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(54) Lock for a vehicle provided with a device deactivating a safety control lever.

(57) Lock (1) for a vehicle comprising a safety control lever (3), movable between a first enable opening position and a second inhibit opening position of said lock (1), and a safety control lever deactivation device (16) to prevent non-authorized operation thereof from inside the vehicle; such a device (16) being carried by lever (3) consisting of two parts (3a,3b), hinged to each other, and comprising engaging means (24,26) controlled by an actuator (20) to rigidly connect or to uncouple said two parts (3a,3b).

FIG. 2

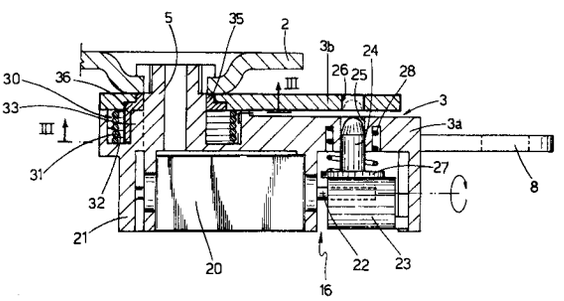
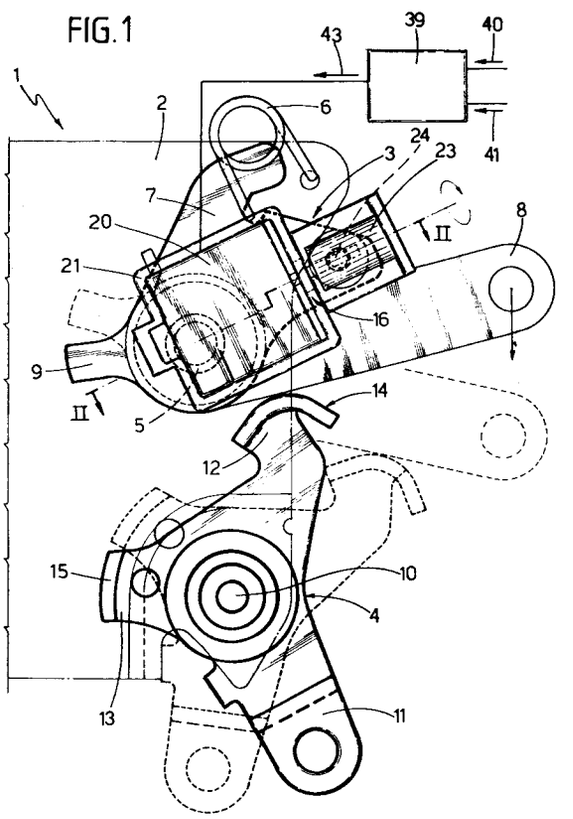


FIG. 1



EP 0 554 913 A1

The present invention relates to a lock for a vehicle provided with a safety control lever deactivation device.

Motor vehicles locks are known to comprise a lever, usually known as safety control lever, movable between a first enable opening position and a second inhibit opening position by means of the outer handle.

The safety control lever may be set in the enable opening position from inside the vehicle by operating an appropriate knob connected thereto and, in most cases, also by operating the inner opening control handle.

Safety lever disconnecting from within the vehicle is a purely mechanical operation and may be carried out by non-authorized persons, as well, who may have had illegitimate access to the inner control members, for example, by smashing one of the vehicle`s windows.

Some types of locks, therefore, have been fitted with a safety lever deactivation device, known in the sector as dead lock, whose aim is that of preventing the safety lever from being disconnected from inside the vehicle in case such a device had not been previously neutralized by "legitimately" opening the lock from outside.

The known deactivation devices are generally incorporated in the doorlocking actuator. For example, the doorlocking actuator motor controls, during a first stage of its stroke, the fastening of the lock and, during a second stage, by means of suitable mechanisms, sets the safety lever on an "idle" position where it may not be manually controlled from within the vehicle. In other instances, the doorlocking actuator comprises two separate motors to control fastening of lock and deactivation of safety lever.

The foregoing entails a few drawbacks.

First of all, the doorlocking actuator is bulky, complex and expensive. Besides, the lock ends up by being complicated, from the mechanical point of view, since specific mechanisms must be provided for to carry out safety lever deactivation. Finally, both doorlocking actuator and lock must be modified with respect to the equivalent version without dead lock, which entails obvious drawbacks from the point of view of production costs.

The aim of the present invention is the embodiment of a lock for a vehicle provided with a safety control lever deactivation device, that may not present such drawbacks as are connected with the known locks and described hereinabove.

Said aim being achieved by the present invention, in that it relates to a lock for a vehicle, of the type comprising a safety control lever that is movable between a first enable opening position and a second inhibit opening position at least through manual control means from outside said vehicle, said safety control lever presenting connecting means to manual control means from inside said vehicle, said lock further comprising a deactivation device of said safety control lever, characterized in that said deactivation device is carried by said safety control lever.

The present invention will be better described by way of non-limiting examples, with reference to the accompanying drawings, in which:

Fig. 1 shows a partial side elevation of a lock according to the provisions of the present invention;

Fig. 2 shows a section taken along lines II-II in Fig. 1;

Fig. 3 shows a section taken along lines III-III in Fig. 2;

Fig. 4 shows an alternative embodiment of a detail of the lock shown in Fig. 1;

Fig. 5 shows a section taken along lines V-V in Fig. 4; and

Fig. 6 shows a further alternative embodiment of a detail of the lock shown in Fig. 1.

With reference to Fig.s 1 and 2, number 1 indicates a lock for a vehicle in its whole.

Of the lock, of a known type as concerns mechanical operation, only such parts are shown, as may be necessary to understand the present invention, being experts in the field already acquainted with the remaining parts.

Lock 1 comprises a support plate 2, capable of being secured to one door of the vehicle, bearing the lever system carrying out the lock`s manifold mechanical functions. In particular, a safety control lever 3 and a lever 4, controlling the opening from within the vehicle, are hinged on support plate 2.

Lever 3 is hinged on support plate 2 around a pivot 5 and is movable between a first position, shown in Fig. 1 by a full line, in which it enables the opening of the lock by means of a control lever from outside the vehicle (not being shown in the drawing), and a second position, in which the lever controlling opening from outside is idle and, therefore, opening is inhibited.

Stability of said two positions of lever 3 is achieved by means of spiral flexure spring 6, constrained to an intermediate side portion 7 of lever 3 and to support plate 2.

Lever 3 comprises a control arm 8, capable of being connected with one of its ends, through known transmission means, a safety lever "on" knob being placed in the door inner panel; lever 3 further comprises an operating arm 9, substantially opposed to control arm 8 with respect to pivot 5, which is capable of cooperating with the lock`s lever system, not shown in the drawing, so as to inhibit opening from outside the vehicle.

Lever 4 is hinged on support plate 2 around a relevant pivot 10 and essentially presents a control

arm 11, capable of being connected with an inner door handle through transmission means, that are not shown in the drawing, and a pair of operating arms 12,13.

Arm 12 has a cam front surface 14, capable of co-operating with lever 3 to bring it from the safety lever "on" position (dotted position) to the safety lever "off" (shown by the full line) during opening from inside the vehicle. Arm 13 presents an end tooth 15, bent by 90° with respect to the lever plane, which is capable of co-operating with the lock`s lever system so as to cause its opening.

Lock 1 further comprises device 16, deactivating lever 3, also known as dead lock, whose aim is that of preventing the lever from being operated from inside the vehicle, should the latter happen to be broken into.

According to the present invention, lever 3 consists of two parts, 3a and 3b, respectively, hinged to each other around hinge pivot 5 to support plate 2 and, therefore, angularly free with respect to each other.

More in particular, part 3a comprises control lever 8 and is therefore connected, during operation, to the safety lever "on" knob; part 3b comprises operating arm 9 and intermediate portion 7. Pivot 5 is carried by part 3a in an integral manner; part 3b is inserted between part 3a and support plate 2 and revolves around pivot 5.

Device 16, wholly carried by lever 3, essentially consists in a mechanism, capable of either rigidly connecting parts 3a and 3b and, consequently, control lever 8 and operating arm 9, or else of uncoupling same.

In the example shown in Fig.s 1 and 2, device 16 comprises an electric motor 20 housed in a case 21 integral with part 3a of lever 3 and provided with an output shaft 22 on to which an eccentric member 23 is angularly fixed. Device 16 further comprises a pin 24 (Fig. 2) slidable along an orthogonal axis to that of eccentric member 23 in a through seat 25 obtained in said part 3a and capable of engaging a relevant hole 26 on part 3b. Pin 24 is fitted with an end disc 27, which is held in contact with the side surface of eccentric member 23 by a spring 28 coaxial to pin 24 and inserted between part 3a of lever 3 and said disc.

Finally, device 16 comprises relative angular locating means between parts 3a and 3b of lever 3, shown in their whole by number 30, whose aim is that of securing alignment between seat 25 and hole 26 also in the case in which parts 3a and 3b are angularly free with respect to each other.

Said means 30, shown in Fig. 2 and, more clearly, in Fig. 3, essentially comprise a helical flexure spring 31, housed in an annular groove 32 obtained in part 3a of lever 3, around pivot 5. Said pivot 5 presenting, in the area inside groove 31, a circumferential projection with a 180° angular width, delimited by two radial surfaces 34. Part 3b is mounted on pivot 5, bush 35, angularly rigid with part 3b, being inserted therebetween; said bush having an axially cantilevered semicylindrical portion 36 extending towards the interior of groove 32, the latter co-operating with projection 33 and being in turn circumferentially delimited by two radial surfaces 37.

Spring 31 presents two end portions 38, bent inwards in a radial direction, co-operating with above-mentioned surfaces 34 and 37.

Stiffness of spring 31 is lower than that of spring 6, so as to enable part 3a to rotate with respect to part 3b, without transmitting to the latter such loads, that may cause, in turn, its rotation.

Electric motor 20 is connected to a control unit 39, which receives a plurality of input signals, e.g., an enable signal 40 activated upon lock opening with the key or upon opening of doorlocking actuator, and a locking condition detection signal 41 with safety lever insertion from outside, by means of either key or doorlocking control, and is capable of generating a control signal 43 of motor 20 in response to said input signals.

Device 16 operates as follows.

When the lock is fastened and safety lever is "on" (dotted position in Fig. 1), signal 41 is active and device 16 is held by the control unit in the position shown in Fig. 2; eccentric member 23 is in its minimum lift position and pin 24 therefore does not engage hole 26 of part 3b of lever 3.

Part 3a, therefore, is "idle" in respect with part 3b and any control being carried out from within the vehicle causes but a rotation of part 3a without affecting part 3b and such lock members, as are downstream thereto.

In particular, operating the knob in order to disconnect the safety lever, only part 3a of lever 3 rotates thus moving into the position shown by a full line in Fig. 1, whereas part 3b remains in the dotted position (in this connection, only operating arm 9 is being shown, for simplicity`s sake). Similarly, if the inner handle, and consequently, lever 4, is operated, the latter moves into the position shown by a full line, displacing part 3a of lever 3, without affecting, though, part 3b; moreover, since safety lever is "on", operating arm 13 does not in the least affect the lock`s opening members.

Rotation of part 3a with respect to part 3b of lever 3 and, therefore, of projection 33 in respect with semicylindrical portion 36, loads spring 31 that, upon manual operation load being released, brings part 3a back into alignment position of pin 24 to hole 26.

When the lock is opened from the outside by means of the key, or else further to the doorlocking actuator being opened from outside, signal 41 is

switched off, whereas enable signal 40 is activated; in response thereto, the control unit feeds electric motor 20 so that eccentric member 23 carries out a 180° rotation moving into maximum lift. Motor 20 may be stopped, once the new position is reached, in any known manner, e.g., by means of a stop micro-switch, not shown in the drawings, or else by means of an encoder.

As a consequence, pin 24 is pushed to engage hole 26 (dotted position in Fig. 2), causing part 3a and part 3b to be rigid with each other. At this point, lever 3 acts as a conventional monolithic lever and may be controlled from inside the vehicle, by means of either knob and inner handle.

Finally, when the lock is fastened from outside, signal 41 re-activates; motor 20 causes eccentric member 23 to rotate by 180° in one of two directions, according to the type of motor and control, and device 16 is brought back into deactivation condition by lever 3.

Fig.s 4 and 5 show an alternative embodiment of said deactivation device, indicated, in its whole, by number 45 and described hereinafter by means of the same numbers as the ones utilized hereinabove to describe device 16, in so far as they refer to similar or corresponding parts.

Device 45 comprises an electric motor 20 housed in a case 21 rigid with part 3a of lever 3 and fitted with an output shaft 22 defining screw 46. Screw 46 engages a nut 47 that is constrained to translate without rotating inside a prismatic guide 48, integral with case 21. Tapered end 49 of nut 47 is opposed to motor 20, capable of engaging a seat 50, the latter having a corresponding shape defined by a pair of projections 51 rigid with part 3b of lever 3 and bent by 90° with respect to the lie plane of part 3b.

Finally, device 45 comprises relative angular locating means between part 3a and part 3b of lever 3, shown in their whole by number 53, whose aim is that of securing alignment between nut 47 and seat 49, when parts 3a and 3b are angularly free in respect with each other, as well.

Such means 53 comprise, in particular, a couple of helical torsion springs 54 mounted, with a curvilinear axis, inside an annular groove 55 obtained in part 3a of lever 3, coaxial to pin 5 and facing part 3b. Groove 55 is interrupted by a radial wall 56, integral with part 3a. Said springs 54 are inserted, prestressed, between relevant surfaces of wall 56 and of a projection 57 integral with part 3b and slidable inside groove 55; being said springs identical, part 3a is brought back, in the absence of external loads, into a position in which wall 56 is diametrically opposed to projection 57; to such a position there corresponds the alignment condition between screw 47 and seat 50.

Operation of device 45 and that of device 16 are entirely alike, the only obvious difference being represented by relative connection between part 3a and part 3b being achieved by engagement of nut 47 in seat 50, whose axial translation is controlled by motor 20 through screw 46.

In Fig. 6, number 60 shows a further alternative embodiment of the deactivation device.

Device 60 very much resembles device 45 described hereinabove and essentially comprises an electric motor 20 housed in a case 21, rigid with part 3a of lever 3 and provided with an output shaft 22 on to which a toothed pinion 61 is angularly fixed. Pinion 61 meshes with rack 62 constrained to slide in a guide 63 along an orthogonal axis with respect to the motor axis. Rack 62 is capable of engaging, by means of its end 64, provided with a pair of side draft chamfers 65, a seat 66 defined by a pair of projections 67, rigid with part 3b of lever 3; such projections are bent by 90° in respect with the lie plane of part 3b and parallel to each other.

Relative alignment between rack 62 and seat 66 is secured by means 30, identical to means 30 described in connection with Fig.s 2 and 3.

Since operation of device 60 is similar to that of device 45, possible differences being self-evident to the experts, for the sake of brevity it is not being described herein.

A close examination of lock 1 fitted with device 16, 45 or 60 according to the provisions of the present invention, clearly shows the advantages offered thereby.

First of all, such a device, instead of being integrated in the doorlocking actuator, is wholly carried by safety control lever 3. Consequently, it may be used on any type of locks, on those lacking a doorlocking actuator, as well. Said device may be used without the doorlocking actuator, if any, having to be modified at all, so that it can be regarded as simple, economical and only relatively bulky.

Similarly, no modification is to be made on the mechanical members of the lock, the only obvious exception being represented, of course, by lever 3. Said device may be mounted on an already existing lock, as an accessory, simply by replacing monolithic lever 3, of common use, with lever 3 described hereinabove, consisting of two parts 3a and 3b; utmost modularity, as well as noticeable economic advantages, are guaranteed by all other details being thoroughly similar.

Since the device in question is not integrated in the doorlocking actuator, a further advantage is represented by the possibility of disconnecting safety lever by means of inside control lever 4.

Finally, devices 16, 45 and 60, described hereinabove, may be obviously modified in such a way, that they may still fall within the scope of

protection of the present invention.

Claims

1. A lock (1) for a vehicle, of the type comprising a safety control lever (3) movable between a first enable opening position of said lock (1) and a second inhibit opening position of said lock (1) at least through manual control means from outside said vehicle, said safety control lever (3) presenting connecting means (8) to manual control means from inside said vehicle, said lock (1) further comprising a deactivation device (16;45;60) of said safety control lever (3), characterized in that said deactivation device (16;45;60) is carried by said safety control lever (3).

2. A lock as claimed in Claim 1, characterized in that said safety control lever (3) is made up of two parts (3a,3b), movable with respect to each other, the former (3a) of said parts comprising said connecting means (8) to said manual control means, the latter (3b) of said parts comprising operating means (9) of the lever system of said lock (1), said deactivating device (16;45;60) comprising relative engagement means (24,26; 47,50; 62,66) between said parts (3a,3b) to rigidly connect the latters and control actuator means (20) of said engagement means.

3. A lock as claimed in Claim 2, characterized in that said parts (3a,3b) of said safety control lever are hinged around a common pivot (5).

4. A lock as claimed in either Claim 2 or 3, characterized in that said engagement means comprise a seat (26;50;66), carried by one of said parts (3b), and an element (24;47;62), carried by the other part (3a), connected with said actuator means (20) and movable between a disengagement position and an engagement position of said seat (26;50;66).

5. A lock as claimed in Claim 4, characterized in that said movable element (24;47;62) is constrained to translate along guiding means (25;48;63), said deactivation device (16;45;60) comprising transmission means inserted between said actiator means (20) and said movable element (24;47;62).

6. A lock as claimed in Claim 5, characterized in that said actuator means comprise an electric motor (20).

7. A lock as claimed in either Claim 5 or 6, characterized in that said transmission means comprise an eccentric member (23), angularly fixed to an output shaft (22) of said motor (20), said mobile member consisting of a pin (24) co-operating with said eccentric member (23).

8. A lock as claimed in either Claim 5 or 6, characterized in that said transmission means comprise a pinion (61), angularly fixed to an output shaft (22) of said motor (20), said mobile member consisting of a rack (62) meshing with said pinion (61).

9. A lock as claimed in either Claim 5 or 6, characterized in that said transmission means comprise a screw (46), angularly fixed to an output shaft (22) of said motor (20), said mobile member consisting of a nut (47) engaging said screw (46).

10. A lock as claimed in any one of Claims 2 to 9, characterized in that it comprises relative angular locating means (30;53) between said parts (3a,3b) of said safety control lever (3).

11. A lock as claimed in Claim 10, characterized in that said relative angular locating means comprise at least one elastic element (31,54), constraining at least one portion (33;56), rigid with said first part (3a) and at least one portion (36;57), rigid with said second part (3b) of said safety control lever (3).

12. A lock as claimed in Claim 11, characterized in that said elastic element (31;54) is housed in an annular groove (32) obtained in one of said two parts (3a,3b), coaxial to said pivot (5).

FIG.1

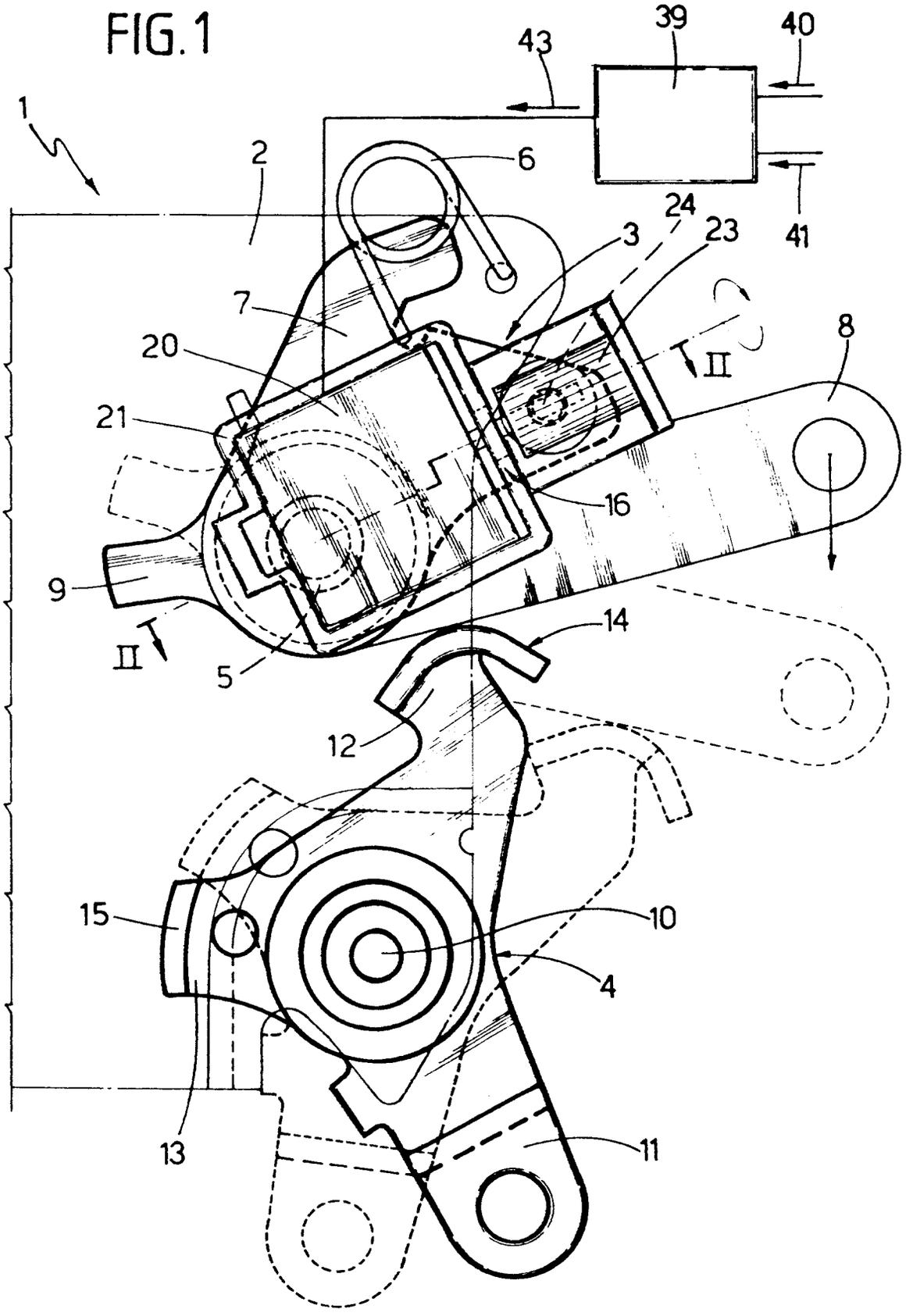
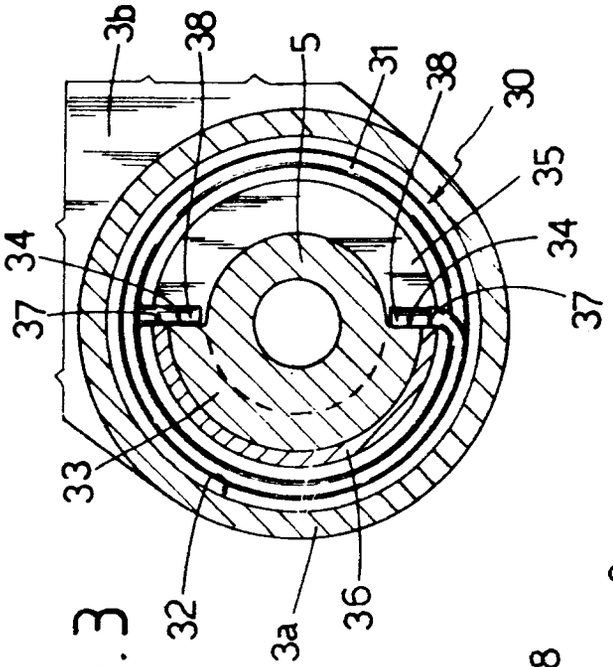


FIG. 3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3a
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FIG. 2

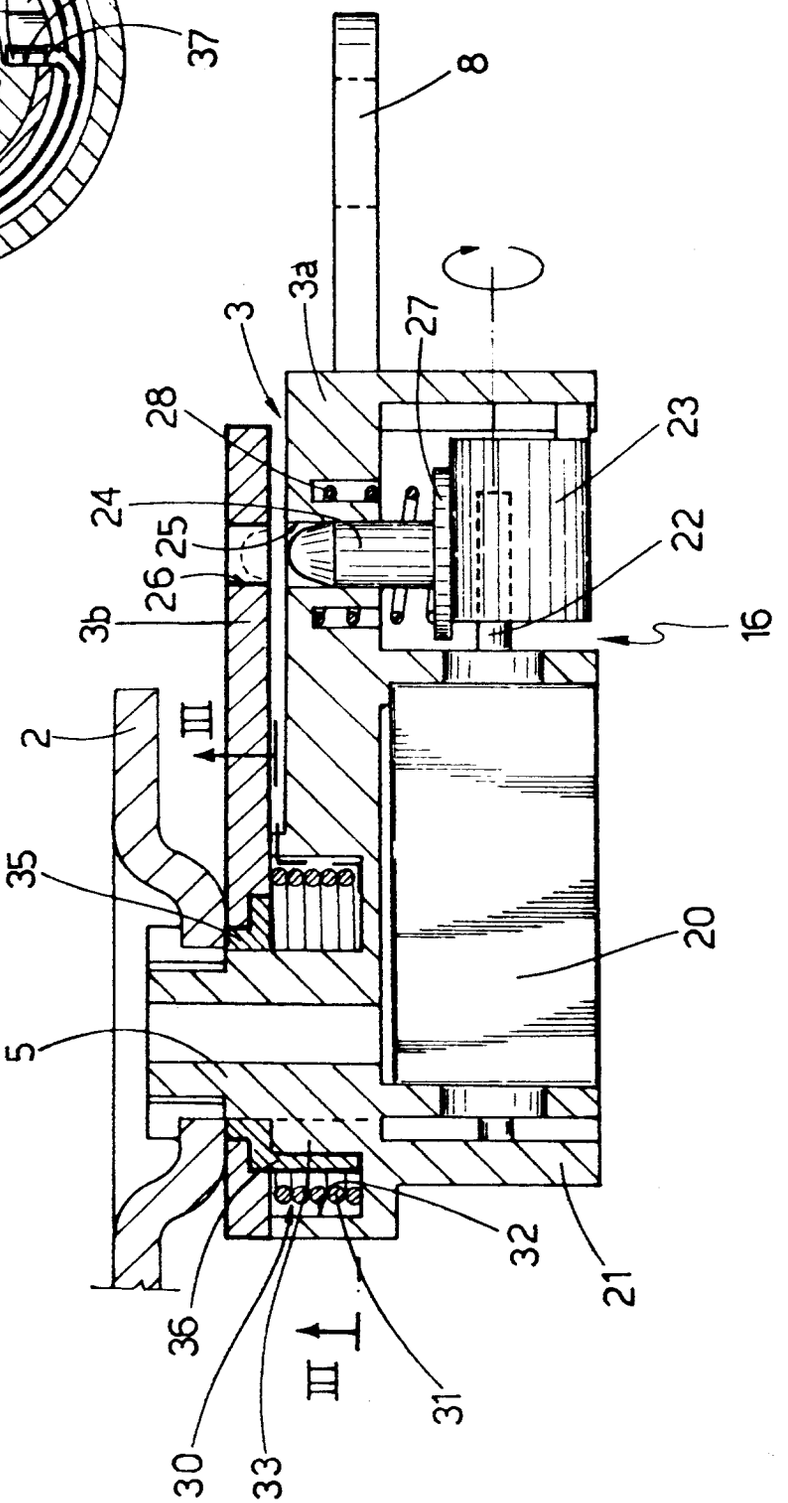
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FIG. 5

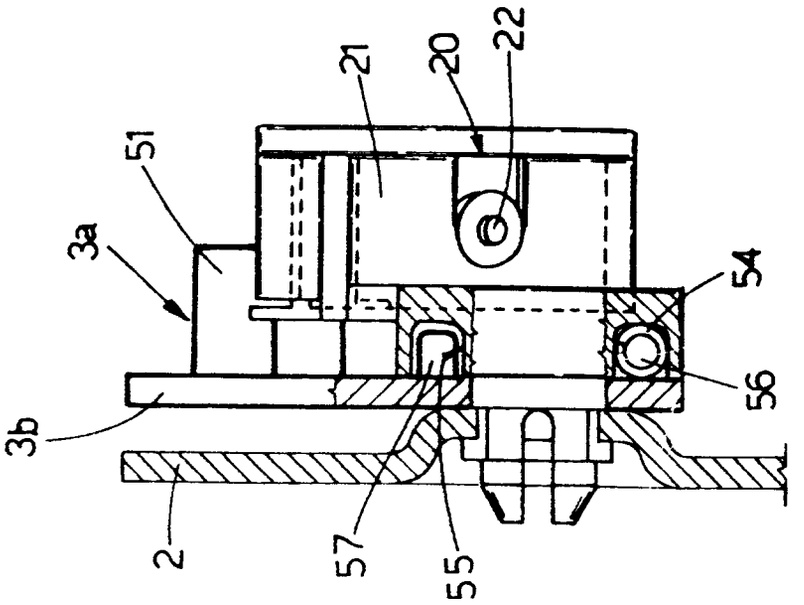
21
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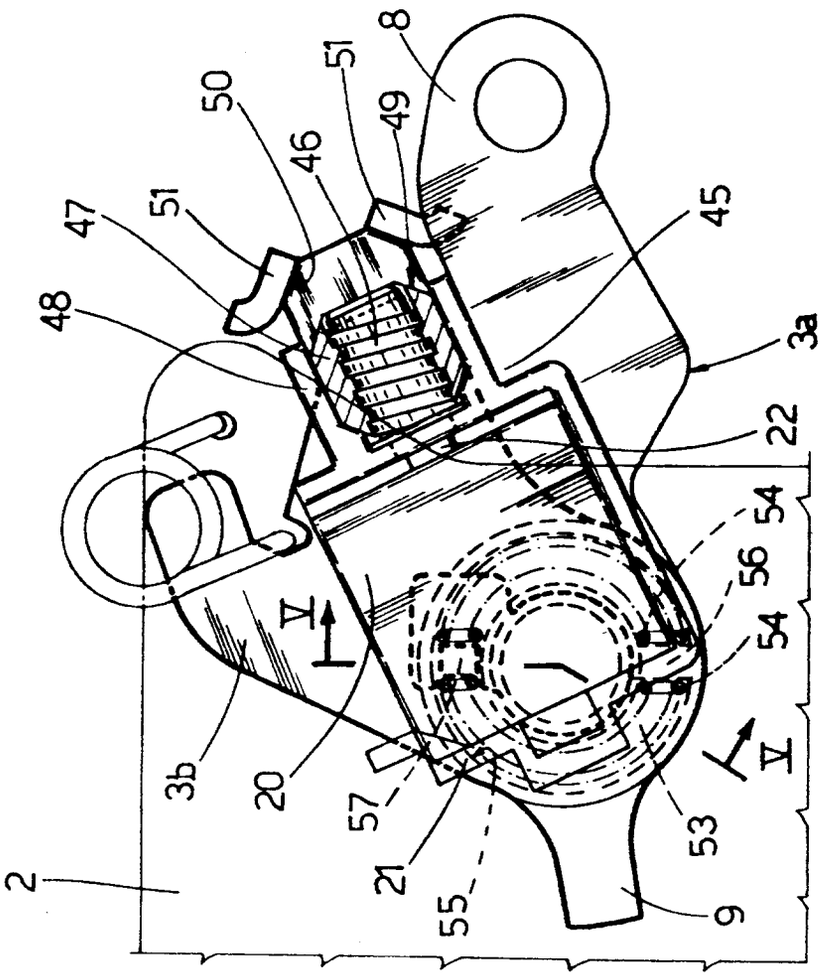
FIG. 4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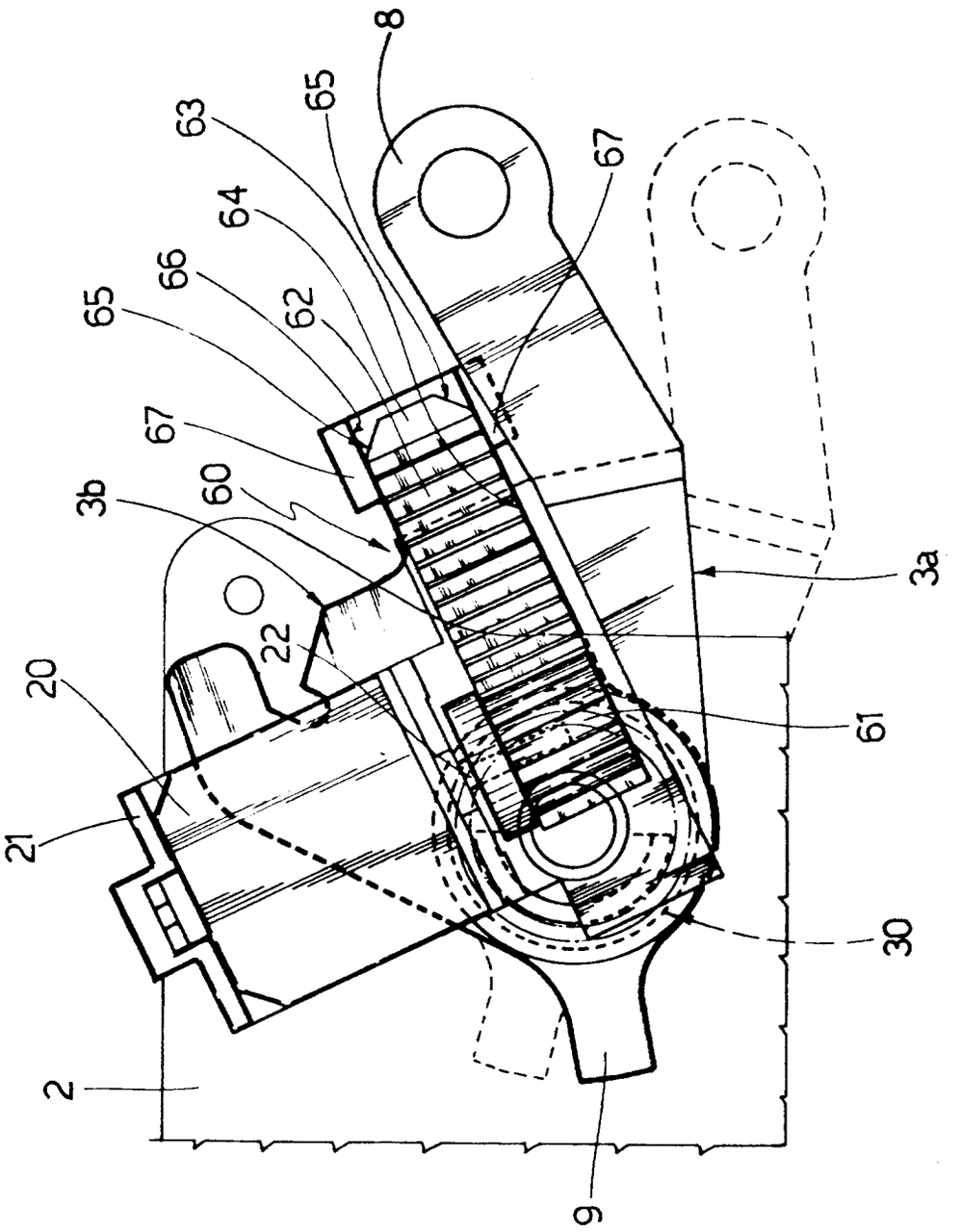

FIG.6

European Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 93 10 1963

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
A	GB-A-2 227 516 (BOMORO BOCKIENBERG & MOTTE GMBH & CO. KG) * the whole document * ---	1	E05B1/00 E05B65/20
A	DE-A-3 938 680 (KIEKERT GMBH & CO KG) * abstract; figures * ---	1	
A	FR-A-2 594 876 (VACHETTE) * the whole document * ---	1	
A	FR-A-2 635 355 (KIEKERT GMBH & CO. KG) * abstract * -----	1	

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

E05B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	14 MAY 1993	GIMENEZ BURGOS R.

CATEGORY OF CITED DOCUMENTS

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