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(54) **LOCK ASSEMBLY WITH A SILENT CLOSE LATCH**

(57) The invention relates to a lock assembly with a silent close latch for reducing noises of the lock assembly when the lock assembly moves in a striking direction towards a closed position and hits a strike member in said striking direction, wherein the silent close latch comprises a latch head and a catch member that is coupled to the latch head and that is rotatable with respect to the latch head between a catch position and a pressed position,

wherein the catch member, in the catch position, protrudes from the latch head in the striking direction to catch the strike member and, in the pressed position, is rotated towards the latch head, wherein the silent close latch is provided with a catch biasing element that is arranged for biasing the catch member with respect to the latch head towards and into the catch position.

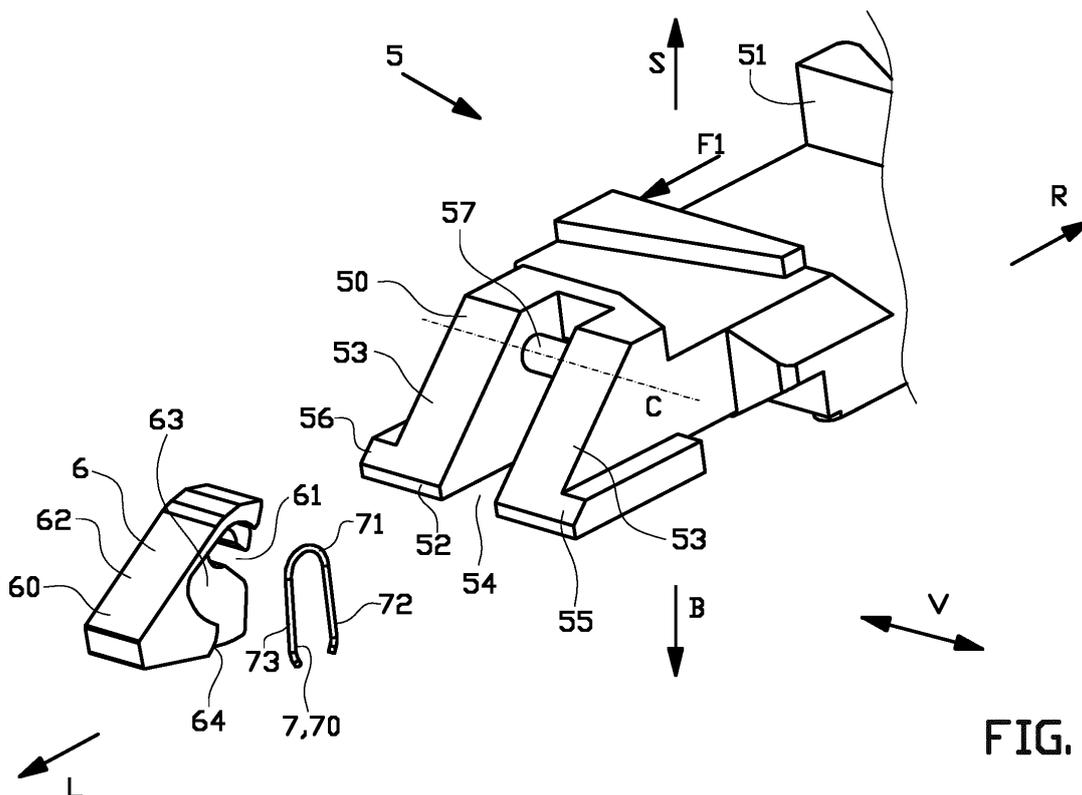


FIG. 2

Description

BACKGROUND

[0001] The invention relates to a lock assembly with a silent close latch for reducing noise made by the lock assembly when the lock assembly hits a strike plate.

[0002] In known lock assemblies with silent close latches, the silent close latch is provided with a latch head and a crank lever that swivels with respect to the latch head between a catch position in which the crank lever protrudes from the latch head towards the strike plate and a pressed position in which the crank lever lies flush with the latch head. During the closing of the lock assembly, the crank lever catches the strike member and causes the latch head to move inwards. In this manner the noises made by the lock assembly during closing can be reduced significantly.

[0003] The known silent close latch is arranged to be retracted into and extended from the housing of the known lock assembly through a latch opening in the front plate. The crank lever consists of a rigid, single body that extends on both sides of the front plate. At the back side of the front plate, the crank lever extends out of one of the lateral sides the housing via a lever opening and hooks behind the front plate. When the silent close latch moves to the extended position, the relative movement of the silent close latch with respect to the front plate and the hooking of the crank lever behind the front plate causes the part of the crank lever on the other side of the front plate to swivel outwards into the catch position. The crank lever subsequently catches the strike plate upon closing of the lock assembly and swivels towards the pressed position, while simultaneously pushing the latch head off with respect to the back side of the front plate into the housing.

[0004] A drawback of the known lock assemblies is that a moving part of the crank lever extends out of a lateral side of the housing. Thus, when creating a pocket in a door, a window or the like, one should carefully cut-out an additional recess at the respective lateral side of the pocket to accommodate said moving part of the crank lever. And even when the lock assembly with the silent close latch is used to replace a previously mounted lock assembly with a conventional latch having the same outer dimensions, cutting out the additional recess in the existing pocket is still required.

[0005] An additional drawback is that the silent close latch, because of the part extending out of the side of the housing behind the front plate, can not be easily reversed. Therefore, different versions of the lock assembly have to be manufactured to provide for both left-hand and right-hand doors, windows or the like.

[0006] DE 197 01 761 C1 discloses a lock assembly with a lock latch and an auxiliary latch. The lock latch is provided with a latch member that is rotatable with respect to the lock latch about a pin to actuate the auxiliary latch. A spring between the lock latch and the latch mem-

ber biases the latch member to move into a position in which the latch member protrudes from the lock latch in the direction of the strike plate. DE 197 01 761 C1 further discloses that said latch member is biased such that upon contact with the strike plate, the latch member is rotated back into the lock latch, after which the auxiliary latch is actuated. More specifically, it is expressly disclosed in DE 197 01 761 C1 that the latch member is not operational during the pushing in of the lock latch. Because of the latch member, the lock latch might be mistaken for a silent close latch. However, the latch member in DE 197 01 761 C1 merely functions as an actuator for the auxiliary latch and does not catch the strike member like a silent close latch.

[0007] It is an object of the present invention to provide an alternative lock assembly with a silent close latch wherein at least some of the aforementioned drawbacks can at least partially be resolved.

20 SUMMARY OF THE INVENTION

[0008] According to a first aspect, the invention provides a lock assembly with a silent close latch for reducing noises of the lock assembly when the lock assembly moves in a striking direction towards a closed position and hits a strike member in said striking direction, wherein the lock assembly comprises a housing and a front plate at one end of the housing that faces the strike member in the closed position, wherein the front plate is provided with a latch opening, wherein the silent close latch is movable through the latch opening in a latching direction between a retracted position within the housing and an extended position at least partially outside the housing, wherein the strike member is provided with a strike opening, wherein the silent close latch comprises a latch head that is arranged to engage the strike opening in the extended position when the latch opening is opposite to the strike opening in the closed position, wherein the silent close latch further comprises a catch member that is coupled to the latch head and that is arranged to be rotatable with respect to the latch head between a catch position and a pressed position about a catch axis that extends perpendicular to the striking direction and the latching direction, wherein the catch member, in the catch position, protrudes from the latch head in the striking direction to catch the strike member and, in the pressed position, is rotated about the catch axis from the catch position towards the latch head, wherein the silent close latch is provided with a catch biasing element that is arranged for biasing the catch member with respect to the latch head towards and into the catch position, wherein the lock assembly comprises a latch biasing element that is coupled to the silent close latch for biasing the silent close latch in the latching direction from the retracted position towards the extended position, wherein the catch biasing element is arranged for countering the bias of the latch biasing element when the catch member is rotated from the catch position towards the pressed position, wherein

the catch biasing element is arranged for pushing off the latch head against the catch member towards the retracted position of the silent close latch when the catch member is rotated from the catch position towards the pressed position.

[0009] Thus, when the catch member strikes the strike member and is pressed towards the pressed position as a result of the subsequent abutment with the strike member, the forces exerted on the catch member by the strike member can be converted via the catch biasing element into a counter force that counteracts the biasing force of the latch biasing element, thereby causing the silent close latch to be at least partially retracted into the housing towards the retracted position thereof. The partial retraction may reduce the intensity of the contact between the latch head and the strike member, or prevent such a contact all together. The catch biasing element can thus use the catch member as a base for biasing the latch head directly from said base.

[0010] As previously discussed, DE 197 01 761 C1 discloses a lock assembly with a lock latch and an auxiliary latch. The lock latch is provided with a latch member that is rotatable with respect to the lock latch about a pin to actuate the auxiliary latch. A spring between the lock latch and the latch member biases the latch member to move into a position in which the latch member protrudes from the lock latch in the direction of the strike plate. DE 197 01 761 C1 discloses that said latch member is biased such that upon contact with the strike plate, the latch member is rotated back into the lock latch, after which the auxiliary latch is actuated. More specifically, it is expressly disclosed in DE 197 01 761 C1 that the latch member is not operational during the pushing in of the lock latch. The skilled person would not contemplate increasing the strength of the spring so that the latch member would push the lock latch inwards, as this would make the latch member unsuitable for its purpose of timely actuating the auxiliary latch. Hence, although the lock latch in DE 197 01 761 C1 might look similar, its function is fundamentally different from the function of the silent close latch in the present invention.

[0011] A further advantage of the present invention is that when the biasing force of the catch biasing element is not counteracted by contact with the strike member, the catch member can automatically be moved to the catch position, irrespective of its position with respect to the front plate. The catch member can thus function independently of the front plate and does not have to extend out of the housing behind the front plate.

[0012] In an embodiment the catch biasing element is arranged for pushing off the catch member against the latch head towards and into the catch position. The catch biasing element can thus use the latch head as a base for biasing the catch member directly from said base.

[0013] In an embodiment the catch biasing element is arranged to bias the catch member up to the catch position. Thus, when the biasing force of the catch biasing element is not counteracted, the catch member can reach

the catch position under the influence of the biasing force of the catch biasing element.

[0014] In an embodiment the catch biasing element is arranged to be continuously in abutment with both the latch head and the catch member between pressed position and the catch position. The position of the catch member with respect to the latch head can thus be made subject to the biasing force of the catch biasing member at any position between the catch position and the pressed position.

[0015] In an embodiment the catch biasing element extends in between the latch head and the catch member in the latching direction. The catch biasing element can thus act on the catch member and the latch head in a direction parallel to the latching direction.

[0016] In an embodiment the latch head is provided with a first push off surface facing the catch member and wherein the catch member is provided with a second push-off surface facing the first push off surface, wherein the catch biasing element extends between the mutually facing push off surfaces and acts on both push off surfaces. The push-off surfaces can be dedicated to receiving the catch biasing element and can therefore be optimized to optimally and/or securely hold the catch biasing element in a position between the latch head and the catch member, and/or to optimally transfer the forces between the catch member and the latch head.

[0017] In an embodiment the catch biasing element is an insertable part of the lock assembly that is placed between the latch head and the catch member in the latching direction. The catch biasing element can thus be a distinct component or part of the lock assembly, rather than being part of the latch head or the catch member.

[0018] In an embodiment the catch biasing element is a resilient element. The resilience can provide the biasing force to move the catch member into the catch position.

[0019] Preferably, the catch biasing element is a spring, most preferably a torsion spring. A spring or a torsion spring can be easily inserted between the latch head and the catch member to bias the catch member towards the catch position.

[0020] In an embodiment the latch head comprises a strike surface that faces the strike member in the striking direction, wherein the catch member protrudes from said strike surface in the striking direction in the catch position and is flush or substantially flush with said strike surface in the pressed position. It can thus be made sure that the catch member hits the strike member first in the striking direction. Furthermore, in the pressed position, the catch member can form a part of or supplement the strike surface of the latch head.

[0021] In an embodiment the latch head further comprises a blocking surface extending in the latching direction and facing in a blocking direction opposite to striking direction, wherein the strike surface tapers towards the blocking surface in the latching direction, wherein the catch member in the pressed position is flush or substan-

tially flush with both the strike surface and the blocking surface. The catch member can thus form a part of or supplement the latch head in the pressed position.

[0022] In an embodiment the silent close latch is reversible over 180 degrees with respect to the housing about a reversal axis extending parallel to the latching direction to a reversed position in which the silent close latch is arranged for reducing noises of the lock assembly when the lock assembly moves in a reversed striking direction towards a closed position and hits a strike member in said reversed striking direction. The lock assembly can thus function in both left-hand and right-hand doors, windows or the like.

[0023] In an embodiment the catch member and/or the catch biasing element, to the extent that they extend out of the housing, extend outside the housing through the latch opening only. The catch member and/or the catch biasing element therefore do not extend out of the housing behind the front plate. The lock assembly according to the invention can thus be mounted in a regular pocket or even an existing pocket of a previously mounted lock assembly, without the need for cutting-out an additional recess for the catch member and/or the catch biasing element.

[0024] According to a second aspect, the invention provides a method for mounting the lock assembly of claim 1 in a door, a window or the like, wherein the method comprises the steps of creating a pocket in the door, window or the like corresponding or substantially corresponding to the outer dimensions of the housing, wherein the catch member is movable from the pressed position into the catch position with the catch member and/or the catch biasing element, to the extent that they extend out of the housing, extending outside the housing through the latch opening only. The lock assembly according to the invention can thus be mounted in a regular pocket or even an existing pocket of a previously mounted lock assembly, without the need for cutting-out an additional recess for the catch member and/or the catch biasing element.

[0025] In an embodiment the method further comprises the step of reversing the silent close latch over 180 degrees with respect to the housing about a reversal axis extending parallel to the latching direction to a reversed position in which the silent close latch reduces noises of the lock assembly when the lock assembly moves in a reversed striking direction towards a closed position and hits a strike member in said reversed striking direction. The lock assembly can thus function in both left-hand and right-hand doors, windows or the like.

[0026] The various aspects and features described and shown in the specification can be applied, individually, wherever possible. These individual aspects, in particular the aspects and features described in the attached dependent claims, can be made subject of divisional patent applications.

BRIEF DESCRIPTION OF THE DRAWINGS

[0027] The invention will be elucidated on the basis of an exemplary embodiment shown in the attached schematic drawings, in which:

figure 1 shows an isometric view of a lock assembly with a silent close latch according to the invention; figure 2 shows an exploded view of the silent close latch according to figure 1; figure 3 shows a side view of the internal mechanism of the lock assembly according to the figure 1; and figures 4A, 4B, 4C and 4D show cross sections of the lock assembly according to the line IV - IV in figure 3, during subsequent steps of the retraction of the silent close latch.

DETAILED DESCRIPTION OF THE INVENTION

[0028] Figures 1 and 3 show a lock assembly 1, in particular a mortise lock assembly 1, with a bolt, a latch bolt or a latch 5 according to an exemplary embodiment of the invention. The latch 5 is arranged to facilitate soft closing, quiet closing or silent closing operation of the lock assembly 1.

[0029] The lock assembly 1 according to the invention is used for locking and unlocking a door, a window or the like with respect to a door or window frame, respectively. Figures 4A-4D show the interaction of the lock assembly 1 according to the invention with an exemplary frame 9 during the closing of the respective door or window with respect to said frame 9. The frame 9 is typically provided with a strike member 90 in the form of a strike plate or a box strike. The strike member 90 comprises a plate-like body 91 that acts as a shield for the frame 9 at the position where the lock assembly 1 first hits the strike member 90 during closing of the door, the window or the like. The strike member 90 further comprises a strike opening 92 in the plate-like body 91 for receiving the silent close latch 5 when the door or window is in a closed position opposite to the strike member 90, as shown in figure 4D. The silent close latch 5 is arranged to reduce noises of the lock assembly 1 when the lock assembly 1 moves in a striking direction S towards the closed position and hits a strike member 90 in said striking direction S, in a manner that will be described in more detail hereafter.

[0030] As shown in figure 1, the lock assembly 1 comprises a housing 2 and a front plate 3 at the side of the housing 2 that faces the frame 9, when the door, window or the like is closed (see figure 4D). In particular, the front plate 3 is arranged to be directly opposite to the strike member 90 in said frame 9 in the situation of figure 4D. The lock assembly 1 is provided with a latch opening 30 in the front plate 3. The silent close latch 5 is placed at least partially inside the housing 2 and is movable into and out of the housing 2 via the latch opening 30 in a retraction direction R and a latching direction L, respectively, between an extended position, as shown in figures

1, 4A and 4D, and a retracted position, as shown in figure 4C.

[0031] As shown in figure 3, the silent close latch 5 is operationally coupled to a lock mechanism 20 inside the housing 2. In this exemplary embodiment, the lock mechanism 20 comprises a follower 21 that is arranged to engage the silent close latch 5 in a retraction direction R to move the silent close latch 5 towards and into the retracted position. The follower 21 can be operated manually, for example through the operation of a handle (not shown) or may be operated electrically, e.g. by a solenoid actuator (not shown). The lock mechanism 20 further comprises a latch biasing element 22 that is arranged between the housing 2 and the silent close latch 5 for biasing the silent close latch 5 with a biasing force F1 in the latching direction L from the retracted position towards the extended position when the follower 21 is not operated. The silent close latch 5 is thus automatically extended when allowed to do so.

[0032] As shown in figures 1, 2, 3 and 4A-4D, the silent close latch 5 comprises a latch head 50 facing in the latching direction L and a latch tail 51 facing in the retraction direction R. The latch tail 51 is arranged to be engaged by the follower 21 of the internal lock mechanism 20 to allow retraction of the silent close latch 5 into the housing 2. The latch head 50 is arranged to extend outside of the housing 2 in the latching direction L through the latch opening 30 to engage the strike opening 92 in the strike member 90, as shown in figures 4A and 4D. The latch head 50 comprises a blocking surface 52 extending in the latching direction L and facing in or perpendicular to a blocking direction B that is opposite to striking direction S. When the silent close latch 5 is received in or engages the strike member 90 in the extended position, as shown in figure 4D, the blocking surface 52 prevents or blocks movement of the lock assembly 1 with respect to the frame 9 in the blocking direction B. The door, window or the like can thus be considered to be locked. The latch head 50 further comprises a run-on surface or strike surface 53 on the opposite side of the latch head 50 with respect to the blocking surface 52. The strike surface 53 faces the strike member 90 in the striking direction S prior and during the closing of the door, window or the like, as shown in figures 4A and 4B. The strike surface 53 is inclined or tapers towards the blocking surface 52 in the latching direction L and meets or merges with the blocking surface 52 at the distal end of the latch head 50 in the latching direction L. Preferably, the blocking surface 52 and the strike surface 53 extend in a vertical or substantially vertical direction V.

[0033] Preferably, the silent close latch 5 dimensioned and/or shaped so as to be invertible, reversible over one-hundred-and-eighty (180) degrees with respect to the housing 2 about a reversal axis extending parallel to the latching direction L from the normal position as shown in figure 1 to a reversed position. In the reversed position the silent close latch 5 is arranged for reducing noises of the lock assembly 1 when the lock assembly 1 moves in

a reversed striking direction towards a closed position and hits the strike member 90 in said reversed striking direction. This occurs when the lock assembly 1 is mounted in a right-hand or left-hand door, window or the like that is contra to the configuration of the lock assembly 1 at that moment. The latch opening 30 in the front plate 3 is shaped accordingly to receive the silent close latch 5 in both the normal and the reversed position.

[0034] As best seen in figure 2, the silent close latch 5 according to the invention is further provided with a cut-out or a recess 54 in the latch head 50 for receiving or accommodating a catch member 6. The catch member 6 is arranged for contacting or catching the strike member 90 in the striking direction S during closing before the latch head 50 does. The catch member 6 has a smaller surface area than the typical strike surface of a conventional latch, so that the noise upon contact with the strike member 90 can be reduced. Preferably, the catch member 6 is made of a softer material than the latch head 50, e.g. from a synthetic, deformable, compressible and/or elastic material.

[0035] The recess 54 is preferably positioned in the center or middle of the height of the latch head 50 in the vertical direction V. The recess 54 is open or debouches at the side of the strike surface 53 and, in this exemplary embodiment, extends through the latch head 50 up to the blocking surface 52. Preferably, the recess 54 extends up to the distal end of the latch head 50 and splits the latch head 50 into two sections; a first section 55 below the recess 54 in the vertical direction V and a second section 56 above the recess 54 in the vertical direction V. At the recess 54, the latch head 50 is provided with a shaft 57 extending between the first section 55 and the second section 56. The shaft 57 is preferably located at or near the strike surface 53 towards the rear of the latch head 50 with respect to the latching direction L. The shaft 57 defines a catch axis C about which the catch member 6 is rotatable within the recess 54. The catch axis C extends perpendicular to the striking direction S and the latching direction L, and preferably parallel to the vertical direction V.

[0036] As further shown in figure 2, the catch member 6 comprises a catch body 60 and a coupling element 61 for rotatably coupling the catch member 6 to the shaft 57 of the latch head 50. In this exemplary embodiment, the coupling element 61 is a snap-fit coupling in the form of a suitably shaped slot that fits over and snaps around the shaft 57 of the latch head 50. It will be apparent to the person skilled in the art that other couplings may also be suitable for rotatably coupling the catch member 6 to the shaft 57. Alternatively, the catch member 6 may be provided with a shaft which is received in suitably shaped coupling members in the latch head. When fitted, the catch member 6 is rotatable with respect to the latch head 50 about the catch axis C between a catch position, as shown in figure 4A, and a pressed position, as shown in figure 4C. In the catch position the catch member 6 stands out from or protrudes from the latch head 50 in

the striking direction S to catch the strike member 9 before the latch head 50 does. In the pressed position, the catch member 6 is rotated about the catch axis C from the catch position towards the latch head 50.

[0037] As shown in figure 2, the catch body 60 is provided with a catch surface 62 that is arranged to be parallel to, coplanar with or lie flush with the strike surface 53 of the latch head 50 in the pressed position of the catch member 6, as shown in figure 4C. In contrast, the catch surface 62 is rotated away from the strike surface 53 of the latch head 50 in the striking direction S in the catch position, as shown in figure 4A and 4D. In particular, the catch member 6 is arranged to be rotated in the striking direction S over such an angle that the catch surface 62 extends parallel, substantially parallel or at a sharp or small angle with respect to the blocking surface 53 of the latch head 52. Alternatively, the catch position of the catch member 6 may be closer to the strike surface 53 of the latch head 50, for example closer to or in the position of figure 4B. The range of the catch member 6 between the catch position and the pressed position can be set or controlled by the shape of the catch member 6, so that the catch member 6 abuts the latch head 52 in the catch position and can not move further outwards. Preferably, the catch body 60 is shaped so as to be complementary to or match the shape of the recess 54 to which it is fitted. Thus, when the catch member 6 is pressed into the pressed position, as shown in figure 4C, the catch member 6 substantially fills the space of the recess 52 and/or supplements the latch head 50 between first section 55 and the second section 56.

[0038] As shown in figure 2, the silent close latch 5 is further provided with a catch biasing element 7. The catch biasing element 7 is arranged for biasing the catch member 6 with respect to the latch head 50 towards and into the catch position as shown in figure 4A and 4D. The catch biasing element 7 preferably pushes the catch member 6 off against or with respect to the latch head 50 towards and into the catch position. To achieve this, the catch biasing element 7 is continuously in abutment with both the latch head 50 and the catch member 6 between pressed position and the catch position. More in particular, the catch biasing element 7 has an active range from the pressed position up to the catch position, in which active range the catch biasing element 7 is resilient and/or flexible and continuously acts on the silent close latch 5 to bias the silent close latch 5 towards and into the catch position.

[0039] As shown in figure 2, the catch biasing element 7 is a loose, insertable and/or removable part of the lock assembly 1 that is distinct from the catch member 6 and the latch head 50. The catch biasing element 7 is placed between the latch head 50 and the catch member 6 in the latching direction L. To this end, the catch member 6 is provided with a chamber 63 for receiving the catch biasing element 7. The chamber 63 is sufficiently large to accommodate the catch biasing element 7 between the catch member 6 and the latch head 50 in both the

catch position and the pressed position of the catch member 6.

[0040] In the particular embodiment as shown in figure 2, the catch biasing element 7 is a resilient element 70, in particular in the form of a torsion spring. The resilient element 70 comprises a bend or twisted portion 71 and two arms 72, 73 on opposite sides thereof. Because of the tension in the twisted portion 71, the arms 72, 73 will tend to move outwards, to move apart or to diverge in the latching direction L. The latch head 50 is provided with a first push-off surface 58 that faces the catch member 6 and that is arranged for receiving or abutting the first of the two arms 72, 73. The catch member 6 is provided with a second push-off surface 64 opposite to the first push-off surface 58 and arranged for receiving or abutting the second of the two arms 72, 73. In this example, the twisted portion 71 is mounted at or around the shaft 57 of the latch head 50, while the arms 72, 73 extend away from the shaft 57 towards and into abutting contact with their respective push-off surfaces 58, 64 to act on the catch member 6 and the latch head 50, respectively, at a distance from the shaft 57. The resilient element 70 thus extends between the mutually facing push off surfaces 58, 64 and acts on both push off surfaces simultaneously.

[0041] Alternatively, the catch biasing element may be an integral part of one of the catch member 6 or the latch head 50, e.g. in the form of a resiliently deformable lip (not shown) that acts on the other of the catch member 6 and the latch head 50 in the latching direction L.

[0042] The methods for mounting the aforementioned lock assembly 1 in a door, a window or the like, the operation of the lock assembly 1 and an optional reversal of the silent close latch 5 will be elucidated below with reference to figures 1, 2, 3 and 4A-4D.

[0043] The method of mounting the lock assembly 1 according to the invention in a door, a window or the like comprises the following steps. First a pocket (not shown) is created in the door, window or the like corresponding or substantially corresponding to the outer dimensions of the housing 2 of the lock assembly 1. This pocket may already have been created for another, conventional lock assembly that was previously fitted in the door, the window or the like. The lock assembly 1 according to the invention has the advantage over the prior art that the components associated with the catch member 6 do not extend outside the housing 2 at the location of the pocket. In particular, the catch member 6 and the catch biasing element 7, to the extent that they extend out of the housing 2, solely extend out of the housing 2 through the latch opening 30 in the front plate 3. Thus, no additional grooves, recesses or spaces have to be cut-out from the pocket to accommodate the components associated with the catch member 6. The lock assembly 1 according to the invention can thus be fitted in a regular pocket and can easily replace a conventional lock assembly with the same outer dimensions.

[0044] When the lock assembly 1 is fitted in the pocket

inside the door, the window or the like, it is ready to interact with and/or engage the respective strike member 90 opposite to the lock assembly 1 when the door, the window or the like is moved in the striking direction S to a closed position in the respective frame 9. Figures 4A-4D schematically show steps during the operation of the lock assembly 1.

[0045] Figure 4A shows the situation in which the door, the window or the like is still open or unlocked and the lock assembly 1 has moved towards the strike member 90 in the frame 9 in the striking direction S. The silent close latch 5 has been moved to the extended position by the biasing force F1 of the latch biasing element 22 in the latching direction L. The catch member 6 has just caught the strike member 90 in the sense that the catch surface 62 of the catch member 6 has contacted or struck the strike member 90. At the moment of first contact of the catch member 6 with the strike member 90, the strike member 90 does not yet exert a force on the catch member 6 that would cause the catch member 6 to move inwards. In figure 4A, the catch member 6 is in the catch position and will start to move inwards towards the pressed position as the striking of the strike member 90 continues.

[0046] Figure 4B shows the situation in which the door, window or the like has continued to move in the striking direction S thereby causing the strike member 90 to force, push or press the catch member 6 inwards, in a rotation about the catch axis C from the initial catch position towards the pressed position as shown in figure 4C. During the pressing of the strike member 90 on the catch member 6, the strike member 90 exerts a normal force N on the catch surface 62 of the catch member 6. The normal force N is converted into torsion in the catch biasing element 7, which ultimately converts the torsion in a counter force F2 that is transmitted by the catch biasing element 7 onto the latch head 50 in the retraction direction R. This counter force F2 counteracts the biasing force F1 of the latch biasing element 22 in the latching direction L.

[0047] Figure 4C shows the situation in which the biasing force F1 of the latch biasing element 22 in the latching direction L is fully counteracted by the counter force F2 that is exerted by the catch biasing element 7 onto the latch head 50 as a result of the pressing of the catch member 6. The silent close latch 5, including the catch member 6 coupled thereto, has started to move into the housing 2 in the retraction direction. Preferably, the balance of forces is chosen such that the silent close latch 5 is caused to move fully inwards before or at the moment that the catch member 6 reaches its pressed position, such that the strike surface 53 of the latch head 50 does not contact the strike member 90 at all during closing. In this manner, metal on metal noise between the strike member 90 and the latch head 50 can be prevented.

[0048] Figure 4D shows the situation in which the silent close latch 5 moves in front of the strike opening 92 in the strike member 90. The catch member 6 is no longer

forced, pushed or pressed into the pressed position and is biased to return to the catch position as a result of the bias of the catch biasing element 7 in the latching direction L. Also, the latch biasing element 22 is no longer counteracted by the catch biasing element 7 and thus biases the silent close latch 5, including the catch member 6 attached thereto, to move into the extended position in the latching direction L. The latch head 50 is now in the extended position inside the strike opening 92 of the strike member 90 and the blocking surface 52 of the latch head 50 blocks movement of the lock assembly 1 in the blocking direction B. The door, the window or the like is now considered to be locked. Manual or electronic operation of the lock assembly 1, e.g. by operation of the follower 21, may retract the silent close latch 5 to such an extent that the door, the window or the like becomes unlocked again.

[0049] When the lock assembly 1 is fitted to a door, window or the like that approaches the strike member 90 in an opposite or reversed striking direction, opposite to the striking direction S as shown in figures 4A-4D, then the silent close latch 5 can be easily reversed. First, the silent close latch 5 is detached from the internal mechanism 20 of the lock assembly 1, after which the silent close latch 5 is taken out of the housing 2 through the latch opening 30 and reversed over one-hundred-and-eighty (180) degrees with respect to the housing about the reversal axis (latching direction L) to a reversed position (not shown) in which the silent close latch 5 reduces noises of the lock assembly 1 when the lock assembly moves in the reversed striking direction towards a closed position and hits the strike member 90 in said reversed striking direction.

[0050] It is to be understood that the above description is included to illustrate the operation of the preferred embodiments and is not meant to limit the scope of the invention. From the above discussion, many variations will be apparent to one skilled in the art that would yet be encompassed by the scope of the present invention.

[0051] In summary, the invention relates to a lock assembly 1 with a silent close latch 5 for reducing noises of the lock assembly 1 when the lock assembly 1 moves in a striking direction S towards a closed position and hits a strike member 90 in said striking direction S, wherein the silent close latch 5 comprises a latch head 50 and a catch member 6 that is coupled to the latch head 50 and that is rotatable with respect to the latch head 50 between a catch position and a pressed position, wherein the catch member 6, in the catch position, protrudes from the latch head 50 in the striking direction S to catch the strike member 90 and, in the pressed position, is rotated towards the latch head 50, wherein the silent close latch 5 is provided with a catch biasing element 7 that is arranged for biasing the catch member 6 with respect to the latch head 50 towards and into the catch position.

Claims

1. Lock assembly with a silent close latch for reducing noises of the lock assembly when the lock assembly moves in a striking direction towards a closed position and hits a strike member in said striking direction, wherein the lock assembly comprises a housing and a front plate at one end of the housing that faces the strike member in the closed position, wherein the front plate is provided with a latch opening, wherein the silent close latch is movable through the latch opening in a latching direction between a retracted position within the housing and an extended position at least partially outside the housing, wherein the strike member is provided with a strike opening, wherein the silent close latch comprises a latch head that is arranged to engage the strike opening in the extended position when the latch opening is opposite to the strike opening in the closed position, wherein the silent close latch further comprises a catch member that is coupled to the latch head and that is arranged to be rotatable with respect to the latch head between a catch position and a pressed position about a catch axis that extends perpendicular to the striking direction and the latching direction, wherein the catch member, in the catch position, protrudes from the latch head in the striking direction to catch the strike member and, in the pressed position, is rotated about the catch axis from the catch position towards the latch head, wherein the silent close latch is provided with a catch biasing element that is arranged for biasing the catch member with respect to the latch head towards and into the catch position, wherein the lock assembly comprises a latch biasing element that is coupled to the silent close latch for biasing the silent close latch in the latching direction from the retracted position towards the extended position, wherein the catch biasing element is arranged for countering the bias of the latch biasing element when the catch member is rotated from the catch position towards the pressed position, wherein the catch biasing element is arranged for pushing off the latch head against the catch member towards the retracted position of the silent close latch when the catch member is rotated from the catch position towards the pressed position.
2. Lock assembly according to claim 1, wherein the catch biasing element is arranged for pushing off the catch member against the latch head towards and into the catch position.
3. Lock assembly according to claim 1 or 2, wherein the catch biasing element is arranged to bias the catch member up to the catch position.
4. Lock assembly according to any one of the preceding claims, wherein the catch biasing element is arranged to be continuously in abutment with both the latch head and the catch member between pressed position and the catch position.
5. Lock assembly according to any one of the preceding claims, wherein the catch biasing element extends in between the latch head and the catch member in the latching direction.
6. Lock assembly according to any one of the preceding claims, wherein the latch head is provided with a first push off surface facing the catch member and wherein the catch member is provided with a second push-off surface facing the first push off surface, wherein the catch biasing element extends between the mutually facing push off surfaces and acts on both push off surfaces.
7. Lock assembly according to any one of the preceding claims, wherein the catch biasing element is an insertable part of the lock assembly that is placed between the latch head and the catch member in the latching direction.
8. Lock assembly according to any one of the preceding claims, wherein the catch biasing element is a resilient element.
9. Lock assembly according to claim 8, wherein the catch biasing element is a spring.
10. Lock assembly according to claim 9, wherein the catch biasing element is a torsion spring.
11. Lock assembly according to any one of the preceding claims, wherein the latch head comprises a strike surface that faces the strike member in the striking direction, wherein the catch member protrudes from said strike surface in the striking direction in the catch position and is flush or substantially flush with said strike surface in the pressed position.
12. Lock assembly according to claim 11, wherein the latch head further comprises a blocking surface extending in the latching direction and facing in a blocking direction opposite to striking direction, wherein the strike surface tapers towards the blocking surface in the latching direction, wherein the catch member in the pressed position is flush or substantially flush with both the strike surface and the blocking surface.
13. Lock assembly according to any one of the preceding claims, wherein the silent close latch is reversible over 180 degrees with respect to the housing about a reversal axis extending parallel to the latching direction to a reversed position in which the silent close latch is arranged for reducing noises of the lock as-

sembly when the lock assembly moves in a reversed striking direction towards a closed position and hits a strike member in said reversed striking direction.

14. Lock assembly according to any one of the preceding claims, wherein the catch member and/or the catch biasing element, to the extent that they extend out of the housing, extend outside the housing through the latch opening only. 5
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15. Method for mounting the lock assembly of claim 1 in a door, a window or the like, wherein the method comprises the steps of creating a pocket in the door, window or the like corresponding or substantially corresponding to the outer dimensions of the housing, wherein the catch member is movable from the pressed position into the catch position with the catch member and/or the catch biasing element, to the extent that they extend out of the housing, extending outside the housing through the latch opening only. 15
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16. Method according to claim 15, wherein the method further comprises the step of reversing the silent close latch over 180 degrees with respect to the housing about a reversal axis extending parallel to the latching direction to a reversed position in which the silent close latch reduces noises of the lock assembly when the lock assembly moves in a reversed striking direction towards a closed position and hits a strike member in said reversed striking direction. 25
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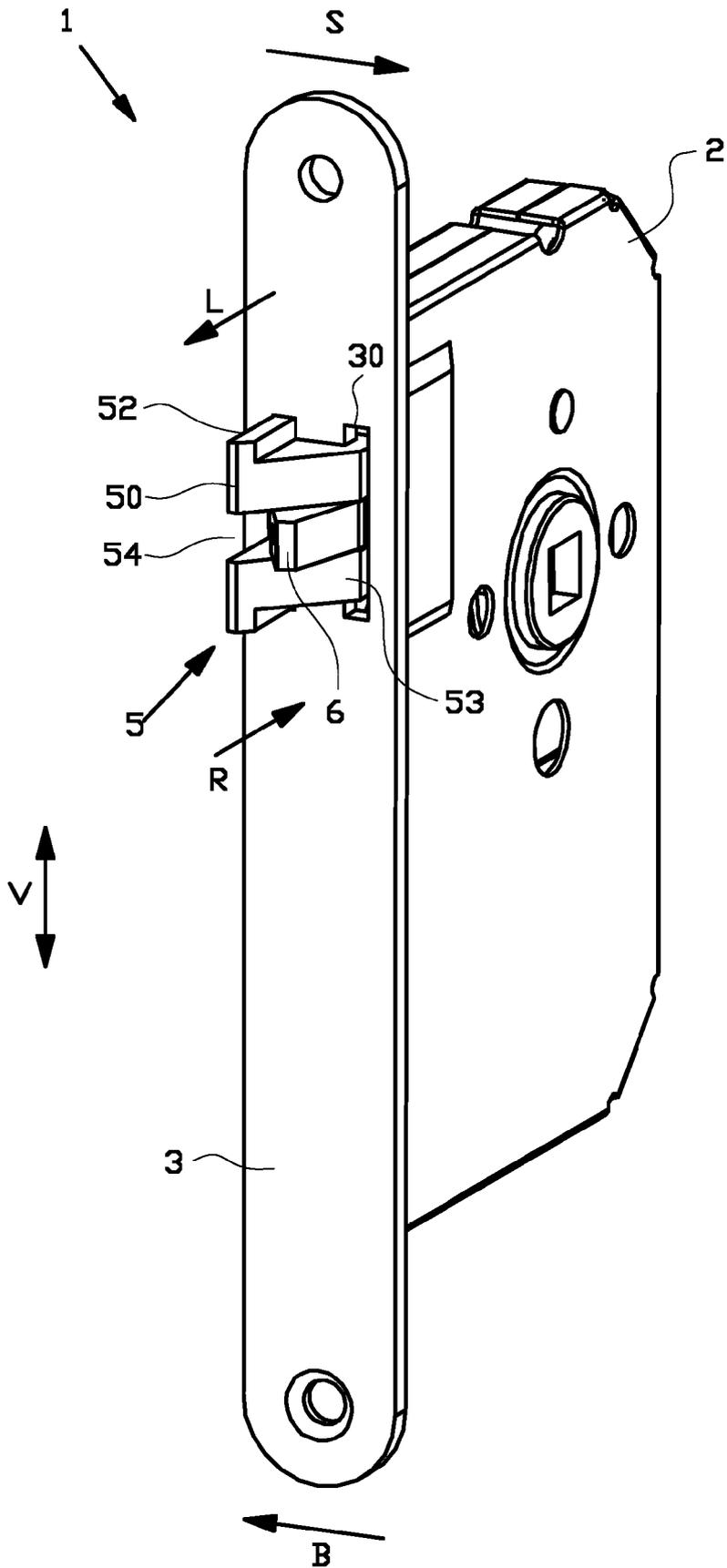


FIG. 1

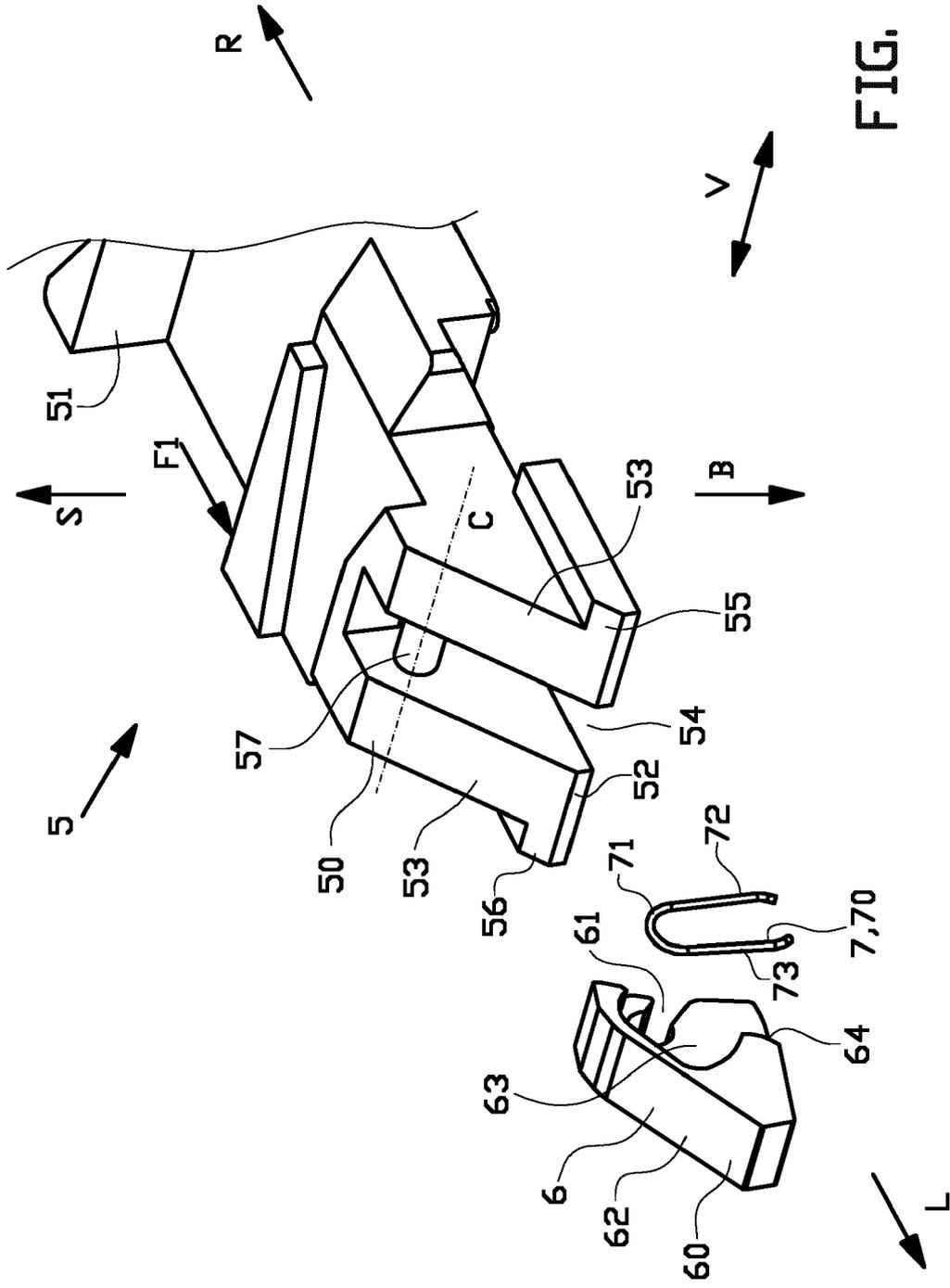


FIG. 2

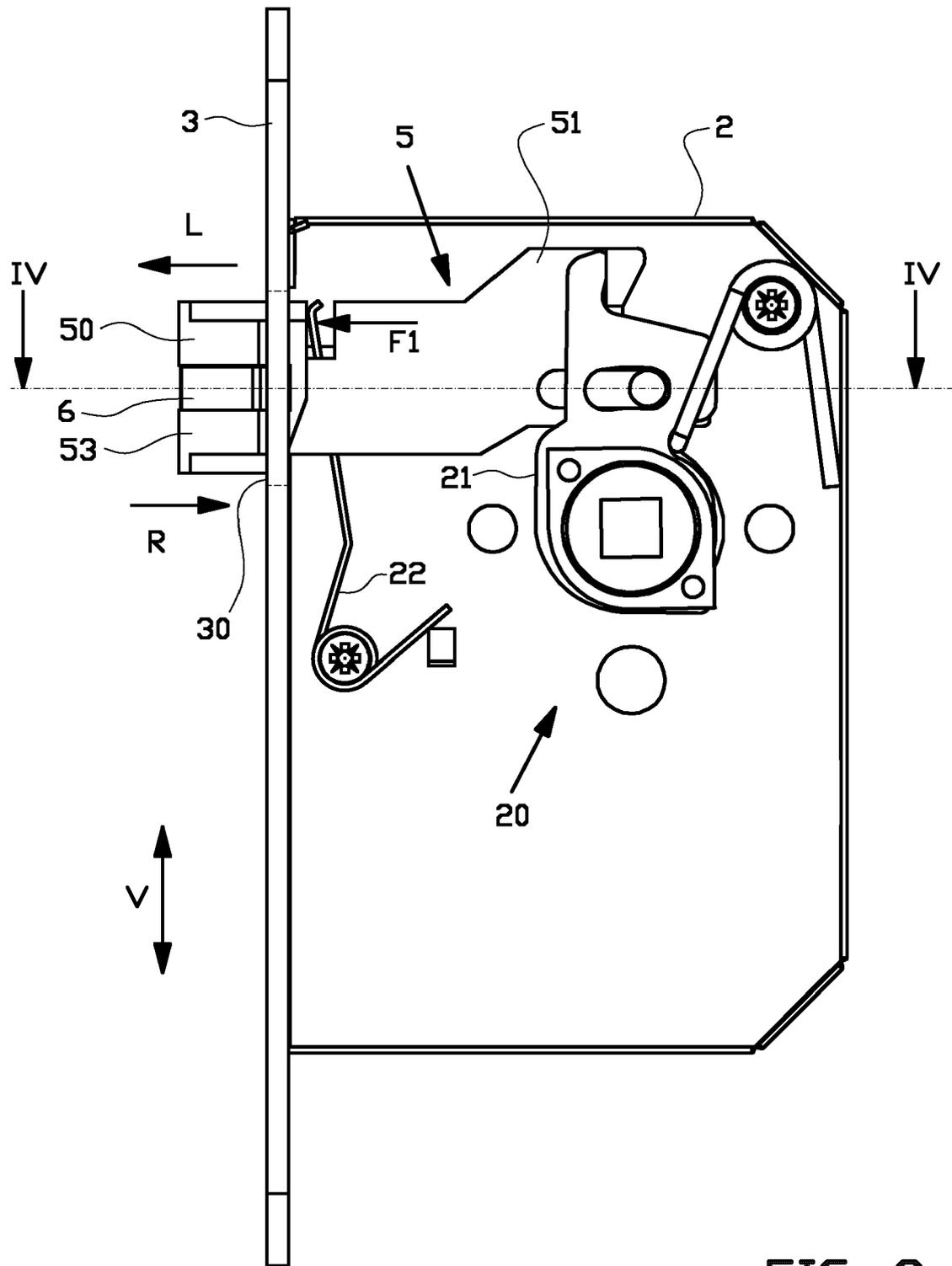


FIG. 3

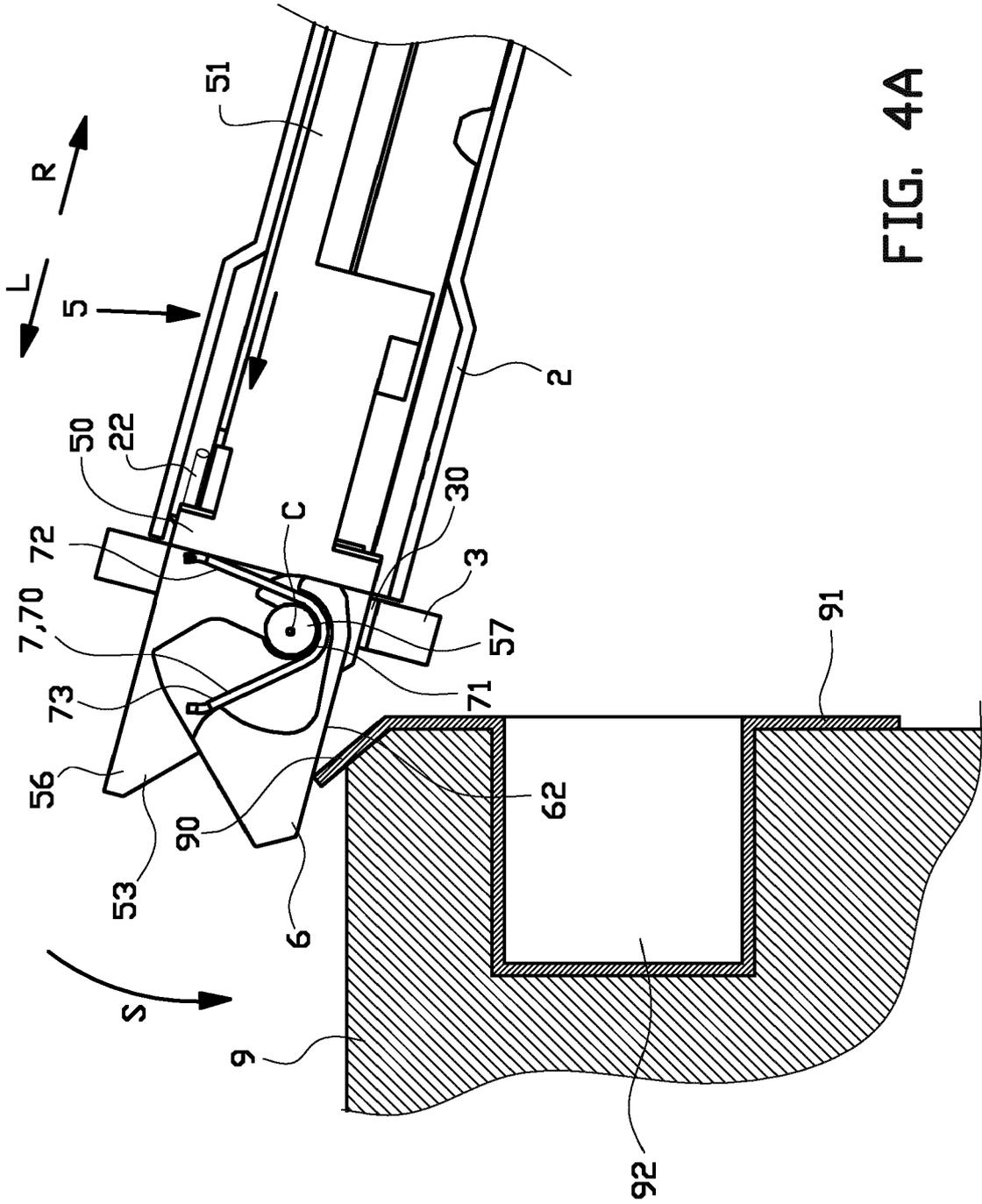
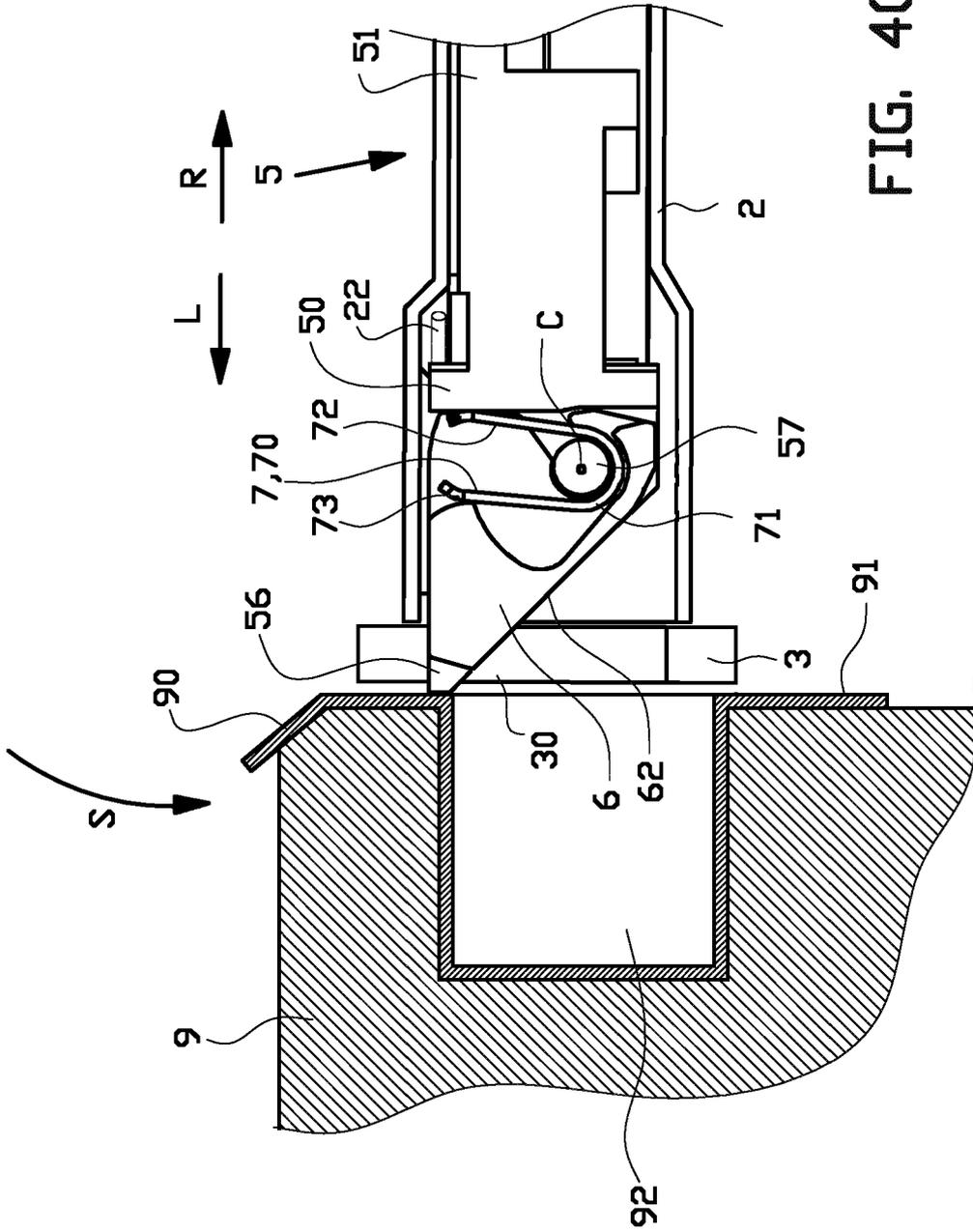
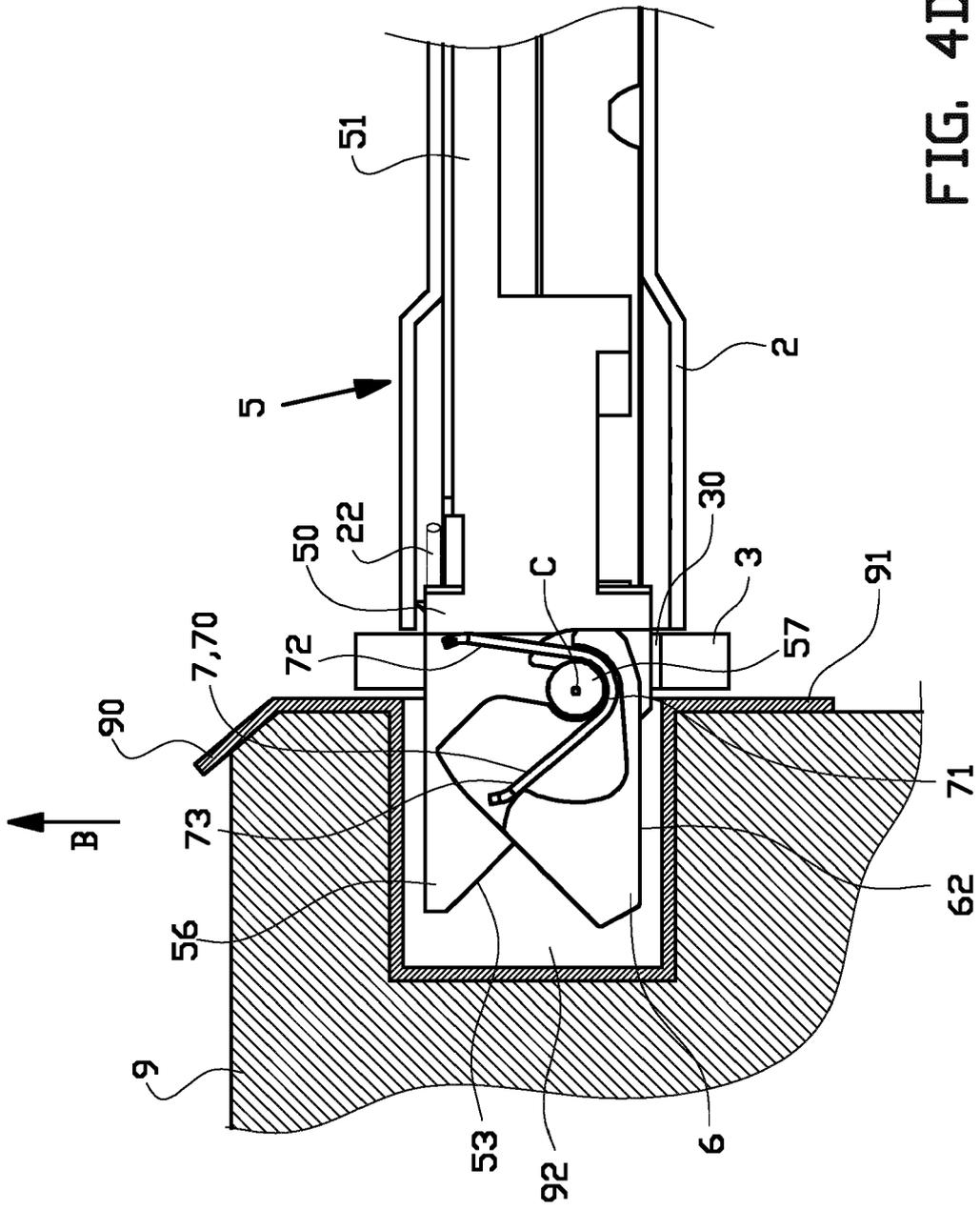


FIG. 4A







EUROPEAN SEARCH REPORT

Application Number
EP 16 17 1453

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	DE 197 01 761 C1 (FUSS FRITZ GMBH & CO [DE]) 16 April 1998 (1998-04-16) * column 5, line 42 - column 6, line 58; figures 8-11 *	1-16	INV. E05B63/04 E05B17/00 E05B15/10
X	DE 297 20 217 U1 (MAYER & CO [AT]) 17 December 1998 (1998-12-17) * the whole document *	1-16	
X	FR 2 927 644 A1 (METALUX SOC PAR ACTIONS SIMPLI [FR]) 21 August 2009 (2009-08-21) * the whole document *	1-9,15	
A		10-14,16	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (IPC)
			E05B
Place of search		Date of completion of the search	Examiner
The Hague		14 October 2016	Cruyplant, Lieve
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ON EUROPEAN PATENT APPLICATION NO.

EP 16 17 1453

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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14-10-2016

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 19701761	C1	16-04-1998	AT 211521 T 15-01-2002
			CA 2227400 A1 20-07-1998
			DE 19701761 C1 16-04-1998
			EP 0854261 A1 22-07-1998
			ES 2169448 T3 01-07-2002
			US 6125670 A 03-10-2000

DE 29720217	U1	17-12-1998	NONE

FR 2927644	A1	21-08-2009	NONE

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- DE 19701761 C1 [0006] [0010]