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(54) Lock having a lockable handle shaft

(57) The lock comprises a frame (1), a handle operated latch bolt (19), a handle shaft (18), a latch bolt actuating mechanism and a mechanism for locking the handle shaft. The latch bolt locking mechanism comprises a locking lever (47) which is fixed with respect to the handle shaft (18) and means, comprising an electromagnet (54), for locking the locking lever with the handle shaft in its angular position wherein the latch bolt projects out of the lock. The locking means further comprise a stop (58) which is fixed with respect to the frame, and at least a portion of the locking lever (47) is arranged to be moved by means of the electromagnet (54) with respect to the handle shaft (18) so that it is either locked behind the stop (58) or it is shifted with respect to said stop so that the locking lever can pass the stop. The locking lever (47) preferably fits with some clearance about the handle shaft (18) so that it can be moved as a whole by means of the electromagnet (54).

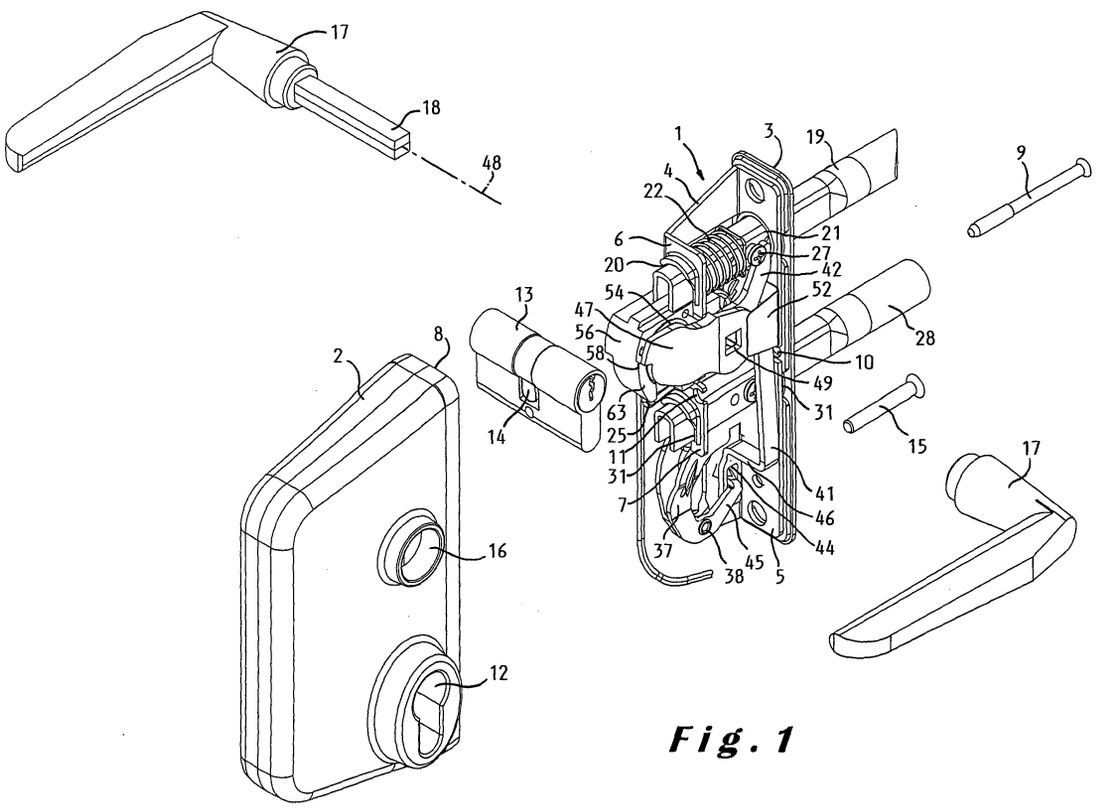

Fig. 1

EP 1 526 234 A1

Description

[0001] The present invention relates to a lock comprising a frame; a bolt movably mounted on the frame between a locking and an unlocking position and arranged to be operated by means of at least one handle; a shaft for said handle, which shaft has a longitudinal axis and is pivotally mounted about its longitudinal axis on the frame between a first and a second angular position; a mechanism for actuating the bolt upon rotation of the handle shaft to move the bolt from its locking to its unlocking position when the handle shaft is rotated from its first angular position to its second angular position and to move the bolt from its unlocking to its locking position when the handle shaft is rotated from its second angular position to its first angular position; and a mechanism for locking the handle shaft, which locking mechanism is arranged to be brought in two states, namely in a locking state wherein the handle shaft is locked in its first angular position and in an unlocking state wherein the handle shaft is unlocked, said locking mechanism comprising a locking lever which is fixed with respect to the handle shaft so that it rotates together with the handle shaft about said axis; and means, comprising an electromagnet, for locking the locking lever with the handle shaft in its first angular position and for unlocking the locking lever.

[0002] An advantage of such a type of lock is that the handle operated bolt can be used to prevent an unauthorised opening of the door or gate, even when a handle is provided on both sides of the door or gate or when the lock is applied to a gate through or over which the handle on the other side of the gate can be reached. Since the handle shaft locking mechanism comprises an electromagnet, a control by means of an electronic access control device can be provided and/or by means of a remote control. When the lock is applied for example onto a garden gate, such a remote control may enable to lock and unlock the gate for example from within the house. When the gate is unlocked, for example when one is outside the house, the gate can still be opened and closed by means of the handles.

[0003] In addition to the handle operated bolt, in particular a latch bolt, the lock will usually also comprise a dead bolt operated by means of a key and/or by means of an electronic access control device. The presence of the handle shaft locking mechanism offers the advantage that the door or gate cannot only be locked by means of the dead bolt but also be means of the handle operated bolt. Consequently, when one is in the house, the garden gate could be locked for example only by means of the handle operated bolt so that the lock can be unlocked by means of a remote control whilst when one has left the house, the garden gate can be locked both by means of the handle operated bolt and by means of the dead bolt to provided additional security. Preferably, the lock comprises a mechanism to unlock the handle operated bolt when unlocking the dead bolt by means of a key operated lock cylinder.

[0004] A lock of the type defined hereabove is disclosed in DE-A-195 14 742 and in DE-A-36 43 388. In these known locks, the locking lever can be locked by means of an additional lever. The additional lever is pivotally mounted around a fixed pivot and can be rotated in and out of engagement with the locking lever by means of an electromagnet. As clearly disclosed in DE-A-36 43 388, the additional lever is kept in one angular orientation by means of the electromagnet and is moved to the other angular orientation by means of a small helical spring.

[0005] A drawback of these prior art locks is that the mechanism for locking the handle shaft is quite complex and delicate so that these locks are not suited for outside use. For a skilled person, it will indeed be clear that under the varying weather conditions and as a result of dust or other dirt penetrating into the lock, the required rotation of the additional lever can be hampered so that the locking mechanism can no longer be operated. Dust or other dirt can penetrate in particular between the additional lever and the surface of the frame onto which it slides. The rotation of the additional lever can especially also be obstructed in case of frosty weather, when dew or condensation becomes frozen in the lock.

[0006] An object of the present invention is therefore to provide a new lock, the mechanism for locking the handle shaft can be kept more simple and rendered more robust or reliable.

[0007] To this end, the lock according to the invention is characterised in that said locking mechanism comprises a stop which is fixed with respect to the frame, and at least a portion of the locking lever is arranged to be moved by means of the electromagnet with respect to the handle shaft so that, in the locking state of the locking mechanism, the locking lever is locked behind the stop whilst, in the unlocking state of the locking mechanism, said portion of the locking lever is shifted with respect to said stop so that the locking lever can pass the stop when the handle shaft moves between its first and second angular positions.

[0008] Since in the lock according to the invention the locking lever itself, or at least a portion thereof, is moved, no additional lever is required to lock the locking lever and the locking mechanism can be made more simple, robust and reliable. In particular it is possible to avoid the sliding motions of the additional lever which are required in the prior art locks.

[0009] In an advantageous embodiment of the lock according to the invention, the locking lever shows an opening through which the handle shaft extends and this opening enables a rotational movement of the locking lever in a plane comprising the longitudinal axis of the handle shaft, the locking lever being arranged to be moved as a whole according to this rotational movement when locking and unlocking the handle shaft by means of said locking means.

[0010] In this embodiment, a very simple, robust and

reliable construction of the handle shaft locking mechanism is achieved. The arrangement of the locking lever in this advantageous embodiment enables to provide a locking lever of a considerable size without requiring a sliding motion between the locking lever and the frame so that not only the reliability thereof is increased but so that more space is available to provide a larger electromagnet for attracting the locking lever. Such a larger electromagnet also increases the robustness and the reliability of the locking mechanism.

[0011] Preferably, the electromagnet is arranged to move said portion of the locking lever by magnetic attraction of said portion of the locking lever. In this embodiment, in addition to the locking lever, no further moving parts are required in the locking mechanism so that the risk of blocking of the lock by dirt or ice is considerably reduced compared to the prior art locks. The electromagnet is further preferably arranged to hold the locking mechanism in its locking state when the electromagnet is being energised so that freezing of the lock is prevented by the heat generated by the electromagnet.

[0012] Other particularities and advantages of the invention will become apparent from the following description of some particular embodiments of the lock according to the present invention. This description is however only given by way of example and is not intended to limit the scope of the invention as defined in the annexed claims. The reference numerals used in this description relate to the annexed drawings wherein:

Figures 1 and 2 are partially exploded views respectively from the front and the back of a lock according to the invention;

Figure 3 is an exploded view of the same lock as in the previous figures but illustrated more elements in a disassembled state;

Figure 4 illustrates on a larger scale a portion of Figure 3;

Figure 5 is a perspective view on a lateral side of the lock illustrated in the previous figures but having one handle and the cover box removed;

Figure 6 illustrates on a larger scale a portion of Figure 5 wherein the handle shaft is unlocked by the locking mechanism;

Figure 7 is a same view as Figure 6 but illustrating the handle shaft in its locked state.

[0013] The lock shown in the drawings is a lock provided to be mounted against a profile, in particular a tubular profile, of a gate, fence, door, etc. The profile has to be provided with holes so that both the latch and the dead bolt can project there through. When mention is made of a retracted position of the latch or dead bolt, this consequently does not mean that the bolt is retracted within the lock but that it is retracted within the tubular profile or that it extends over a small distance out of this profile. In its extended position, the bolt then extends over a larger distance out of the tubular profile, the difference between these two distances being called the stroke of the bolt. When the lock is mounted so that the latch and dead bolts do not have to extend through a profile, the length thereof can of course be reduced.

[0014] The illustrated lock comprises a frame 1 composed of a cover box 2, a front cover plate 3 for closing the box 2 and a base plate 4 arranged within the closed box 2. The base plate 4 has on its front side an upstanding edge 5 and on its back side two upstanding edge portions 6, 7. The cover box 2 has such dimensions that the base plate 4 can be slid completely therein, more particularly through the substantially rectangular front opening 8 of the box 2, even the upstanding edge 5.

[0015] The cover plate 3, which is fixed to the upstanding edge 5 of the base plate 4, is somewhat larger than the front opening 8 so that it engages against the peripheral edge thereof. By means of a screw 9, which passes through an opening 10 in the upstanding edge 5 and an opening 11 in the upstanding edge portion 7 of the base plate 4, the base plate and cover plate are fixed to the cover box.

[0016] The cover box 2 is provided with two aligned openings 12 through which a cylinder 13 can be inserted in the lock, in particular a so-called Euro-cylinder corresponding to the standard DIN V18254/07.91. This key actuated cylinder 13 comprises a rotary driving bit 14 which rotates around a central axis of the cylinder to actuate the lock as described hereinafter. The cylinder 13 is fixed in the lock by means of a screw 15 passing through little holes made in the cover plate 3 and in the upstanding edge 5 of the base plate 4. The cover box 2 is further provided with two additional aligned openings 16 through which the door handles 17 can be mounted to the lock. Both handles 17 are mounted onto a square handle shaft 18, having a longitudinal axis 48 and extending uninterruptedly from one handle to the other. In this way, both handles move always simultaneously and the lock can be operated by both handles without having to actuate first any clutch mechanism.

[0017] The illustrated lock further comprises a bolt 19 which is operated by means of the handles 17 to move it between a locking and an unlocking position. The bolt 19 is in particular a latch bolt which is slidably mounted on the frame 1 of the lock, more particularly within an opening 20 in the upstanding edge portion 6 and an opening 21 in the upstanding edge 5 of the base plate 4. The latch bolt 19 can thus move between a projecting position shown in Figures 1 and 2 and a retracted position which has not been shown. A compression spring 22 is applied over the latch bolt 19 to urge this bolt to its projecting position. For bringing the latch bolt 19 by means of the handles 17 to its retracted position to open the gate, the rectangular handle shaft 18 is inserted in a corresponding hole in a follower 23. This follower 23 is provided in its turn with a latch bolt lever 24 which follows the rotations of the handles 17 and which engages the latch bolt 19 against the action of a main spring 25 to retract this latch bolt. The main spring 25 serves

to push the latch bolt lever 24 and thus the follower 23 and the handles 17 and handle shaft 18 to their initial rest positions. The handle shaft 18 can be rotated by means of the handles 17 between a first angular position, wherein the latch bolt 19 is in its projecting or locking position, and a second angular position, wherein the latch bolt 19 is in its retracted or unlocking position.

[0018] In order to allow an adjustment of the latch bolt, treaded holes 26 are provided in the lateral sides of the latch bolt 19. In any one of these holes 26 an adjustment screw 27, forming an abutment for the compression spring 22 and for the latch bolt lever 24 can be fixed. The different positions of the holes 26 correspond to different distances over which the latch bolt 19 projects out of the lock.

[0019] In addition to the latch bolt, the lock illustrated in the drawings also comprises a dead bolt 28. The dead bolt 28 is slidably mounted on the frame 1 between a projecting position, illustrated in Figures 1 and 2, and a retracted position which has not been illustrated. The dead bolt 28 can more particularly slide in an opening 31 in the upstanding edge portion 7 and an opening 32 in the upstanding edge 5 of the frame 1. Just like the latch bolt, the dead bolt 28 is provided with treaded holes 29 wherein a screw 30 can be fixed. The holes 29 are located to enable an adjustment of the distance over which the dead bolt projects out of the lock, i.e. to enable to adjust the lock to different diameters of the profile to which it is to be mounted.

[0020] In contrast to the latch bolt, the dead bolt 28 is not urged by a spring to its projecting position but is locked in both its retracted and projecting positions by means of locking means. In the illustrated embodiment, these locking means comprise a retaining plate 33 which is slidably mounted in the up- and downward direction on the frame 1. The plate 33 is provided with a slot 34, which form at both ends an upward notch 35. In its normal position, the plate 33 is urged downward by means of an end 36 of the main spring 25, which engages an upstanding edge of the plate 33, so that the screw 30 fixed to the dead bolt projects into one of the notches 35 and thus locks the dead bolt 28 in one of its extreme positions.

[0021] The movement of the dead bolt 28 between its two extreme positions is controlled by rotating the key in the cylinder 13, or in other words by the resulting rotation of the rotary driving bit 14. When rotating this bit 14, it first of all engages the bottom edge of the retaining plate 33 so that this plate is lifted and the dead bolt is unlocked. In the embodiment illustrated in the figures, the rotary driving bit 14 does not act directly upon the dead bolt 28 but instead through the intermediary of a dead bolt lever 37. This lever 37 is pivoted onto the base plate 4 about a pivot 38. The free extremity of the lever 37, situated opposite the pivot 38, is provided with a slot 39. This free extremity extends within the dead bolt 28 so that the adjustment screw 30 extends through the slot 39 of the lever 37.

[0022] To actuate the dead bolt, the driving bit 14 engages the dead bolt lever 37 in a notch 40 situated between the dead bolt 28 and the pivot 38. When rotating the key and thus the driving bit of the cylinder 13, the dead bolt lever 37 rotates in the same direction around the pivot 38 and the dead bolt moves along since the screw 30 extends through the slot 39 in the dead bolt lever 37. Instead of providing such an intermediate dead bolt lever 37, it is also possible to omit such a lever and to have the driving bit of the cylinder act directly upon the dead bolt, more particularly into notches provided in the lowed side of the dead bolt. The presence of the dead bolt lever offers however the advantage of increasing the stroke of the dead bolt.

[0023] An additional advantage of the presence of the dead bolt lever 37 is that it can be used to move a second turn pusher 41 into and out of the path of the rotary driving bit 14. Such a second turn pusher 41 is connected to a second turn lever 42 arranged to move the latch bolt 19, against the action of the compression spring 22, from its projecting to its retracted position. The second turn lever 42 is more particularly rotatably applied over the follower 23. It engages the screw 27 on the latch bolt 19 and shows further a hole 43 wherein the free extremity of the pusher 41, which is hook shaped, is applied. At its other free extremity, the pusher 41 is provided with a slot 44 by means of which it is slidably connected to an arm 45 of the dead bolt lever 37. This connection between the pusher 41 and the arm 45 of the dead bolt lever 37 is located between the dead bolt 28 and the pivot 38 of the dead bolt lever 37 so that the pusher 41 is out of the path of the rotary driving bit 14 in the projecting position of the dead bolt 28 but comes into this path when the dead bolt moves, upon a first turn of the rotary bit 14, to its retracted position. Upon a second turn of the rotary bit 14, this rotary bit 14 engages a hook shaped portion 46 of the pusher 41 and pushes this pusher 41 upwards to rotate the second turn lever 42 and thus retract the latch bolt 19.

[0024] EP-B-1 118 739, which is also in the name of the present applicant, discloses more details of the above described features of the lock. The more detailed description of the lock given in this prior European patent is therefore taken up in the present specification by way of reference.

[0025] In addition to the above described elements, the lock according to the invention comprises further a mechanism for locking the handle shaft 18 so that the lock cannot only be locked by means of the dead bolt but also by means of the latch bolt. Although the presence of a dead bolt is preferred, it is consequently also possible to omit the dead bolt, and the above described mechanism for operating the dead bolt by means of the cylinder 13.

[0026] The mechanism for locking the handle shaft 18 comprises first of all a locking lever 47. This locking lever 47 is fixed to the handle shaft 18 so that it rotates together with the handle shaft about the longitudinal axis

48 thereof. The locking lever 47 is provided with an opening 49 through which the handle shaft 18 extends. In the illustrated embodiment the handle shaft 18 engages the inner side of the opening 49 of the locking lever 47. The opening 49 in the locking lever 47 has a shape so that it prevents the locking lever from rotating around the longitudinal axis 48 of the handle shaft with respect to this handle shaft 18. The opening 49 has more particularly a same square cross-section as the handle shaft. The opening 49 in the locking lever 47 fits however with some clearance around the handle shaft 18 so that the locking lever 47 can rotate over a small angle in a plane comprising the longitudinal axis 48 of the handle shaft 18, more particularly according to arrows 50 and 51 in Figures 5, 6 and 7.

[0027] The locking lever 47 engages the front of the follower 23 and the front of the second turn lever 42 which is applied over the follower 23. When the cover box 2 and the handles 17 and the handle shaft 18 are removed from the lock, the locking lever 47 is maintained in its position against the follower 23 and the second turn lever 42 by means of a resilient, hook shaped piece of sheet metal 52 which is fixed to the upstanding edge 5 of the base plate 4. To maintain the locking lever 47 in the right angular position with respect to the follower 23 so that the handle shaft 18 can be easily inserted in the lock, the front side of the follower 23 is provided with two notches 53 (see Figure 4) wherein corresponding projections on the back of the locking lever 47 can engage (not shown in the figures).

[0028] In addition to the locking lever 47, the mechanism for locking the handle shaft 18 comprises an electromagnet 54 which is fixed in a hole 55 in a mounting element 56. This mounting element 56 is fixed to the base plate 4 of the lock. The mounting element 56 is more particularly positioned with one end between the two upstanding edge portions 6 and 7 of the base plate 4 and has two grooves 57 wherein the upstanding edge portions 6 and 7 extend to fix the mounting element to the base plate.

[0029] The electromagnet 54 is arranged to lock the locking lever 47, and hence the handle shaft 18, in its first angular position, namely in the angular position of the handle shaft wherein the latch bolt 19 is in its locking or projecting position. The electromagnet 54 and the locking lever 47 are mounted in such a manner in the lock that, in the first angular position of the handle shaft 18, the locking lever 47 is situated in front of the electromagnet 54 so that the locking lever can be attracted magnetically towards the electromagnet. As illustrated in the figures, the electromagnet 54 preferably attracts the locking lever 47 in a direction which is substantially parallel to the longitudinal axis 48 of the handle shaft 18 so that the locking lever can be rotated, as explained hereabove and illustrated in Figures 5 to 7, in a plane containing the longitudinal axis 48 of the handle shaft 18.

[0030] The front surface of the mounting element 56 for the electromagnet 54 shows a shoulder forming a stop 58 which is fixed with respect to the frame and is more particularly in a fixed position with respect to the frame. The stop 58 is intended for locking the locking lever 47 in the locking state of the locking mechanism, more particularly when the locking lever 47 is attracted magnetically towards the electromagnet in the first angular position of the handle shaft. When the locking lever 47 is blocked behind the stop 58, the handle shaft 18 can no longer be rotated from its first to its second angular position so that the latch bolt can no longer be operated by means of the handles 17 and is thus locked.

[0031] In order to enable to unlock the locking lever 47, the locking mechanism of the lock illustrated in the drawings further comprises a spring 59 for urging the locking lever 47 away from the electromagnet 54 so that the locking lever 47 can pass the stop 58 when the locking mechanism is in its unlocking state (see Figures 5 and 6), more particularly when the electromagnet 54 is de-energised so that the locking lever is no longer attracted by the electromagnet. In this state, the handle shaft 18 can thus be rotated from its first to its second angular position to withdraw the latch bolt 19.

[0032] The spring 59 may be a leaf spring positioned between the locking lever 47 and the front surface of the mounting element 56. In the preferred embodiment illustrated in particular in Figure 4 the spring 59 is however a spiral compression spring 59 applied in a boring 60 in the mounting element 56 underneath the locking lever 47. The boring extend substantially in the same direction as the direction wherein the locking lever is moved when the electromagnet is energised and de-energised in the first angular position of the handle shaft. At the location of the stop 58, this direction is substantially parallel to the longitudinal axis 48 of the handle shaft 18. The end of the boring 60 facing the locking lever 47 has a reduced cross-section and is in particular slot shaped whilst the other part of the boring is cylindrical. In order to enable the spring 59 to urge the locking lever 47 away from the electromagnet 54, a sliding piece 61 is provided in the boring 60, the sliding piece 61 having one end with a reduced cross-section projecting through the slot shaped end of the boring and another, cylindrical end fitting into the cylindrical part of the boring 60. The boring 60 is closed off by means of a stopper 62 to maintain the spring 59 and the sliding piece 61 in the boring 60. The end of the sliding piece which has a reduced cross-section so that it can penetrate through the slot shaped end of the boring has such a length that, when being pushed out of the boring by the spring, i.e. when the electromagnet is de-energised, it can push the locking lever 47 away from the electromagnet so that it can be rotated by the handle shaft over the stop or shoulder 58 (see Figures 5 and 6).

[0033] As explained hereabove, the locking lever can be locked behind the stop or shoulder 58 when energising the electromagnet. In the lock illustrated in the drawings, the locking lever will always be locked behind the

stop 58, even when the electromagnet would be energised when the handle shaft is rotated by one of the handles so that it is not in its first angular position wherein the latch bolt projects out of the lock. The locking means of the illustrated lock comprise a guide 63 formed by the mounting element 56 on the other side of the shoulder or stop 58 so that, even when the locking lever 47 is attracted towards the electromagnet 54, the springs 22 and 25 are strong enough to rotate the handle shaft back to its first angular position with the locking lever 47 sliding over the guide surface 63 until it snaps behind the stop and pushes the sliding piece 61 into the boring 60. When actuating the locking means to lock the latch bolt, the latch bolt will thus always be locked, independing of the angular position of the handle shaft 18.

[0034] In the above described preferred embodiment, the electromagnet is arranged to hold the locking mechanism in its locking state when the electromagnet is being energised. An advantage of this embodiment is that, due to the heat generated by the electromagnet, the lock is prevented from being frozen in case of frost weather. Another advantage is that in case of a power failure (for example as a result of a fire), the door or gate is unlocked automatically.

[0035] From the above description of a preferred embodiment of the invention, it will be clear that many modifications can be applied thereto as to the shape, composition, etc. of the lock without departing from the scope of the invention as defined in the appended claims.

[0036] For a skilled person it will for example be clear that the locking lever 47 could be made of two parts which are for example hinge connected to one another so that only the free end portion of the locking lever has to be moved by means of the electromagnet to lock or unlock the locking lever. In this case, the free end portion of the locking lever could also form an angle with the other portion of the locking lever and could in particular extend parallel to the longitudinal axis of the handle shaft. The embodiment illustrated in the drawings is however preferred since it contains less moving elements and is thus more reliable and robust.

Claims

1. A lock comprising:

- a frame (1);
- a bolt (19) movably mounted on the frame between a locking and an unlocking position and arranged to be operated by means of at least one handle (17);
- a shaft (18) for said handle, which shaft has a longitudinal axis (48) and is pivotally mounted about its longitudinal axis on the frame (1) between a first and a second angular position;
- a mechanism (22, 23, 24) for actuating the bolt upon rotation of the handle shaft (18) to move the bolt (19) from its locking to its unlocking position when the handle shaft (18) is rotated from its first angular position to its second angular position and to move the bolt (19) from its unlocking to its locking position when the handle shaft (18) is rotated from its second angular position to its first angular position; and
- a mechanism for locking the handle shaft (18), which locking mechanism is arranged to be brought in two states, namely in a locking state wherein the handle shaft is locked in its first angular position and in an unlocking state wherein the handle shaft is unlocked, said locking mechanism comprising:
  - a locking lever (47) which is fixed with respect to the handle shaft (18) so that it rotates together with the handle shaft (18) about said axis (48); and
  - means, comprising an electromagnet (54), for locking the locking lever (47) with the handle shaft (18) in its first angular position and for unlocking the locking lever (47),

characterised in that
said locking means further comprise a stop (58) which is fixed with respect to the frame (1), and
at least a portion of the locking lever (47) is arranged to be moved by means of the electromagnet (54) with respect to the handle shaft (18) so that, in the locking state of the locking mechanism, the locking lever (47) is locked behind the stop (58) whilst, in the unlocking state of the locking mechanism, said portion of the locking lever (47) is shifted with respect to said stop (58) so that the locking lever (47) can pass the stop (58) when the handle shaft (18) moves between its first and second angular positions.

2. A lock according to claim 1, **characterised in that**, at the location of said stop (58), said portion of the locking lever (47) is arranged to be moved by the electromagnet (54) in a direction substantially parallel to the longitudinal axis (48) of the handle shaft (18).

3. A lock according to claim 1 or 2, **characterised in that** said locking lever (47) shows an opening (49) through which the handle shaft (18) extends.

4. A lock according to claim 3, **characterised in that** the handle shaft (18) engages an inner side of said opening (49) in the locking lever (47).

5. A lock according to claim 3 or 4, **characterised in that** said opening (49) in the locking lever (47) enables a rotational movement of the locking lever

(47) in a plane comprising the longitudinal axis (48) of the handle shaft (18) and the locking lever (47) is arranged to be moved as a whole according to this rotational movement when locking and unlocking the handle shaft by means of said locking means.

6. A lock according to any one of the claims 1 to 5, **characterised in that** the electromagnet (54) is arranged to move said portion of the locking lever (47) by magnetic attraction of said portion of the locking lever.

7. A lock according to claim 6, **characterised in that** the electromagnet (54) is arranged to magnetically attract said portion of the locking lever (47) in a direction substantially parallel to the longitudinal axis (48) of the handle shaft (18).

8. A lock according to any one of the claims 1 to 7, **characterised in that** said electromagnet (54) is arranged to hold the locking mechanism in its locking state when the electromagnet is being energised.

9. A lock according to any one of the claims 1 to 8, **characterised in that** said locking means comprise at least one spring (59) for urging said portion of the locking lever (47) away from the electromagnet (54).

10. A lock according to any one of the claims 1 to 9, **characterised in that** said locking means further comprise a guide (63) arranged to guide said portion of the locking lever (47) over said stop (58) into the locking state behind the stop (58) when said locking means are actuated to lock the locking lever (47) when the handle shaft (18) is not in its first angular position but is rotated subsequently into its first angular position.

11. A lock according to any one of the claims 1 to 10, **characterised in that** said handle shaft (18) extends through the lock and is arranged to mount two handles (17) to the lock, a first handle on one side of the lock and a second handle on the other side of the lock, the handle shaft (18) extending uninterruptedly from said first handle to said second handle.

12. A lock according to any one of the claims 1 to 11, **characterised in that** said bolt (19) is a latch bolt and said bolt actuation mechanism comprises a spring (22) arranged to urge the latch bolt (19) towards its locking position.

13. A lock according to claim 12, **characterised in that** it further comprises a dead bolt (28) operated by means of a key operated lock cylinder (13) having a rotary driving bit (14) for moving the dead bolt (28) between a projecting and a retracted position, a second turn lever (42) pivotally mounted on the frame (1) and arranged to move the latch bolt (19) from its locking to its unlocking position upon rotation of the second turn lever (42), and a second turn pusher (41) arranged to be actuated by said rotary driving bit (14) and connected to the second turn lever (42) to rotate this second turn lever (42) upon actuation by said driving bit (14) to move the latch bolt (19) to its unlocking position and a mechanism (44, 45) for moving the second turn pusher (41) in the path of said rotary driving bit (14) when the dead bolt (28) is moved from its projecting to its retracted position.

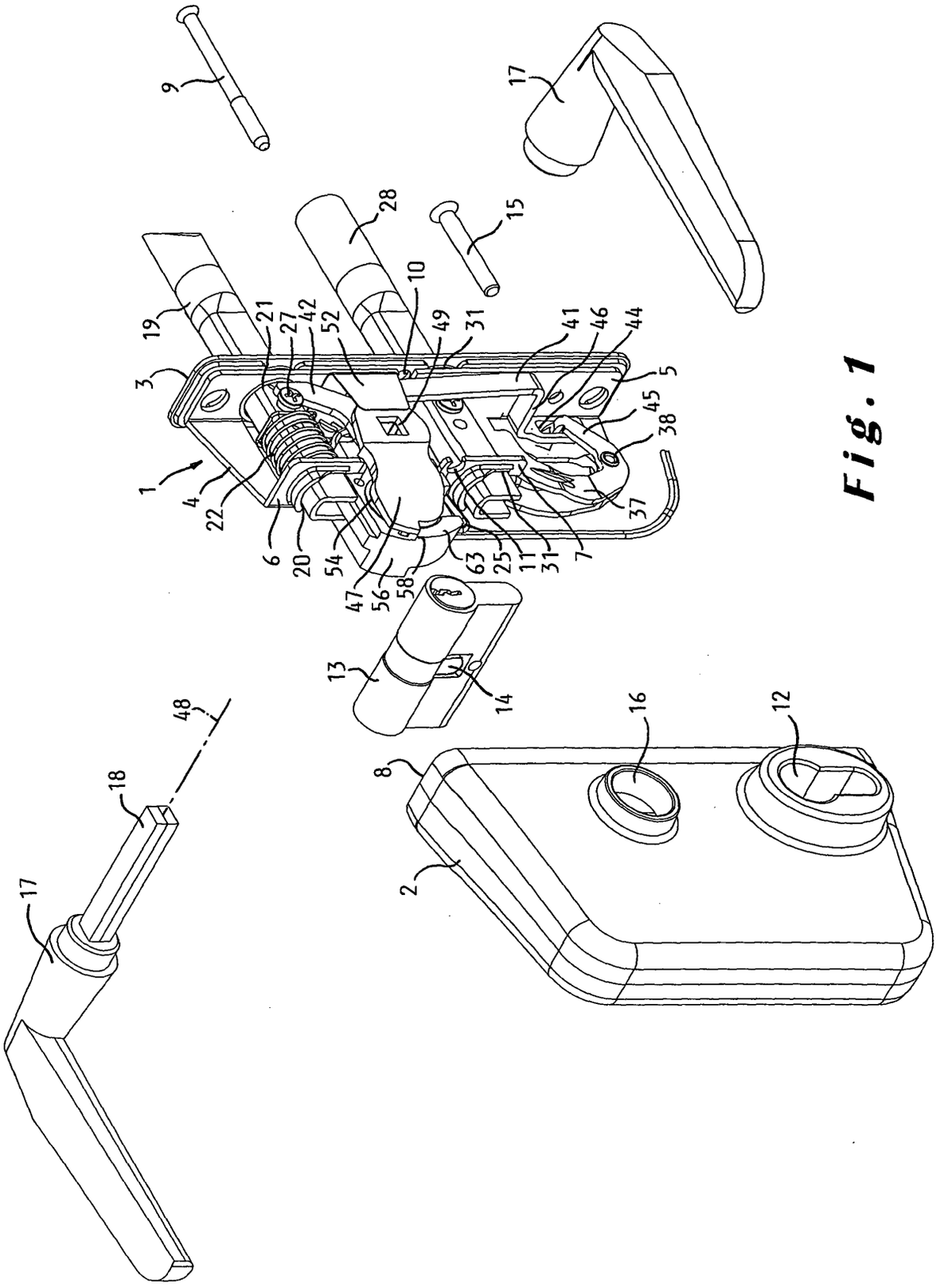
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Fig. 1

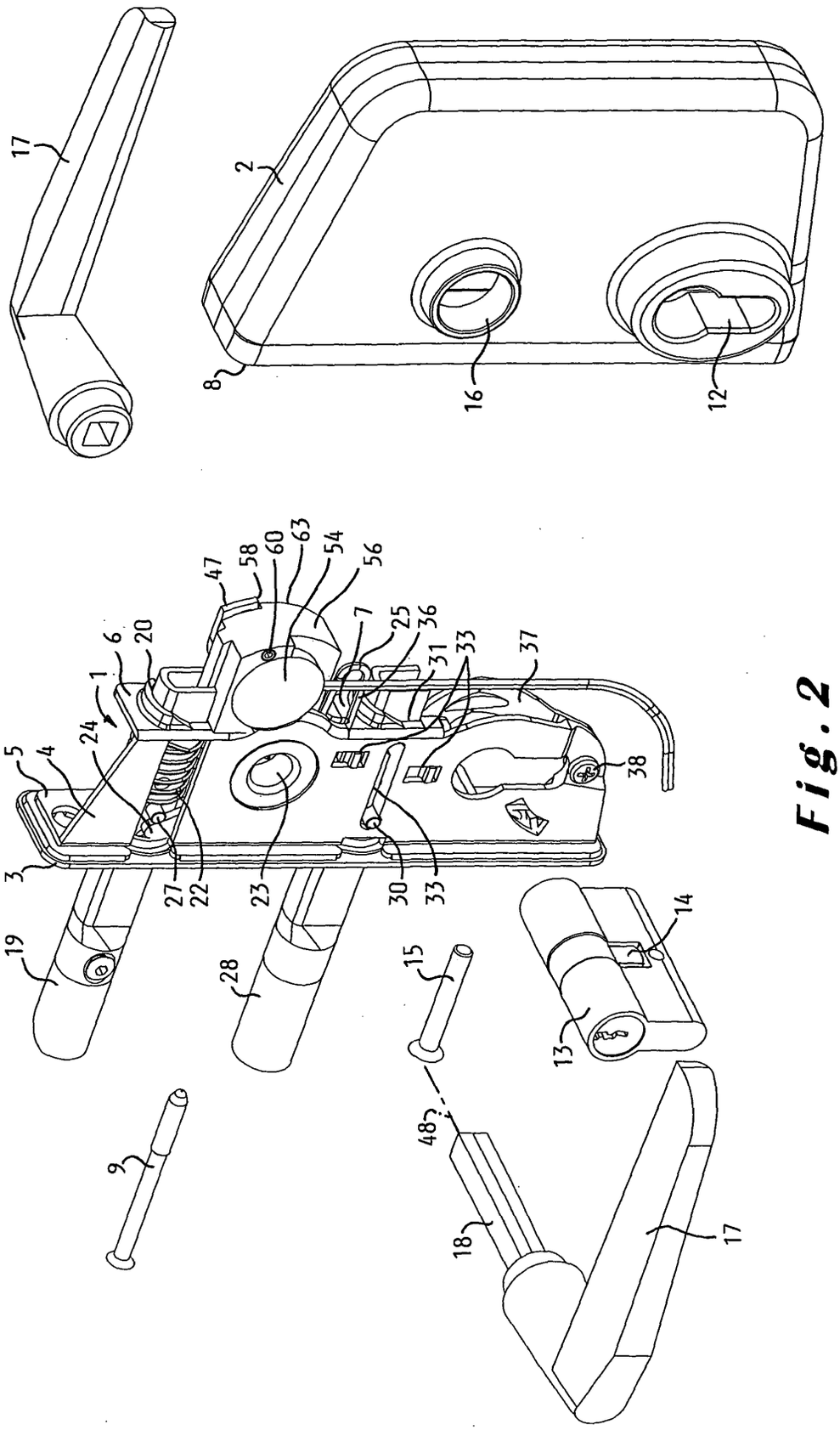
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Fig. 2

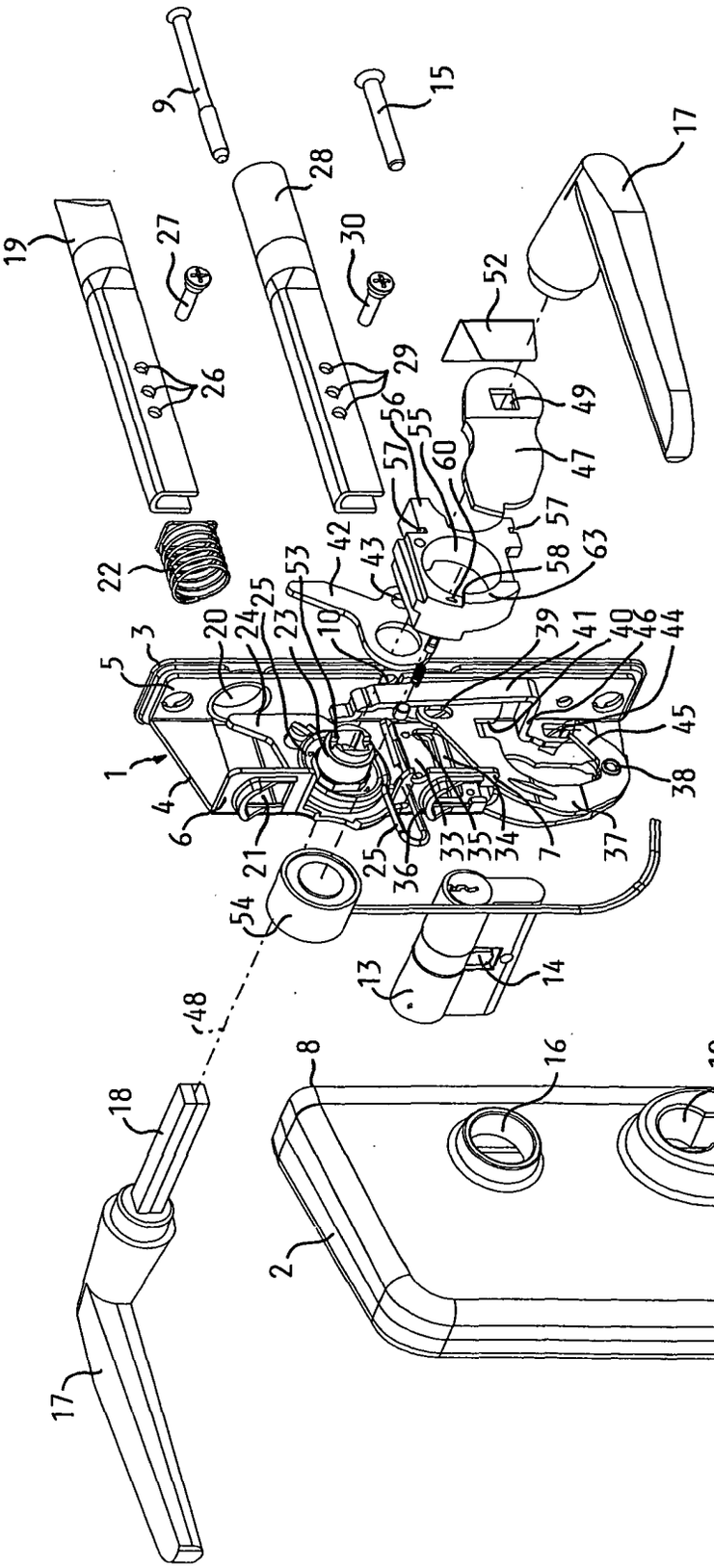
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Fig. 3

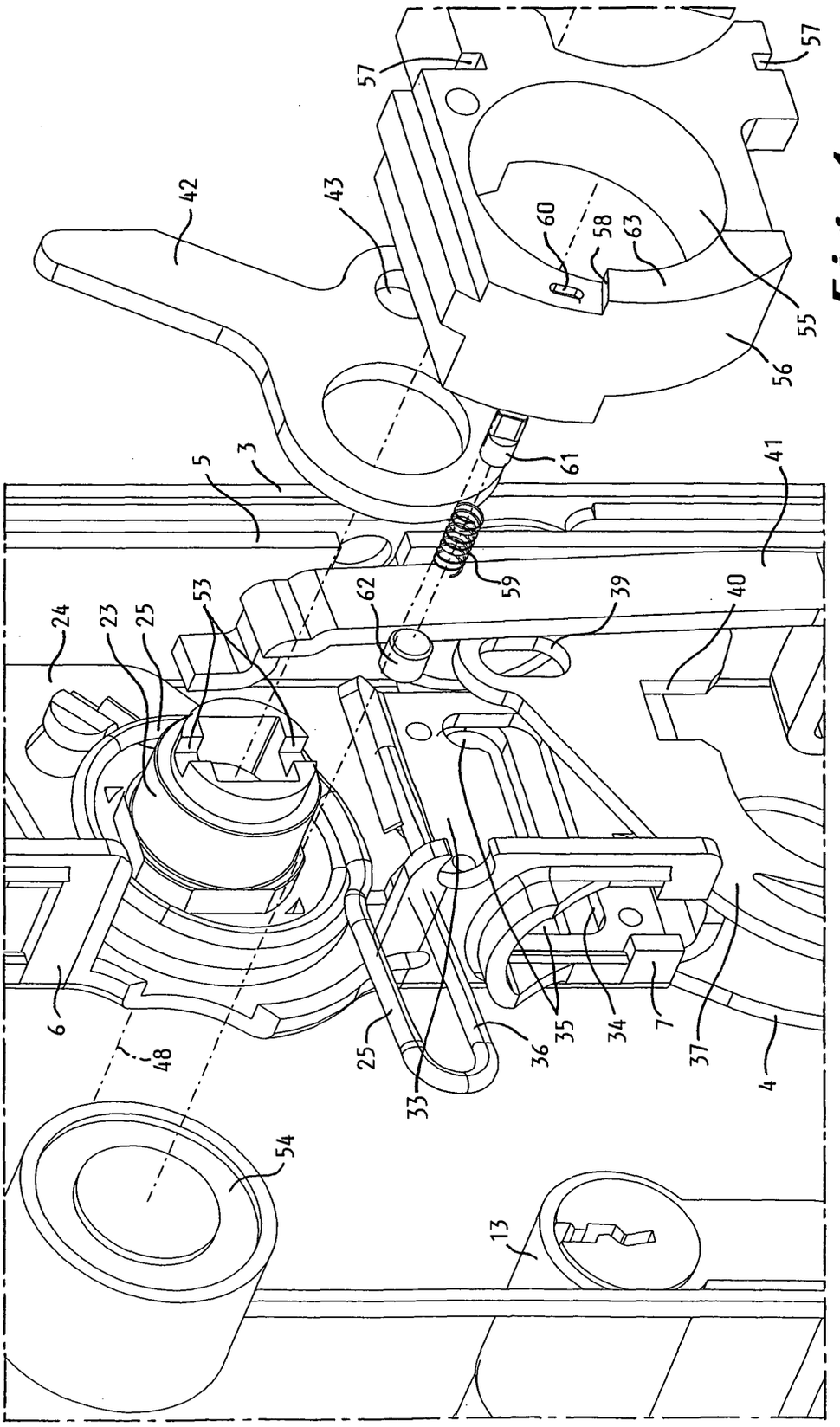
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Fig. 4

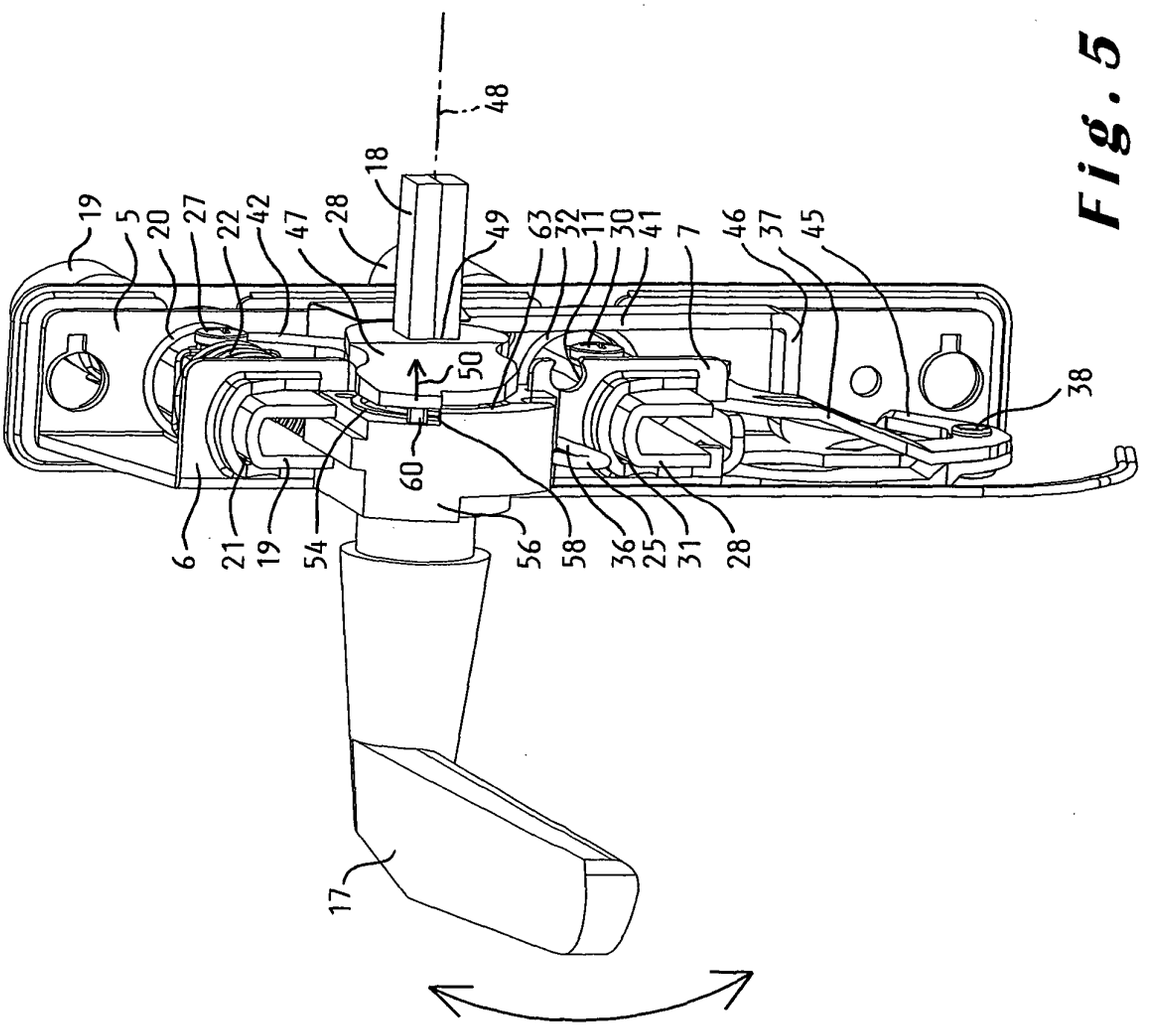
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Fig. 5

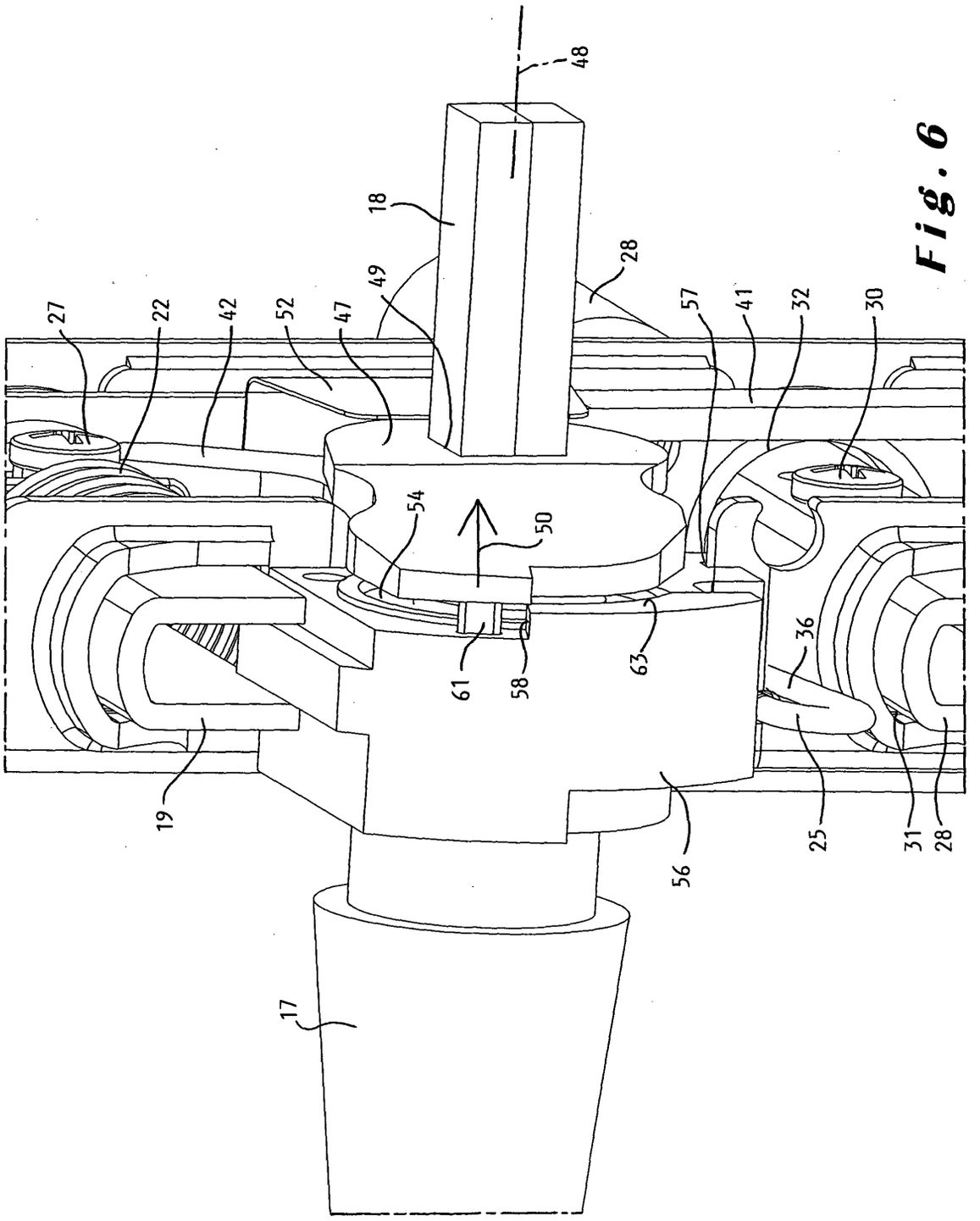
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Fig. 6

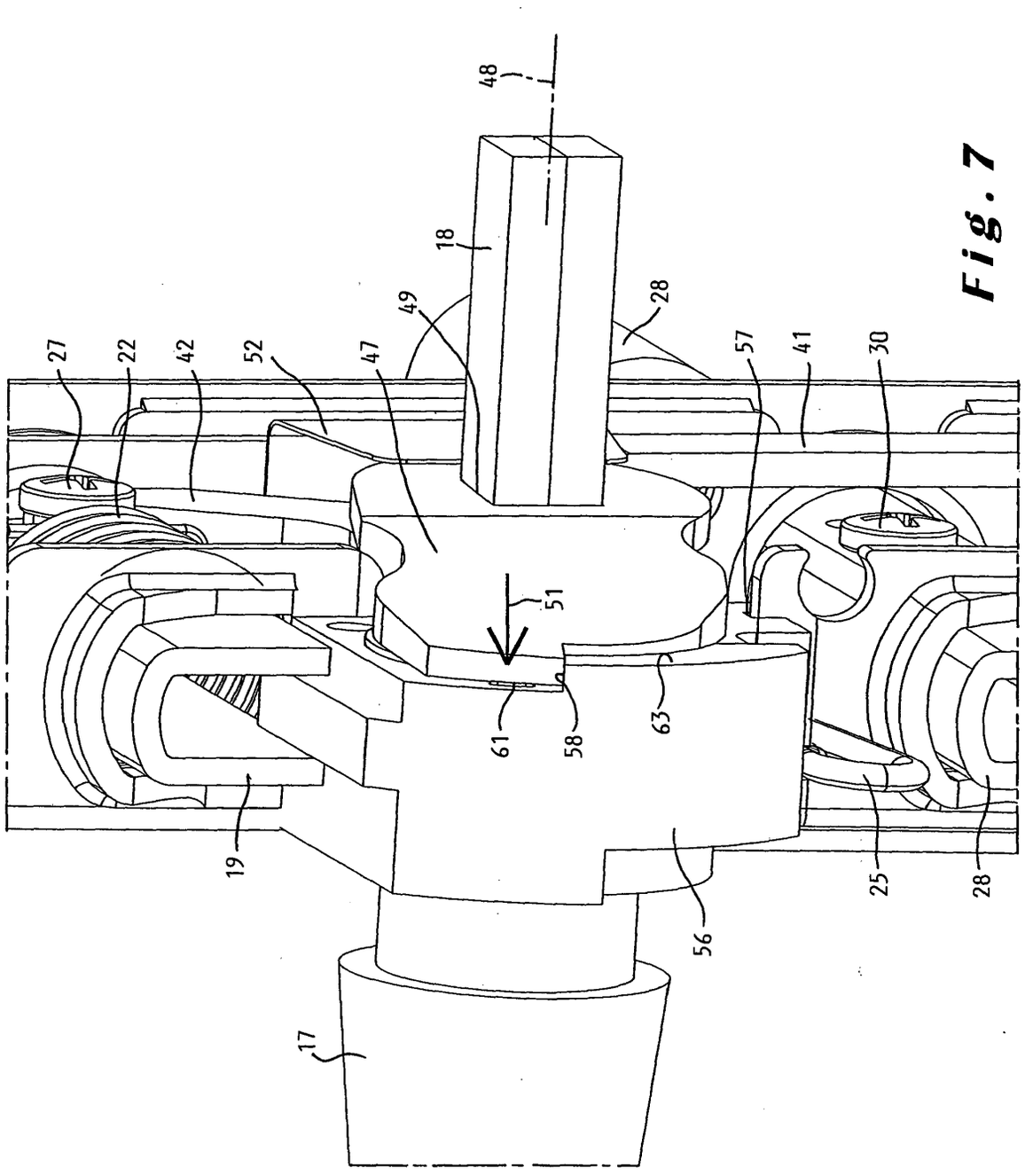

Fig. 7

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 03 44 7267

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
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E05B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	4 May 2004	Van Beurden, J

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