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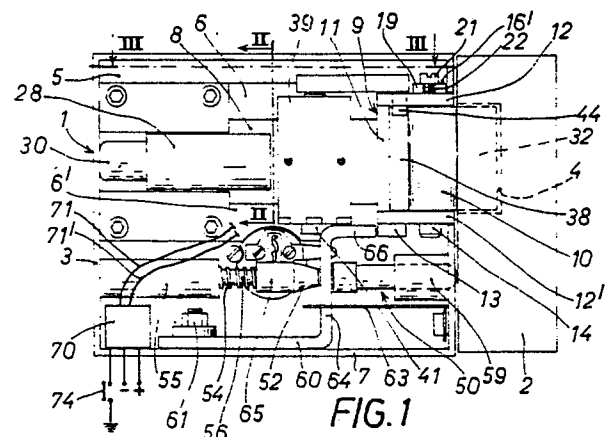
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An electric safety lock with timed opening.

An electric lock is provided with a timer (70) actuated through a remote control (71), that causes the disengagement of a latch (10) without modifying the position thereof with respect to the door jamb (2). In case the door is not opened within the actuation time of the timer, the latch is automatically blocked again.

On the contrary, in the time interval during which the latch is unblocked, the door can be opened through the rotation of the latch (10) about a vertical pivot (14) pushing the door against the door jamb (2). A spring (15) returns the latch to the initial position before the rotation. The latch (10) is further mounted on a slide (8) urged by a spring (26), and is translated together with the slide toward the inside of the lock during the closing movement of the door. The final closed position is achieved by the extension of the spring (26) carrying back the latch into the cavity (4) of the jamb (2).

There are provided the unblocking the latch (10) by means of a key (78) and an additional device for the safety blocking of the closed door.



AN ELECTRIC SAFETY LOCK WITH TIMED OPENING.

This invention relates to a safety electric lock with timed opening.

The remote controlled electric locks for gates or front doors of houses and buildings have the drawback to let the door or gate open when the remote control push button -usually placed within the house- is actuated by error or when the person to be let in does not cross the threshold and goes away without closing the door. Namely, in order to close again the doors in systems equipped with such known electric locks it is in any case necessary to push the door against the door jamb, even when nobody came in and the door has not even been touched. This is so since in this type of locks the movement disengaging the latch from the jamb is directly caused by the remote controlled opening command, so that the door is always left ajar after every actuation of the command button, and the safety closure can be obtained only by manual intervention.

Considering that in a co-ownership building with many flats the accidental actuation of the remote push button opening the door or the main gate is anything but rare, and that often he who accidentally opened the door or gate either does not realize so or is not willing to go outside to close again the door, it is easily understood why such doors remain often open.

The object of the present invention is to eliminate the above drawback by realizing an electric safety lock that can be opened by remote control, which does not require a manual intervention to be closed in case the remote opening command has been given by mistake, but on the contrary which allows for a completely automatic closure. are particularly, the object of the invention is that of realizing a lock of this type wherein the closing latch is not necessarily disengaged from the jamb due to the opening impulse, but is only unblocked, leaving the door openable through an easy manual intervention during a predetermined time interval following the opening impulse, after which the latch is blocked again and the door is locked in case it has not been manually thrown open.

The above and other advantages of the invention such as will become apparent from the description hereinbelow, are achieved through a safety electric lock comprising a box having at least a side aperture for the passage of a latch adapted to engage a door jamb outside the lock and in a position corresponding thereto, characterized in that said latch is rotatably mounted about a vertical pivot and is urged to rotate by a spring, said pivot being fastened to a slide also urged by a spring, movable between a position in which said latch

projects from said box aperture and a position in which said latch is substantially retracted, and a member adapted to block the rotation of said latch, actuated by an electromagnet controlled by a timer, said blocking member being maintained in a blocking position when the electromagnet is de-energized, and being brought into a blocking position during the time interval in which the electromagnet is energized, said time interval being defined by said timer.

A preferred embodiment of the invention, only supplied as a non limiting example, will now be disclosed with reference to the attached drawings, in which:

- Fig. 1 is a front elevation view of the lock in closed conditions;

- Fig. 2 is a cross section scrap view along line II-II of Fig. 1;

- Fig. 3 is a cross section scrap view along line III-III of Fig. 1;

- Fig. 4 is a plan top view of a detail of Fig. 3;

- Fig. 5 is an elevation schematic view of the rotatable latch of the lock according to the invention;

- Fig.s 6, 7, 8 and 9 are schematic cross section views along line V-V of Fig. 5, in different operative conditions of the detail illustrated therein;

- Fig. 10 is a view, part in front elevation and part in perspective, of another operative arrangement of the invention;

- Fig. 11 is a plan view of the same detail of Fig. 4 in another operative arrangement;

- Fig.s 12, 13 and 14 are schematic cross section views along line V-V of Fig. 5 of additional operative arrangements of the detail shown therein;

- Fig. 15 is a front elevation view of the lock in the arrangement of Fig. 14; and

- Fig. 16 is a schematic view of another detail relating to Fig. 5.

With reference to the drawings, the lock according to the invention is housed within a box 1 mounted on a (not shown) door in correspondence of the door jamb 2 which provides for a suitable cavity or recess 4. Fig.s 1, 10 and 11 show the lock members that can be seen after removing the box side wall normally facing the inside of the door, so that the door opening is achieved through a movement by means of which the lock approaches the observer, as can be appreciated in Fig. 8 where the jamb is shown in perspective view behind the observer.

To the bottom wall of the box 1 there are fastened guides 6, 6' on which it is movable a slide 8 which carries at one end a structure 9 supporting

a rotatable latch 10. The structure 9 is a fork shaped member, fastened to the slide 8 through its transverse branch 11, and carrying a pivot 14 between its parallel branches 12, 12', fitted in a through hole 18 of the latch 10 and provided with a head 19. A helical spring 15 is interposed between the latch 10 and the pivot 14, having one end 16 introduced in a small hole 20 of the latch 10 (as can be seen in the plan view of Fig. 6), and the opposed end 16' introduced in a similar small hole 20' drilled in the head 19 of pivot 14, as can be seen in detail in Fig. 3 illustrating this detail in plan view from above. The helical spring 15 is a flexion spring that works as a torsion spring, i.e. is stressed to rotate the latch about the fixed pivot 14. The rotation of the latch about the pivot 14 is further limited by the "torsion" of the spring 15 since the spring opposes the rotation during the opening phase, and restores the initial position after the opening, as will be explained later. The load acting on spring 15 is adjusted by rotating the pivot 14 in respect of the latch 10 and by fixing the position thereof through the screw 21, whose stem 22 enters a cavity 23 of the head 19 of pivot 14.

Also the shift of the slide 8 and of the structure 9 fastened thereto and carrying the latch 10 is subjected to the action of a spring opposing the translation movement away from the jamb, and urging on the contrary the movement toward the jamb. Such spring is a helical spring 26 housed in a cylindrical seat 27 formed in a guide sleeve 28 fastened to the slide 8 by means of its base 29. One end of the spring 26 is fastened to a short push rod 30 projecting from the guide sleeve 28 and abutting against the side 3 of the box 1. The translation movement of the slide 8 away from the jamb 2 causes the spring 26 being compressed against the push rod 30.

An embodiment of the latch 10 is schematically shown in Figs 5-9 and 12-14. According to this embodiment, it substantially consists of a cylindrical sector block having a hole or bore 18 housing the pivot 14 near the vertex, with a projection 35 abutting against the branch 11 of the fork supporting structure 9, so that the plane face 32 is about parallel to the bottom wall 5 of the box 1 when the projection 35 is abutting against the structure 9. The cylindrical surface 33 extends between the plane face 32 and the projection 35, and a second plane face about orthogonal to the face 32, forms a pawl 38 with the projection 35.

Finally, to the slide 8 there is fastened a box 39 containing an electromagnet 40 enclosing a movable bar 41 that projects both upward and downward from the electromagnet and the box 39. At the upper end of the bar there is fastened a horizontal arm 42 terminated by a stop pin 44 extending downward and abutting - in the operative

position corresponding to the non energized electromagnet - against the pawl 38 so as to prevent the rotation thereof.

The lower portion of the box 1 shown in detail in Fig. 4 houses a safety device for blocking the closed lock. It comprises a rod 50 with a rounded tip 51, a middle frusto conical portion 52 starting from a portion 65 and terminating with a portion 53 having a reduced diameter. The rear portion 56 of the rod is housed in a cylindrical guide sleeve 55 fastened to the wall 3. Between the guide sleeve 55 and the wall 56 there is interposed a spring 54 urging the rod out from the box 1 through a hole drilled in a second cylindrical guide sleeve 59. A double bend blocking lever 60 is pivotally mounted about a vertical pivot 61 fastened to the base wall 7 of the box 1. A spring 63 urges the vertical portion 64 of the lever 60 against the rod 50, this latter being completely retracted within the box 1 in the arrangement of Fig. 1, with the tip 51 thereof pressed against the jamb 2. In such retracted condition of the rod 50, the vertical branch 64 of the lever 60 is pressed against the portion 53 of reduced diameter of the rod, whereas the end portion 66 of the lever abuts against the lower projection 13 of the structure 9, thus blocking (preventing) the movement of the slide 8. Since Fig. 1 shows the lock in the closed condition, it is understood that the blocking device just illustrated constitutes a mechanism that increases the safety of the closure against possible attempts of breaking open the lock, but does not constitute a mechanism necessary for the operation of the main members of the lock.

In the box 1 it is further housed a timer 70 of known type, connected to the electromagnet 40 by leads 71, 71', and fed in a known manner by a low voltage. The timer is actuated by a push button 74 remote from the door and placed, for example, within the house and usually associated to an inter-communication system.

The operation of the lock according to the invention is the following.

Referring to the closed condition shown in Fig. 1, when the button 74 is depressed the timer 70 is actuated. Consequently leads 71, 71' feed for a short time -e.g. 15 or 20 seconds- the electromagnet 40 that results energized. This length of time is of course established as desired by selecting and/or adjusting a timer with proper characteristics.

When the electromagnet is energized, the rod 41 is lifted and the stop pin 44 no longer abuts against the pawl 38 of the lock 10. This condition is schematically shown in Fig. 5. As a consequence, the latch 10 is free to rotate about the pivot 14. The steps that bring to the door opening are schematically shown in sequence in Figs 6 to 8.

Fig. 6 still shows the lock in the locked door

condition corresponding to the situation of Fig. 1. The latch 10 is introduced in the cavity 4 of the door jamb 2 with the plane surface 32 abutting against the jamb. When somebody has to come in and has been so allowed by the consent command which lifts the pin 44, he pushes the door as usual in the direction shown by arrow A in Fig. 6 - i.e. toward inside - thus causing the abutment of the surface 32 against the jamb 2 and, as a reaction, the rotation of the latch 10 about the pivot 14, as shown by arrow B in Fig. 7. This rotation causes the spring 15 within the latch to be flexed. Continuing to push the door, the latch reaches the final position of Fig. 8 wherein the surface 32 is freed by the engagement with the jamb 2 and the door can be opened. The latch 10 is returned by the spring 15 to the initial position shown in Fig. 9. The arrangement of the lock members after the opening, that is when the lock is no longer engaged with the door jamb, is illustrated in Fig. 10. The bar 41 is again lowered, the energizing period of the electromagnet being lapsed, and the stop pin is therefore retracted on pawl 38.

The differences between Fig. 1 and Fig. 10 only relate to the arrangement of the members of the safety blocking device and not the arrangement of the main members of the lock. Namely, during the opening, the outcoming of the rod 50 is preferably progressive, this being obtained by means of a curved shape of the jamb 2 - as shown in perspective in Fig. 10 - over which the rod tip 51 slides. In the final position of maximum extension from box 1, the vertical branch 64 of the lever 60 abuts against the portion 65 of larger diameter of the portion 53, so that the lever 60 is rotated with respect to the position of Figs 1 and 4, as shown in Fig. 11. In such rotated configuration, the end portion 66 of the lever no longer abuts against the lower projection 13 of the structure 11, so that the slide 8 is free to translate backward toward the side 3 of the box 1. This arrangement allows for closing the door as will be sequentially illustrated by Figs 12 to 15.

Whereas the door opening has been obtained by means of a rotating movement of the latch 10 only, the closing is obtained by means of a translation movement of the assembly formed by the slide 8 and all the members fastened thereto, including the latch 10. The closing is obtained by pushing the door against the jamb 2, along the direction of the arrow C in Fig. 12. The cylindrical surface 33 of the latch 10 comes in contact with the corresponding curved surface of the jamb 2 and consequently causes a translation of the latch and of the slide fastened thereto through the blocking pin 44, backward along the direction of arrow D. The translation continues with the further push of the latch against the jamb, as illustrated in Fig.

13, and reaches the maximum in the position of Fig. 14, corresponding to the elevation view of Fig. 15. Under these conditions, the slide 8 is completely retracted and the push rod 30 is almost completely introduced within the cylindrical guide sleeve 28. As a consequence, the spring 26 is strongly stressed and able to push the slide as soon as the latch 10 is freed from the engagement with the jamb 2, again in the position of Fig. 1, in which the latch is again introduced in the cavity 4 of the jamb 2. Thus the door closing has been achieved.

Fig. 16 shows how it is possible to obtain the manual opening of the lock by means of a key. A key 78 introduced into the keyhole 79, as illustrated in Fig. 3, enters the corresponding opening of a cam 80, fastened to the keyhole but rotatable with the key, as shown in Fig. 1. The eccentric portion 82 of the cam is carried by the key rotation to lift the bar 41 of the electromagnet and therefore to free the latch pawl 38 from the stop pin 44. It is thus possible to open the door without the intervention of the above described electric components.

A preferred embodiment of the invention has been disclosed, but of course the same is subjected to a number of modifications and changes within the scope of the invention.

Claims

1. A safety electric lock comprising a box (1) having at least a side aperture for the passage of a latch (10) adapted to engage a door jamb (2) outside the lock and in a position corresponding thereto, characterized in that said latch (10) is rotatably mounted about a vertical pivot (14) and is urged to rotate by a first spring (15), said pivot (14) being fastened to a slide (8) also urged by a second spring (26), movable between a position in which said latch (10) projects from said box aperture and a position in which said latch is substantially retracted, and a member (44) adapted to block the rotation of said latch, actuated by an electromagnet (40) controlled by a timer (70), said blocking member (44) being maintained in a blocking position when the electromagnet (40) de-energized, and being brought into a blocking position during the time interval in which the electromagnet (40) is energized, said time interval being defined by said timer (70).

2. An electric lock as claimed in claim 1, characterized in that said latch (10) comprises a block substantially shaped as a cylindrical sector, provided with a hole (18) near the vertex for housing said spring (15) and with engagement means for engaging said blocking member (44) of the latch (10).

3. An electric lock as claimed in claim 2, characterized in that said means engaging the blocking member (44) is a surface (36) provided with a pawl (38) projecting from said latch (10).

4. An electric lock as claimed in claim 1, characterized in that said blocking member (44) is a pin carried by a horizontal arm (42) fastened to a vertical bar (41) which is slidable within said electromagnet (40) in such a manner that the movement for disengaging said pin from said latch (10) is obtained by energizing the electromagnet (40), and the movement in the opposed direction to block said latch (10) is caused by gravity.

5. An electric lock as claimed in claim 1, characterized in that said pivot (14) is mounted between the parallel branches (12, 12') of a fork structure (9) fastened to said slide (8) through its transverse branch (11).

6. An electric lock as claimed in claim 1, characterized in that said spring (26) urging said slide (8) is housed in a cylindrical guide sleeve (28) and is bound at one end to a push bar (30) abutting against a wall (3) of said box (1), said guide sleeve (28) being fastened through its basis (29) to said slide (8).

7. An electric lock as claimed in claims 1 and 4, further comprising a key (78) for manual opening, characterized in that said key (78), when introduced in the lock keyhole, extends within the box (1) and engages for rotation a cam (80) whose eccentric member (82) is near to said electromagnet (40) and is adapted to lift said bar (41) of the electromagnet.

8. An electric lock as claimed in claim 1, further comprising a safety blocking device, characterized in that such device comprises a lever (60) rotatable between a position blocking the movement of said slide (8) and a position disengaged from this latter, said lever being urged by a third spring (63) against a rod (50) also slidable parallel to said slide (8) and having a profile adapted to cause the rotation of said lever (60).

9. An electric lock as claimed in claims 5 and 8, characterized in that said lever (60) provides for an end portion (66) which in the blocking position abuts against a lower projection (13) of said fork structure (9) fastened to said slide (8).

10. An electric lock as claimed in claims 8 and 9, characterized in that said rod (50) comprises a portion with larger diameter (65) and a portion with reduced diameter (53) connected by a frusto-conical portion (52), said portions being slidable against the lever (60) to move this latter in said disengaging position and blocking position, respectively, of said slide (8).

11. An electric lock as claimed in claim 1, characterized in that said timer (70) is housed within said box (1) and is electrically connected to

said electromagnet (40) by a pair of leads (71, 71') also contained in said box (1).

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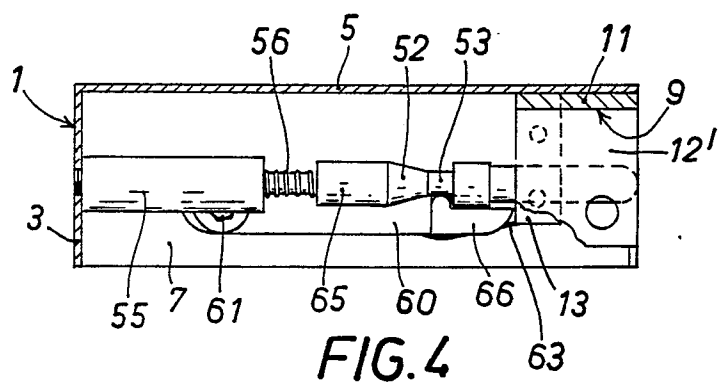
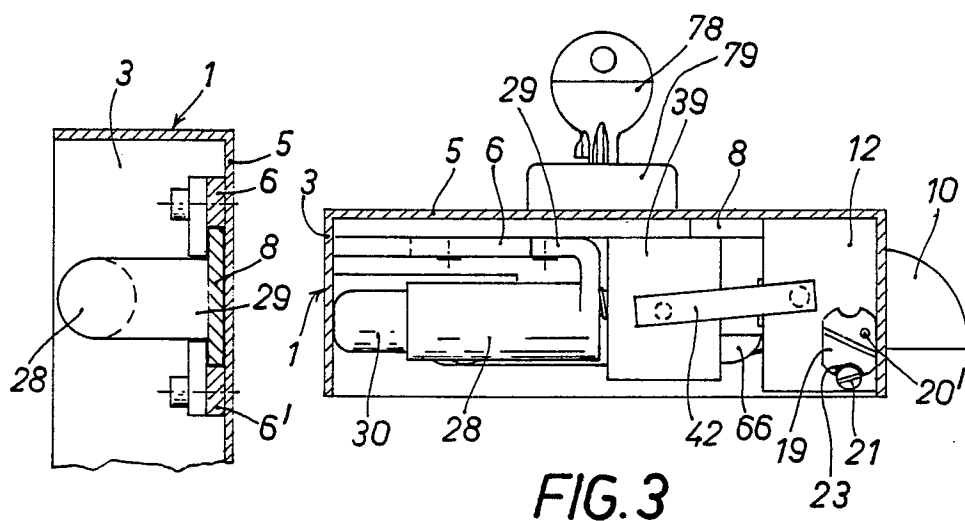
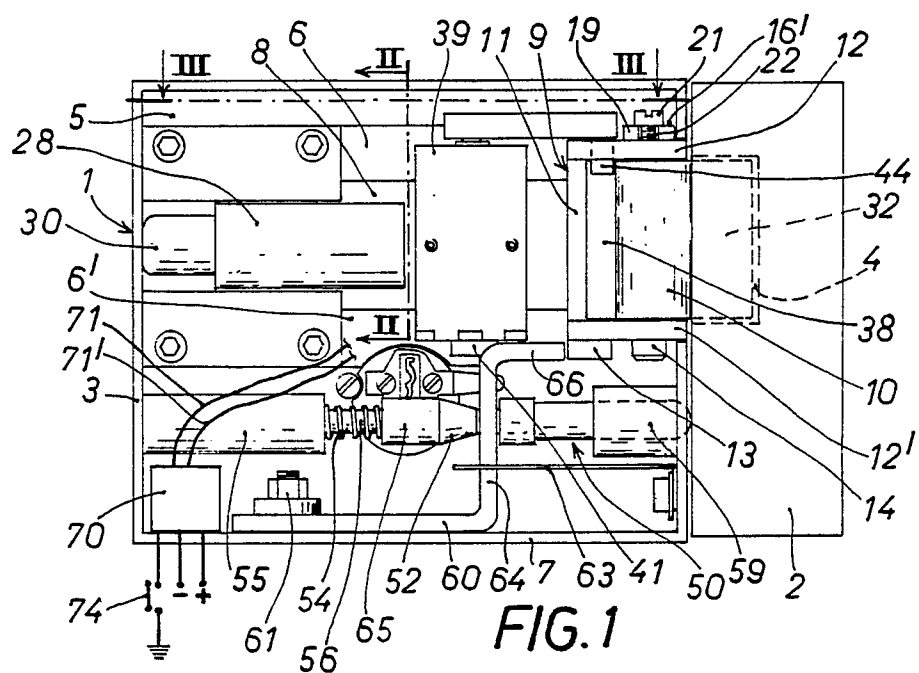
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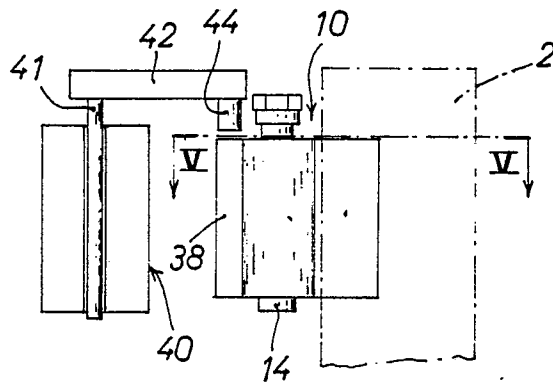


FIG. 5

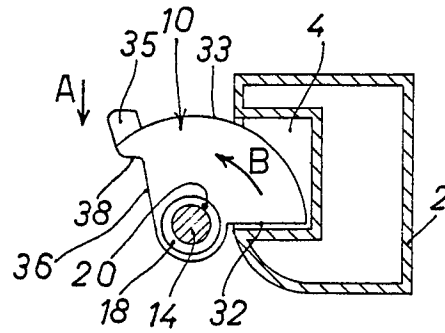


FIG. 6

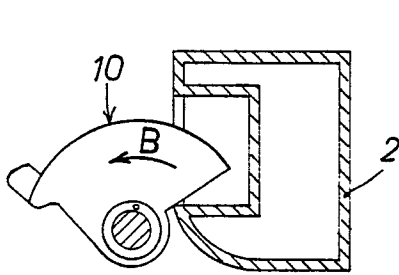


FIG. 7

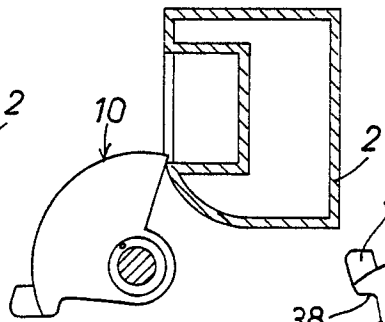


FIG. 8

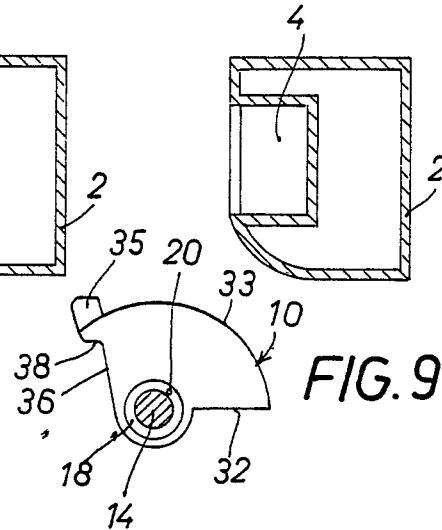


FIG. 9

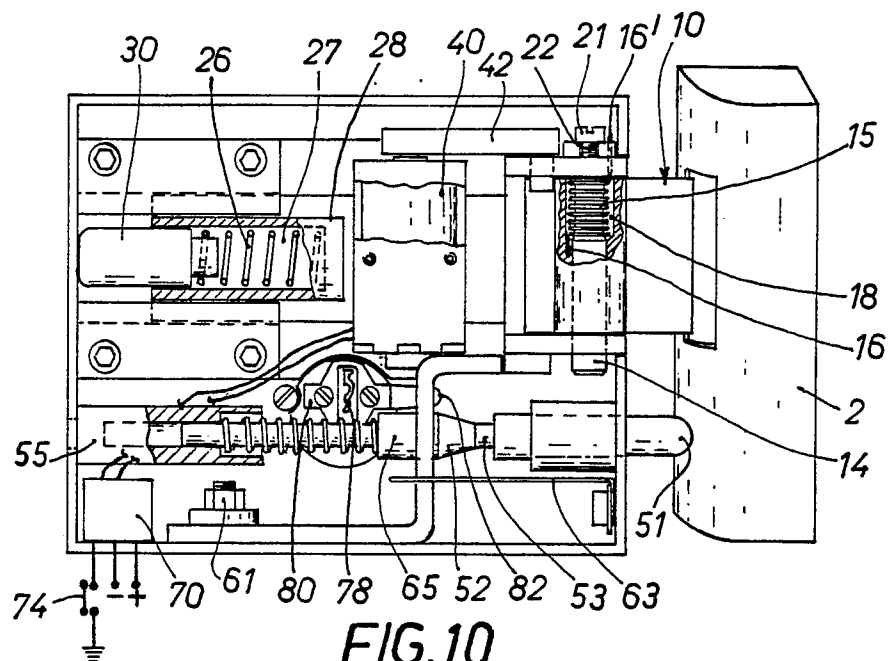
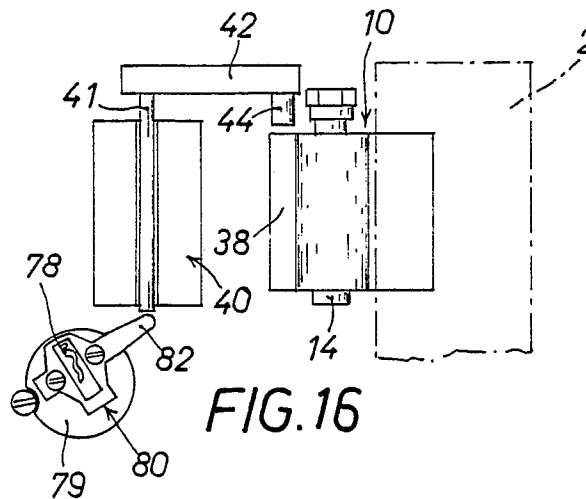
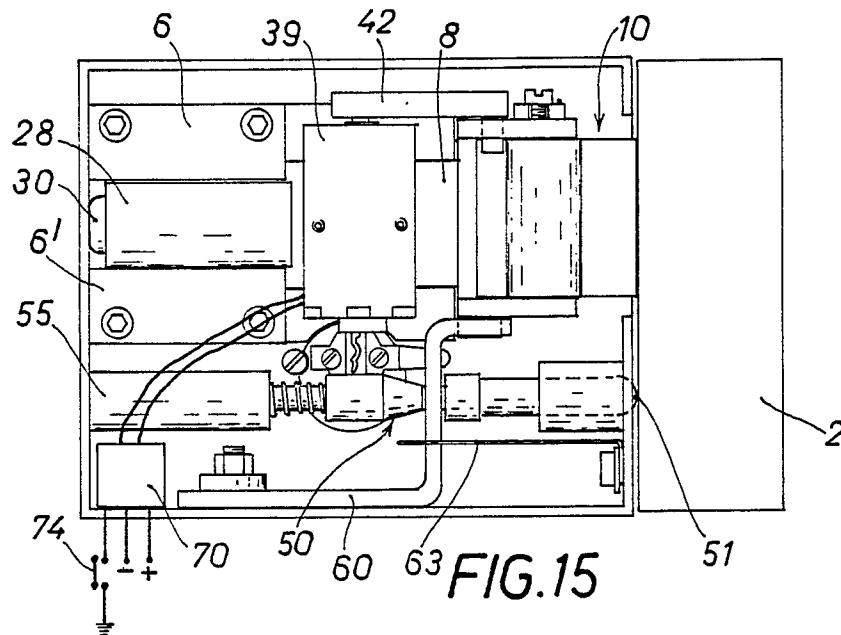
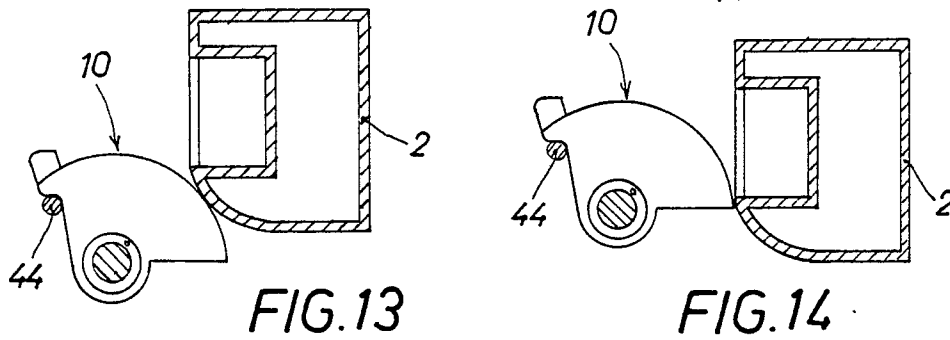
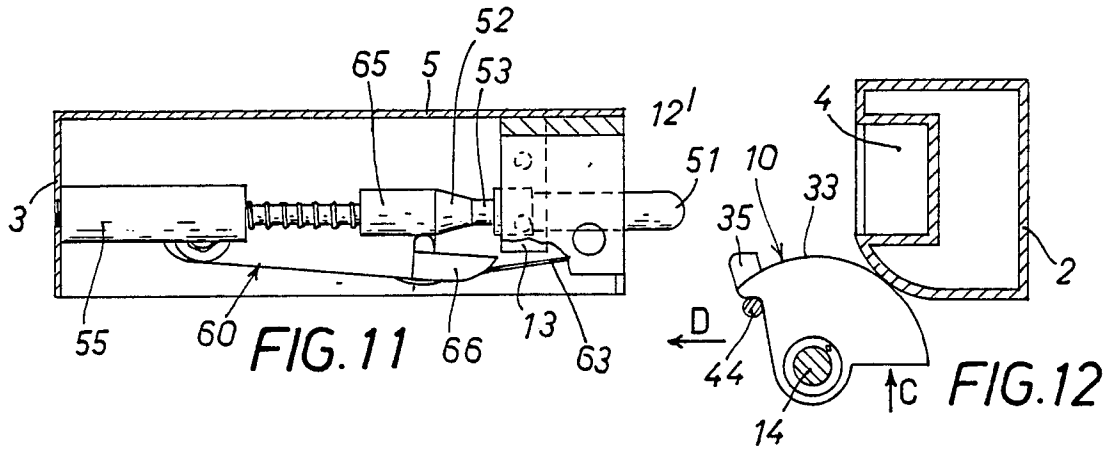


FIG. 10





EP 89202249.2

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	<u>FR - A - 2 172 604</u> (STREMLER) * Fig. 1-5; claims 1-4 * --	1-6	E 05 B 63/00
A	<u>FR - A - 2 210 208</u> (NEIMAN) * Fig. 1-10; claims 1-7 * --	1-6	
A	<u>DE - A - 2 536 295</u> (NIEDERDRENK) * Fig. 1-5; claims 1-3 * --	1-7	
A	<u>DE - B - 1 963 570</u> (BRUMME) * Fig. 1-3; claims 1-4 * ----	1-5	
			TECHNICAL FIELDS SEARCHED (Int. Cl.) ⁵
			E 05 B
The present search report has been drawn up for all claims			
Place of search VIENNA		Date of completion of the search 06-02-1990	Examiner CZASTKA
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	