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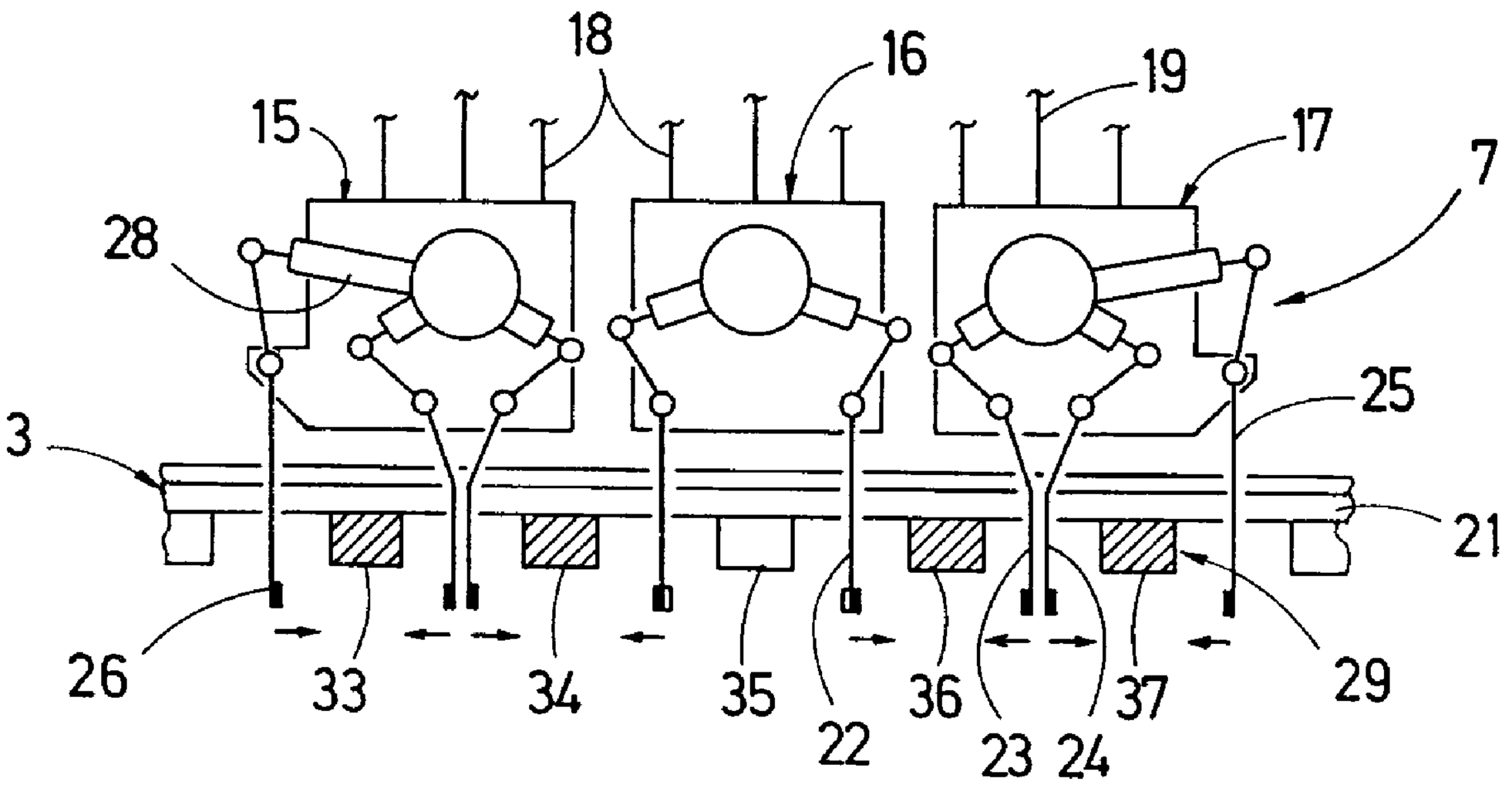

(57) Abrégé/Abstract:
A tamping unit (7) for track tamping machines for tamping a group (29) of adjacent sleepers of a track (3) is equipped with tool carriers (15,16,17), vertically adjustable independently of one another and arranged one following the other in the longitudinal direction of the track, and tamping tools (22-25) mounted thereon and having tamping tines (26) for penetration into the ballast, the tamping tools being squeezable towards one another in the longitudinal direction of the track by means of a squeeze drive (28) for tamping a sleeper. A first tool carrier (15) comprises three tamping tools (23-25) arranged one following the other in the longitudinal direction of the machine, while a second tool carrier (16) has two tamping tools (22) arranged one following the other in the longitudinal direction of the machine. At least the squeeze drive (28) of the tamping tool (22) mounted on the second tool carrier (16) adjacent to the first tool carrier (15) is designed for a first squeezing motion of the two tamping tools (22) towards one another and for a second squeezing motion away from one another.

ABSTRACT

A tamping unit (7) for track tamping machines for tamping a group (29) of adjacent sleepers of a track (3) is equipped with tool carriers (15,16,17), vertically adjustable independently of one another and arranged one following the other in the longitudinal direction of the track, and tamping tools (22-25) mounted thereon and having tamping tines (26) for penetration into the ballast, the tamping tools being squeezable towards one another in the longitudinal direction of the track by means of a squeeze drive (28) for tamping a sleeper. A first tool carrier (15) comprises three tamping tools (23-25) arranged one following the other in the longitudinal direction of the machine, while a second tool carrier (16) has two tamping tools (22) arranged one following the other in the longitudinal direction of the machine. At least the squeeze drive (28) of the tamping tool (22) mounted on the second tool carrier (16) adjacent to the first tool carrier (15) is designed for a first squeezing motion of the two tamping tools (22) towards one another and for a second squeezing motion away from one another.

A TAMPING UNIT

The invention relates to a tamping unit for track tamping machines for tamping a group of adjacent sleepers of a track, comprising tool carriers, vertically adjustable independently of one another and arranged one following the other in the longitudinal direction of the track, and tamping tools mounted thereon and having tamping tines for penetration into the ballast, the tamping tools being squeezable towards one another in the longitudinal direction of the track by means of a squeeze drive for tamping a sleeper.

A tamping unit of this kind is known from DE-A1-2 426 841 and is designed for simultaneously tamping a group of three immediately adjoining sleepers of a track. Said tamping unit comprises two tool carriers mounted one following the other in the longitudinal direction of the track on vertical guide columns respectively for vertical adjustment independently of one another and positioned above the two outer sleepers of the group of three. Each tool carrier is equipped with an eccentric shaft and three tamping tools connected thereto, two of said tamping tools being squeezable towards one another in the longitudinal direction of the track and forming a pair for tamping the outer sleeper respectively. The third tamping tools of each of the two tool carriers are arranged in such a way that together they form a further pair associated with the middle sleeper and are also designed to be squeezable towards one another in the longitudinal direction of the track. The squeezing motions are caused by hydraulically operated spindle drives.

According to US 3,343,497, a tamping unit for simultaneously tamping three adjacent sleepers is also described, the tamping unit being formed by two tool carriers mounted on a machine frame at a distance from one another corresponding to the distance of two sleepers. Each tool carrier

comprises a pair of tamping tools connected to one another by means of a squeeze drive, which are immersed into the ballast at both sides of the first and third sleeper of the group respectively and are moved towards one another in the longitudinal direction of the track for the tamping thereof, each tamping tool having an individual vibrator. For tamping the middle sleeper, the hydraulic cylinders forming the squeeze drives are activated in the opposite direction, causing the tamping tools of each of the two tool carriers facing one another to move towards one another. The oppositely directed movement of the two outer tamping tools, being the furthest apart from one another in the longitudinal direction of the track, is terminated by means of stops.

It is further known, for instance according to DE-A1-2 005 187, to arrange a number of separate single-sleeper tamping units on a machine frame, one following the other in the longitudinal direction of the track, each being designed to be lowered into the ballast bed independently of one another. Such an arrangement requires considerable structural expense.

In DE-A1-2 460 700 it is also disclosed to attach three pairs of tamping tools on a single tool carrier for tamping a group of three sleepers. However, this does not allow for selective lowering of only part of the tamping tools, for instance in the presence of an obstacle in the track.

The object of the present invention is now to provide a tamping unit of the type previously defined, by means of which more economic tamping of the track can be achieved with a structurally most simple embodiment.

This object is achieved with a tamping unit of the type described at the beginning which is characterized by a first tool carrier having three tamping tools arranged one following the other in the longitudinal direction of the machine, a second tool carrier having two tamping tools arranged one following the other in the longitudinal direction of the machine, with at least the squeeze drive of the tamping tool mounted on the

second tool carrier adjacent to the first tool carrier being designed for a first squeezing motion of the two tamping tools towards one another and for a second squeezing motion away from one another, and a third tool carrier which also comprises three tamping tools arranged one following the other in the longitudinal direction of the machine, wherein the second tool carrier is arranged, in the longitudinal direction of the machine, between the first tool carrier and the third tool carrier.

Such an embodiment of a tamping unit comprising tool carriers with different numbers of tamping tools in combination with a special squeeze drive permitting two tamping motions allows for particularly extensive adaptation to various tamping conditions. The latter may for instance be established by varying sleeper distances, tamping obstructions and switch sections and would hamper or make impossible the simultaneous lowering of a multitude of tamping tools positioned one following the other in the longitudinal direction of the machine. By virtue of the asymmetrical distribution of the tamping tools with regard to the tool carriers it can be avoided, on the one hand, to arrange the tamping tools too close together, which, for reasons of space availability, would be very difficult to solve structurally, and, on the other hand, it becomes possible to progressively activate the individual tool carriers in dependence on the track conditions. Thus, for the first time, particularly high tamping performance is ensured in connection with the possibility of continuous tamping even under difficult track conditions, for instance in switch sections.

Other advantages according to the invention emerge from the description.

The invention is explained in more detail in the following with the aid of the drawings, in which

Fig. 1 shows a simplified side view of a tamping machine comprising a tamping unit for tamping a group of five immediately adjacent sleepers,

Fig. 2 shows an enlarged detailed side view of the tamping unit,

Fig. 3 and 4 each show a highly schematized side view of said tamping unit in operation, and

Fig. 5 shows a side view of another embodiment of the invention.

A tamping machine 1, shown in Fig. 1, designed to travel continuously during operation comprises a machine frame 4 supported on a track 3 via on-track undercarriages 2 and a satellite frame 6 which is displaceable longitudinally relative to the machine frame 4 by means of a drive 5. This satellite frame 6 is designed to roll on the track 3 via an on-track undercarriage 40 and serves to support a tamping unit 7 and a track lifting-lining unit 8 having a lifting drive 9. A motor 10 is provided for supplying energy to a motive drive 11 and to the further drives of the machine 1 which are controllable from a working cab 41 by a control device 12. The working direction is indicated by an arrow 13.

As is shown in Fig. 2, the tamping unit 7 is fastened to a unit frame 14 connected to the satellite frame 6. The tamping unit 7 is composed of three tool carriers 15,16 and 17 arranged one following the other in the longitudinal direction of the track, of which the middle tool carrier 16 with regard to the longitudinal direction of the machine or track will, for reasons of clear distinction, henceforth be called second tool carrier while the other two tool carriers 15,17 will be called first and third tool carrier respectively. Each tool carrier 15,16,17 is respectively mounted on two vertical guide columns 18 of the unit frame 14 for vertical displacement independently of the other two tool carriers by means of a separate vertical adjustment drive 19 and is equipped with a separate eccentric

shaft 20 respectively. The first and third tool carrier 15,17 each have three tamping tools 23,24,25 and the second tool carrier 16 has two tamping tools 22, distanced from one another in the longitudinal direction of the machine, for penetration into the ballast at one longitudinal side of a rail 21 of the track 3. Each one of said tamping tools 22 to 25, arranged one following the other in the longitudinal direction of the machine and being provided at their lower ends with tamping tines 26, is pivotable about a horizontal axis 27 extending in the transverse direction of the machine and is connected to the eccentric shaft 20 of the respective tool carrier 15,16,17 by means of a squeeze drive 28. The tamping tools 22 to 25 are arranged symmetrically with respect to a plane of symmetry 42 extending perpendicularly to the longitudinal direction of the machine. Each tool carrier 15,16,17 comprises two tamping tools lying opposite one another with regard to the transverse direction of the machine, so that with the lowering of the tool carriers 15,16,17 two tamping supports can be tamped, each adjoining a longitudinal side of a rail.

Visible in the region of the second tool carrier 16 is an auxiliary lifting unit 31 which can be employed in one variant of embodiment and is shown in dash-dotted lines and which, similarly to the track lifting-lining unit 8, is provided with a lifting member 32, formed as a roller clamp, for form-fittingly gripping and lifting the rail 21 of the track 3 and is vertically adjustably connected to the satellite frame 6 or arranged on the unit frame 14. Provided further between the tamping unit 7 and the track lifting-lining unit 8 is a measuring axle 30, belonging to the machine's own reference system, for recording the track position, the measuring axle being mounted on the satellite frame 6.

For simultaneously tamping a group 29 of five adjacent sleepers 33,34,35,36 and 37 of the track 3, the tamping tools 22 to 25 are designed to be squeezable towards one another in

pairs in the longitudinal direction of the track by means of their squeeze drives 28, the tamping tools 25 distanced furthest from one another in the longitudinal direction of the track and the tamping tools 24, adjacent thereto, of the tool carriers 15 and 17 forming a pair respectively associated with the outer sleepers 33 and 37 of the group 29. The tamping tools 22 of the second tool carrier 16 also form a pair for tamping the middle sleeper 35, their squeeze drives 28 being designed, however, in addition to said first squeezing motion towards one another also for a second squeezing motion of the tamping tools 22 away from one another. During this second squeezing motion the tamping tools 22 together with the immediately adjacent tamping tools 23 of the first and third tool carriers 15,17 respectively form a pair for tamping the sleepers 34 and 36 adjacent to the middle sleeper 35 of the group 29. For that reason, the tamping tines 26 of the tamping tools 22 of the second tool carrier 16 are connected at their lower ends to tamping plates 38 having two working surfaces 39 facing away from one another in the longitudinal direction of the machine.

In order to precisely limit the two-fold squeezing motion of the tamping tools 22, a respective blocking drive 44 - formed as a cylinder-piston-drive - is associated with the two squeeze drives 28 of the second tool carrier 16. When said blocking drive is activated (as in the position shown here), the pivoting motion of the tamping tool 22 about the axis 27 is blocked in the vertical, middle position which means that only a pivoting of the two tamping tools 22 in the direction towards one another is possible. If the piston of the blocking drive 44 is retracted, the tamping tool 22 can also be pivoted by means of the squeeze drive 28 beyond the middle position in the direction towards the adjacent tamping tools 23 of the tool carriers 15 and 17. (The blocking drive 44 may, of course, also be formed differently, for instance as a solenoid-activated bolt, etc.)

Fig. 3 shows the first phase of operation of the tamping unit 7 for simultaneously tamping a group 29 of sleepers 33 to 37, the operation taking place in two phases. In this first phase, all tamping tines 26 are immersed into the ballast by lowering the three tool carriers 15,16,17 by means of the vertical adjustment drives 19, and the tamping tools 24 and 25 of the first and third tool carrier 15 and 17 are squeezed towards one another respectively in order to tamp the sleepers 33 and 37. At the same time, the tamping tools 23 of the tool carriers 15 and 17 as well as the tamping tools 22, adjacent thereto respectively, of the second tool carrier 16 are also squeezed towards one another in order to tamp the sleepers 34 and 36 (see small arrows and cross-hatching of the sleepers). Thereafter, all three tool carriers 15,16,17 are raised.

In the immediately following second phase of the operation, represented in Fig. 4, only the central or second tool carrier 16 is lowered again. The tamping tools 22 are now squeezed in the direction towards one another - opposite to the squeezing direction during the first phase - for tamping the central tie 35 of the group 29. During this, the first and third tool carrier 15 and 17 remain in the raised, inoperative position. After finishing tamping of the sleeper 35 and raising the second tool carrier 16, the tamping unit 7 is moved onward with the satellite frame 6 in the operating direction (arrow 13) to the next group of five sleepers to be tamped.

The variant of embodiment of a tamping unit 43 according to the invention as shown in Fig. 5 essentially corresponds to the tamping unit 7 in Figs. 1 to 4 in a reduced or simplified shape. Therefore, parts having the same function are denoted by the same reference numerals.

The tamping unit 43 comprises only two tool carriers, i.e. a first tool carrier 15 having three tamping tools 23,24,25 arranged one following the other in the longitudinal direction

of the machine and a second tool carrier 16 having two tamping tools 22. The squeeze drive 28 of the tamping tool 22 of the second tool carrier 16 adjacent to the first tool carrier 15 is designed for a two-fold or reciprocal squeezing motion (as in the tamping unit 7), while the second tamping tool 22 as well as the tamping tools 23,24 and 25 of the first tool carrier 15 are equipped with squeeze drives 28 which can only be activated one way. In operation for tamping a group 29 of three sleepers 33,34,35 - with lowering of both tool carriers 15 and 16 - first the two adjacent sleepers 33 and 34 are tamped. Then, in a second operating sequence, only the second tool carrier 16 is lowered again and the third sleeper 35 of the group 29 is tamped.

Within the scope of the invention, it is naturally also possible to arrange the tamping unit 7 or 43 directly on the machine frame of a tamping machine travelling step-by-step from tamping location to tamping location. Likewise, the tamping tines may be fastened in known manner on the respective tamping tool 22-25 for lateral pivoting by means of a drive about an axis extending in the longitudinal direction of the machine.

CLAIMS

1. A tamping unit for track tamping machines for tamping a group (29) of adjacent sleepers of a track (3), comprising tool carriers (15,16,17), vertically adjustable independently of one another and arranged one following the other in the longitudinal direction of the track, and tamping tools (22-25) mounted thereon and having tamping tines (26) for penetration into the ballast, the tamping tools being squeezable towards one another in the longitudinal direction of the track by means of a squeeze drive (28) for tamping a sleeper, characterized by a first tool carrier (15) having three tamping tools (23-25) arranged one following the other in the longitudinal direction of the machine, a second tool carrier (16) having two tamping tools (22) arranged one following the other in the longitudinal direction of the machine, with at least the squeeze drive (28) of the tamping tool (22) mounted on the second tool carrier (16) adjacent to the first tool carrier (15) being designed for a first squeezing motion of the two tamping tools (22) towards one another and for a second squeezing motion away from one another, and a third tool carrier (17) which also comprises three tamping tools (23-25) arranged one following the other in the longitudinal direction of the machine, wherein the second tool carrier (16) is arranged, in the longitudinal direction of the machine, between the first tool carrier (15) and the third tool carrier (17).

2. A tamping unit according to claim 1, characterized in that the tamping tools (22-25) are arranged symmetrically with respect to a plane of symmetry (42) extending

perpendicularly to the longitudinal direction of the machine.

3. A tamping unit according to claim 1 or claim 2, characterized in that both squeeze drives (28) of the second tool carrier (16) are designed for a first squeezing motion of the two tamping tools (22) towards one another and for a second squeezing motion away from one another.

4. A tamping unit according to any one of claims 1 to 3, characterized in that tamping plates (38) are provided on the tamping tines (26) of the tamping tools (22) of the second tool carrier (16), the tamping plates having two working surfaces (39) facing away from one another.

5. A tamping unit according to any one of claims 1 to 4, characterized in that an auxiliary lifting unit (31) having a lifting member (32) for form-fittingly gripping and lifting the track (3) is provided on a unit frame (14) in the region of the second tool carrier (16).

Fig. 1

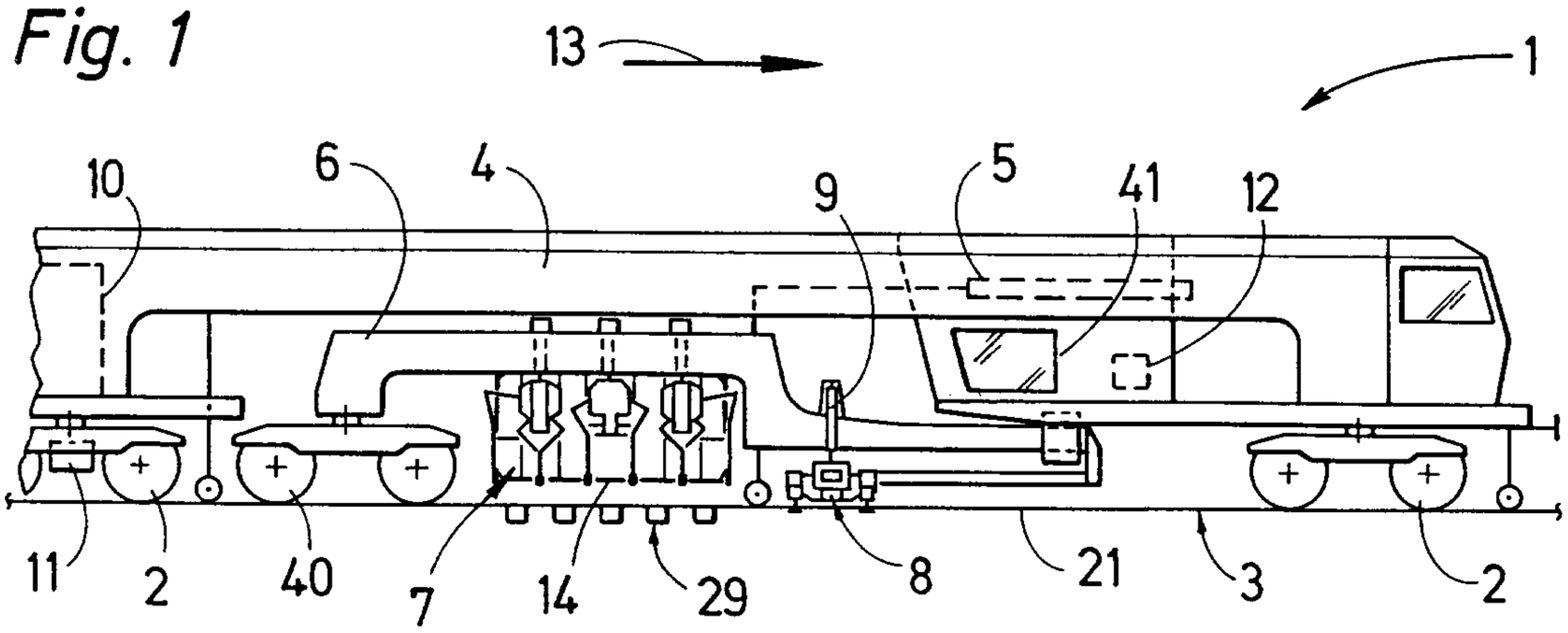

Fig. 3

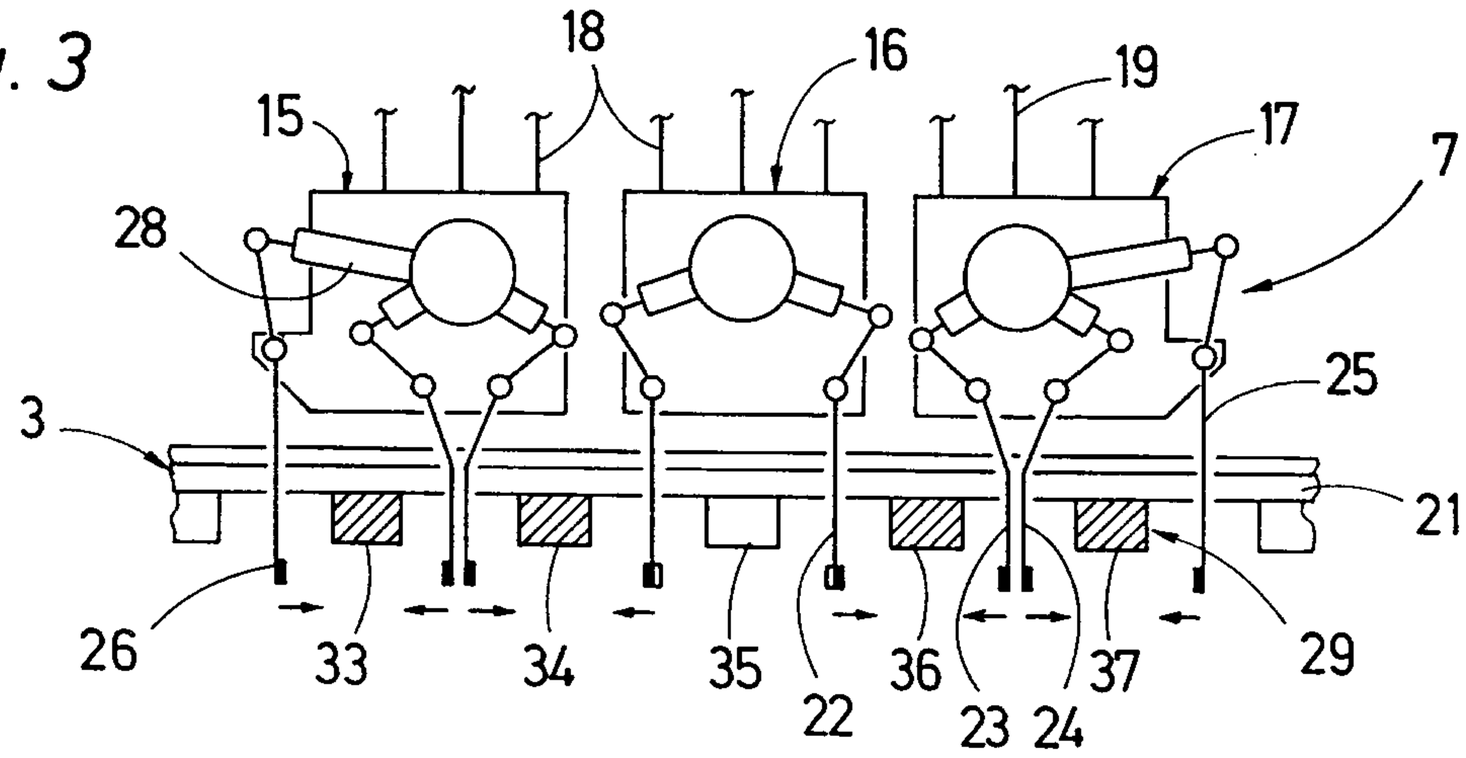

Fig. 4

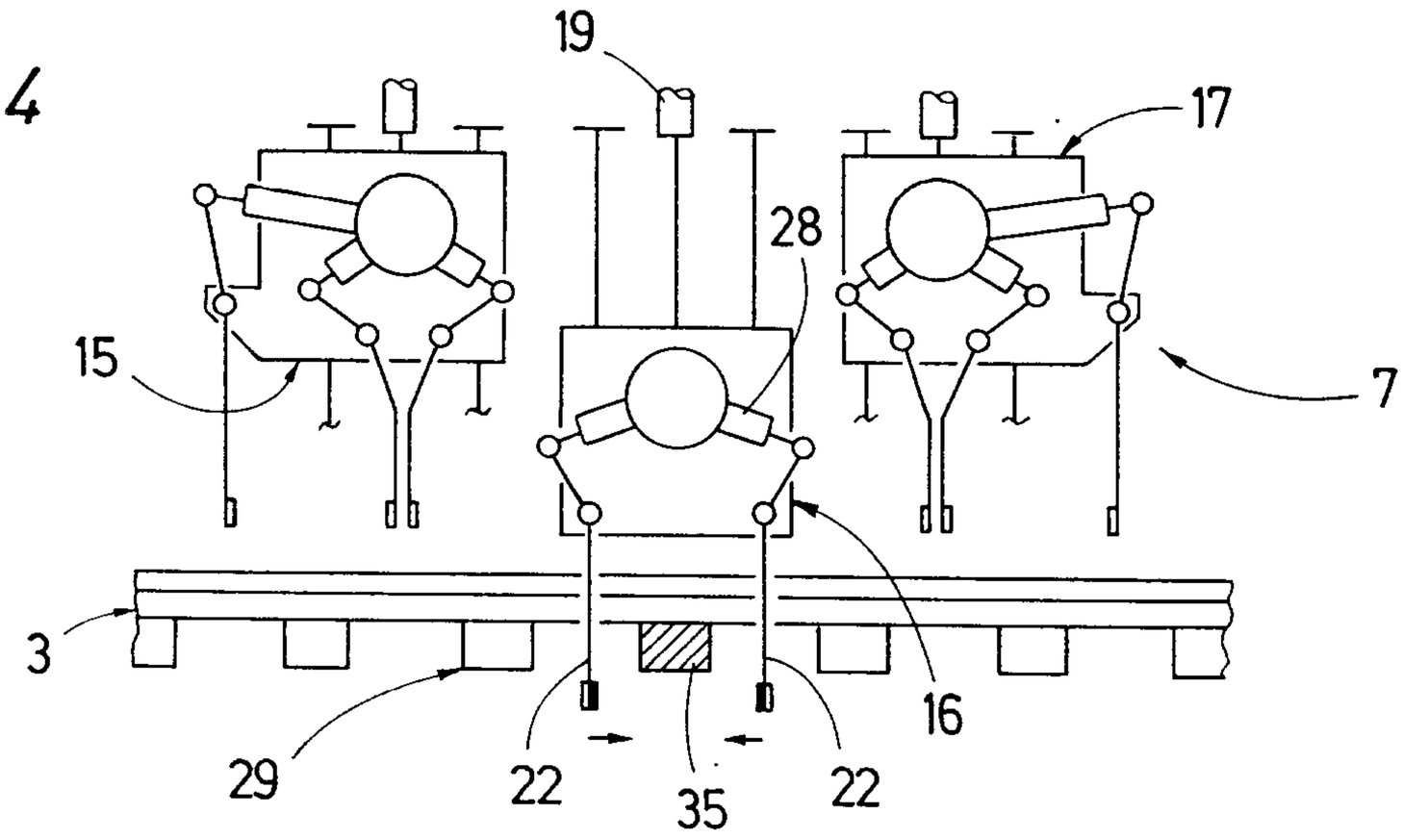

Fig. 2

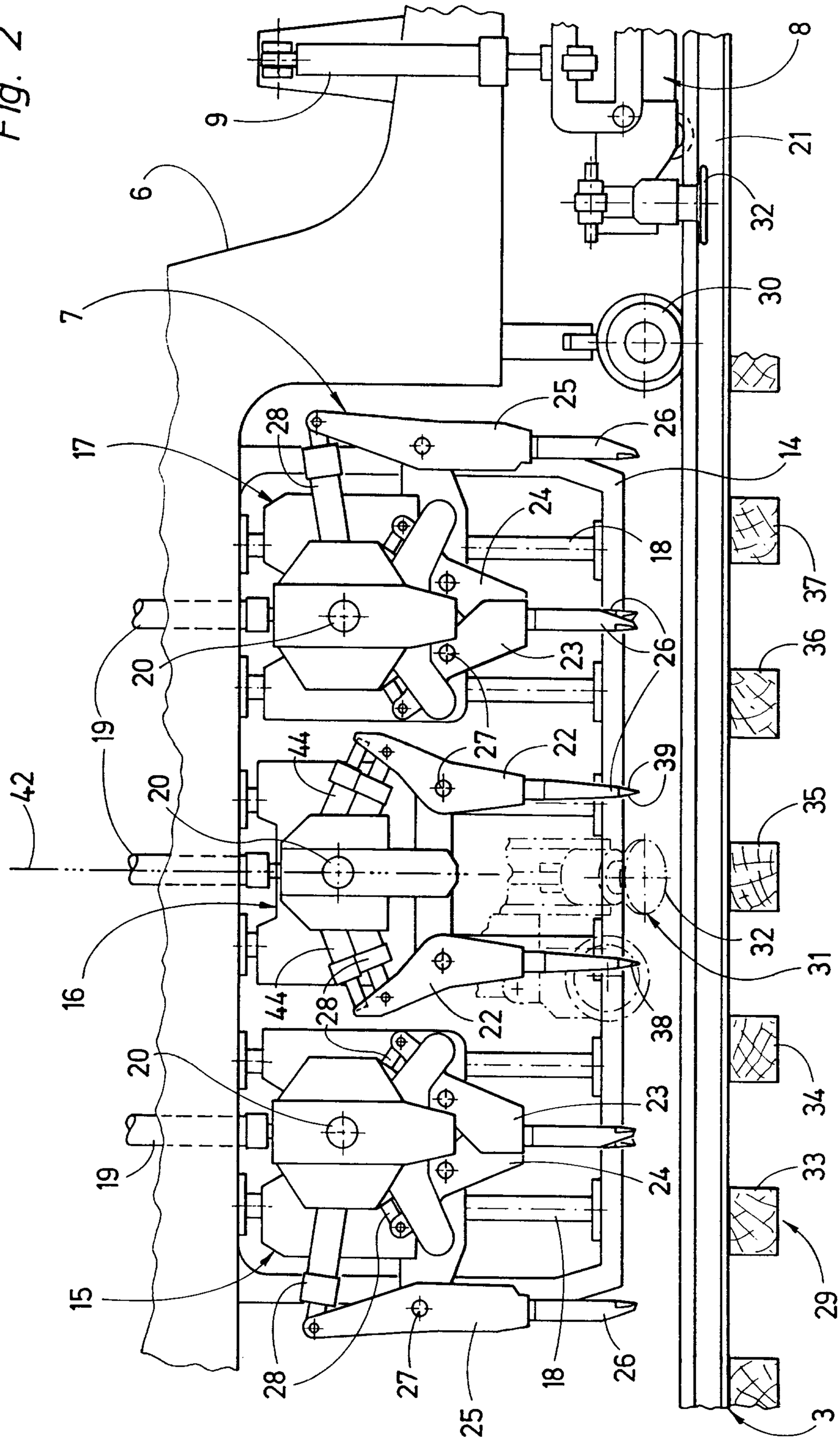
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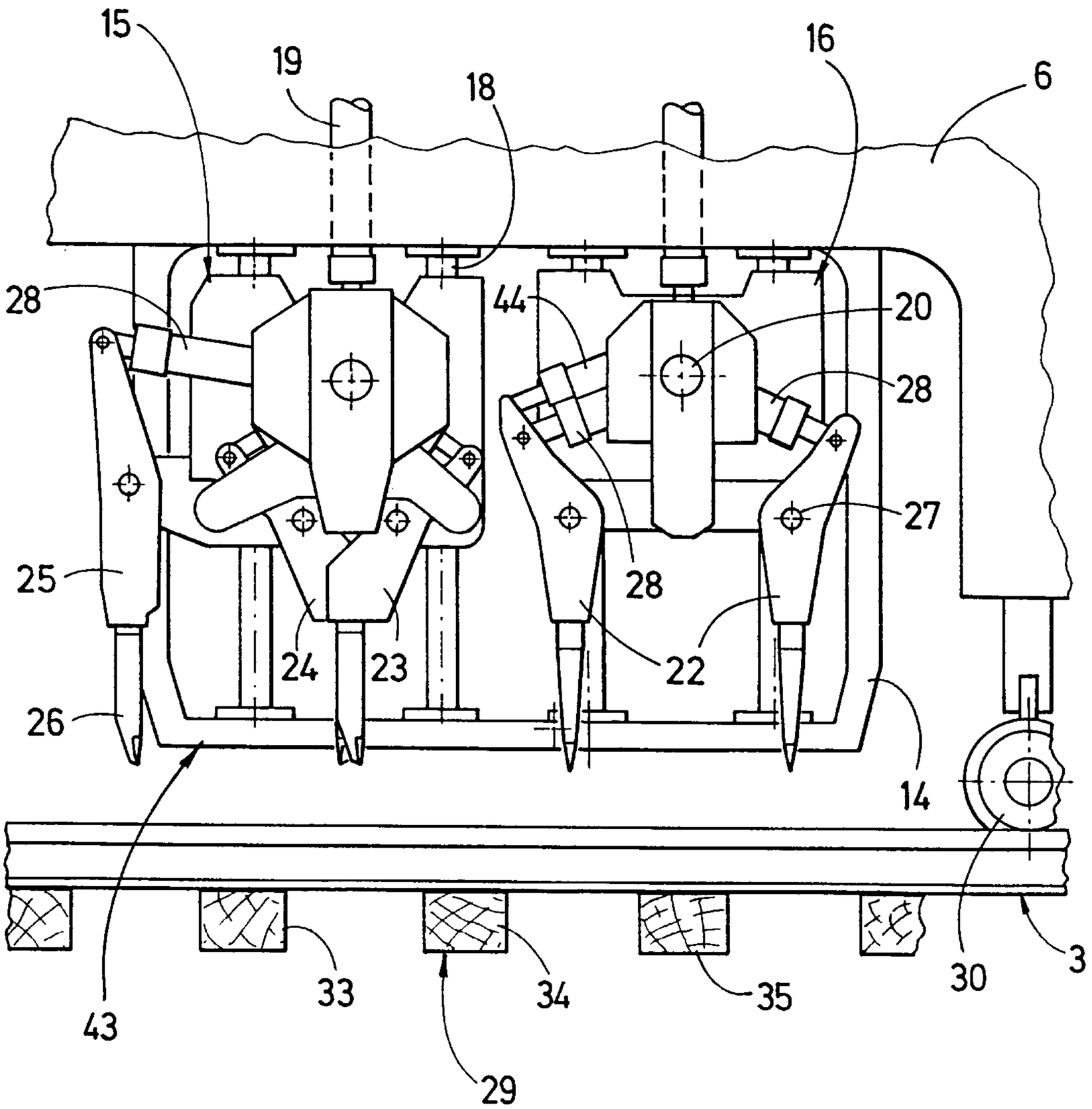
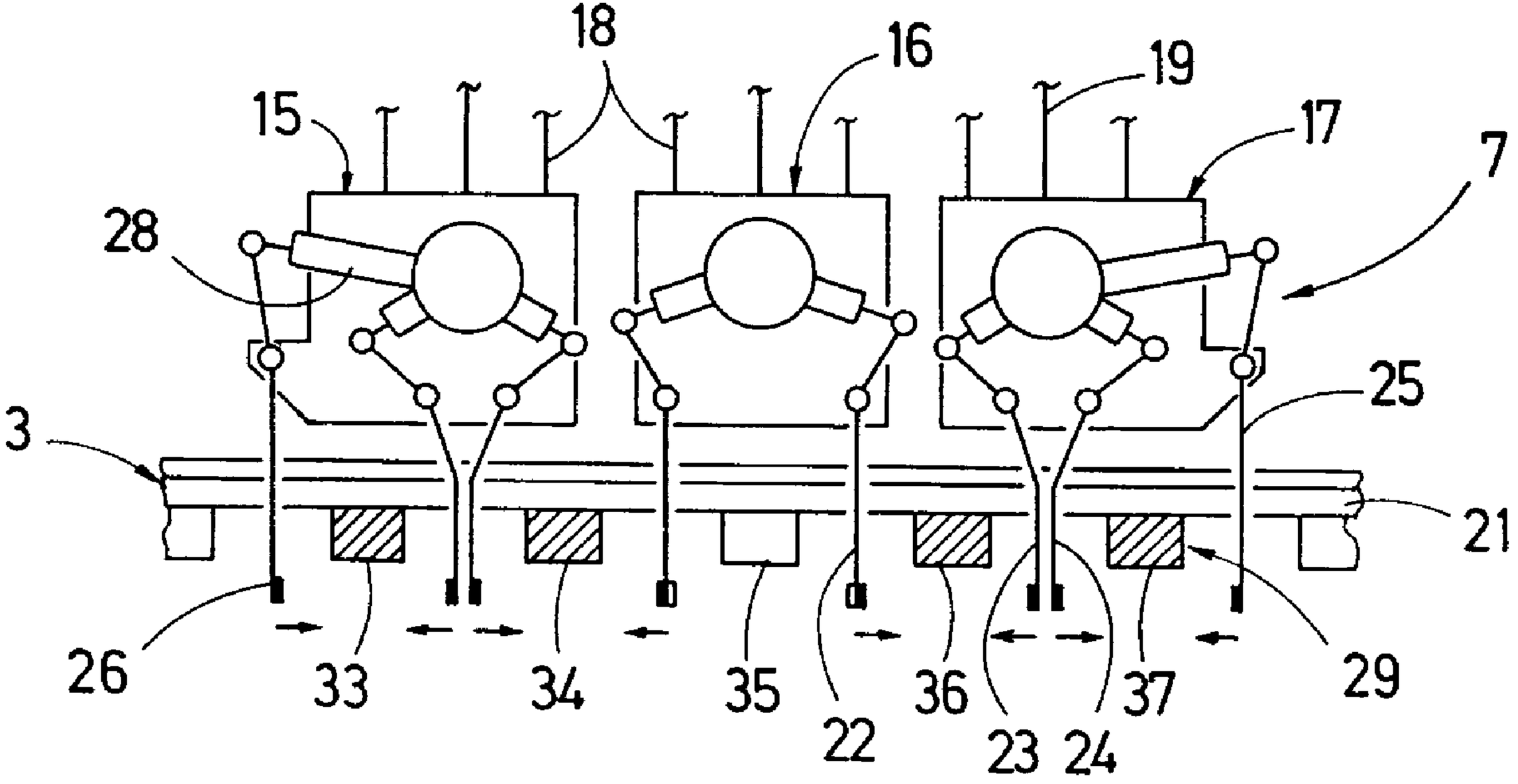
Fig. 5

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