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(71) Applicant: **Campisa S.r.l.**
20030 Palazzolo Milanese (Milano) (IT)

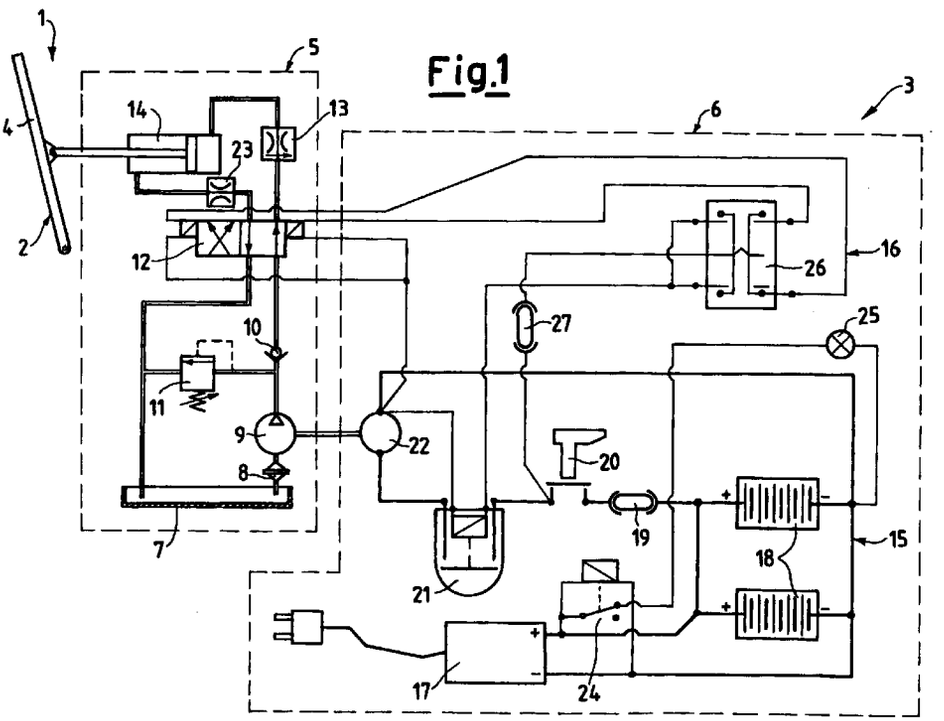
(72) Inventor: **Nelzi, Giampaolo**
22070 Appiano Gentile (Como) (IT)

(74) Representative:
De Gregori, Antonella et al
Ing. Barzano & Zanardo Milano S.p.A.
Via Borgonuovo 10
20121 Milano (IT)

(54) Improved motor-driven gate

(57) The improvement consists in providing a motor-driven gate (2) with a 12 Volt DC electric motor (22), said motor being powered by an accumulator battery (18) associated to a battery charger (17) which can be connected to the 220 V power grid. In this way, the gate (2) can always be automatically driven independently of the presence of the power grid voltage. The electric system (6) and the gate (2) according to the present invention, besides being reliable, are more economical and safer with regard to electric shocks.

Fig.1



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Description

The present invention refers to an improved motor-driven gate or carriage gate.

Motor-driven gates or carriage gates are presently known, said gates being provided with at least one gate wing and comprising drive means which drive said at least one gate wing. The drive means comprise an electric system which is associated either to a hydraulic system or, in alternative, to a mechanical group, which drive the gate wing (in the case that there is just one wing) or the gate wings in the other cases. The electric system comprises a power feeding electric circuit and a control electric circuit, said circuits drive at least one electric motor which drives either at least a hydraulic pump (in the case that the hydraulic circuit is provided) or at least a reduction unit (in the case that a mechanical group is provided). Such reduction unit can be of the type comprising a worm screw.

These types of motor-driven gates have proved to be not sufficiently reliable and not safe since, in case the power supply stops, said gates cannot be opened as' fast as needed or they cannot be opened at all since they could remain locked. Therefore these gates may become particularly dangerous especially in case of fire.

Further, the electric system needed for the proper operation of said gates affects significantly the manufacturing, installation and maintenance costs of said motor-driven gates, since said electric system has to be realised, installed, assembled and managed so as to reduce to the minimum level the danger of electric shocks for the operators working close to the gate during adverse weather conditions and therefore at high risk due to the presence of humidity.

The purpose of the present invention is to provide a motor-driven gate which overcomes the above disadvantages, and to provide a motor-driven gate which can work independently of the presence of the power grid voltage and which is, further, more economical and safer than the traditional motor-driven gates of the same type.

Said purposes are achieved by an improved motor-driven gate according to claims 1 and 2, which are taken as reference.

By powering the electric motor through at least an accumulator battery rechargeable by means of a battery charger, the improved motor-driven gate of the invention can be driven even in case of power grid failures. The improved motor-driven gate according to the invention is therefore much more reliable than the corresponding traditional motor-driven gates. Further, the use of very low voltages reduces significantly the manufacturing, assembly and maintenance costs of the electric system since the electric system is much simpler as it is no longer necessary to provide the electric system with specific means and/or features to protect the user and the maintenance people of the gate from electric shocks, even in case of high humidity working conditions. The cost reduction is such that it largely compensates the need to integrate the accumulator battery and the battery charger in the electric system.

Said features shall be more evident from the description concerning the preferred embodiments of the invention; it is understood that said embodiments are just non limiting examples of the invention.

Figure 1 shows schematically a first embodiment of an improved motor-driven gate according to the invention.

Figure 2 shows schematically a second embodiment of an improved motor-driven gate according to the invention.

Figure 3 shows schematically a third embodiment of an improved motor-driven gate according to the invention.

Figure 4 shows schematically a fourth embodiment of an improved motor-driven gate according to the invention.

With reference to Figure 1, the improved motor-driven gate 1 according to the invention, comprises, besides the gate 2, drive means, generally indicated by numeral 3. In this example, the drive means 3 drive just one gate wing 4 of the gate 2. The drive means 3 comprise a hydraulic system 5 and an electric system 6. The hydraulic system 5 substantially comprises a liquid (oil) storage tank 7, a filter 8, at least a hydraulic pump 9, a nonreturn valve 10, a maximum pressure valve 11, a backflow solenoid valve 12, a first 13 and a second 23 constant flow valves, placed upstream and downstream, respectively, of at least one hydraulic cylinder 14 which drives the gate wing 4. As shown in Figure 1, the components of the hydraulic system 5 are hydraulically connected and positioned in such a way that the pump 9 drives the cylinder 14. The electric system 6 comprises a power feeding electric circuit, generally indicated by numeral 15, and an electric control system generally indicated by numeral 16.

The power feeding electric circuit 15 substantially comprises: a battery charger 17, at least one accumulator battery 18, a first fuse 19, a battery switch 20, a first relay 21 and an electric motor 22 which drives the hydraulic pump 9 which is mechanically connected to said motor. As shown in Figure 1, the electric connections among the components of the power feeding electric circuit 15 are realised to guarantee the electric power supply and therefore the operation of the electric motor 22. In the example, two accumulator batteries 18 are provided in order to increase the reliability, said batteries are connected in parallel so as to prevent the risk that one of the batteries is short circuited. The electric motor 22 and the accumulator batteries 18 are of the very low voltage type (preferably 12 V direct current), the battery charger 17 can be connected to the alternate current power grid, preferably 220 V monophase current.

The battery charger 17 is of the stabilised type,

again in order to increase the reliability. Further, in the shown example, the power feeding electric circuit 15 is connected to a second relay 24 and at least to an emergency light 25, said relay and said light are activated by power grid failures. The electric control circuit 16 substantially comprises a drive push-button 26 to move forth and back and to stop the gate, a second fuse 27 and the already mentioned first relay 21 which is the connection element between the power feeding electric circuit 15 and the electric control circuit 16.

The second embodiment of the motor-driven gate indicated by 1A in Figure 2 is different from the first embodiment of the motor-driven gate, since the drive means 3A are different from the ones indicated by numeral 3 in Figure 1; in fact, they are structured so as to comprise a plurality of hydraulic cylinders 14 to drive the corresponding gate wings 4 of a gate 2. In the example case the gate is of the double wing 4 type. The drive means 3A can thus control several gates 2. In Figure 2, the elements corresponding to the elements of Figure 1 are indicated with the same numerals. In summary: the hydraulic system 5A is different from the hydraulic system 5 since it comprises a plurality of hydraulic cylinders 14 (two in this example) and just one constant flow valve 13.

The opening and the closing of the motor-driven gate 2 is realised by putting the hydraulic system 5A under pressure and by selecting the position of the valve 12 through the drive pushbutton 26 which controls simultaneously both the valve 12 and the motor 22.

The third and the fourth embodiments of the improved motor-driven gate, generally indicated by 1B and 1C, respectively, in Figures 3 and 4, are different from the previous embodiments since, instead of the hydraulic group, they comprise a first and second mechanical group respectively indicated by 28B and 28C, while, in both cases, the electric system comprises a third multipolar relay 29 in place of the first relay 21. With particular reference to Figure 3, the first mechanical group 28B comprises a first reduction unit 30 driven by the electric motor 22 which drives a pinion 31 which engages a rack 32 integral with a gate (not shown). With particular reference to Figure 4, the second mechanical group 28C comprises a plurality of gearmotors-worm screws unit 33 equal to the number of gate wings to be driven (two units in this case).

Just by way of example, a motor-driven gate normally considered "heavy", i.e. having dimensions equal to a carriage gate of 4 x 4.5 meters, requires just a 500 Watt motor, which is powered by a 45 AH accumulator battery and which guarantees at least 20 full opening and closing cycles of the gate, even consecutive (without pauses), without having to recharge the battery. Again by way of example, the transformer of the battery charger can just be a 30 VA transformer, with a 220 V monophase current consumption of very few Watts.

Usually the energy consumption is such that it is possible to use the drive means 3 and 3C for more than one gate and/or for other relevant devices, for instance remote control units.

Claims

1. Improved motor-driven gate (1, 1A) provided with at least one gate wing (4), said motor-driven gate comprising drive means (3, 3A) which drive the gate wing (4), wherein said drive means (3, 3A) comprise a hydraulic system (5, 5A) and an electric system (6), wherein:

   - said hydraulic system (5, 5A) comprises at least a hydraulic pump (9) which drives at least one hydraulic cylinder (14) for each gate wing (4), said at least one hydraulic cylinder (14) driving said at least one wing (4),
   - said electric system (6) comprises a power feeding electric circuit (15) and an electric control circuit (16), said circuits driving at least one electric motor (22) which drives the hydraulic pump (9),

   characterised in that the electric motor (22) is of the very low voltage type and is powered by at least one accumulator battery (18) connected to a battery charger (17) which can be connected to the alternate current power grid.

2. Improved motor-driven gate comprises drive means (3B, 3C) which drive at least one gate wing (4), wherein said drive means (3B, 3C) comprise an electric system (6) and a mechanical group (28B, 28C), wherein:

   - said electric system (6) comprises a power feeding electric circuit (15) and an electric control circuit (16), said circuits driving at least one electric motor (22),
   - said mechanical group (28B, 28C) comprises at least said electric motor (22) which is operatively connected to at least one reduction unit (30) or, in alternative, comprises at least one gearmotor-worm screw unit (33) which drives at least one gate wing(4),

   characterised in that said electric motor (22) associated with the gearmotor (30) or the motor associated with said gearmotor-worm screw unit (33) are of the very low voltage type and are powered by at least one accumulator battery (18) connected to a battery charger (17) which can be connected to the alternate current power grid.

3. Improved motor-driven gate as claimed in claim 1 and/or 2, characterised in that the electric motor (22) and the motor of the gearmotor-worm screw unit (33) are of the DC monophase type and in that the battery charger (17) can be connected to a low

voltage power grid.

4. Improved motor-driven gate as claimed in claim 1 and/or 2, characterised in that the electric motor (22) and the motor of the gearmotor-worm screw unit (33), the accumulator battery (18) are of the very low voltage type and in that the battery charger (17) is of the type which can be connected to a low voltage power grid.

5. Improved motor-driven gate as claimed in claim 1 and/or 2, characterised in that the battery charger (17) is of the stabilised type.

6. Improved motor-driven gate as claimed in claim 1 and/or 2, characterised by comprising two accumulator batteries (18) in a parallel arrangement.

7. Improved motor-driven gate as claimed in claim 1 and/or 2, characterised in that the power feeding electric circuit (15) is associated to a second relay (24) and to at least one emergency light (25), said relay and said light are activated in case of a power grid failure.

8. Improved motor-driven gate as claimed in claim 1 and/or 2, characterised in that the drive means (3, 3A, 3B, 3C), the electric system (6) and the hydraulic system (5, 5A) or the mechanical groups (28B, 28C) are suitable to drive a plurality of gates (2).

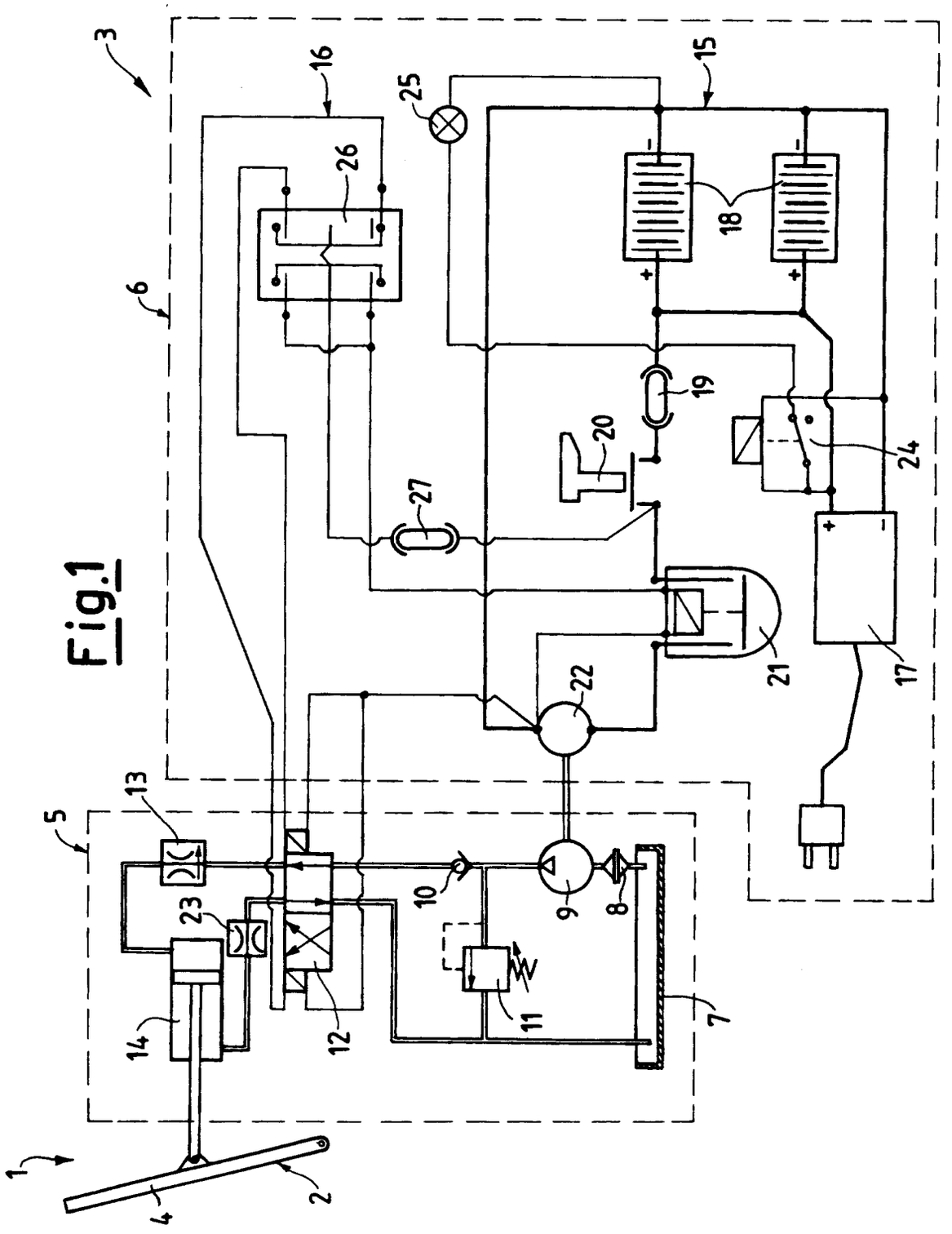
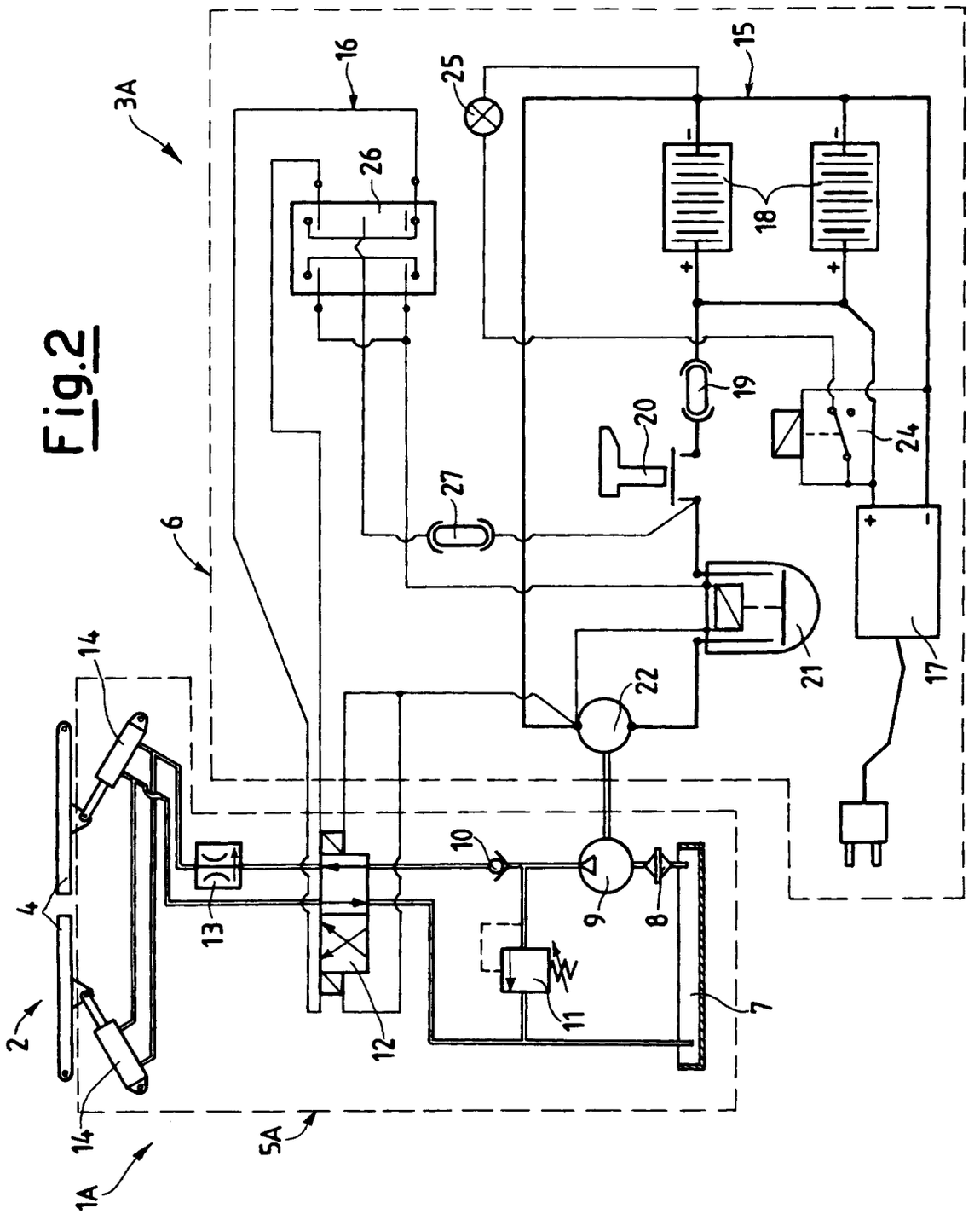


Fig.1

Fig.2



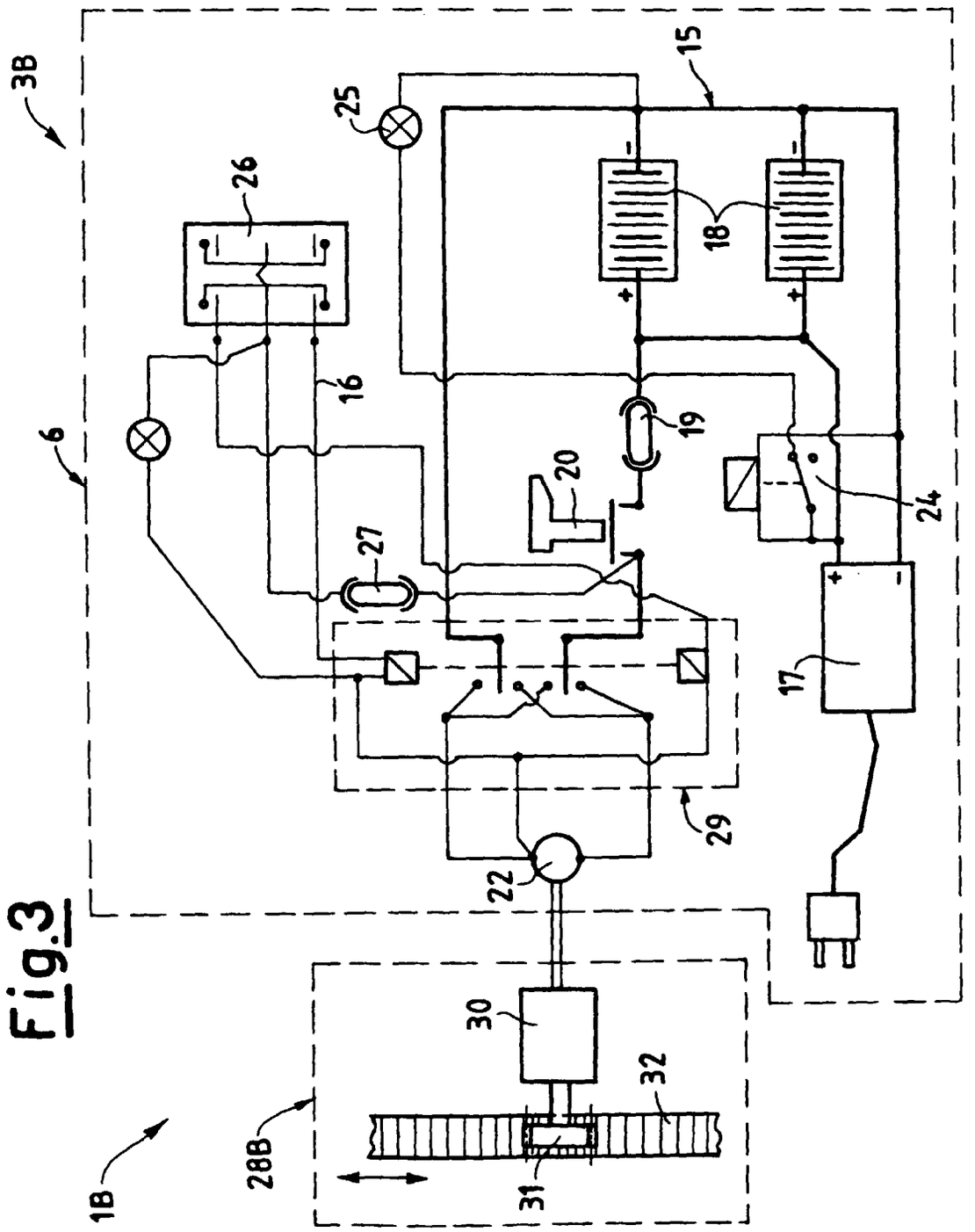


Fig.3

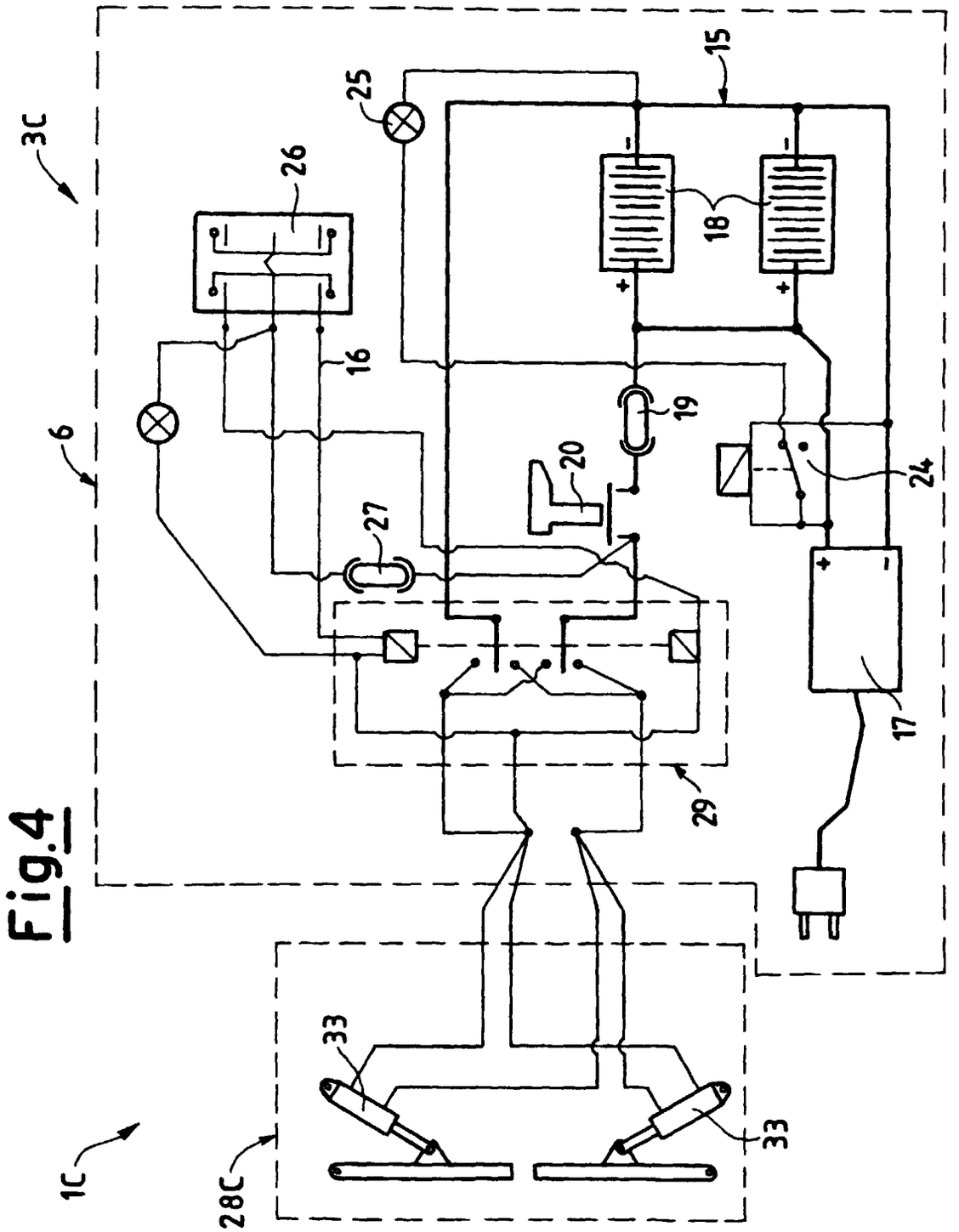


Fig.4