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54 **An electrical lock for vehicles.**

57 An electrical lock for vehicles is described the principal characteristic of which lies in the fact that it includes electrical activation means for electrical apparatus (1) for controlling at least one mechanical actuator installed in a door (2) of a vehicle (3) for locking and unlocking this latter. The activation means include at least one keyboard (4) installed outside the vehicle (3) and having a plurality of push buttons (5) by means of which, in use, a combination is selected, and means (6) for processing the selected combination.

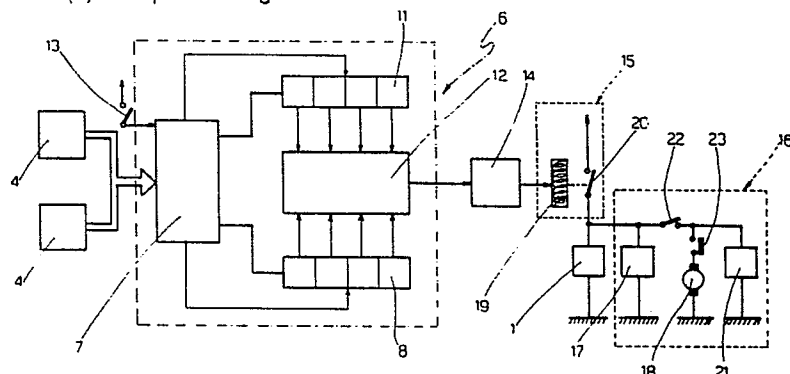


Fig. 1

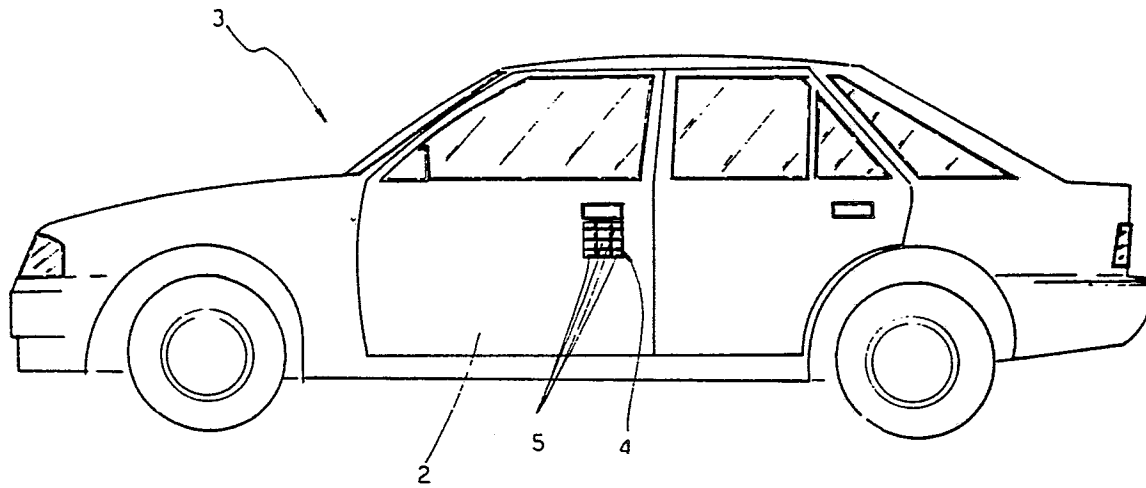


Fig.3

AN ELECTRICAL LOCK FOR VEHICLES

The present invention relates to an electrical lock for vehicles.

As is known, vehicle doors are currently provided with mechanical locks which can be operated by means of a normal key. This conventional system of opening vehicle doors has various disadvantages due, above all, to the fact that the mechanical locks are easily broken into, for example with a counterfeit key. Moreover, it can happen that the inattentive user may lose the key or have it stolen, and a reserve key or a specialist garage which can open a vehicle door without damaging it is not always available.

The object of the present invention is that of providing an electrical lock for vehicles which provides for a system of opening which is free from the cited disadvantages.

According to the present invention there is provided an electrical lock for vehicles, characterised by the fact that it includes electric activation means for electric apparatus for controlling at least one mechanical actuator installed in a vehicle door for locking and unlocking this latter; the said activation means comprising at least one keyboard installed outside the said vehicle and having a plurality of push buttons by which, in use, a combination is selected, and means for processing the said selected combination.

For a better understanding of the present invention two preferred embodiments will now be described purely by way of non-limitative example, with reference to the attached drawings, in which:

Figures 1 and 2 are two different electrical diagrams of an electrical lock for vehicles; and

Figure 3 is a view of a motor vehicle provided with an electrical lock.

With reference to the attached drawings the electrical lock forming the subject of the present invention comprises electrical activation means for an electrical apparatus 1 for controlling a mechanical actuator responsible for the locking and unlocking of a door 2 of a motor vehicle 3. The actuator is of known type and for simplicity has not been illustrated. The activation means comprise two keyboards 4 installed outside the motor vehicle 3 and for example, as illustrated in Figure 3, on the front doors 2. Each keyboard 4 comprises a plurality of push buttons 5 on each of which is printed a number, a letter, or any form of graphic symbol. By means of the keyboard 4 it is therefore possible to select a combination of numbers of letters or graphic symbols which, by means of the processor means 6 is compared with a reference combination. If the selected combination is exact the apparatus is enabled by the means 6 whereby to

control the mechanical actuator.

As illustrated in Figure 1, the processor means 6 comprise a processor unit 7 connected to the keyboard 4, two registers 8 and 11 connected to the unit 7 and a comparator unit 12. A reference combination, for example of four numbers, is memorised in the register 8, whilst the combination selected by the user by means of one of the keyboards 4 is transferred into the register 11. The registers 8 and 11 are connected to the unit 7 respectively by two lines, one for data transfer and the other for zeroing the registers. In use, by acting on a switch 13 the register 8 can be zeroed for the purpose of making memorisation of a reference combination possible by means of a keyboard 4. The switch 13 is therefore a member which if actuated disables the connection between the unit 7 and the register 11 and enables the connection between the unit 7 and the register 8 making it possible to set a reference combination into this latter. The comparator unit 12 compares the combination set into the register 11 with the predetermined combination in the register 8. In the case of equality of these combinations the comparator unit 12 emits an electric pulse which, via an amplifier 14, is passed to a coil 19 of a bistable relay 15 which in turn enables electrical supply of the apparatus 1. As is known the bistable relay is a device which changes the state of a switch 20 connected to it whenever it receives an electrical pulse; therefore, each time that the user enters the same combination as the reference combination the apparatus 1, if it was activated, is disactivated or vice versa. In parallel with the apparatus 1 there is also connected a unit 16 comprising electrical apparatus 17 for controlling a steering lock member of known type, a starter motor 18, and an electrical system 21 responsible for the determined supply to the lights typical of the motor vehicle 3, such as for example the headlights and dipped headlights, those for illumination of the dashboard etc. Upstream of the unit constituted by the motor 18 and the electrical system 21, a switch 22 is fitted in the supply line, which can be located on the dashboard of the motor vehicle 3. Energisation of the motor 18 is achieved by acting on a push button 23 inserted immediately upstream of the motor 18, which push button is also located on the dashboard.

In use, starting from a configuration in which the doors 2 are locked and therefore there is no electrical supply to the apparatus, the user must enter combination of numbers by means of the keyboard 4, which are transferred, by means of the unit 7, to the register 11. If the user contrives to

enter an incorrect combination, it is possible to zero the register 11 by pressing one of the push buttons 5 on which a specific symbol is printed. The comparator unit 12 compares the combination entered into the register 11 with that memorised in the register 8, and if these are the same it activates the relay 15 which enables electrical supply to the apparatus 1. To lock the door 2 from the outside it is sufficient to repeat the combination.

With reference to Figure 2, in this diagram the means 6 are also connected to the apparatus 1 by the relay 15. These means 6 include two terminals 31 on which one of the push buttons 5 acts, which constitutes the first push button of the combination to be selected. One of the terminals 31 is connected to a positive pole of an electrical energy source such as, for example, the battery of the motor vehicle 3, whilst the other terminal 31 is connected by means of a resistor 32 to a timer 33. A plurality of pairs of terminals 34 are connected in parallel with this. On the first pair of terminals 34 acts the push button 5 provided for zeroing the combination which has just been selected, whilst the push buttons 5 not involved in this combination act on the other pairs of terminals 34. These latter push buttons 5, therefore, if actuated, also cause zeroing. The second terminal 31 is, further, connected by means of the resistor 32 to an amplifier 35 constituted by two transistors connected as a Darlington pair. The amplifier 35 has a supply terminal connected to a conductor 36 in turn connected to the positive pole, and an output connected by means of a resistor 37 to a grounded conductor 38.

The means 6 further comprise a plurality of electrical blocks 41 similar to one another and connected in cascade, only the first of which is illustrated in its entirety for simplicity. This electric block 41 comprises a pair of terminals 42 the first of which is connected to the output of the amplifier 35 and the second to the control electrode (gate) of a silicon controlled rectifier (SCR) 43 the anode of which is connected to the output of the amplifier 35 and the cathode of which is connected via a resistor 44 to the conductor 38. The control electrode of the rectifier 43 is further connected by means of a resistor 45 to the conductor 38. Each block 41 includes a switch 46 having a common terminal 47 connected to the cathode of the rectifier 43, a terminal 48 connected to the first terminal 42 of the successive block 41, and a terminal 51 connected to the base of an NPN transistor 52 the emitter of which is connected to the conductor 38 and the collector of which is connected, via the coil 19 of the relay 15 (this time of monostable type) to the conductor 36.

With reference to Figure 2 the combination to be selected for unlocking the door 2 is, in this

case, composed of two numbers in that in the first block 41 the switch 46 is in a configuration which determines the connection between the terminal 47 and the terminal 51. In this case, by pressing, in succession, the push button 5 coupled to the terminals 31 and the push button 5 coupled to the terminals 42 of the first block 41 the transistor 52 is turned on to supply the coil 19 which, if excited, causes a change of state of the switch 20. This is fitted upstream of the apparatus 1 in the supply line 36 so that if the apparatus 1 was deactivated it becomes activated or vice versa. Naturally, in this case, too, the unit 16 first described is inserted in parallel with the apparatus 1.

When it is desired to establish a combination of for example four numbers, it is sufficient to press the push button 5 relating to the first number in correspondence with the terminals 31, and the other three push buttons 5 in succession in correspondence with the first three blocks 41. Naturally only the latter of these three blocks 41 will have the switch 46 in the configuration which ensures the connection between the terminals 47 and 51, whilst the switches 46 of the other blocks 41 will have the connection between the terminals 47 and 48. With such means 6 a combination can be constituted by as many numbers as there are blocks 41 plus one relating to the push button 5 acting on the terminals 31. The latter block 41 is not provided with the switch 46 because it is evidently superfluous and therefore the cathode of the rectifier 43 is connected, via an uncoupling diode 55, to the base of the transistor 52.

In use, by pressing the push button 5 acting on the terminals 31 the timer 33 is charged and the first input of the amplifier 35 is connected to the positive pole; this causes connection of the first terminal 42 and the anode of the rectifier 43 of the first block 41 to the positive pole. By pressing the push button 5 of this block 41 the control electrode of the rectifier 43 is also connected to the positive pole so that, by triggering this latter the terminal 47 is connected also to the positive pole. If the terminal 47 is connected to the terminal 51 and therefore to the base of the transistor 52, this latter becomes conductive and therefore enables the relay 15 to supply electricity to the apparatus 1. If on the other hand the terminal 47 is connected to the terminal 48 the positive pole is connected to the first terminal 42 of the subsequent block 41. If the push button 5 provided for zeroing, or any of the other push buttons 5 not involved in the combination, is pressed the timer 33 discharges and then it is necessary to repeat the combination to be selected from the beginning.

From what has been described above the numerous advantages achieved with the present invention will be evident.

In particular, to lock or unlock the door 2 of the motor vehicle 3 it is necessary to enter into the keyboard 4 the combination corresponding to that selected. This constitutes a deterrent for theft of the motor vehicles since only by knowing the exact combination is it possible to introduce it. Moreover, it is no longer necessary to have a key which, as already indicated, can be lost, stolen or counterfeited. It is to be noted that even if entry is gained, for example, through a window into the motor vehicle, to unlock the steering and start the starter motor 18 it is still necessary to enter the exact combination. In this description there have been illustrated two possible embodiments which are simple to achieve and of low production cost.

Finally, it is clear that the electrical lock described and illustrated here can have modifications and variations introduced thereto without by this departing from the protective ambit of the present invention.

In particular, the apparatus 1 can effect control of a single actuator, that is to say to control the opening of a single door 2, or can effect centralised control of all the actuators installed on the doors 2, that is to say to control the opening of all these.

Claims

1. An electrical lock for vehicles, characterised by the fact that it comprises electric means for activation of electrical apparatus (1) for controlling at least one mechanical actuator installed on a door (2) of a vehicle (3) for locking and unlocking this latter; the said activation means including at least one keyboard (4) installed on the exterior of the said vehicle (3) and having a plurality of push buttons (5) by means of which, in use, a combination is selectable, and means (6) for processing the said selected combination.

2. A lock according to Claim 1, characterised by the fact that between the said processing means (6) and the said apparatus (1) there is mounted an electrical device (15) operable, if actuated by the said processing means (6), to enable or inhibit electrical supply to the said apparatus (1).

3. A lock according to Claim 2, characterised by the fact that the said processing means (6) include a processing unit (7) connected to the said keyboard (4), a first register (8) in which a reference combination is memorised, a second register (11) into which the said selected combination is transferred, and a comparator unit (12) operable to compare the said combinations and to activate the said apparatus (1) by means of the said device (15).

4. A lock according to Claim 3, characterised by the fact that one of the said push buttons (5) of the keyboard (4) is pre-arranged for zeroing the said second register (11).

5. A lock according to Claim 3 and/or Claim 4, characterised by the fact that it includes a member (13) controlled by means of the said processor unit (7) for zeroing the said first register (8).

6. A lock according to Claim 2, characterised by the fact that it includes two first terminals (31) on which a first of the said push buttons (5) relating to the first number of the said combination to be selected acts, one of which terminal is connected to a positive pole and the other to a timer (33) and to the first of a plurality of electrical blocks (41) those of which involved in the said combination to be selected have one of the said push buttons (5) which if pressed is able to connect the said one block (41) to the successive unit; the last of the said blocks (41) involved in the said combination being connected to the said electrical device (15).

7. A lock according to Claim 6, characterised by the fact that the said one of the push buttons (5) which is pre-arranged for zeroing the said combination to be selected is connected in parallel with the said timer (33).

8. A lock according to Claim 7, characterised by the fact that the said push buttons (5) not involved in the said combination to be selected and therefore not installed in the said blocks (41) are connected in parallel with the said timer (33).

9. A lock according to at least one of Claims from 6 to 8, characterised by the fact that each of the said blocks (41) has a switch (46) operable to put the said block (41) into communication with the successive unit or with the said device (15); only the last of the said blocks (41) involved in the said combination to be selected having its said switch (46) connecting it to the said device (15).

10. A lock according to Claim 9, characterised by the fact that each of the said blocks (41) has two second terminals (42) on which one of the said push buttons (5) act and one of which is connected to a terminal (42) of the said switch (46) of the preceding said block (41) and the other of which is connected to the control-electrode of a rectifier (43) the anode of which is connected, via an amplifier (35) to the second of the said first terminals (31), and the cathode of which is connected to a common terminal of the said switch (46).

11. A lock according to Claim 10, characterised by the fact that between the said switches (46) and the said device (15) there is installed an NPN transistor (52) with its base connected to the said switch (46), its emitter connected to an electrical reference mass (38), and its collector connected to the said device (15).

12. A lock according to any of Claims from 2 to 11, characterised by the fact that the said electrical device includes a bistable relay (15) which, when it receives an electrical impulse in use, is able to change the state of the switch (20) installed in the supply line to the said apparatus (1).

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13. A lock according to any of Claims from 2 to 12, characterised by the fact that it includes second apparatus (17) for controlling a steering lock member; the said second apparatus (17) being connected in parallel with the said first apparatus (1).

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14. A lock according to any of Claims from 2 to 13, characterised by the fact that it includes a starter motor (18) and an electrical system (21) responsible for all of the illumination circuits typical of the said vehicle; the said starter motor (18) and the said lighting system (21) being respectively connected in parallel to the said first apparatus (1).

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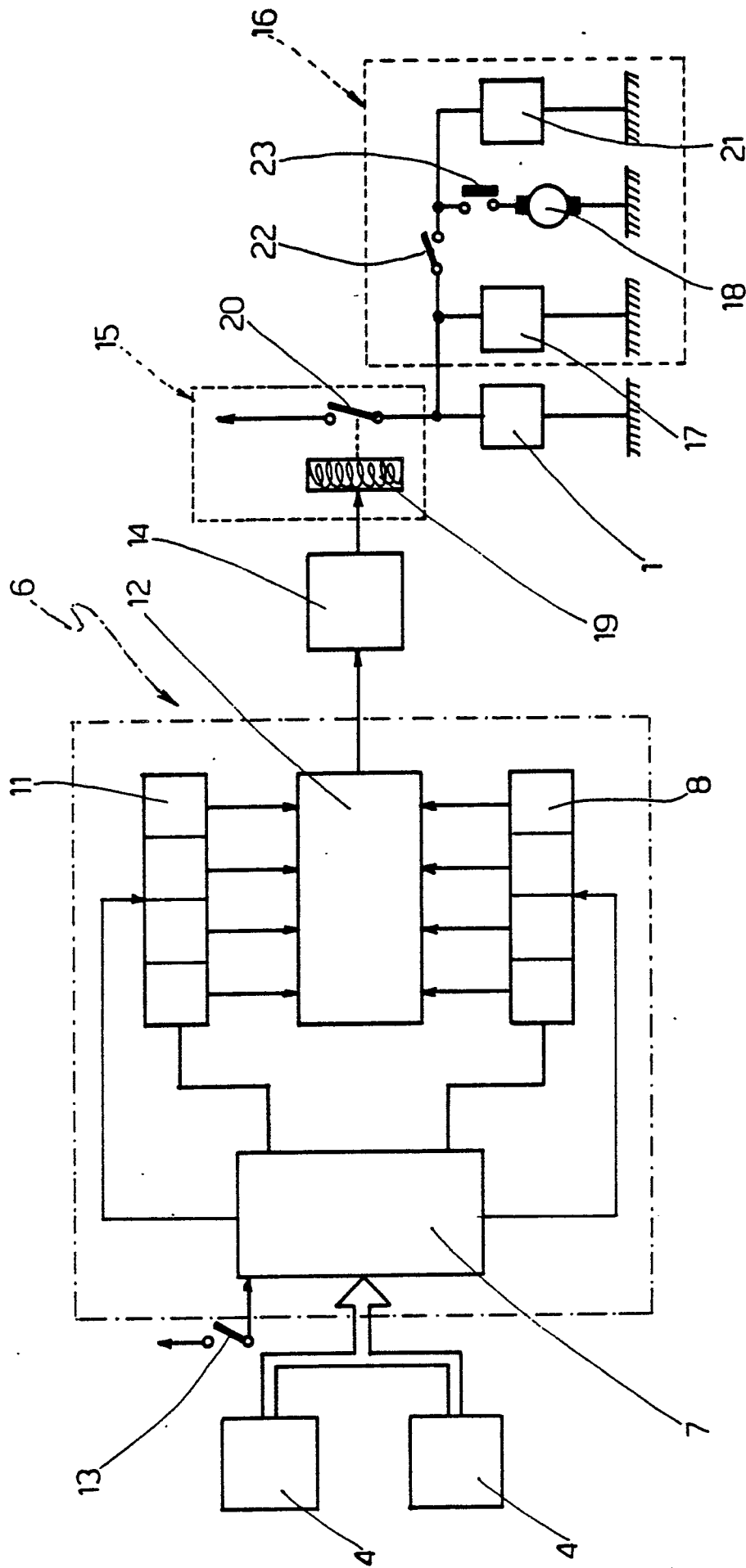


Fig.1

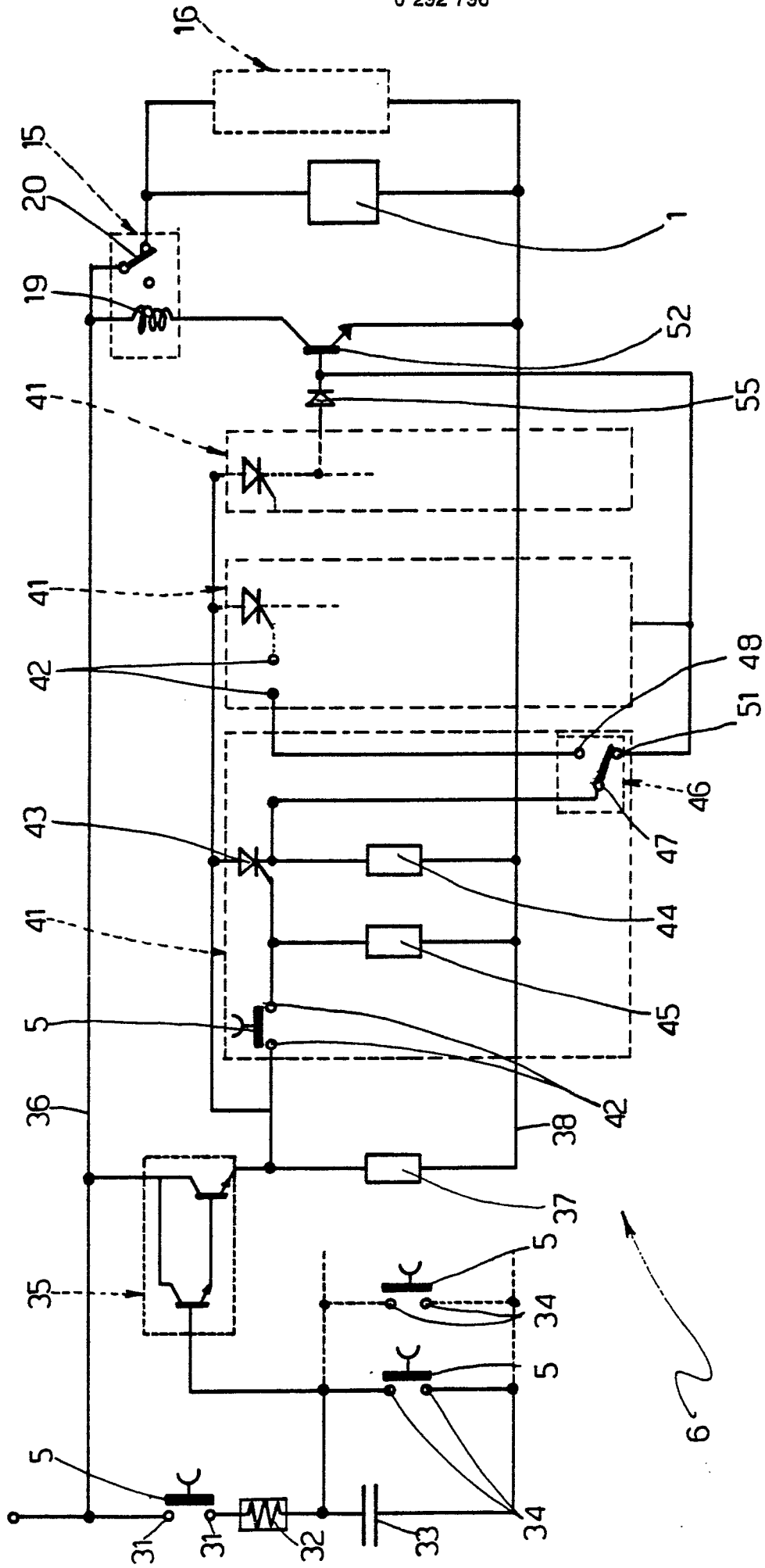


Fig.2

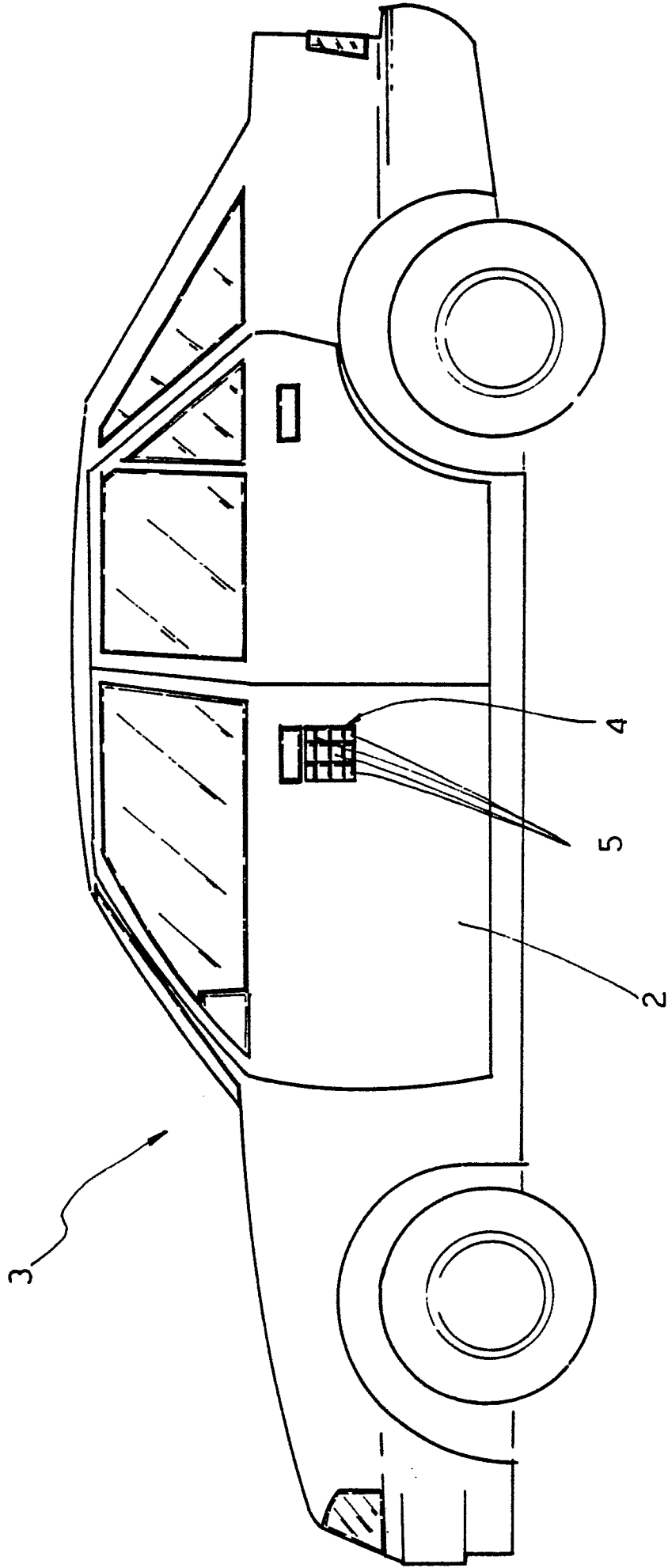


Fig.3