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Europäisches Patentamt  
European Patent Office  
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(11) Publication number:

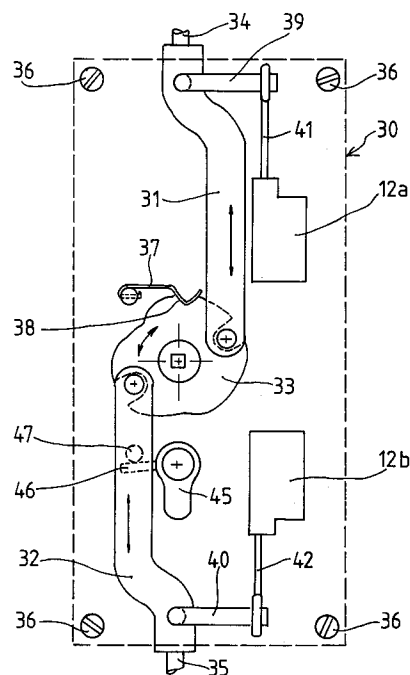
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(12)

**EUROPEAN PATENT APPLICATION**(21) Application number: **94203684.9**(51) Int. Cl.<sup>6</sup>: **E05B 65/20, E05B 47/02, E05C 9/04, E05B 65/16**(22) Date of filing: **20.12.94**(30) Priority: **21.12.93 NL 9302221**(43) Date of publication of application:  
**28.06.95 Bulletin 95/26**(64) Designated Contracting States:  
**AT BE CH DE DK ES FR GB GR IE IT LI LU NL PT SE**(71) Applicant: **Lokkerbol, Wilhelmus Antonius Stephanus**  
**Meeuwenlaan 21**  
**NL-2661 BM Bergschenhoek (NL)**(72) Inventor: **Lokkerbol, Wilhelmus Antonius Stephanus**  
**Meeuwenlaan 21**  
**NL-2661 BM Bergschenhoek (NL)**(74) Representative: **Reynvaan, Lambertus Johannes**  
**Octroobureau Reynvaan**  
**Rivierdijk 551**  
**NL-3371 EC Hardinxveld-Giessendam (NL)**(54) **Device for securing doors against unauthorized opening thereof, in particular for the doors of a motor vehicle.**

(57) In order to prevent a car from being broken into or stolen, the invention proposes a security device which is formed by a lock fitted slidably in each door of the car, which lock is connected to and driven by a drive element (12a, 12b). The lock can be slid by means of said drive element so that it engages with or is disconnected from an opening disposed in the frame of the car door in question. For this purpose, the drive elements are accommodated in an electrical circuit which also contains the voltage supply of the vehicle and a switch element. The security device can be turned on by means of said switch element, in order to lock all car doors securely. This switch element is therefore situated outside the passenger compartment. In another embodiment the security device is suitable in particular for the loading door of a lorry, which door has two locking rods (31,34; 32,35) which are axially slidable in opposite directions to each other, and which each interact with an opening disposed in the doorframe thereof. This embodiment is distinguished by the fact that each locking rod is connected to a drive element (12a, 12b), which drive elements are disposed in opposite directions in order to move the two rods simultaneously in opposite directions. The two drive elements are again accommodated in a control circuit (50) containing a voltage supply and a switch

element.

**FIG. 3****EP 0 659 965 A2**

The present invention relates to a device for securing doors against unauthorized opening thereof, in particular for the doors of a motor vehicle, for example the doors of a car or the rear doors of a lorry, but also the loading doors of a container. However, the device can also be used advantageously for securing roll-down shutters or doors of factories and the like.

A major aim of the invention is the provision of an additional locking device which, apart from the usual closure of the door, also offers an effective security measure to protect the vehicle or the container from being broken into and/or the vehicle itself from being stolen.

The theft of a car generally occurs either through the lock of a door being forced or through a window being smashed and the door then being opened from the inside. The security systems for vehicles or the alarm systems known until now are electronic systems which produce sound and/or light signals. These systems have the disadvantage that they are fairly expensive. Moreover, their effectiveness is limited, since the public tends not to react or is afraid to react when the alarm goes off. Besides, such alarm systems regularly go off accidentally.

The object of the invention is then to provide a security system which offers effective protection against break-in or theft, without said system having the disadvantages of the known alarm systems. This object is achieved according to the invention by a device with the characteristics indicated in Claim 1. Claim 2 indicates a further effective development of the invention.

The invention is in fact based on the idea that if the doors of the vehicle are locked in such a way that they cannot be opened from the inside and cannot be forced either, stealing the vehicle becomes much more difficult, if not impossible.

Another aim of the invention is the provision of a security device which is intended in particular for the loading doors of a lorry. Such a device is distinguished by the features indicated in Claim 3. The security device in this case can advantageously be connected to a control circuit, which can ensure that said device is turned on automatically after the loading doors are closed. This means that it is impossible to leave the loading doors unsecured by mistake.

Claims 4 - 6 give expedient further details of this embodiment.

The invention is explained in greater detail with reference to the drawing, in which:

Figure 1 shows diagrammatically a security device according to the invention, of the type which is suitable in particular for installation in a door of a car;

Figure 2 shows diagrammatically a wiring diagram for the security device of Fig. 1;

Figure 3 shows diagrammatically a different embodiment of the security device according to the invention, which is suitable in particular for the loading doors of a lorry; and

Figure 4 shows diagrammatically a wiring diagram for the device of Figure 3.

As can be seen clearly in Figure 1, the security device according to the invention is formed by a lock 1, consisting of a housing 2 with a locking bolt 3 which is axially slidable therein. The housing 2 is cylindrical in shape and is provided with an external screw thread on which two nuts 4, 4' are fitted. The housing is fixed to a door 5 of a motor vehicle in the manner shown, by means of these nuts 4, 4'. The construction with the two nuts 4, 4' makes it possible to fit the housing in an axially adjustable manner, so that when the locking bolt 3 is in the slid-out position it can be ensured that said housing engages in an opening 6 provided in a doorpost 7 adjoining the door 5 in question. A protective sleeve 8, made of a suitable plastic, such as nylon, is provided in the opening 6, which sleeve can accommodate the locking bolt 3 with some play.

A flexible coaxial cable 9, consisting of an outer cable 10 and an axially movable inner cable 11 lying therein, connects the lock 1 to a drive element 12 in the manner to be described below.

The drive element 12 consists of a housing 13, containing a reciprocating gear rack 14 which meshes with a pinion 15, which is in turn driven by an electric motor (not shown). The gear rack 14 is suitably immovably connected to the one end of the inner cable 11 of the coaxial cable 9, while the other end of the inner cable 11 is immovably connected to the locking bolt 3.

The outer cable 10 is immovably connected by one end to the housing 2 of the locking bolt 3, and by the other end to a connecting bush 16. At the end facing away from the cable, the bush 16 is provided with external screw thread, on which two nuts 17, 17' are disposed, by means of which nuts the bush 16, and thus the outer cable 10, is immovably connected to the housing 13. It will thus be clear that rotation of the pinion 15 in one or in the other direction results in an axial displacement of the gear rack, and thus of the inner cable 11 with the locking bolt 3 connected thereto. The locking bolt 3 connected to the inner cable can thus be moved by means of the drive element 12 into a slid-out working position (shown) and into a retracted rest position, in which the locking bolt lies inside the housing 2, and vice versa.

The housing 13 of the drive element is fixed, for example by means of screws (not shown), inside the appropriate door of the vehicle. The flexible cable 9 makes it possible to fit the housing 13

in a suitable place inside the vehicle door, so that the device is suitable for vehicle doors of any type. In order to provide additional protection, a metal tube (not shown) can also be disposed around the flexible coaxial cable, thus making it impossible to disable the security device from the inside.

The operation of the security device according to the invention will be described below with reference to Figures 1 and 2.

The unit shown in Figure 1 is fitted in each door of the motor vehicle to be secured, which unit consists of the lock 1 and the drive element 12 connected thereto by means of the flexible cable 9. The drive element fitted in each door is accommodated in an electrical circuit 18, in which a voltage supply 19 of the vehicle is also accommodated. The circuit 18 also contains a switch element 20 for operating the security device. The voltage supply 19 is normally formed by the 12-volt or 24-volt batteries present in the vehicle. This switch element is also provided with switch-off relays, which in the two end positions of the security device interrupt the power supply to the drive elements.

The switch element 20 can be disposed at any suitable point outside the passenger compartment, and can also be of any suitable design. For example, it can be in the form of a contact lock which is operated by a key, or in the form of a switch which is remote-controlled by a coded radio signal.

As soon as one leaves the vehicle, one turns on the security device by means of the switch element 20, as a result of which the drive elements 12 are activated simultaneously in all doors, and the locks 1 connected thereto are slid out into their working position.

In this end position the power supply to the drive elements is interrupted. All vehicle doors are now securely locked, and it is virtually impossible for any unauthorized person to gain access to the vehicle. The additional locking can be undone by operating the switch element 20 again, as a result of which the drive elements 12 are activated in the opposite direction, and the locks are slid inwards into their non-working position. In this end position also, the power supply to the drive elements is interrupted again.

Figure 3 shows diagrammatically another embodiment of the security device according to the present invention, which device is suitable in particular for securing the loading doors of a lorry, the doors of a container or the like. As can be seen in this figure, this device consists essentially of a conventional espagnolette closure which is formed by two bars 31 and 32 guided parallel to and at a distance from each other in a diagrammatically shown housing 30, which bars are connected hingedly and with some play by the ends facing each

other to a common disc 33 rotatably mounted in the housing. At the ends facing away from each other the bars 31 and 32 each bear a locking rod 34, 35 respectively. The bars 31 and 32 are formed in such a way that the locking rods 34 and 35 lie in line with each other. The construction is such that a rotation of the disc 33 causes a mutually opposed rectilinear movement of the respective locking rods 34 and 35.

The housing 30 is fixed, for example by screws 36, to the inside of the door to be secured, the only partially shown locking rods being slidably guided along the door in a conventional manner, and being able to engage with their free ends in suitable openings disposed in the doorframe. In the position shown in Figure 3 the disc 33 has been rotated in such a way that the locking rods are slid out into their working position. In this position a spring 37 engages with its free end in a recess 38 of the disc 33, which spring is immovably connected by the other end to the housing 30. The purpose of the spring is to retain the disc 33 in this position, so that the locking rods cannot accidentally slide inwards. The espagnolette closure described until now is conventional, and such a closure is normally operated by rotating the disc 33 by means of a handle which engages thereon and is situated on the outside of the door.

As shown in Figure 3, each bar 31, 32 has a side arm 39, 40 respectively, each connected to a drive element 12a, 12b respectively. The drive elements 12a and 12b are essentially identical to the drive element 12 of Figure 1, except that the rack 14 is connected here to a connecting rod 41, 42 respectively, which again is immovably connected to the corresponding side arm 39, 40 respectively. The drive elements 12a and 12b are disposed in opposite directions to each other, so that the connecting rods 41, 42 running parallel to the corresponding locking rods always drive these two locking rods in opposite directions.

The device according to the invention is also provided with a lock 45, which lock is fixed in the housing 30 and projects through the door to be secured, so that it can be operated from the outside of the door. The lock 45 has a lip 46 which is movable by means of a key fitting in the lock, and which can interact with a pin 47 which is immovably fixed to the bar 32. In the locked position shown, the pin 47 lies in such a way against the lip 46 of the lock 45 that the bars 31, 32 can be slid unimpeded with the locking rods connected thereto out of their working into their non-working position, and vice versa. The lock 45 is purely intended for undoing the locking if the drive elements 12a and 12b are not working for one reason or another. In this case the lip 46 can be rotated from the outside of the door by means of the key fitting in the lock.

The lip 46 can then press the bar 32, and by way of the disc 33 also the bar 31, into the position in which the locking rods assume their non-working position and the door can be opened.

It should also be pointed out that the device described here is fitted in addition to the usual closure of the door. The device is thus intended purely as additional security. This also means that the locking rods 34, 35 can engage with relatively great play in the corresponding openings in the doorframe, so that a smooth-running operation of the security device is ensured.

Figure 4 shows diagrammatically a control circuit for the security device, for activating the drive elements 12a and 12b of the security device of Figure 3. The circuit contains a control module 50 with six connecting terminals a, b, c, d, e and f. A direct current supply 51 is connected to the terminals a and b, which current supply is usually formed by the battery present in the vehicle. The electric motors M of the two drive elements 12a and 12b are connected in a mutually parallel arrangement to the terminals c and d of the control module 50 by way of lines 52 and 53. Since these drive elements are fixed in a loading door of the vehicle, the lines 52 and 53 are each provided with a door switch 54, which breaks the lines when the door is opened and restores the connection when the door is closed. A door switch 55 is connected to the connecting terminal e of the control module, which switch is connected to earth at the other side. The switch 55 is in the open position when the door on which the security device is fitted is open, and is in the closed position when the door is closed. Finally, the contact lock 56 of the vehicle is connected to the connecting terminal f of the control module 50, which contact lock is connected at the other side to the positive pole of the power supply 51 of the vehicle.

The control circuit works as follows:

When the driver closes the loading door a signal is emitted by way of the door switch 55 to the control module 50, which after a preset time of, for example, 5 seconds activates the motors of the drive elements 12a and 12b, in order to turn on the security device. The driver can start the lorry and drive to another location and the security device remains in the working position. As soon as the driver turns off the contact lock and removes the key from the lock, the control module 50 will activate the motors M in order to put the security device in the non-working position for a few seconds (for example, 15 seconds), in which position the loading door can be opened. If the door is not opened by the driver during this time, after 5 seconds in this example the security device is automatically turned on again. If, after all, the driver does then wish to open the loading door, he need

only turn on the contact lock and turn it off again immediately, so that the loading door can be opened again during the preset time.

It will be clear that the embodiments of the invention shown and described here are suitable for a large number of modifications and variants within the scope of the appended claims. If, for example, the security device is being used for securing a container, a special battery will have to be fitted for this, and the contact lock 56 can be replaced by, for example, another suitable switch, for example a remote-controlled switch which is known per se. Instead of the control circuit of Figure 4, the security device according to Figure 3 can also be operated by a circuit of the type shown in Figure 2. In this case the switch element can, of course, simply be fitted in the driver's cab. Of course, in addition to the security device for the loading doors of Fig. 3, it is also possible to fit a security device of the type from Fig. 1 for the doors of the driver's cab.

#### Claims

1. Device for securing doors of a motor vehicle, **characterized** in that each door of the vehicle to be secured is provided with an axially movable locking bolt (3) which interacts with an opening (6) disposed in the corresponding doorframe (5), which locking bolt is connected to a drive element (12) disposed in said door, in order to move the locking bolt out of a non-working position into a working position, in which the locking bolt engages in the opening of the doorframe, which drive element is connected to a control circuit (18) containing the batteries (19) present on the vehicle and a switch element (20), which switch element is situated outside the driver's cab of the vehicle.
2. Device according to Claim 1, **characterized in that** the locking bolt is connected to the end of the inner cable of a flexible coaxial cable (9), while the other end of the inner cable is connected to a linear reciprocating element (14) of the drive element.
3. Device according to Claim 1, intended for the loading door of a lorry, which door is provided with two axially slidable locking rods (34, 35) lying essentially in line with each other, and each interacting with an opening disposed in the doorframe, **characterized in that** each locking rod is connected to a drive element (12a, 12b), which drive elements are disposed in opposite directions, in order to slide both rods simultaneously outwards out of their non-working position into the locked position, in

which the two rods engage in their respective openings, and vice versa, which drive elements are accommodated in a control circuit containing the batteries (51) of the vehicle and a switch element (56).

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4. Device according to Claim 3, **characterized in that** the control circuit contains a control module (50) to which the battery of the vehicle (51), the drive elements (M), a door switch (55) and the switch element (56) are connected.
5. Device according to Claim 3 or 4, **characterized in that** the switch element is formed by the contact lock of the vehicle.
6. Device according to Claim 3 or 4, **characterized in that** the switch element is formed by a switch which can be remote-controlled by means of a coded radio signal.
7. Device according to the preceding Claims 3-6, **characterized in that** both locking rods are interconnected by a disc (33) and in that one (32) of locking rods is provided with a pin (47), said pin cooperating with the lip (46) of a lock (45) which lock can be operated from outside of the door in order to move said locking rods into their non-working position.
8. Device according to Claim 7 **characterized in that** the disc (33) is provided with a retaining element (37, 38) so that the the locking rods can not move unintendedly.

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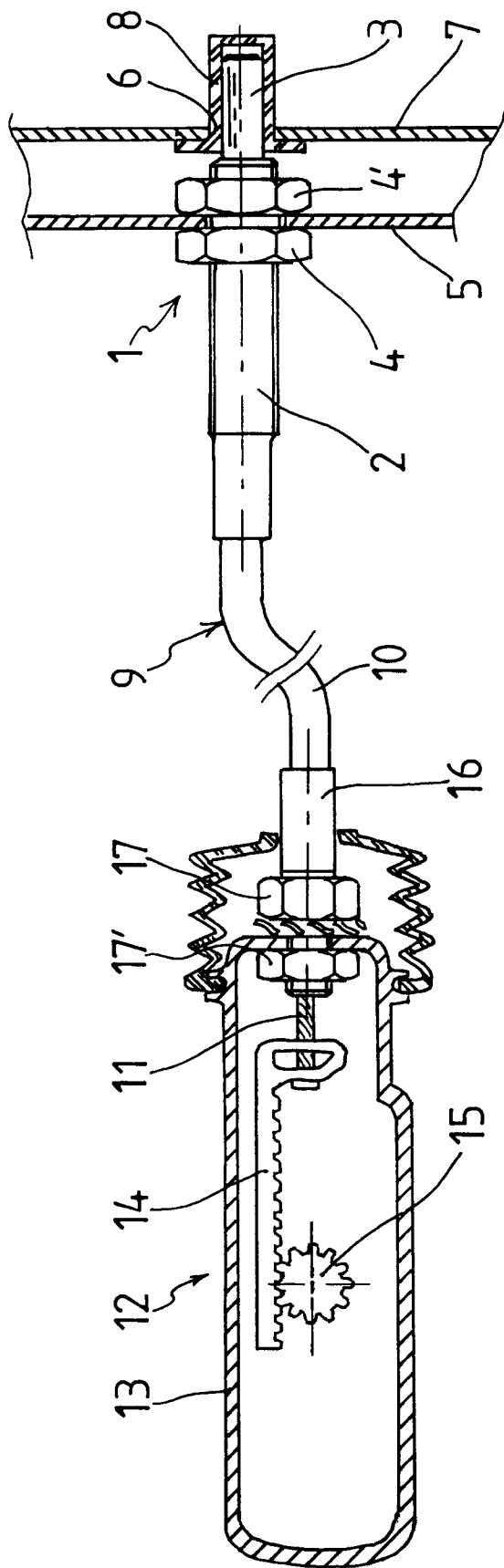


FIG. 1

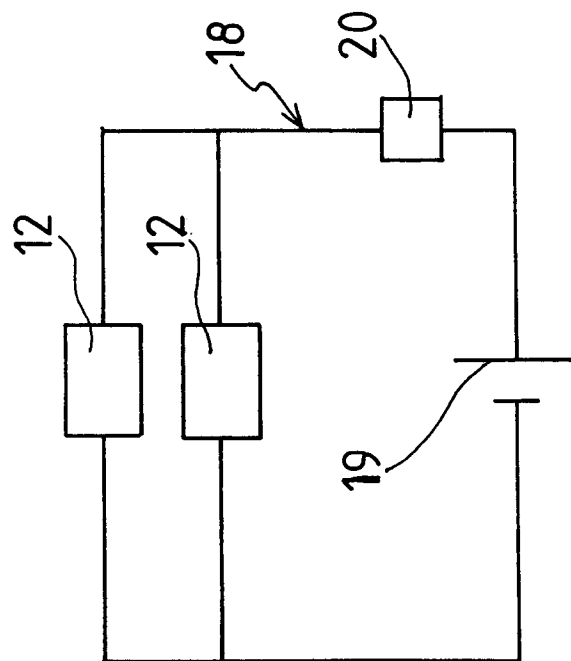


FIG. 2

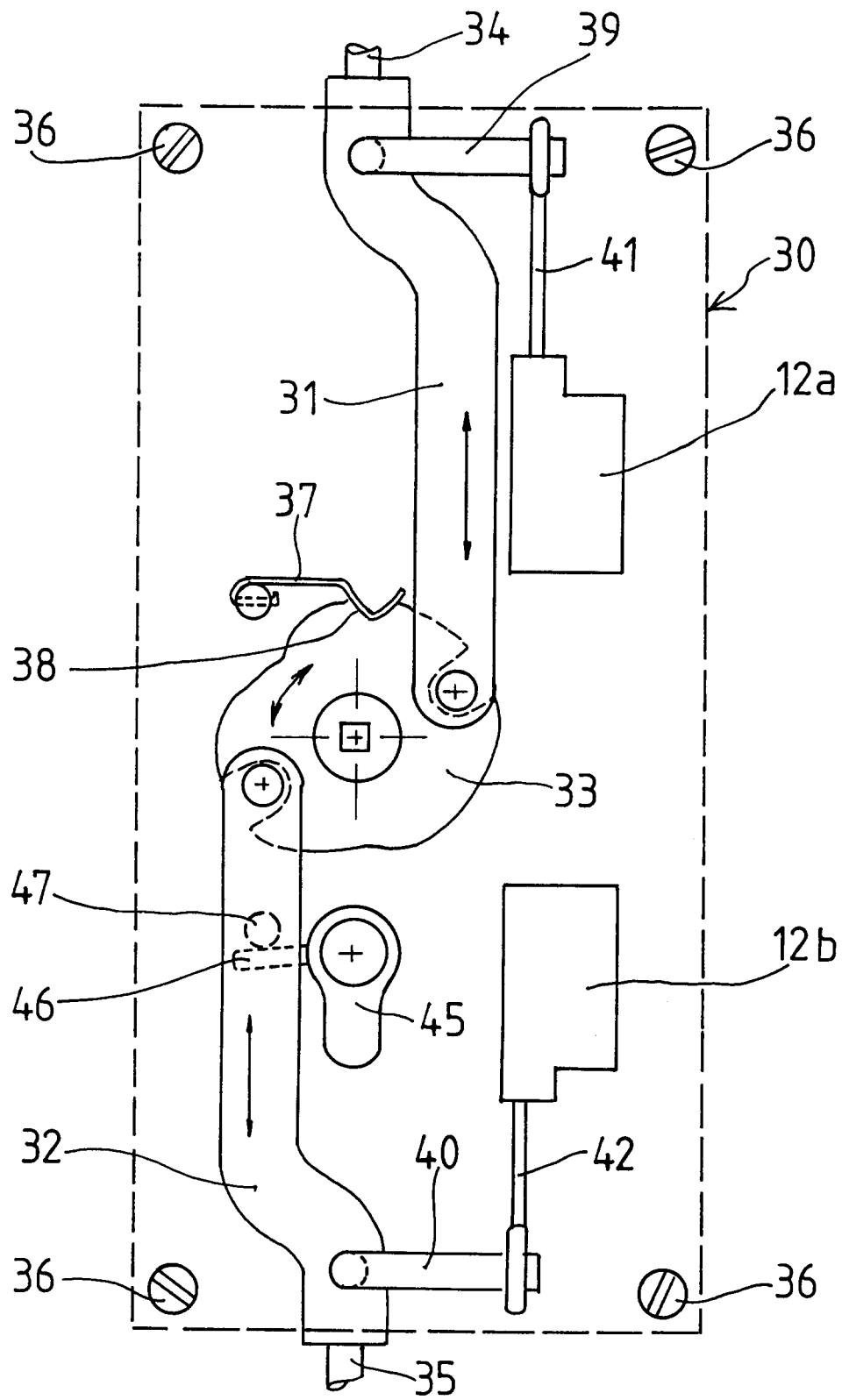


FIG. 3

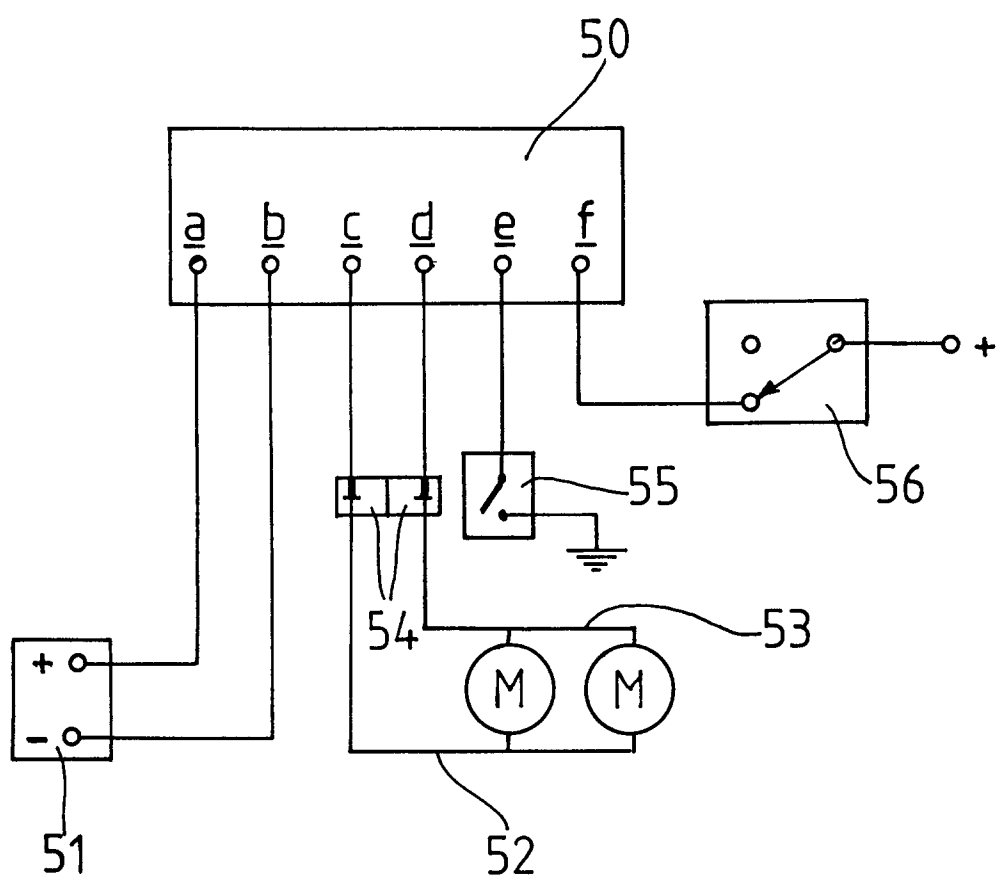


FIG. 4