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(54) **Lock assembly**

(57) Lock assembly for outside doors, particularly front doors, comprising a lock case accommodated in the door leaf, the lock case having a latch and at least one dead bolt, as well as one or more lock plates accommodated in the door casing and having receiving spaces for the latch and the dead bolt, wherein an inner lever handle is arranged on the lock case which lever handle by means of first connection means is operative-

ly connected to the latch for retracting it, by means of second connection means is operatively connected to the dead bolt for extending it, and by means of third connection means is operatively connected to the dead bolt for retracting it, wherein the first coupling means are provided for bringing the third connection means in and out of coupled condition.

EP 1 443 163 A2

Description

[0001] The invention relates to a lock assembly for doors, as well as to a lock case for it.

[0002] It is known to provide front doors of houses with lock assemblies having a lock case provided with a latch and possibly a dead bolt, wherein at the inside of the door a lever handle is provided for operating the latch. At the outside the door is provided with a permanent knob or bracket. The door may furthermore be provided with one or more dead bolts.

[0003] It is an object of the invention to provide a lock assembly for front doors in particular, which at the inside may be equipped with a lever handle for operating the lock, particularly latches and dead bolts.

[0004] It is a further object of the invention to provide a lock assembly for doors having an increased ease of operation, particularly with front doors.

[0005] It is another object of the invention to provide a lock assembly for doors, which at the outside is provided with an operation lever handle which is permanently movable.

[0006] A further object of the invention is to provide a lock assembly with which the dead bolts can be extended and retracted by means of a lever handle, but which provides an increased safety against unauthorised operation.

[0007] It is a further object to provide a lock assembly which in an authorised manner is easy to operate, particularly from the outside.

[0008] From one aspect the invention provides a lock assembly for outside doors, particularly front doors, comprising a lock case accommodated in the door leaf, the lock case having a latch and at least one dead bolt, as well as one or more lock plates accommodated in the door casing and having receiving spaces for the latch and the dead bolt, wherein an inner lever handle is arranged on the lock case which lever handle by means of first connection means is operatively connected to the latch for retracting it, by means of second connection means is operatively connected to the dead bolt for extending it, and by means of third connection means is operatively connected to the dead bolt for retracting it, wherein first coupling means are provided for bringing the third connection means in and out of operative coupled condition between the dead bolt and the inner lever handle.

[0009] Thus the operation of the inner lever handle for retracting the dead bolts again can be cancelled. As a result an unauthorised person who is in the house and who wishes to use the door for taking objects out of the house, is unable to retract the dead bolts in the usual way. He will then either have to force the door or follow the way used for the unauthorised entrance. The chance of the person getting caught is thereby increased.

[0010] Preferably the third connection means comprise a first connection member provided with a first stop and permanently connected to the dead bolt and com-

prise a second connection member provided with a second stop and operatively connected to the inner lever handle, in order to when rotating the inner lever handle have the second stop about the first stop in order to move the first connection member for retracting the dead bolt, wherein the first coupling means are operable for changing the relative position of the first and second stop until out of each other's reach.

[0011] Preferably the first coupling means are operable for in absolute sense moving the path of motion of the second stop until out of reach of the first stop.

[0012] In a simple development thereof the second connection member comprises a sliding plate, which by rotating the inner lever handle follows a substantially linear path of movement, wherein the first coupling means are adapted for moving the second stop transverse to the path of movement. Preferably the first coupling means comprise a first coupling plate which is provided with a pin and the sliding plate comprises an elongated hole into which the pin fittingly engages, wherein the first coupling plate is slidable in a direction transverse to the elongated hole.

[0013] It is furthermore preferred that, preferably spring-biased, means are provided for locking the first coupling means in the position uncoupling the third connection means.

[0014] It is furthermore preferred that, preferably spring-biased, means are provided for locking the first coupling means in the position coupling the third connection means.

[0015] The lock assembly preferably is provided with a cylinder lock (profile cylinder, such as Europrofile) of which the cam is part of the first coupling means. Preferably the cam is positioned for shifting the first coupling plate between the uncoupling and the coupling condition.

[0016] Preferably the lock assembly is provided with means for cancelling the locking, particularly with a cylinder lock (profile cylinder, such as Europrofile), of which the cam is part of the means for cancelling the locking.

[0017] The placing of the cylinder lock (profile cylinder, such as Europrofile) and the first coupling plate and/or the means for cancelling the locking preferably is such that the cam is operative in there in an upper part track of the circumferential path of the cam.

[0018] The second connection means preferably are permanently operative.

[0019] From a further aspect it is provided that an outer lever handle is arranged on the lock case which lever handle by means of fourth connection means is operatively connected to the latch for retracting it, by means of fifth connection means is operatively connected to the dead bolt for extending it, and by means of sixth connection means is operatively connected to the dead bolt for retracting it, wherein the second coupling means are provided for bringing the sixth connection means in and out of operative coupled condition between the dead bolt and the outer lever handle.

[0020] From the outside as well the resident is able to render the retraction of the dead bolts impossible.

[0021] Furthermore third coupling means may be provided for bringing the fourth connection means in and out of operative coupled condition, so that the latch is not operated for retraction.

[0022] In a simple embodiment the second and third coupling means are at least partially similar.

[0023] Preferably the first coupling means are also operative in bringing the sixth connection means in and out of operative coupled condition and preferably are also in series with the second coupling means. Thus a double security is obtained against unauthorised operation of the dead bolts.

[0024] The sixth connection means may partially coincide with the third connection means, wherein the second coupling means are operative in either realising or cancelling said coincidence.

[0025] The fourth connection means may partially coincide with the first connection means, and the third coupling means may be operative in either realising or cancelling said coincidence.

[0026] The second coupling means may be provided with first biasing means for biasing a first coupling member thereof towards a position uncoupling the second coupling means.

[0027] The second coupling means may furthermore comprise a second coupling member, particularly a tiltable lever, which is movable, particularly tiltable, between a coupling and an uncoupling position, wherein second biasing means are present for biasing the second biasing member towards a coupling position, wherein the first and the second coupling member in the uncoupled position abut each other and the first coupling member keeps the second coupling member in the uncoupled position counter the second biasing means.

[0028] Preferably the lock assembly is furthermore provided with a cylinder lock (profile cylinder, such as Europrofile), of which the cam is part of the second coupling means and which operates the first coupling member.

[0029] Preferably the second coupling means comprise a third coupling member, such as a lever, which is lifted by the cam to move the first coupling member, counter spring-biasing, to the coupling position. By a slight rotation of the key the coupling can be accomplished, due to which the ease of use is strongly increased.

[0030] In a further embodiment the inner lever handle and the outer lever handle have their own lever handle spindle and their own followers, which are placed adjacently in a centre plane, wherein at the inner side and at the outer side follower plates and coupling plates have been arranged, which respectively have been provided with cams and with lips extending in lever handle spindle direction, over the centre plane and in the path of the cams.

[0031] From a further aspect the invention provides a

lock assembly for outside doors, particularly front doors, comprising a lock case accommodated in the door leaf, the lock case having a latch and at least one dead bolt, as well as one or more lock plates accommodated in the door casing and having receiving spaces for the latch and the dead bolt, wherein an inner lever handle and an outer lever handle have been arranged on the lock case, wherein the inner lever handle and the outer lever handle have their own lever handle spindle and their own followers, which are placed adjacently in a centre plane, wherein at the inner side and at the outer side follower plates and coupling plates have been arranged, which respectively have been provided with cams and with lips extending in lever handle spindle direction, over the centre plane and in the path of the cams.

[0032] From a further aspect the invention provides a lock assembly for outside doors, particularly front doors, comprising a lock case accommodated in the door leaf, the lock case having a latch and at least one dead bolt and operation means for them, furthermore comprising at least one movable lever handle that can be brought into operative connection with operation means for the latch and/or dead bolt, and furthermore comprising means for uncoupling the lever handle motion, particularly at the outer side, with the operation means for retracting the latch and/or dead bolt, wherein the uncoupling means are adapted for releasing the lever handle motion by means of a key, and can be brought into a stable position by the key.

[0033] As a result the door can be opened with one single hand, if necessary, by first operating the key and subsequently by operating the lever handle with the same hand.

[0034] Preferably the means for coupling-uncoupling comprise a lever spring-biased to a coupling position, which lever in the coupling position directly or indirectly couples the lever handle to the operation means.

[0035] The invention furthermore provides a lock case suitable and intended for a lock assembly according to the invention.

[0036] The invention furthermore provides a door, provided with a lock assembly according to the invention, designed as front door of a residential building, provided with a lever handle on both sides.

[0037] The invention will be elucidated on the basis of an exemplary embodiment shown in the attached drawings, in which:

Figure 1 shows a lever handle/follower plate assembly for an exemplary embodiment of a lock assembly according to the invention in exploded view;

Figure 2 shows the lever handle/follower plate assembly of figure 1, in exploded view, seen from the opposite side;

Figures 3, 3A, 3B and 3C show the assembly of figures 1 and 2, in perspective view, a view from the

inside, a view from the outside and in side view, respectively;

Figures 4A-C show views corresponding to those of figures 3A-C, respectively, when operating a lever handle of the lock assembly according to the example;

Figure 5 shows a lock assembly according to the invention, having the said lever handle/follower assembly, accommodated in a front door of a house, with only the latch extending;

Figure 6 shows the lock assembly of figure 5, with retracted latch;

Figures 7A and 7B show the lock assembly of the figures 5 and 6, near the upper end and near the lever handle operative area, respectively, when opening the door from the outside;

Figure 8A and 8B show the lock assembly of the figures 5 and 6, in partial and full cut-away view, before and in additionally secured condition of the dead bolts;

Figure 9 shows the lock assembly of the figures 5 and 6, immediately after extending the dead bolts; and

Figure 10 shows a number of parts of the lock assembly of the figures 5 and 6, in exploded view.

[0038] The disassembled lever handle/follower plate assembly 1 in figures 1 and 2 comprises a first lever handle plate 20 and a second lever handle plate 10 situated at the residential side of the lock assembly, subsequently an inner follower plate 30, an inner follower part 40, an outer follower part 50, an outer follower plate 60 and an outer lever handle plate 70. Closing rings 80a, 80b have been arranged at both ends. All parts mentioned are provided with passages that are aligned with each other for lever handle spindles 101, 111 of the inner lever handle 100 and the outer lever handle 110, respectively.

[0039] The lever handle spindles 101 and 111 snugly fit into the square passages in the follower parts 40 and 50, which are each built up from a hexagonal portion 41, 51 and a circular portion 42, 52. In the mounted situation, the hexagonal portions 41, 51 abut each other flat, the surfaces that face each other lying in an imaginary centre plane, where the ends of the lever handle spindles 101 and 111 also meet. The hexagonal portions 41, 51 exactly fit into the hexagonal apertures 31, 61 of the inner and outer follower 30, 60. These plates, at least almost, abut each other as well. In the mounted situation, as can be seen in the figures 3 and further, the circular portions 42, 52 extend into the circular holes in the first and second lever handle plate 20, 10 or into the

substantially circular hole 71 in the outer lever handle plate 70. The circular portions 42, 52 moreover extend into the said closing rings 80a, 8b.

[0040] The first lever handle plate 20 has an arm 24 having an integrally formed and perpendicularly turned operation lip 25. At a location almost diametrical to the arm 24, the first lever handle plate 20 is furthermore provided with an integrally formed and perpendicularly turned operation lip 21, which is provided with a stop surface 22. The first lever handle plate 20 is provided with perpendicularly turned lips 26 and 27, which can be formed as one unity with each other.

[0041] The second lever handle plate 10 is provided with an operation cam 13 formed in the same plane, as well as with an attachment pin 16, which will be mentioned further below, and an ear 14 shifted from and parallel to the plane of the lever handle plate 10, which ear has a hole 15. Furthermore a turned lip 17 is integrally formed to the second lever handle plate 10.

[0042] As indicated in the figures 1 and 2 the pin 16 serves to attach a coupling catch 90, which is provided with an operation lip 92 a lip 93 and a stop end 91, of which the function is yet to be described. By means of a spring that is not shown, the coupling catch 90 is biased towards a position extending into the path of motion of lip 26, for engagement therewith.

[0043] The inner follower plate 30 is provided with a cam 32 on which on the one hand stop surface 33 is provided and on the other hand an inner stop surface 34 and an outer stop surface 35 are provided. At the diametrical opposite side a cam 36 is formed, having stop surface 37. A cam 38 having stop surface 39 is also formed there.

[0044] In a comparable manner the outer follower plate 60 is provided with a cam 62, having stop surface 63 and stop surface 64 facing in counter direction, and diametrically opposite it with a cam 65 having stop surface 66 and a cam 67 having stop surface 68. In radial direction the cam 62 extends just as far as the surface 34. The cam therefore describes a larger path than the cam 62.

[0045] The outer lever handle plate 70 is provided with a hole 71, a lip 72 which extends inward and has a stop surface 73, an a diametrically opposite lip 75, having stop surface 76. The plate 70 itself is furthermore provided with an operation cam 74.

[0046] The degree to which the lips 11, 22, 25, 72 and 75 project from the plates in question is such that in the assembled situation, see the figures 3 and 4, they come within the paths of movement of the various cams. For instance cam 72 extends up to the first lever handle plate 20 and the lips 11 and 21 both extend up to the lever handle plate 70. The cam 62 is situated in the path of rotation of the lip 72, which is bent out of the material of the lever handle plate 70 and is also situated in the path of rotation of the lip 21.

[0047] Likewise the cam 32 extends within the path of rotation of the lip 72 and furthermore within the path of

rotation of the lip 21 as well as of the lip 11.

[0048] In general diametrically opposite lips or cams having stop surfaces are used in optimising the transmission of forces during rotation.

[0049] In the figures 3A-C and figures 4A-C the lever handle/follower assembly of figures 1 and 2 is assembled and shown in various views. The situations are different to such an extent, however, that in the figures 3A-C the coupling catch 90 extends in the path of the lips 26, 27, with the stop end 91 and thus a motion coupling is present between the lever handle plates 10 and 20, but that this is not the case in the figures 4A-C. In the figures 4A-C, as a result, as will be further explained, when rotating the follower 50, a corotation of the first lever handle plate 20 but not of the lever handle plate 10, is realised so that the cam 13 and the ear 14 remain in their places, as considered in direction of rotation. The lever handle plate 70 furthermore remains in its place as considered in direction of rotation.

[0050] The figures 5 and further show an assembly that substantially corresponds with the assembly of the previous figures accommodated in a lock case, in a door, particularly a front door of a house or the like.

[0051] A lock assembly 2 according to the invention is accommodated in the front door 5, the lock assembly having a lock case or housing formed by walls 3a, 3b, 3c and 4, in which various parts shown in the figures 5 and further have been accommodated.

[0052] The lock assembly comprises a latch 170, arranged on a pin 171, having a stop 172. The latch 170 is spring-biased into a projecting position, extending beyond the lock plate 6.

[0053] The lock assembly 2 is furthermore provided with a dead bolt 160, that is rotatable about fixed pin 161 and is provided with a slot 162 and a hook 163. In the slot 162 a pin 151 (see figure 5) is accommodated, which pin 151 is permanent to bolt plate 150 that can be slid up and down. The bolt plate 150 is slightly shorter than the distance between the walls 3a and 3b of the lock case, and reciprocally slidable between them. At both ends the bolt plate 150 is provided with turned ends 156, 159, and formed as one unity with vertical strips 155, which form a connection that is not further shown with other dead bolts, which are accommodated in a manner that is not shown in the door 5.

[0054] Parallel to the bolt plate 150, an operation plate 300 is arranged, which is also strip-shaped and hinged to the ear 14 of the second lever handle plate 10 by means of a pin passed through the hole 15. The upper end of the operation plate 300 is provided with a vertical slot 303, in which a pin 335 which will be further discussed is accommodated in a manner so as to be slidable up and down. In addition the operation plate 300, as seen in the drawing on the left-hand side, is provided with a downward turned lip 302. The upper edge of the operation plate 300 forms a stop edge 301. An inclined edge 304 is furthermore provided near the upper edge.

[0055] A torsion spring 180 is furthermore shown,

which is permanent to the lock case, and abuts the turned lip 25 with the arm 181, as can be seen in figures 5 and 6.

[0056] As can be seen in the figures 5-9, a sliding plate 220 is provided below the operation plate 300, which sliding plate at the lower end 240 is provided with an pilot edge 241. The pilot edge 241 is in contact with the turned lip 92 of the coupling catch 90. At the broadened upper end of the sliding plate 220 a transversely projecting pin 221 is attached, which extends in a slot 337 of a sliding plate 330. The sliding plate 220 is vertically movable. The sliding plate 220 is then guided by the permanent pin 190 extending in the vertical elongated hole 223 of the sliding plate 220 and by the permanent pin 191 extending in the slot 224. The pin 221 and thus the plate 220 is pre-biased downward by a torsion spring 341, which is provided with two arms 342a, 342b. The arm 341 a supports against the wall 3a of the lock case and the other arm 342b supports against the pin 221.

[0057] The sliding plate 330 is slidable in the direction G (among others figure 8A) and at the lower edge is provided with a run-in edge 331, a recess 332 and a run-out edge 333. At the left end the slot 337 has a recess 334 and at the right end it has a recess 338. In those recesses, and also in the slot 337, the pin 221 extends, which as already stated, is permanent to the sliding plate 220.

[0058] At the left-hand side, the sliding plate 330 is furthermore provided with a slot 336 opening towards the clear of the frame and into which a pin 190 extends which is permanent to the lock case.

[0059] The sliding plate 330 is furthermore provided with a horizontal slot 339, into which a pin 327 extends, which is permanent to the lock case, and around which the torsion spring 341 is arranged. A pin 335 is permanently attached on the sliding plate 330, which pin 335 extends into the slot 303 of plate 300.

[0060] Furthermore (as seen in the drawing - figure 7A) a tilting plate 320 is situated above the sliding plate 330, which tilting plate can be hinged about a pin 500 that is permanent to the sliding plate 330 and which is provided with hole 328 into which the pin 335 of the sliding plate 330 extends with play. The tilting plate 320 thus is tiltable with respect to the sliding plate 330. The tilting plate 320 at its right upper end is provided with lip 320a, to which an end of a compression spring 344 is attached. With its other end the compression spring 344 is attached to lip 343 of sliding plate 330. At the left upper end of the tilting plate 320 a cam 320d is provided, which may lie in the path of edge 304 of plate 300. At the opposite side of the tilting plate 320, top left, an abutment edge 325 is provided. At the side facing the cylinder lock (profile cylinder) 400, the tilting plate 320 is provided with a shoulder 321 a, and above it with a concave edge 321 b. At the opposite side the tilting plate 320 is provided with a slot 324 in which a first receiving space 322 and a second receiving space 323 are provided, sepa-

rated by a ridge 329. The edge of the ridge 329 facing the receiving space 323, is oriented such that it may exert a clamping action on the pin 335, in the situation shown in figure 7A.

[0061] The operation of an exemplary embodiment of the lock according to the invention will now be discussed.

[0062] When (see figure 1), in this case, the lever handle 100 placed at the inner side of the door is pivoted upward in the direction A its square top 101 will co-rotate the follower part 40. The follower part 50 remains in its place. Due to the hexagonal edge 41 of the follower part 40 which engages into the hexagonal hole 31 of follower plate 30, follower plate 30 is co-rotated in the direction A. Thus, the cam 32 is also rotated, and thus the stop surface 33 on it. This surface 33 abuts surface 73 on lip 72 of outer lever handle plate 70, which co-rotates and thus the cam 74 which presses against the stop 158 of the plate 150. As can be seen in figure 9 the bolt plate 150 is thus urged downward in the direction B into the position shown in figure 9. The cam 151 is thus also urged downward. The cam 151 is thereby moved within hole 162 of hooked bolt 160, as a result of which this hooked bolt 160 is rotated about fixed hinge point 161 into the extended locking position shown in figure 9. The bolt plate 150 is connected to hooked bolts that are not further shown and arranged in the lower portion of the door by an espagnolette plate 155 that is common per se. These hooked bolts are extended in a manner that can be compared with hooked bolts 160.

[0063] The latch is not operated here.

[0064] When the lever handle 100 situated at the inner side is turned downwards in the direction C, the lever handle will rotate the follower part 40 in the direction C. The follower part 50 here remains in its place. Here too, the inner follower plate 30 is taken along, in opposite direction, and thus the cam 32 as well, which with cam surface 34 then abuts cam surface 22 of cam 21 on the first lever handle plate 20 in order to co-rotate it in the direction C. The plate 70 here remains in its place.

[0065] Due to rotating the lever handle plate 20, tension is built up in the spring 180 as a result of the cam 25 abutting lip 24 against protrusion 181 of spring 180. Compare figures 5 and 6. Due to abutment of the cam surface 35 on the inner follower plate 30 against cam surface 12 of cam 11, the second lever handle plate 10 is also co-rotated and thus the cam 13 is also co-rotated, which cam abuts the abutment plate 172 at the end of bolt pin 171 of latch 170, wherein the latch 170 is retracted in direction D, as can be seen in figure 6.

[0066] With the second lever handle plate 10, the ear 14 that is integrally formed therewith in a shifted manner, co-rotates, and which by means of hole 15 and pin 301 is hinged to the elongated operation plate 300 (see figures 5 and 6). The plate 300 is moved upwards in the direction E by the ear 14.

[0067] In the figures 5 and 6 the operation plate 300, which is situated with the stop edge 301 at a distance

below the turned end 156 of the bolt plate 150, is able to move upwards freely. The dead bolts 160 are then not yet extended.

[0068] When the dead bolts are indeed extended, the stop edge 301 will indeed contact the turned end 156 of the bolt plate 150 which turned end is then situated lower. The operation plate 300 has the inclined orientation shown in figure 6, and will when moving upwards in the direction E, driven by ear 14, take the turned end 156 upwards along with it. As a result the bolt plate 150 will also go upwards, and thus the pin 151 (and also the espagnolette plate 155) will go upwards as well, due to which the hooked bolt 160 and also the other hooked bolts, are retracted.

[0069] Thus by operating the lever handle 100 from the inside, by moving it in a usual opening manner, both the latch and the hooked bolts can be retracted. In case of fleeing a residence the dead bolts need not be unlocked by means of a key.

[0070] The lock assembly according to the invention, however, has an additional facility, by which means unlocking from the inside by moving the lever handle 100 downwards, can be prevented. This facility can be used when the residence is left unattended for some time, for instance during the holidays. A burglar that may for instance have entered the house through a window, then cannot use the door for removing the objects from the house.

[0071] This is achieved by bringing the operation plate 300 with the turned lip 301 in front of the slot 157 in turned end plate 156. Upward direction in E of the operation plate 300, by operating the lever handle 100, can then take place without the transverse plate 156 is taken along upwards. The plate 300 can then move to the position shown in figure 8B. The operation of the hooked bolts therefore remains left undisturbed, and the hooked bolts remain extended.

[0072] For the positioning of the operation plate 300 needed to that end, the sliding plate 330 is provided, which is reciprocally slidable in the direction G, positions shown in figures 8A and 8B. The cylinder lock (profile cylinder) 400 lies with cam 401 in a vertical plane with the aforementioned edges 331-333 and 328, as a result of which when operating with a key of the lock 400, the key being turned in the direction F, the cam slightly lifts the plate 320 and subsequently, due to abutment against the edge of the recess 332, will urge the plate 330 to the left as seen in the drawing. The pin 335 that is attached to the plate 330 and extends in the vertical slot 303 in the operation plate 300, takes the upper end of the plate 300 along to the left, until the cam 401 is rotated beyond the edge 333. With the sliding of the plate 330 the slot 337 is also shifted, wherein the pin 221, which is fixed to plate 220, which plate is biased in downward direction by means of spring 341, is lifted by the lifting forces exerted by the cam 401 on the lower edge 222, from the receiving space 334. The pin 221 has thus also left the receiving space 322. The pin 221

is then released from the recess 338, and during moving the plate 330 towards the left (G), due to the rotation of the cam 401, the pin 221 will (relatively) run through the slot 337, in order to finally end up in front of the recess 338. During this sliding the permanent pin 190 runs in slot 336. The pin 221 is pressed into the receiving space 338 by the spring 341. The pin 221 has thus also ended up in the receiving space 223. The given position of the sliding plate 330 is locked, and thus the position of the upper end 301, 302 of the operation plate 300 in the position of figure 8B. When the inner lever handle 100 is now operated, to rotate the ear 14 upwards, to move the operation plate 300 upwards in the direction E, said turned lip 302, in the position shown in figure 8B, will move through the slot 157, wherein the bolt plate 150 remains in its place.

[0073] When unlocking this facility again, when the residents will stay in their house for a longer period again, the key of the lock 400 is operated in opposite direction, so that the cam 401 moves in the direction H. Here the cam 401 rotates past edge 333 of the sliding plate 330 against the edge 222, as a result of which the plate 220 and thus the pin 221 is lifted and the sliding plate 330 is taken along to the right again. The lip 302 then no longer is in front of slot 157, so that an upward movement of the operation plate 300 results again in the taking along of the bolt plate 150, so that the hooked bolts 160 can be retracted again when moving the lever handle 100 down.

[0074] From the outside, operation of the lever handle 110, the operation of the lock according to this exemplary embodiment of the inventions is as follows.

[0075] When rotating the outer lever handle 110 in upward direction A, the follower part 50 is co-rotated, and due to inter-engagement of the hexagonal edge 51 in hexagonal hole 61 the follower plate 60 is co-rotated. Thus the cam 62 is co-rotated, so that plane 63 abuts surface 73 of cam 72 on lever handle plate 70.

[0076] As a result the bolt plate 150 is pressed downwards, and the hooked bolts 160 will be extended as described before.

[0077] In principle the operation of the outer lever handle 110 in downward direction C may have the same result as the operation of the inner lever handle 100 in the same direction. The follower part 50 takes along the outer follower plate 60 in the direction C, wherein the cam surface 64 abuts the cam surface 22 of cam 21. Thus, in principle, the first lever handle plate 20 is co-rotated, but it can be decided whether the second lever handle plate 10 has to be co-rotated as well, and thus separately, via ear 14, the bolt plate 150 has to be moved upwards in order to retract the hooked bolts 160.

[0078] For said coupling the coupling plate 90 is tiltably attached on the second lever handle plate 10. The coupling plate 90 is tiltable about the pin 16 and is provided with a stop end 91 and a lip-shaped operation end 92. The lip 92 is in contact with the bent edge 241 of the lower portion 240 of the sliding plate 220. By means of

the spring 341 which is effective on the pin 221, the plate 220 is biased downwards. Thus also the edge 241 presses against the lip 92, due to which, as can be seen in figure 7B, a moment in the direction I is exerted on the coupling plate member 90. As a result the stop 91 remains out of reach of the lip 26 which is integrally formed to the first lever handle plate 20. Rotation of the first lever handle plate 20 will then not result in corotation of the second lever handle plate 10, and by operating the outer lever handle 110 neither the latch 170 nor the dead bolt 160 can be retracted.

[0079] When as indicated in figure 7A, the cam 401 is moved in the direction H using the key in the lock 400, the cam 401 will abut the shoulder 321 so that the tilting plate 320 is tilted upwards. As a result the pin 221 is slightly lifted, from the first receiving space 322 and will come to support on the elevation or ridge 229. The tilting plate 320 then takes up a tilted position, counter the force in the compression spring 344. Pin 221 is then clamped between the ridge 329 and the spring arm 342b, but the tilting plate 320 cannot tilt back as a result of the orientation of the aforementioned edge of the ridge 329. The key can then be turned back (the cam cannot be rotated further, due to the presence of the edges of the sliding plate 330), and be taken out. The tilting plate 320 keeps the (stable) position of figure 7A. In that position the plate 220 is moved slightly upwards, so that the bent edge 241 moves away from the lip 92. Thus room is created for -spring-biased-rotation of the member 90, so that the stop 91 comes into engagement with the lip 26. Now the outer lever handle can be operated with the same hand as used to operate the key. Rotation of the lever handle 110 in downward direction C in that case indeed results in corotation of the second lever handle plate 10, and via ear 14, in upward movement of the bolt plate 150, and thus in retraction of the latch and the hooked bolt 160, if they were extended.

[0080] After opening the door the tilting plate 320 remains in the tilted position. In order to have the tilting plate 320 tilt back again, the lip 304 will abut the cam 320d when moving the plate 300, so that the tilting plate 320 is urged aside then, wherein the pin 221 moves away from the ridge 329 towards the first recess 322. A similar cooperation exists between the edge 325 of the tilting plate 320 and the turned end 156 of plate 150.

[0081] When in case of an extended sliding plate 330 due to a revolution of the cam 401 of the lock 400 the plates 320 and 330 are moved to the left, and the operation plate 300 cannot be operative, that situation will first have to be cancelled by a full revolution of the cam. This is therefore the case when the so-called holiday position is used. Usually a partial revolution of the cam 401 will suffice, in order to subsequently lift 324, which facilitates the operation of the lock assembly from the outside to the resident.

Claims

1. Lock assembly for outside doors, particularly front doors, comprising a lock case accommodated in the door leaf, the lock case having a latch and at least one dead bolt, as well as one or more lock plates accommodated in the door casing and having receiving spaces for the latch and the dead bolt, wherein an inner lever handle is arranged on the lock case which lever handle by means of first connection means is operatively connected to the latch for retracting it, by means of second connection means is operatively connected to the dead bolt for extending it, and by means of third connection means is operatively connected to the dead bolt for retracting it, wherein first coupling means are provided for bringing the third connection means in and out of operative coupled condition between the dead bolt and the inner lever handle.
2. Lock assembly for outside doors, wherein the third connection means comprise a first connection member provided with a first stop and permanently connected to the dead bolt and comprise a second connection member provided with a second stop and operatively connected to the inner lever handle, in order to when rotating the inner lever handle have the second stop abut the first stop in order to move the first connection member for retracting the dead bolt, wherein the first coupling means are operable for changing the relative position of the first and second stop until out of each other's reach.
3. Lock assembly according to claim 2, wherein the first coupling means are operable for in absolute sense moving the path of motion of the second stop until out of reach of the first stop.
4. Lock assembly according to claim 3, wherein the second connection member comprises a sliding plate, which by rotating the inner lever handle follows a substantially linear path of movement, wherein the first coupling means are adapted for moving the second stop transverse to the path of movement.
5. Lock assembly according to claim 4, wherein the first coupling means comprise a first coupling plate which is provided with a pin and the sliding plate comprises an elongated hole into which the pin fittingly engages, wherein the first coupling plate is slidable in a direction transverse to the elongated hole.
6. Lock assembly according to any one of the preceding claims, furthermore provided with, preferably spring-biassed means for locking the first coupling means in the position uncoupling the third connection means.

7. Lock assembly according to any one of the preceding claims, furthermore provided with, preferably spring-biassed means for locking the first coupling means in the position coupling the third connection means.
8. Lock assembly according to any one of the preceding claims, furthermore provided with a cylinder lock (profile cylinder, such as Europrofile) of which the cam is part of the first coupling means.
9. Lock assembly according to claim 5 and 8, wherein the cam is positioned for shifting the first coupling plate between the uncoupling and the coupling condition.
10. Lock assembly according to claim 6 or 7, furthermore provided with means for cancelling the locking.
11. Lock assembly according to claim 10, furthermore provided with a cylinder lock (profile cylinder, such as Europrofile), of which the cam is part of the means for cancelling the locking.
12. Lock assembly according to claim 9 or 11, wherein the placing of the cylinder lock and the first coupling plate and/or the means for cancelling the locking is such that the cam is operative in there in an upper part track of the circumferential path of the cam.
13. Lock assembly according to any one of the preceding claims, wherein the second connection means are permanently operative.
14. Lock assembly according to any one of the preceding claims, wherein an outer lever handle is arranged on the lock case which lever handle by means of fourth connection means is operatively connected to the latch for retracting it, by means of fifth connection means is operatively connected to the dead bolt for extending it, and by means of sixth connection means is operatively connected to the dead bolt for retracting it, wherein the second coupling means are provided for bringing the sixth connection means in and out of operative coupled condition between the dead bolt and the outer lever handle.
15. Lock assembly according to claim 14, wherein third coupling means are provided for bringing the fourth connection means in and out of operative coupled condition.
16. Lock assembly according to claim 14 and 15, wherein the second and third coupling means are

at least partially similar.

17. Lock assembly according to claim 14, 15 or 16, wherein the first coupling means are also operative in bringing the sixth connection means in and out of operative coupled condition and preferably are also in series with the second coupling means.
18. Lock assembly according to any one of the claims 14-17, wherein the sixth connection means partially coincide with the third connection means, and the second coupling means are operative in either realising or cancelling said coincidence.
19. Lock assembly according to any one of the claims 14-18, wherein the fourth connection means partially coincide with the first connection means, and the third coupling means are operative in either realising or cancelling said coincidence.
20. Lock assembly according to any one of the claims 14-19, wherein the second coupling means are provided with first biasing means for biasing a first coupling member thereof towards an uncoupling position.
21. Lock assembly according to claim 20, wherein the second coupling means furthermore comprise a second coupling member, particularly a tiltable lever which is movable, particularly tiltable, between a coupling and an uncoupling position, wherein second biasing means are present for biasing the second biasing member towards a coupling position, wherein the first and the second coupling member in the uncoupled position abut each other and the first coupling member keeps the second coupling member in the uncoupled position counter the second biasing means.
22. Lock assembly according to claim 20 or 21, furthermore provided with a cylinder lock (profile cylinder, such as Europrofile), of which the cam is part of the second coupling means and which operates the first coupling member.
23. Lock assembly according to claim 22, wherein the second coupling means comprise a third coupling member which is lifted by the cam to move the first coupling member, counter spring-biasing, to the coupling position.
24. Lock assembly according to any one of the claims 14-23, wherein the inner lever handle and the outer lever handle have their own lever handle spindle and their own followers, which are placed adjacently in a centre plane, wherein at the inner side and at the outer side follower plates and coupling plates have been arranged, which respectively have been

provided with cams and with lips extending in lever handle spindle direction, over the centre plane and in the path of the cams.

25. Lock assembly according to any one of the preceding claims, comprising means for coupling-uncoupling the lever handle motion, particularly at the outer side, with the operation means for retracting the latch and/or the dead bolt, wherein the coupling-uncoupling means are adapted for releasing the lever handle motion by means of a key, and can be brought into a stable position by means of the key.
26. Lock assembly for outside doors, particularly front doors, comprising a lock case accommodated in the door leaf, the lock case having a latch and at least one dead bolt, as well as one or more lock plates accommodated in the door casing and having receiving spaces for the latch and the dead bolt, wherein an inner lever handle and an outer lever handle have been arranged on the lock case, wherein the inner lever handle and the outer lever handle have their own lever handle spindle and their own followers, which are placed adjacently in a centre plane, wherein at the inner side and at the outer side follower plates and coupling plates have been arranged, which respectively have been provided with cams and with lips extending in lever handle spindle direction, over the centre plane and in the path of the cams.
27. Lock assembly for outside doors, particularly front doors, comprising a lock case accommodated in the door leaf, the lock case having a latch and at least one dead bolt and operation means for them, furthermore comprising at least one movable lever handle that can be brought into operative connection with the operation means for retracting the latch.
28. Lock assembly according to claim 26, wherein the means for coupling-uncoupling comprise a lever handle spring-biased to the coupling position, which in the coupling position directly or indirectly couples the lever handle to the operation means.
29. Lock case suitable and intended for a lock assembly according to any one of the preceding claims.
30. Door, provided with a lock assembly according to any one of the claims 1-28, preferably designed as front door of a residential building and provided with a lever handle on both sides.

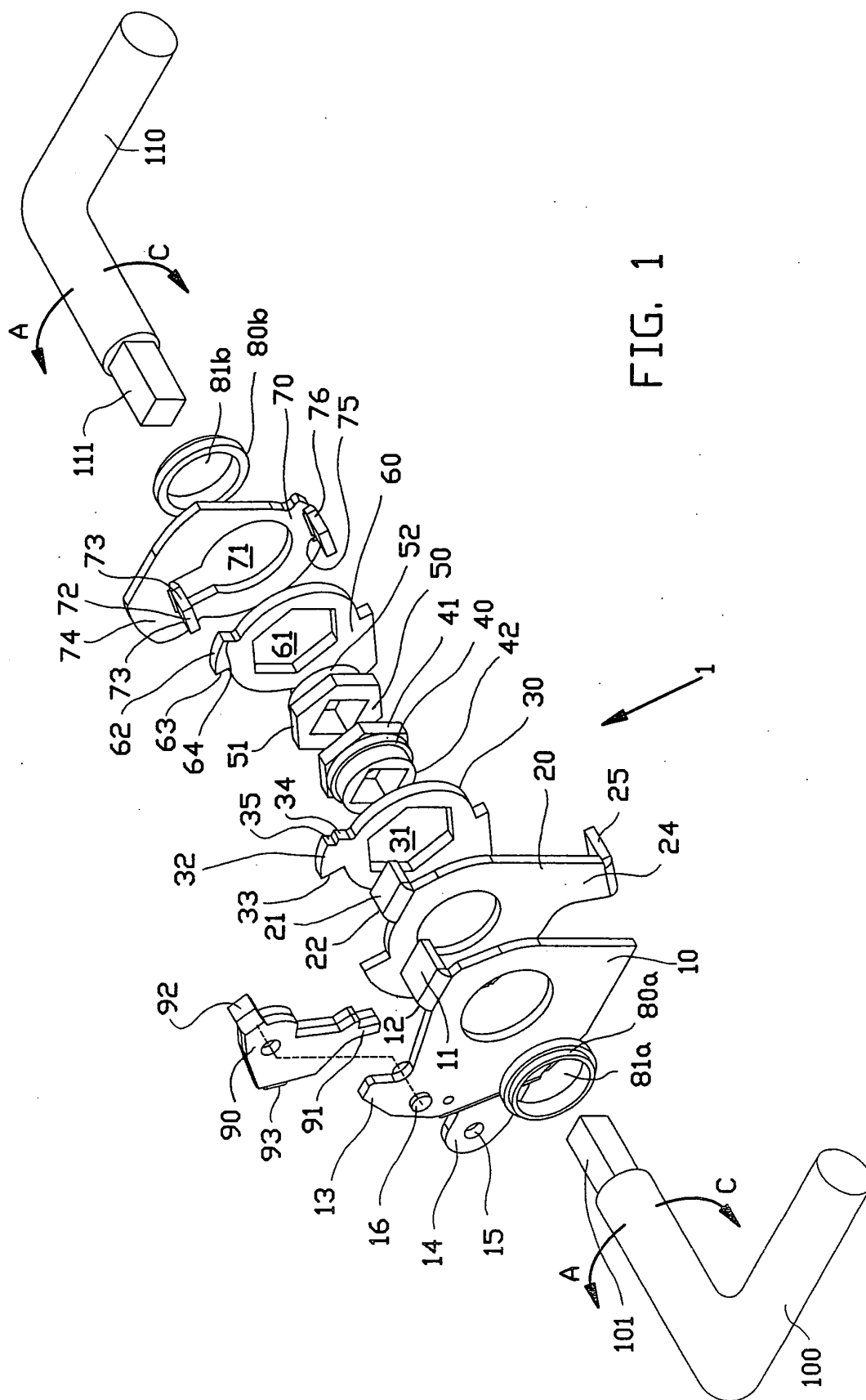


FIG. 1

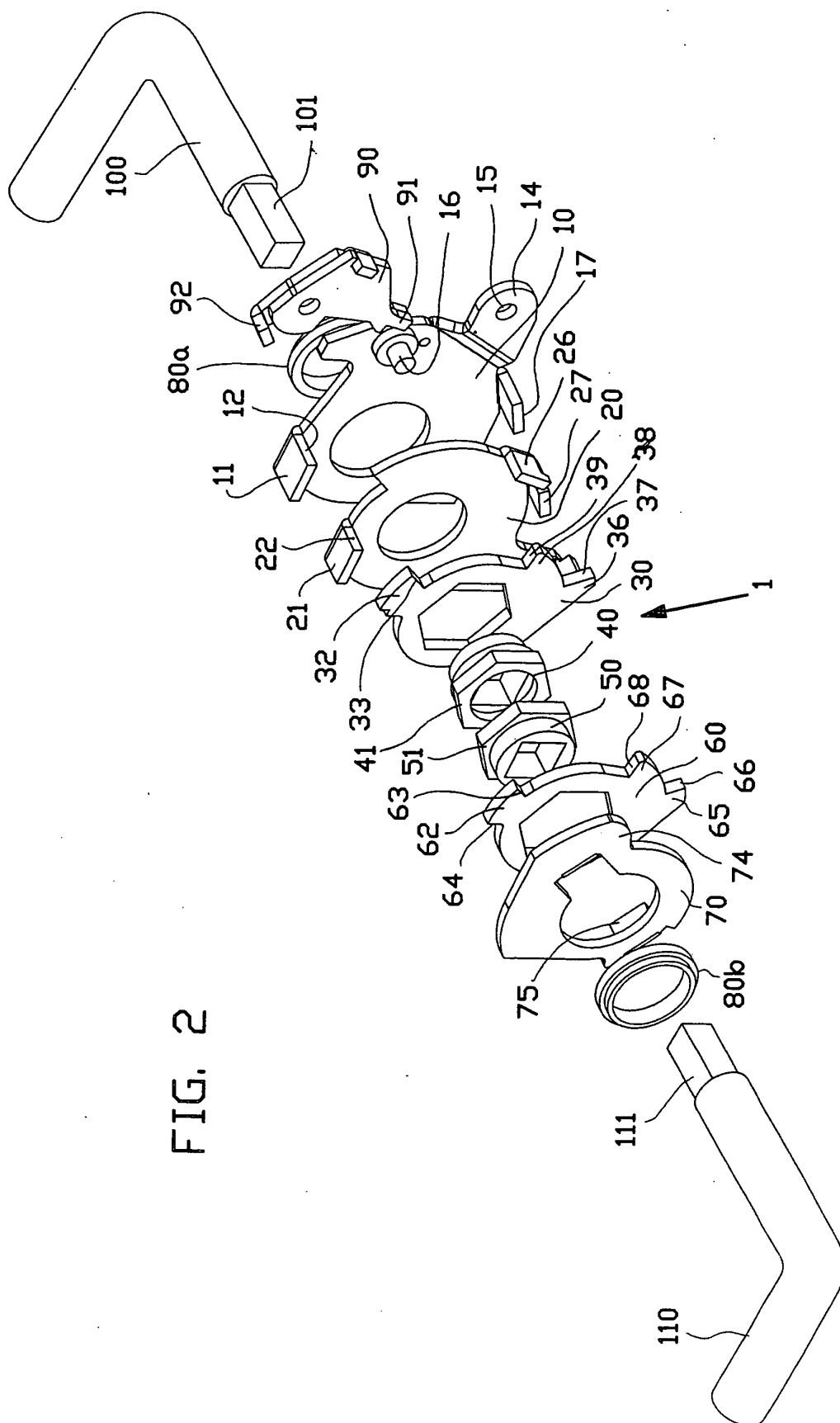
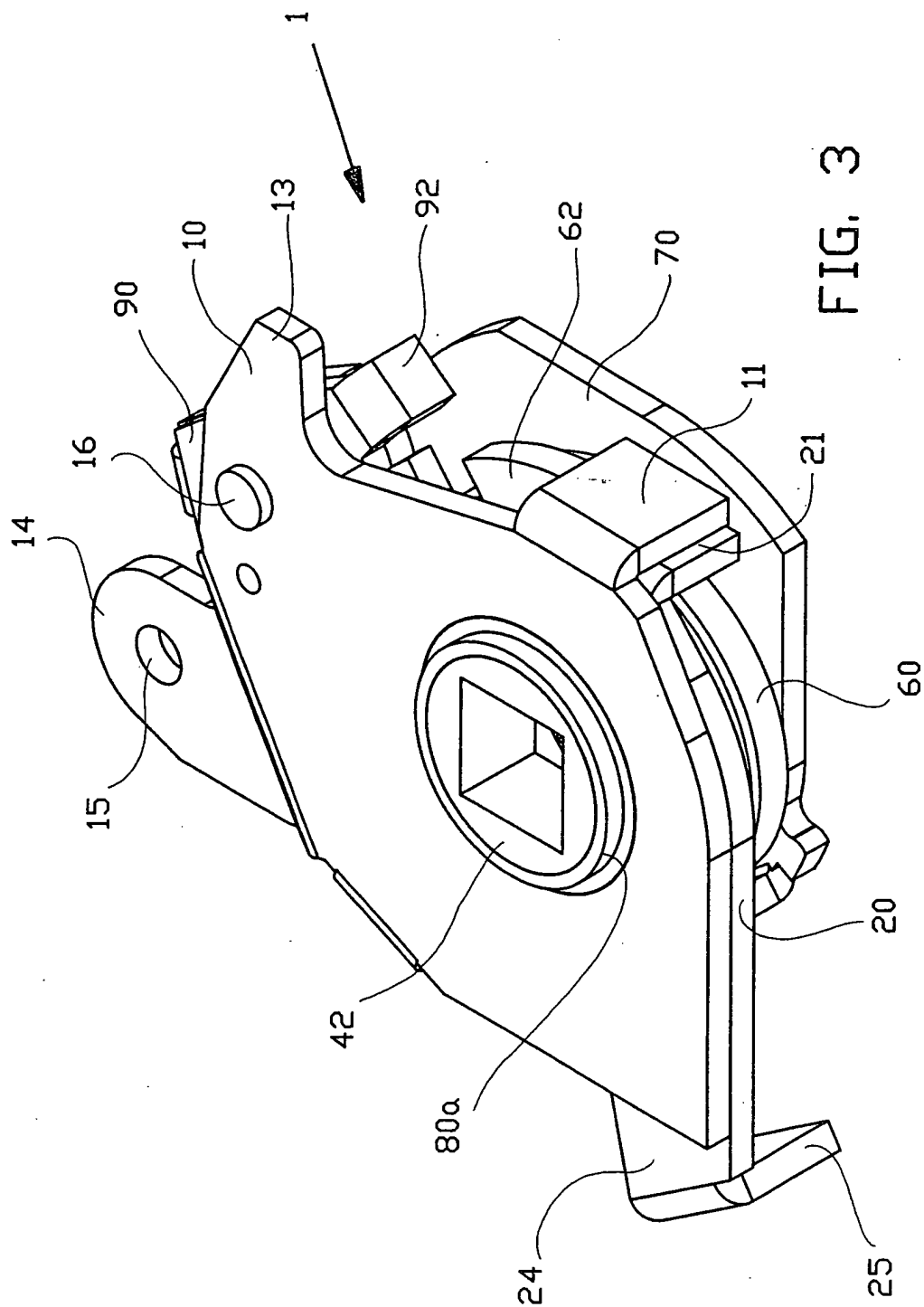


FIG. 2



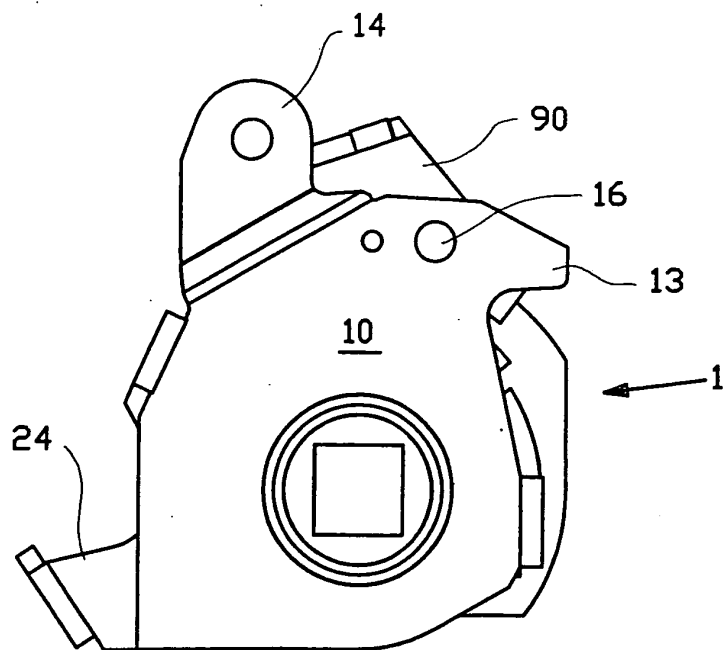


FIG. 3A

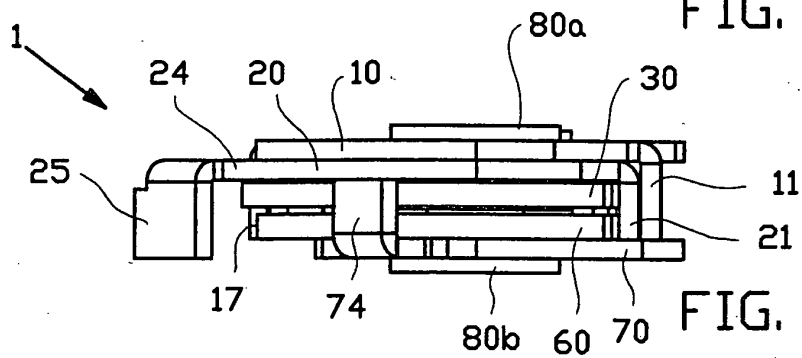


FIG. 3C

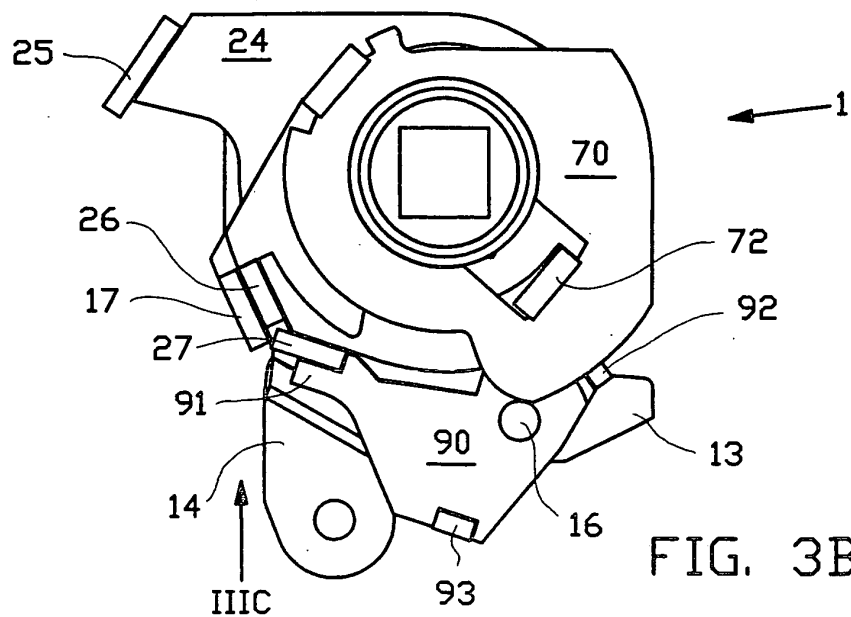


FIG. 3B

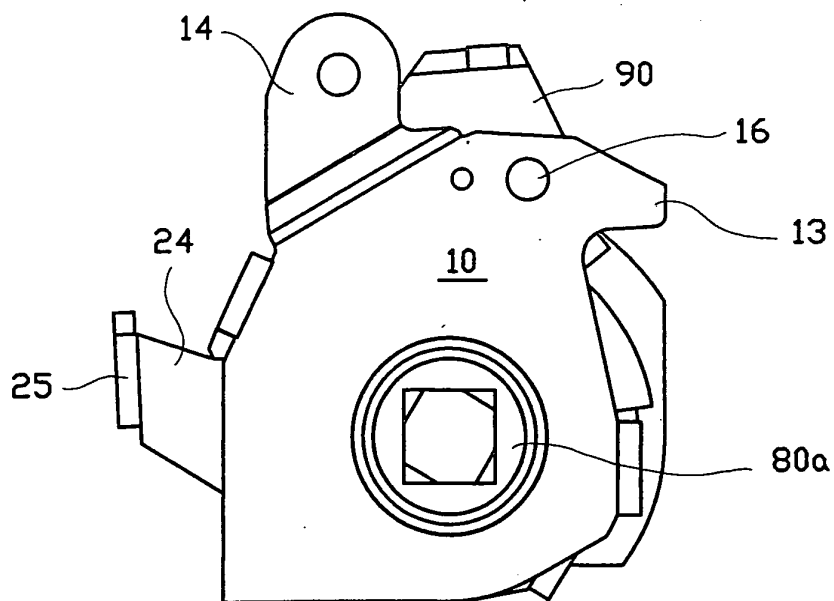


FIG. 4A

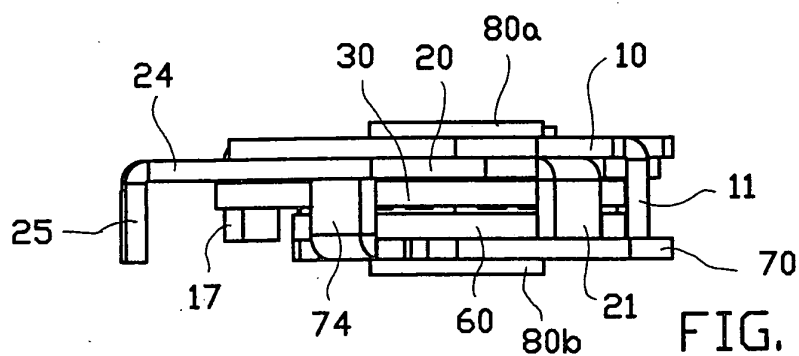


FIG. 4C

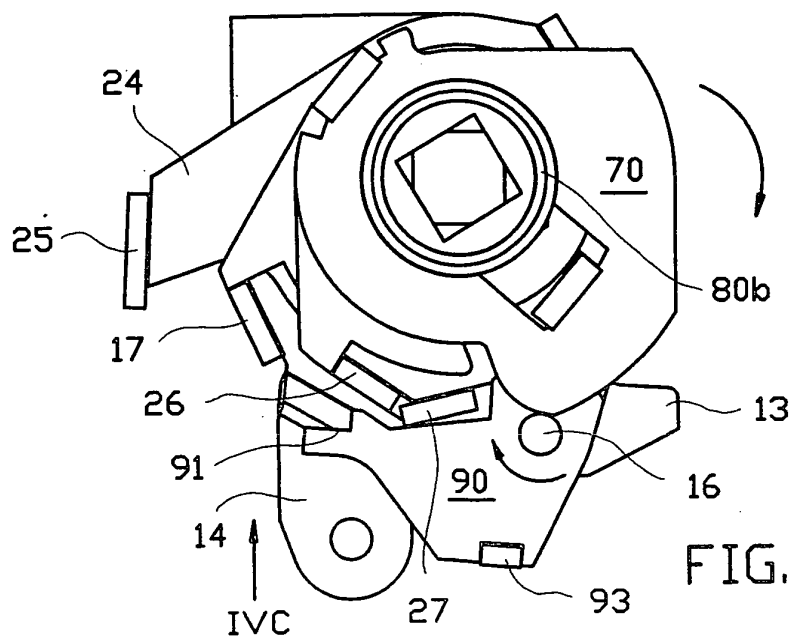


FIG. 4B

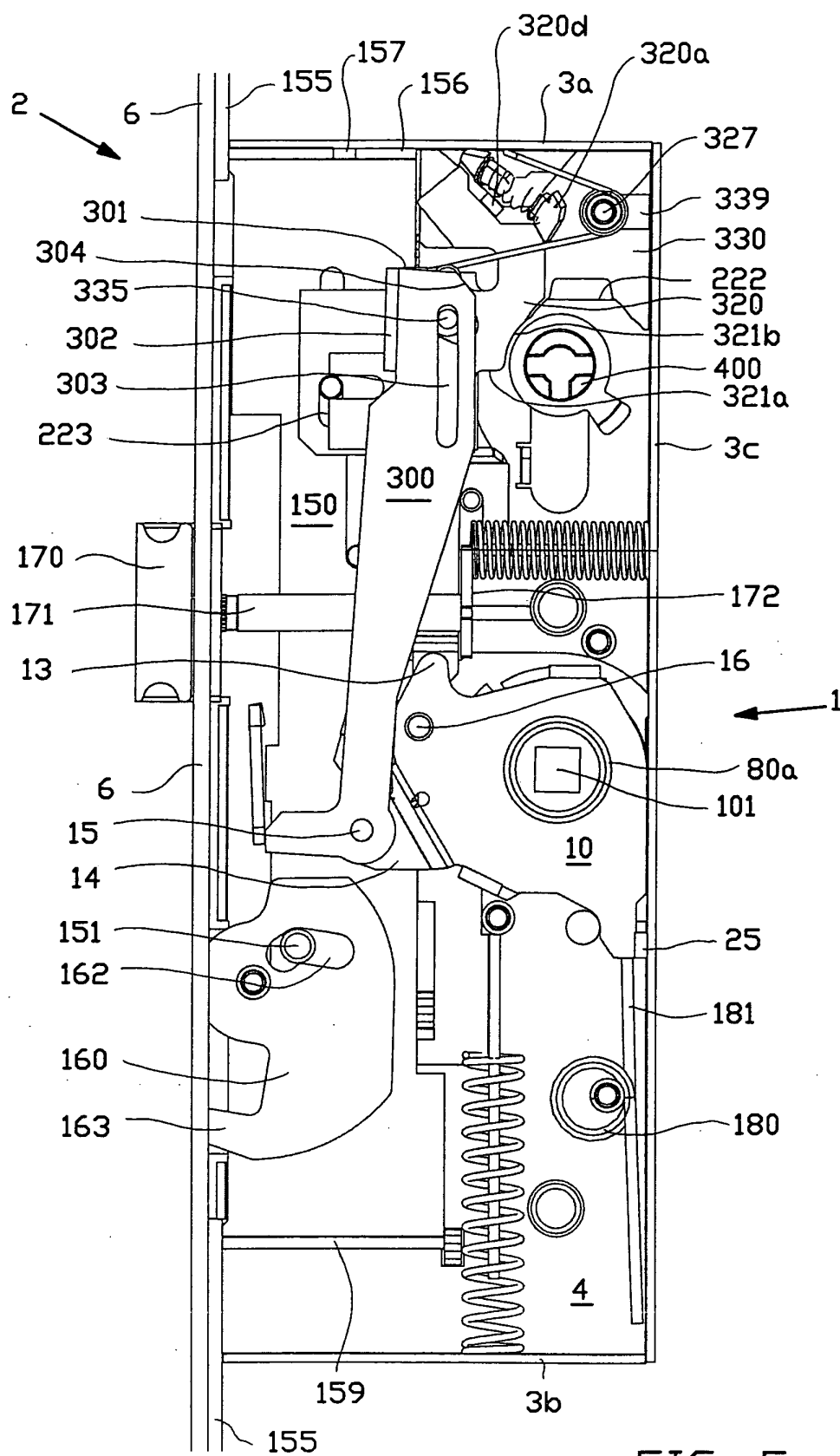


FIG. 5

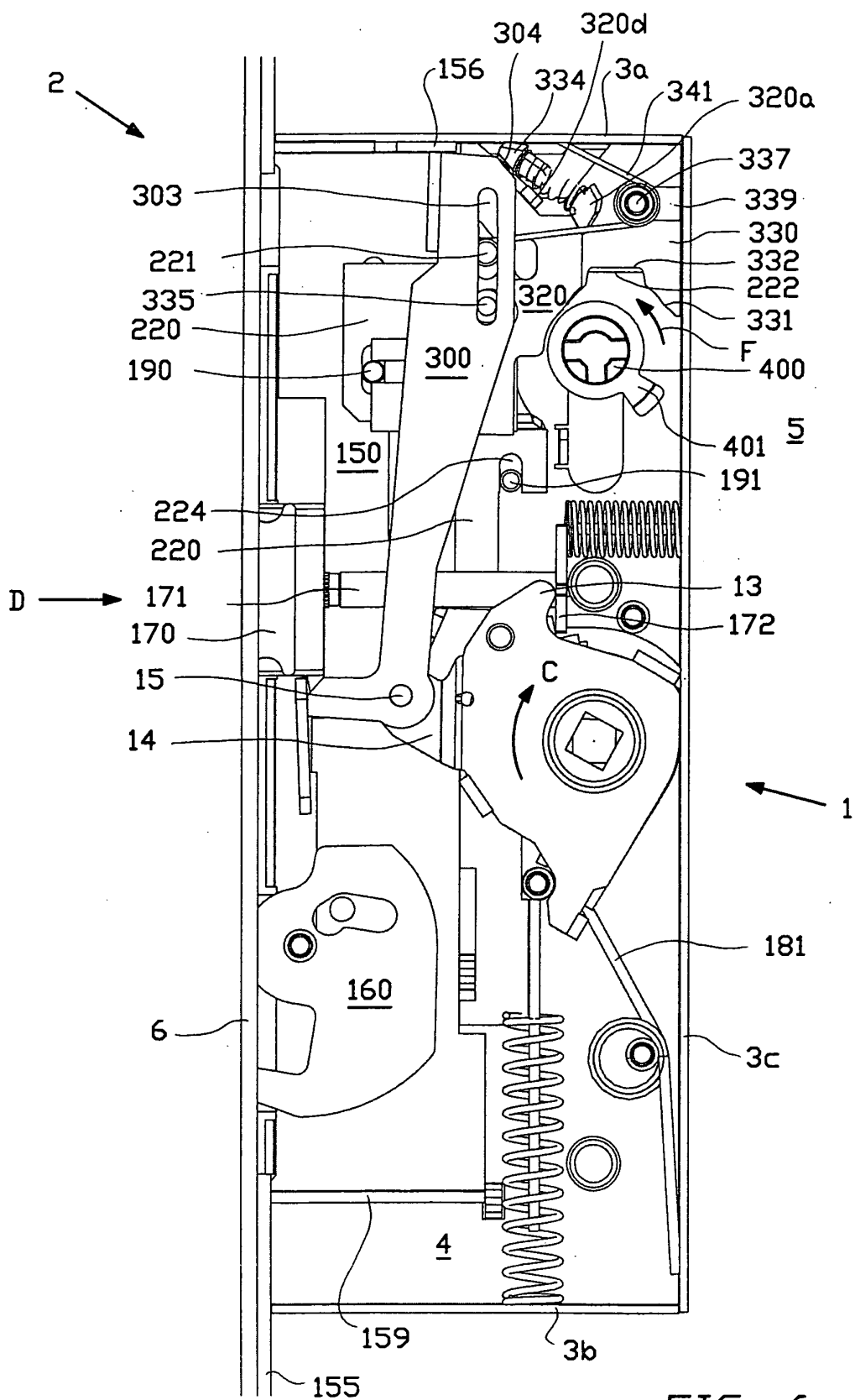


FIG. 6

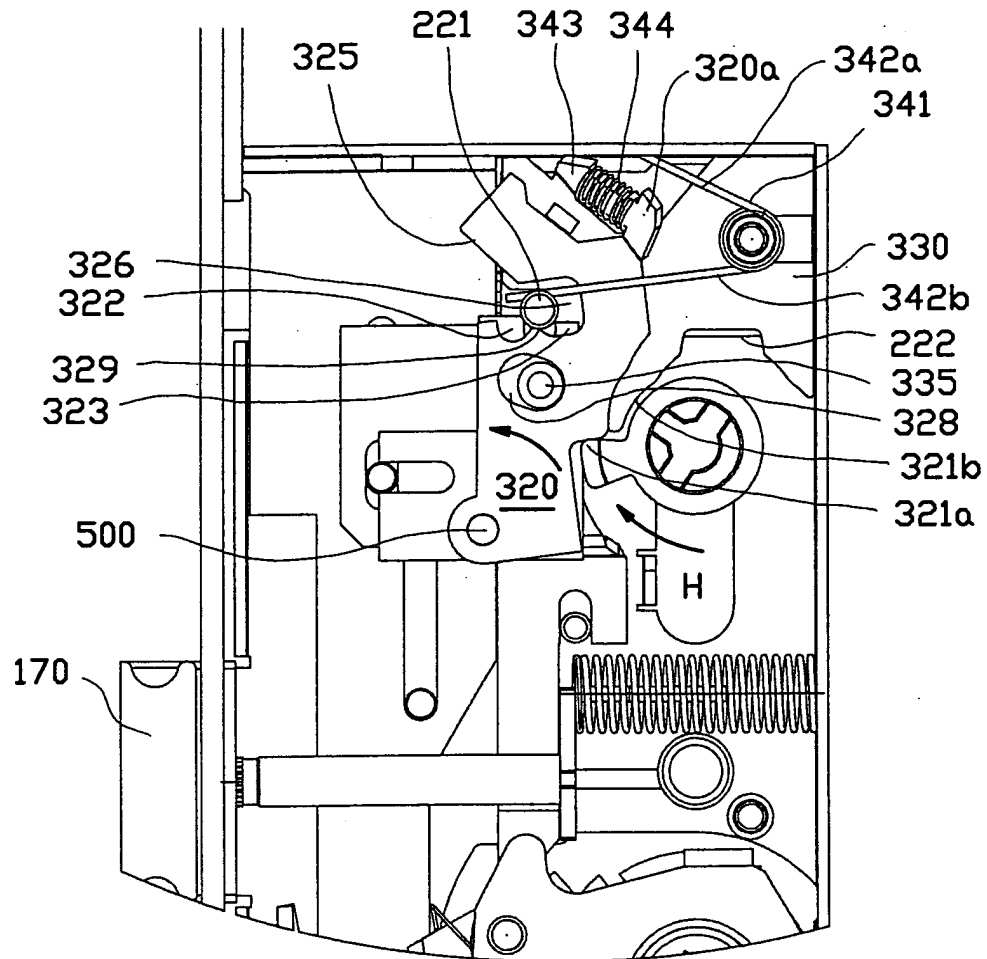
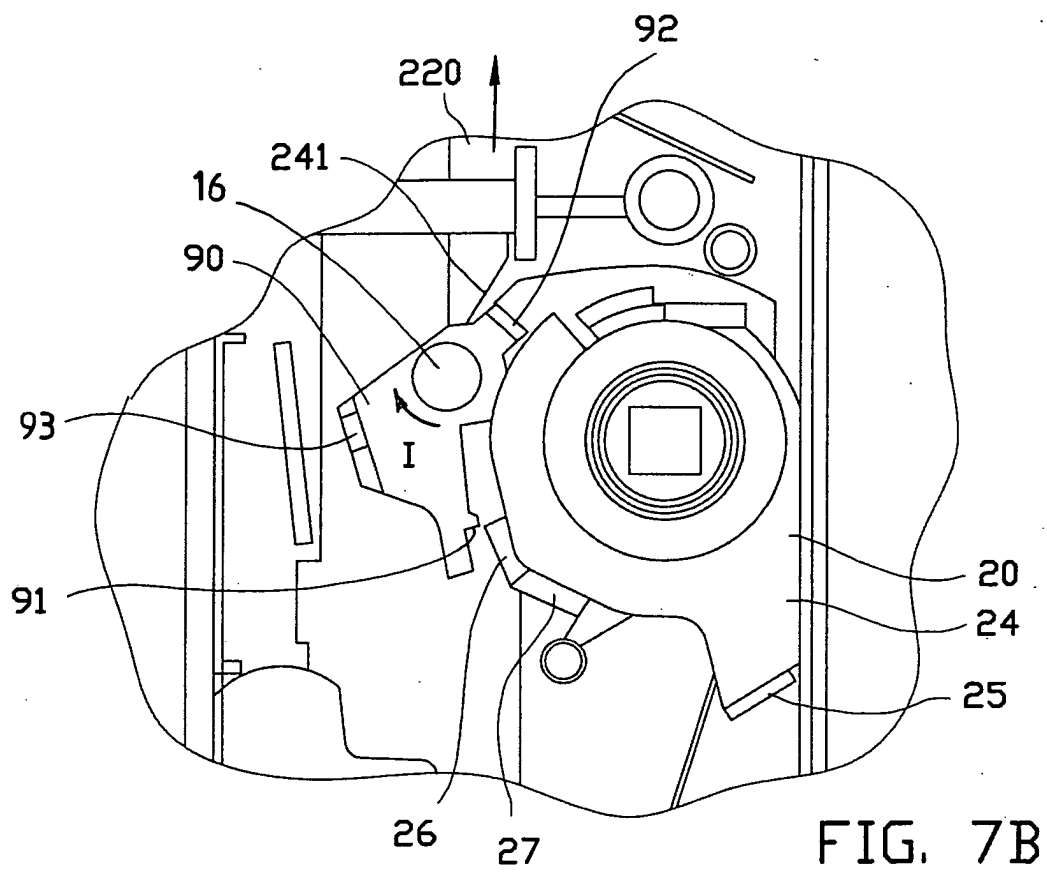


FIG. 7A



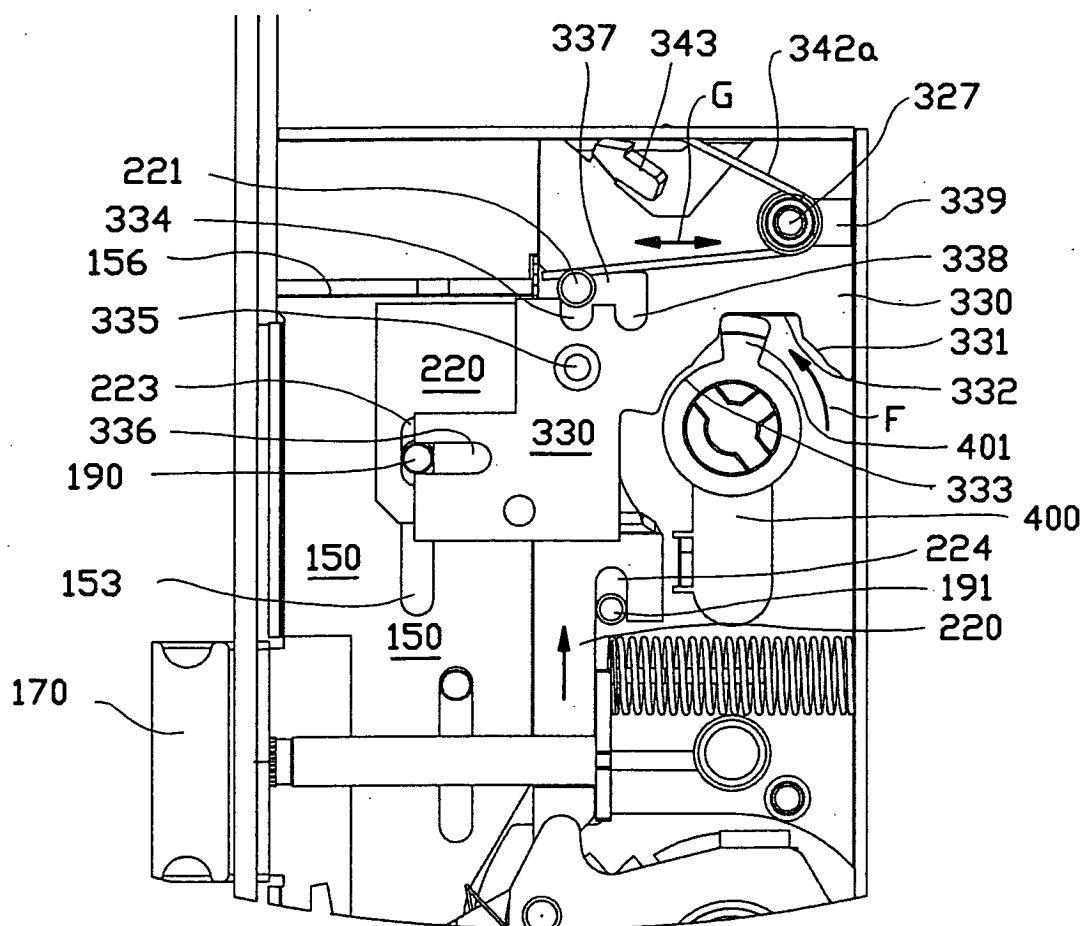


FIG. 8A

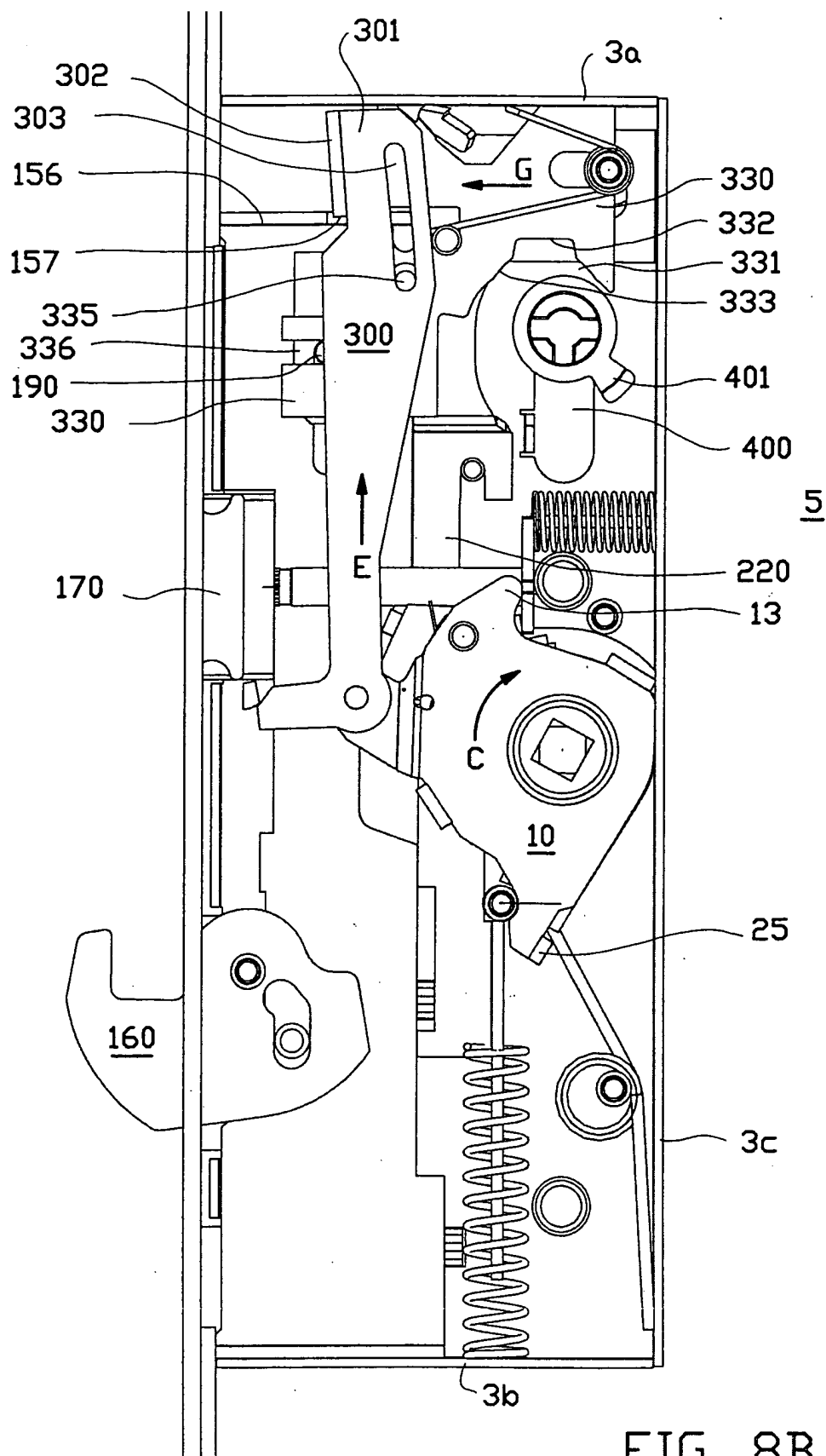


FIG. 8B

