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(54) Sliding cylinder locks.

(57) In a lock of the kind where a cylinder assembly (4) is slidable as a whole to shift a locking member (14) to its locking position and is retained in that position by a lateral retainer bolt (16) extending into an associated detention (17), a member (13) which carries that bolt (16) is formed separately from the cylinder barrel (5) and plug (6) and is connected to the barrel (5) by screws (25) which will fail when subject to a predetermined load in the unlocking axial direction of the cylinder assembly (4) which is less than that which will cause failure of the retainer bolt (16) or its detention (17). Accordingly, if an attempt is made to attack the lock by forcibly withdrawing the cylinder assembly (4) from its locking position there will ultimately be a preferential failure of the connecting screws (25). Even though the cylinder assembly (4) is withdrawn to what would be the normal unlocking position, therefore, the retainer bolt (16) and locking member (14) remain secure and unaffected.

Fig.1.

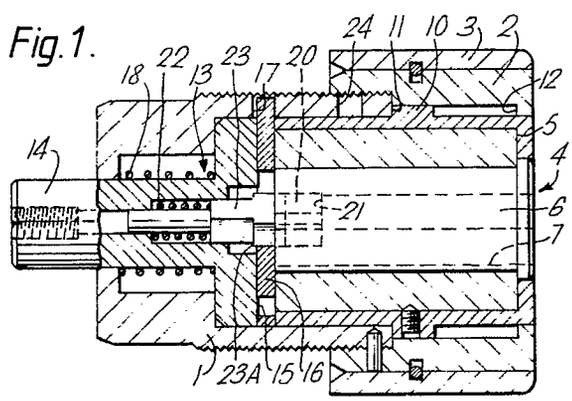
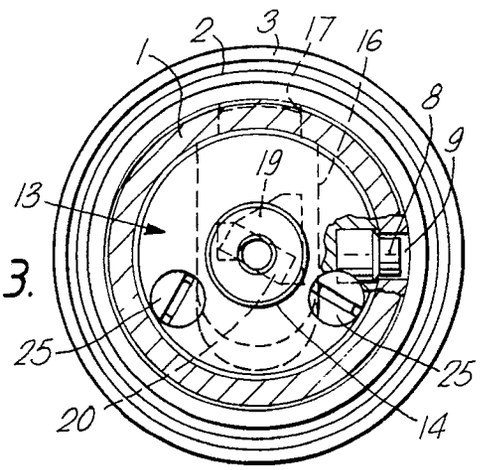


Fig.3.



EP 0 428 202 A2

SLIDING CYLINDER LOCKS

The present invention relates to locks and more particularly is concerned with cylinder locks of the kind where the cylinder assembly is borne in a casing for axial movement as a whole, whereby to shift a plunger or other locking member into its locking position. Such locks are used e.g. in various furniture and automotive applications. In the locking (inner) condition of the assembly, a retainer bolt extends laterally from the cylinder into a detention in the casing, this bolt being withdrawn when the proper key is turned within the cylinder to permit the assembly to move backward, normally under spring bias, to its unlocking (outer) condition.

The present invention is concerned to improve the security of such cylinder locks against attacks aimed at forcibly withdrawing the cylinder assembly from its locking condition. In this regard tools are available, as described e.g. in European patent application no 0297172, which comprise a hardened screw held in a frame which can be screwed into the keyway of a cylinder lock, two other clamping screws threaded through the frame then being turned against the lock casing to force the frame away from the lock. By this means an extremely high axial load tending to pull the cylinder assembly from the lock can be applied to the cylinder plug through the frame and central screw, which can result in failure of the retainer bolt or its detention and consequently withdrawal of the cylinder assembly to its unlocking condition.

With this in view, the invention proposes a cylinder lock of the kind stated above where the cylinder barrel and plug are formed separately from a member which bears the retainer bolt and through which the locking member is shifted, said member being connected to the barrel by fastening means adapted to fail when subject to a predetermined load in the unlocking axial direction of the cylinder assembly which is less than that which will cause failure of the retainer bolt or its detention when in the locking condition. In this way, an attempt to forcibly withdraw the cylinder assembly from its locking condition will ultimately lead to preferential failure of said fastening means, meaning that even though the cylinder barrel and plug can be withdrawn to what would be the unlocking condition, the retainer bolt and locking member will remain in the locking condition unaffected by the backward movement of the other parts of the assembly.

The invention will now be more particularly described, by way of example, with reference to the accompanying drawings, in which:

Figure 1 is an axial section through a preferred embodiment of cylinder lock constructed in accordance with the invention;

Figure 2 is a view of the lock of Figure 1 from its key-entry end;

Figure 3 is a view of the lock of Figures 1 and 2 from its opposite end with the rear part of the casing and some other parts broken away;

Figure 4 is a view of the retainer bolt for the lock of Figures 1 to 3;

Figures 5A and B are respectively side and end views of a coupling element for the lock of Figures 1 to 3;

Figures 6A and B are respectively side and end views of a coupling element retainer for the lock of Figures 1 to 3; and

Figure 7 is a view of a screw for use in attaching the bolt-carrying member to the cylinder assembly in the lock of Figures 1 to 3.

Referring to Figures 1 to 3, the illustrated lock has a casing composed of parts 1, 2 and 3, parts 1 and 2 being screwed and pinned together to define a chamber wherein a cylinder assembly 4 is borne for limited sliding movement as a whole. The cylinder assembly comprises a two-part barrel (or stator) 5 and a plug (or rotor) 6 and its operation can be based upon any conventional arrangement of pin or disc tumblers (not shown), it being understood that the plug 6 will normally be blocked by the tumblers against rotary movement relative to the barrel 5 but can be released for turning relative to the barrel by the insertion of a proper key into the keyway 7 to set the tumblers into their releasing positions. In the particular embodiment illustrated the cylinder assembly will comprise three rows of pin tumblers, adapted to engage in dimples formed in the two sides and one edge of a flat key bit of complementary section to the keyway 7. The cylinder assembly is keyed against rotation relative to the lock casing by means of a pin 8 (Figure 3) held in a recess in the periphery of the barrel 5 and engaging in a longitudinal groove 9 in the casing part 1, and the limits of its sliding movement in the casing are set by abutment of an external annular flange 10 on the barrel against faces 11 and 12 of the casing.

Located behind the cylinder assembly 4 in the casing, and attached to the barrel 5 by means to be described below, is another sliding member 13 formed at one end as a locking plunger 14. In the illustrated condition of the lock, with the assembly 4 and member 13 in their inner axial positions, the plunger 14 protrudes from the rear end of casing part 1 to accomplish the locking or control function for which the lock is intended. At its forward end the member 13 is formed with a transverse groove 15 in which it carries a lateral retainer bolt 16, of

the configuration more fully shown in Figures 3 and 4. In the illustrated locking condition, the tip of this bolt extends into a detention 17 in the casing part 1 to retain the member 13 and cylinder assembly 4 in the inner position, against the bias of a spring 18.

The bolt 16 has a central profiled aperture 19 of the configuration shown in Figures 3 and 4, by which the bolt can be driven to extend and retract through the turning of a coupling element 20 associated with the cylinder plug 6. More particularly, the coupling element 20 is in the form of a rectangular-sectioned block as shown in Figure 5 which is normally held completely within the confines of a complementarily-sectioned recess 21 in the rear end of the plug 6. The coupling element is biased to that position by means of a spring 22 acting through the retainer 23 shown in Figures 1 and 6. When a proper key is fully inserted into the keyway 7, however, its tip engages the coupling element 20 and displaces it partially out of the recess 21 against the bias of the spring 22 so that its rearward end lies within the bolt aperture 19, while the coupling element is still constrained to rotate with the plug 6. Consequently, insertion of a proper key into the keyway 7 and turning thereof in the clockwise direction as viewed in Figure 2 (anticlockwise as viewed in Figures 3 and 4), is effective to turn the cylinder plug 6 and coupling element 20 so as to withdraw the bolt 16 from the detention 17 into the confines of the member 13, by engagement of the coupling element with the drive face 19A of the bolt. In this condition, the cylinder assembly 4 and member 13 are freed to slide under the bias of the spring 18 to their outer axial position, in which the locking plunger 14 is withdrawn to its unlocking condition, whereupon return rotation of the key throws out the bolt once more to engage in a second detention 24 in the casing part 1, by engagement of the coupling element 20 with the drive face 19B of the bolt. From this unlocking condition the mechanism can be returned to the locking condition by repeat use of the key to withdraw the bolt 16, pressing the cylinder assembly in to extend the locking plunger 14, and throwing out the bolt 16 into the detention 17 once more.

The means whereby the member 13 is attached to the cylinder assembly 4 comprise two screws 25 (Figures 3 and 7) which extend through bores in the member 13 parallel to but offset from the central axis of the lock, and which are threaded into complementary tapped holes in the rear of the barrel 5. These screws have reduced-section necks 25A or are otherwise so formed as to fail under a predetermined axial tensile stress, which is so chosen as to ensure that in the event of an attack aimed at forcibly withdrawing the cylinder assembly 4 in the locking condition of the lock, it is the screws 25 which will fail in preference to any other part of the structure, and in particular before there is a risk of failure of the bolt 16 or its detention 17. When such failure occurs, the cylinder assembly 4 can be withdrawn to what is normally its unlocking condition, as limited by the abutment of flange 10 against face 12, but the member 13 with its locking plunger 14 will be retained in the locking condition by the bolt 16. This method of attack will therefore not succeed in withdrawing the plunger 14. Furthermore, as the cylinder assembly is drawn forwardly away from member 13 the coupling element 20 will tend to disengage from its retainer 23 while the latter will be ejected a short distance by the spring 22 and will then drop down with its shoulder 23A in front of the bolt 16. consequently, the coupling element 20 cannot thereafter be re-engaged within the bolt aperture 19, so that even if a torque is applied to the front end of the barrel 5 sufficient to fracture the pin 8 and allow the cylinder assembly as a whole to rotate, this will not be effective to withdraw the bolt 16.

Although described above in terms of a lock which requires manipulation of the key both to lock and to unlock the mechanism, the invention is equally applicable to sliding cylinder locks of the kind where locking is achieved by a simple push-button action on the cylinder assembly, the retainer bolt being spring-biased to engage in a detention in the inner axial condition and use of the key being necessary only for unlocking.

Claims

1. A lock including a cylinder assembly (4) comprising a barrel (5) and plug (6), the plug (6) being rotatable in the barrel (5) when freed by a proper key; the cylinder assembly (4) being borne in a casing (1/2/3) for axial movement as a whole, whereby to shift a locking member (14) between its unlocking and locking positions; and comprising a retainer bolt (16) which, in the locking axial position of the cylinder assembly (4) is adapted to extend laterally with respect to the axis of the cylinder assembly (4) into a detention (17) in the casing (1/2/3/), said bolt (16) being withdrawn from said detention (17) by rotation of the cylinder plug (6) in an unlocking direction; characterised in that the cylinder barrel (5) and plug (6) are formed separately from a member (13) which bears the retainer bolt (16) and through which the locking member (14) is shifted, said member (13) being connected to the barrel (5) by fastening means (25) adapted to fail when subject to a predetermined load in the unlocking axial direction of the cylinder assembly (4) which is less than that which will cause failure

of the retainer bolt (16) or its detention (17) when in the locking condition.

2. A lock according to claim 1 wherein said locking member is in the form of a plunger (14) carried by or formed integrally with said member (13).

3. A lock according to claim 1 or claim 2 wherein the cylinder assembly (4) is resiliently biased (18) towards its unlocking axial position.

4. A lock according to any preceding claim wherein the retainer bolt (16) is adapted to extend into a second detention (24) in the casing (1/2/3) when the cylinder assembly (4) is in its unlocking axial position.

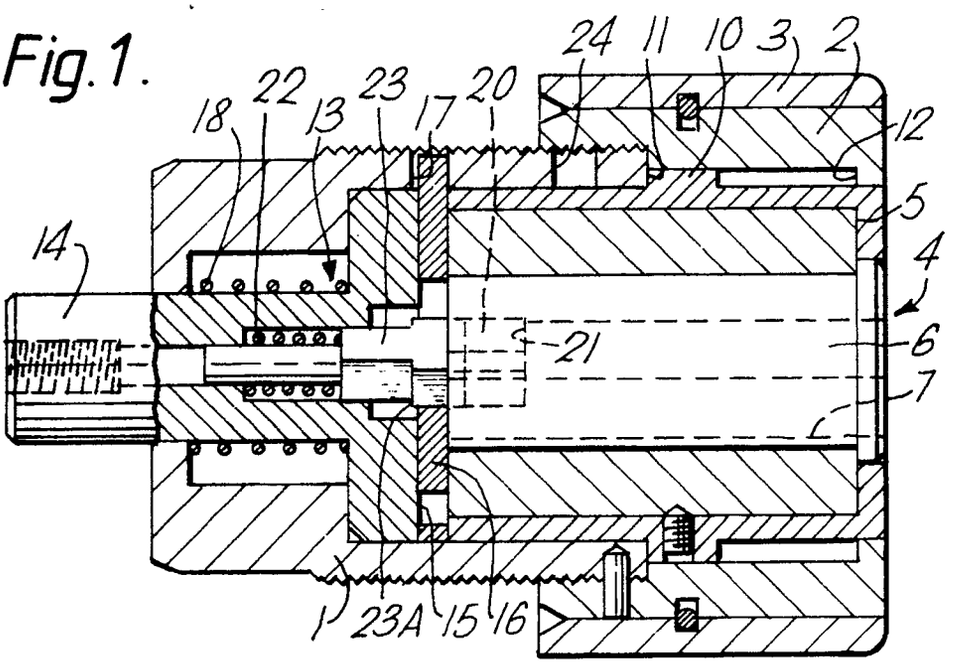
5. A lock according to any preceding claim wherein the retainer bolt (16) is adapted to be extended into the or each said detention (17/24) by rotation of the cylinder plug (6) in a locking direction.

6. A lock according to any one of claims 1 to 4 wherein the retainer bolt (16) is adapted to be extended into the or each said detention (17/24) by resilient biasing means.

7. A lock according to any preceding claim comprising a coupling element (20) borne by the cylinder plug (6) which, when a proper key is inserted into said plug (6) is displaced thereby to a position in which it is engageable with the retainer bolt (16) for shifting the same in response to rotation of said plug (6), but which in the absence of a proper key is normally biased away from that position.

8. A lock according to claim 7 wherein said coupling element (20) is biased as aforesaid through a retaining element (23) which is configured such that, in the event of failure of said fastening means (25) and subsequent movement of the cylinder assembly (4) to its unlocking axial position without said member (13) and bolt (16), said retaining element (23) will act to block subsequent movement of said coupling element (20) to the position in which it is engageable with said bolt (16).

Fig.1.



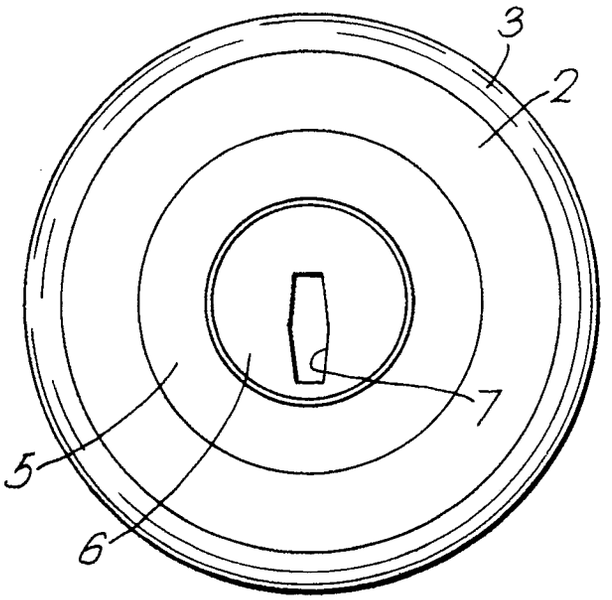
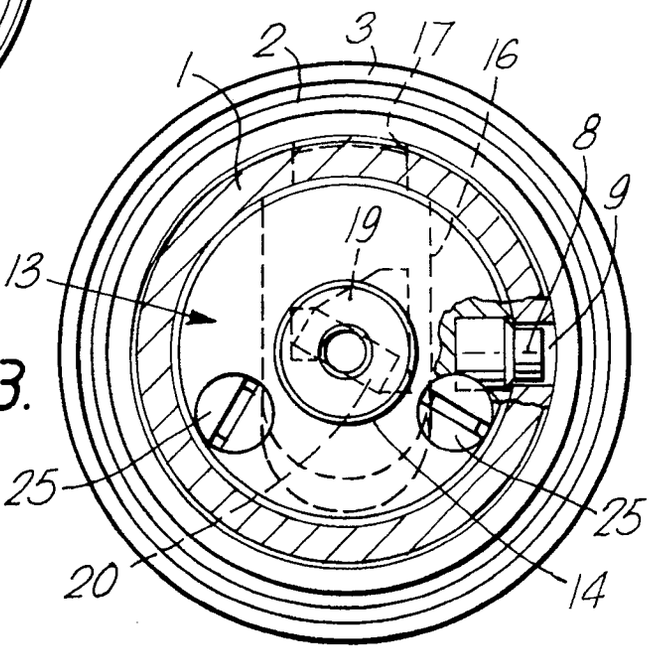


Fig.2.

Fig.3.



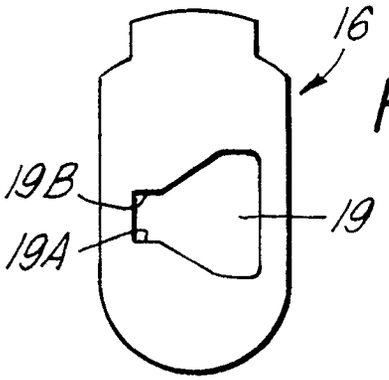


Fig.4.

Fig.5A.

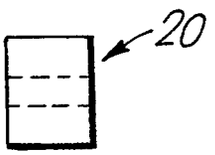


Fig.5B.

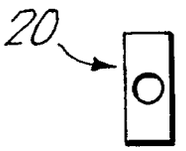


Fig.6A.

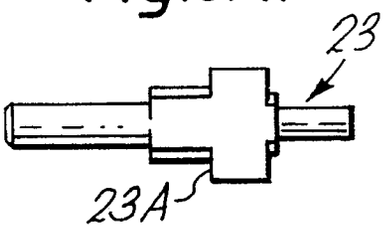


Fig.6B.

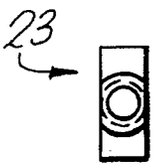


Fig.7.