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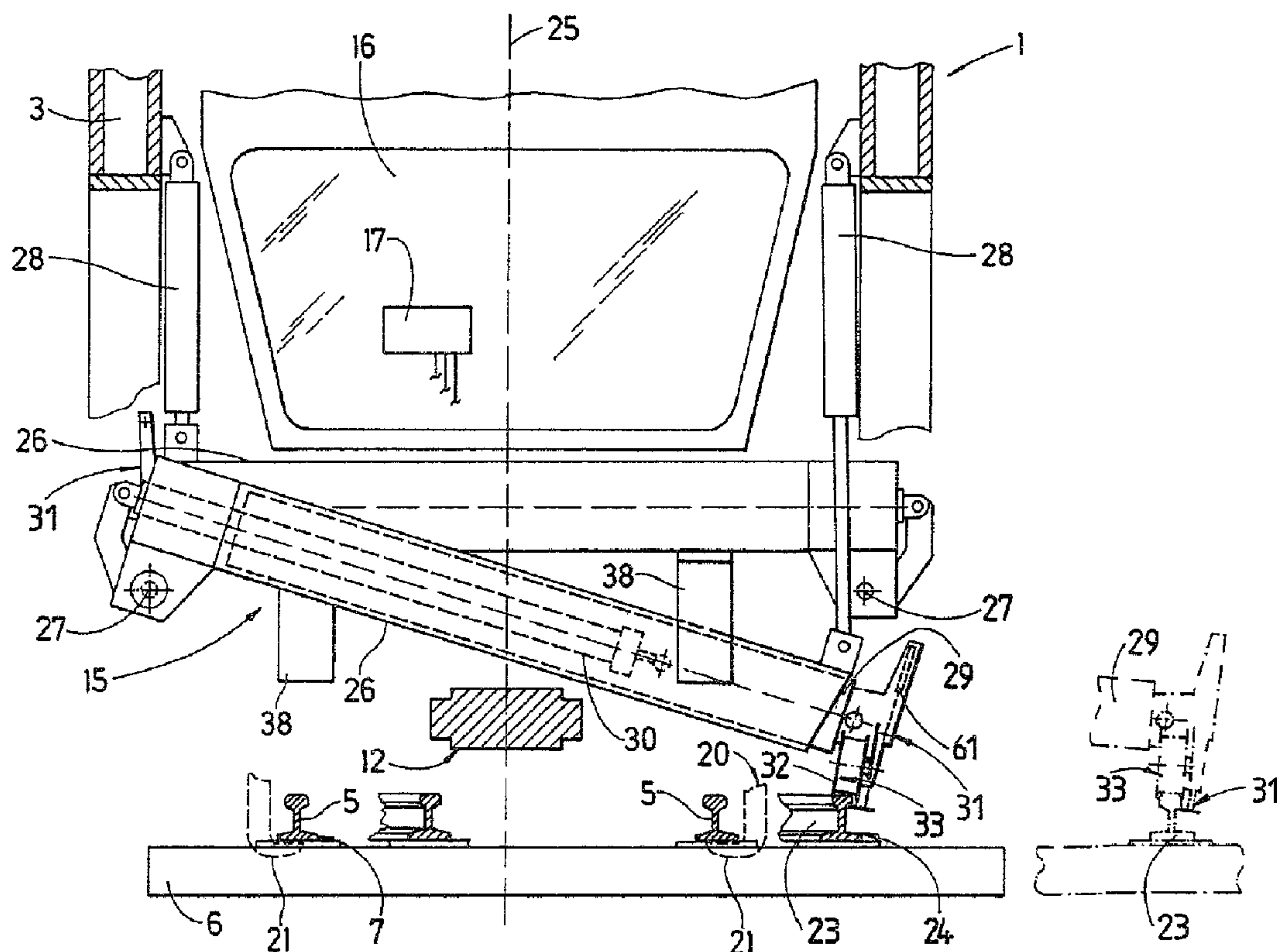
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(54) Titre : BOURREUSE DE RAIL COMPRENANT UN UNITE AUXILIAIRE DE LEVAGE ET DE RIPEUSE POUR UN
EMBRANCHEMENT DE RAIL

(54) Title: TRACK TAMPING MACHINE HAVING AN AUXILIARY LIFTING AND LINING UNIT FOR A BRANCH TRACK



(57) Abrégé/Abstract:

A track tamping machine (1) comprising a machine frame (3) supported on on-track undercarriages is provided with a vertically adjustable tamping unit and a lifting-lining unit (12) having lifting and lining drives and also a lifting member (20), with which is associated an auxiliary lifting device (15) having at least one gripping member (31) for gripping a rail (23) of a branch track (24)



(57) **Abrégé(suite)/Abstract(continued):**

and comprising its own lifting drive (28). The gripping member (31) is arranged on a support frame (26) and is adjustable relative to the machine frame (3) by means of a displacement drive (30). Associated with the auxiliary lifting device (15), in the end region which is connected to the gripping member (31), is a contact part (33) for positioning on top of the rail (23) to be gripped by the gripping member (31).

ABSTRACT

A track tamping machine (1) comprising a machine frame (3) supported on on-track undercarriages is provided with a vertically adjustable tamping unit and a lifting-lining unit (12) having lifting and lining drives and also a lifting member (20), with which is associated an auxiliary lifting device (15) having at least one gripping member (31) for gripping a rail (23) of a branch track (24) and comprising its own lifting drive (28). The gripping member (31) is arranged on a support frame (26) and is adjustable relative to the machine frame (3) by means of a displacement drive (30). Associated with the auxiliary lifting device (15), in the end region which is connected to the gripping member (31), is a contact part (33) for positioning on top of the rail (23) to be gripped by the gripping member (31).

Track Tamping Machine Having an Auxiliary Lifting and Lining Unit for a Branch Track

The invention relates to a track tamping machine comprising a machine frame supported on on-track undercarriages, a vertically adjustable tamping unit with squeezable and vibratable tamping tools and a lifting-lining unit having lifting and lining drives and also a flanged roller and a lifting member, with which is associated an auxiliary lifting device having at least one gripping member for gripping a rail of a branch track and comprising its own lifting drive, the gripping member being arranged on a support frame and being adjustable relative to the machine frame by means of a displacement drive.

A mobile track tamping machine of this kind, designed is already described in U.S. Patent No. 4,893,565, issued January 16, 1990. The treatment of such track regions turns out to be relatively difficult not only because of the more complex positioning of the rails, but primarily also because of the particularly great weight of these sections of track, as the track to be treated is still joined to the secondary or branch track section by so-called long sleepers. This considerable weight – which is also distributed very asymmetrically – adversely affects the working precision, specifically during the lifting and lining

operation. The known machine, mounted on on-track undercarriages, is equipped with a vertically adjustable tamping unit arranged on a machine frame and a lifting-lining unit which, in order to grip the rails of the track, is provided with flanged rollers and also gripping members in the form of gripping hooks and lifting rollers. For use in track switch regions, an auxiliary lifting device connected to the lifting-lining unit is provided – one for each side of the

track - which has a support frame oriented transversely to the longitudinal direction of the machine and capable of being telescopically extended or elongated by means of a displacement drive. Located at the outer end of the said support frame is a gripping member designed as a hook which is vertically adjustable in a vertical guide and is lowered into abutment against the rail or the rail base of the branch track, and also a lifting jack which may similarly be lowered. This serves to support the free end of the support frame on the ballast in the crib region and to apply the additional lifting forces by means of its own drive.

Further, a track tamping machine is known - according to U.S. Patent No. 4,825,768, issued May 2, 1989 - the tamping and lifting-lining units of which are specifically suited to the treatment of track switch and crossing regions. An auxiliary lifting device provided for this purpose consists of a frame which is mobile on a rail of the branch track, has arranged upon it the gripping members for gripping the rail and which is attached in an articulated manner to the machine frame by means of a drawbar. Also, the frame is connected by means of a cable to a support frame which is secured to the top of the tamping machine and may be extended telescopically. Via the cable the frame with the gripping members may be operated in the vertical direction by means of a lifting drive with lifting forces for additionally lifting the branch track. For use on the opposite longitudinal side of the machine, the support frame along with the cable is swivelled horizontally around 180° . The engagement or disengagement of the auxiliary lifting device is relatively time-consuming and cannot be implemented without manual assistance on the part of an operator.

The object of the invention lies in creating a track tamping machine of the type described in the introduction for the treatment of track switch regions in which the auxiliary lifting device can be transferred into operational use without difficulty from a working cab of the machine.

This object is achieved with a machine of the generic type in that associated with the auxiliary lifting device, in the end region which is connected to the gripping member, is a contact part for positioning on top of the rail to be gripped by the gripping member.

With this construction according to the invention the simplified operation of the auxiliary lifting device for lifting a branching-off rail length is ensured, as the contact part positioned on top of the rail head now enables the gripping member to be centred automatically so as to achieve a rapid and secure positive-locking connection. The use of a separate labour-force for centering and observing the auxiliary lifting device in the switch region where security is at risk thus also becomes unnecessary.

Accordingly, one aspect of the present invention resides in a track tamping machine comprising a machine frame supported on on-track undercarriages, a vertically adjustable tamping unit with squeezable and vibratable tamping tools and a lifting-lining unit having lifting and lining drives and also a flanged roller and a lifting member, with which is associated an auxiliary lifting device having at least one gripping member for gripping a rail of a branch track and comprising its own lifting drive, the gripping member being arranged on a support frame and being adjustable relative to the machine frame by means of a displacement drive, characterised in that associated with the auxiliary lifting device, in the end region which is connected to the gripping member, is a contact for positioning on top of the rail to be gripped by the gripping member, and wherein the support frame is mounted on the machine frame on the longitudinal side of the machine which is further away from the gripping member so as to be pivotable about a support frame pivot axis extending in the longitudinal direction of the machine.

With the further development of the track tamping machine described above, characterised in that the contact part is designed as a roller with a roller axis extending perpendicularly to the longitudinal direction of the machine, and characterised in that the contact part is a double-flanged roller, and characterised in that the gripping member is designed as a lifting roller with a mushroom-shaped lifting plate provided for abutment against the lower edge of the rail head and rotatable about an axis of rotation, and characterised in that the lifting roller is mounted on the support frame in the region of the contact part so as to be pivotable by means of a drive about a lifting roller pivot axis extending in the longitudinal direction of the machine, while the auxiliary lifting device is securely supported on the rail by means of the roller, the rail which is to be lifted can be gripped in a vice-like manner. Thus, even in combination with heavy concrete long sleepers, problem-free lifting of the branching-off rail length into the desired position is ensured. Furthermore - so as to avoid repeated centering procedures to position the roller on top and to apply the lifting roller - a positive-locking connection can also be maintained for a fairly long rail section.

If the track tamping machine described above is designed such that the opposite end of the support frame to the support frame pivot axis is connected to a lifting drive supported on the machine frame, this provides an advantageous combination of axis of rotation and lifting drive to achieve the best possible lever effect so as to transmit the additional vertical forces without difficulty to the rail which is to be lifted.

Further developments of the track tamping machine described above, characterised in that the gripping member is mounted inside the tubular support frame so as to be displaceable in the longitudinal direction thereof and is connected to a

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displacement drive secured to the support frame, and characterised in that the gripping member is connected to a sliding part mounted inside the tubular support frame so as to be displaceable in the longitudinal direction thereof, ensure that the gripping member remains uninterruptedly and constantly in contact with the rail head during the lifting operation and also lateral displacements may be performed without difficulty during the lifting operation in order to correct the lateral position of the track.

A preferred form of construction of the track tamping machine described above, characterised in that the support frame, in the opposite end region to the support frame pivot axis, is arranged between two mutually parallel guide plates extending perpendicularly to the longitudinal direction of the machine, ensures the stability of the support frame in the longitudinal direction of the machine in all pivoting positions, thereby avoiding overloading of the axle bearing.

The further development of the track tamping machine described above, characterised in that two support frames are provided, extending parallel with one another and in each case mounted in an articulated manner on one of the two longitudinal sides of the machine, is expedient to enable the machine to be used for switches which branch off both to the right and to the left without any adaptations.

In another aspect, the present invention resides in a ballast tamping machine for leveling, lining and tamping a track switch comprising a main track and a branch track comprising a rail laterally adjacent the main track and having a rail head defining a running surface, which comprises a machine frame extending in a longitudinal direction and supported on undercarriages; a tamping unit vertically adjustably mounted on the machine frame and comprising, (1) reciprocable vibratory tamping tools; a track

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lifting and lining unit mounted on the machine frame and comprising, lifting and lining drive means, a flanged roller, and a lifting tool; and (d) an auxiliary track lifting device associated with the track lifting and lining unit, the auxiliary track lifting device comprising, (1) a carrier frame extending perpendicularly to the longitudinal direction and having a free end, (2) a tool for gripping the branch track rail mounted on the free carrier frame end, the carrier frame being pivoted to a side of the machine frame remote from the branch track rail gripping tool for pivoting about an axis extending in the longitudinal direction of the machine frame (3) an auxiliary lifting drive means, (4) a displacement drive for adjusting the branch track rail gripping tool on the carrier frame relative to the machine frame, and (5) a part for contacting and resting on the running surface of the branch track rail head, said part being mounted adjacent the branch track rail gripping tool.

The invention is described in more detail below with the aid of embodiments represented in the drawings, in which

Fig. 1 shows a side view of a track tamping machine comprising a lifting-lining unit and an auxiliary lifting device for lifting switch sections of a branch track which are located laterally adjacent to the machine,

Fig. 2 shows an enlarged side view of the lifting-lining unit and the auxiliary lifting device according to Fig. 1,

Fig. 3 shows an enlarged view of the auxiliary lifting device in the longitudinal direction of the machine, according to arrow III in Fig. 2,

Fig. 4 shows an enlarged detail view, in the longitudinal direction of the machine, of the end region of the auxiliary lifting device having the gripping member, and

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Fig. 5, 6 and 7 show detail views in greatly schematic form of further forms of construction of a gripping

member according to the invention.

The track tamping machine 1 represented in Fig. 1 has an elongated machine frame 3 supported on on-track undercarriages 2 with driver's cabs 4 arranged at the ends thereof and is mobile on a track 7 consisting of rails 5 and sleepers 6. An energy source 8 or a motive drive serves to advance the machine 1 in a working direction 9 and to supply power to all the working units of the machine. A tamping unit 10 is mounted so as to be vertically adjustable on the machine frame 3 and has squeezable and vibratable tamping tools 11 for immersion in the ballast. Provided in front of it in the working direction is a lifting-lining unit 12 which is attached to the machine frame 3 in an articulated manner and is connected thereto by lifting drives 13 and lining drives 14, and also an auxiliary lifting device 15 - described in detail in the other Figures - which is associated with the lifting-lining unit 12. Immediately above the said auxiliary lifting device is a working cab 16 with control equipment 17 for controlling the working units of the track tamping machine 1 in cooperation with a reference system 18.

The region of the lifting-lining unit 12 may be seen in more detail in Fig. 2. The unit 12 may be rolled along by means of flanged rollers 19 on the rails 5 of the track 7 along which the machine 1 is travelling and which is to be treated, and has lifting members 20 in the form of vertically and laterally adjustable lifting hooks 21 and laterally pivotable lifting rollers 22. The latter serve to grip the head of the rail 5, while the lifting hook 21 may also be applied to the base thereof. The auxiliary lifting device 15, represented more accurately in its individual details particularly in Fig. 3 and 4, is provided to grip a rail 23 of a branch track 24 which is joined in the switch region to the track 7 by long sleepers 6.

This auxiliary lifting device 15 is formed from two parts

arranged one behind the other in the longitudinal direction of the machine and rotated 180^0 in relation to a vertical longitudinal plane of symmetry 25 of the machine 1 extending in the longitudinal direction of the machine. Each of these parts has a support frame 26 extending perpendicularly to the longitudinal direction of the machine. Each of the two support frames 26, arranged so as to be parallel to one another, is mounted at one of its ends on the machine frame 3 so as to be pivotable about an axis 27 extending in the longitudinal direction of the machine, while at the opposite end to the axis 27 there is secured a hydraulic lifting drive 28, attached in an articulated manner to the machine frame above this end. The support frames 26 are tubular or are designed as hollow sections, inside which a sliding part 29 is positioned, displaceable in the longitudinal direction of the frame and connected to a displacement drive 30 similarly arranged inside the support frame 26 and secured thereto.

In the opposite end region to the axis 27 of each support frame 26, the auxiliary lifting device 15 is provided with a respective gripping member 31 and contact part 33, these being connected to the respective sliding part 29 and thus being adjustable relative to the machine frame 3 by means of the displacement drive 30. The individual details of the contact part 33 and the gripping member 31 are apparent in more detail particularly in Fig. 4. The contact part 33 is provided for positioning on top of the rail 23 of the branch track 24 to be gripped by the gripping member 31 and is designed as a roller 32 which in the present case is a double-flanged roller 34 with an axis 35 extending perpendicularly to the longitudinal direction of the machine and which is mounted at the end of the sliding part 29 by means of a support bracket 36. The gripping member 31 is in the form of a lifting roller 57 which has a mushroom-shaped lifting plate 59 rotatable about an axis of rotation 58. The said lifting plate is provided for abutment against the underside 37 of the rail head of the rail 23. To this end the lifting roller 57 is arranged on the

support frame 26 or on the sliding part 29 in the region of the contact part 33 so as to be pivotable about an axis 60 extending in the longitudinal direction of the machine, and is connected to a hydraulic drive 61 similarly attached in an articulated manner to the sliding part 29.

The end region, lying opposite the axis 27, of each support frame 26 is arranged in each case between two mutually parallel guide plates 38 oriented perpendicularly to the longitudinal direction of the machine, these being secured to the underside of the machine frame 3 and guiding or stabilising the support frames 26 during the vertical pivoting thereof by means of the lifting drives 28. When the gripping members 31 are in the (fully retracted) out-of-service position, they are located entirely within the external outline of the machine (see left-hand side of Fig. 3).

In working use, the machine 1 is controlled by an operator positioned in the working cab 16 by way of the control equipment 17. The rails 5 of the track 7 are gripped by the lifting hooks 21 (indicated by broken lines in Fig. 3) of the lifting-lining unit 12 and/or optionally by the lifting rollers 22 thereof and the track is moved into the desired position by means of the lifting and lining drives 13, 14. In switch and crossing regions with particularly long and therefore heavy sleepers 6, the respective support frame 26 of the auxiliary lifting device 15 which is associated with the branch track 24 is lowered by means of its lifting drive 28 and at the same time the displacement drive 30 is operated until the contact part 33 or the double-flanged roller 34 is positioned on top of the rail 23. The lifting roller 57 of the gripping member 31 is here located in the upwardly pivoted position - represented in Fig. 4 by dot and dash lines. As soon as the contact part 33 or the double-flanged roller 34 is securely in engagement with the rail 23, the lifting plate 59 is pivoted inwards by means of the drive 61 so that it rests against the outer lower edge 37 of the rail head, with respect

to the machine, and the auxiliary lifting device 15 is thus connected to the rail 23 in a positive-locking manner. This connection may be maintained over a fairly long distance, as the double-flanged roller 34 - with the displacement drive 30 controlled without pressure - is able to follow the rail 23 of the branch track 24 extending at an angle to the track 7 without difficulty while the track tamping machine 1 is moving along the track 7 (see the position shown in dot and dash lines on the right-hand side of Fig. 3). A construction of this kind is suitable, for example, for use in a so-called continuous tamping machine in which the machine frame is not moved on from one sleeper to the next but is advanced continuously and the lifting and lining members remain constantly in engagement with the rails. The lifting drive 28 of the support frame 26 in use at the time is operated in synchronism with the lifting drives 13 of the lifting-lining unit 12 so as to lift the branch track 24 evenly in unison with the lifting of the track 7 by the lifting hooks 21.

Represented in Fig. 5 in greatly schematic form is a simplified form of construction of a gripping member 39 and a contact part 40 of an auxiliary lifting device 41. The contact part 40 is here designed as a simple roller 42 provided for positioning on top of a rail 43. The gripping member 39 consists of a lifting roller 44 which is rotatable about an approximately vertical axis 45 but which is not pivotable. The positive-locking contact with the rail 43 or the outer lower edge of the rail head is therefore maintained by continuous operation of the displacement drive (not represented) of the sliding part 46, while the roller 42 and the lifting roller 44 roll along on top of the rail 43, the lifting roller 44 forming a contact part of a gripping member.

Fig. 6 shows an even more simplified version of the invention in which a gripping member 48 designed as a hook 47 and a contact part 49 are rigidly connected to the sliding part 50 of a support frame 52 forming part of an auxiliary lifting device 51. This auxiliary lifting device 51 is not

suitable for continuous use and is brought into fresh positive-locking engagement with the rail 53 before each track lifting operation. The hook 47 can also be called a contact part of a gripping member.

Finally, a gripping member 54 of an auxiliary lifting device 66 in the form of a hook 55 is evident in Fig. 7, this - unlike the other constructional variants of the invention - being provided for abutment against an inner lower edge 56 of the rail head, in relation to the machine. The hook 55 is rigidly arranged on a sliding part 62 on which, furthermore, a contact part 64 constructed as a roller 63 is mounted for rotation about an approximately horizontal axis or for rolling along on top of the rail. The advantage of this form of construction lies in the fact that the distance of the upper edge of the sliding part 62 away from the running surface of the rail may be particularly small in this case and thus the likelihood of violation of the clearance gauge 67 (indicated by a double dot and dash line) of an adjacent track 65 by the auxiliary lifting device 66 is reduced to a minimum; the traffic on the adjacent track 65 is thus scarcely or only very slightly affected by the use of the machine equipped with the auxiliary lifting device 66. The hook 55 may also be termed a contact part of a gripping member.

WHAT IS CLAIMED IS:

1. A track tamping machine comprising a machine frame (3) supported on on-track undercarriages (2), a vertically adjustable tamping unit (10) with squeezable and vibratable tamping tools (11) and a lifting-lining unit (12) having lifting and lining drives (13,14) and also a flanged roller (19) and a lifting member (20), with which is associated an auxiliary lifting device (15; 41; 51; 66) having at least one gripping member (31; 39; 48; 54) for gripping a rail (23; 43; 53) of a branch track (24) and comprising its own lifting drive (28), the gripping member (31; 39; 48; 54) being arranged on a support frame (26; 52) and being adjustable relative to the machine frame (3) by means of a displacement drive (30), characterised in that associated with the auxiliary lifting device (15; 41; 51; 66), in an end region of said support frame which is connected to the gripping member (31; 39; 48; 54), is a contact part (33; 40; 49; 64) for positioning on top of the rail (23; 43; 53) to be gripped by the gripping member (31; 39; 48; 54), and wherein the support frame (26) is mounted on the machine frame (3) on a side of the machine that extends in a longitudinal direction of advancement of the machine which is further away from the gripping member (31) so as to be pivotable about a support frame pivot axis (27) extending in a longitudinal direction of advancement of the machine.
2. A machine according to claim 1, characterised in that the contact part (33) is designed as a roller (32) with a roller axis (35) extending perpendicularly to the longitudinal direction of the machine.
3. A machine according to claim 2, characterised in that the contact part (33) is a double-flanged roller (34).
4. A machine according to any one of claims 1 to 3, characterised in that the gripping member (31) is designed as a

lifting roller (57) with a mushroom-shaped lifting plate (59) provided for abutment against the lower edge (37) of the rail head and rotatable about an axis of rotation (58).

5. A machine according to claim 4, characterised in that the lifting roller (57) is mounted on the support frame (26) in the region of the contact part (33) so as to be pivotable by means of a drive (61) about a lifting roller pivot axis (60) extending in the longitudinal direction of the machine.

6. A machine according to any one of claims 1 to 5, characterised in that the opposite end of the support frame (26) to the support frame pivot axis (27) is connected to a lifting drive (28) supported on the machine frame (3).

7. A machine according to any one of claims 1 to 6, characterised in that the gripping member (31) is mounted inside the tubular support frame (26) so as to be displaceable in the longitudinal direction thereof and is connected to a displacement drive (30) secured to the support frame (26).

8. A machine according to any one of claims 1 to 7, characterised in that the gripping member (31) is connected to a sliding part (29) mounted inside the tubular support frame (26) so as to be displaceable in the longitudinal direction thereof.

9. A machine according to any one of claims 1 to 8, characterised in that the support frame, in the opposite end region to the support frame pivot axis (27), is arranged between two mutually parallel guide plates (38) extending perpendicularly to the longitudinal direction of the machine.

10. A machine according to any one of claims 1 to 9, characterised in that two support frames (26) are provided,

extending parallel with one another and in each case mounted in an articulated manner on one of the two longitudinal sides of the machine.

11. A ballast tamping machine for leveling, lining and tamping a track switch comprising a main track and a branch track comprising a rail laterally adjacent the main track and having a rail head defining a running surface, which comprises:

- (a) a machine frame extending in a longitudinal direction of advancement of the machine and supported on undercarriages;
- (b) a tamping unit vertically adjustably mounted on the machine frame and comprising,
 - (1) reciprocable vibratory tamping tools;
- (c) a track lifting and lining unit mounted on the machine frame and comprising,
 - (1) lifting and lining drive means,
 - (2) a flanged roller, and
 - (3) a lifting tool, and
- (d) an auxiliary track lifting device associated with the track lifting and lining unit, the auxiliary track lifting device comprising,
 - (1) a carrier frame extending perpendicularly to the longitudinal direction of advancement of the machine and having a free end,
 - (2) a tool for gripping the branch track rail mounted on the free carrier frame end, the carrier frame being pivoted to a side of the machine frame remote from the branch track rail gripping tool for pivoting about an axis extending in the longitudinal direction of advancement of the machine frame,
 - (3) an auxiliary lifting drive means,
 - (4) a displacement drive for adjusting the branch track rail gripping tool on the carrier frame relative to the machine frame, and
 - (5) a part for contacting and resting on the running surface of the branch track rail head, said part being mounted adjacent the branch track rail gripping tool.

12. The ballast tamping machine of claim 11, wherein the part for contacting and resting on the branch track rail is a roller having a roller axis extending perpendicularly to the longitudinal direction of the machine frame.

13. The ballast tamping machine of claim 12, wherein the roller is a double-flanged wheel.

14. The ballast tamping machine of claim 11, wherein the branch track rail gripping tool is a lifting roller comprising a mushroom-shaped element rotatable about a lifting roller rotation axis for subtending the branch track rail head.

15. The ballast tamping machine of claim 14, further comprising a drive for pivoting the lifting roller about a pivoting drive axis extending in the longitudinal direction of the machine frame, the pivoting drive connecting the lifting roller to the carrier frame end adjacent the part for contacting and resting on the branch track rail.

16. The ballast tamping machine of claim 11, wherein the auxiliary lifting drive means comprises a lifting drive connecting the carrier frame end opposite the pivoting axis to the machine frame.

17. The ballast tamping machine of claim 11, wherein the carrier frame is tube-shaped and extends perpendicularly to the longitudinal direction, the branch rail gripping tool is mounted in the tube-shaped carrier frame for displacement in the longitudinal direction thereof, and the displacement drive is affixed to the tube-shaped carrier frame and connected to the branch rail gripping tool.

18. The ballast tamping machine of claim 17, wherein the branch rail gripping tool comprises a gliding part extending into the interior of the tube-shaped carrier frame.

19. The ballast tamping machine of claim 11, wherein the carrier frame end is arranged between two parallel guide plates extending perpendicularly to the longitudinal direction of the machine frame.

Fig. 1

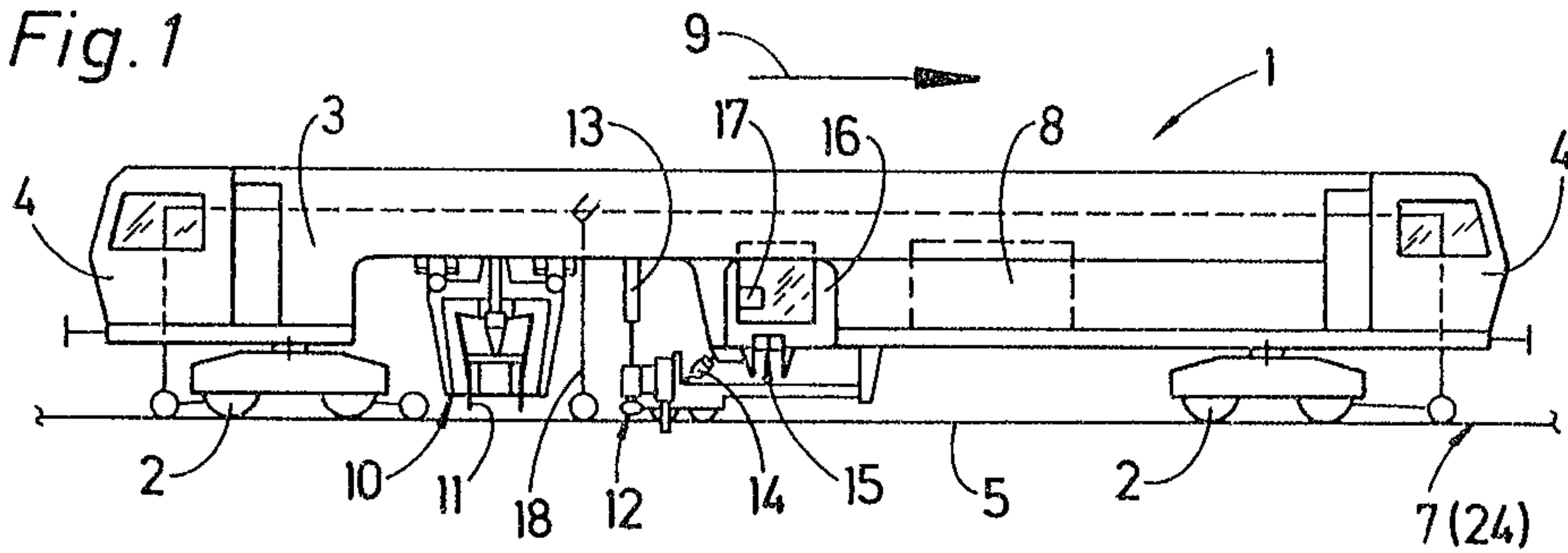


Fig. 2

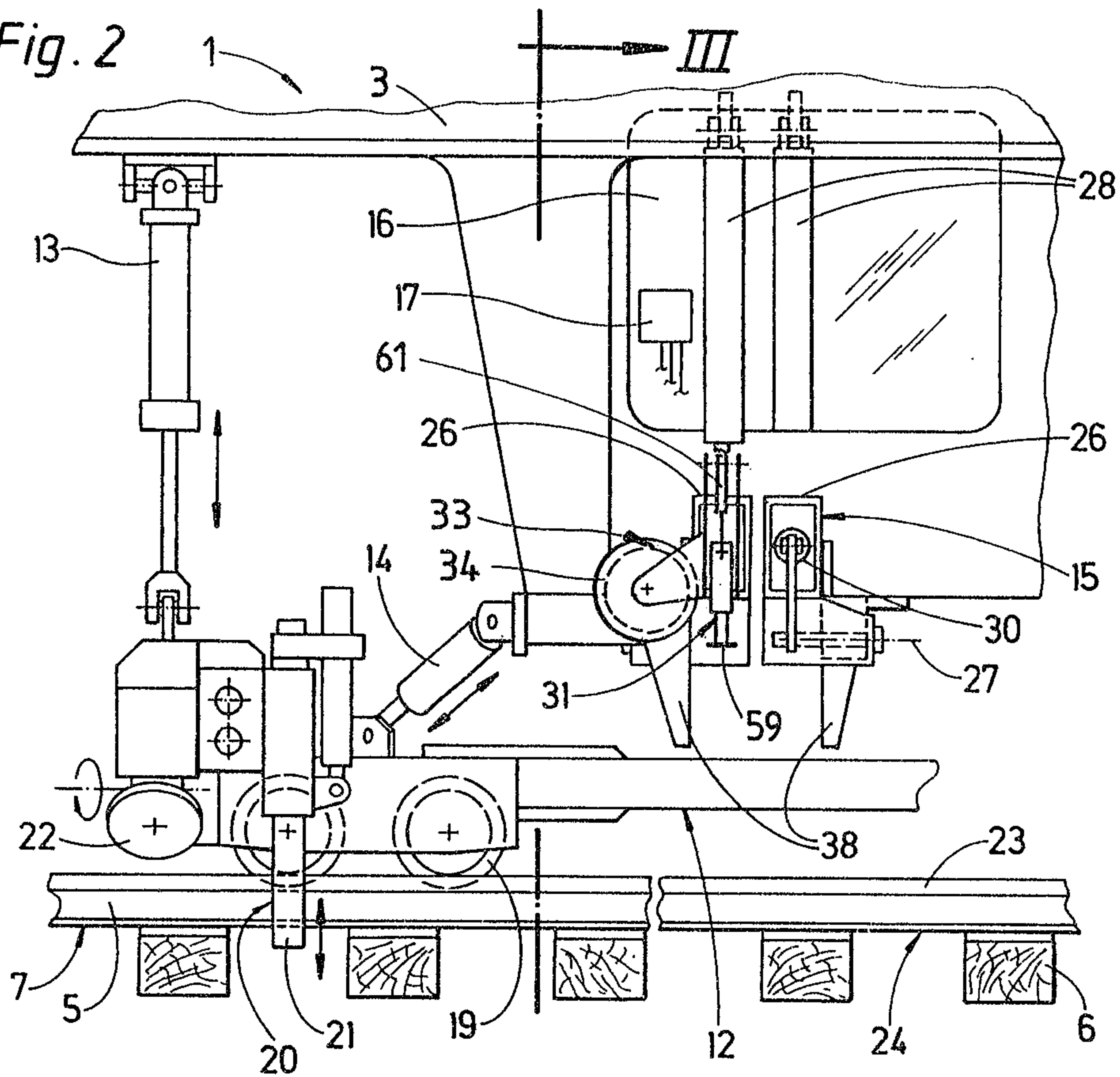


Fig. 5

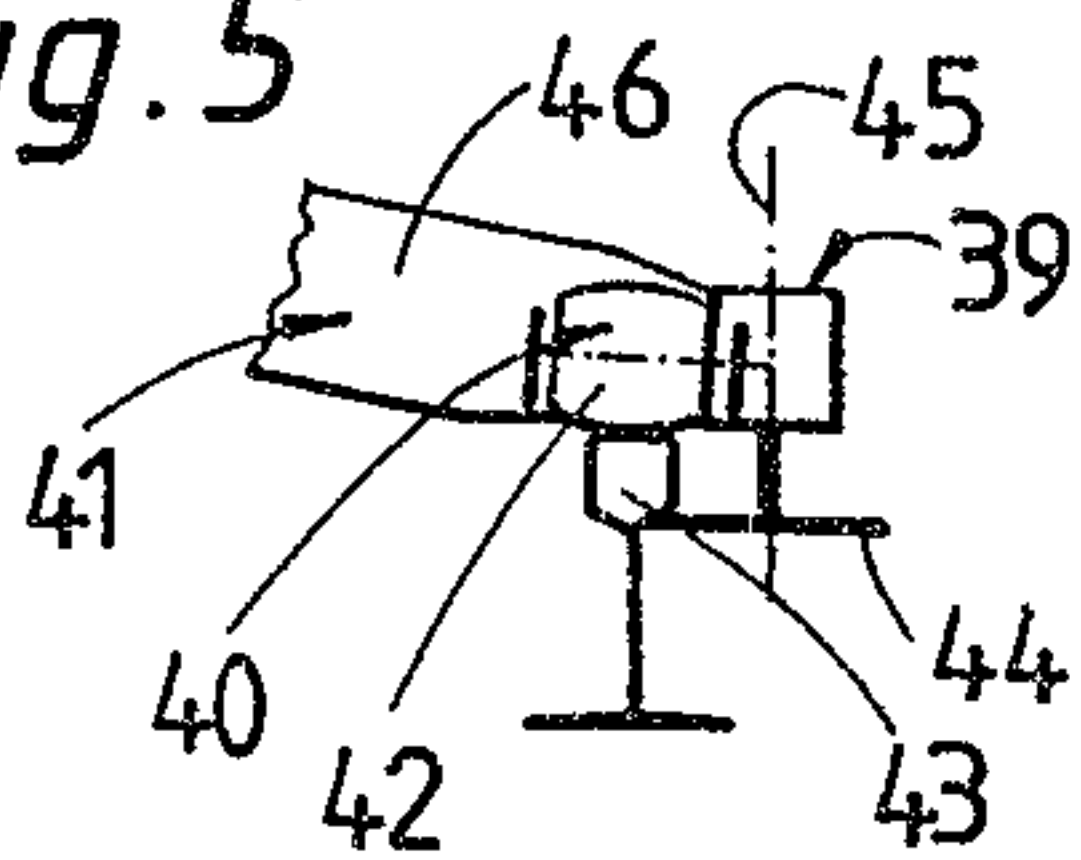


Fig. 6

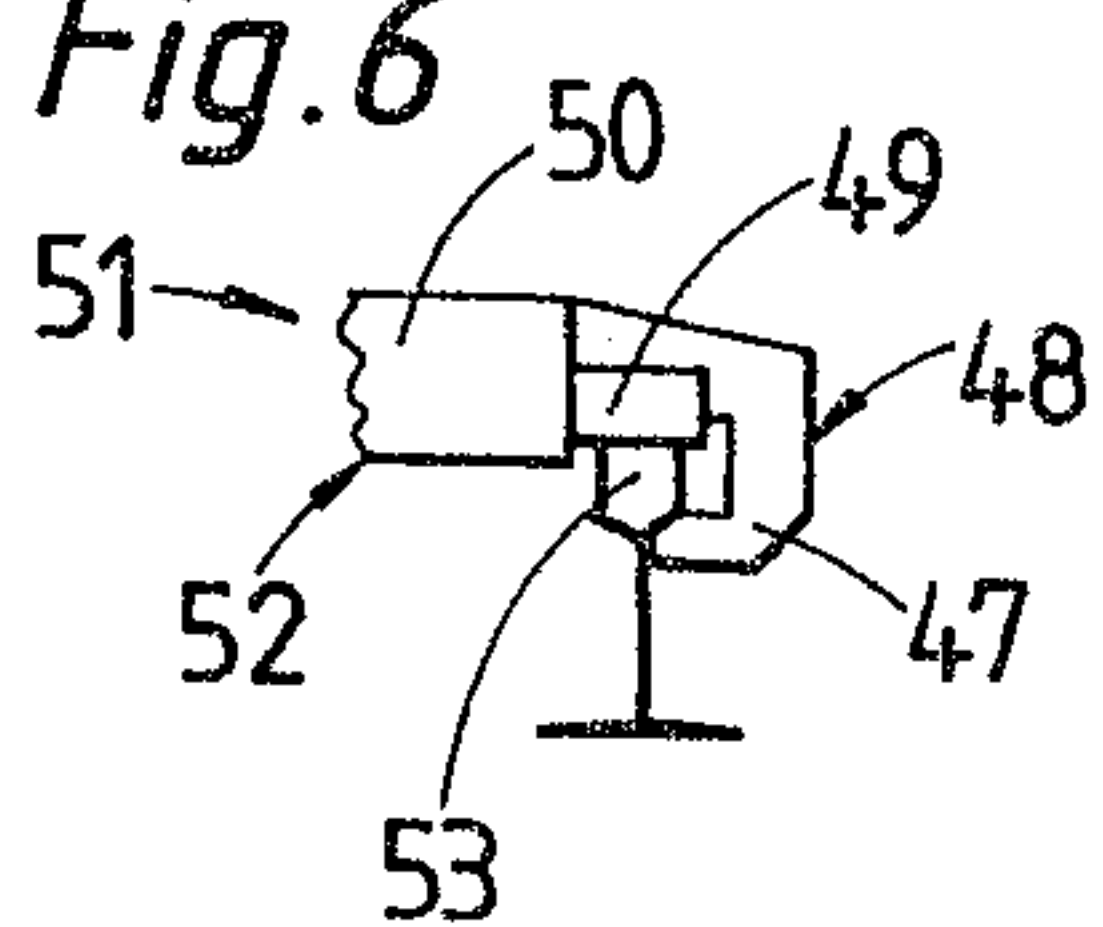
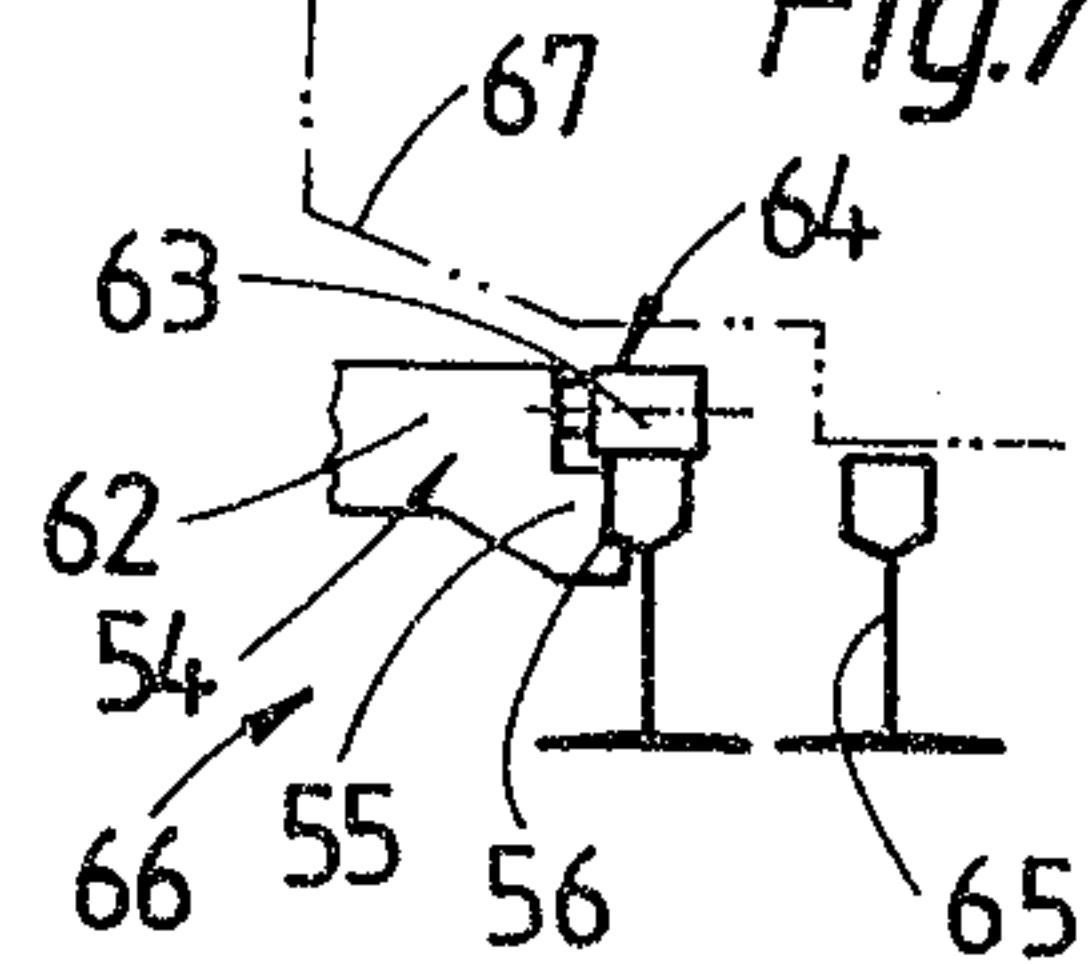
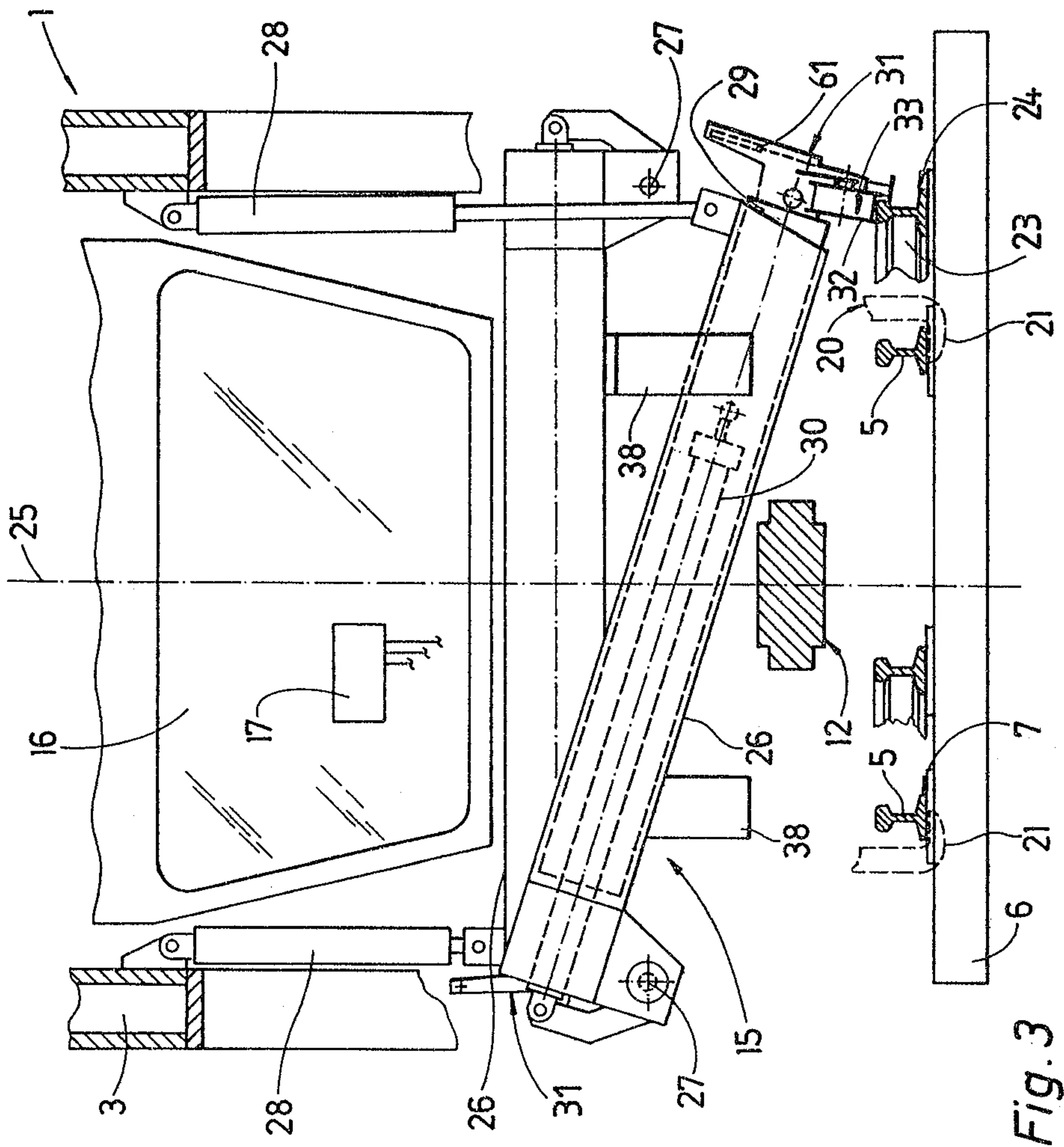
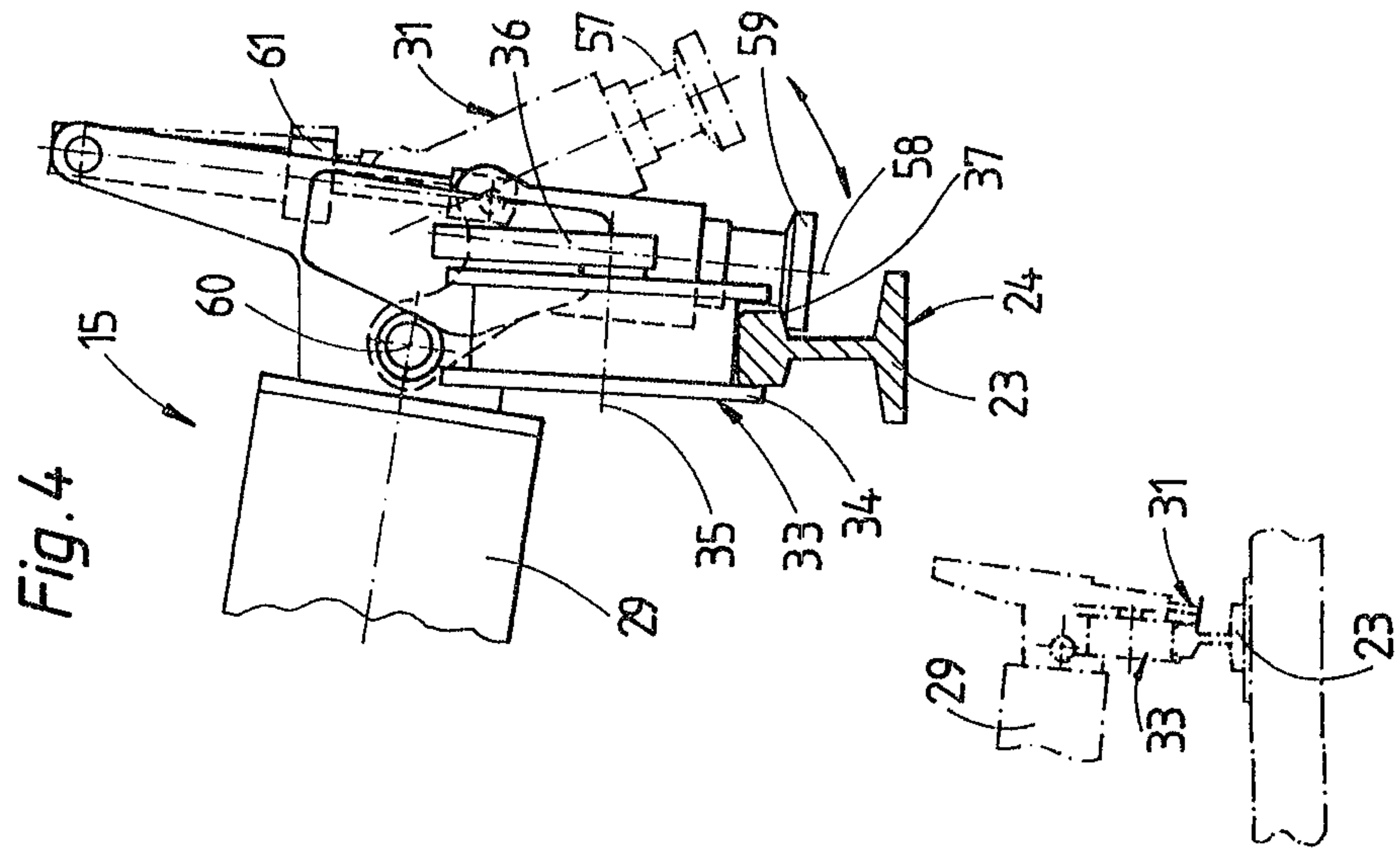


Fig. 7



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