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(54) **MACHINE FOR THE APPLICATION AND / OR REMOVAL OF CONNECTING FASTENERS FOR RAILS**

MASCHINE ZUR ANWENDUNG UND/ODER ENTFERNUNG VON VERBINDUNGSELEMENTEN
FÜR SCHIENEN

MACHINE POUR L'APPLICATION ET/OU LE RETRAIT D'ATTACHES DE LIAISON POUR RAILS

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Description

[0001] The present invention relates to a device for the application and/or removal of connecting fasteners (so-called e-clips or fast-clips) for connecting a rail to a tie of a railway track.

[0002] The insertion (also called application) of the connecting fasteners aims to fix the rail to the underlying ties, while the extraction (or removal) of the fasteners releases the connection between the rail and the tie.

[0003] Connecting fasteners are usually applied on two opposite sides of the rail base and have an anchoring portion destined for insertion in an anchoring seat, the so-called joint of the tie and a pressure portion destined to be inserted over the rail base so that with the connecting fastener applied (or inserted) it engages the tie and the rail and keeps them connected and pressed against each other.

[0004] In the case of connecting fasteners of the "fast-clip" type, the joints of the ties and the connecting fasteners are configured for insertion and extraction of the fastener in a direction substantially horizontal and perpendicular to the longitudinal direction of the rail.

[0005] In the case of connecting fasteners of the "e-clip" type, the joints of the ties and the connecting fasteners are configured for insertion and extraction of the fastener in a direction substantially horizontal and parallel to the longitudinal direction of the rail.

[0006] Machines for the application or removal of connecting fasteners from rails and ties are known from WO-A-2006/031168, hereinafter for brevity called "application machines", which may have large dimensions if made for the laying of new railway lines, or small in size and weight, and more easily transportable if designed for the maintenance of sections of existing rail. The application machines of the prior art typically comprise a frame which can rest on the rail by means of support rollers, a thrust member mounted on the frame so as to shift in relation to the frame in a direction of insertion and/or extraction and suitable to engage the connecting fastener, at least one oleo-dynamic actuator mounted on the frame and connected to the thrust member to move the thrust member in the direction of insertion and/or extraction to apply or remove the connecting fastener from the rail. The oleo-dynamic actuator is driven by an oleo-dynamic pump connected to an internal combustion engine.

[0007] The engine, once started, always works at the maximum number of revolutions needed for the proper functioning of the pump in all operating phases. The pressurising and depressurising of the oleo-dynamic actuator does not take place by switching on or off the internal combustion engine or the oleo-dynamic pump, but by switching valves that permit or interrupt access to the oil permanently pumped and pressurised by the oleo-dynamic actuator. The duration of operation of the engine is thus determined by the capacity of the fuel tank, since switching on or off the engine during the application and removal phases of the fasteners is not feasible as con-

sidered incompatible with the type, sequence and timing of this type of work.

[0008] This results in high fuel consumption and exposure of operators using the application machines and those nearby, to considerable levels of noise and air pollution.

[0009] Furthermore, the hydraulic oil kept in circulation by the pump tends to overheat, reducing the efficiency of the machine and creating a security risk for the operators.

[0010] In order to reduce the risks due to overheating of the hydraulic oil, it is known of to oversize the volume of hydraulic oil and use it together with the ducts of the hydraulic circuit as a radiant mass for dissipating heat. This increases the dimensions and manufacturing and operating costs of the application machine.

[0011] It is also known of to fit the hydraulic circuit with a specific radiator for cooling the oil. Said radiator constitutes an additional component to the pump and to the tank and increases the pressure drops of the hydraulic system, as well as the complexity, dimensions, manufacturing and maintenance costs of the machine.

[0012] A further disadvantage of the application machines of the prior art consists of the poor handling and practicality during transport and use due to the distribution of the weight and dimensions in relation to the gripping handles, of the lack of adaptability of the machine to the stature and strength of the operator and of the fact that the application machine does not actively contribute to the correct movement and positioning of the rail to the tie before the insertion of the connecting fastener.

[0013] The purpose of the present invention is therefore to make available an application machine for the application and/or removal of connecting fasteners (so-called clips, e-clips or fast-clips) for connecting a rail to a tie of a railway track, having characteristics such as to overcome at least some of the drawbacks mentioned with reference to the prior art.

[0014] One particular aim of the invention is to reduce the sound pressure generated by the application machine in the work cycle and also in the intervals of inactivity of the oleo-dynamic actuator during which the combustion engine is in any case on.

[0015] A further particular aim of the invention is to reduce fuel consumption and pollutant emissions, as well as to increase the stand-alone operation of the application machine for the same weight and volume of the fuel tank.

[0016] Yet a further aim of the invention is to reduce the risk of overheating the hydraulic oil and, thus, limit the total volume, and to simplify and economise the entire hydraulic circuit, for example by removing the radiator as an additional component and relative hydraulic connections.

[0017] Some of the objectives are achieved by means of an application machine according to claim 1. The dependent claims refer to advantageous embodiments.

[0018] For a clearer understanding of the invention and

its advantages some of its embodiments, made by way of non-limiting examples will be described below with reference to the appended drawings, wherein:

- figures 1 and 2 are perspective views of an application machine for connecting fasteners of the e-clip type according to one embodiment of the invention;
- figure 2A shows an actuation assembly of an application machine in the transport configuration, according to one embodiment;
- figure 3 is a partial front view of the application machine in figure 1;
- figure 4 shows an oleo-dynamic pump with an internal combustion engine of an actuation assembly of an application machine according to one embodiment;
- figures 5 and 6 are perspective views of an application machine for connecting fasteners of the Fastclip type according to one embodiment of the invention;
- figure 7 is a front view of a thrust assembly of the application machine in figure 5;
- figure 8 is a perspective view of the thrust assembly of the application machine in figure 5;
- figures 9 and 10 show a detail of the thrust assembly in figure 7, in an insertion configuration;
- figure 11 shows the detail of the thrust assembly in figure 7, in an extraction configuration;
- figures 12 and 13 show a thrust assembly of the application machine during an extraction cycle of a Fastclip connecting member;
- figures 14 and 15 show a thrust assembly of the application machine during an insertion cycle of a Fastclip connecting member;
- figure 16 is a partial view in cross-section of a tie lifting device of the application machine according to one embodiment;
- figure 17 shows a diagram of the oleo-dynamic control of the lifting device in figure 16;
- figure 18 is a view in cross-section of a locking device of an operating handle of the application machine according to one embodiment;
- figures 19-22 show a support arm of the application machine, according to one embodiment, in different adjustment configurations.

[0019] With reference to figures 1, 2, 5, 6 and 12, reference numeral 1 globally denotes an application machine for the application and/or removal of connecting fasteners 2 (so-called e-clips or fast clips or Pandrol clips) for the connection of a rail 3 to a tie 4 of a railway track. The application machine 1 comprises:

- a frame 5 which can rest, for example by means of special support rollers 6, 7, on the rail 3,
- a thrust assembly 8 mounted on the frame 5 and having at least one thrust member 9 suitable to engage the connecting fastener 2, and an oleo-dynamic actuator 10 arranged to be able to move the thrust

member 9 in an insertion 11 and/or extraction direction 12 to insert or remove the connecting fastener 2 from the rail 3 and to a joint 13 of the tie 4

- an actuating assembly 14 mounted on the frame 5 and having an internal combustion engine 15, an oleo-dynamic pump 16 connected with the engine 15, an oleo-dynamic circuit 17 connecting the pump 16 with the oleo-dynamic actuator 10 and comprising one or more control valves 18 for the actuation of the oleo-dynamic actuator 10,
- a driving and control device 19 actuatable by an operator and connected with the control valve 18 to control the oleo-dynamic actuator 10.

[0020] According to a first aspect of the invention (figures 2, 6), the control device 19 comprises an adjusting device 20 of an accelerator 21 of the engine 15, which (automatically) adjusts the number of revolutions of the engine 15 depending on the actuation of the oleo-dynamic actuator 10.

[0021] In particular, the adjusting device 20 adjusts the accelerator 21 so as to increase the number of revolutions of the engine 15 during the actuation of the oleo-dynamic actuator 10 with respect to a reduced number of revolutions during non-actuation intervals of the oleo-dynamic actuator 10.

[0022] This way, the number of revolutions of the internal combustion engine 15 is adjusted in real time to the momentary kinetic energy needs of the pump 16 which requires a lot of energy at the time of driving the oleo-dynamic actuator 10 for inserting and extracting the connecting fasteners 2, little energy at the time of the return of the oleo-dynamic actuator 10 from an advanced working position to a rearward rest position and, theoretically, no energy during the pause or non-operation intervals of the oleo-dynamic actuator 10.

[0023] Similarly, the number of revolutions of the engine 15 is adapted in real time to the need to save fuel and reduce noise and pollution, lowering fuel consumption and noise and pollutant emissions to the minimum necessary in the pause or non-actuation intervals of the oleo-dynamic actuator 10, as well as during the return of the oleo-dynamic actuator 10 from the working position to the rest position.

[0024] In one embodiment, the adjusting device 20 of the accelerator 21 may comprise a gear motor with an encoder connected to the accelerator 21 and suitable to adjust the accelerator 21 position (which in turn determines the number of revolutions of the motor) according to an acceleration ramp or curve optimised for operation of the machine 1.

[0025] Alternatively, the adjusting device 20 of the accelerator 21 may comprise an electromagnetic actuator (solenoid) connected to the accelerator 21 and suitable to switch the accelerator 21 into just two positions corresponding to "a high number of revs" and "low number of revs".

[0026] In one embodiment, the application machine 1

comprises an electric current generator 22, for example an electric alternator connected to the engine 15 and configured to generate, even at the lower number of revs of the engine 15 switched on, an electric current sufficient to power the driving and control device 19 as well as for any lights 23 for lighting an operational area of the machine 1.

[0027] According to a second aspect of the invention (figure 4), the pump 16 is a two stage oleo-dynamic pump which switches by means of a limiting valve, depending on the oil pressure, between:

- a two-stage pumping configuration with a high flow rate and a reduced pressure, and
- a single-stage pumping configuration with a reduced flow rate and a high pressure.

[0028] In particular, upon exceeding a pressure threshold in the oleo-dynamic circuit the limiting valve on the pump 16 switches from the two-stage configuration to the single-stage configuration.

[0029] This way, in the non-actuation intervals of the oleo-dynamic actuator 10 (i.e. the intervals between successive insertions or extractions):

- the control device 19 controls the control valves 18 in such a way as not to operate the oleo-dynamic actuator 10 (which remains in its rest position or returns to its rest position), and
- the adjusting device 20 adjusts the accelerator 21 of the engine 15 to a low number of revs, and
- the resulting oil pressure in the oleo-dynamic circuit 17 is less than the threshold pressure, so that
- the two-stage pump 16 is switched to the two-stage pumping configuration.

[0030] This speeds up the return of the oleo-dynamic actuator 10 to the rest position, by shortening the cycle time of the application machine 1, reduces the oil temperature and, during the waiting intervals between two consecutive actuation cycles, makes the oil circulate repeatedly at low pressure through a filter of the oleo-dynamic circuit 17.

[0031] In the actuation phases of the oleo-dynamic actuator 10:

- the control device 19 controls the control valves 18 in such a way as to operate the oleo-dynamic actuator 10 (which moves from the rest position to the work position), and
- the adjusting device 20 adjusts the accelerator 21 of the engine 15 to a high number of revs, and
- when the oleo-dynamic actuator encounters a resistance load the resulting oil pressure in the oleo-dynamic circuit 17 is greater than the threshold pressure, so that
- the two-stage pump 16 is switched to the single-stage pumping configuration.

[0032] This allows the engine 15 to supply the pump 16 with the number of revs and the maximum kinetic energy and allows the pump 16 to supply the oleo-dynamic actuator 10 with the maximum pressure exactly and only when required, i.e. in the actuation phases which determine the insertion or removal of the connecting fasteners 2.

[0033] In one embodiment, the pump 16 is a two stage gear pump, per se known (see for example EP0811165B1, DE3520884) and thus not described or illustrated in detail, which allows the aforesaid switching of the pump in synergic combination with the adjustment of the accelerator of the engine and with the work cycles of the thrust assembly 8.

[0034] According to a third aspect of the invention (figure 4), the oleo-dynamic circuit 17 comprises a reservoir 28 forming an inlet opening 25, an outlet opening 26, a cooling wall 27 which may have cooling tabs projecting outwardly of the reservoir 24, and an internal oil path 28 extending from the inlet opening 25 to the outlet opening 26 and having a thermal exchange section arranged between the inlet opening and the outlet opening, and extending along the cooling wall 27 (see the schematic illustration in figure 4).

[0035] This way the oil recirculated by the pump 16 is continuously cooled during its "guided" passage through the reservoir 24 and without any need to provide an additional radiator or oversize the oil volume.

[0036] In one embodiment of the machine 1 for the application of Fastclips (application and extraction transversal to the longitudinal direction of the rail), the thrust assembly 8 comprises two opposite levers 29, rotatably mounted on two sides of the frame 5 about respective axes and only one oleo-dynamic actuator 10 connected with both levers 29 to move them in a counter-direction, wherein one of the thrust members 9 is mounted at each of the two levers 29.

[0037] With reference to this embodiment and according to a fourth aspect of the invention (figures 7-13), each of the thrust bodies 9 forms at a first end an inserting tool 30 (made for example as a thrust block) for inserting the connecting fastener 2 and, and at a second end, an extracting tool 31 (made for example as a hook) for extracting the connecting fastener 2, and each of the thrust bodies 9 can be turned or tipped over and blocked or restrained in:

- an extraction position (figures 11-13) in which the extracting tool 31 projects from the lever 29 so as to be able to engage and extract the connecting fastener 2 inserted,
- an insertion position (figure 10) in which the inserting tool (30) projects from the lever 29 so as to be able to engage and insert the disengaged connecting fastener 2.

[0038] This solution allows a smooth transition between an application operation and a subsequent oper-

ation for removal of the connecting fasteners and vice versa by means of a simple reversal of the thrust members 9. This saves costs and time as compared to the prior art which provided different thrust members for the insertion and extraction of the Fastclips, as well as their complete replacement in case of change of use of the application machine.

[0039] In one embodiment, the thrust member 9 is hinged to the lever 29 by a hinge 32 lockable in the extraction and insertion positions and releasable by means of a locking knob 33 (figures 9, 10). The hinge 32 may also comprise a retention spring 34 which facilitates the rotation of the thrust member 9 and keeps it in the chosen position.

[0040] According to a fifth aspect of the invention (figures 7, 12, 13), the thrust assembly 8 comprises a counter frame 35 rigidly connected to the frame 5 and having two counter surfaces 36 opposite and directly facing the rail 3, preferably at the profile of the rail base, or at the joint 13 of the tie 4, on two opposite sides of the rail, so as to form a counter support during an extraction movement of the thrust assembly 8.

[0041] This permits use of the thrust assembly 8 with a single oleo-dynamic actuator and in any case guarantees a counter support even in the case in which one of the two opposite connecting fasteners has already been extracted and no longer provides any contrast for the extraction of the other fastener.

[0042] In one embodiment, the counter-frame 35 is in the shape of a horseshoe, suitable to extend astride the rail profile and the thrust members 9 are movable with respect to the counter-frame 35 moving towards each other (insertion) or away from each other (extraction) transversally to the longitudinal direction of the rail 3. This way torques on the machine caused by the extraction thrust are avoided and the risk of tipping over the machine 1 itself is overcome.

[0043] The frame 5 may form a platform or central portion 37 to which the thrust assembly 8 and the actuation assembly 14 is connected, a front supporting arm 38 extending from the central portion 37 toward a front side of the machine 1 and having one or more rollers 6 for a front support of the frame 5 on the rail 3, and a rear support arm 39 extending from the central portion 37 toward a rear side of the machine 1 and having at least one roller 7 for a rear support of the frame 5 on the rail 3. The rear arm 39 is connected with the central portion 37 by a rotary joint 40 with a spring 41 that is preloaded as to solicit (with the machine 1 resting on the rail) the central portion 37 with the thrust assembly 8 against the force of gravity upwards in a raised waiting position with respect to the front and rear supports (rollers 6, 7) and to allow the operator to push the central portion 37 with the thrust assembly 8 against the spring pre-load 41 downwards in a lowered position where the thrust members 9 can engage the connecting fasteners 2 positioned on the tie 4 (and possibly partially pre-inserted in the mounting attachments 13).

[0044] According to a sixth aspect of the invention (figures 1, 5, 19-22), the preload of the spring which acts between the central portion 37 and the rear arm 39 of the frame 5 is adjustable to adjust the raised waiting position and be able to adapt the resistance of the frame 5 to lowering, to the individual preferences of the user. This facilitates the use of the application machine 1 and reduces operator fatigue.

[0045] In one embodiment, the spring 41 comprises a gas spring connected to a first point or fulcrum 42 in the rear arm 39 away from the rotary joint 40 and a second point or fulcrum 43 of the central portion 37 away from the rotary joint and from the first fulcrum 42 so that the central portion 37, the rear arm 39 and the air spring 41 form an articulated triangle, and wherein the position or distance of one of the first 42 and second points or fulcrums 43 (preferably of the second point 43) in relation to the rotary joint 40 is adjustable, for example by means of an adjusting screw 44 with a manual knob to adjust the preload torque exerted by the air spring on the axis of the rotary joint 40.

[0046] According to a seventh aspect of the invention (figures 7, 8, 12 - 17), the thrust assembly 8 comprises a lifting device 45 to lift the tie against the rail, and the control device 19 drives the lifting device 45 automatically depending on the actuation of the oleo-dynamic actuator 10, so that the lifting of the tie 4 takes place during an initial phase of insertion of the Fastclip fastener in which the Fastclip fastener does not yet engage the profile of the rail base 3 but is already partially fitted into the joint 13 of the tie 4 and the joint 13 of the tie 4 is thus already engaged with the thrust member 9.

[0047] This automates the assembly cycle of the Fastclip fasteners, even when the tie is not already in contact with the rail.

[0048] In one embodiment, the lifting device 45 comprises:

- a palette 46 projecting from a lower side of an inserting tool 30 of the thrust member 9 in the direction of the rail 3 (i.e. inwardly of the thrust assembly 8), so as to insert itself under the connecting fastener 2 (Fastclip) when the inserting tool 30 engages the connecting fastener 2 partially inserted in the joint 13 of the tie 4,
- a lifting piston 47 that is rested from above against the rail 3 and moves downwardly so as to lift the entire thrust assembly 8 with respect to the rail 3 and approximates the tie 4 coupled to the thrust members 9 towards the rail 3 base.

[0049] In one advantageous embodiment, the lifting piston 47 is moved by an oleo-dynamic piston-cylinder lifting assembly 48 automatically controlled depending on the oleo-dynamic pressure in the oleo-dynamic actuator 10, in particular by means of a group of pressure-controlled passive valves 49.

[0050] This simplifies and strengthens the control sys-

tem of the application machine 1 and reduces the number of control buttons or levers, reducing the risk of human error and correcting synchronisation errors between the phases of moving the thrust members 9 and moving the lifting piston 47.

[0051] The insertion cycle of the Fastclip springs occurs in the following sequence: The user actuates the control member 51 and the control device 19 drives the control valves 18 of the oleo-dynamic circuit 17 which supplies pressurised oil to the oleo-dynamic actuator 10. The oleo-dynamic actuator 10 moves from the rest position toward the insertion position and the thrust members engage the Fastclip fasteners and insert the palettes 46 under the latter. As the oleo-dynamic actuator 10 advances towards the insertion position, the thrust members 9 push the Fastclip fasteners into the corresponding joints 13 of the tie 4 and the resistance to the insertion of the connecting fasteners increases the pressure of the oleo-dynamic fluid in the actuator 10. Upon achievement of a threshold fluid pressure which corresponds to a threshold force acting on the Fastclip fasteners, the group of pressure-controlled passive valves 49 switches the oleo-dynamic circuit 17, so as to stop or slow down the further advancement of the oleo-dynamic actuator 10 and (pressurise the oleo-dynamic piston-cylinder lifting assembly 48 so as to) lower the lifting piston 47 against the rail 3 so that the thrust members 9 lift the tie 4 to rest against the rail 3. The support of the tie against the rail entails an increase of the fluid pressure up to a further threshold value, which ensures the lifting of the tie against the rail, upon the achievement of which the group of pressure-controlled passive valves 49 switches the oleo-dynamic circuit 17, so that the oleo-dynamic actuator 10 and the thrust members 9 continue their stroke as far as the insertion position, completing the insertion of the Fastclip fastener above the rail base with the tie 4 moved correctly towards the latter.

[0052] According to an eighth aspect of the invention (figures 1, 5), the control device 19 comprises a cycle selection member 50, for example a lever, knob, or push-button for a manual selection between an application cycle of the connecting fasteners 2 and a removal cycle of the connecting fasteners 2 (differing substantially in the direction of movement of the oleo-dynamic actuator 10), as well as an actuating member 51, for example a push-button, for the manual actuation of the cycle pre-selected by the cycle selection member 50, wherein the same actuating member 51 actuates both the application and the removal cycles of the connection fasteners 2.

[0053] This enables use of the same hand (e.g. Right hand) by the operator to insert and to disconnect the connecting fasteners 2, making the use of the application machine 1 more ergonomic.

[0054] In one embodiment, the control device 19 comprises a memory and stores in the memory the number of insertion/extraction cycles and/or the total number of hours of operation, and generates an acoustic and/or visual maintenance alert depending on the number of hours

of operation and/or of the number of cycles and predetermined maintenance intervals. According to a ninth aspect of the invention (figures 1, 2, 5, 6, 18), the actuating assembly 14 forms a module that is free-standing and removably connectable to the frame 5, and comprises two front handles 52 formed on a front side of the actuating assembly 14 and two rear handles 53 formed on a rear side of the actuating assembly 14 which permit the gripping and transport of the actuating assembly 14 by two people (one in front and one behind), as well an operating handle 54 with two handles 55 and at least one actuating member 51, for example a push-button or a lever, wherein the operating handle 54 is movable, for example, can be tipped between an operative position, wherein the operating handle 54 is extended outwardly of the actuating assembly 14 in the direction of the rear side, and a transport position, wherein the operating handle 54 is collapsed inwardly of the actuating assembly 14.

[0055] This facilitates the transport of the actuating assembly 14 in a "collapsed" configuration in which the front 52 and rear 53 handles are easily accessible. Furthermore, even the operation of the application machine 1 is facilitated, thanks to the fact that the operating handle 54 can be placed (for example rotated, tipped, extended) into the operative position (possibly adjustable) most ergonomic for the operator.

[0056] In one embodiment, the operating handle 54 can be locked in the operative position by a friction or snap locking device 56 configured to:

- keep the operating handle 54 locked in the operative position until reaching a shifting force threshold below a limit force which would damage the operating handle 54,
- permit the movement of the operating handle 54 from the operative position to the transport position upon overcoming the shifting force threshold.

[0057] This obviates the problem that operators may want to carry the actuating assembly 14 lifting it by the extended operating handle 54 with the risk that the weight of the actuating assembly 14 could damage the operating handle 54 or that the entire actuating assembly 14 could fall and be damaged.

[0058] In case of lifting the actuating assembly 14 with the operating handle 54 extended in the operative position, the locking device 56 would gradually yield, preventing actions that could injure the operator or damage the application machine 1.

[0059] In one embodiment (figure 18), the locking device 56 comprises one or more pairs of friction surfaces which can be clamped against one another and detached from one another by means of a locking knob 58. The friction surfaces are made, one on the operating handle 54 and the other on a frame of the actuating assembly 14, preferably at a tipping hinge which connects the operating handle 54 to the (frame) of the actuating assembly 14. Advantageously, the operating handle 54 can be

completely detached from the actuating assembly 14.

[0060] In one advantageous embodiment, the rear handles 53 are also made on the operating handle 54 near one of its ends opposite the handles 55, and are moved, for example, tipped into the position of use when the operating handle 54 is moved to the collapsed position.

Claims

1. An application machine (1) for the application and the removal of connecting fasteners (2) for connecting a rail (3) to a tie (4) of a railroad track, the application machine (1) comprising:

- a frame (5) that can be rested on the rail (3),
- a thrust assembly (8) mounted on the frame (5) and having at least one thrust member (9) suitable to engage the connecting fastener (2), and an oleo-dynamic actuator (10) so arranged as to be able to move the thrust member (9) in an insertion direction (11) to engage the connecting fastener (2) with the rail (3) and with a joint (13) of the tie (4), and in an extraction direction (12) to disengage the connecting fastener (2) from the rail (3) and the joint (13) of the tie (4),
- an actuating assembly (14) mounted on the frame (5) and having an internal combustion engine (15) with an accelerator (21), an oleo-dynamic pump (16) connected with the engine (15), an oleo-dynamic circuit (17) connecting the pump (16) with the oleo-dynamic actuator (10),
- a driving and control device (19) actuable by an operator, **characterized in that** the actuating assembly (14) comprises one or more control valves (18) for the actuation of the oleo-dynamic actuator (10), and **in that** the driving and control device (19) is connected with the control valve (18) for controlling the control valve (18) to control the oleo-dynamic actuator (10),

wherein the driving and control device (19) comprises an adjusting device (20) of the accelerator (21), which adjusting device (20) automatically adjusts the number of revolutions of the engine (15) depending on the actuation of the oleo-dynamic actuator (10).

2. The application machine (1) according to claim 1, wherein the adjusting device (20) adjusts the accelerator (21) so as to increase the number of revolutions of the engine (15) during the actuation of the oleo-dynamic actuator (10) with respect to a reduced number of revolutions during non-actuation intervals of the oleo-dynamic actuator (10).
3. The application machine (1) according to claim 1 or

2, wherein the adjusting device (20) comprises a gear motor with an encoder connected to the accelerator (21) and suitable to adjust the accelerator (21) position in accordance with a predetermined acceleration function.

4. The application machine (1) according to one of the preceding claims, wherein the pump (16) is a two-stage oleo-dynamic pump that switches depending on the number of revolutions of the engine (15) and/or depending on the oil pressure in the oleo-dynamic circuit (17) between:

- a two-stage pumping configuration with a high flow rate and a reduced pressure, and
- a single-stage pumping configuration with a reduced flow rate and a high pressure.

5. The application machine (1) according to claim 4, wherein:

- upon exceeding a pressure threshold in the oleo-dynamic circuit during an actuation of the oleo-dynamic actuator (10), the pump (16) switches from the two-stage configuration to the single-stage configuration, and
- after the completion of an actuation of the oleo-dynamic actuator (10), the pump (16) switches from the single-stage configuration to the two-stage configuration.

6. The application machine (1) according to claim 4 or 5, wherein the pump (16) is a two-stage gear pump.

7. The application machine (1) according to one of the preceding claims, wherein the oleo-dynamic circuit (17) comprises a reservoir (28) forming an inlet opening (25), an outlet opening (26), a cooling wall (27) with cooling tabs projecting outwardly of the reservoir (24), and an internal oil path (28) extending from the inlet opening (25) up to the outlet opening (26) and having a thermal exchange length arranged between the inlet opening and the outlet opening, and extending along the cooling wall (27).

8. The application machine (1) according to one of the preceding claims, wherein the thrust assembly (8) comprises two opposite levers (29), rotatably mounted on two sides of the frame (5) about respective axes and only one oleo-dynamic actuator (10) connected with both levers (29) to move them in a counter-direction, wherein one of the thrust members (9) is mounted at each of the two levers (29), and

- each of the thrust members (9) forms, at a first end thereof, an inserting tool (30) for inserting the connecting fastener (2) and, at a second end thereof, an extracting tool (31) for extracting the

connecting fastener (2), and

- each of the thrust members (9) can be over-turned between:

- an extraction position at which the extracting tool (31) projects from the lever (29) so as to be able to engage and extract the connecting fastener (2) inserted,
- an insertion position at which the inserting tool (30) projects from the lever (29) so as to be able to engage and insert the disengaged connecting fastener (2).

9. The application machine (1) according to claim 8, wherein the thrust member (9) is hinged to the lever (29) by a hinge (32) provided with a spring (34) to facilitate the rotation of the thrust member rotation and to hold the thrust member at the selected position.

10. The application machine (1) according to one of the preceding claims, wherein the thrust assembly (9) comprises a counter-frame (35) rigidly connected with the frame (5) and having two opposite counter-surfaces (36) so located as to directly face the rail (3) or the joint (13) of the tie (4), so as to form, on two opposite sides of the rail, a counter-support during an extraction movement of the thrust assembly (9).

11. The application machine (1) according to claim 10, wherein the counter-frame (35) is in the shape of a horse shoe, suitable to extend astride of the rail profile, so that it can be abutted against the rail base at two opposite sides, and the thrust members (9) are movable with respect to the counter-frame (35) mutually moving towards each other or away from each other transversally with respect to the rail (3) longitudinal direction.

12. The application machine (1) according to one of the preceding claims, wherein the frame (5) forms:

- a central platform (37) to which the thrust assembly (8) and the actuating assembly (14) are connected,
- a front supporting arm (38) extending from the central platform (37) towards a front side of the machine (1) and having one or more rollers (6) for frontally supporting the frame (5) on the rail (3),
- a rear supporting arm (39) extending from the central platform (37) towards a rear side of the machine (1) and having at least one roller (7) for a rear support of the frame (5) on the rail (3),

wherein the rear arm (39) is connected with the central portion (37) by a rotary joint (40) with a spring

(41) that is so preloaded as to:

- allow, when the frame (5) is rested on the rail, lowering and lifting the central portion (37) with the thrust assembly (8) with respect to the rail, and
- balancing at least part of the central portion (37) weight with the thrust assembly (8), wherein the spring (41) preload is adjustable to be able to adjust the frame resistance to the lowering and lifting of the central portion (37) with the thrust assembly (8).

13. The application machine (1) according to claim 12, wherein the spring (41) comprises a gas spring connected with a first fulcrum (42) in the rear arm (39) away from the rotary joint (40) and with a second fulcrum (43) of the central portion 37 away from the rotary joint and the first fulcrum (42), so that the central portion (37), the rear arm (39), and the gas spring (41) form an articulated triangle, and wherein the second fulcrum (43) position with respect to the rotary joint (40) can be adjusted.

14. The application machine (1) according to one of the preceding claims, wherein the thrust assembly (8) comprises a lifting device (45) to lift the tie against the rail, and the control device (19) automatically actuates the lifting device (45) depending on the oleodynamic actuator (10) actuation, so that the tie (4) lifting occurs during an initial step of the insertion of the connecting fastener (2) in which it is already partially inserted into the joint (13) of the tie (4).

15. The application machine (1) according to claim 14, wherein the lifting device (45) comprises:

- a palette (46) projecting from a lower side of an inserting tool (30) of the thrust member (9) inwardly of the thrust assembly (8), so as to insert under the connecting fastener (2) when the inserting tool (30) engages the connecting fastener (2) that is partially inserted into the joint (13) of the tie (4),
- a lifting piston (47) that is rested from above against the rail (3) and moves downwardly so as to lift the entire thrust assembly (8) with respect to the rail (3) and approximates the tie (4) coupled to the thrust members (9) towards the rail (3) base.

16. The application machine (1) according to claim 15, wherein the lifting piston (47) is moved by an oleodynamic lifting cylinder-piston assembly (48), automatically driven by a group of fluid pressure-controlled passive valves (49) which switch depending on the oleo-dynamic pressure in the oleo-dynamic actuator (10).

17. The application machine (1) according to one of the preceding claims, wherein the control device (19) comprises a cycle selection member (50) for a manual selection between an application cycle of the connecting fasteners (2) and a removal cycle of the connecting fasteners (2), as well as an actuating member (51) for the manual actuation of the cycle previously selected by the cycle selection member (50), wherein the same actuating member (51) actuates both the application and the removal cycles of the connection fasteners (2).

18. The application machine (1) according to one of the preceding claims, wherein the control device (19) comprises a memory and stores in the memory the number of insertion/extraction cycles and/or the total number of hours of operation, and it emits an acoustic and/or visual maintenance alert as a function of the number of hours of operation and/or of the number of cycles and predetermined maintenance intervals.

19. The application machine (1) according to one of the preceding claims, wherein the actuating assembly (14) is a module that is free-standing and removably connectable to the frame (5), and it comprises two front handles (52) formed on a front side of the actuating assembly (14) and two rear handles (53) formed on a rear side of the actuating assembly (14), as well as an operating handle (54) with two handles (55) and at least one user actuating member (51), wherein the operating handle (54) can be displaced between:

- an operative position, where the operating handle (54) is extending outwardly of the actuating assembly (14) to the direction of the rear side, and
- a transport position, where the operating handle (54) is collapsed inwardly of the actuating assembly (14).

20. The application machine (1) according to claim 19, wherein the operating handle (54) is rotatable between the transport position and the operative position, and wherein the operative position is adjustable, wherein the application machine (1) comprises a friction or snap locking device (56) to lock the operating handle (54) in the selected operative position, said locking device (56) being configured so as to:

- keep the operating handle (54) locked in the selected operative position until reaching a rotation moment threshold below a limit rotation moment which would lead to damage the operating handle (54), and
- upon exceeding the rotation moment threshold, allow a rotation of the operating handle (54)

out of the operative position .

21. The application machine (1) according to claim 19, wherein the operating handle (54) is fully detachable from the actuating assembly (14).

Patentansprüche

1. Anbringemaschine (1) für das Anbringen und Entfernen von Verbindungselementen (2) zum Verbinden einer Schiene (3) mit einer Schwelle (4) eines Eisenbahngleises, wobei die Anbringemaschine (1) aufweist:

- einen Rahmen (5), der auf die Schiene (3) aufsetzbar ist,
- eine Schubanordnung (8), die an dem Rahmen (5) angebracht ist und zumindest ein Schubelement (9) aufweist, das zum Eingriff mit dem Verbindungselement (2) geeignet ist, und einen öldynamischen Aktuator (10), der so angeordnet ist, dass er in der Lage ist, das Schubelement (9) in eine Einsetzrichtung (11) zu bewegen, um das Verbindungselement (2) mit der Schiene (3) und mit einer Verbindungsstelle (13) der Schwelle (4) in Eingriff zu bringen, und einer Ausziehrichtung (12), um das Verbindungselement (2) von der Schiene (3) und der Verbindungsstelle (13) der Schwelle (4) zu lösen,
- eine Aktivierungsanordnung (14), die an dem Rahmen (5) angebracht ist und einen Verbrennungsmotor (15) mit einem Drehzahlsteller (21) aufweist, eine öldynamische Pumpe (16), die mit dem Motor (15) verbunden ist, und einen öldynamischen Kreislauf (17), der die Pumpe (16) mit dem öldynamischen Aktuator (10) verbindet,
- eine Antriebs- und Steuervorrichtung (19), die von einem Fahrer betätigbar ist,

dadurch gekennzeichnet, dass die Aktivierungsanordnung (14) ein oder mehrere Steuerventile (18) für die Aktivierung des öldynamischen Aktuators (10) aufweist, und dass die Antriebs- und Steuervorrichtung (19) mit dem Steuerventil (18) verbunden ist, um das Steuerventil (18) zur Steuerung des öldynamischen Aktuators (10) zu steuern, wobei die Antriebs- und Steuervorrichtung (19) eine Einstellvorrichtung (20) des Drehzahlstellers (21) aufweist, wobei die Einstellvorrichtung (20) die Drehzahl des Motors (15) in Abhängigkeit von der Aktivierung des öldynamischen Aktuators (10) automatisch einstellt.

2. Die Anbringemaschine (1) nach Anspruch 1, wobei die Einstellvorrichtung (20) den Drehzahlsteller (21) einstellt, um die Drehzahl des Motors (15) während der Aktivierung des öldynamischen Aktuators (10)

in Bezug auf eine reduzierte Drehzahl während Nicht-Aktivierungsintervallen des öldynamischen Aktuators (10) zu erhöhen.

3. Die Anbringemaschine (1) nach Anspruch 1 oder 2, wobei die Einstellvorrichtung (20) einen Getriebemotor mit einem Kodierer aufweist, der mit dem Drehzahlsteller (21) verbunden ist und geeignet ist, die Position des Drehzahlstellers (21) gemäß einer vorbestimmten Drehzahlstellfunktion einzustellen. 5 10
4. Die Anbringemaschine (1) nach einem der vorhergehenden Ansprüche, wobei die Pumpe (16) eine zweistufige öldynamische Pumpe ist, die in Abhängigkeit von der Drehzahl des Motors (15) und/oder in Abhängigkeit vom Öldruck des öldynamischen Kreislaufs (17) umschaltet zwischen: 15
 - einer zweistufigen Pumpenkonfiguration mit hoher Strömungsrate und reduziertem Druck, und 20
 - einer einstufigen Pumpenkonfiguration mit reduzierter Strömungsrate und hohem Druck.
5. Die Anbringemaschine (1) nach Anspruch 4, wobei: 25
 - bei Überschreiten eines Druckschwellenwerts in dem öldynamischen Kreislauf während Aktivierung des öldynamischen Aktuators (10), die Pumpe (16) von der zweistufigen Konfiguration zur einstufigen Konfiguration schaltet, und 30
 - nach Abschluss einer Aktivierung des öldynamischen Aktuators (10), die Pumpe (16) von der einstufigen Konfiguration zur zweistufigen Konfiguration schaltet. 35
6. Die Anbringemaschine (1) nach Anspruch 4 oder 5, wobei die Pumpe (16) eine zweistufige Zahnradpumpe ist. 40
7. Die Anbringemaschine (1) nach einem der vorhergehenden Ansprüche, wobei der öldynamische Kreislauf (17) ein Reservoir (28) aufweist, das eine Einlassöffnung (25), eine Auslassöffnung (26), eine Kühlwand (27) mit Kühlrippen, die auswärts des Reservoirs (24) vorstehen, und einen inneren Ölweg (28), der sich von der Einlassöffnung (25) bis zur der Auslassöffnung (26) erstreckt und eine Wärmeaustauschlänge hat, die zwischen der Einlassöffnung und Auslassöffnung angeordnet ist, und sich entlang der Kühlwand (27) erstreckt, bildet. 45 50
8. Die Anbringemaschine (1) nach einem der vorhergehenden Ansprüche, wobei die Schubanordnung (8) zwei gegenüberliegende Hebel (29) aufweist, die von zwei Seiten des Rahmens (5) um jeweilige Achsen herum drehbar angebracht sind, und nur einen öldynamischen Aktuator (10), der mit beiden Hebeln 55

(29) verbunden ist, um diese in Gegenrichtung zu bewegen, wobei an jedem der zwei Hebel (29) eines der Schubelemente (9) angebracht ist, und

- jedes der Schubelemente (9) an seinem ersten Ende ein Einsetzwerkzeug (30) zum Einsetzen des Verbindungselements (2) und an seinem zweiten Ende ein Ausziehwerkzeug (31) zum Ausziehen des Verbindungselements (2) bildet, und
 - jedes der Schubelemente (9) umgedreht werden kann zwischen:
 - einer Ausziehposition, in der das Ausziehwerkzeug (31) von dem Hebel (29) vorsteht, um in der Lage zu sein, das eingesetzte Verbindungselement (2) zu ergreifen und herauszuziehen,
 - einer Einsetzposition, in der das Einsetzwerkzeug (30) von dem Hebel (29) vorsteht, um in der Lage zu sein, das gelöste Verbindungselement (2) zu ergreifen und einzusetzen.
9. Die Anbringemaschine (1) nach Anspruch 8, wobei das Schubelement (9) an dem Hebel (29) durch ein mit einer Feder (34) versehenes Gelenk (32) angelenkt ist, um die Drehung des Schubelements zu erleichtern und das Schubelement an der gewählten Position zu halten.
 10. Die Anbringemaschine (1) nach einem der vorhergehenden Ansprüche, wobei die Schubanordnung (9) einen Gegenrahmen (35) aufweist, der mit dem Rahmen (5) starr verbunden ist und zwei entgegengesetzte Gegenflächen (36) aufweist, die so angeordnet sind, dass sie direkt zur Schiene (3) oder zur Verbindungsstelle (13) der Schwelle (4) weisen, um während einer Ausziehbewegung der Schubanordnung (9) an zwei entgegengesetzten Seiten der Schiene eine Gegenstütze zu bilden.
 11. Die Anbringemaschine (1) nach Anspruch 10, wobei der Gegenrahmen (35) hufeisenförmig und geeignet ist, sich über das Schienenprofil hinweg zu erstrecken, so dass er gegen die Schienenbasis an zwei entgegengesetzten Seiten abgestützt werden kann, und die Schubelemente (9) in Bezug auf den Gegenrahmen (35) bewegbar sind, wobei sie sich quer zur Längsrichtung der Schiene (3) aufeinander zu oder voneinander weg bewegen.
 12. Die Anbringemaschine (1) nach einem der vorhergehenden Ansprüche, wobei der Rahmen (5) bildet:
 - eine mittlere Plattform (37), mit der die Schubanordnung (8) und die Aktivierungsanordnung (14) verbunden sind,

- einen vorderen Tragarm (38), der sich von der mittleren Plattform (37) zur Vorderseite der Maschine (1) erstreckt und eine oder mehrere Rollen (6) aufweist, um den Rahmen (5) auf der Schiene (3) vorne zu stützen, 5
- einen hinteren Tragarm (39), der sich von der mittleren Plattform (37) zur Rückseite der Maschine (1) erstreckt und zumindest eine Rolle (7) aufweist, um den Rahmen (5) auf der Schiene (3) hinten zu stützen, aufweist, 10

wobei der hintere Arm (39) mit dem mittleren Abschnitt (37) durch ein Drehgelenk (40) mit einer Feder (41) verbunden ist, die so vorbelastet ist, um:

- Erlauben, wenn der Rahmen (5) auf der Schiene aufliegt, den mittleren Abschnitt (37) mit der Schubanordnung (8) in Bezug auf die Schiene abzusenken und anzuheben, und 15
- das Gewicht von zumindest einem Teil des mittleren Abschnitts (37) mit der Schubanordnung (8) auszugleichen, 20

wobei die Vorlast der Feder (41) einstellbar ist, um in der Lage zu sein, den Rahmenwiderstand zum Absenken und Anheben des mittleren Abschnitts (37) mit der Schubanordnung (8) einzustellen. 25

13. Die Anbringemaschine (1) nach Anspruch 12, wobei die Feder (41) eine Gasfeder aufweist, die mit einer ersten Stütze (42) in dem hinteren Arm (39) von dem Drehgelenk (40) weg und mit einer zweiten Stütze (43) des mittleren Abschnitts (37) von dem Drehgelenk und der ersten Stütze (42) weg verbunden ist, so dass der mittlere Abschnitt (37), der hintere Arm (39) und die Gasfeder (41) ein gelenkiges Dreieck bilden, und wobei die Position der zweiten Stütze (43) in Bezug auf das Drehgelenk (40) eingestellt werden kann. 30
14. Die Anbringemaschine (1) nach einem der vorhergehenden Ansprüche, wobei die Schubanordnung (8) eine Hubvorrichtung (45) aufweist, um die Schwelle gegen die Schiene anzuheben, und die Steuervorrichtung (19) die Hubvorrichtung (45) in Abhängigkeit von der Aktivierung des öldynamischen Aktuators (10) automatisch aktiviert, so dass das Anheben der Schwelle (4) während der Anfangsstufe des Einsetzens des Verbindungselements (2) erfolgt, indem es bereits teilweise in die Verbindungsstelle (13) des Verbinders (4) eingesetzt ist. 35 40 45 50
15. Die Anbringemaschine (1) nach Anspruch 14, wobei die Hubvorrichtung (45) aufweist: 55
 - eine Palette (46), die von einer Unterseite des Einsetzwerkzeugs (30) des Schubelements (9) einwärts der Schubanordnung (8) vorsteht, um

es unter das Verbindungselement (2) einzusetzen, wenn das Einsetzwerkzeug (30) das Verbindungselement (2) ergreift, das partiell in die Verbindungsstelle (13) der Schwelle (4) eingesetzt ist,

- einen Hubkolben (47), der von oben auf der Schiene (3) aufliegt und sich abwärts bewegt, um die gesamte Schubanordnung (8) in Bezug auf die Schiene (3) anzuheben und sich der mit den Schubelementen (9) gekoppelten Schwelle (4) zur Basis der Schiene (3) annähert.

16. Die Anbringemaschine (1) nach Anspruch 15, wobei der Hubkolben (47) durch eine öldynamische Hubzylinderkolbenanordnung (48) bewegt wird, die durch eine Gruppe von Fluiddruck-gesteuerten passiven Ventilen (49) automatisch angetrieben wird, die in Abhängigkeit vom öldynamischen Druck in dem öldynamischen Aktuator (10) schalten. 15
17. Die Anbringemaschine (1) nach einem der vorhergehenden Ansprüche, wobei die Steuervorrichtung (19) ein Zykluswählelement (50) zur manuellen Auswahl zwischen einem Anwendungszyklus und der Verbindungselemente (2) und einem Entfernungszyklus der Verbindungselemente (2) aufweist, sowie ein Betätigungselement (51) zur manuellen Betätigung des zuvor vom Zykluswählelement (50) gewählten Zyklus, wobei dasselbe Betätigungselement (51) beide Anwendungs- und Entfernungszyklen der Verbindungselemente (2) aktiviert. 20
18. Die Anbringemaschine (1) nach einem der vorhergehenden Ansprüche, wobei die Steuervorrichtung (19) einen Speicher aufweist und in dem Speicher die Anzahl von Einsetz- und/oder Ausziehzyklen und/oder die Gesamtanzahl von Betriebszyklen speichert, und eine akustische und/oder visuelle Wartungswarnung als Funktion der Anzahl der Betriebsstunden und/oder Anzahl von Zyklen und vorbestimmten Wartungsintervallen ausgibt. 25 30 35 40
19. Die Anbringemaschine (1) nach einem der vorhergehenden Ansprüche, wobei die Aktivierungsanordnung (14) ein Modul ist, das freistehend ist und mit dem Rahmen (5) entfernbar verbindbar ist, und sie zwei vordere Griffe (52) aufweist, die an einer Vorderseite der Aktivierungsanordnung (14) ausgebildet sind, und zwei hintere Griffe (53), die an der Rückseite der Aktivierungsanordnung (14) ausgebildet sind, sowie einen Bedienungsgriff (54) mit zwei Griffen (55) und zumindest einem Benutzeraktivierungselement (51), wobei der Bedienungsgriff (54) angeordnet werden kann zwischen: 45 50 55
 - einer Arbeitsposition, in der sich der Bedienungsgriff (54) aus der Aktivierungsanordnung

(14) in Richtung zur Rückseite hin erstreckt, und
- einer Transportposition, in der der Bedienungsgriff (54) in die Aktivierungsanordnung (14) eingefahren ist.

20. Die Anbringemaschine (1) nach Anspruch 19, wobei der Bedienungsgriff (54) zwischen der Transportposition und der Arbeitsposition drehbar ist, und wobei die Arbeitsposition einstellbar ist, wobei die Anbringemaschine (1) eine Reib- oder Schnapparretiervorrichtung (56) aufweist, um den Bedienungsgriff (54) in der ausgewählten Betriebsposition zu arretieren, wobei die Arretiervorrichtung (56) konfiguriert ist, um:

- den Bedienungsgriff (54) in der gewählten Betriebsposition arretiert zu halten, bis ein Drehmomentschwellenwert unter einem Grenzdrehmoment erreicht wird, das zu einer Beschädigung des Bedienungsgriiffs (54) führen würde, und
- bei Überschreiten des Drehmomentschwellenwerts eine Drehung des Bedienungsgriiffs (54) aus der Betriebsposition heraus zu erlauben.

21. Die Anbringemaschine (1) nach Anspruch 19, wobei der Bedienungsgriff (54) von der Aktivierungsanordnung (14) vollständig abnehmbar ist.

Revendications

1. Machine d'application (1) pour l'application et le retrait d'attaches de liaison (2) pour lier un rail (3) à une traverse (4) d'une voie ferrée, la machine d'application (1) comprenant :

- un châssis (5) qui peut être posé sur le rail (3),
- un ensemble de poussée (8) monté sur le châssis (5) et ayant au moins un élément de poussée (9) adapté pour engager l'attache de liaison (2), et un actionneur oléodynamique (10) agencé de sorte à être apte à déplacer l'élément de poussée (9) dans un sens d'insertion (11) pour engager l'attache de liaison (2) avec le rail (3) et avec un joint (13) de la traverse (4), et dans un sens d'extraction (12) pour désengager l'attache de liaison (2) du rail (3) et du joint (13) de la traverse (4),
- un ensemble d'actionnement (14) monté sur le châssis (5) et ayant un moteur à combustion interne (15) avec un accélérateur (21), une pompe oléodynamique (16) reliée au moteur (15) un circuit oléodynamique (17) reliant la pompe (16) à l'actionneur oléodynamique (10),
- un dispositif d'entraînement et de commande (19) actionnable par un opérateur, **caractérisé en ce que** l'ensemble d'actionnement (14) com-

prend un ou plusieurs distributeurs (18) pour l'actionnement de l'actionneur oléodynamique (10), et **en ce que** le dispositif d'entraînement et de commande (19) est relié au distributeur (18) pour commander au distributeur (18) de commander l'actionneur oléodynamique (10),

dans lequel le dispositif d'entraînement et de commande (19) comprend un dispositif de réglage (20) de l'accélérateur (21), ce dispositif de réglage (20) réglant automatiquement le nombre de tours du moteur (15) en fonction de l'actionnement de l'actionneur oléodynamique (10).

2. Machine d'application (1) selon la revendication 1, dans laquelle le dispositif de réglage (20) règle l'accélérateur (21) de sorte à augmenter le nombre de tours du moteur (15) pendant l'actionnement de l'actionneur oléodynamique (10) par rapport au nombre réduit de tours pendant des intervalles de non-actionnement de l'actionneur oléodynamique (10).

3. Machine d'application (1) selon la revendication 1 ou 2, dans laquelle le dispositif de réglage (20) comprend un moteur à engrenages avec un encodeur relié à l'accélérateur (21) et adapté pour régler la position de l'accélérateur (21) conformément à une fonction d'accélération prédéterminée.

4. Machine d'application (1) selon l'une des revendications précédentes, dans laquelle la pompe (16) est une pompe oléodynamique à deux étages qui exécute une commutation en fonction du nombre de tours du moteur (15) et/ou en fonction de la pression d'huile dans le circuit oléodynamique (17) entre :

- une configuration de pompage à deux étages avec un débit élevé et une pression réduite, et
- une configuration de pompage mono-étagée avec un débit réduit et une pression élevée.

5. Machine d'application (1) selon la revendication 4, dans laquelle :

- lors du dépassement d'un seuil de pression dans le circuit oléodynamique pendant un actionnement de l'actionneur oléodynamique (10), la pompe (16) exécute une commutation de la configuration à deux étages à la configuration mono-étagée, et
- après l'exécution d'un actionnement de l'actionneur oléodynamique (10), la pompe (16) exécute une commutation de la configuration mono-étagée à la configuration à deux étages.

6. Machine d'application (1) selon la revendication 4 ou 5, dans laquelle la pompe (16) est une pompe à engrenages à deux étages.

7. Machine d'application (1) selon l'une des revendications précédentes, dans laquelle le circuit oléodynamique (17) comprend un réservoir (28) formant une ouverture d'entrée (25), une ouverture de sortie (26), une paroi refroidissante (27) avec des languettes refroidissantes saillantes à l'extérieur du réservoir (24), et un chemin d'huile interne (28) s'étendant de l'ouverture d'entrée (25) jusqu'à l'ouverture de sortie (26) et ayant une longueur d'échange thermique agencée entre l'ouverture d'entrée et l'ouverture de sortie, et s'étendant le long de la paroi refroidissante (27).
8. Machine d'application (1) selon l'une des revendications précédentes, dans laquelle l'ensemble de poussée (8) comprend deux leviers opposés (29), montés de manière pivotante sur deux côtés du châssis (5) par rapport à des axes respectifs et seulement un actionneur oléodynamique (10) relié aux deux leviers (29) pour les déplacer dans un sens inverse, dans laquelle un des éléments de poussée (9) est monté sur chacun des deux leviers (29), et
- chacun des éléments de poussée (9) forme, à une première extrémité de celui-ci, un outil d'insertion (30) pour insérer l'attache de liaison (2) et, à une seconde extrémité de celui-ci, un outil d'extraction (31) pour extraire l'attache de liaison (2), et
 - chacun des éléments de poussée (9) peut être inversé entre :
 - une position d'extraction dans laquelle l'outil d'extraction (31) se projette depuis le levier (29) de sorte à être apte à engager et à extraire l'attache de liaison (2) insérée,
 - une position d'insertion dans laquelle l'outil d'insertion (30) se projette depuis le levier (29) de sorte à être apte à engager et à insérer l'attache de liaison (2) désengagée.
9. Machine d'application (1) selon la revendication 8, dans laquelle l'élément de poussée (9) est articulé par rapport au levier (29) par une articulation (32) équipée d'un ressort (34) pour faciliter le pivotement du pivotement de l'élément de poussée et pour maintenir l'élément de poussée dans la position sélectionnée.
10. Machine d'application (1) selon l'une des revendications précédentes, dans laquelle l'ensemble de poussée (9) comprend un contre-châssis (35) relié de manière rigide au châssis (5) et ayant deux contre-surfaces opposées (36) situées de sorte à faire directement face au rail (3) ou au joint (13) de la traverse (4), de sorte à former, sur deux côtés opposés du rail, un contre-support pendant un mouvement d'extraction de l'ensemble de poussée (9).
11. Machine d'application (1) selon la revendication 10, dans laquelle le contre-châssis (35) est en forme de fer à cheval, adapté pour s'étendre à califourchon sur le profil de rail, de sorte à ce qu'il puisse être adossé contre la base du rail à deux côtés opposés, et les éléments de poussée (9) sont mobiles par rapport au contre-châssis (35) se déplaçant mutuellement l'un vers l'autre ou l'un à l'opposé de l'autre transversalement par rapport au sens longitudinal du rail (3).
12. Machine d'application (1) selon l'une des revendications précédentes, dans laquelle le châssis (5) forme :
- une plateforme centrale (37) à laquelle l'ensemble de poussée (8) et l'ensemble d'actionnement (14) sont reliés,
 - un bras-support avant (38) s'étendant de la plateforme centrale (37) vers un côté avant de la machine (1) et ayant un ou plusieurs rouleaux (6) pour supporter frontalement le châssis (5) sur le rail (3),
 - un bras-support arrière (39) s'étendant de la plateforme centrale (37) vers un côté arrière de la machine (1) et ayant au moins un rouleau (7) pour un support arrière du châssis (5) sur le rail (3),
- dans laquelle le bras arrière (39) est lié à la partie centrale (37) par un joint pivotant (40) avec un ressort (41) qui est préchargé de sorte à :
- permettre, lorsque le châssis (5) est posé sur le rail, d'abaisser et de lever la partie centrale (37) avec l'ensemble de poussée (8) par rapport au rail, et
 - équilibrer au moins une partie du poids de la partie centrale (37) avec l'ensemble de poussée (8), dans laquelle la précharge du ressort (41) est réglable pour être en mesure de régler la résistance du châssis à l'abaissement et le soulèvement de la partie centrale (37) avec l'ensemble de poussée (8).
13. Machine d'application (1) selon la revendication 12, dans laquelle le ressort (41) comprend un ressort à gaz relié avec un premier pivot (42) dans le bras arrière (39) à l'écart du joint pivotant (40) et avec un second pivot (43) de la partie centrale 37 à l'écart du joint pivotant et du premier pivot (42), de sorte que la partie centrale (37), le bras arrière (39) et le ressort à gaz (41) forment un triangle articulé, et dans lequel la position du second pivot (43) par rapport au joint pivotant (40) peut être réglée.
14. Machine d'application (1) selon l'une des revendications précédentes, dans laquelle l'ensemble de

poussée (8) comprend un dispositif de levage (45) pour lever la traverse contre le rail, et le dispositif de commande (19) actionne automatiquement le dispositif de levage (45) en fonction de l'actionnement de l'actionneur oléodynamique (10), de sorte que le levage de la traverse (4) se produit pendant une étape initiale de l'insertion de l'attache de liaison (2) dans laquelle elle est déjà partiellement insérée dans le joint (13) de la traverse (4).

15. Machine d'application (1) selon la revendication 14, dans laquelle le dispositif de levage (45) comprend :

- une palette (46) saillant d'un côté inférieur d'un outil d'insertion (30) de l'élément de poussée (9) vers l'intérieur de l'ensemble de poussée (8), de sorte à insérer en dessous l'attache de liaison (2) lorsque l'outil d'insertion (30) engage l'attache de liaison (2) qui est partiellement insérée dans le joint (13) de la traverse (4),
- un piston de levage (47) qui est posé par-dessus, contre le rail (3) et se déplace vers le bas de sorte à lever l'intégralité de l'ensemble de poussée (8) par rapport au rail (3) et approche la traverse (4) couplée aux éléments de poussée (9) vers la base du rail (3).

16. Machine d'application (1) selon la revendication 15, dans laquelle le piston de levage (47) est déplacé par un ensemble piston-cylindre de levage oléodynamique (48), entraîné automatiquement par un groupe de soupapes passives commandées par la pression de liquide (49) qui commutent en fonction de la pression oléodynamique dans l'actionneur oléodynamique (10).

17. Machine d'application (1) selon l'une des revendications précédentes, dans laquelle le dispositif de commande (19) comprend un élément de sélection de cycle (50) pour une sélection manuelle entre un cycle d'application des attaches de liaison (2) et un cycle de retrait des attaches de liaison (2), ainsi qu'un élément d'actionnement (51) pour l'actionnement manuel du cycle précédemment sélectionné par l'élément de sélection de cycle (50), dans lequel le même élément d'actionnement (51) actionne à la fois les cycles d'application et de retrait des attaches de liaison (2).

18. Machine d'application (1) selon l'une des revendications précédentes, dans laquelle le dispositif de commande (19) comprend une mémoire et enregistre dans la mémoire le nombre de cycles d'insertion/extraction et/ou le nombre total d'heures de fonctionnement, et il émet une alerte de maintenance sonore et/ou visuelle en fonction du nombre d'heures de fonctionnement et/ou du nombre de cycles et des intervalles de maintenance prédéterminés.

19. Machine d'application (1) selon l'une des revendications précédentes, dans laquelle l'ensemble d'actionnement (14) est un module qui est autoporteur et peut être relié de manière amovible au châssis (5), et il comprend deux poignées avant (52) formées sur un côté avant de l'ensemble d'actionnement (14) et deux poignées arrière (53) formées sur un côté arrière de l'ensemble d'actionnement (14), ainsi qu'une poignée de fonctionnement (54) avec deux poignées (55) et au moins un élément d'actionnement (51) de l'utilisateur, dans laquelle la poignée de fonctionnement (54) peut être déplacée entre :

- une position de fonctionnement, où la poignée de fonctionnement (54) est étendue vers l'extérieur de l'ensemble d'actionnement (14) vers le sens du côté arrière, et
- une position de transport, où la poignée de fonctionnement (54) est rentrée dans l'ensemble d'actionnement (14).

20. Machine d'application (1) selon la revendication 19, dans laquelle la poignée de fonctionnement (54) est pivotable entre la position de transport et la position de fonctionnement, et dans laquelle la position de fonctionnement est réglable, dans laquelle la machine d'application (1) comprend un dispositif de verrouillage par friction ou accrochage (56) pour verrouiller la poignée de fonctionnement (54) dans la position de fonctionnement sélectionnée, ledit dispositif de verrouillage (56) étant configuré de sorte à :

- maintenir la poignée de fonctionnement (54) verrouillée dans la position de fonctionnement sélectionnée jusqu'à atteindre un seuil de moment de pivotement inférieur à une limite de moment de pivotement qui entraînerait l'endommagement de la poignée de fonctionnement (54), et
- lors du dépassement du seuil de moment de pivotement, permettre un pivotement de la poignée de fonctionnement (54) hors de la position de fonctionnement.

21. Machine d'application (1) selon la revendication 19, dans laquelle la poignée de fonctionnement (54) est entièrement détachable de l'ensemble d'actionnement (14).

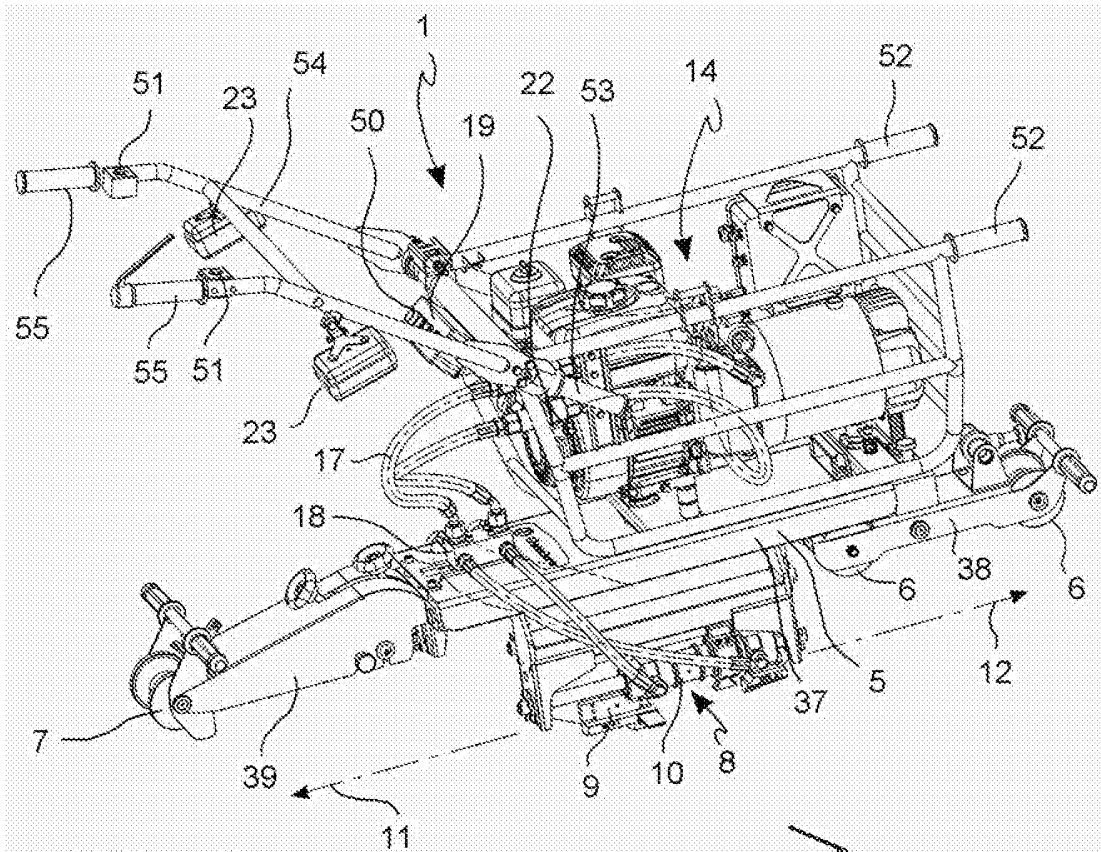


FIG. 1

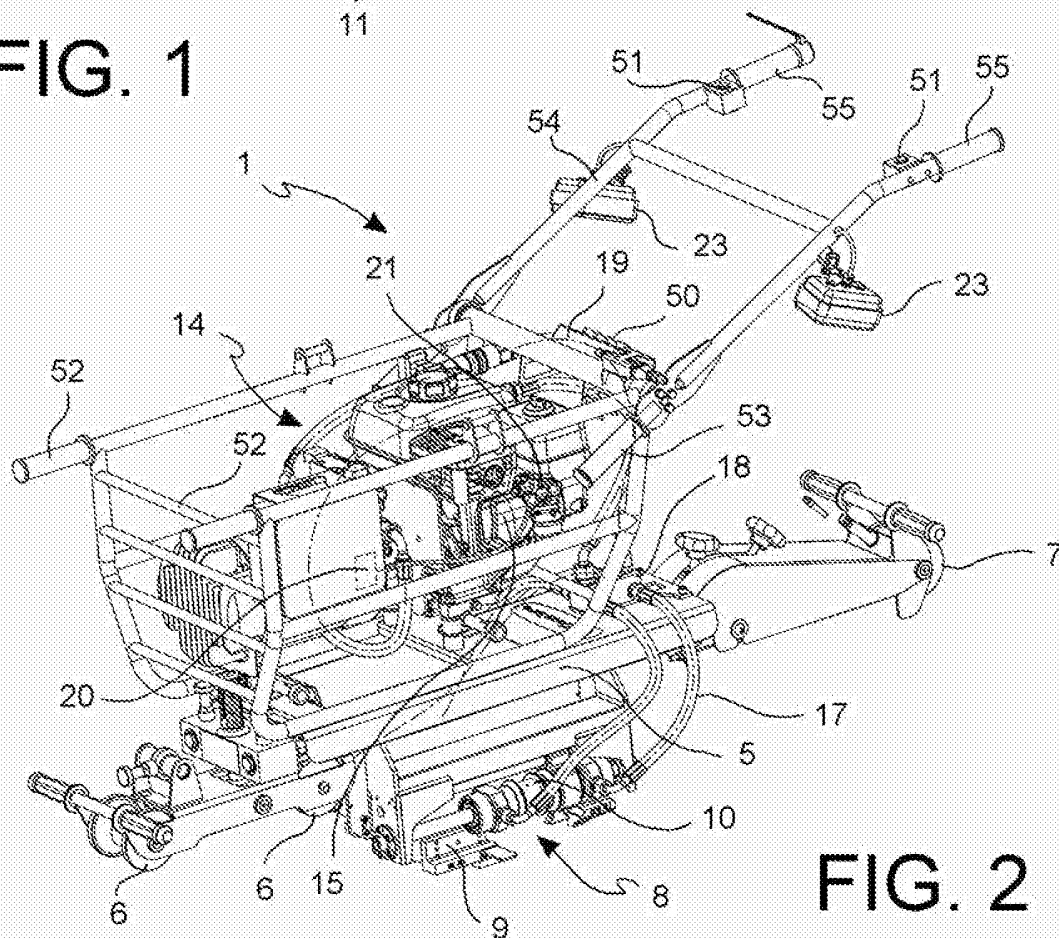


FIG. 2

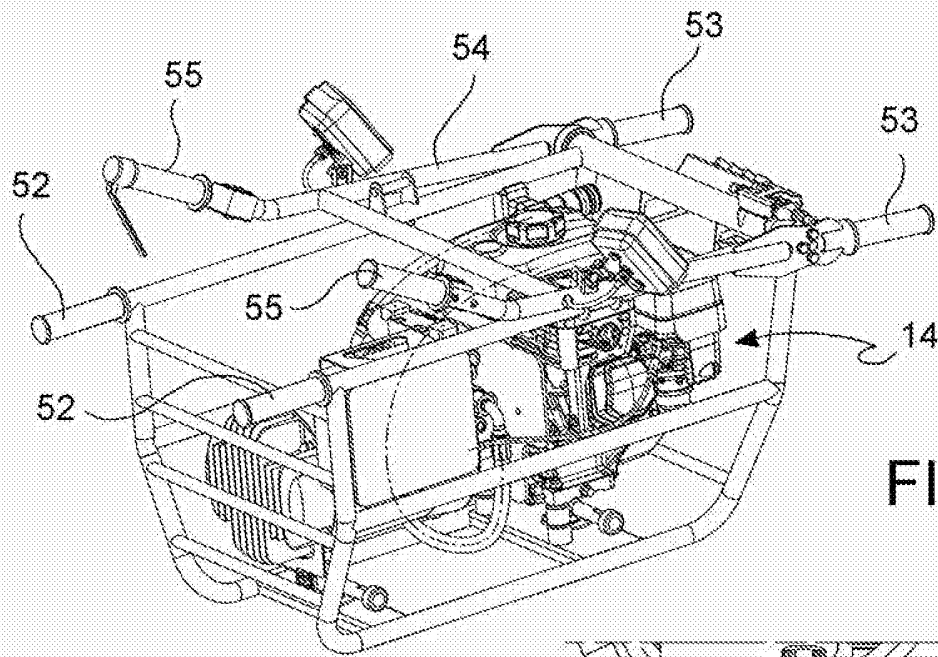


FIG. 2A

FIG. 3

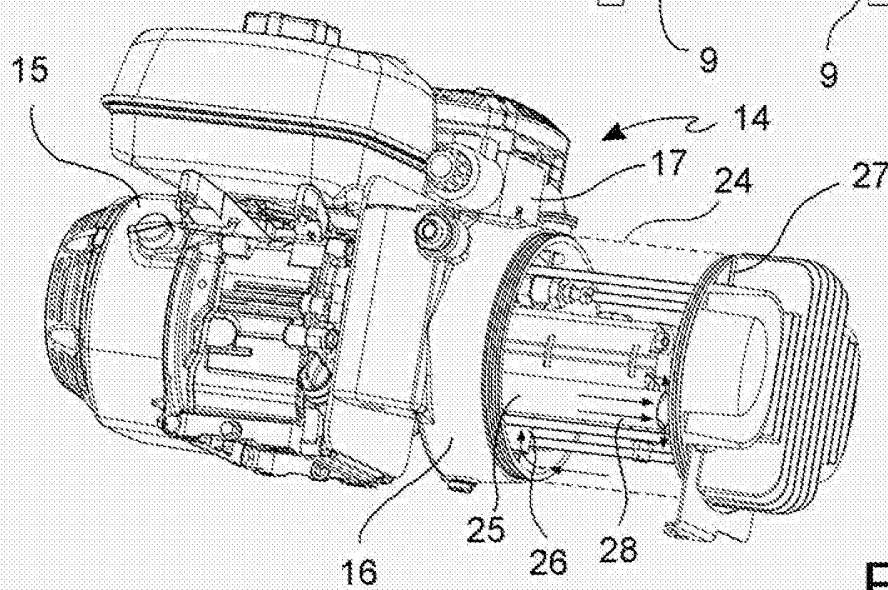
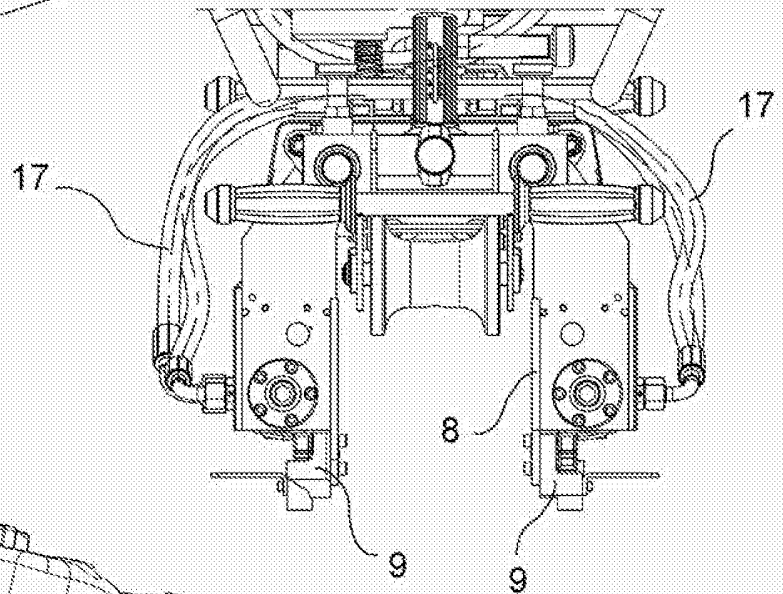


FIG. 4

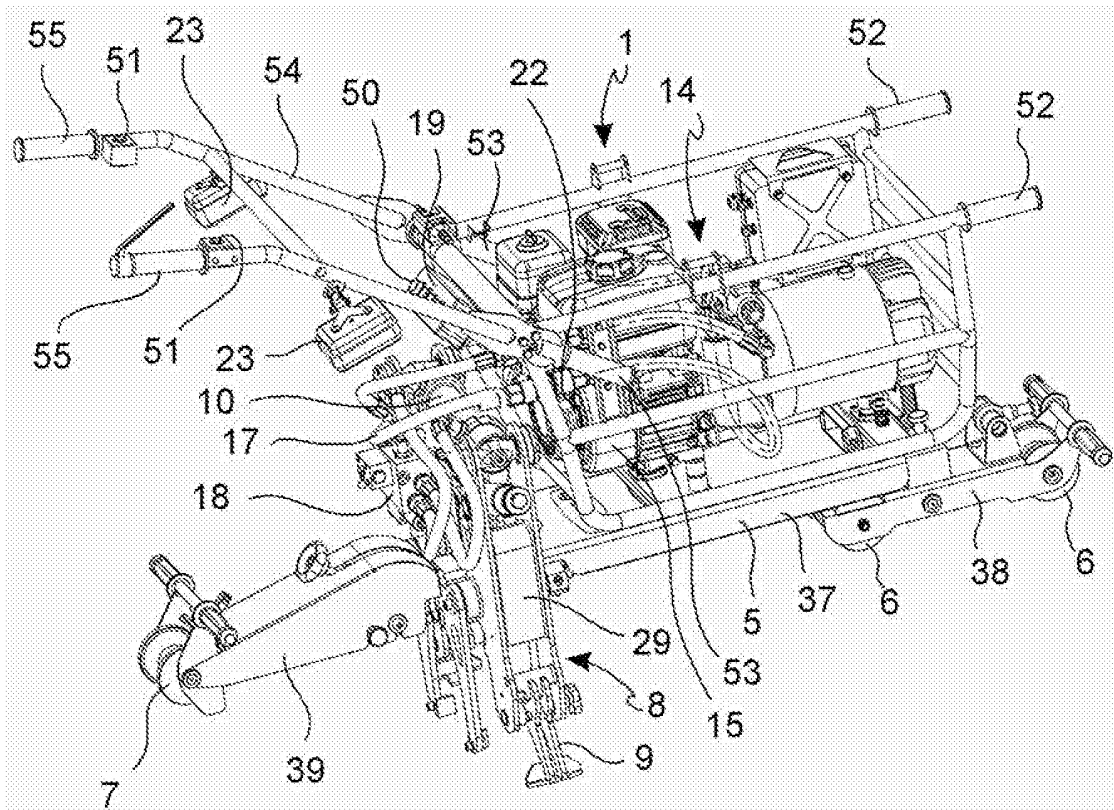


FIG. 5

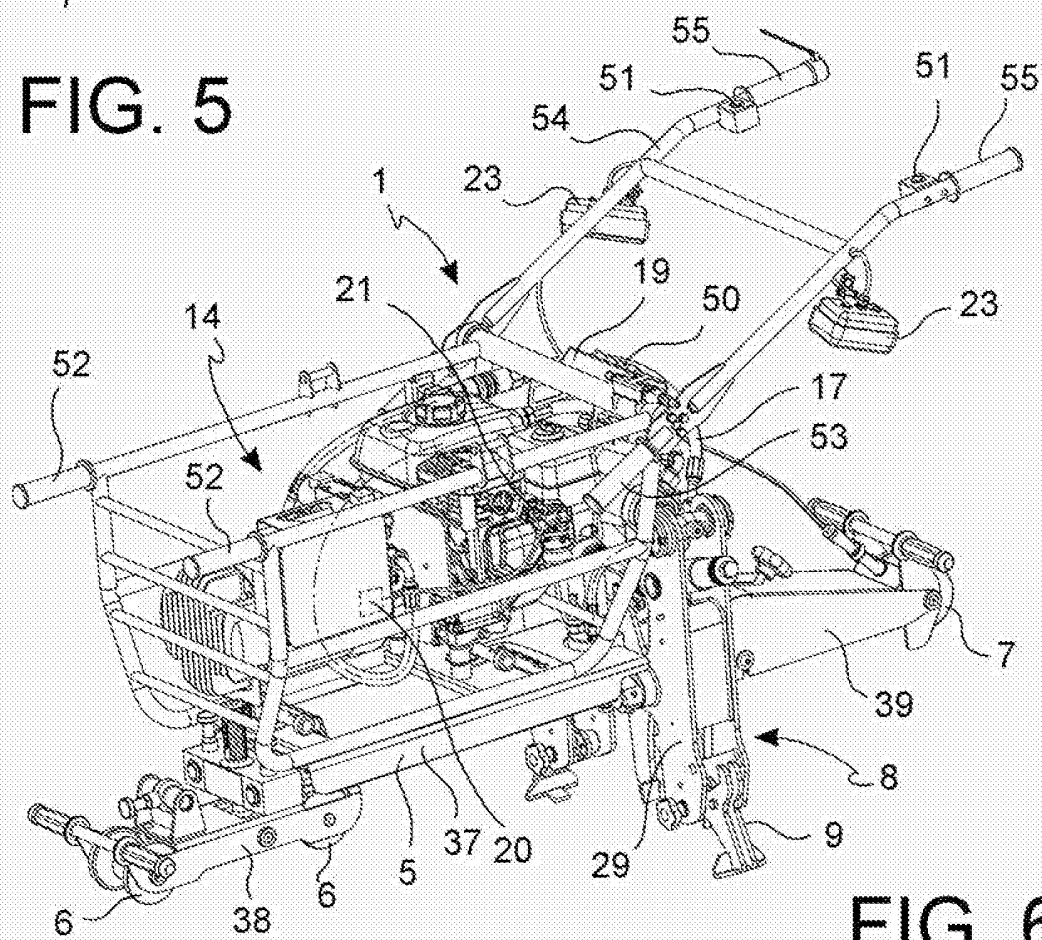


FIG. 6

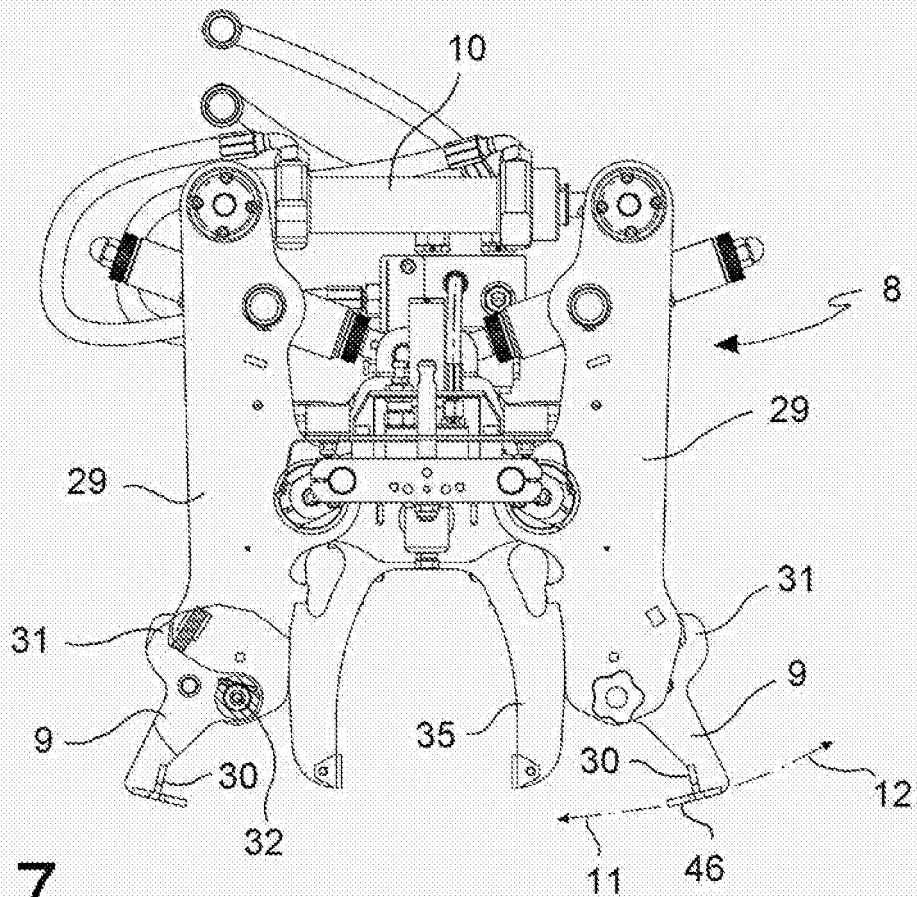


FIG. 7

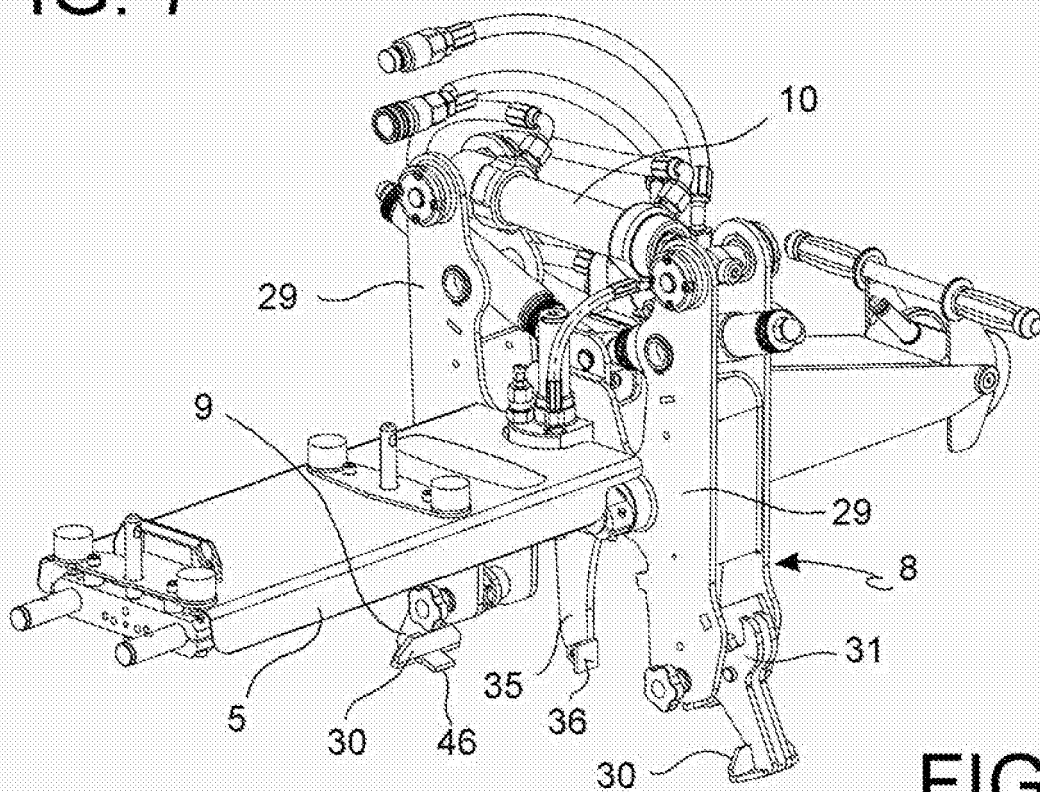


FIG. 8

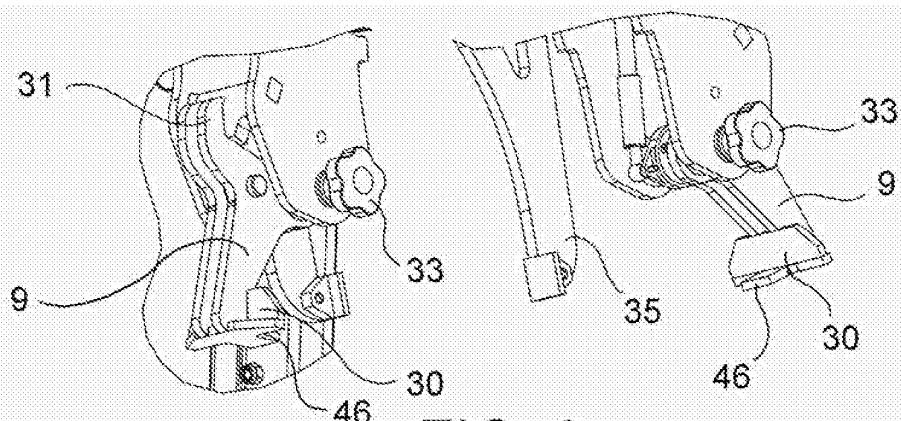


FIG. 9

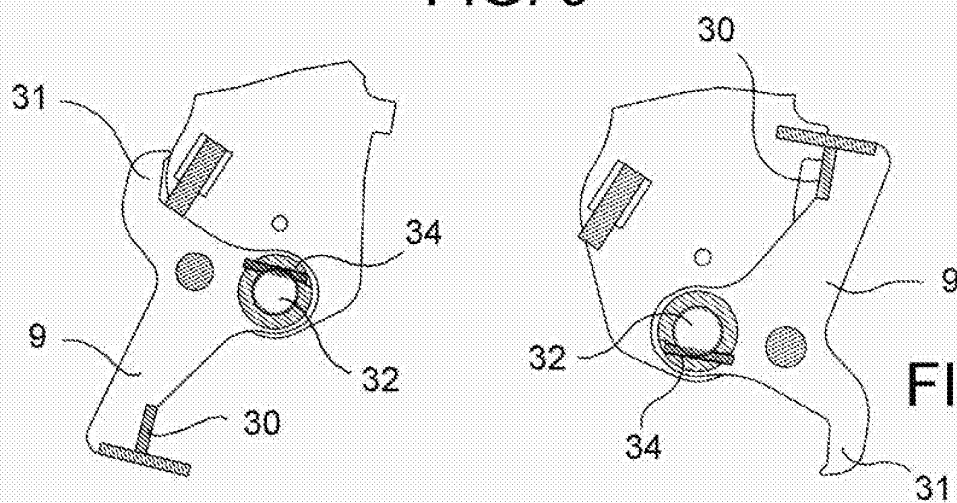


FIG. 11

FIG. 10

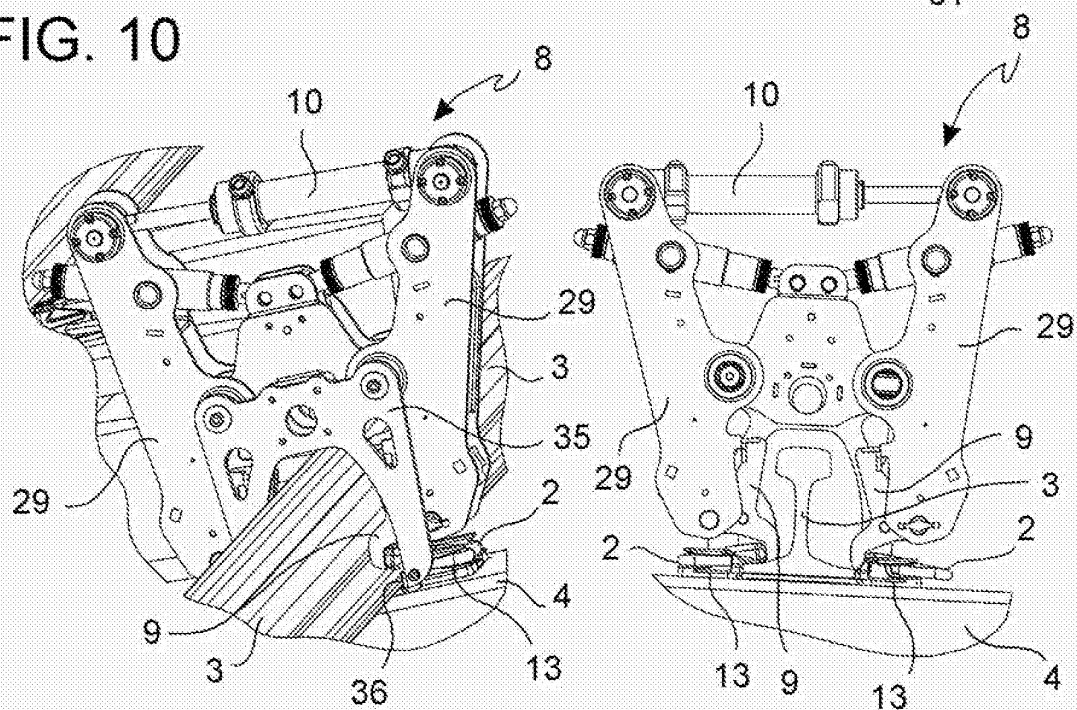


FIG. 12

FIG. 13

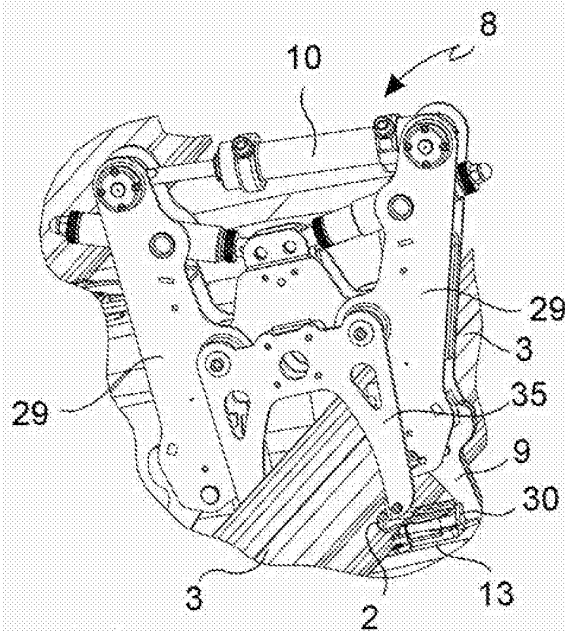


FIG. 14

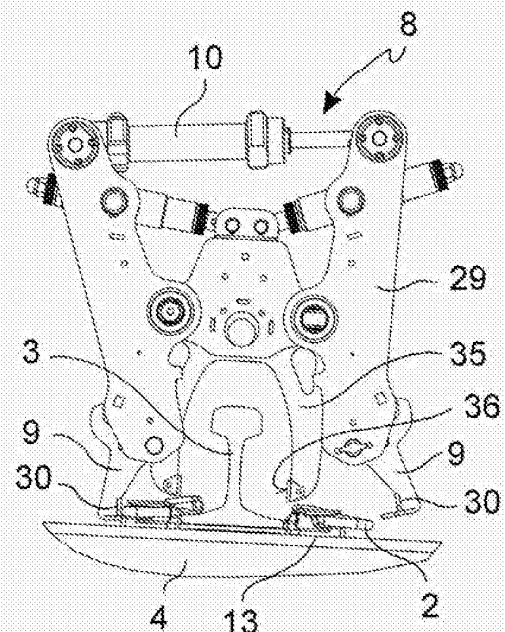


FIG. 15

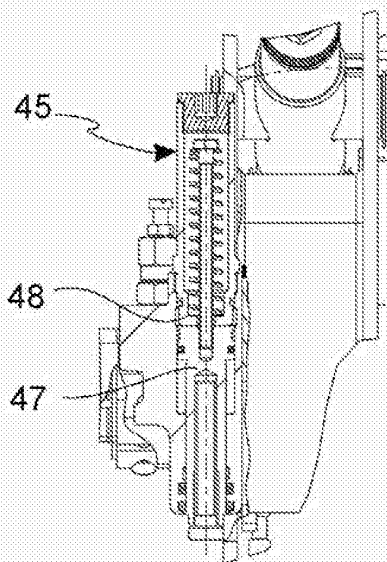


FIG. 16

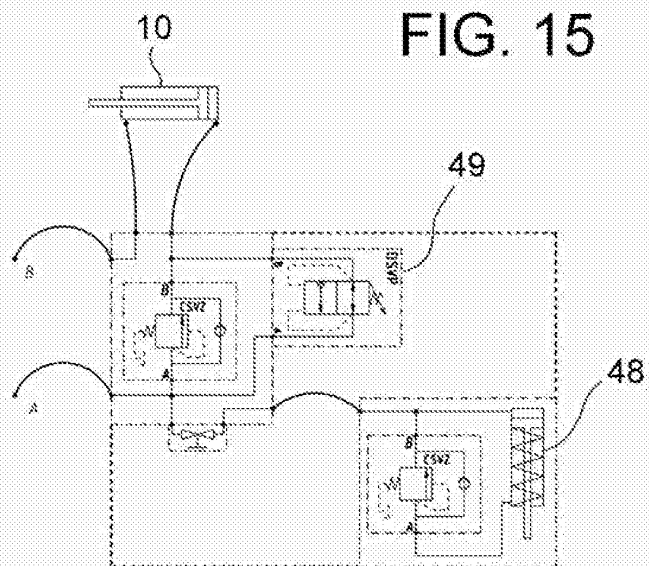


FIG. 17

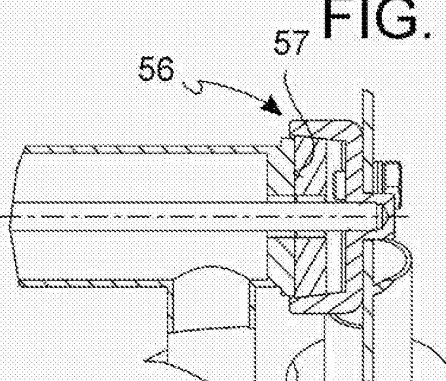
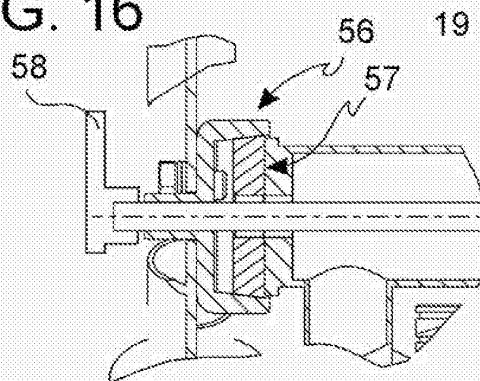


FIG. 18

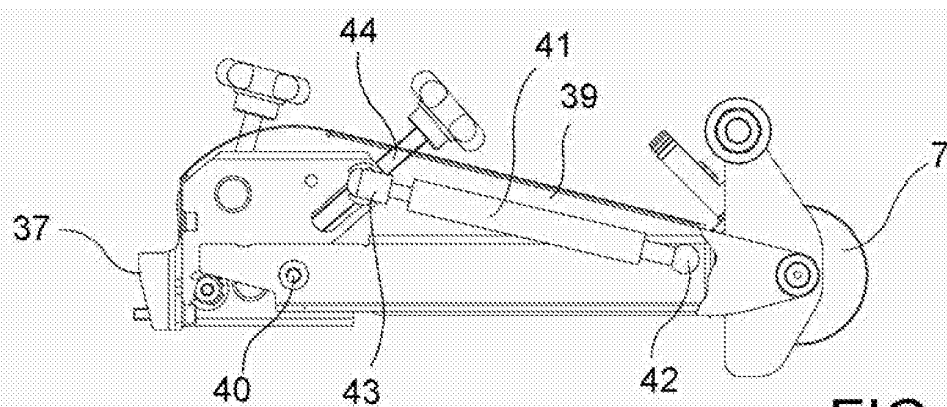


FIG. 19

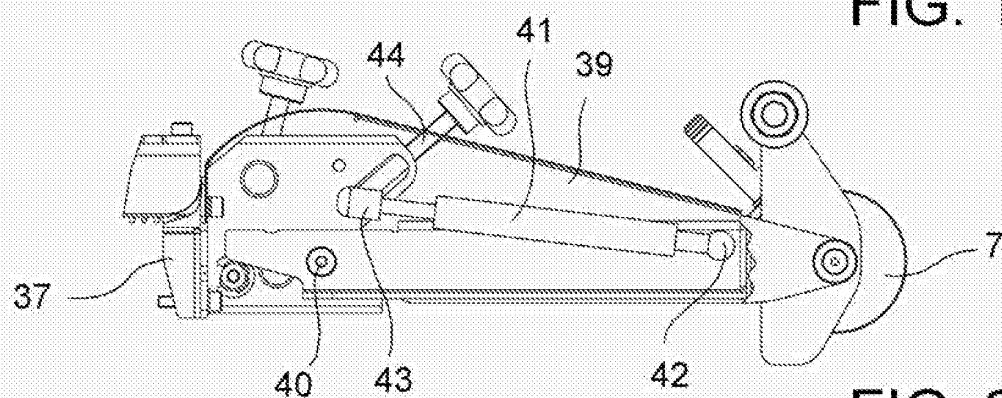


FIG. 20

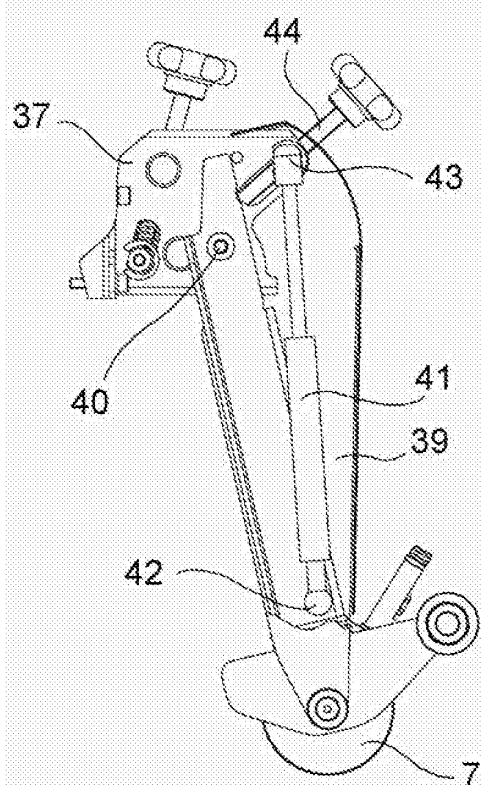


FIG. 21

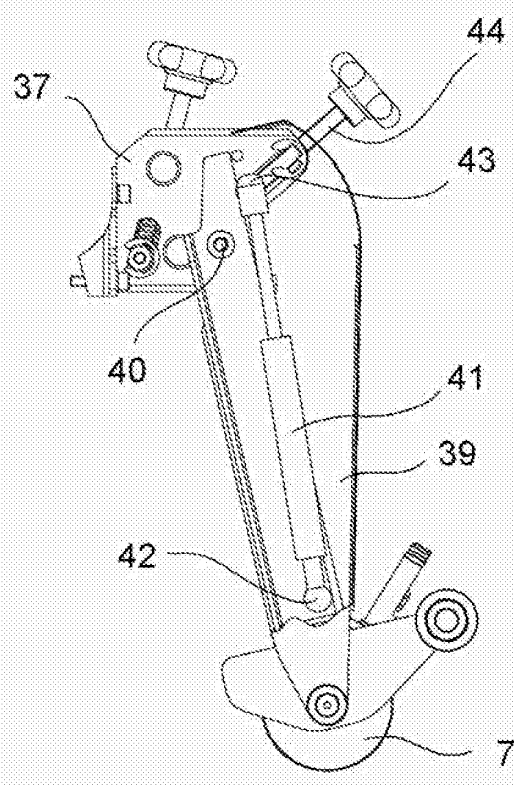


FIG. 22

REFERENCES CITED IN THE DESCRIPTION

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