips the rails 4 and lifts them off the sleepers 3 already positioned but not yet connected. Moreover, the anchoring element 30 is positioned on the rail to connect to the rail 4. In addition, in this step the cylinders 38a are moved so that they make contact with the ballast and stabilise the frame 6.

[0091] At this point, the arm 20 lifts the sleepers 3 (Figure 1c) moving them out of the frame 6 (Figure 1d). Moreover, the sleepers 3 are rotated by the rotation part 26 so that they are parallel with the longitudinal extension of the rails 4.

[0092] As illustrated in Figure 1e the arm 20 brings the sleepers 3 under the rails 4 lifted by the lifting part. Then the sleepers 3 are again rotated until they are transversal to the longitudinal extension of the track 2 (Figure 1f).

[0093] Finally, the arm 20 grippers are moved away from one another to distance the sleepers 3 which are rested on the ballast 5 (Figure 1g) after the carrier device 21 has moved backwards slightly to position the sleepers at the correct distance from those already laid.

[0094] As illustrated in Figure 1h, the arm 20 returns to its initial position to grip other sleepers 3 which in the meantime were picked up by the carriage 18, whilst the forward movement means 29 move the wagon 1 towards the section of track not yet formed.

[0095] The present invention achieves the preset aims and brings important advantages.

[0096] Firstly, it should be noticed that the wagon 1 does not discharge its weight onto the ballast. The front portion 6a projects cantilever style from the leading bogie 7 and is distanced from the ballast 5. It should also be noticed that although the cylinders 38a, when present, rest on the ballast 5, they do not discharge the weight of the wagon onto the ballast, but simply prevent wagon oscillations. It should also be said that the wagon 1 has a simple and compact structure. This simplicity is given by the possibility of moving the leading bogie 7, forming the above-mentioned projecting portion without having to support the front portion with other parts projecting from the frame 6, and without having to increase the overall dimensions of the wagon.

[0097] Moreover, operating cantilever style allows more extensive rail lifting, since the bending point of the rails corresponds to the position of the leading bogie 7.
[0098] In addition, the wagon shape described can operate on the track without the danger of hitting any overhead electrical lines.

Claims

1. A wagon for laying railway tracks comprising:

- a supporting frame (6) having a leading bogie (7) and a trailing bogie (8), both fitted under the frame (6) to move the wagon on a section (2a) of track (2) already formed;
- pick up means (9) located on the frame (6) for placing at least one sleeper (3) under the rails (4) of a section (2b) of track not yet formed, consecutive to the section (2a) of track already formed; and
- at least one lifting part (26a) attached to the frame (6), it being possible to couple the lifting part to the rails (4) to lift them off the ballast (5);

the wagon being **characterised in that** the lifting part (26a) is attached to the frame (6) at its front end (10), and **in that** at least in a wagon (1) operating condition, the pick up means (9) are at least partly mounted on a front portion (6a) of the frame (6) located above the section (2b) of track not yet formed and extending between the leading bogie (7) and the front end (10) of the frame (6).

2. The wagon according to the foregoing claim, **characterised in that** the front portion (6a) extends cantilever style from the leading bogie (7) and is suspended over the ballast (5) on which the track (2) extends.

3. The wagon according to either of the foregoing claims, also comprising movement means (11) attached to the frame (6) and operatively engaged with the leading bogie (7) to move the leading bogie (7) between a first position, corresponding to a wagon (1) travel condition, in which it is moved towards the front end (10) of the frame (6), and a second position, corresponding to the wagon (1) operating condition, in which it is distanced from the front end (10), forming the front portion (6a).

4. The wagon according to the foregoing claim, **characterised in that** the movement means (11) comprise: a rotary shaft (12) attached to a motor (13) engaged with the supporting frame (6); and at least one transmission part (14) for connecting the rotary shaft (12) to a leading bogie (7) supporting structure (7a); the leading bogie (7) running between the first position and the second position along a direction parallel with the longitudinal extension of the wagon (1) and of the track (2).

5. The wagon according to any of the foregoing claims, **characterised in that** the supporting frame (6) has a rear portion (6b) adjacent to the front portion (6a) and designed to support a plurality of sleepers (3).

6. The wagon according to any of the foregoing claims, **characterised in that** the front portion (6a) has a first feed device (16) mobile along the front portion (6a), bringing at least one sleeper (3) to the front end (10).

7. The wagon according to claims 5 and 6, **characterised in that** the rear portion (6b) has a second feed device (17) for the sleepers (3) for placing at least one sleeper (3) on the first feed device (16).

8. The wagon according to claim 7, **characterised in that** the first feed device (16) comprises a carriage (18) that slides along the front portion (6a) between a loading position in which it is close to the second feed device (17) and an unloading position in which it is alongside the front end (10).

9. The wagon according to the foregoing claim, **characterised in that** the sliding carriage (18) has three supporting elements (19), each able to support a sleeper (3); the supporting elements (19) being alongside one another in the carriage (18) loading position and distanced from one another in the unloading position.

10. The wagon according to any of the foregoing claims, **characterised in that** the pick up means (9) comprise an arm (20) supporting a pick up head (39), the arm being mobile between a first position in which the head (39) can pick up the sleepers (3), and a second position in which it at least partially projects outside the frame (6) and in which the head can place the sleepers (3) under the rails (4).

11. The wagon according to the foregoing claim, **characterised in that** the pick up means (9) also comprise a carrier element (21) which runs along at least one guide (22a, 22b) extending along the front portion (6a); the carrier element (21) supporting the arm (20) and being mobile between a first position in which it is distanced from the front end (10) and the arm can remain in the respective first position and a second position in which it is close to the front end (10) and the arm (20) can remain in the respective second position.

12. The wagon according to claim 10 and/or 11,

characterised in that the head (39) comprises: a plurality of grippers (23) each able to engage with a sleeper (3); and a gripper (23) rotation part (26) for angling the grippers (23) between a pick up and release position in which the longitudinal extension of the sleepers (3) is perpendicular to the longitudinal extension of the track (2) and a transit position in which the sleepers (3) are parallel with the longitudinal extension of the track (2).

13. The wagon according to claim 12, **characterised in that** the head (39) is connected to the arm (20) by a sliding element (25) mobile relative to the arm (20) along a direction transversal to the longitudinal extension of the track (2).

14. The wagon according to any of the foregoing claims, **characterised in that** the lifting part (26a) comprises two pick up portions (27), distanced from one another and each able to engage with a rail (4), the lifting part being vertically mobile between a retracted position in which it is distanced from the ballast (5) and an extended position in which it is close to the ballast (5).

15. The wagon according to the foregoing claim, **characterised in that** each pick up portion (17) has two wheels (28) which can be moved towards one another when the lifting part (26a) is in the extended position to grip the rail (4); the wheels (28) also running on the rail (4) when the lifting part (26a) is in the retracted position and the rail (4) is detached from the sleepers (3).

16. The wagon according to any of the foregoing claims, **characterised in that** the lifting part (26a) is mobile transversally to the wagon direction of forward movement.

17. The wagon according to any of the foregoing claims, also comprising forward movement means (29) for moving the wagon (1) along the track (2).

18. The wagon according to the foregoing claim, **characterised in that** the forward movement means (29) comprise: at least one anchoring element (30) which can engage with a rail (4); and a return part (31) engaged with the frame (6) and attached to the anchoring element (30).

19. The wagon according to the foregoing claim, **characterised in that** the return part (31) has a traction element (32) with a first end (32a) attached to the anchoring element (30) and a second end (32b) opposite the first end (32a) attached to the frame (6); the traction element (32) being extendable and retractable between a first position in which the ends (32a, 32b) are distanced from one another and a second position in which the ends (32a, 32b) are brought close to one another.

20. The wagon according to claim 19, **characterised in that** the anchoring element (30) has a connecting gripper (33) for gripping the rail (4) and a sliding element (34) for moving the anchoring element (30) along the rail (4) during the relative movements.

21. The wagon according to any of the foregoing claims, also comprising an aligner device (35) which can engage with the frame (6) for aligning the sleepers (3) with one another and relative to the rails (4).

22. The wagon according to any of the foregoing claims, also comprising a leading bogie (7) stabiliser element (38).

Amended claims in accordance with Rule 86(2) EPC.

1. A wagon for laying railway tracks comprising:

- a supporting frame (6) having a leading bogie (7) and a trailing bogie (8), both fitted under the frame (6) to move the wagon on a section (2a) of track (2) already formed;
- pick up means (9) located on the frame (6) for placing at least one sleeper (3) under the rails (4) of a section (2b) of track not yet formed, consecutive to the section (2a) of track already formed; and
- at least one lifting part (26a) attached to the frame (6), it being possible to couple the lifting part to the rails (4) to lift them off the ballast (5);

wherein the lifting part (26a) is attached to the frame (6) at its front end (10), and wherein at least in a wagon (1) operating condition, the pick up means (9) are at least partly mounted on a front portion (6a) of the frame (6) located above the section (2b) of track not yet formed and extending between the leading bogie (7) and the front end (10) of the frame (6); **characterized in that** the wagon also comprises movement means (11) attached to the frame (6) and operatively engaged with the leading bogie (7) to move the leading bogie (7) between a first position, corresponding to a wagon (1) travel condition, in which it is moved towards the front end (10) of the frame (6), and a second position, corresponding to the wagon (1) operating condition, in which it is distanced from the front end (10), forming the front portion (6a).

2. The wagon according to the foregoing claim, **characterised in that** the front portion (6a) extends cantilever style from the leading bogie (7) and is suspended over the ballast (5) on which the track (2)

extends.

3. The wagon according to claim 1, **characterised in that** the movement means (11) comprise: a rotary shaft (12) attached to a motor (13) engaged with the supporting frame (6); and at least one transmission part (14) for connecting the rotary shaft (12) to a leading bogie (7) supporting structure (7a); the leading bogie (7) running between the first position and the second position along a direction parallel with the longitudinal extension of the wagon (1) and of the track (2).

4. The wagon according to any of the foregoing claims, **characterised in that** the supporting frame (6) has a rear portion (6b) adjacent to the front portion (6a) and designed to support a plurality of sleepers (3).

5. The wagon according to any of the foregoing claims, **characterised in that** the front portion (6a) has a first feed device (16) mobile along the front portion (6a), bringing at least one sleeper (3) to the front end (10).

6. The wagon according to claims 4 and 5, **characterised in that** the rear portion (6b) has a second feed device (17) for the sleepers (3) for placing at least one sleeper (3) on the first feed device (16).

7. The wagon according to claim 6, **characterised in that** the first feed device (16) comprises a carriage (18) that slides along the front portion (6a) between a loading position in which it is close to the second feed device (17) and an unloading position in which it is alongside the front end (10).

8. The wagon according to the foregoing claim, **characterised in that** the sliding carriage (18) has three supporting elements (19), each able to support a sleeper (3); the supporting elements (19) being alongside one another in the carriage (18) loading position and distanced from one another in the unloading position.

9. The wagon according to any of the foregoing claims, **characterised in that** the pick up means (9) comprise an arm (20) supporting a pick up head (39), the arm being mobile between a first position in which the head (39) can pick up the sleepers (3), and a second position in which it at least partially projects outside the frame (6) and in which the head can place the sleepers (3) under the rails (4).

10. The wagon according to the foregoing claim, **characterised in that** the pick up means (9) also comprise a carrier element (21) which runs along at least one guide (22a, 22b) extending along the front portion (6a); the carrier element (21) supporting the arm (20) and being mobile between a first position in which it is distanced from the front end (10) and the arm can remain in the respective first position and a second position in which it is close to the front end (10) and the arm (20) can remain in the respective second position.

11. The wagon according to claim 9 and/or 10, **characterised in that** the head (39) comprises: a plurality of grippers (23) each able to engage with a sleeper (3); and a gripper (23) rotation part (26) for angling the grippers (23) between a pick up and release position in which the longitudinal extension of the sleepers (3) is perpendicular to the longitudinal extension of the track (2) and a transit position in which the sleepers (3) are parallel with the longitudinal extension of the track (2).

12. The wagon according to claim 11, **characterised in that** the head (39) is connected to the arm (20) by a sliding element (25) mobile relative to the arm (20) along a direction transversal to the longitudinal extension of the track (2).

13. The wagon according to any of the foregoing claims, **characterised in that** the lifting part (26a) comprises two pick up portions (27), distanced from one another and each able to engage with a rail (4), the lifting part being vertically mobile between a retracted position in which it is distanced from the ballast (5) and an extended position in which it is close to the ballast (5).

14. The wagon according to the foregoing claim, **characterised in that** each pick up portion (17) has two wheels (28) which can be moved towards one another when the lifting part (26a) is in the extended position to grip the rail (4) ; the wheels (28) also running on the rail (4) when the lifting part (26a) is in the retracted position and the rail (4) is detached from the sleepers (3).

15. The wagon according to any of the foregoing claims, **characterised in that** the lifting part (26a) is mobile transversally to the wagon direction of forward movement.

16. The wagon according to any of the foregoing claims, also comprising forward movement means (29) for moving the wagon (1) along the track (2).

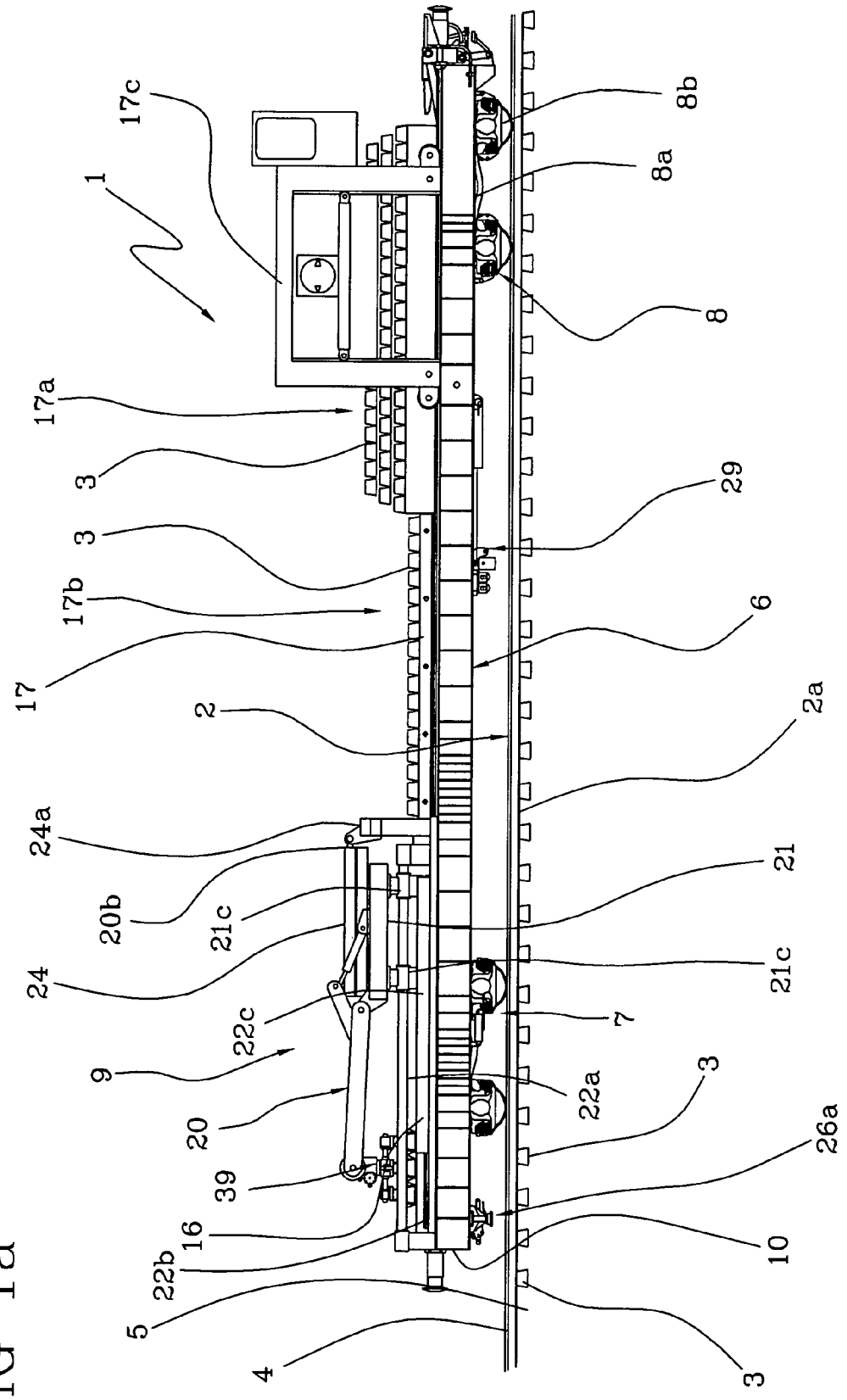
17. The wagon according to the foregoing claim, **characterised in that** the forward movement means (29) comprise: at least one anchoring element (30) which can engage with a rail (4); and a return part (31) engaged with the frame (6) and attached to the anchoring element (30).

18. The wagon according to the foregoing claim, **characterised in that** the return part (31) has a traction element (32) with a first end (32a) attached to the anchoring element (30) and a second end (32b) opposite the first end (32a) attached to the frame (6); the traction element (32) being extendable and retractable between a first position in which the ends (32a, 32b) are distanced from one another and a second position in which the ends (32a, 32b) are brought close to one another.

19. The wagon according to claim 18, **characterised in that** the anchoring element (30) has a connecting gripper (33) for gripping the rail (4) and a sliding element (34) for moving the anchoring element (30) along the rail (4) during the relative movements.

20. The wagon according to any of the foregoing claims, also comprising an aligner device (35) which can engage with the frame (6) for aligning the sleepers (3) with one another and relative to the rails (4).

21. The wagon according to any of the foregoing claims, also comprising a leading bogie (7) stabiliser element (38).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21c
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9
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3
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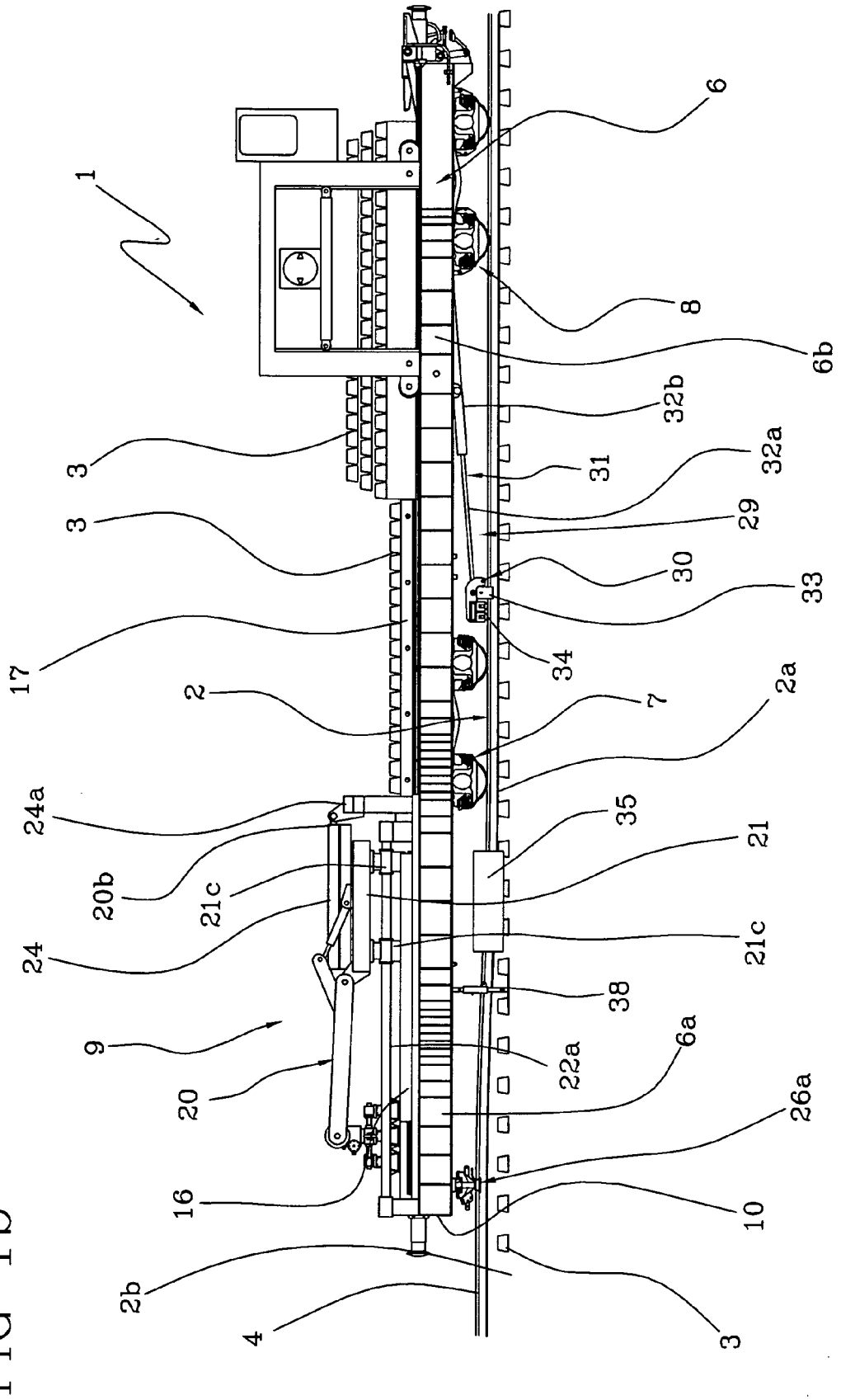
26a
39
16
10
22b
5
4
3

FIG 1a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6a
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26a
16
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2b
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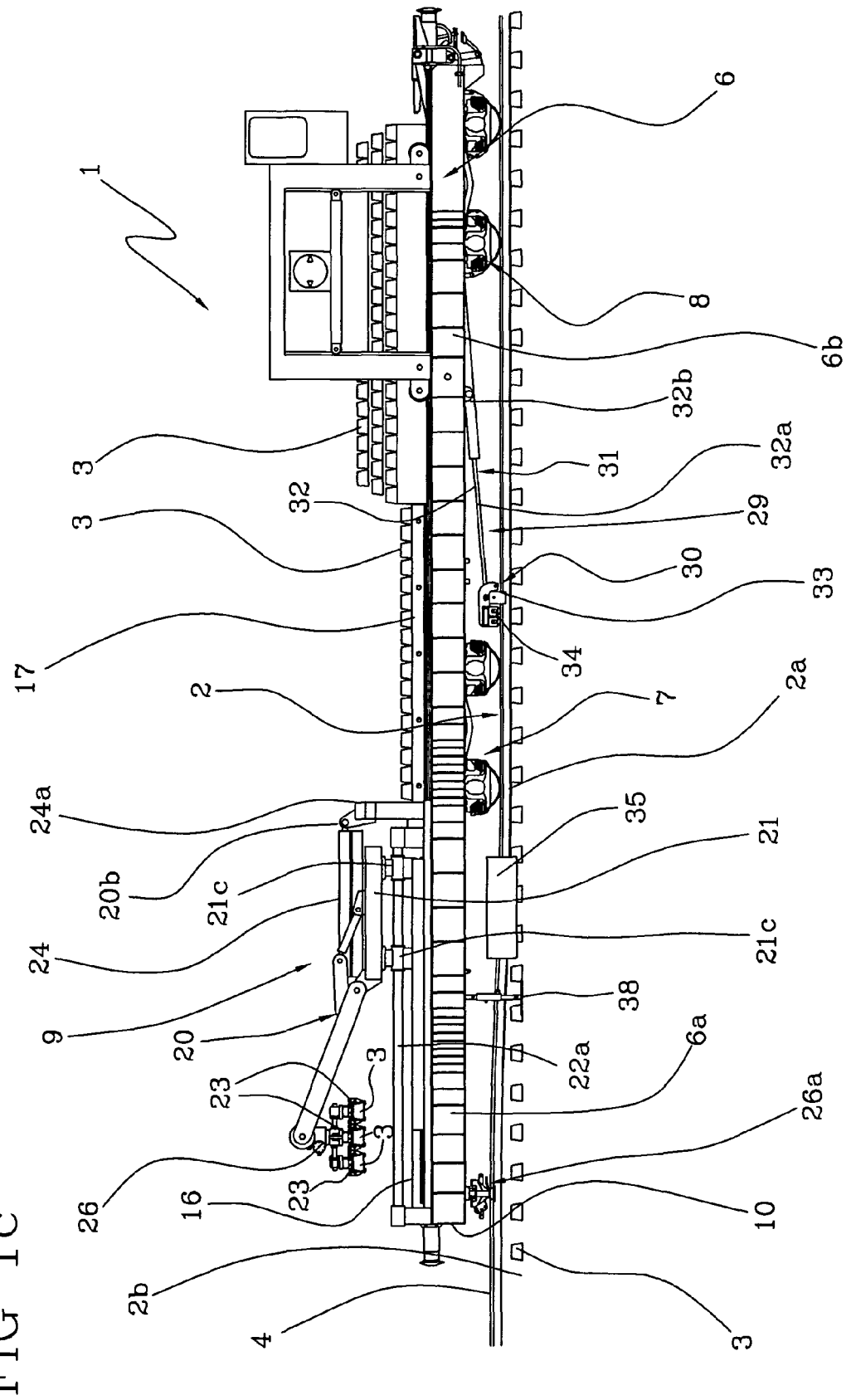
3

FIG 1b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6a
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26
16
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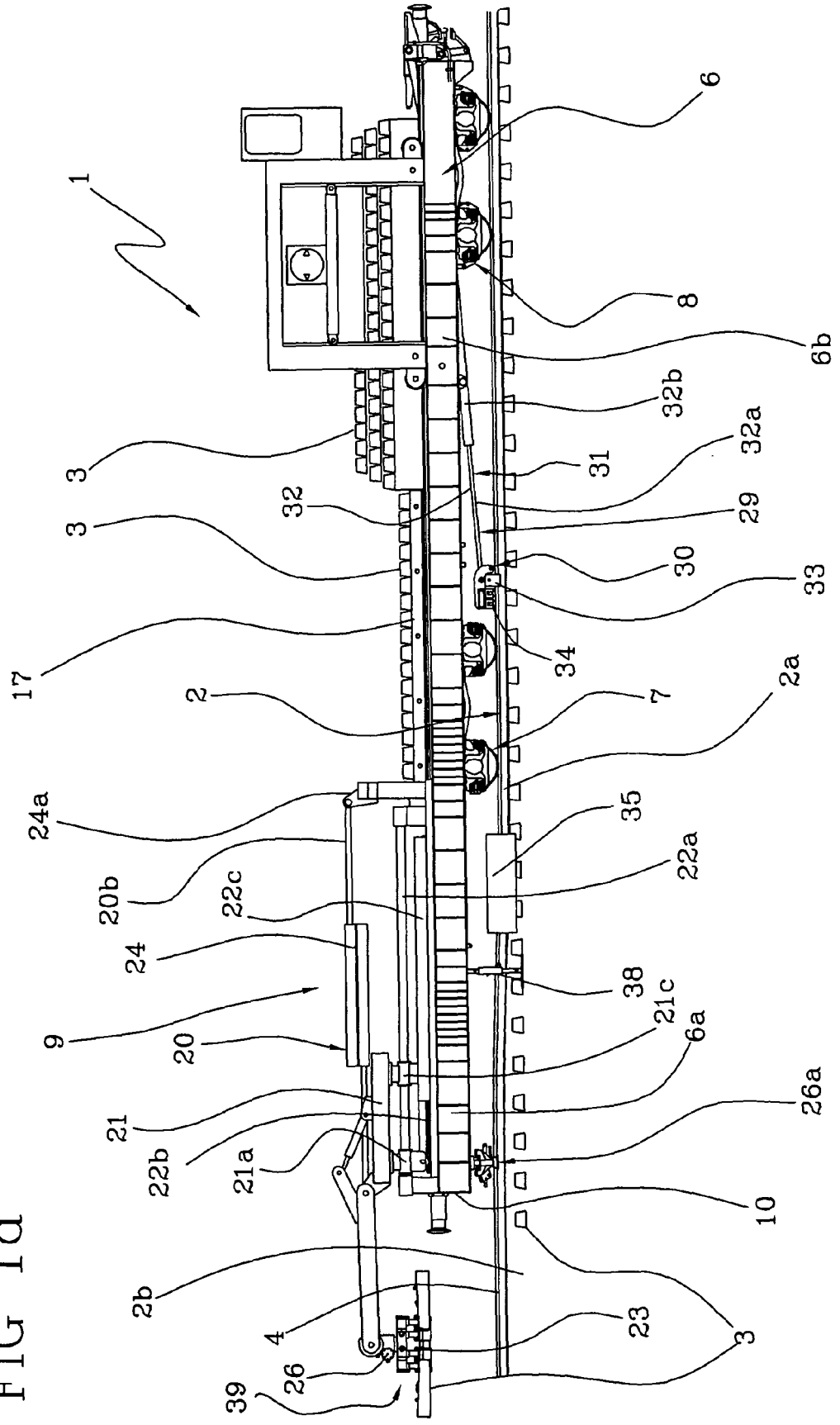
2b
4

FIG 1c

FIG 1d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22c
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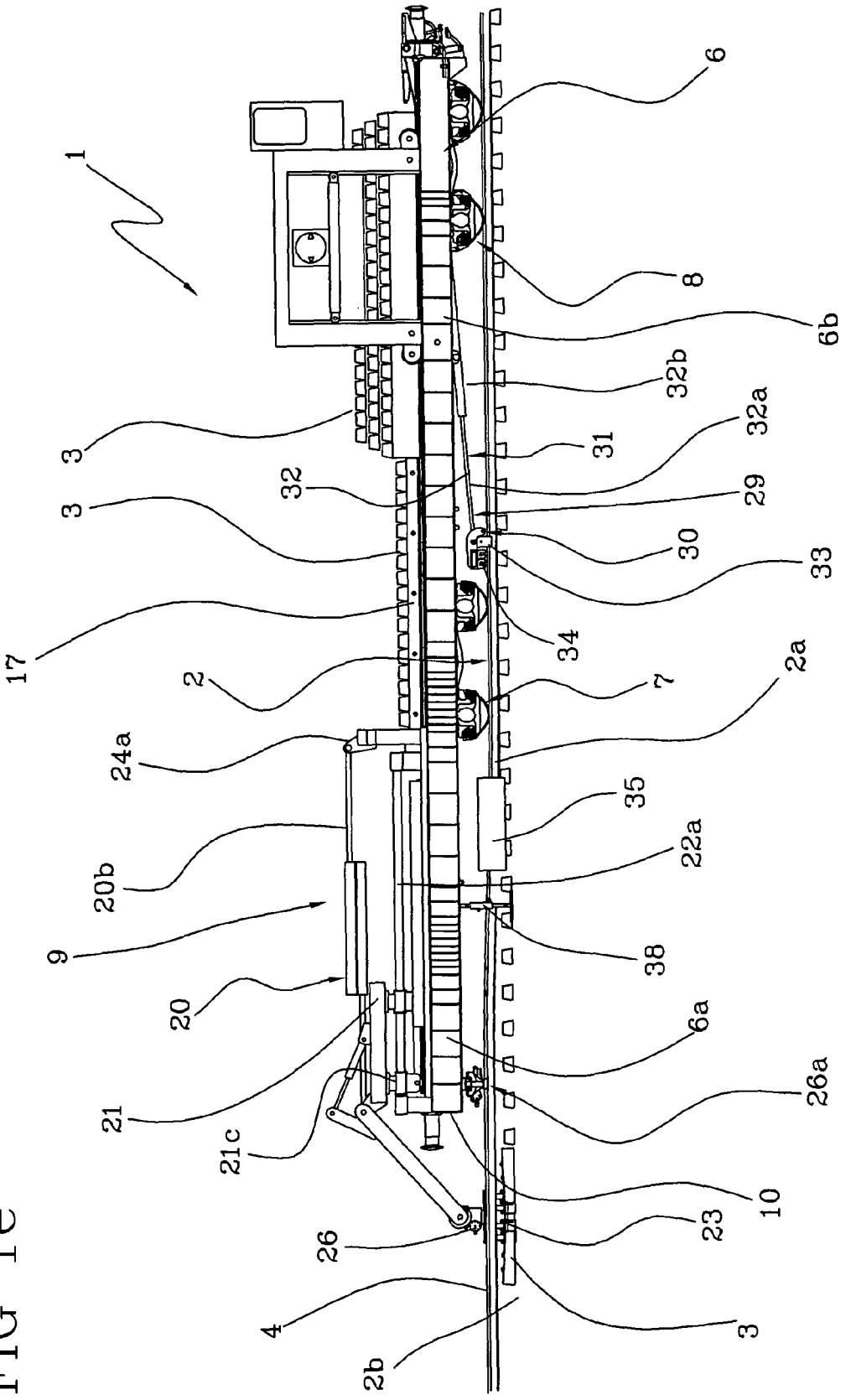
39
26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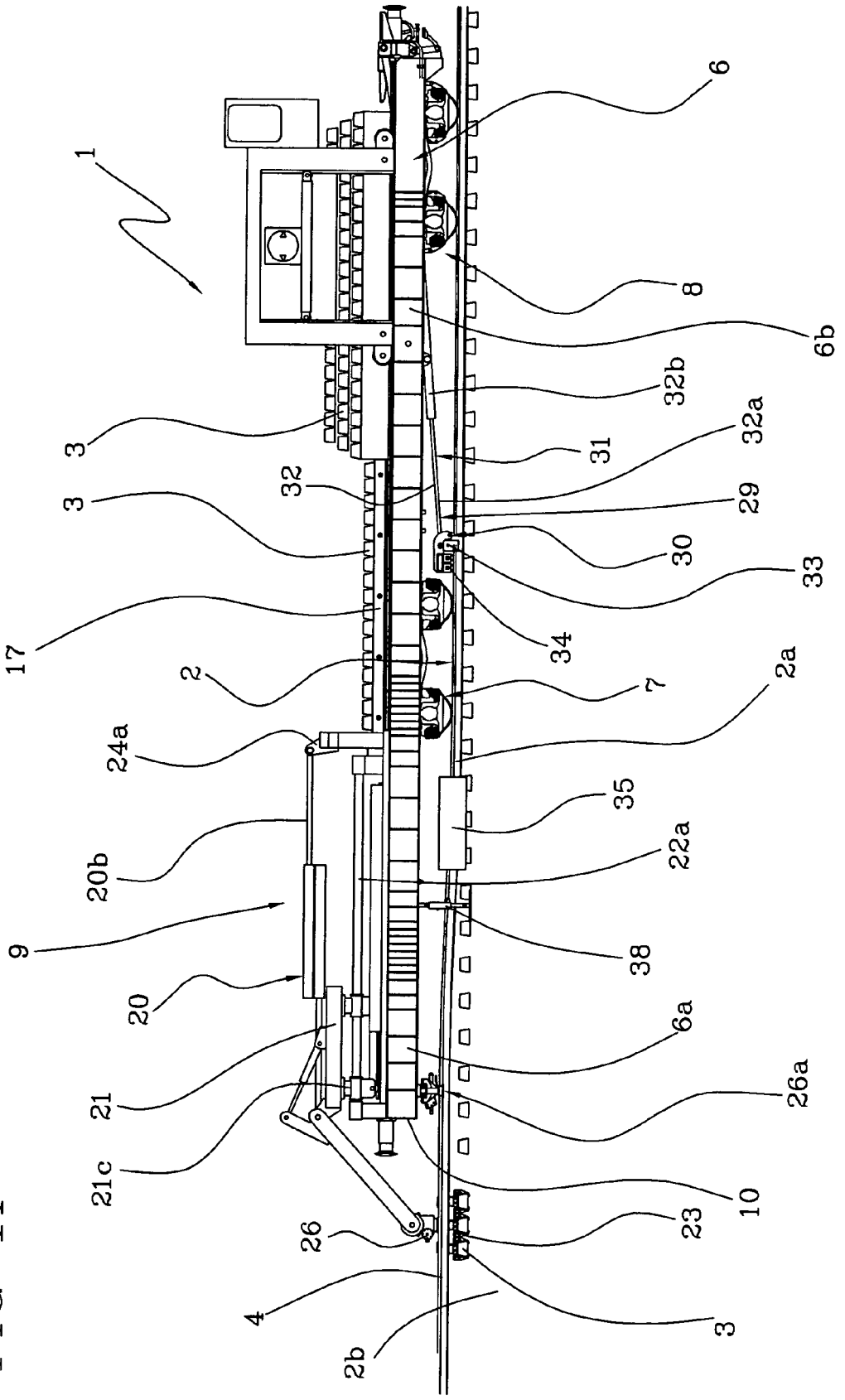
26
4
3
2b

FIG 1e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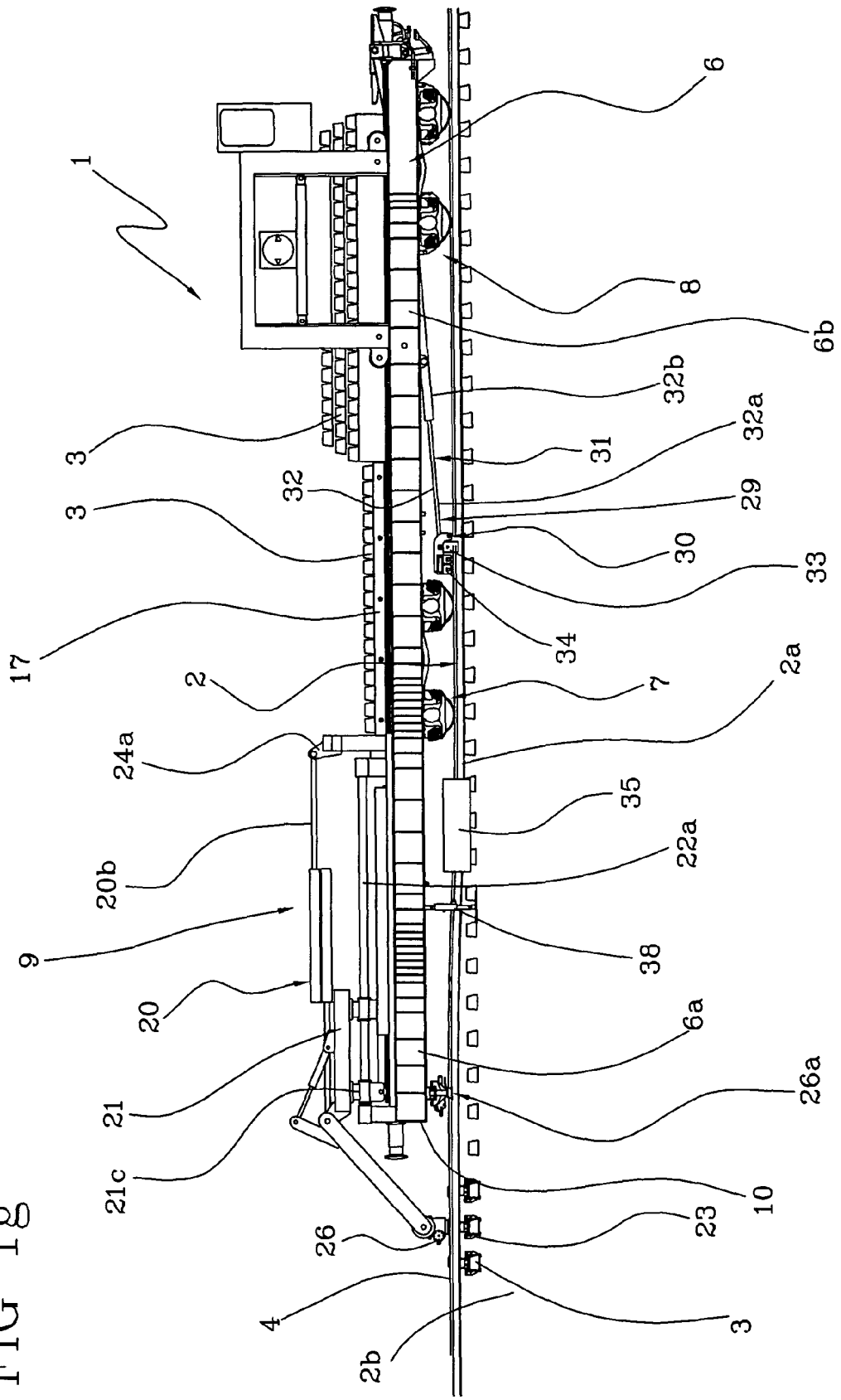
3
2b

FIG 1f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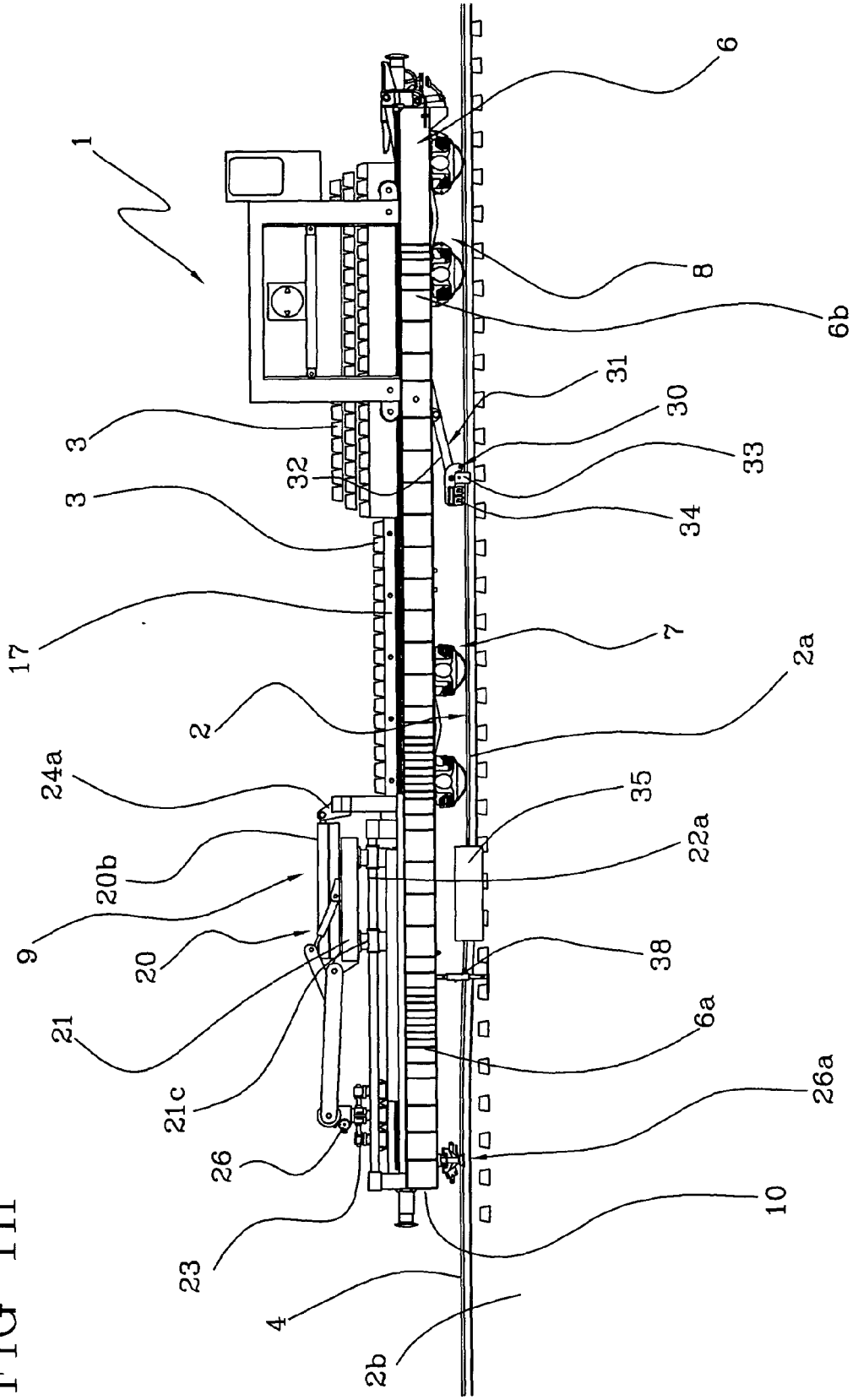
3
2b

FIG 1g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2b

FIG 1h

FIG 2a

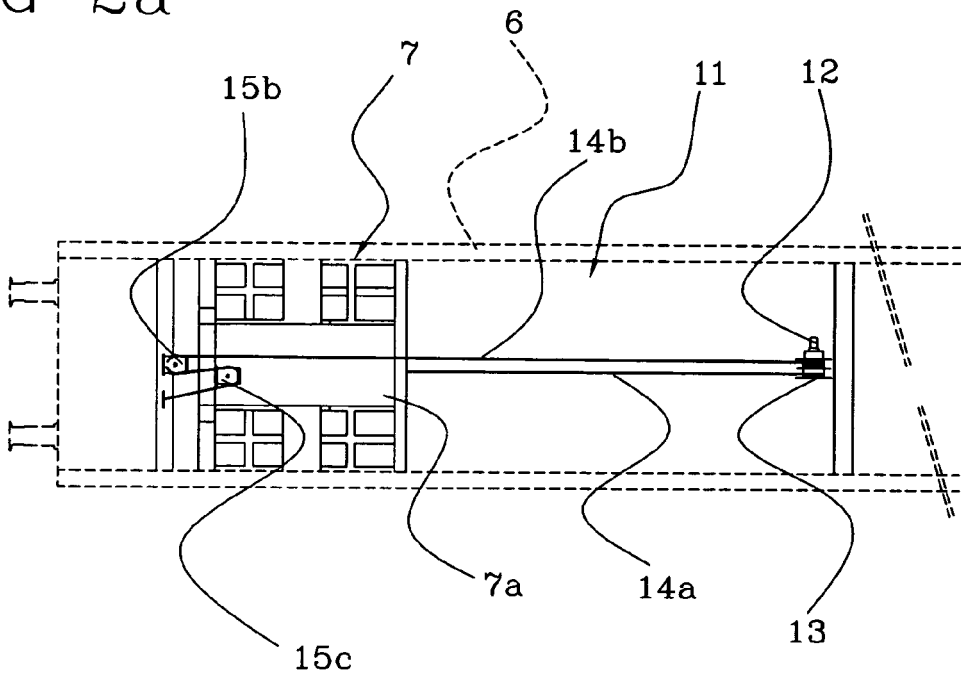
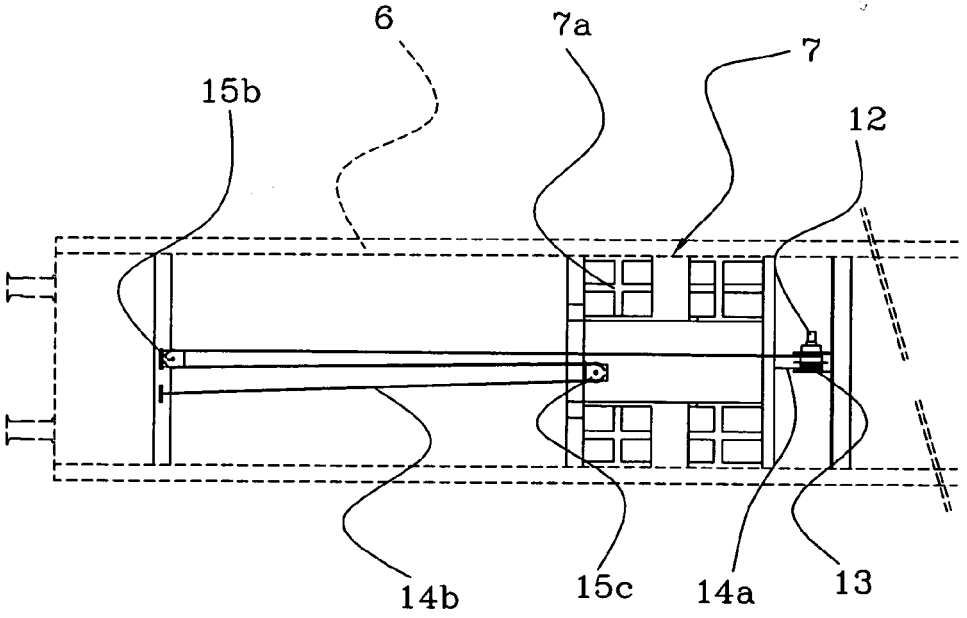
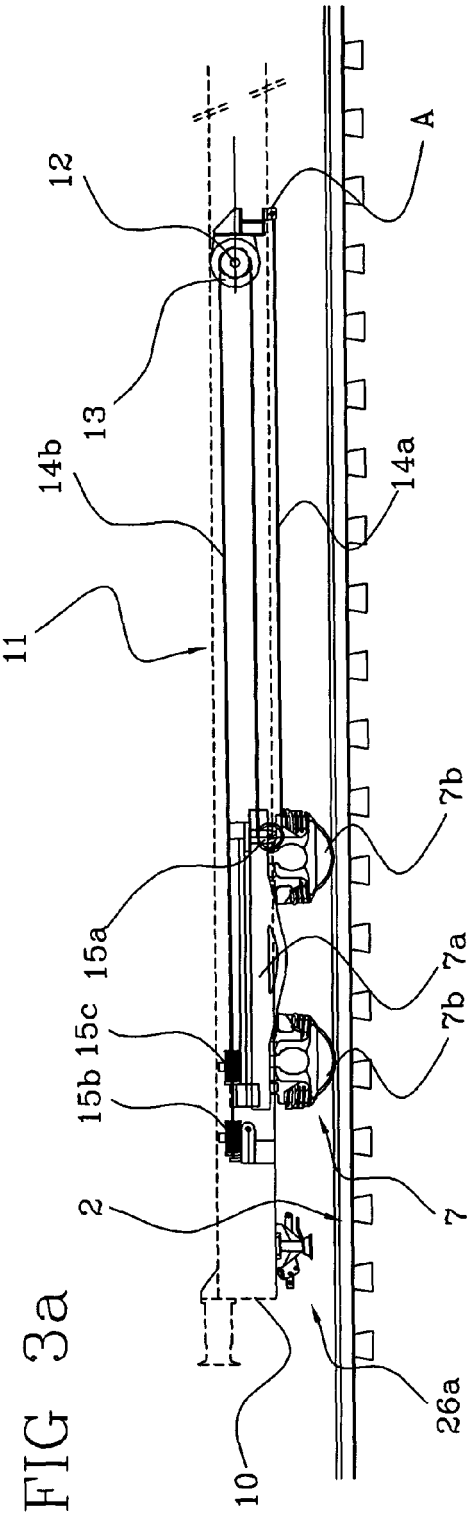


FIG 2b

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7a
15b 15c
7b
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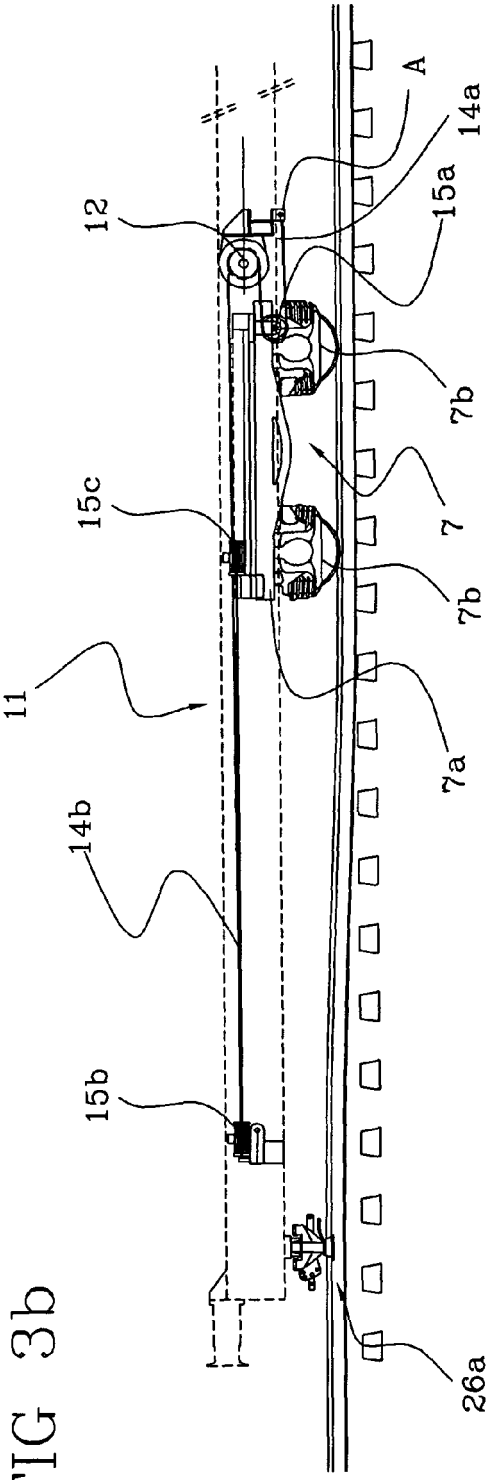
26a
10

FIG 3a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11
7a
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15b
26a

FIG 3b

FIG 4a

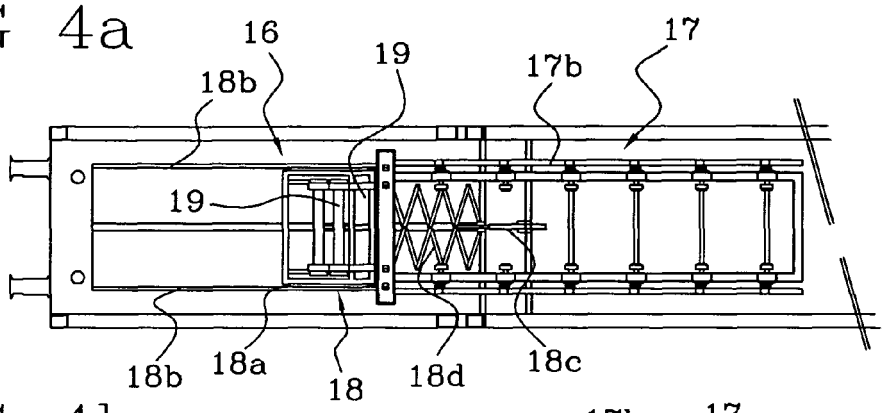


FIG 4b

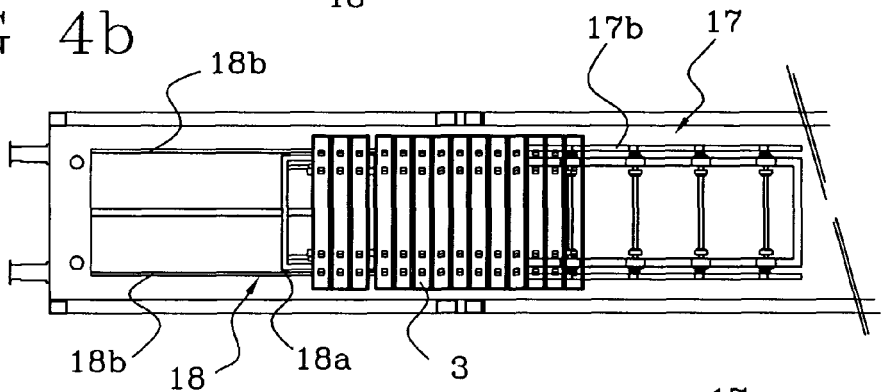


FIG 4c

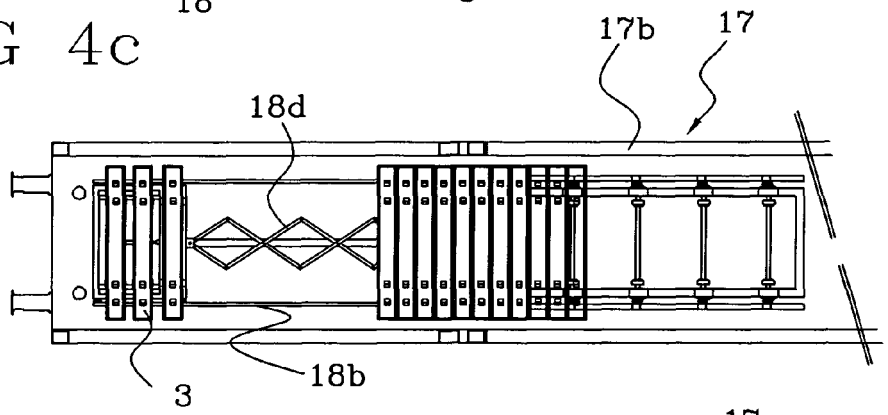
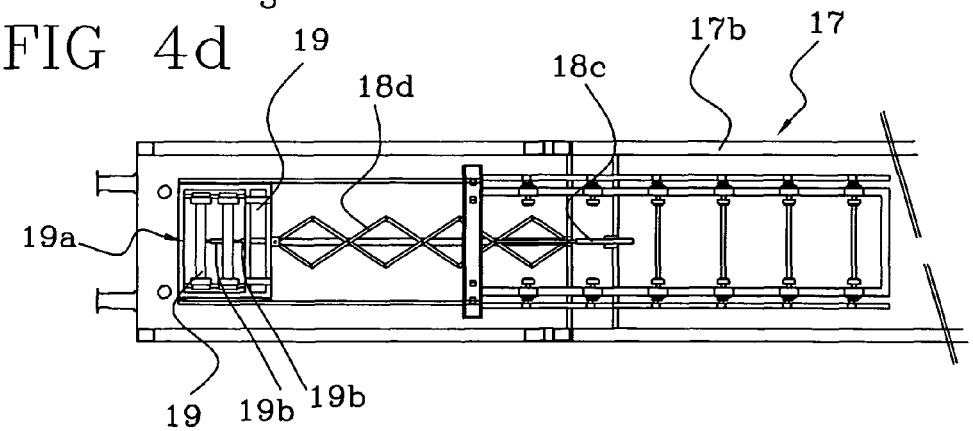


FIG 4d



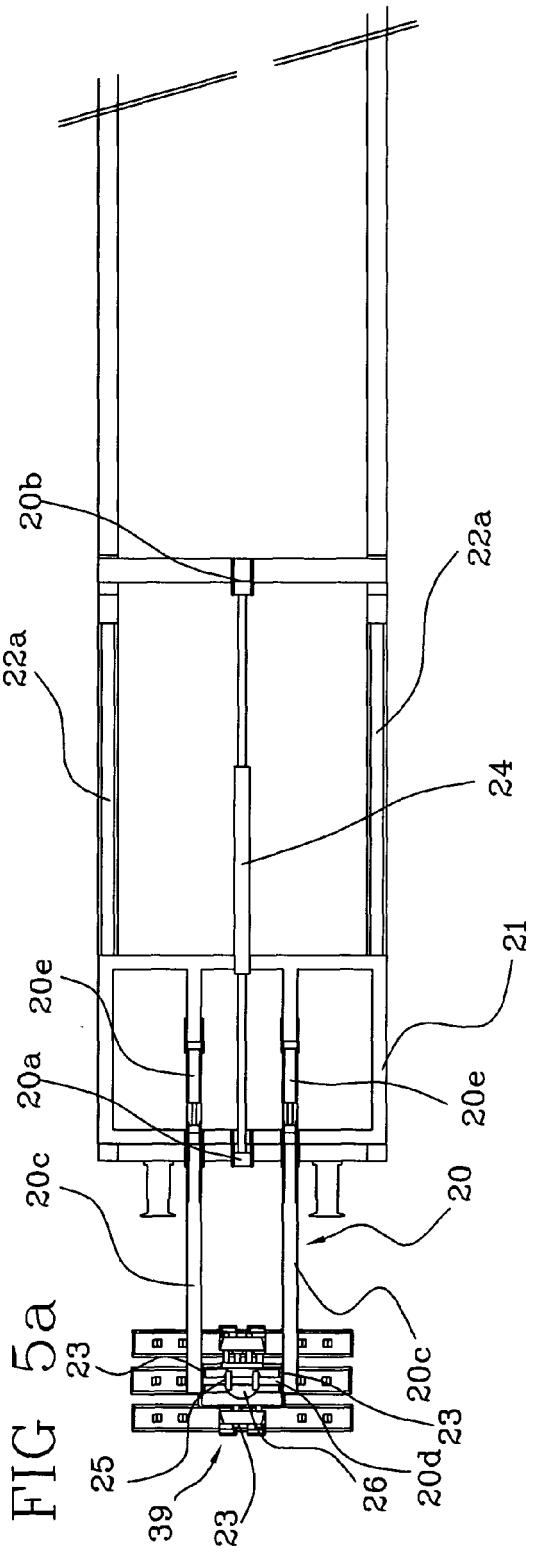

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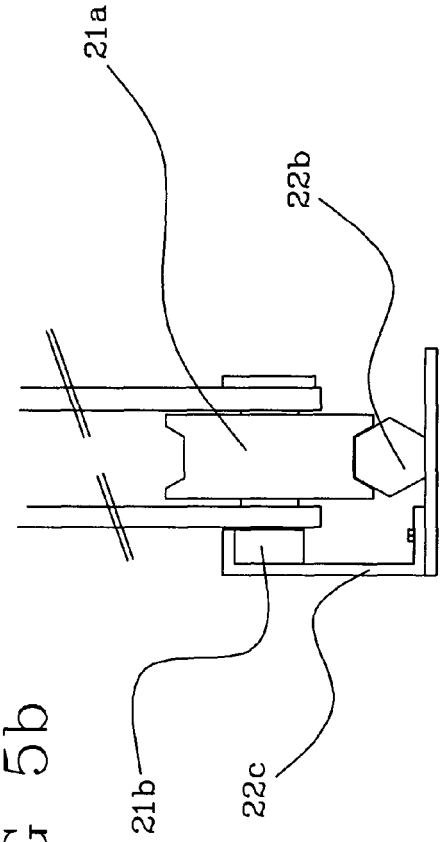
FIG 5a


21a
22b
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22c

FIG 5b

FIG 6c

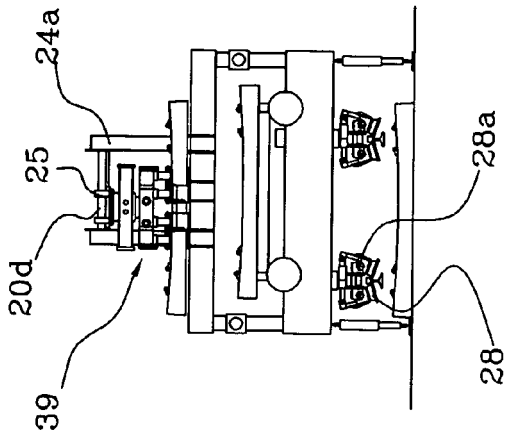


FIG 6b

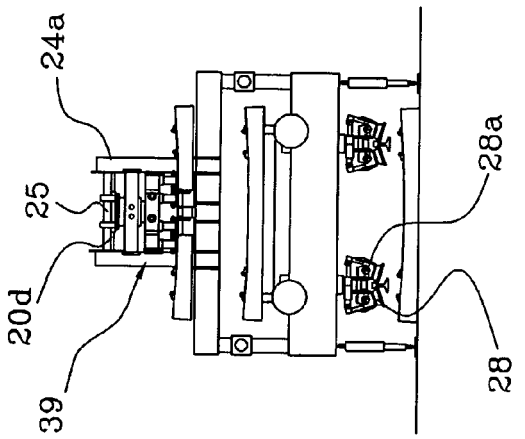


FIG 6a

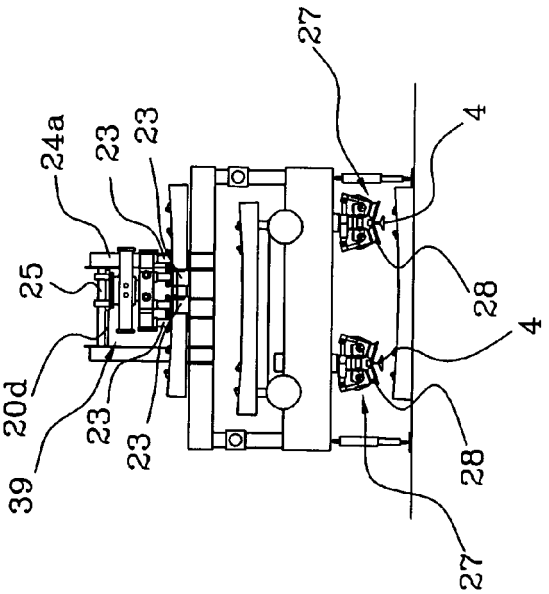
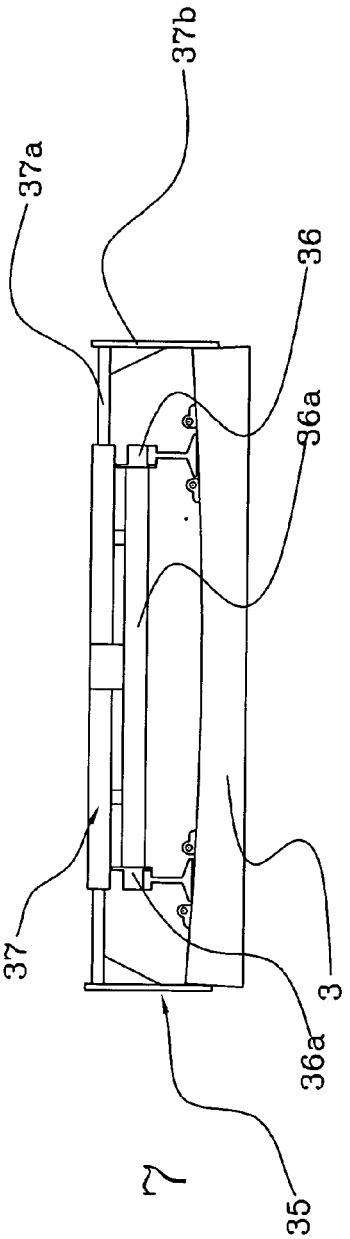


FIG 7



European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 05 42 5336

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.7)
X	DE 11 80 767 B (FRANZ PLASSER) 5 November 1964 (1964-11-05) * the whole document * -----	1,2,5-7, 10-12, 16,17	E01B29/10
D,A	US 3 691 957 A (FRANZ PLASSER ET AL) 19 September 1972 (1972-09-19) * the whole document * -----	1	
A	DE 25 29 975 A1 (FRANZ PLASSER BAHNBAUMASCHINEN-INDUSTRIEGESELLSCHAFT MBH; FRANZ PLASSE) 6 May 1976 (1976-05-06) * page 8, paragraph 1; figure 1 * -----	1	

TECHNICAL FIELDS SEARCHED (Int.Cl.7)

E01B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	31 October 2005	Movadat, R

CATEGORY OF CITED DOCUMENTS

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L : document cited for other reasons

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31-10-2005

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REFERENCES CITED IN THE DESCRIPTION

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