



(11) **EP 2 151 536 A2**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
10.02.2010 Bulletin 2010/06

(51) Int Cl.:
E05B 63/00 (2006.01) E05B 63/20 (2006.01)

(21) Application number: **09002099.1**

(22) Date of filing: **16.02.2009**

(84) Designated Contracting States:
**AT BE BG CH CY CZ DE DK EE ES FI FR GB GR
HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL
PT RO SE SI SK TR**
Designated Extension States:
AL BA RS

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(30) Priority: **06.08.2008 IT MI20081481**

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(54) **Lock with several automatic closure points**

(57) The lock with several automatic closure points comprises a first kinematic device for closing the lock and retention by means of spring latch following the alignment of the movable part with the fixed part of the door/window frame, a second kinematic device for selecting the operating mode for closing the lock, a third kinematic device for opening the lock by means of handle and/or key, separately or selectively activatable, and a fourth kinematic device for preventing the opening of the lock by means of the handle.

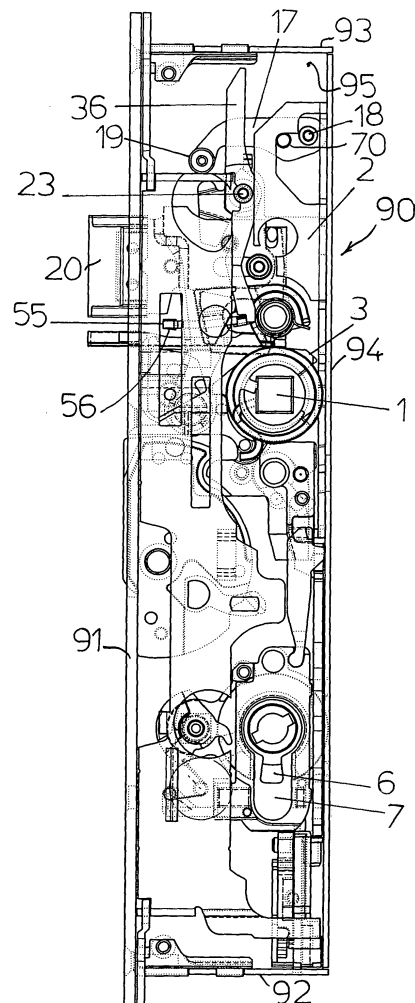


Fig-1

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Description

[0001] The present invention relates to a lock with several automatic closure points.

[0002] As is known, there are currently several types of locks with several automatic closure points on the market.

[0003] These locks of known type normally have the complete exit of the bolts when the shutter or door on which they are mounted is not yet perfectly aligned or retained at the ledge, with all the consequences that such defect can involve.

[0004] In addition, the locks of known type very often require the use of a counter-plate suitably made with abutment elements, which for example can be seats or reliefs, in order to allow the sequential exit first of the spring latch and then of the bolts so to avoid their exit before the alignment of the shutter or door with the ledge.

[0005] In addition to that stated above, the locks of the prior art have closing and opening modes that are not very flexible, since - although they are made with two bolts, an upper bolt and a lower bolt, and a spring latch placed in the centre thereof - they are not capable of ensuring the complete, simultaneous closing of two bolts and the spring latch, or of only the spring latch, or the total prevention of closure of the bolts and the spring latch, or of only the spring latch in order to also ensure the so-called hold open.

[0006] In the locks of known type, the opening modes are also not very flexible, since the opening normally is assigned to the handle or the key which sequentially operates on the bolts and on the spring latch for the opening of the lock.

[0007] Last but not least, it should also be indicated that the current locks with several automatic closure points either have little flexibility of use or they are equipped with a kinematic functioning mechanism that is extremely complex if they must ensure different closing and opening types.

[0008] The technical task proposed by the present invention is therefore that of making a lock with several automatic closure points which allows eliminating the lamented technical drawbacks of the prior art.

[0009] In the scope of this technical task, one object of the invention is that of making a lock with several automatic closure points which allows the complete exit of the bolts only when the movable part of the door/window frame (for example a door or a shutter) is perfectly aligned with the ledge of the fixed part of the door/window frame and retained by the spring latch.

[0010] Another object of the finding is that of making a lock with several automatic closure points which has a very high flexibility of use, since it can allow, from among the other closure modes, that complete with bolts and spring latch, that with only spring latch, and the total prevention of the two aforesaid closure types in order to obtain the so-called hold open.

[0011] A further object of the finding is that of making

a lock with several automatic closure points which has extremely flexible opening modes, assigned for example to the handle and/or to the key which can allow the opening of the bolts and spring latch simultaneously or selectively or by preventing only the handle.

[0012] The technical task, as well as these and other objects according to the present invention, are achieved by making a lock with several automatic closure points in accordance with claim 1.

[0013] Other characteristics and advantages of the present invention are moreover defined in the subsequent claims.

[0014] Further characteristics and advantages of the invention will be more evident from the description of a preferred but not exclusive embodiment of the lock with several automatic closure points according to the finding, illustrated as indicative and non-limiting in the attached drawings, in which:

Figure 1 shows a side elevation view of a lock in accordance with the present invention, in the configuration with active prevention of the automatic reclosure of the bolts;

Figure 2 shows the lock of figure 1, in the configuration with bolts and spring latch out;

Figure 3 shows the lock of figure 1, in the configuration with active prevention of the handle and block of the movement of the bolt-moving rod;

Figure 4 shows the lock of figure 1, in the configuration for returning bolts and spring latch by operating on the handle board;

Figure 5 shows the lock of figure 1, in the configuration for returning bolts and spring latch by operating on the cylinder tooth;

Figure 6 shows the lock of figure 1, in the bolts-out configuration;

Figure 7 shows a side elevation view of the lock of figure 1 with inclusion of the second device for selecting the operating mode for closing the lock in the third selection position for preventing the automatic reclosure of the bolts;

Figure 8 shows a front view of the second device for selecting the operating mode for closing the lock illustrated in figure 7;

Figure 9 shows a rear view of the second device for selecting the operating mode for closing the lock illustrated in figure 7;

Figure 10 shows a side elevation view of the lock of figure 1 with inclusion of the second device for selecting the operating mode for closing the lock in the second selection position for allowing the automatic reclosure of the bolts;

Figure 11 shows a front view of the second device for selecting the operating mode for closing the lock illustrated in figure 10;

Figure 12 shows a rear view of the second device for selecting the operating mode for closing the lock illustrated in figure 10;

Figure 13 shows a side elevation view of the lock of figure 1 with inclusion of the second device for selecting the operating mode for closing the lock in the first selection position for preventing the automatic reclosure of the bolts and spring latch, mode known as hold open;

Figure 14 shows a front view of the second device for selecting the operating mode for closing the lock illustrated in figure 13; and

Figure 15 shows a rear view of the second device for selecting the operating mode for closing the lock illustrated in figure 13.

[0015] The description of the lock with several automatic closure points is schematically reported below.

[0016] The lock is applicable to any one door/window frame, preferably metal, of which the movable part can be a door or a shutter adapted to be locked to a fixed part, against which it is abutted.

[0017] The functions of the lock, subject of the finding, are the following.

[0018] First of all, there is the complete exit of the bolts only when the shutter or door is perfectly aligned with the ledge and retained by the spring latch at such ledge.

[0019] When the shutter is retained by the spring latch, the bolts come out.

[0020] A counter-plate of traditional type is used, lacking seats or abutment elements as is instead sometimes necessary for the locks of the prior art.

[0021] The spring closure mode of the lock can be substantially defined by the complete closure of the bolts and the spring latch or of only the single spring latch, or alternatively there is also the possibility for totally preventing the complete closure of the bolts and spring latch or of only the spring latch, so as to have the so-called hold open function.

[0022] In the case of lock opening mode, there are many possibilities which give the lock a high flexibility of use.

[0023] It is possible to operate the opening of the lock by means of the handle, with a rotation of the same of about 40°, so as to sequentially open the bolts and then the spring latch.

[0024] It is also possible to operate the opening of the lock through the key, by means of which the bolts are returned with the first turn, and the spring latch is returned with the second half turn.

[0025] Among the various use possibilities of the lock, there is that of carrying out the prevention of the handle.

[0026] The prevention of the handle occurs with a turn of the key in the lock's closing direction, and it is possible to activate this option only if the shutter or door is closed with the bolts out.

[0027] The prevention of the handle referred to above involves controlling the complete closure of the bolts.

[0028] Indeed, if the bolts are not completely inserted in the proper seats, the key is not capable of completing the closure turn.

[0029] The prevention of the handle referred to above also involves blocking the rod for moving the central bolts and the additional bolts.

[0030] By simultaneously operating the aforesaid options for preventing the handle, for controlling the complete closure of the bolts by means of the key itself, and for blocking the rod for moving the central bolts and additional bolts, the lock is set in maximum-security position.

[0031] In order to obtain the above-indicated functioning type, the lock that is the subject of the finding substantially provides for four main kinematic devices for its functioning.

[0032] The first device is the device for aligning the shutter or door and retention by means of spring latch, with consequent closure arrangement of the lock which also affects the additional bolts.

[0033] The second device is that for selecting the operating mode for closing the lock.

[0034] The third device is that for opening by means of the handle and the key, which can be separately or selectively activated.

[0035] The fourth device has means for carrying out the previously described functions related to the prevention of the inner handle, or the outer handle, or both handles, for controlling the complete closure of the bolts by means of the key itself and for blocking the rod for moving the central bolts and the additional bolts.

[0036] The lock has components contained in a box cover 90 defined by a front plate 91 (from hereon simply defined as plate), a lower base 92 and an opposite upper base 93, a rear base 94 opposite the plate, and two opposite lateral bases 95 (of which only one is illustrated).

[0037] Below, when reference is made to hinging of the lock components, it is intended that the rotation axes are orthogonal to the lateral bases 95 of the cover 90.

[0038] In particular, the first alignment device has an "S"-shaped equaliser 30 which has three hinging points, of which the first 31 is situated on the spring latch 20, the second 32 is on a reload piston 33, and the third 34 is that of rotation on a bush 35 fixed to the cover 90 of the lock.

[0039] Analogous to the spring latch 20, the reload piston 33 is projected outside the plate 91 of the lock and is movable in horizontal translation.

[0040] The equaliser 30 is therefore movable with rototranslational motion action commanded by the movement of the spring latch 20 and the reload piston 33.

[0041] The equaliser 30 is moved, as we will see below, in order to free a reload element 36.

[0042] The first device substantially operates in the following manner.

[0043] The movable part is brought close to the fixed part of the door/window frame.

[0044] The spring latch 20, which operates in an opposing manner and due to the action of a spring which pushes it towards the extracted position, encounters the counter-plate and is moved back, so to then exit when it

encounters a suitable recess in the counter-plate in which it is positioned. Meanwhile, the reload piston 33 moves back, encountering the counter-plate, and remains in the back position.

[0045] Due to this differential movement of the spring lock 20 and the reload piston 33, the equaliser 30 by means of the hinging point 31 is driven in rotation by the spring latch 20.

[0046] The rotation of the equaliser 30 moves a small anchor 55 pivoted in 56 which frees the reload element 36 which, by rotating on a pivot 23, frees a rod 11 which translates vertically upward, pushed by suitable springs, setting in rotation the bolt 13 by means of a tooth 12 integral with the rod 11 so as to cause the extraction of the bolt 13.

[0047] The re-entry of the bolts occurs by means of the handle and the key.

[0048] The second closure device has a selector 61 that can be moved between a first angular position for blocking the rod 11 in order to prevent the closure of each bolt present (in particular the single central bolt if it is the only one present or of the central main bolt and any other additional bolt present) and the spring lock, and a second angular position for unblocking the travel of the rod 11 in order to allow the closure of all the bolts (central and additional if present) and the spring latch, and a third angular position for partially blocking the rod 11, which limits the travel of the rod 11, thus allowing the closure of only the spring latch.

[0049] A lock element 62 is integral with the selector 61, and both are pivoted in 63 to the plate of the lock.

[0050] The central bolt and the spring latch are controlled by the rod 11 contained in the lock, which is integral with one or more transmission rods 60, each of which controlling an additional bolt 98.

[0051] A transmission rod 60 has a slot 65 having a first tooth 64a in which the element 62 is engaged only when the selector 61 assumes its first angular blocking position (shutter free, hold open) and a second tooth 64 in which the element 62 can be engaged only when the selector assumes its third angular position for partial blocking of the rod (only spring latch closure), while when the selector 61 assumes its second angular blocking position there is no interference between the slot 65 and the teeth 64 and 64a, such that the transmission rod 60 and consequently the rod 11 are not blocked (closure with bolt and spring latch).

[0052] In the partial blocking position, the lock is set for closure mode by means of the alignment device, in which the activation system for closing the bolts is prevented while the spring latch functions normally.

[0053] The third kinematic mechanism or opening device can be activated by means of the handle 1 which, by means of its own tooth 3, translates a tie-rod 2 downward. Such tie-rod 2 places in rotation a return lever 17 pivoted in 18, with which it is engaged by means of a drive pin 70.

[0054] The return lever 17 has a roller 19 which is en-

gaged with a tongue 21 of the rod 11, making it translate downward.

[0055] The rod 11, through the tooth 12, causes the bolt 13 to re-enter, and subsequently causes the spring latch 20 to re-enter.

[0056] For moving the spring latch 20, the tongue 21 of the rod 11 engages a lever 22 pivoted in 23, which by rotating pushes against a pin 75 integral with the inner plate 76 of the spring latch 20, thus carrying out the re-entry of the spring latch 20.

[0057] The third kinematic device or opening device can also be activated by means of the key, which by means of a rack 8 pulls the rod 11 downward by means of a drop section 24 associated with the rod 11 so as to return the bolt 13 first and then the spring latch 20.

[0058] It must be observed that, after the first key turn with which the bolt 13 is returned, the rod 11 is momentarily retained by a tooth 25 in the position which it attained due to the first key turn, so that it can be retaken in that position with the subsequent key turn for the return of the spring latch 20, cancelling the action of the springs which between the first and the second key turn would tend to bring the rod 11 back, vertically upward.

[0059] The fourth device is that adapted for operating the prevention of the handle, and still subordinately to this operation, it operates the control of the complete closure of the bolts by means of the key and the blocking of the rod 11.

[0060] The tie-rod 2 has two windows 4 and 5 and in case of prevention of the handle 1 it is not activated, since the tooth 3 of the handle 1 is engaged in the second window 5 and thus is not operative. Consequently, such tooth 3 does not act on the tie-rod 2 and the handle 1 remains idle.

[0061] In particular, for attaining the prevention of the handle, the cam 6 of the cylinder 7 of the lock, by rotating in the closure direction, translates the rack 8 upward. Such rack 8 rotates a prevention equaliser 9 pivoted in 10 which in turn translates upward the tie-rod 2 which presents the inactive window 5 to the tooth 3.

[0062] Subordinately to the prevention of the handle, there is the control of the complete closure of the bolts by means of the key, when such bolts are not totally out.

[0063] Indeed, at the same time as the driving in rotation of the equaliser 9, the rack 8 by means of its drop section 14 places in rotation a relock 15 pivoted in 16 which passes from a first position in which the downward translation of the rod 11 is not blocked to a second position in which it intercepts the rod 11 with its tilted surface 77 in order to prevent the downward translation of the rod 11.

[0064] The rod 11 has an extra travel 81 which ensures the irreversibility of the bolt movement 13, such that it remains blocked when it is out.

[0065] In the case of incomplete closure of the bolt 13, the relock 15, during the passage from its first to its second position and by means of its tilted surface 77, pushes the rod 11 and consequently the tooth 12 in upward trans-

lation in order to complete the exit of the bolt 13 and make the rod 11 execute also the additional travel 81 necessary for ensuring the irreversibility of the bolt movement 13.

[0066] In figure 3, the rod 11 is visible upon completion of the extra travel 81, with in particular the tooth 12 positioned against a section 79 of the cam 78 engaging the movement of the bolt 13 from the tooth 12, which does not allow the bolt 13 to rotate around its own pivot 80 in order to be moved back.

[0067] Therefore, thanks to the fourth device, the handle is prevented with a key turn, and following the prevention of the handle, the extraction is completed of the bolts that may not be completely out and the rod 11 is locked in the end stop position.

[0068] The lock with several automatic closure points thus conceived is susceptible to numerous modifications and variants, all falling within the scope of the inventive concept; moreover, all details can be substituted with technically equivalent elements.

[0069] In practice, the materials used, as well as the size, can be of any type according to needs and the state of the art.

Claims

1. Lock with several automatic closure points of a door/window frame, **characterised in that** it comprises a first kinematic device for closing said lock following the alignment of the movable part with the fixed part of said door/window frame and retaining in alignment position by means of spring latch, a second kinematic device for selecting the operating mode for closing said lock, a third kinematic device for opening said lock by means of handle and/or key, and a fourth kinematic device for preventing the opening of said lock by means of said handle.
2. Lock with several automatic closure points according to the preceding claim, **characterised in that** said first kinematic device is adapted for the complete exit of the bolts of said lock only and exclusively when the alignment of said movable part with said fixed part is verified, first the spring latch and then the bolts sequentially coming out upon attaining said alignment.
3. Lock with several automatic closure points according to one or more of the preceding claims, **characterised in that** said first kinematic device has a rototranslatable equaliser which has a first hinging point on the spring latch of the lock, a second hinging point on a load piston, and a third hinging point at the covering of the lock, said spring lock and said reload piston being projected outside the plate of the lock and being movably supported in translation through said plate for moving said equaliser.

4. Lock with several automatic closure points according to one or more of the preceding claims, **characterised in that** said second kinematic device is adapted for selecting the complete closure of the bolts and the spring latch or only the spring latch or for totally preventing the complete closure of the bolts and spring latch or only the spring latch so to have hold open function.
5. Lock with several automatic closure points according to one or more of the preceding claims, **characterised in that** said second kinematic device has a selector movable between a first angular position for totally blocking the travel of a rod for moving at least the main bolt, a second angular position for totally unblocking the travel of said rod for moving at least the main bolt, and a third angular position limiting the travel of said rod for moving at least the main bolt.
6. Lock with several automatic closure points according to one or more of the preceding claims, **characterised in that** a lock element is integral with said selector and both are pivoted to the lock plate, and **in that** at least one transmission rod is provided for moving at least one secondary bolt, integrally supported by said rod for moving the main bolt and having one slot having a first tooth in which said stop element is engaged only when said selector assumes its said first angular position and a second tooth in which said stop element can be engaged only when said selector assumes its said third angular position, there being no interference between said slot and said first and second tooth when said selector assumes its said second angular position.
7. Lock with several automatic closure points according to one or more of the preceding claims, **characterised in that** said third kinematic mechanism, for its own activation by means of the tooth of the handle, comprises a tie-rod that can be actuated in translation by said tooth and is in turn adapted for actuating in rotation a return lever which is engaged with a tongue of the rod for moving the main bolt, in order to move it in translation so as to cause the re-entry of at least the main bolt.
8. Lock with several automatic closure points according to one or more of the preceding claims, **characterised in that** said third kinematic device, in order to cause the re-entry of the spring latch after the re-entry of the main bolt, of the bolts, comprises a lever actuatable in rotation by said tongue and adapted to interfere with spring latch for its re-entry.
9. Lock with several automatic closure points according to one or more of the preceding claims, **characterised in that** said third kinematic device, for its own activation by means of key, comprises a translatable

rack that is associated with the rod for moving the main bolt.

10. Lock with several automatic closure points according to one or more of the preceding claims, **characterised in that** fourth kinematic device is activated by means of a key turn in the closing sense of said lock, when said movable part is closed with the bolts of said lock out. 5
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11. Lock with several automatic closure points according to one or more of the preceding claims, **characterised in that** fourth kinematic device comprises an inactive window of said tie-rod in which said tooth is engaged without actuating said tie-rod. 15
12. Lock with several automatic closure points according to one or more of the preceding claims, **characterised in that** fourth kinematic device for preventing the handle comprises a prevention equaliser which can be actuated in rotation by said rack actuated by said tooth in order to move in turn said tie-rod, such that it presents said inactive window to said tooth. 20
13. Lock with several automatic closure points according to one or more of the preceding claims, **characterised in that** fourth kinematic device has means for controlling the complete closure at least of the main bolt, which can be actuated during said key turn for preventing the handle. 25
30
14. Lock with several automatic closure points according to one or more of the preceding claims, **characterised in that** fourth kinematic device has means for locking the rod for moving the main bolt which can be actuated during said key turn for preventing the handle. 35
15. Lock with several automatic closure points according to one or more of the preceding claims; **characterised in that** means for locking the rod for moving the main bolt comprise a relock actuatable in rotation by said rack in order to pass from a first interference position to a position of non-interference with the rod for moving the main bolt. 40
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16. Lock with several automatic closure points according to one or more of the preceding claims, **characterised in that** said rod for moving the main bolt has an extra travel which ensures the irreversibility of the main bolt movement such that this remains locked when it is out, and **in that** said means for controlling the complete closure at least of the main bolt comprise a tilted surface of said relock adapted to engage said rod for moving the main bolt, in order to translate it so as to complete the exit of the main bolt and carry out said extra travel. 50
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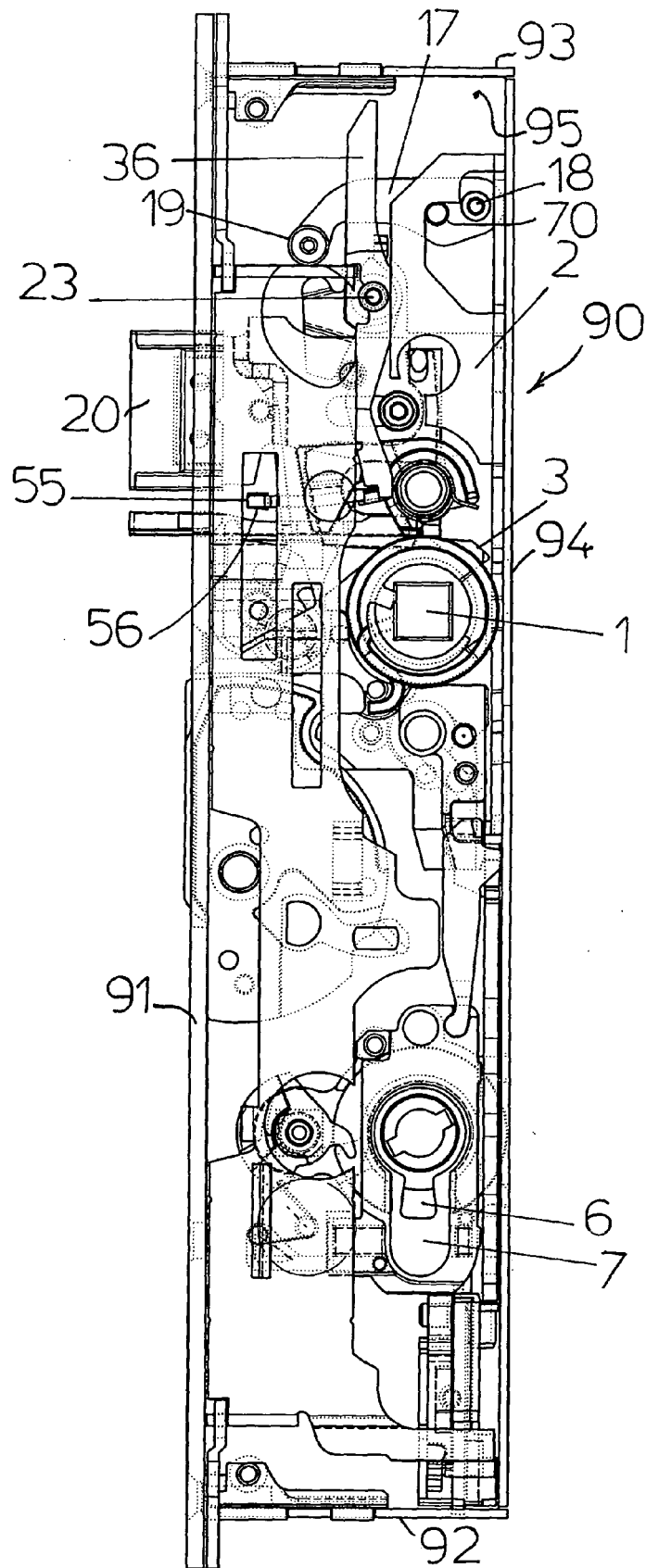


Fig-1

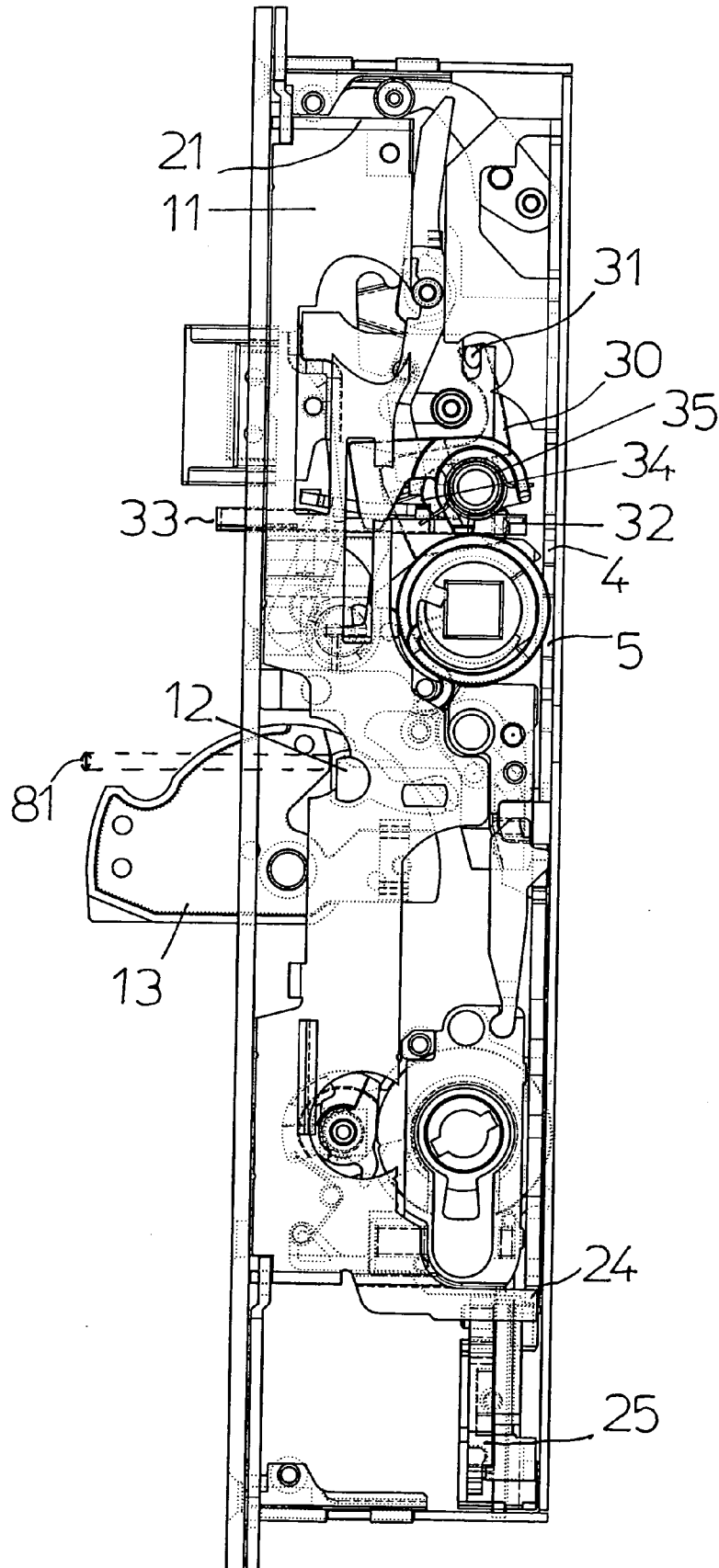


Fig-2

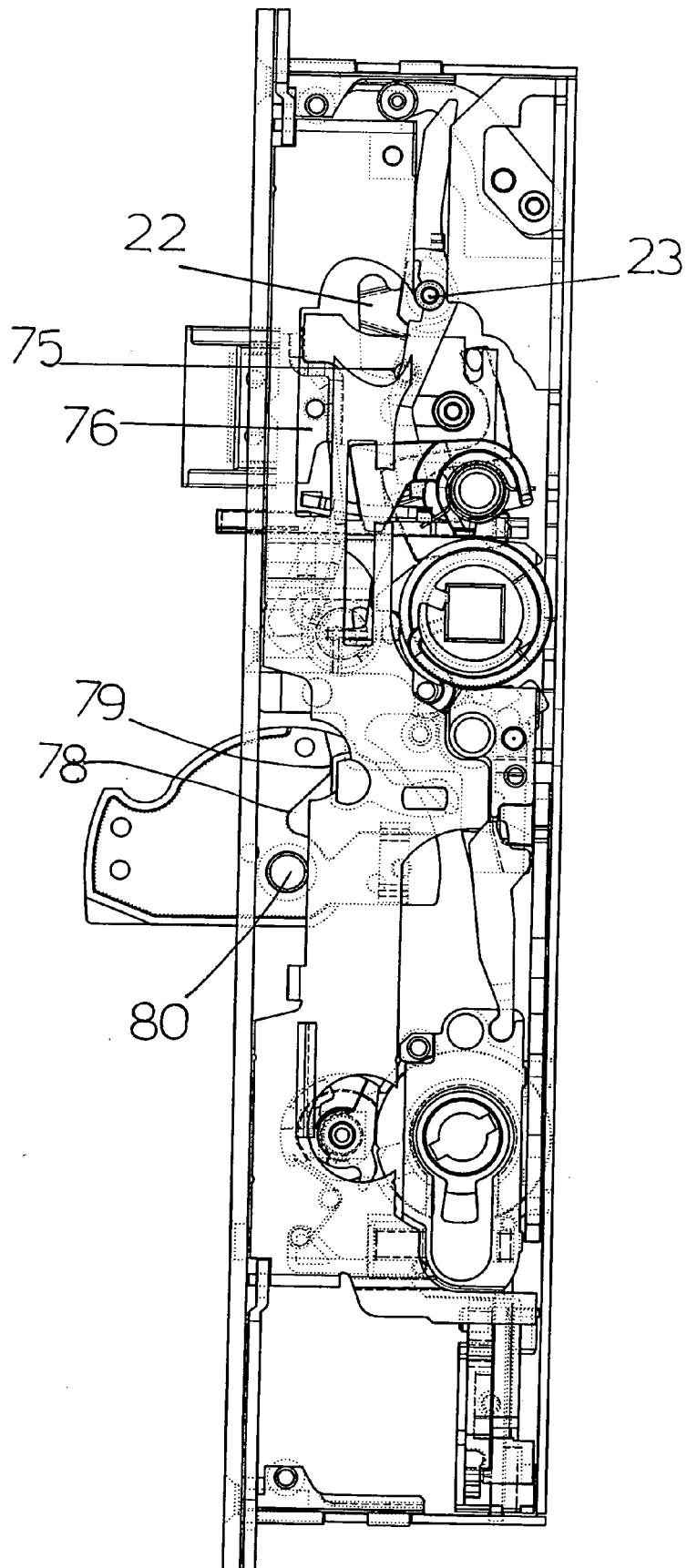


Fig-3

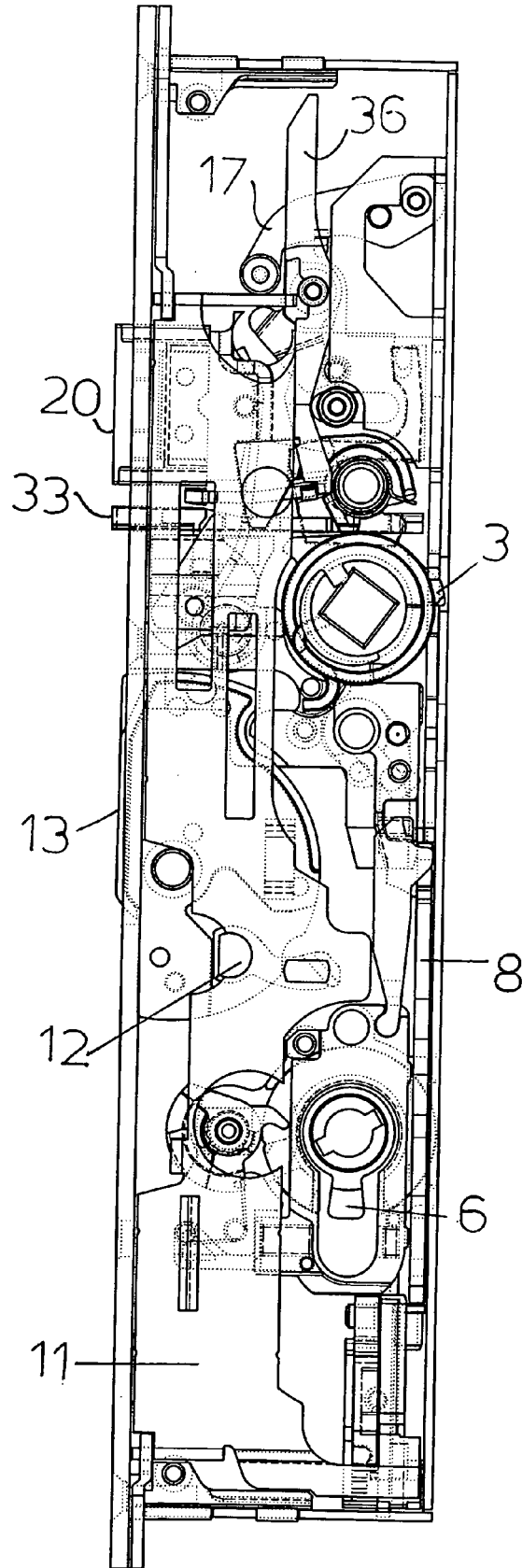


Fig-4

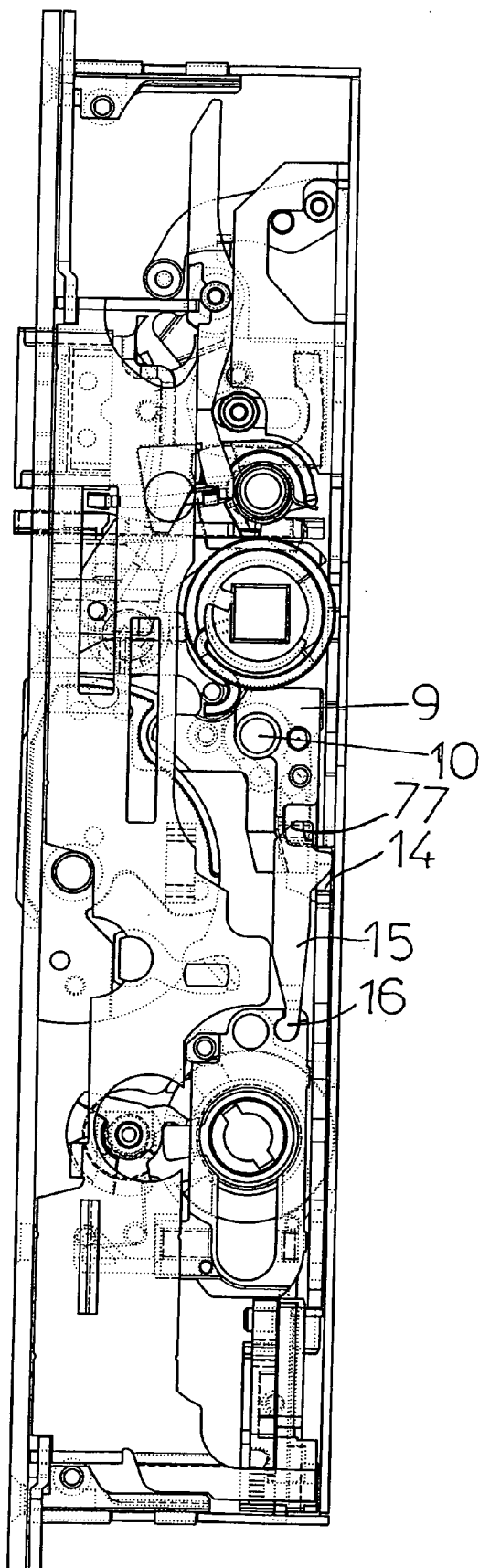


Fig-5

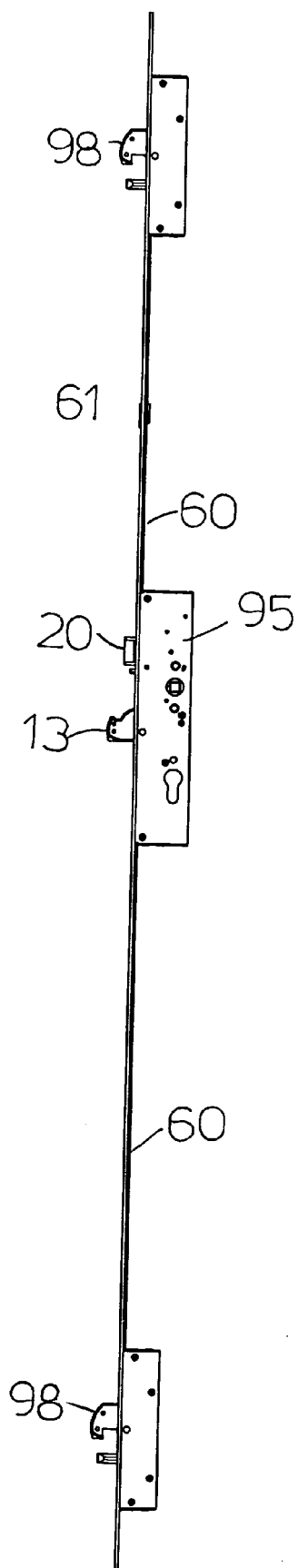
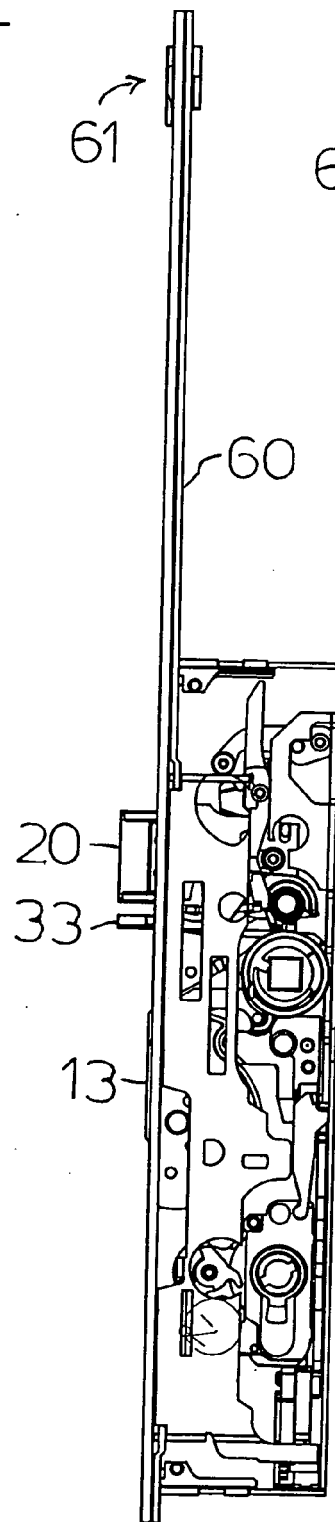
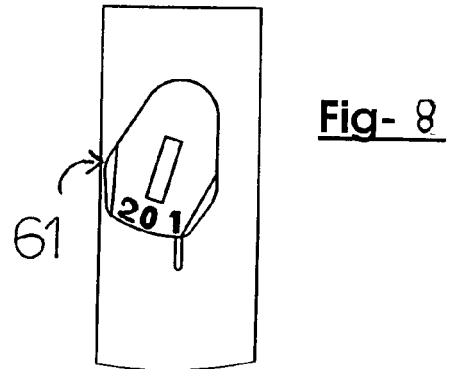
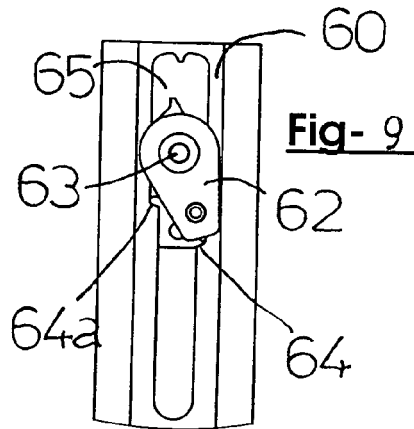


Fig-6



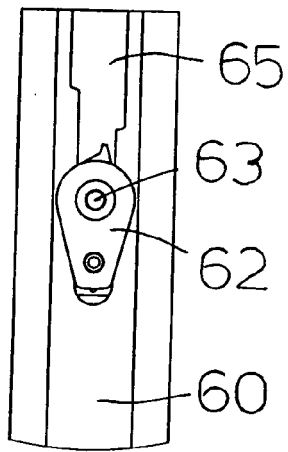


Fig-12

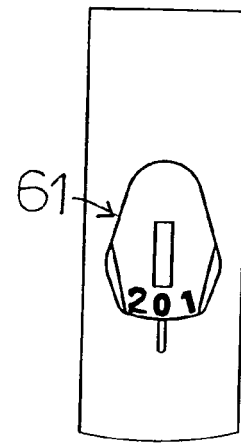
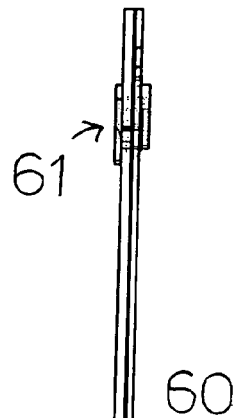


Fig-11

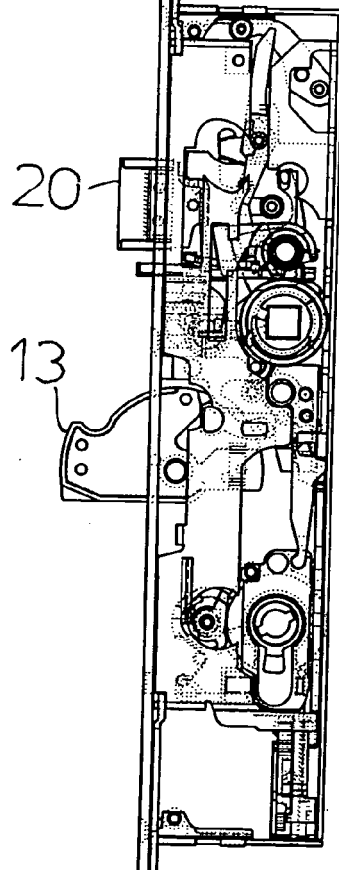


Fig-10

