(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 1 526 230 A2

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
27.04.2005 Bulletin 2005/17

(51) Int Cl.[7]: **E05B 9/08**, E05B 15/02, E05B 17/20

(21) Application number: **04256508.5**

(22) Date of filing: **22.10.2004**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IT LI LU MC NL PL PT RO SE SI SK TR
Designated Extension States:
AL HR LT LV MK

(30) Priority: **24.10.2003 GB 0324813**

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(54) Lock assembly

(57) A lock assembly including a lock mechanism (12) to be received within a recess in a door or window stile (11), the lock mechanism having a lock cylinder (22) which protrudes in use from an exterior face of the stile into a housing defined at the exterior face of the stile by the backplate (23a) of associated door/window furniture (18a) secured to the stile (11) and, a cylinder protector (29) arranged to be received within said housing, and at the same time to receive within it the protruding portion of the lock cylinder, said cylinder protector being arranged to cooperate with the stile and said backplate to enhance the resistance of the fixing of the backplate against unauthorised removal of the backplate from the stile.

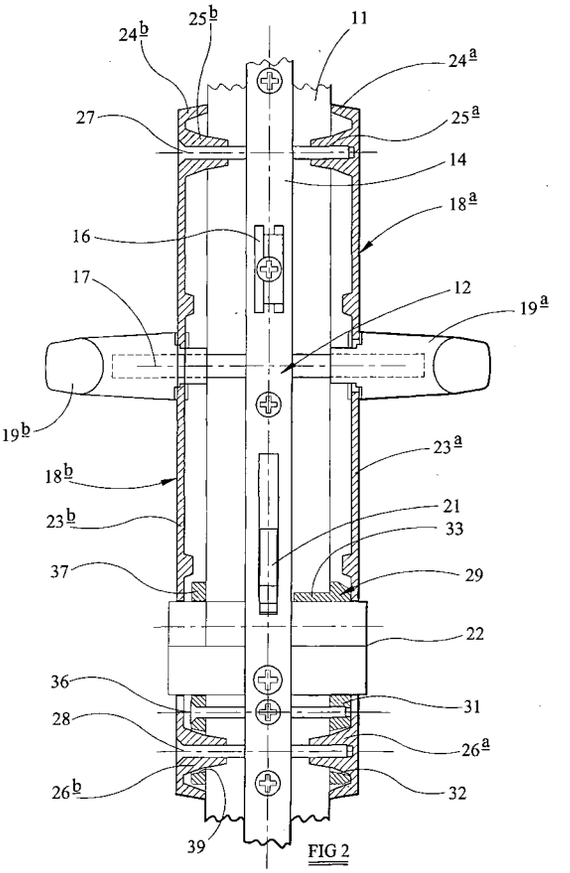

FIG 2

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Description

Technical Field

[0001] This invention relates to a key operated lock assembly for a door or window, the assembly being of the kind in which a lock cylinder, containing the key operated lock barrel, protrudes from a face of the door or window stile fitted with a lock mechanism of the assembly, to be received within a backplate of handle furniture fitted to the face of the stile.

[0002] In one example of the invention, to be described in more detail hereinafter, the lock mechanism includes a dead bolt arrangement which is actuated by rotation of the lock barrel within the lock cylinder of the mechanism by means of an appropriate key, and a latch bolt which is operated by movement of the handle of the handle furniture fitted to the stile of the door. In the specific example described herein the lock mechanism is fitted within the door stile and the external door handle furniture includes a spring returned lever having a spindle operated by movement of the lever, the spindle passing through the lock mechanism to actuate the latch bolt, and cooperating with a corresponding handle of the furniture on the interior face of the stile. It is to be understood however that various forms of lock mechanism and handle furniture are within the ambit of the present invention; for example, the invention can be applied to an assembly which has only a single bolt which can be withdrawn against spring loading by movement of the handle of the furniture or rotation of the barrel by means of the key, and which can be locked in a protruding (operative) position by appropriate key actuation of the lock cylinder. The backplate may have a functional handle which is movable or a non-functional handle which is simply to allow the user to grip the door, or may be decorative and devoid of a handle, serving primarily to improve the door appearance by enclosing the protruding lock cylinder.

Background Art

[0003] In conventional assemblies of the kind with which the invention is concerned unauthorised release operation of the lock mechanism, without a suitable key, has been achieved by grasping a protruding part of the lock cylinder with a Mole® grip or wrench, or a similar tool and wrenching the lock cylinder from the lock mechanism exposing part of the lock mechanism through the aperture left by removal of the lock cylinder. A tool can then be introduced into the lock mechanism to retract the dead bolt and/or latch bolt and so open the door or window. UK Patent GB 2360546 B teaches that accessibility to the lock cylinder should be restricted by insetting the lock cylinder into the stile of the door with which the lock mechanism is associated, such the lock cylinder does not protrude from the stile. The teaching of UK Patent GB 2360546 B does not therefore assist in innumerable applications in which the lock cylinder is too long, or the stile is too narrow, for the lock cylinder to be inset within the stile.

[0004] Conventionally the portion of the lock cylinder which protrudes from the external face of the stile is covered by the backplate of the handle furniture on the exterior face of the stile, the backplate having an aperture through which a key can be introduced, but not providing access to any portion of the lock cylinder for a grasping tool to apply wrenching force to the lock cylinder. It will be understood however that the security afforded by the backplate is determined by the strength of the fixing of the backplate to the door stile. It is a first object of the present invention to provide a lock mechanism of enhanced security.

Disclosure of the Invention

[0005] In accordance with a first aspect of the present invention there is provided a lock assembly including a lock mechanism to be received within a recess in a door or window stile, the lock mechanism having a lock cylinder which protrudes in use from an exterior face of the stile into a housing defined at the exterior face of the stile by the backplate of associated door/window furniture secured to the stile, and, a cylinder protector arranged to be received within said housing, and at the same time to receive within it the protruding portion of the lock cylinder, said cylinder protector being arranged to cooperate with the stile and said backplate to enhance the resistance of the fixing of the backplate against unauthorised removal of the backplate from the stile.

[0006] Preferably said protector cooperates with a fixing element of said backplate.

[0007] Prefèrably said cylinder protector co-acts with both the stile and a screw fixing boss of the backplate into which a fixing screw extends to secure the backplate to the stile.

[0008] Conveniently the cylinder protector includes an extension which is received within the body of the stile.

[0009] Preferably the cylinder protector is secured to the stile other than by the backplate.

[0010] More preferably the cylinder protector is secured to the stile by means of a through-fixing which extends through a load spreader plate engaging the inner face of the stile, through the stile, and co-acts with the cylinder protector at the exterior face of the stile.

[0011] Conveniently the through-fixing extends through the casing of the lock mechanism within the stile.

Desirably the lock cylinder terminates adjacent the outer face of the cylinder protector so that there is insufficient protruding lock cylinder to permit the lock cylinder to be grasped, and more desirably the exterior surface shaping of the cylinder protector is curved and/or tapered in order to resist the cylinder protector being grasped.

[0012] In accordance with a second aspect of the present invention there is provided a lock assembly including a lock mechanism to be received within a recess in a door or window stile, the lock mechanism having a lock cylinder which protrudes in use from an exterior face of the stile, and, a cylinder protector secured to said stile and receiving within it the protruding portion of the lock cylinder, said lock cylinder terminating adjacent the outer face of the cylinder protector so that there is insufficient protruding lock cylinder to permit the lock cylinder to be grasped, and the exterior surface shaping of the cylinder protector being curved and/or tapered in order to resist the cylinder protector being grasped.

[0013] In accordance with a third aspect of the present invention there is provided a lock protector for use in lock assemblies as defined above.

Brief Description of the Drawings

[0014] One example of the present invention is illustrated in the accompanying drawings wherein:

Figure 1 is an exploded perspective view of a lock assembly with its supporting door stile, and associated door furniture omitted for clarity;

Figure 2 is a front elevational view of a door fitted with the lock mechanism of Figure 1, the lock mechanism being shown in full lines, but the stile and the associated door furniture being shown in cross-sectional view;

Figure 3 is a perspective view from the rear of a modified cylinder protector, and;

Figure 4 is a view similar to Figure 2 illustrating the protector of Figure 3 in use.

Preferred Mode of Carrying Out the Invention

[0015] Referring to the drawings, the door stile 11 is formed from UPVC but it is to be understood that the invention can be applied to doors having wooden stiles, and the invention can also be applied to windows. The edge of the stile 11 which is presented to the door jamb when the door is in its closed position, is formed, in conventional manner, with a recess which extends into the plane of the drawing in Figure 2. The recess is shaped to receive the casing 13 and front plate 14 of a lock mechanism 12. As is conventional the front plate 14 is recessed into the edge surface of the stile so that it is flush therewith. Fixing screws (not shown) extend through corresponding holes 15 in upper and lower extensions of the front plate 14 and serve to secure the front plate and lock casing in position in the stile.

[0016] The internal construction of the lock mechanism in the casing 13 is not of relevance to the present invention, but in the example illustrated in Figures 1 and 2 there is a spring loaded latch bolt 16 which can be retracted against spring force by rotation of a drive spindle 17 passing transversely through the lock casing and cooperating with movable handles 19a, 19b of external and internal door furniture 18a, 18b secured to the corresponding faces of the stile 11. Additionally the lock mechanism includes a dead-bolt in the form of a hook-bolt 21 which can be caused to protrude from the lock front plate 14 and into a corresponding keep in the door jamb by movement of the handles 19a, 19b to drive the spindle 17 out of its normal range of latch bolt operation.

[0017] Additionally, the lock mechanism includes a key operated lock cylinder 22 containing a rotatable key receiving barrel 23 which can be actuated to lock the bolt 21 in its thrown condition, locking the bolt 21 in engagement with the corresponding keep in the door jamb. Furthermore, the key operation of the cylinder 22 can also be used to lock the whole of the internal mechanism of the lock assembly to prevent movement of the spindle 17 and the latch bolt 16.

[0018] In other modifications the lock assembly may include only a single operating bolt and in some applications the bolt can be actuated as well as locked by rotation of the barrel 23 by means of the key. As mentioned previously, the internal nature of the lock mechanism is not of significance to the invention.

[0019] The external door furniture 18a of the lock assembly is substantially a mirror image of the internal door furniture 18b, and each comprises a cast, or stamped aluminium or aluminium alloy backing plate 23a, 23b rotatably supporting the respective handle 19a, 19b. Each of the backing plates 23a, 23b is formed with a peripheral upstanding wall 24a, 24b which serves to space the main, planar portion of the backing plate from the corresponding face of the stile 11 to accommodate, *inter alia,* the parts of the handles 19 which protrude through the backing plates to cooperate with the spindle 17. Upstanding from the internal face of each backing plate are upper and lower fixing bosses 25a, 26a; 25b, 26b. The bosses 25a, 26a which are integral with the front or exterior backplate 23a contain internally screw threaded blind bores which do not penetrate the front face of the backing plate 23a. However, the bosses 25b, 26b of the interior backing plates 23b, which are aligned in use with the bosses 25a, 26a, have through bores with counter sunk recesses in the outer face of the backing plate 23b, and elongate countersink head fixing screws 27, 28 extend through the bosses 25b, 26b respectively, passing through the stile 11 and above and below the lock casing 13 respectively, and are received in screw threaded engagement in the blind bores of the bosses 25a, 26a. Tightening the screws 27, 28 pulls the backing plates 23a, 23b towards one another so that their upstanding peripheral walls 24a, 24b seat against the respective opposing faces of the stile 11 and the free end regions of the bosses 25a, 26a; 25b, 26b are received in corresponding recesses in the material of the stile 11 concentric with the through bores which receive

the fixings screws 27, 28. In some applications the lock casing 13 may be larger necessitating the screws 27, 28 passing through holes provided in the lock casing.

[0020] The lock cylinder 22 extends through the lock casing 13 and protrudes from the opposite faces thereof. The protrusion of the lock cylinder 22 is such that both ends of the lock cylinder 22 protrude through the material of the stile 11, and through the gap between the stile 11 and the backing plates 23a, 23b, the backing plates being formed with "key-hole" shaped apertures to receive the end regions of the lock cylinder 22. It will be understood that within the body of the casing 13 the lock cylinder 22 is apertured to allow cooperation between parts of the mechanism within the casing 13 and the barrel 23 by means of an appropriate key.

[0021] The lock assembly described so far is generally conventional. It is known that attempts have been made to operate the lock assembly without an appropriate key by destroying the lock cylinder 22 thereby to gain access to the interior of the casing 13. Such attempts are frustrated in the assembly described above as the lock cylinder 22 protrudes through the backplates 23a, 23b by an amount insufficient to allow the cylinder 22 to be grasped by a tool such as a Mole® grip and thus the door furniture frustrates the application of wrenching forces to the lock cylinder 22 to break the cylinder. However, it is known that attempts have been made to rip the door furniture from the door stile to gain access to the protruding parts of the lock cylinder 22. The fixing of the door furniture to the door stile by means of the fixing screws 27, 28 is robust, but can be defeated if sufficient leverage is applied to the door furniture to lift the door furniture away from the stile 11. Usually of course such force is applied to the exterior door furniture, and if sufficient leverage can be applied then the anchorage of the screws 27, 28 in the bosses 25a, 26a is known to fail, particularly if when the leverage is applied such that the anchorage of the screws 27, 28 in the bosses is subjected to axial and lateral forces, as can occur when the handle 19a is used as the means of leverage.

[0022] In order to enhance security, both by supporting the backplate 23a, and by providing a further line of defence for the lock cylinder 22, there is provided a cylinder protector 29 in the form of a cast or machined metal component which is received between the backplate 23a and the stile 11. The cylinder protector 29 includes a planar body 31 which seats against the exterior face of the stile 11, and which is of sufficient thickness to fill the space between the stile 11 and the inner face of the backplate 23a so that in its secured position the backplate 23a seats against the outer face of the body 31 of the protector 29. The body 31 is formed with a generally frusto-conical aperture 32, having its wider end presented to the backplate 23a, the aperture 32 receiving the boss 26a. Integral with the body 31 is a rigid shroud 33 which protrudes from the rear face of the body 31 into a correspondingly shaped recess in the outer part of the stile 11. Internally the shroud 31 is formed with a passage 34 which receives the outwardly protruding part of the lock cylinder 22 as a close fit. The passage 34 of the shroud 33 is continued forwardly to form a key-hole shaped aperture in the body 31 through which the cylinder 22 extends. As illustrated in Figure 1 the passage 34 is open along the lower edge of the shroud 33 so that the shroud 33 does not completely encase the lock cylinder 22. The omission of a portion of shroud lying beneath the lower edge of the lock cylinder 22 is purely for convenience of providing a fixing point for the cylinder protector 29. In an alternative design the shroud 33 extends completely around the lock cylinder 22.

[0023] In order to secure the cylinder protector 29 to the stile 11 the body 31 is formed, between the shroud 33 and the aperture 32, with an internally screw threaded bore 35 which receives a fixing screw 36 extending through the stile 11 and the lock casing 13 (it being recognised that in an application using a smaller lock casing 13 the screw 36 will pass through the stile below the lock casing). Desirably, but not essentially, a load spreading plate 37 is provided at the inner face of the stile and the screw 36 extends through an aperture in the plate 37 so that the screw 36 clamps the plate 37 against the inner face of the stile, pulling the protector 29 against the outer face of the stile. The plate 37 spreads the load of the head of the screw 36 across a greater area of the stile and so enhances the security of the fixing of the protector 29 to the stile. Moreover, desirably the plate 37 has a key hole shaped aperture 38 for receiving the internally projecting portion of the cylinder 22 and a frusto-conical aperture 39 for receiving the boss 26b of the backplate 23b. If desired the plate 37 could be of similar thickness to the body 31 of the protector 29.

[0024] The protector 29 seats against the stile 11 and the shroud 33 is a close fit within an aperture in the stile, and is a close fit over the cylinder 22. Moreover, the edge surface of the body 31 of the protector 29 is chamfered or rounded so as to frustrate any attempt to grip the body 31 by means of a wrenching tool such as a Mole® grip or like tool.

[0025] In operation the protector 29 is securely fixed to the stile by fixing means 36 separate to the fixing of the backplates 23a, 23b. Moreover, the protector 29 supports the backplate 23a both by filling the gap between the backplate 23a and the stile 11, and by receiving and supporting the boss 26a. Thus if an attempt is made to wrench the external door furniture from the door, by using the handle 19a as a lever, then lateral loading on the screw fixing of the screw 28 in the boss 26a is minimised by the support provided by the protector 29. Should an intruder ultimately be successful in wrenching the external door furniture from the door then the protector 29 will remain in place since its securing to the door is separate from the securing of the backplates. Insufficient length of the cylinder 22 protrudes from the protector 29, even with the backplate 23a removed, for adequate gripping of the cylinder 22 by a

Mole® grip or like tool. Thus the application of wrenching force to the cylinder 22 to break the cylinder 22 away from the lock mechanism is frustrated. Moreover, the chamfering or rounding of the edge of the body 31 of the protector frustrates any attempt to wrench the protector 29 away from the door using Mole® grips or similar tools. The fixing of the protector 29 is of course hidden from view since the head of the screw 36 is at the inner face of the door stile.

[0026] In a modification illustrated in Figures 3 and 4 the stile is formed with a vertical elongate slot below the cylinder 22, which encompasses the bores through which the screws 36 and 28 extend. To enhance the co-operation of the protector 29 with the door stile the protector is extended rearwardly around the threaded bore 35 to define a tapering boss 35a receiving the screw shank and itself being received in the stile. The boss 35a provides greater coaction with stile and greater thread length receiving the screw 36. The plate 37 has a similar integral boss 37a around the hole which receives the screw 36 making the plate 37 more robust, around the screw head, and the boss 37a is similarly received in the slot cut in the stile. It is chosen to utilise circular section bosses 35a, 37a rather than matching the boss cross-section to the shape of the slot cut in the stile as circular cross-section permits the boss to cooperate with the side walls and an end wall of the slot while accommodating the possibility that the installer chooses to cut a circular hole in stile for the screw 36 rather than cutting a slot to accommodate both screws 36, 28.

Claims

1. A lock assembly including a lock mechanism (12) to be received within a recess in a door or window stile (11), the lock mechanism having a lock cylinder (22) which protrudes in use from an exterior face of the stile into a housing defined at the exterior face of the stile by the backplate (23a) of associated door/window furniture (18a) secured to the stile (11) and, a cylinder protector (29) arranged to be received within said housing, and at the same time to receive within it the protruding portion of the lock cylinder, said cylinder protector being arranged to cooperate with the stile and said backplate to enhance the resistance of the fixing of the backplate against unauthorised removal of the backplate from the stile.

2. A lock assembly as claimed in claim 1 **characterised in that** said protector cooperates with a fixing element (26a) of said backplate.

3. A lock assembly as claimed in claim 1 **characterised in that** said cylinder protector co-acts with both the stile and a screw fixing boss (26a) of the backplate into which a fixing screw extends to secure the backplate to the stile.

4. A lock assembly as claimed in any one of the preceding claims **characterised in that** the cylinder protector includes an extension which is received within the body of the stile.

5. A lock assembly as claimed in any one of the preceding claims **characterised in that** the cylinder protector is secured to the stile other than by the backplate.

6. A lock assembly as claimed in any one of the preceding claims **characterised in that** the cylinder protector is secured to the stile by means of a through-fixing (36) which extends through a load spreader plate (37) engaging the inner face of the stile, through the stile, and co-acts with the cylinder protector at the exterior face of the stile.

7. A lock assembly as claimed claim 6 **characterised in that** the through-fixing extends through the casing of the lock mechanism within the stile.

8. A lock assembly as claimed in any one of the preceding claims **characterised in that** the lock cylinder terminates adjacent the outer face of the cylinder protector so that there is insufficient protruding lock cylinder to permit the lock cylinder to be grasped.

9. A lock assembly as claimed in any one of the preceding claims **characterised in that** the exterior surface shaping of the cylinder protector is curved and/or tapered in order to resist the cylinder protector being grasped.

10. A lock assembly including a lock mechanism to be received within a recess in a door or window stile, the lock mechanism having a lock cylinder which protrudes in use from an exterior face of the stile, and, a cylinder protector secured to said stile and receiving within it the protruding portion of the lock cylinder, said lock cylinder terminating adjacent the outer face of the cylinder protector so that there is insufficient protruding lock cylinder to permit the lock cylinder to be grasped, and the exterior surface shaping of the cylinder protector being curved and/or tapered in order to resist the cylinder protector being grasped.

11. A door or window assembly including a stile, a lock assembly as claimed in any one of the preceding claims received by the stile, and door furniture including a backplate cooperating with the cylinder protector of the lock assembly.

12. A door or window assembly as claimed in claim 11

wherein said lock protector is sufficiently thick to fill the gap between the interior of the backplate and the stile.

13. A lock protector for use in a lock assembly as claimed in any one of the preceding claims 1 to 10, comprising a sleeve for receiving a lock cylinder and means for receiving a fixing component of an associated door furniture backplate.

14. A lock protector as claimed in claim 13 including a load spreader plate and a through fixing for extending through a door or window stile to link the load spreader plate on one side of the stile with the sleeve carrying component on the other side of the stile.

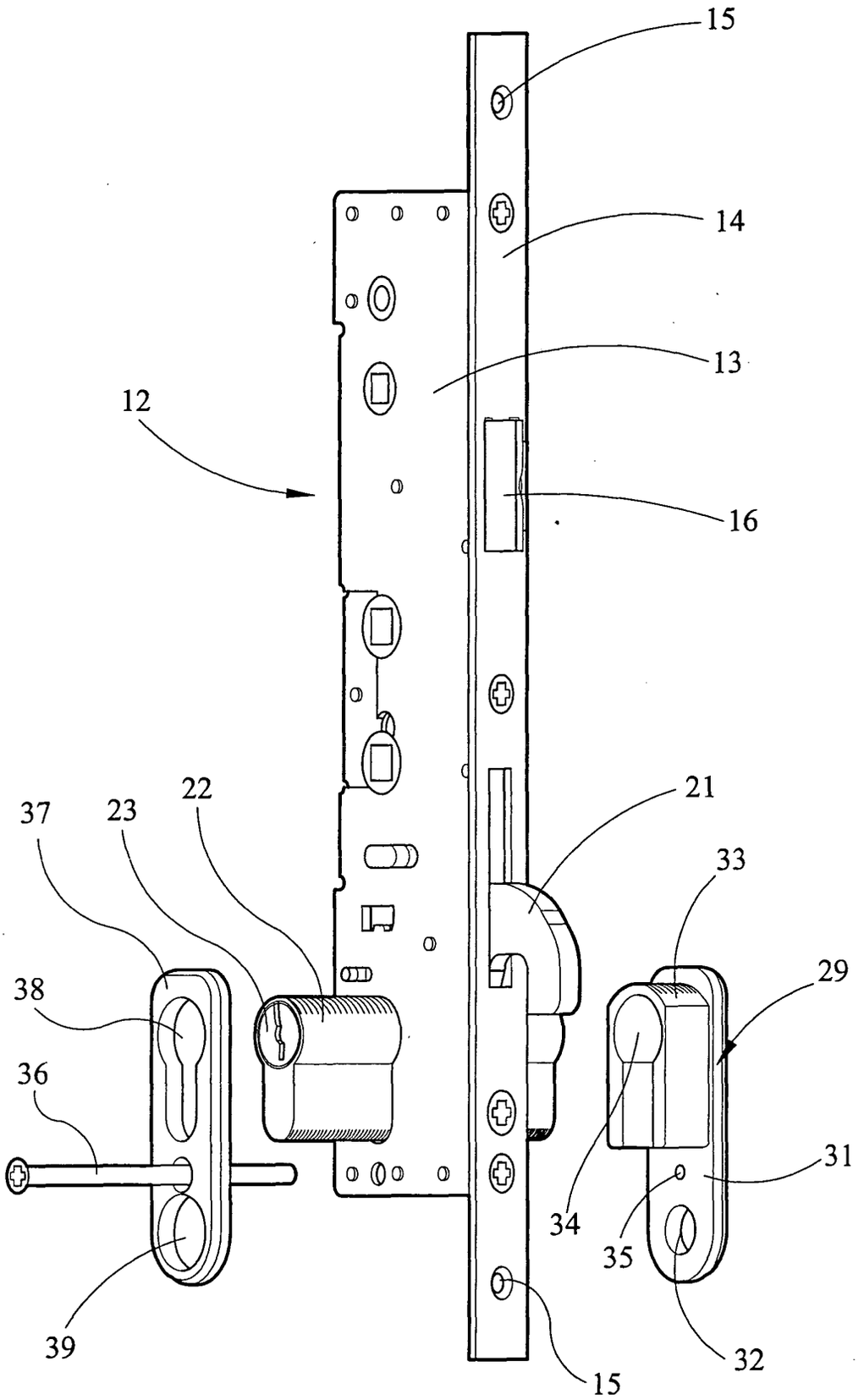

FIG 1

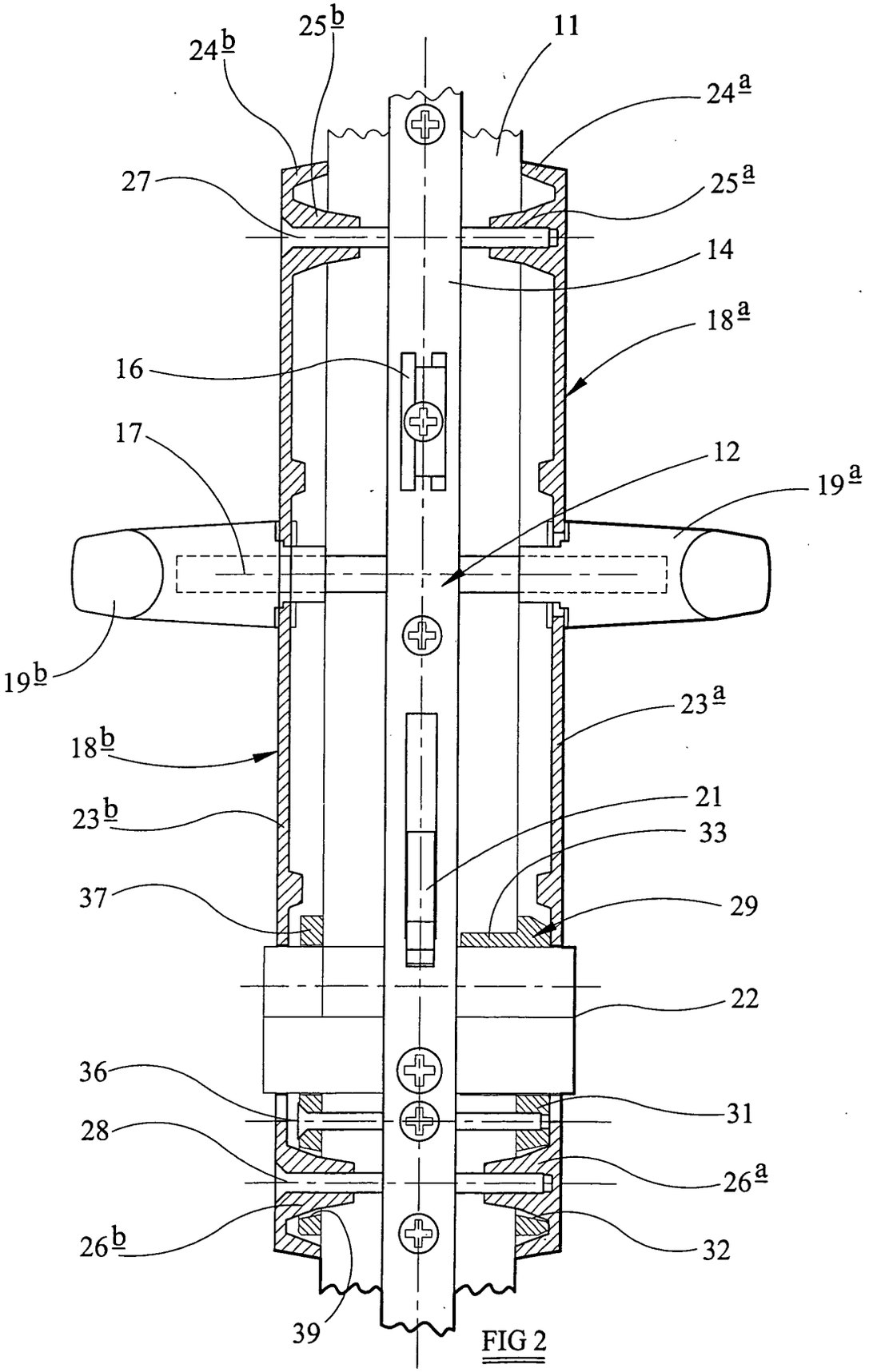
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FIG 2

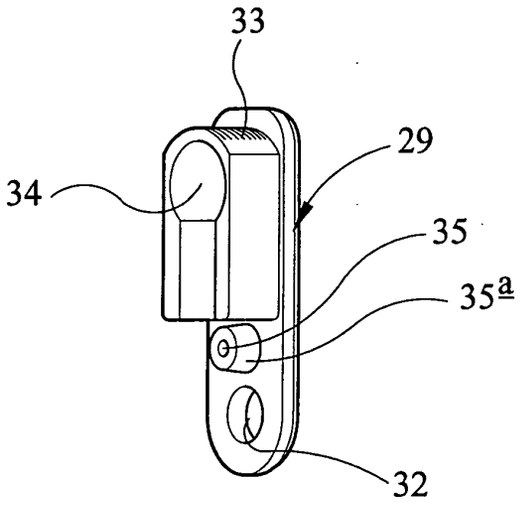
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FIG 3

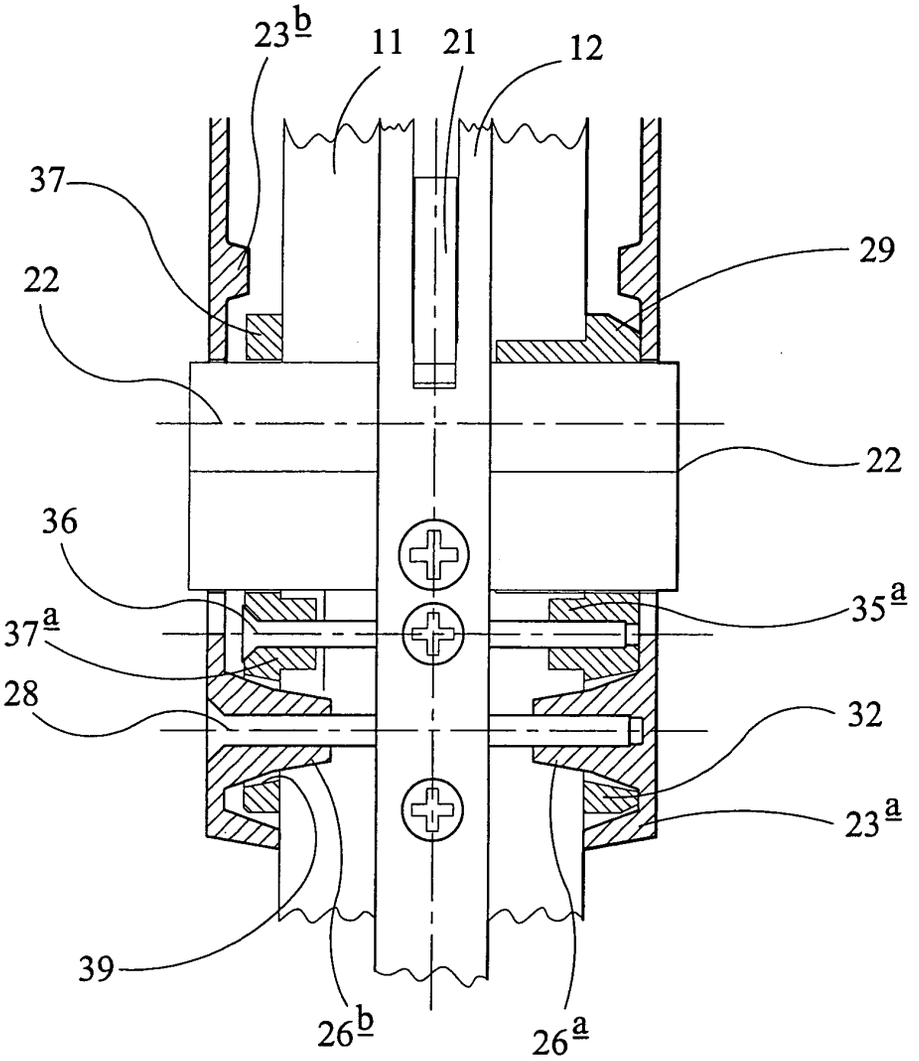
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FIG 4