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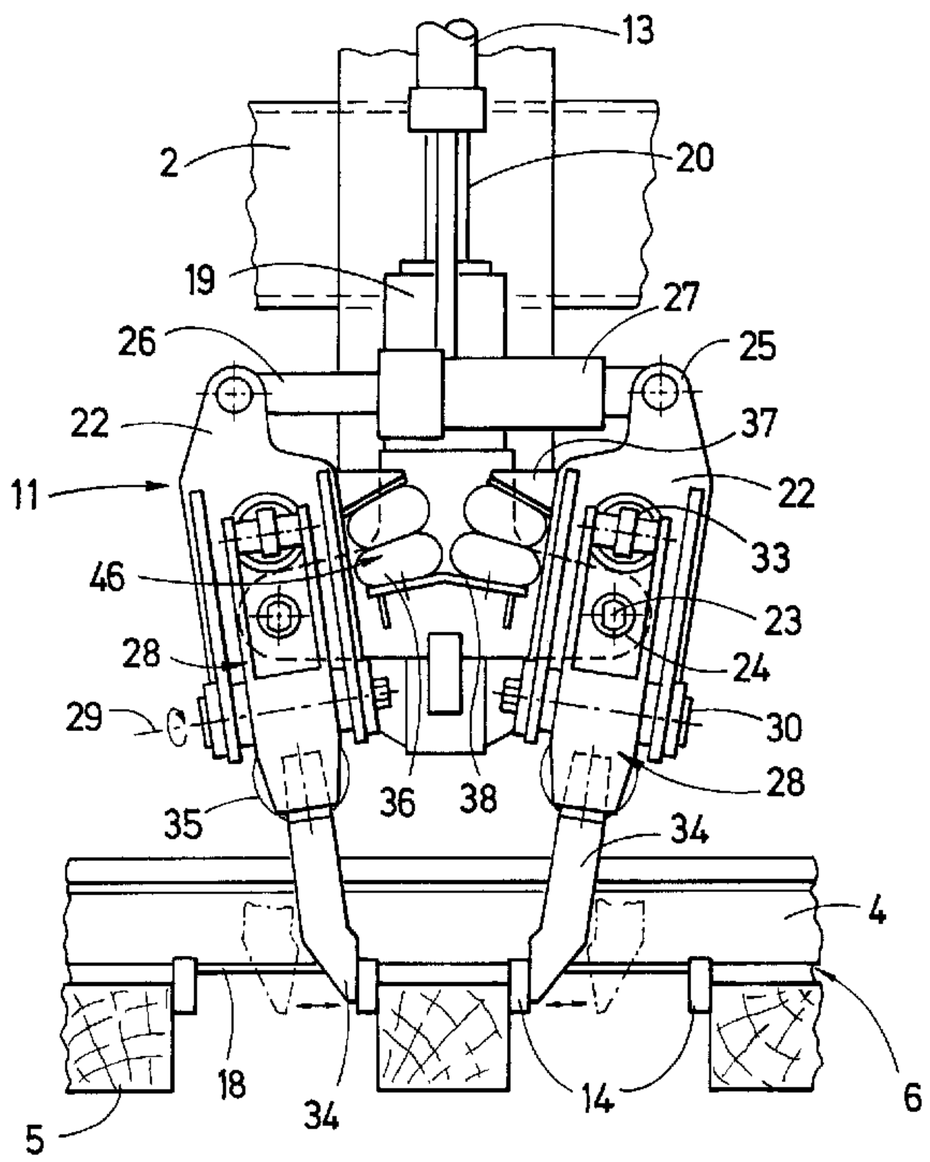

(57) Abrégé/Abstract:
A machine for pressing sleeper anchors (14) fastened to a rail (4) against a sleeper (5) of a track (6) is equipped with a work unit (11) vertically adjustable with respect to the machine frame (2) by means of a drive (13). The work unit comprises pressing tools (28) on both longitudinal sides of the rail (4) for application to the sleeper anchors (14), the pressing tools being squeezable towards one another in respective pairs in the longitudinal direction of the rail by means of a squeezing drive (26) and being pivotable about a first axis (23) extending horizontally in the transverse direction of the machine. The pressing tools (28) are additionally mounted for pivoting in the transverse direction of the track respectively about a second axis (29) extending perpendicularly to the first axis (23) by means of an adjustment drive (33).

ABSTRACT

A machine for pressing sleeper anchors (14) fastened to a rail (4) against a sleeper (5) of a track (6) is equipped with a work unit (11) vertically adjustable with respect to the machine frame (2) by means of a drive (13). The work unit comprises pressing tools (28) on both longitudinal sides of the rail (4) for application to the sleeper anchors (14), the pressing tools being squeezable towards one another in respective pairs in the longitudinal direction of the rail by means of a squeezing drive (26) and being pivotable about a first axis (23) extending horizontally in the transverse direction of the machine. The pressing tools (28) are additionally mounted for pivoting in the transverse direction of the track respectively about a second axis (29) extending perpendicularly to the first axis (23) by means of an adjustment drive (33).

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A MACHINE FOR PRESSING SLEEPER ANCHORS

The invention relates to a machine for pressing sleeper anchors fastened to a rail against a sleeper of a track, comprising a machine frame supported on on-track undercarriages and a work unit vertically adjustable by means of a drive, the work unit having pressing tools on both longitudinal sides of the rail for application to the sleeper anchors, the pressing tools being squeezable towards one another in respective pairs in the longitudinal direction of the rail by means of a squeezing drive and being pivotable about a first axis extending horizontally in the transverse direction of the machine.

Sleeper anchors of this kind are clamped onto the rail base underneath a rail and serve to prevent a longitudinal displacement of the rail relative to its bearing surface or to the sleeper. For that purpose it is required that the anchors tightly abut one or both vertical longitudinal sides of the sleeper.

According to US 5,277,122, a machine is already described which is equipped, per rail of the track, with a respective unit for pressing on sleeper anchors. Both units are supported on the machine frame via vertical guides and are connected to a hydraulic vertical adjustment drive and comprise four pressing tools each. The latter are arranged on both longitudinal sides of the rail and are designed to be squeezable towards one another in respective pairs in the longitudinal direction of the track, a hydraulic drive connecting the upper ends of the pairs of pressing tools causing a pivoting of the tools around a horizontal axis extending parallel to the longitudinal direction of the sleepers. At the lower end of the plate-shaped pressing tools there is a removable pressing member designed for application to the sleeper anchor. In order to adjust the distance of

the pressing members, opposing one another in the transverse direction of the track at both sides of the rail, in the event of rail bases having varying widths, there is provided a system of interchangeable, washer-like spacer plates of different thickness which are installed as required to prevent damaging the rail base when lowering the tools as well as missing the sleeper anchor if the transverse distance is too great.

It is further known to combine the installing of sleeper anchors on a rail with pressing the anchors onto the side surfaces of the sleepers. A machine designed to carry out this process is known, for instance, from US 5,142,987. Situated in the region of each longitudinal side of the sleeper is a device for delivering and applying a sleeper anchor onto the rail base. Before the clip-like anchor snaps into its final clamping position, both devices are moved towards one another in the longitudinal direction of the rail by means of a hydraulic drive. In doing so, the sleeper anchors are firmly pressed against the sleeper from both sides by means of engaging plates and are lastly fixed to the rail in this position.

The object of the present invention is to provide a machine of the type previously defined, which can be employed unrestrictedly for reliably pressing on sleeper anchors even in the presence of inaccuracies concerning the centering of the pressing tools with regard to the rail, or also without retooling operations in the case of different rail shapes and widths of the rail base.

This object is achieved with a machine as specified in the introduction in that the pressing tools are additionally mounted for pivoting in the transverse direction of the track respectively about a second axis extending perpendicularly to the first axis by means of an adjustment drive.

With this solution according to the invention it is possible, while using simple and dependable structural means, to extend the effective range of the pressing tools inasmuch as various interference factors, such as, for instance, centering inaccuracies and/or differing widths of the rail base or different kinds of sleeper anchors, now can have no more adverse effect whatsoever. The pressing tools, which are spread apart in the longitudinal direction of the sleeper before the work operation, automatically establish a relatively large operating area in which an exact centering of the pressing tools in the longitudinal direction of the sleepers is assured immediately before the pressing movement of the sleeper anchors is carried out. This is achieved in that an automatic centering process of the pressing tools results from the application of the pressing tools to the rail base edges before initiating the squeezing movement in the longitudinal direction of the rail. With the aid of the rail base edges serving as a guide rail, it thus becomes unnecessary to keep a slight safety distance of the pressing tools from the rail base which is required in the known solutions and compromises a safe application to the already very narrow sleeper anchor. In an advantageous way, any supervising duties regarding the occurrence of the said interference factors and including a retooling operation dependent therefrom also become unnecessary, said duties being very strenuous for the operator.

Further advantages according to the invention will become apparent from the sub-claims and the description.

The invention is described in more detail in the following with the aid of embodiments shown in the drawing, in which

Fig. 1 shows a side view of a machine designed according to the invention for pressing on sleeper anchors,

Fig. 2 shows a perspective rendering of a typical sleeper anchor mounted to a rail base,

Fig. 3 and 4 respectively show an enlarged side view in transverse and longitudinal direction of the track of a work unit of the machine in Fig. 1, and

Fig. 5 and 6 respectively show a view in longitudinal direction of the track of additional embodiments of the invention.

A machine 1, evident in Fig. 1, comprises a machine frame 2 supported via on-track undercarriages 3 on a track 6 composed of rails 4 and sleepers 5. The machine frame 2 is provided at both ends with a coupling 7 and is equipped with a driver´s cabin 8 as well as a motor 9. The latter supplies the energy for a motive drive 10 as well as for the further drives of the machine 1 yet to be described.

In the area between the two on-track undercarriages 3, two work units 11,12 can be seen which are arranged on the machine frame 2 distanced from one another in the longitudinal direction of the machine and which are associated with the one rail 4 of the track 6 (see Fig. 4). Two further work units, not visible here, are provided above the other rail 4 of the track and are designed symmetrically to the work units 11,12 with reference to a vertical longitudinal plane of symmetry of the machine 1. The work units, which are vertically adjustable individually by means of drives 13, serve for pressing sleeper anchors 14 fastened to the rails 4 against the sleepers 5, the work unit 12 being

adjustable in the longitudinal direction of the track with regard to the work unit 11 by means of a longitudinal adjustment drive 15. For that purpose, the work unit 12 is displaceably supported on a longitudinal guide 16 of the machine frame 2 in familiar manner.

In Fig. 2, one kind of a typical sleeper anchor 14 as it can be found in practice is illustrated for better comprehension. The sleeper anchor basically consists of a metal clip 17 which is clamped onto the rail base 18 and snaps shut thereon under tension. A displacement along the rail 4 is possible with application of suitable force.

Fig. 3 and 4 now show in further detail the structural design of the work unit 11 (as representative for the other, identically designed work units). The work unit 11 is mounted on a supporting frame 19 which is slidingly supported by means of a sliding sleeve 21 on a vertical guide pole 20 connected to the machine frame 2 and to which the drive 13 for vertical adjustment of the unit is linked. The supporting frame 19 is connected to two pivoting frames 22, distanced from one another in the longitudinal direction of the machine, which are each designed to be pivotable with respect to the supporting frame 19 about a shaft 24 forming a horizontal first axis 23 extending in the transverse direction of the machine. The upper ends 25 of the two pivoting frames 22 are connected to one another by means of a squeezing drive 26 in the form of a hydraulic cylinder 27.

Supported on each pivoting frame 22 is a pair of pressing tools 28 arranged opposite one another in the transverse direction of the machine with regard to the rail 4, each of the pressing tools 28 being pivotable in the transverse direction of the machine by means of a shaft 30 forming a second axis 29 extending perpendicularly to the first axis 23. A separate shaft 30 is provided for each pressing tool 28

associated respectively with one longitudinal side of the rail, the shafts extending parallel to each other and being distanced from one another in the transverse direction of the machine. The two pressing tools 28 are in the shape of levers 31, arranged approximately vertically, which are connected to one another at their upper ends 32 by means of an adjustment drive 33 accommodated in an opening of the pivoting frame 22, the shaft 30 or the second axis 29 being provided at about the longitudinal center of the respective lever 31. The lower portion of the pressing tools 28 is designed as a detachably secured pressing member 34 for application to a sleeper anchor 14.

Associated with the two pressing tools 28, lying opposite one another with respect to the transverse direction of the machine or of the track, is a centering device 45 fashioned from elastically deformable damping elements 35. The latter may for instance be made from rubber and are fastened to each pressing tool 28 directly below the second axis 29. The damping elements 35, arranged following one another in the transverse direction of the machine and adjoining one another, are compressed when the pressing members 34 are pivoted by means of the adjustment drive 33. Another two damping elements 36 of this kind, forming a centering device 46, are respectively arranged between a mount 37 of each of the two pivoting frames 22 and a bracket 38 provided on the supporting frame 19 and are compressed in the course of the spreading apart of the pressing tools 28 in the longitudinal direction of the track by means of the squeezing drive 26.

At the start of operations of the work unit 11,12, the respective four pressing tools 28 are spread apart both in the longitudinal and transverse direction of the track by means of the squeezing drive 26 or the adjustment drive 33 (see position shown in dot and dash lines in Fig. 3 and 4). In doing so, each pressing tool 28 is pivoted about the two

axes 23,29 extending perpendicularly to one another. The damping elements 36 of the centering device 46 ensure that, for automatic stabilisation of the two pivoting frames 22, the pivoting movement thereof by means of the squeezing drive 26 is carried out symmetrically with respect to each other or to the vertical. Thereafter, the work unit 11,12 - positioned above a point of intersection of rail 4 and sleeper 5 - is lowered by means of the drive 13 until the pressing members 34 project downwards slightly beyond the rail base 18.

Now the two adjustment drives 33 are operated and the pressing members 34 are placed against the rail base 18 on either side, the centering device 45 assisting, by means of the damping elements 35, the centering with respect to the rail 4 and automatically stabilising the pressing tools 28 with regard to the vertical. Finally, the squeezing drive 26 is activated again in order to move the pressing members 34 in pairs towards one another in the longitudinal direction of the track. During this, the rail base 18 functions as a guide rail for guiding the pressing members 34 moved therealong towards the sleeper anchor 14. The sleeper anchors 14 are thus engaged reliably and pressed against the vertical side surfaces of the sleepers 5.

In the course of a working operation, it is naturally not necessary to raise the work unit 11 or 12 entirely above the rail 4 after every pressing procedure, but it will mostly suffice to activate the drive 13 just so far until the spread-apart pressing members 34 are positioned slightly above the upper surfaces of the sleepers.

The positioning of the two work units 11,12 with respect to each other by means of the longitudinal adjustment drive 15 depends, on the one hand, on the average distance between the sleepers in the track 6 and, on the other hand, on whether every individual sleeper 5 or only every other sleeper 5

is provided with sleeper anchors 14. In the latter case, the work units 11,12 are positioned at double the sleeper distance from one another, and the machine 1 is moved forward by four times the sleeper distance in each instance. In Fig. 1, the other situation is represented in which every sleeper 5 of the track 6 is to be treated. Appropriately in this case, the distance of the two work units 11,12 from one another in the longitudinal direction of the machine corresponds to three times the sleeper distance, the machine being moved forward by two sleepers in the direction of arrow 39 after every pressing procedure (see brackets denoted a,b,c,d in Fig. 1).

In order to clear away ballast stones from the area of the sleeper anchors 14 on either side of the rail base 18 and thereby ensuring a problem-free application of the pressing members 34 even if accumulations of ballast are present, the machine 1 is equipped with a sweeping device 40 (see Fig. 1) which is situated in front of the work unit 11,12 in the working direction. The sweeping device 40, mounted to the machine frame 2, is designed to be lowered by means of a drive 41 at both longitudinal sides of the rail and has flexible sweeping elements 44 rotatable about a vertical axis of rotation 42 by means of a rotary drive 43. The sweeping elements 44 are arranged at an angle to the axis of rotation 42 in such a way that their rotational movement causes them to describe an acute cone.

In the following description of Figs. 5 and 6, parts having the same function are, for simplicity´s sake, denoted by the same reference numerals as in Fig. 1 to 4.

Fig. 5 shows a side view in the longitudinal direction of the track of a work unit 47 in which the pressing tools 28 are composed of two parts 48,49. The lower part 48, intended for application to a sleeper anchor 14, is respectively designed

to be adjustable relative to the upper part 49. To that end, the upper part 49, pivotably supported on the supporting frame 19 via the second axis 29, is formed as a cylindrical tube and constitutes a guide 50 in which the lower part 48 of the pressing tool 28 is mounted for adjustment in approximately vertical direction. The adjusting motion is effected by a hydraulic drive 51 which is integrated in the lower part 48 respectively. In this variant of embodiment, the adjustment drive 33 consists of a spindle drive 52 connecting the two upper ends 32 of the pressing tools 28 opposing one another in the transverse direction of the track.

Contrary to the embodiment described in the context of Fig. 1 to 4, the work unit 47 does not need to be raised by means of the drive 13 during the advancement of the machine 1 from work site to work site, but rather the only requirement to that end is a slight spreading apart in the transverse direction of the track by means of the spindle drive 52 as well as a slight vertical adjustment of the lower parts 48 of the pressing tools 28 with the aid of the drives 51.

In Fig. 6, a work unit 53 is shown in which each pressing tool 28 is equipped with its own adjustment drive 33. The latter is articulatedly connected in each case to the pivoting frame 22 and allows for relatively great lateral adjustment in the transverse direction of the track of the respective pressing tool 28 or a pivoting of the same about the second axis 29 in order to move the pressing member 34 into the area above the sleepers 5. In that way, the work unit 53 may remain in the lowered working position continuously. The squeezing drive 26 is combined with a vibrator 54 for generating vibrations, by means of which the pivoting frame 22 may be charged with a vibration which facilitates the penetration of the pressing organs 34 into ballast possibly accumulated between the sleepers 5, or which ensures a problem-free displacement even in the case of jammed sleeper anchors.

Claims

1. A machine for pressing sleeper anchors (14) fastened to a rail (4) against a sleeper (5) of a track (6), comprising a machine frame (2) supported on on-track undercarriages (3) and a work unit (11,12;47;53) vertically adjustable by means of a drive (13), the work unit having pressing tools (28) on both longitudinal sides of the rail (4) for application to the sleeper anchors (14), the pressing tools (28) being squeezable towards one another in respective pairs in the longitudinal direction of the rail by means of a squeezing drive (26) and being pivotable about a first axis (23) extending horizontally in the transverse direction of the machine, characterized in that the pressing tools (28) are additionally mounted for pivoting in the transverse direction of the track respectively about a second axis (29) extending perpendicularly to the first axis (23) by means of an adjustment drive (33).

2. A machine according to claim 1, characterized in that the pressing tools (28) are fastened to a pivoting frame (22) via the second axis (29) formed by a first shaft (30), the pivoting frame (22) in turn being connected to a supporting frame (19) of the work unit (11, 12; 47; 53) via the first axis (23) formed as a second shaft (24).

3. A machine according to claim 2, characterized in that the work unit (11,12;47;53) comprises two pivoting frames (22) distanced from one another in the longitudinal direction of the machine, each being designed for supporting two pressing tools (28) lying opposite one another in the transverse direction of the track with regard to the rail (4).

4. A machine according to claim 3, characterized in that the two pivoting frames (22) are connected to one another

at their upper ends (25) or are pivotable relative to one another by means of the squeezing drive (26) extending parallel to the longitudinal direction of the track.

5. A machine according to any one of claims 2 to 4, characterized in that the two pressing tools (28) supported in each case on a common one of said pivoting frames (22) and designed as approximately vertically extending levers (31) are connected to one another at their upper ends (32) by means of the adjustment drive (33), the second axis (29) being provided approximately in the longitudinal center of the levers (31).

6. A machine according to any one of claims 2 to 5, characterized in that a centering device (45,46) is associated with each pivoting frame (22) and each pressing tool (28) for automatically stabilising the pivoting frame (22) or the pressing tool (28) with regard to the vertical.

7. A machine according to claim 6, characterized in that the centering device (45,46) is in the form of elastically deformable damping elements (35,36) .

8. A machine according to claim 6 and 7, characterized in that associated with each pressing tool (28) are damping elements (35), mounted directly below the second axis (29), which are arranged following one another in the transverse direction of the machine and adjoining one another.

9. A machine according to any one of claims 2 to 8, characterized in that a vibrator (54) for generating vibrations is associated with at least one pivoting frame (22).

10. A machine according to any one of claims 1 to 9, characterized in that the lower portion of each pressing tool (28) is designed as a detachably secured pressing member (34).

11. A machine according to any one of claims 1 to 9, characterized in that the pressing tool (28) is composed of two parts (48,49) of which the lower part (48), intended for application to the sleeper anchor (14), is designed to be adjustable relative to the upper part (49) comprising the second axis (29).

12. A machine according to claim 11, characterized in that the lower part (48) of the pressing tool (28) is supported by means of a guide (50) on the upper part (49) and is adjustable thereto in approximately vertical direction by means of a vertical adjustment drive (51).

13. A machine according to any one of claims 1 to 12, characterized in that two work units (11,12) are provided per rail (4) of the track (6), the work units being arranged on the machine frame (2) distanced from one another in the longitudinal direction of the machine.

14. A machine according to claim 13, characterized in that one of the two work units (12) associated with the same rail (4) is in each case mounted for displacement in the longitudinal direction of the track with respect to the other work unit (11) by means of a longitudinal adjustment drive (15).

15. A machine according to any one of claims 1 to 14, characterized by a sweeping device (40) mounted for vertical displacement on the machine frame (2) and designed to be lowered by means of a vertical displacement drive (41) at both longitudinal sides of the rail in the region of the sleeper anchors (14).

16. A machine according to claim 15, characterized in that the sweeping device (40) comprises flexible sweeping elements (44) rotatable about a vertical axis of rotation (42) by means of a rotary drive (43), the sweeping elements (44)

being arranged at an angle to the axis of rotation (42) in such a way that their rotational movement causes them to describe an acute cone.

Fig. 1

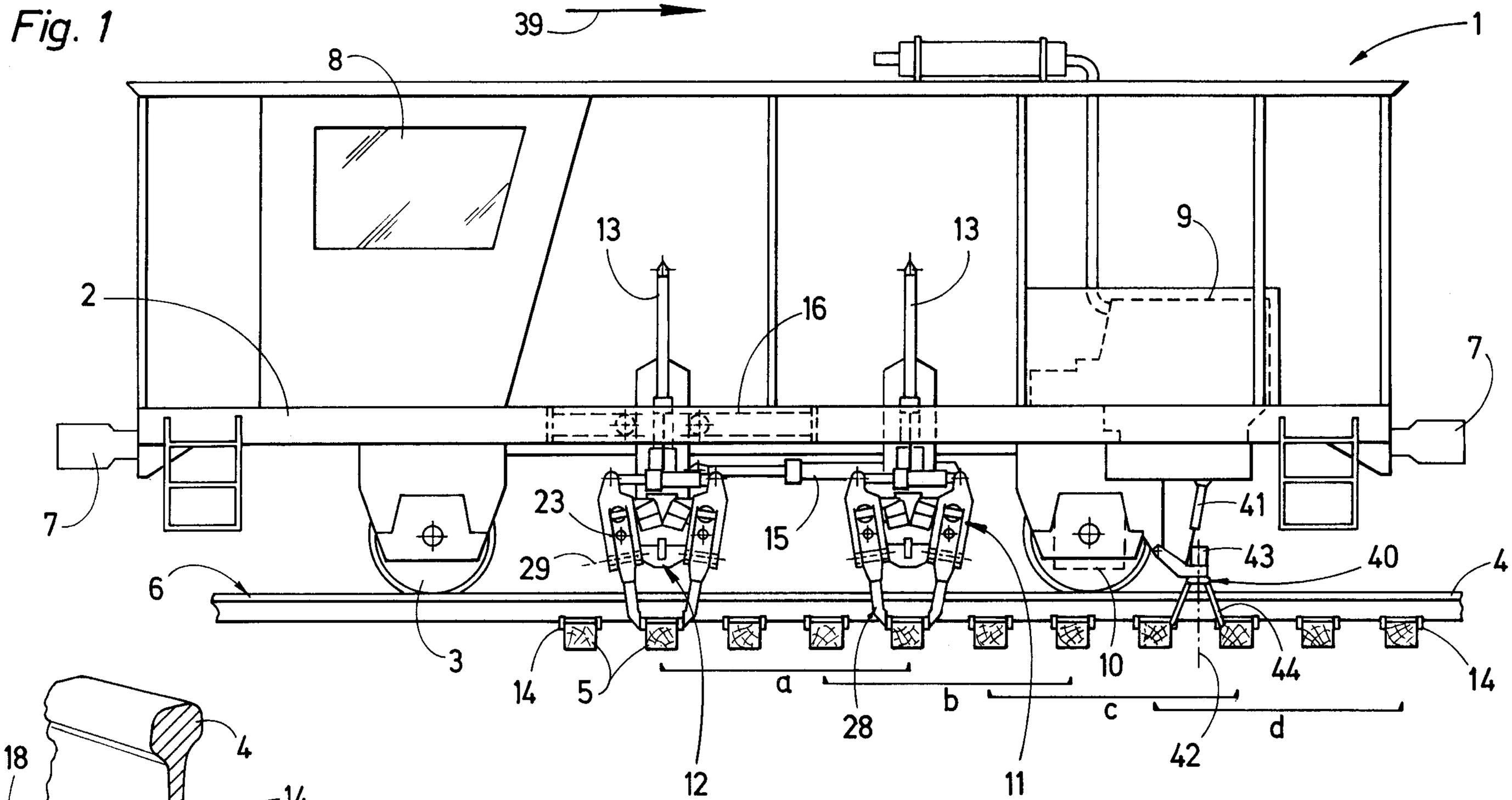

Fig. 2

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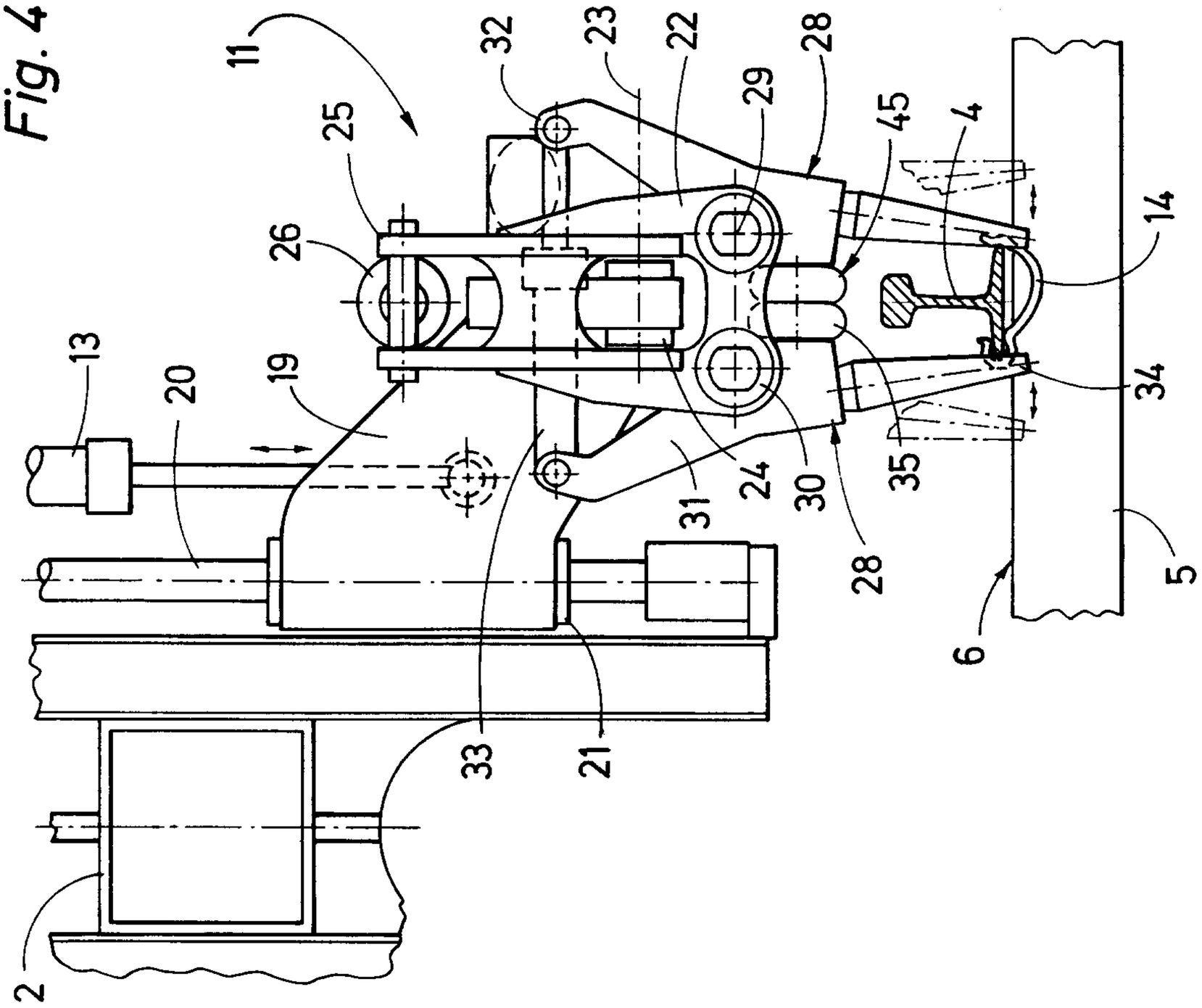
Fig. 4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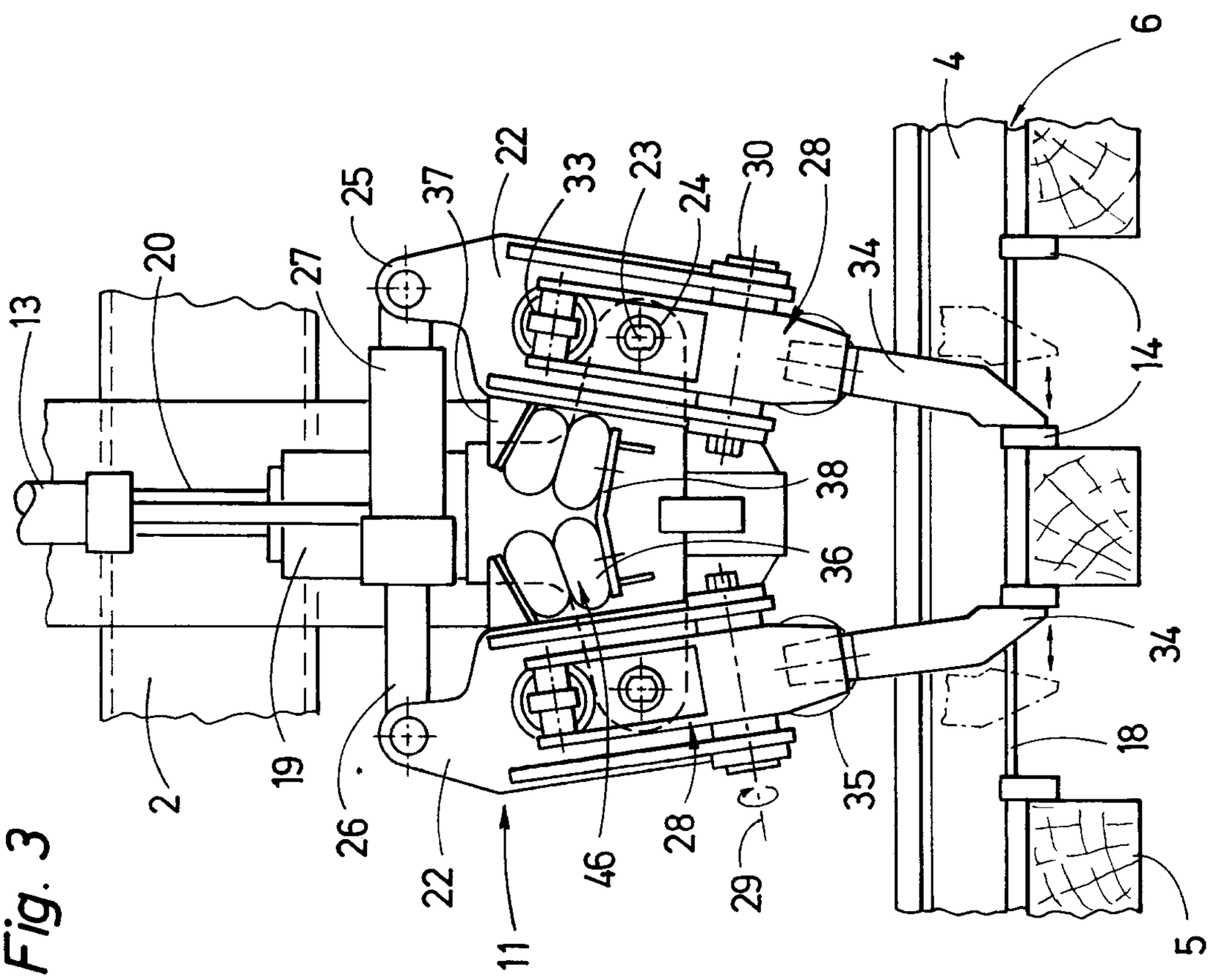
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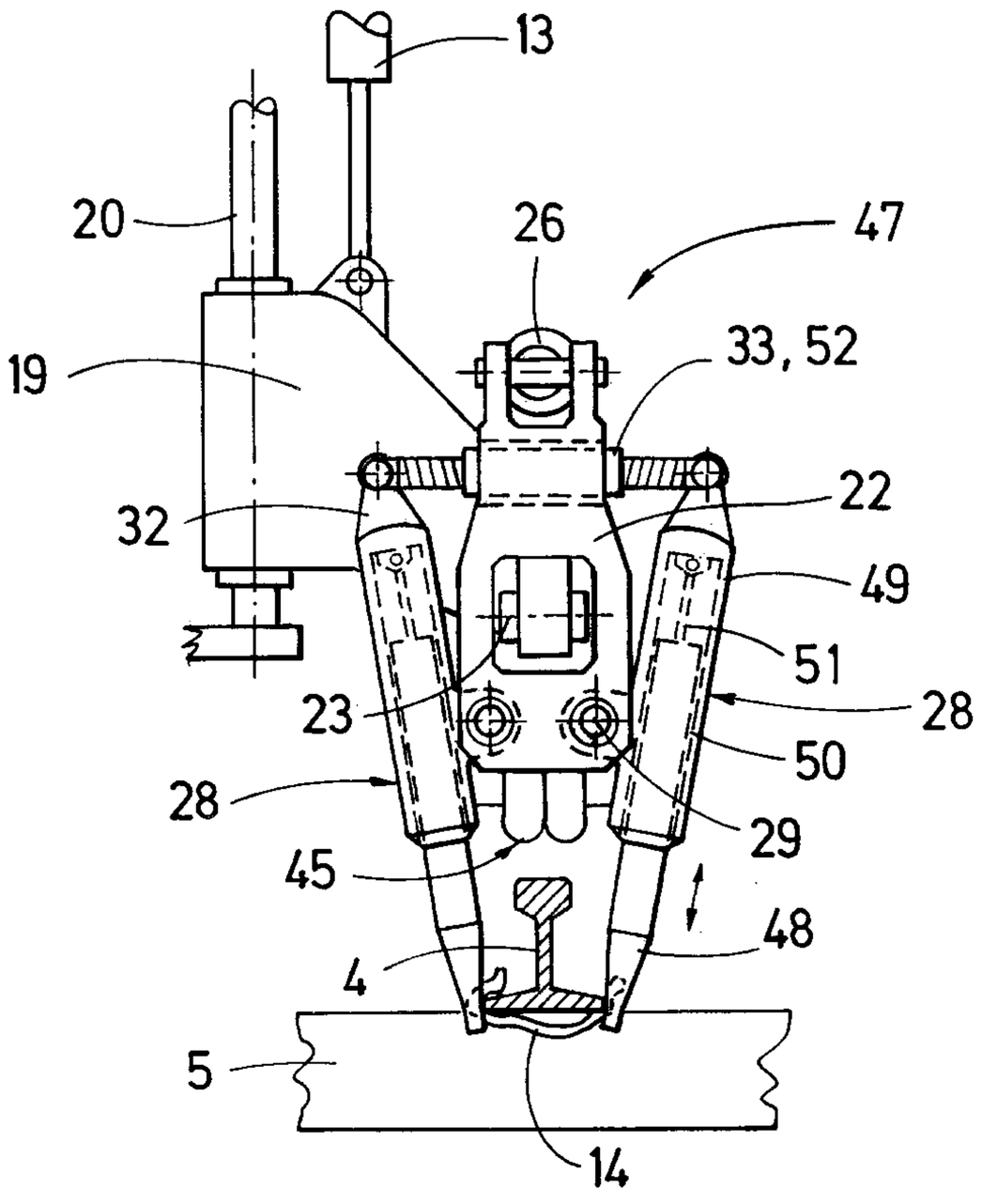
Fig. 3

Fig. 5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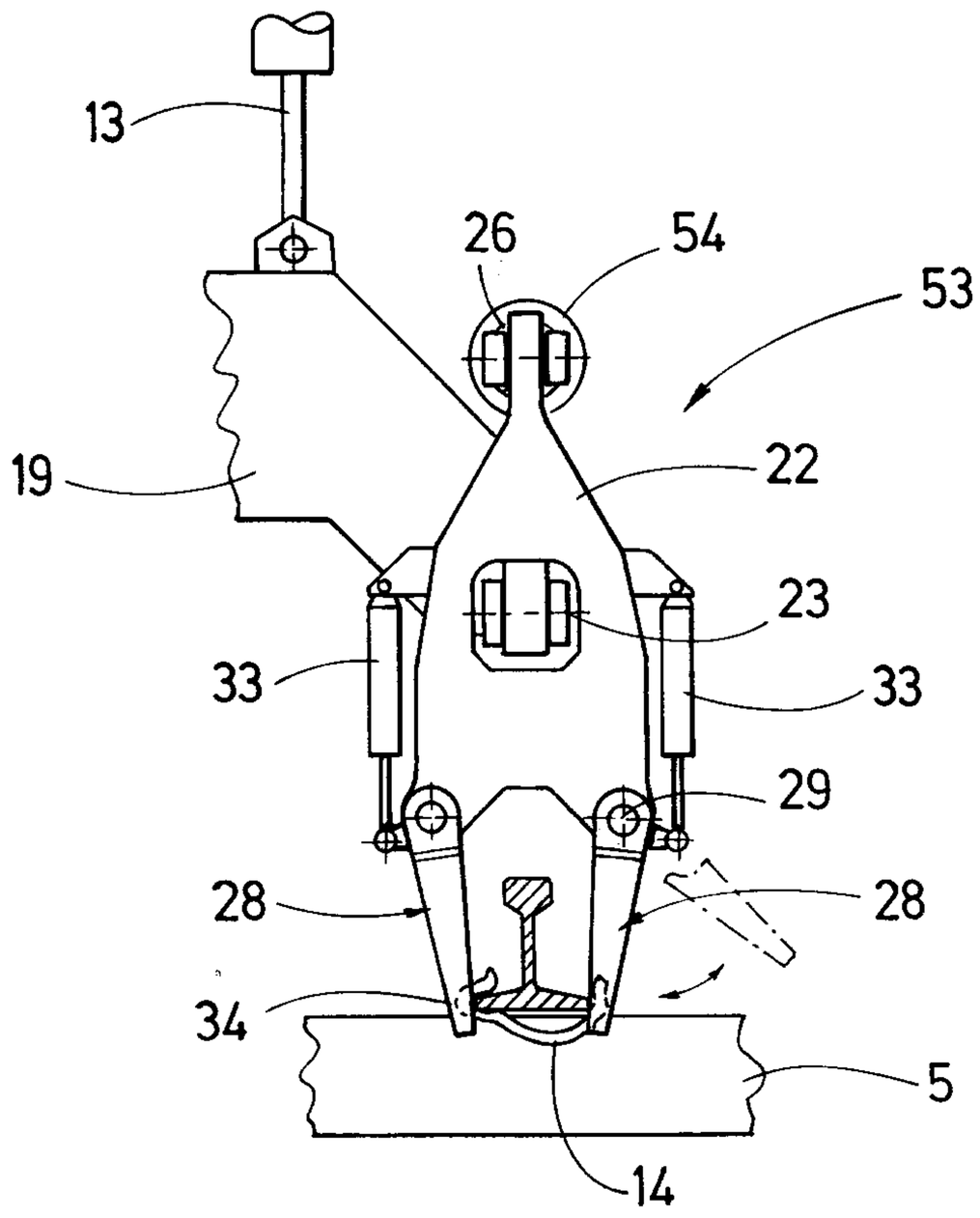
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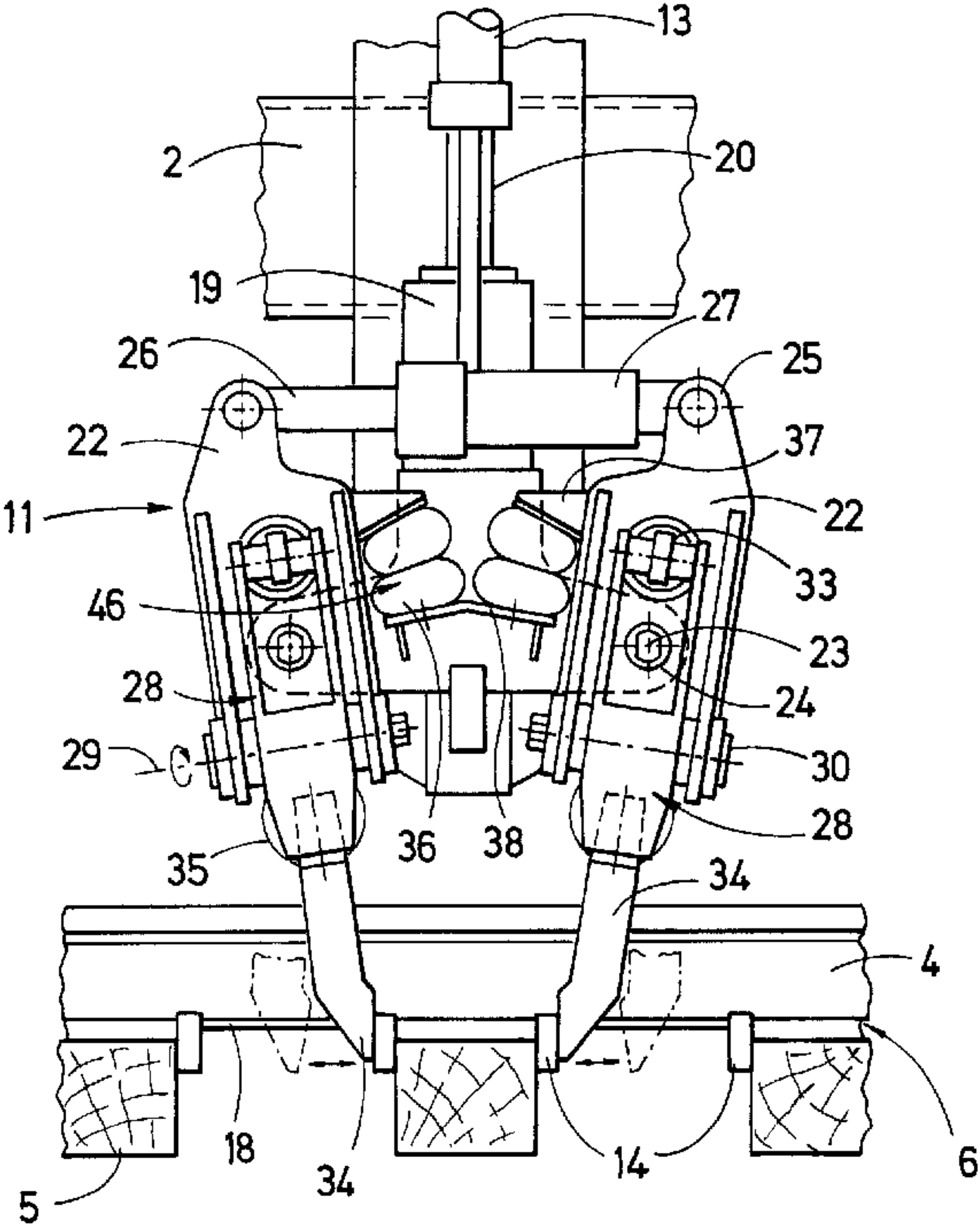
Fig. 6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