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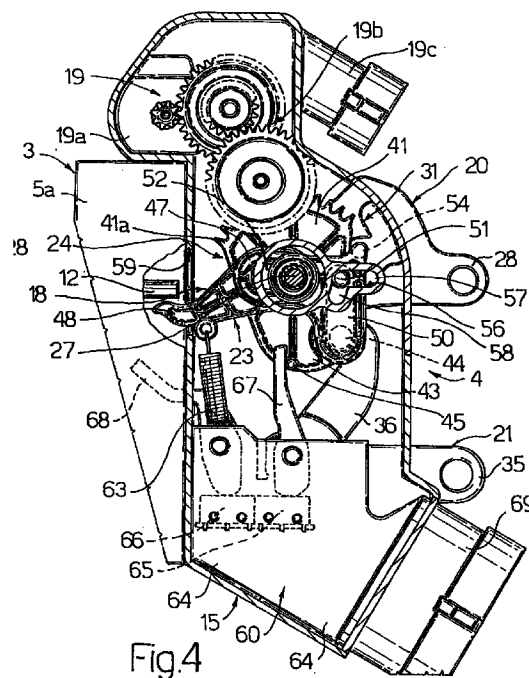
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(54) **Vehicle door lock**

(57) Lock (1) for a vehicle door (2) comprising a locking mechanism (5), an operating device (18) capable of interacting with the locking mechanism (5) and a single electric actuator (19); the operating device (18) comprises a release lever (23) capable of moving from a first position to a second position to cause the release of the locking mechanism (5) and from the first position to a third position to inhibit the release thereof, following respective operations of the electric actuator (19).



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Description

[0001] This invention relates to a lock for a door of a motor vehicle, and more particularly to an electrically operated lock for a motor vehicle and to a method of control of the lock itself.

[0002] As is well known, conventional locks comprise a locking device, a mechanical operating device capable of being connected to the manual control components associated with the door, such as the exterior handle, the interior handle and the knob for switching on the security function, and capable of interacting with the locking device to control or inhibit its release, and an electrically operated actuating device for switching the security function on and off.

[0003] Locks are also known in which there is a second electric actuator to control the release of the lock itself. These locks are however very complex and expensive, both because of the additional costs introduced by the second actuator and because of the large number of mechanical components of which they are made up.

[0004] The object of this invention is to produce an electrically operated lock which does not have the disadvantages of the known locks specified above, which in particular allows release by means of an electric operation but which is relatively simple and inexpensive.

[0005] The object outlined above is achieved by this invention in that it relates to an electric lock according to claim 1.

[0006] For greater understanding of this invention, a preferred embodiment is described below simply as a non-exhaustive example and with reference to the attached diagrams in which:

figure 1 is a front elevation view of a lock for a motor vehicle produced according to this invention;
figure 2 illustrates schematically a front door of a motor vehicle fitted with the lock of the invention and a control system for the lock itself;
figures 3, 4 and 5 are views in side elevation and in part section of the lock in figure 1;
figure 6 is a perspective view with parts removed for clarity of an operating device for the lock in figure 1;
figure 7 is a perspective view of the lock in figure 1 broken down into its component parts; and
figure 8 is a logic block diagram illustrating the operation of the control system in figure 2.

[0007] With reference to figure 1, a lock for a front door 2 (figure 2) of a motor vehicle is given the overall reference 1. The lock 1 comprises essentially a locking unit 3 and an operating unit 4 which are assembled together to form a single body.

[0008] The locking unit 3 comprises a locking mechanism 5 housed in a casing 5a. More particularly, the locking mechanism 5 comprises a fork 6 that can rotate around its own axis 7 and capable of interacting with a

striker 8 secured to an upright of the door 2 (not illustrated) and a check 9 that can rotate around an axis 10. The fork 6, in a known manner, can move between a release position (not illustrated) in which it permits the entry of the striker 8 into its own seat 13, and a locking position (illustrated in figure 1) in which it locks the striker 8 inside the seat 13; the fork 6 is pushed towards its own release position by a spring which is not illustrated. The check 9 is capable of co-operating with the fork 6 to lock it in the position of engagement with the striker 8 and is subjected to a load in the direction of the fork 6 itself by a spring which is not illustrated. The check 9 carries integrally an operating pin 12 (figures 3-5) parallel to the axis 10 and capable of interacting with the operating unit 4, as described below, to receive release forces from it.

[0009] The operating unit 4, illustrated in greater detail in figures 3 to 7, comprises essentially an external casing 15 constituted by a body 16 and a cover 17 (figure 7), and an operating device 18 housed inside the casing 15.

[0010] This device comprises essentially a geared motor 19 for the electric operation of the lock 1, a pair of levers 20, 21 for emergency manual operation of the lock itself, respectively from inside and outside the door 2, a release lever 23 capable of interacting with the locking mechanism 5, and a transmission lever 24 capable of transmitting the operations from the geared motor 19 to the release lever 23.

[0011] The geared motor 19 comprises an electric motor 19a housed in the body 16 of the casing 15, and a multi-stage gear reduction unit 19b, fitted with an output toothed wheel 42 (figure 7). The geared motor 19 is also fitted with an electrical connector 19c, the insulating casing of which is obtained in one piece with the casing 15.

[0012] The interior operating lever 20 has an end 26 (figure 7) hinged to a pivot 27 with axis A carried by the casing 15 of the operating unit 4 and protrudes from the casing 15 itself via an opening 25 in the same with its own opposite end 28 capable of being connected in use to an interior handle 29 of the door 2 by means of a tie-rod 30 (figure 2).

[0013] The lever 20 also has a substantially S-shaped slot 31 (figures 5 and 6), comprising an intermediate portion 32 which is substantially radial and two portions 33a, 33b circumferential in relation to the pivot 27, arranged as radii respectively smaller and larger than the pivot itself and extending from opposite ends in relation to the intermediate portion 32. In particular, with reference to figures 3, 4 and 5, the portions 33a and 33b extend respectively clockwise and anti-clockwise in relation to the intermediate portion 32. The intermediate portion 32 defines a shoulder 32a facing the portion 33a.

[0014] The lever 20 is subjected to a load by a spring 20a (figure 7) which holds it in the rest position in figures 3, 4 and 5, in which it co-operates against a ridge 25a

defined by one end of the opening 25.

[0015] The transmission lever 24 is hinged to the pivot 27 and comprises a first arm 41 fitted with a toothed sector 41a which engages with the output wheel 42 (figure 7) of the gear reduction unit 19b and a second arm 43 opposite the first arm 41, from which extend, in parallel with the axes A and B and towards the cover 17 of the casing 15, a transmission pivot 44 and a pin 45. The transmission lever 24 also comprises a pivot 46 which extends from an opposite face of the second arm 43 (that is, towards the body 16).

[0016] The exterior operating lever 21 is hinged to a second pivot 34 (figure 7) with axis B parallel to the axis A, and is substantially L-shaped, defined by a first arm 35 and by a second arm 36 which are substantially radial in relation to the second pivot 34.

[0017] The first arm 35 protrudes from the casing 15 through an opening 39 in the same and is capable of being connected, in use, to a key block 37 of the door 2 of the motor vehicle by means of a tie-rod 38 (figure 2).

[0018] The second arm 36 is capable of interacting with the pivot 46 of the transmission lever 24.

[0019] The lever 21 is held by a spring 21a (figure 7) in the rest position illustrated in figures 3, 4 and 5, in which the arm 35 strikes against a stop 39a defined by one end of the opening 39.

[0020] The release lever 23 comprises an intermediate portion 47, an appendix 48 extending as a projection from one end of the portion 47 and constituting the output member of the operating unit 4, and an arm 50 extending transversely from an opposite end of the portion 47, from which a guide pin 51 extends towards the cover 17 of the casing 15.

[0021] The portion 47 has a longitudinal slot 52, which is aligned with the pin 51 and is engaged, so as to slide, with the pivot 27. The arm 50 has a groove 53, which is longitudinal in relation to the arm itself (that is, substantially orthogonal to the slot 52) and is engaged, so as to slide, with the pivot 44 of the transmission lever 24; from the arm 50 there also extends, in proximity to the pin 51 but on the opposite side of the arm itself, a second pin 54 which engages with the S-shaped slot 31 of the interior operating lever 20.

[0022] The pin 51 engages, so as to slide, with a guide 56 which is produced integrally in the cover 17. More particularly, the guide 56 has an L-shaped travel and comprises a radial section 57 and a circumferential section 58 extending from one end of the section 57 turned towards the axis of the pivot 27 (clockwise with reference to figures 3, 4 and 5).

[0023] The appendix 48 is capable of protruding from the casing 15, as will be described in more detail below, through a side opening 59 in the same, so as to interact with the operating pin 12 of the check 9 (figures 4 and 5).

[0024] The release lever 23 is held in an angular rest position (figures 3 and 4), in which the pin 51 co-operates with one edge of the radial section 57 of the guide

56, by a traction spring 63 interposed between the appendix 48 and the casing 15.

[0025] The operating unit 4 has a signalling module 60 which comprises a plastic body 64 housing a plurality of microswitches 65, 66 for the detection of the position of the members of the lock.

[0026] In particular, the microswitch 65 is associated with a control lever 67 capable of being intercepted by the pin 45 of the transmission lever 24 so as to change the switch itself to an intermediate position (figure 4) on the angular travel of the lever 24 corresponding to the condition of enabling release, as will be described in more detail below.

[0027] The microswitch 66 is associated with a second control lever 68, which protrudes from the casing 15 of the operating unit 4 to interact with the fork 6 and detect its position so as to change the microswitch 66 close to the complete locking position of the fork.

[0028] The signalling module 60 also comprises an electrical connector 69 for connection to the electrical system of the vehicle, the insulating casing of which is made integrally with the body 64 of the module 60 itself.

[0029] Figure 2 illustrates a control system 70 for the lock 1.

[0030] The system 70 comprises essentially an electronic control unit 71, for example with a microprocessor, which receives a plurality of input signals of a logical type from elements which detect the operating state of the lock 1 and operating parameters of the vehicle related thereto. This unit 71 is capable of generating an output signal c1 which controls the electric motor 19a.

[0031] In particular, the control unit 71 receives a signal s1 from a microswitch 74 associated with the interior handle 29 of the door 2 assuming a high logical level (s1 equal to 1) when the handle 29 is operated, a second signal s2 from a push-button 76 for releasing the lock 1 from outside the door 2 assuming a high logical level (s2 equal to 1) when the push-button 76 is operated, a third signal s3 from a push-button 77 positioned inside the passenger compartment and capable of switching the security function on/off, a signal s4 from an inertia switch 78 assuming a high logical level (s4 equal to 1) in the event of an impact, a signal s5 from a microswitch 79 which can be operated by means of the key block 37 and a signal s6 from an on-board receiver 80 associated with a remote control 81 capable of switching the security and dead lock functions on/off, a signal s7 from the microswitch 66 of the signalling module 60 capable of assuming a high logical level (s7 equal to 1) when the fork 6 is not in the locking position, a signal s8 from the microswitch 65 of the signalling module 60, the value of which changes in relation to the intermediate position in figure 4 of the transmission lever 24, and a signal s9 from a speed sensor 72 assuming a high logical level (s9 equal to 1) when the vehicle is in motion.

[0032] The control unit 71 is also capable of generating output signals c2, c3 for the control, respectively, of

a door-open indicator light 84 and an audible warning signal 85.

[0033] The operation of the lock 1 is as follows.

[0034] Under normal operating conditions, the operation of the lock 1 is purely electrical. The levers 20, 21 for manual operation from inside and from outside are used only in emergency conditions, as will be explained in more detail below, or in the event of an electrical system failure.

[0035] The "security" function, that is, the function which inhibits release of the door 2 from outside the vehicle, is carried out electronically, and corresponds to the inhibition of the operation of the electric motor 19a in response to the operation of the push-button 76 for release from outside, using the control unit 71, when this function is activated.

[0036] The operation is described starting from the operating position in figure 3, in which the lock 1 is locked and the dead lock function, that is, the function which also inhibits release from inside, is activated.

[0037] In this state, the transmission lever 24 is in its own end-of-travel position (anticlockwise with reference to figure 3) against a mechanical stop (not illustrated) defined by the casing 15.

[0038] The pivot 44 of the lever 24 occupies the upper end of the groove 53 of the release lever 23 and holds the latter in a retracted or inhibited position in which the appendix 48 does not project inside the locking unit 3 and therefore cannot operate the check 9.

[0039] Figure 4 illustrates the "dead lock off" position of the operating unit 4. In this operating state, the transmission lever 24 is in an intermediate angular position, coincident with the position of changing the microswitch 65 by the effect of the interaction between the pin 45 of the lever 24 and the lever 67 associated with the microswitch itself.

[0040] The rotation of the transmission lever 24 from the position in figure 3 to that in figure 4 results in longitudinal sliding of the release lever 23 guided by the sliding coupling of the fixed pivot 27 and the pivot 51 of the lever 23, respectively, with the slot 52 of the lever 23 itself and with the radial portion 57 of the guide 56.

[0041] This sliding results initially in the protrusion of the appendix 48 through the opening 49 and thus enables the appendix itself to interact with the operating pin 12 of the check 9. Secondly, this sliding brings the pivot 51 of the lever 23 in correspondence with the circumferential portion 58 of the guide 56, thus enabling the rotation of the lever 23 itself around the fixed pivot 27 which is necessary for the release of the lock 1, as will be described below. Finally, the pin 51 of the lever 23 positions itself in correspondence with the portion 33a of the slot 31 in such a way as to enable the transmission of the operations of the lever 20 to the release lever 23.

[0042] The electrically operated release of the lock 1 is obtained by means of further rotation of the transmission lever 24 (clockwise with reference to figure 4) using the geared motor 19; this rotation is transmitted from the

pivot 46 of the lever 24 to the release lever 23, which in turn rotates around the pivot 27, against the action of the spring 63, causing the lifting of the pin 12 of the check 9 by means of the appendix 48 (in the same way as is illustrated in figure 5). The fork 6 (figure 1) is thus free to click into the release position, releasing the striker 8.

[0043] On completion of the operation of the geared motor 19, suitably timed, the release lever 23 and the transmission lever 24 return to the position in figure 4 through the return action of the spring 63.

[0044] From the position in figure 4, the geared motor 19 can be operated in the opposite direction to return the lock 1 to the "on" position of the dead lock function illustrated in figure 3.

[0045] The operating unit 4 is capable of permitting emergency manual manoeuvres in the event of failure of the electrical system or of the motor 19a. These manual operations are described in detail below.

[0046] In the position in figure 3 (dead lock function on), manual release from outside using a key is possible, but release from inside is inhibited. This is to prevent opening of the door 2 in the event of access by means of breaking the window of the door itself.

[0047] To prevent mechanical overloads of the members of the operating unit 4, in this position the interior operating lever 20 is idle. In fact, if it is operated by the relative tie-rod 30, the lever 20 rotates clockwise without interacting with the release lever 23, the pin 54 being able to slide into the portion 33b of the slot 31.

[0048] Emergency mechanical release from outside, using a key, can be obtained by turning the key to an excess travel position (that is, to a greater angle than that necessary for operation of the microswitch 79). In this way the tie-rod 38 is operated (lifted), and this rotates the lever 21. The latter interacts by means of its own arm 36 against the pivot 46 (figures 3 and 6) of the transmission lever 24 and produces a rotation of the lever 24 itself, initially in the position in figure 4, in which the lever 23 protrudes and is able to interact with the pin 12 of the check 9, and then in the release position in figure 5. To carry out emergency manual operation, it is necessary to drive the geared motor 19 and overcome the reaction of the spring 63 during the angular travel of release of the lever 23.

[0049] In the position in figure 4 (dead lock function off), manual release from outside using a key, as described above, is possible, as is manual release from inside the door 2 by means of the handle 29, for which a first section of travel is suitably provided, during which the microswitch 74 is operated for the activation of the electrically operated release but there is no effect on the tie-rod 30, and a second section or excess travel during which the tie-rod 30 is operated and rotates the lever 20 (clockwise with reference to figure 5).

[0050] The lever 20 (figure 5) co-operates with the pin 54 of the release lever 23 by means of the shoulder 32a of the slot 32, and causes it to rotate as described with

reference to electrically operated release.

[0051] The kinematic functioning of the operating unit 4 of the lock 1 having been explained, the functioning of the related control system 70 illustrated in figure 2 is described below with particular reference to the block diagram of figure 8 which illustrates the control programme which is executed in a cycle by the control unit 71. It is necessary to state that the control system 70 has been illustrated for simplicity with reference to a single front door 2 of the vehicle; the way in which the control unit 71 is connected to all the doors of the vehicle, and if appropriate to the tailgate, for "centralised" execution of the functions of release, switching the security function on/off, and switching the dead lock function on/off is, however, obvious.

[0052] From a start-of-cycle block 90, there is progression to a successive block 91 for verification of the locking of the door 2; if the signal s7 is equal to 1 (fork 6 not closed) there is a return to the beginning of the cycle, otherwise there is a progression to a successive block 92 in which it is verified whether or not the security function on/off push-button 77 has been operated. If it has been operated, there is a progression to a block 93 for the verification of the state of the signal s8 (microswitch 65). If the signal s8 assumes a low logical level (s8 equal to 0), which corresponds to the position in figure 3 of the operating unit 4 (dead lock on), the operation of the push-button 77 has no effect and the cycle progresses to a further block 94 for verification of the state of the signal s4 of the inertia switch 78. If s8 assumes a high logical level (s8 equal to 1, dead lock off), a block 95 is reached for the verification of a logic state indicator ("flag") f which is made equal to 1 if the security function is switched on and equal to 0 if the security function is switched off, as will be described below. If f is equal to 0, a block 96 is reached for switching on the security function, in which f is made equal to 1, then to a block 97 for activation of a first audible signal, and finally to the end of the cycle. If, however, f is equal to 1 (security function on), there is a progression to a block 98 in which f is made equal to 0 (security function off), then to a block 99 for activation of a second audible signal, and then to the end of the cycle. In practice, the push-button 77 switches on the security function if it is switched off and vice versa.

[0053] If at the block 94 a high logical level of the signal s4 (s4 equal to 1) is detected, there is a progression to a block 103 for verification of the state of s8, perfectly analogous to the block 93 described above. If s8 is equal to 0 (dead lock on), there is a progression to a block 104 which controls the rotation of the motor 19 in order to switch off the dead lock, then to a block 105 which waits until the signal s8 is equal to 1 (dead lock off), and then to the block 98 for switching off the security function. If at the block 103 the dead lock is detected to be switched off (s8 not 0), there is a progression to a block 106 for verification of the state of the indicator f. If f is equal to 1 (security function on) there is a progres-

sion to the above-mentioned block 98 for switching off the security function, if f is equal to 0 there is a progression to a new block 107, in which the state of s5 (possible operation of the key) is verified. If s5 assumes a high logical level (s5 equal to 1), there is a progression to a block 108 for verification of the state of s8, perfectly analogous to the block 103. If s8 is equal to 0 (dead lock on), there is a progression to the previously described block 104 which controls the rotation of the motor 19a for switching off the dead lock; if, on the other hand, s8 is equal to 1 (dead lock off), there is a progression to a new block 109 for verification of the state of the indicator f. If f is equal to 1 (security function on) there is a progression to the block 98 for switching off the security function, if f is equal to 0 a block 110 is reached which compares the key operation time t_c with a threshold value t_s , for example equal to 1 second.

[0054] If t_c is less than t_s , there is a progression to the block 96 for switching on the security function. If, on the other hand, t_c is greater than t_s , that is, operation of the key is maintained for a certain time, there is a progression to a block 114 for switching on the security function, and then to a block 115 which controls the operation of the motor 19 for the switching on the dead lock. The operation of the motor is timed by a successive block 116, from which a block 117 is reached for activation of a third audible signal, and then to the end of the cycle.

[0055] If the signal s5 at the block 107 is not 1, there is a progression to a block 118 for verification of the possible operation of the remote control. The logic for management of the operation of the remote control 81 is perfectly analogous to that of key operation, as illustrated by the blocks 119, 120, 121 which correspond, mutatis mutandis, to the blocks 109, 109 and 110 described above. In particular, if the dead lock was switched on, its switching off is commanded (block 119); if the security function was switched on, its switching off is commanded (block 120); if the dead lock and the security function are switched off, activation of the remote control for a brief time t_i switches on the security function, for a long time also switches on the dead lock (block 121).

[0056] From the negative output from the block 119, a block 125 is reached which verifies the state of the signal s1 (possible operation of the interior handle 29). If s1 is equal to 1, that is, the handle 29 is operated, there is a progression to a block 126 for verification of the state of the signal s8 (switching on the dead lock). If the dead lock is switched on (s8 equal to 0), there is a progression to the end of the cycle, that is, the command via the handle 29 is ignored. If, on the other hand, the dead lock is switched off, there is a progression to a block 127 which verifies the state of the indicator f. If f is equal to 1 (security function on), there is a progression to a block 129 which switches it off, then to a block 129 which activates the corresponding audible signal, and finally to a block 130 which verifies the state of the signal s9 generated by the speed sensor 72. If this signal

is equal to 1 (vehicle in motion), the end of the cycle is reached and operation of the handle 29 is ignored. If, on the other hand, the signal s9 indicates that the vehicle is stationary (s9 not 1), a block 131 is reached for activation of the motor 129 for execution of the release travel of the lock 1. If at the block 127 the security function is detected to be switched off, the block 130 is reached directly.

[0057] In practice, electrical release (and possible switching off of the security function, if switched on) is obtained by operating the interior handle 29 only if the dead lock is switched off and if the vehicle is stationary. If these two conditions are not verified, the command is ignored.

[0058] If at the block 125 a high logical level of the signal s1 is not detected, a block 132 is reached in which there is detection of whether the signal s2 is at a high logical level (operation of the push-button 76 for release of the lock 1 from outside the door). If the signal s2 is not equal to 1, the end of the cycle is reached.

[0059] If, on the other hand, s2 is equal to 1 there is a progression to a further block 133 for verification of the state of the indicator f. If f is equal to 1 (security function on), the operation of the push-button 76 is ignored and the end of the cycle is reached; if, on the other hand, f is equal to 0, the block 131 for control of release is reached.

[0060] Electrically operated release from outside is, therefore, only enabled if the security function is switched off (which condition implies that the dead lock is also switched off).

[0061] The control of the locks associated with the rear doors of the vehicle (not illustrated) is identical to that described above with reference to the lock 1 of a front door 2. With reference to the rear doors, the additional "child lock" function is conveniently provided, that is, inhibition of opening from inside the rear doors only.

[0062] This function is performed electronically and consists substantially of the possibility of switching on the dead lock in a non-centralised way, limited to the rear doors. The function can be activated and deactivated by means of a push-button 140 positioned inside the passenger compartment of the vehicle and conveniently provided with a signalling device 141, for example with LEDs, for the display of the status of the function itself (active/deactivated).

[0063] At the time of activation of the function, the dead lock is switched on for the rear doors only; release from inside is therefore inhibited as described above with reference to figure 3. When the exterior release push-button is operated, the motor 19a rotates and brings the release lever 23 from the position in figure 3 to the position in figure 5, first switching off the dead lock and then releasing the lock.

[0064] Conveniently, if the "child lock" function is activated, the dead lock is reactivated automatically, as soon as the rear doors are closed manually, in response to the change of the corresponding signal s7.

[0065] Finally, while the vehicle is in motion, in the event of activation of the inertia switch 78 the function is deactivated automatically, thus enabling the door to be opened from inside the vehicle.

[0066] An examination of the characteristics of the lock 1 produced according to this invention demonstrates the advantages which it makes it possible to obtain.

[0067] In particular, although the lock 1 has only one actuator and is mechanically very simple and compact, it enables advanced functions to be carried out (release, switching on/off of the dead lock) without introducing additional costs in comparison with conventional locks.

[0068] Finally, it is clear that modifications and variations can be made to the lock 1 described which do not go beyond the scope of protection of the claims.

Claims

1. Lock (1) for a door (2) of a vehicle, of the type comprising a locking mechanism (5), an operating device (18) capable of interacting with the said locking mechanism (5) and an electric actuator (19), the said locking mechanism (5) comprising a coupling element (6) capable of co-operating with a striker (18) and capable of moving between a release position and a locking position in which it is coupled to the striker (18) itself, and a locking element (9) capable of co-operating in a releasable way with the said coupling element (6) in the said locking position of the same to prevent the release thereof, the said operating device (18) comprising an operating member (23) that can move between a first position and a second position along a release travel in which the said operating member (23) interacts with the said locking element (9) to release the said coupling element (6), transmission means (24) interposed between the said electric actuator (19) and the said operating member (23) and capable of moving the said operating member (23) between the said first position and the said second position in response to a first operating travel of the said electric actuator (19), an element (20) for manual control of release from inside and an element (21) for manual control of release from outside capable of moving the said operating member (23) from the said first position to the said second position, characterised by the fact that the said operating member (23) is capable of positioning itself in a third position for inhibition of release in which the said operating member (23) is uncoupled from at least one of the said locking element (9) and the said element (21) for manual control of release from inside, the said transmission means (24) being capable of moving the said operating member (23) between the said first position and the said third position along an enabling/inhibiting travel in response to a second operating travel of the said electric actuator

(19).

2. Lock according to claim 1, characterised by the fact that the said electric actuator (19) comprises an electric motor (19a), the said means of transmission comprising a rotating transmission member (24) operated by the said electric motor (19a) and constrained to the said operating member (23), the said transmission member (24) being capable of rotation between two limiting positions corresponding to the said second position and to the said third position of the said operating component (23), the said lock (1) comprising control means (65) to define an intermediate stop position of the said transmission member (24) corresponding to the said first position of the said operating member (23). 5
3. Lock according to claim 1 or 2, characterised by the fact that the said operating member is constituted by a release lever (23) which has a portion (48) capable of interacting with a control portion (12) of the said locking member (9) along the said release travel, and a portion (50) for coupling with the said transmission member (24). 10 20 25
4. Lock according to claim 3, characterised by the fact that it comprises means of constraint (27, 56) of the said release lever (23) capable of permitting it substantially to rotate between the said first position and the said second position, and substantially to be translated between the said first position and the said third position, the said portion (48) of the said release lever (23) being distanced from it by the said control portion (12) of the said locking member (9) in the said third position of the said release lever (23). 30 35
5. Lock according to claim 3 or 4, characterised by the fact that it comprises elastic return means (63) acting on the said release lever (23) in the said release travel to return the said release lever (23) to the said first position at the end of the said first operating travel of the said electric actuator (19). 40 45
6. Lock according to any one of claims 3 to 5, characterised by the fact that the said manual control means for release from inside comprise a first control lever (20) which can be operated by means of an interior handle (29) of the vehicle door (2) and drive means (54) interposed between the said first control lever (20) and the said release lever (23). 50
7. Lock according to claim 6, characterised by the fact that it comprises uncoupling means (33b) between the said first control lever (20) and the said release lever (23) in the said third position of the said release lever (23). 55
8. Lock according to claim 7, characterised by the fact that the said drive means comprise a pin (54) carried by the release lever and engaging a slot (33) of the said first control lever (20), the said uncoupling means being defined by a circumferential portion (33b) of the said slot (33) which can be engaged with the said pin (54) in the said third position of the said release lever (23).
9. Lock according to any one of claims 3 to 8, characterised by the fact that the said manual control means for release from outside comprise a second control lever (21) which can be operated by means of a key block (37) of the said door (2).
10. Lock according to claim 9, characterised by the fact that the said manual control means for release from outside comprise drive means (46) interposed between the said second control lever (21) and the said transmission member (24).
11. Lock according to claim 10, characterised by the fact that the said electric actuator (19) comprises a gear reduction unit (19b) operated by the said electric motor (19a), the said rotating member consisting of a transmission lever (24) which has a first arm (41) with a toothed sector (41a) engaged with an output wheel of the said gear reduction unit and a second arm (43), the said drive means comprising a pivot (46) carried by the said second arm (43) of the said transmission lever (24) and capable of interacting with an arm (36) of the said second control lever (21).
12. Lock according to claim 11, characterised by the fact that the said control means for defining the said intermediate stop position of the said transmission lever (24) comprise a microswitch (65) capable of being changed by the said transmission lever (24) into the said intermediate position.

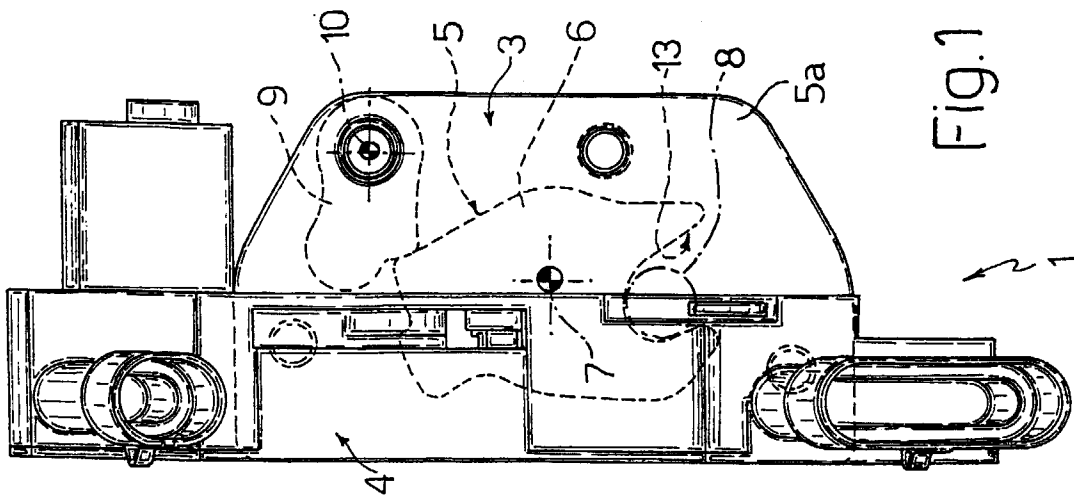


Fig. 1

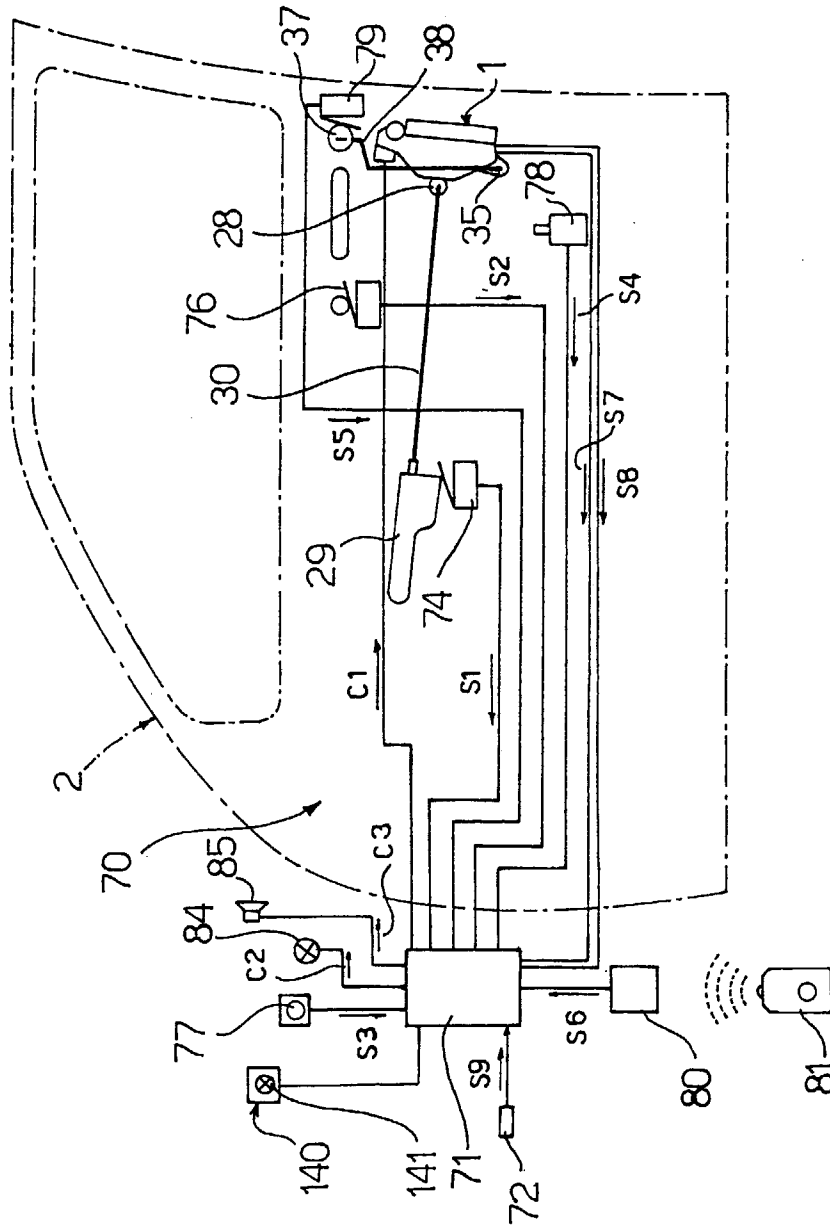
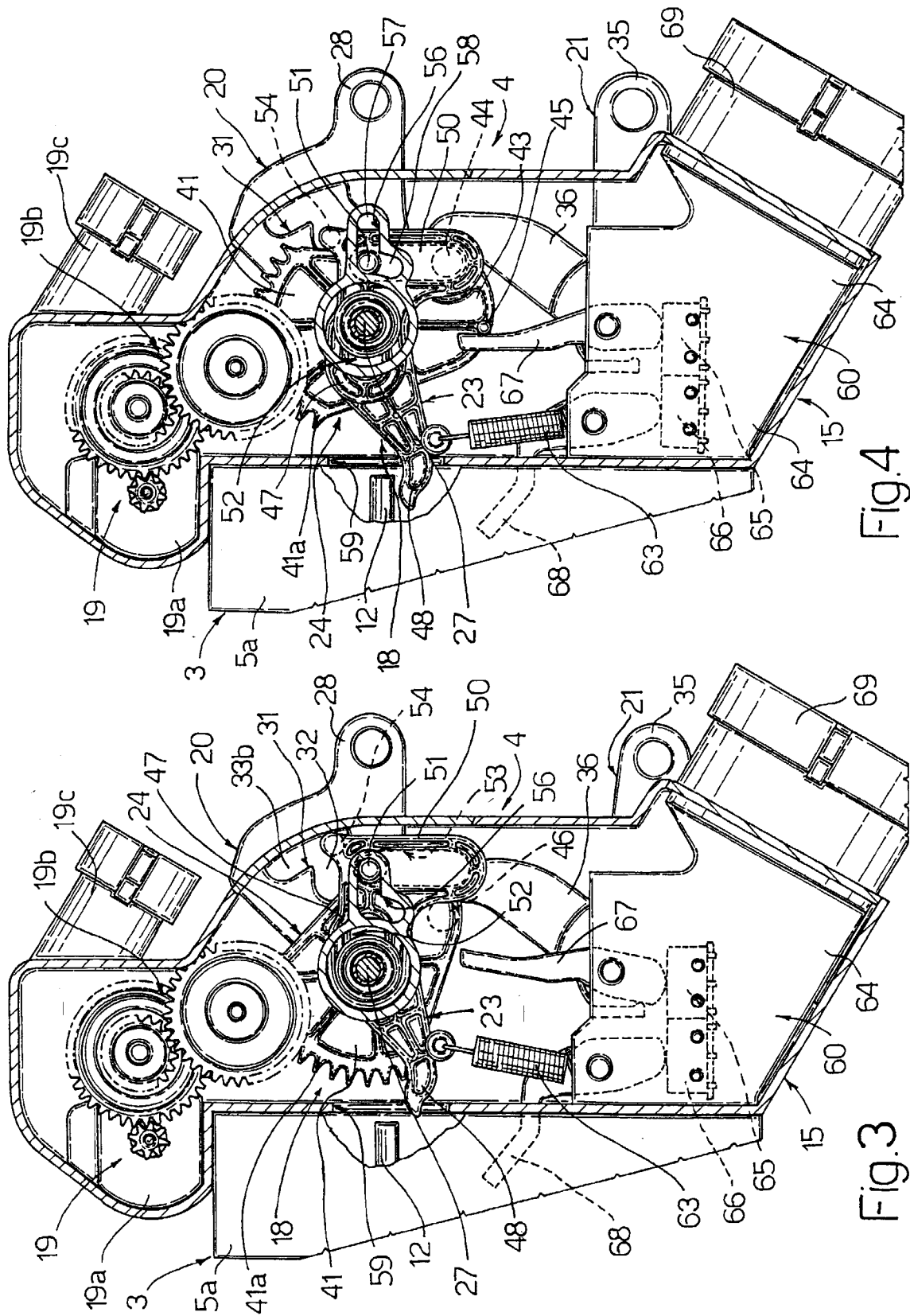


Fig. 2



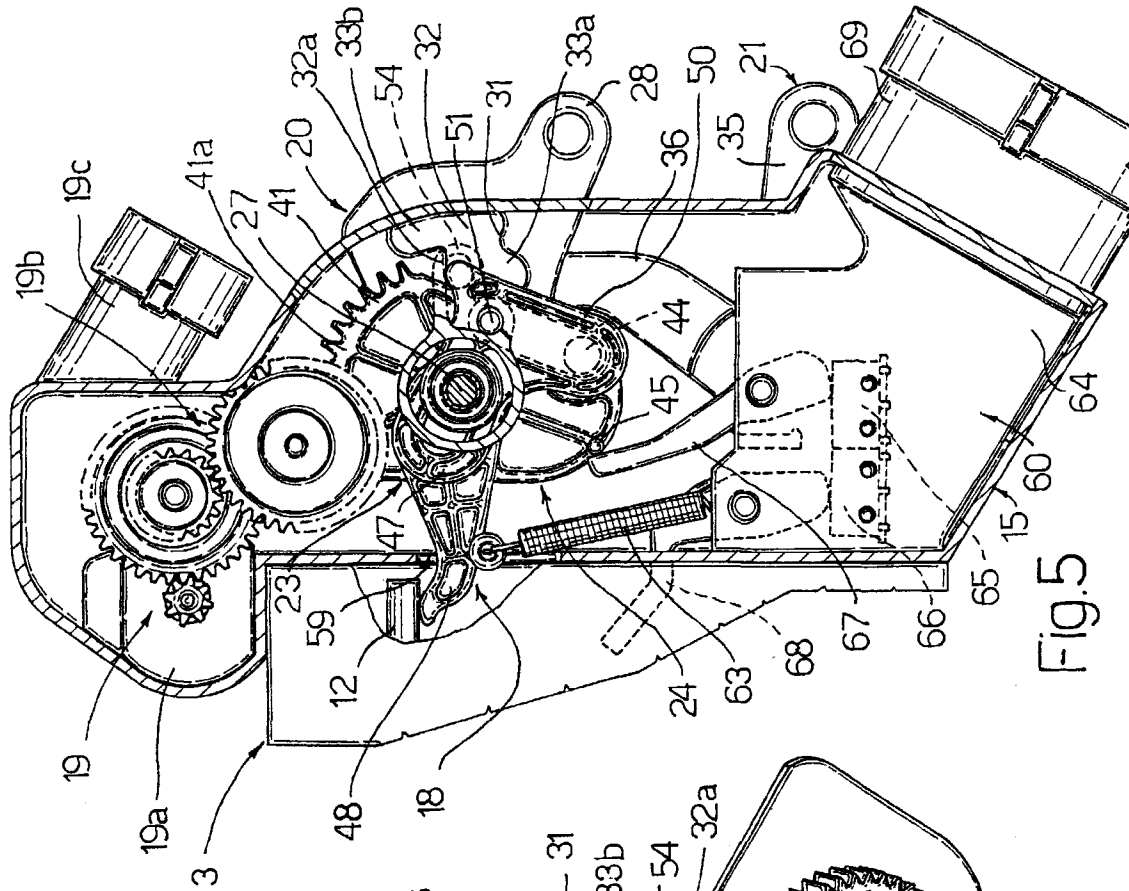


Fig. 5

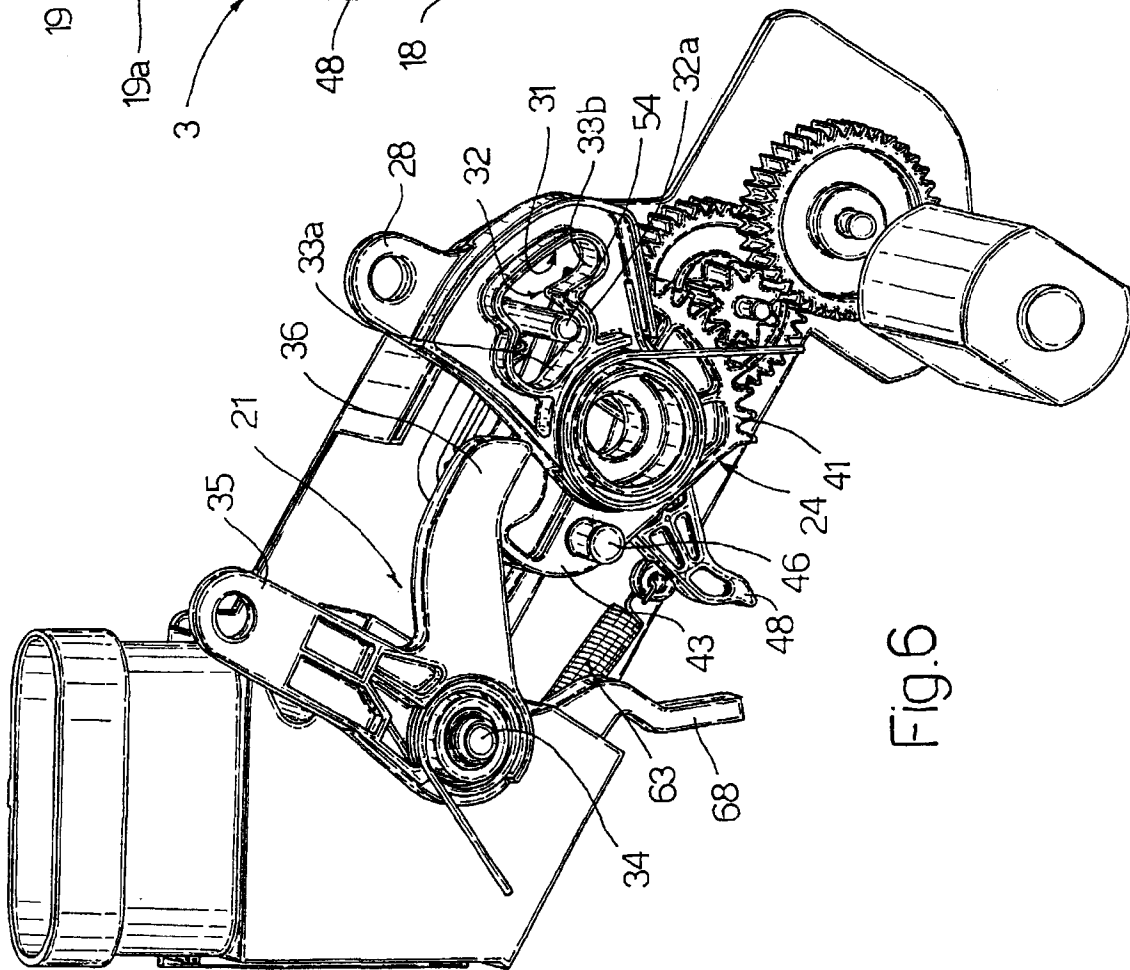


Fig. 6

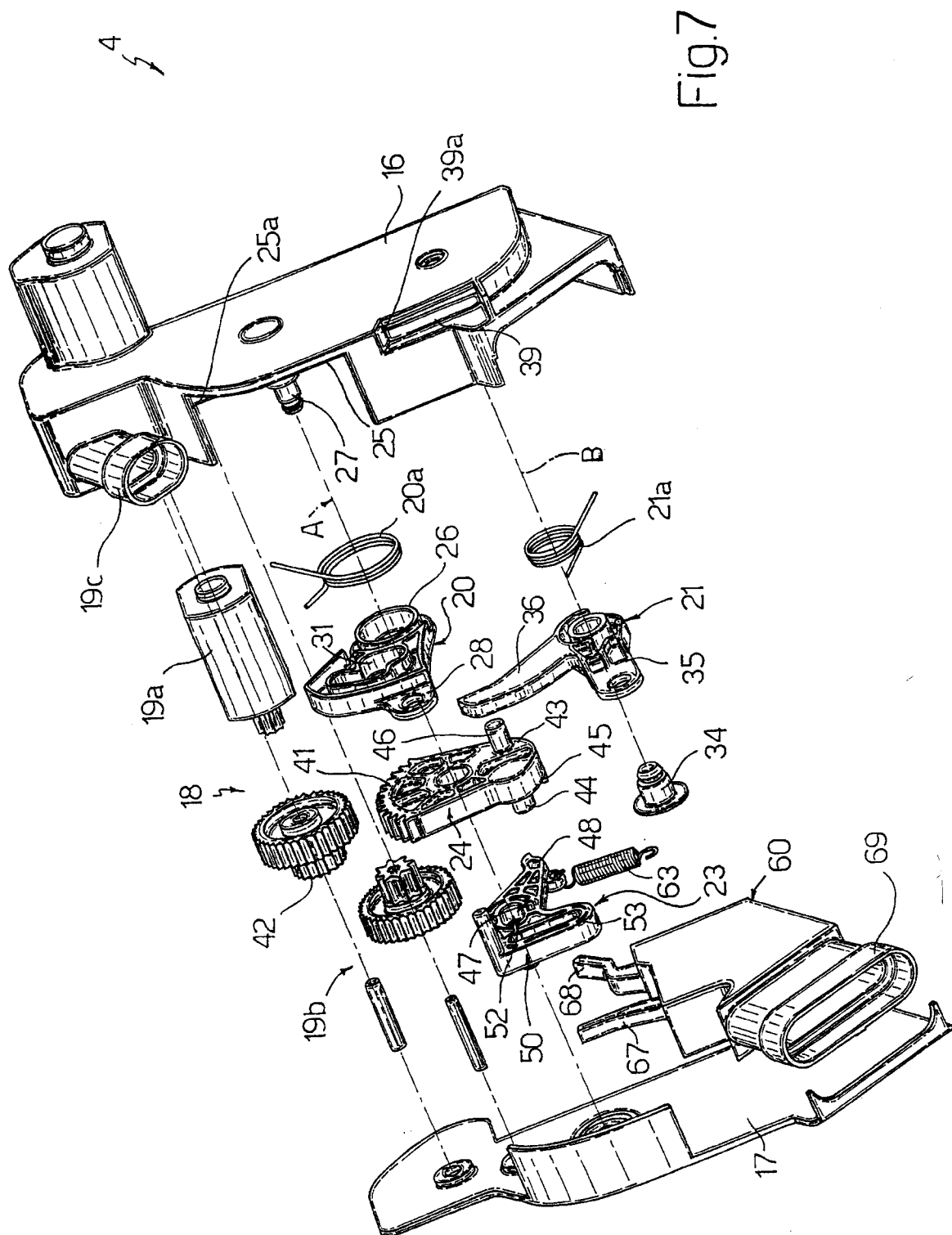


Fig.7

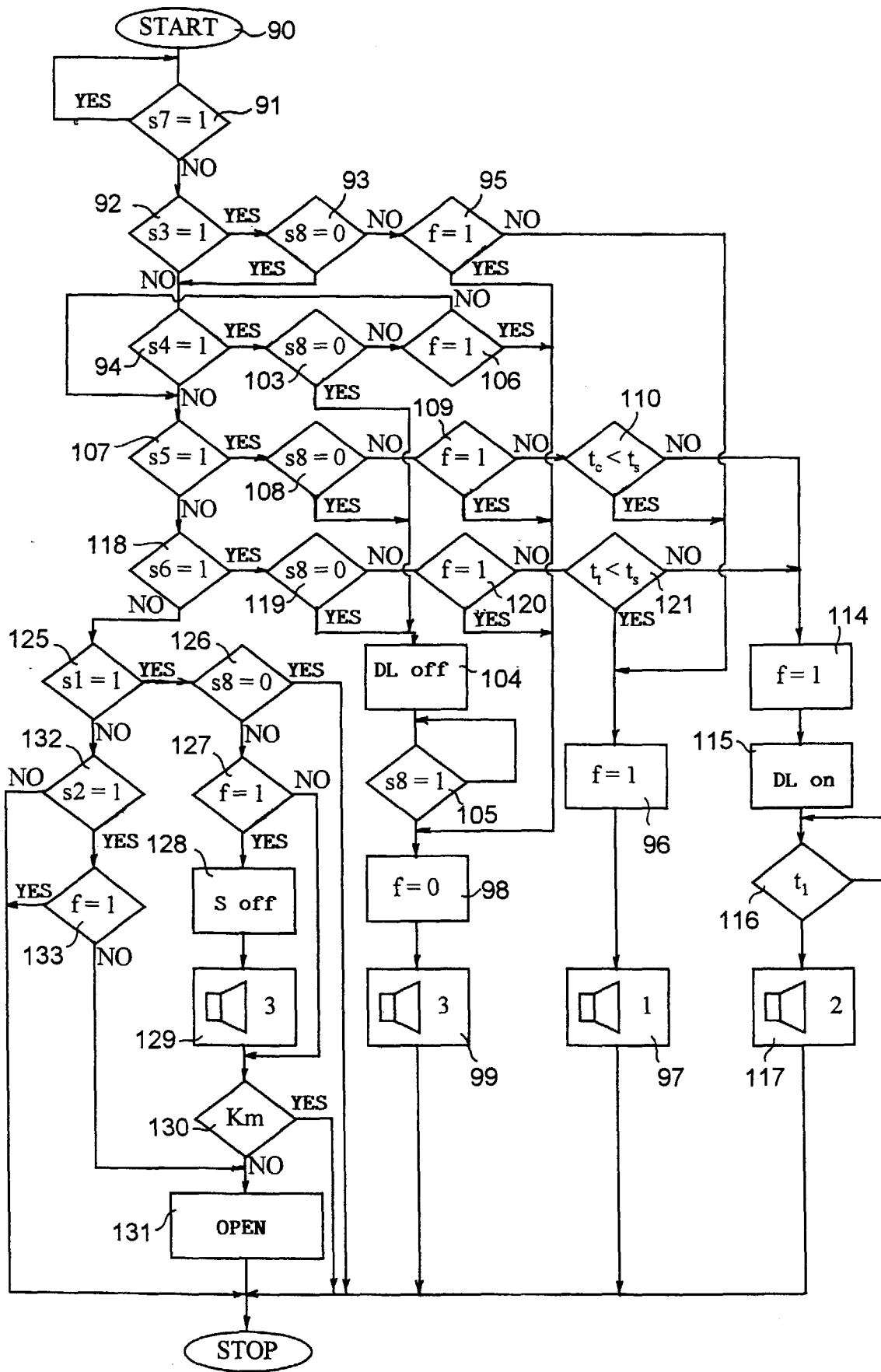


Fig. 8



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EUROPEAN SEARCH REPORT

Application Number
EP 99 10 9703

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Place of search		Date of completion of the search	Examiner
THE HAGUE		9 August 1999	PEREZ MENDEZ, J
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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