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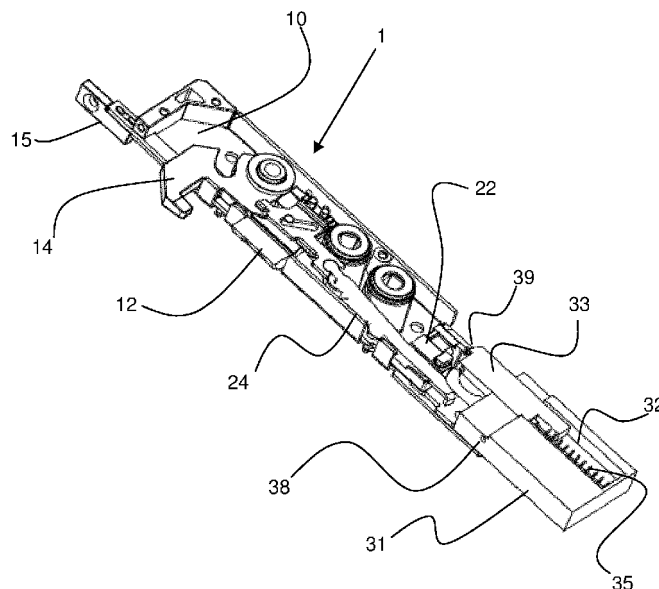
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(54) **Lock unit**

(57) A lock unit (1) for installation in a door of the like, the lock unit being for use in association with a cylinder lock (5) and including a channel (29) within which the

cylinder lock is, in use, received, wherein the lock unit comprises a shutter element (33) arranged to occlude the channel in the event that the cylinder lock is forcibly removed therefrom.

Figure 7



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Description

[0001] This invention relates to a lock unit, and in particular to a lock unit of the type that is used in association with a cylinder lock, and which has improved security.

[0002] Lock units commonly installed in doors, particularly of the uPVC type, are commonly used in association with a cylinder lock. Cylinder locks comprise an elongate barrel that is accommodated in a channel within the lock unit, the barrel having a cam member that is operated by a key inserted into the lock.

[0003] Customarily, when the cylinder lock is installed, the external end of the cylinder lock barrel projects from the door. One method employed by criminals to break into a property is to apply sufficient force to the projecting end of the cylinder lock barrel to break the barrel and forcibly remove the cylinder lock from the lock unit. The criminal is then able to access the interior of the lock unit, for instance using the tip of a screwdriver, in order to operate the locking mechanism and open the door.

[0004] Clearly, there is an ongoing need for improvements to the security of such lock units, which are effective to foil any attempt to gain unauthorised access by forced removal of the cylinder lock. Generally, any measures that prolong the time necessary for a forced entry to be effected contribute to the overall security of a lock system. Industry standard performance tests, for instance, often require an installation to withstand attack for a period of three minutes, it being considered that criminals will generally not spend longer than that in attempting to break in to a property.

[0005] There has now been devised an improved lock unit which addresses this need, and which overcomes or substantially mitigates the above-mentioned and/or other disadvantages associated with the prior art.

[0006] According to a first aspect of the invention, there is provided a lock unit for installation in a door or the like, the lock unit being for use in association with a cylinder lock and including a channel within which the cylinder lock is, in use, received, wherein the lock unit comprises a shutter element arranged to occlude the channel in the event that the cylinder lock is forcibly removed therefrom.

[0007] The lock unit according to the invention is advantageous primarily in that the occlusion of the channel by the shutter element in the event of forced removal of the cylinder lock prevents or inhibits access to the interior of the lock unit. Consequently, even if a criminal successfully removes the cylinder lock, he is unable to gain access to the locking mechanism within the lock unit, as such access is blocked by the shutter element.

[0008] In certain embodiments of the invention, the shutter element is a plate that is of sufficient dimensions that it is capable of completely occluding the channel in which the cylinder lock is received within the lock unit. The plate may be slidably mounted within a groove or guide.

[0009] Commonly, the channel is defined by a pair of corresponding openings in opposite faces of the lock unit.

Typically, the openings are formed in opposite walls of the casing of the lock unit, and are dimensioned such that the cylinder lock is closely received within them. The shutter element is preferably disposed such it is aligned flush with the internal surface of the casing, at the side of lock unit that, in use, is towards the external side of the door.

[0010] The shutter element is preferably biased towards the position in which it occludes the channel in the lock unit. In other words, in normal use the shutter element is preferably prevented from occluding the channel by the presence of the cylinder lock, removal of the cylinder lock causing the shutter element to move to its operative position in which it occludes the channel. Biasing of the shutter element to its operative position is preferably brought about by means of a resilient member that acts upon the shutter element. Most conveniently, the resilient member is a spring, eg a compression spring, which may act between the shutter element and the end of a groove or guide within which the shutter element is slidably mounted.

[0011] Preferably, means are provided for restraining the shutter element in an inoperative position, in which the channel in the lock unit is not occluded, for the purposes of installation of the lock unit. Once the lock unit has been installed, and the cylinder lock positioned within the channel, the shutter element is released so that it can perform its function. The restraining means may comprise a pin mounted transverse to the shutter element and which locates in a recess formed at the edge of the shutter element. The tip of the pin and the recess in which it locates may be so shaped that the pin can be removed from the recess, thereby releasing the shutter element, by rotation of the pin. The restraining means may be re-engaged whenever it is desired to remove the cylinder lock for legitimate purposes, eg replacement or maintenance.

[0012] To provide additional security, the shutter element may, in addition to occluding the channel, also engage the locking mechanism within the lock unit, thereby further inhibiting its operation. For instance, the leading edge of the shutter element may be provided with a detent or other formation that engages a component of the locking mechanism and prevents or restricts movement of it.

[0013] The lock unit may incorporate a locking mechanism of any suitable form. The invention is applicable to any situation in which a cylinder lock is used, and in which forcible removal of the cylinder lock from a channel in which it is accommodated would otherwise provide access to the locking mechanism such that the lock could be unlocked.

[0014] Because doors may be hung at either the right-hand or left-hand edge, to suit the requirements of the installation site, and because it is desirable that the shutter element should be arranged adjacent the outward side of the lock unit, it is particularly convenient for the lock unit to include two shutter elements, one at each side, so that the lock unit is universal in that it is suitable

for installation in doors that are hung in either sense.

[0015] According to a second aspect of the invention, there is provided a lock assembly comprising a lock unit including a channel within which a cylinder lock is received, wherein the lock unit comprises a shutter element arranged to occlude the channel in the event that the cylinder lock is forcibly removed therefrom.

[0016] In a further aspect of the invention, there is provided a door or the like in which is installed a lock assembly comprising a lock unit including a channel within which a cylinder lock is received, wherein the lock unit comprises a shutter element arranged to occlude the channel in the event that the cylinder lock is forcibly removed therefrom.

[0017] Although described above primarily with reference to installation in doors, it will be appreciated that the lock unit of the invention may be used in other forms of closure, eg windows, hatches etc.

[0018] The invention will now be described in greater detail, by way of illustration only, with reference to the accompanying drawings, in which

Figure 1 is a perspective view of lock unit incorporating a security device according to the invention, in a locked operating condition, and showing a cylinder lock received within the lock unit;

Figure 2 is a plan view, partly in section, of the lock unit of Figure 1, in the condition in which it is supplied, prior to installation;

Figure 3 is a view similar to Figure 2, but showing the lock unit after installation in a door, with the security device released;

Figure 4 is a perspective view of the lock unit in its normal operating condition, when used to lock the door;

Figures 5 and 6 show the security device in the course of activation caused by removal of a lock cylinder from the door; and

Figures 7 and 8 show the security device in a fully engaged condition following removal of the lock cylinder from the door.

[0019] Referring first to Figure 1, a lock unit incorporating a security device according to the present invention is generally designated 1. The lock unit 1 is, save for the presence of the security device of the invention (which is described in detail below), of the form described in GB2455777A. Briefly summarised, the lock unit 1 includes a casing 10 that, together with a cover plate 11 forms a substantially fully enclosed housing. The cover plate 11 is shown only in Figure 1, so as to reveal the internal components of the lock unit 1 in the other views. The lock unit 1 forms part of a multi-point locking system

for a door, and comprises a spring-loaded retractable latch 12 and a locking hook 14, both of which are operated in a conventional manner by door handles mounted on spindles that pass through one or both of square section bores 16, 18 in two cam members 17, 19. The mechanism is further coupled to a drive bar 15, by which secondary locking units located elsewhere on the edge of the door. Such secondary locking units may comprise locking hooks, espagnolettes etc. In the embodiment illustrated, the lock unit 1 is installed in the door with the cover plate of the housing disposed towards the external side of the door.

[0020] Keyhole-shaped openings 29 in the casing 10 and the cover plate 11 define a channel into which the barrel of a cylinder lock 5 can be inserted after the lock unit 1 has been fitted to a door. Again, this is entirely conventional. The cylinder lock 5 is shown only in Figure 1.

[0021] The cylinder lock 5 includes a cam member that acts on a displaceable carriage 22, causing the carriage 22 to reciprocate between locked and unlocked positions. In all the drawings, the carriage 22 is shown in the locked position (at the leftmost extent of its travel, as viewed in the drawings). The carriage 22 is operably linked to the latch 12 and locking hook 14 by means of a lever 24.

[0022] The manner in which the lock unit 1 is operated, and the manner in which the cylinder lock is coupled to the latch 12 and locking hook 14 is entirely as described in GB2455777A and is not pertinent to the present invention.

[0023] The present invention addresses a problem associated with lock units of the type described in GB2455777A and indeed all lock units comprising a cylinder lock coupled to a locking mechanism, which is that the barrel of the cylinder lock may be relatively easy for a skilled and determined criminal to remove. Successful removal of the cylinder lock barrel may then permit the criminal to operate the lock mechanism, eg using a screwdriver or other such implement, thereby to unlock the door.

[0024] The embodiment of the invention shown in the drawings differs from the lock unit described in GB2455777A in that the foot of the lock unit 1 is constituted by a shutter unit 30 comprising a cast metal block 31 having a vertical (in use) groove 32 formed therein. The groove 32 carries a shutter plate 33. The lower end of the shutter plate 33 is formed with a slot that serves as a mounting for a compression spring 35. The compression spring 35 acts between the shutter plate 33 and the lower end of the groove 32, so as to urge the shutter plate 33 upwards.

[0025] One of the sides of the shutter plate 33 (the left hand side as viewed in the drawings) is formed with two cutouts 36, 38. The first cutout 36 has the form of a right-angled triangle and is located adjacent the top edge of the shutter plate 33. The first cutout 36 cooperates with a spring-loaded restraining pin 37 that is mounted in a transverse bore in the block 31 and which has a cham-

ferred tip that engages in the first cutout 36 (see Figure 2) in such a way that the shutter plate 33 is retained in the position shown in Figure 2.

[0026] The restraining pin 37 can be rotated by means of a thin gauge Allen key inserted into a hole 38 at the end of the bore within which the pin 37 is mounted. After the lock unit 1 has been installed in a door, and after the cylinder lock 5 has been inserted in the channel defined by the openings 29, the pin 37 is rotated through 180°. The resultant camming action of the abutting surfaces of the pin 37 and the first cutout 36 causes the pin 37 to be displaced from the first cutout 36 (see Figure 3). Consequently, the upper end of the shutter plate 33 bears against the underside of the cylinder lock 5.

[0027] If it is desired to remove the cylinder lock 5 for some legitimate purpose, eg maintenance or replacement, the pin 37 is first rotated through 180° to the position shown in Figure 2, so that removal of the cylinder lock 5 does not permit upward displacement of the shutter plate 33.

[0028] In normal use, when the door is locked, the lock unit 1 has the configuration shown in Figure 4. The locking hook 14 protrudes from the lock unit 1 and engages a keeper on the door jamb. The latch 12 also protrudes into a keeper. Any secondary locking units are similarly engaged with keepers on the door jamb. The carriage 22 occupies the locked (leftmost) position.

[0029] To attempt to break open the door, a criminal may forcibly remove the cylinder lock 5. If it were not for the presence of the security device according to the invention, this would provide access to the locking mechanism. In particular, the criminal may be able to manipulate the carriage 22 and/or lever 24, for instance by inserting a screwdriver through the opening 29 in the cover plate, in such a way that the mechanism can be unlocked and the door opened, so that the criminal is able to gain access to the property.

[0030] The security device of the present invention, however, prevents or severely inhibits the ability of the criminal to gain access to the locking mechanism. As soon as the cylinder lock 5 is forcibly removed, the shutter plate 33 is urged upwards by the compression spring 35. The shutter plate 33 is aligned substantially flush with the internal surface of the cover plate of the lock unit 1. Movement of the shutter plate 33 from its normal, resting position (see Figure 4) to the operative position shown in Figures 7 and 8 (via the intermediate position of Figures 5 and 6) occurs very rapidly. In the operative position (Figures 7 and 8), the shutter plate 33 occludes the opening 29 in the cover plate and so blocks access to the interior of the lock unit 1.

[0031] Access to the interior of the lock unit 1 is further prevented by engagement of the pin 37 with the second cutout 38. Upward movement of the shutter plate 33 brings the second cutout 38 into registration with the transverse bore in which the pin 37 is accommodated, such that the pin 37 is pressed into the second cutout 38 by the action of its associated compression spring. En-

gagement of the pin 37 in the second cutout 38 prevents the shutter plate 33 being prised downwards in such a way that might reopen the opening 29 and so enable access to the lock mechanism.

[0032] The upper, leading edge of the shutter plate 33 is provided with an upstanding detent 39 which, when the shutter plate 33 is in its operative position engages behind part of the carriage 22. This effectively maintains the lock mechanism in the fully locked condition.

[0033] It will be appreciated that the illustrated embodiment is suitable for use in door that is hung on the right (when viewed from the exterior), such that the cover plate of the lock unit 1 and the shutter plate 33 are disposed at the external side of the lock unit 1. For installation in a door hung in the opposite sense, an embodiment in which the shutter plate 33 is disposed flush with the internal surface of the casing 10, rather than the cover plate, would be suitable. More conveniently, however, the shutter unit 30 may contain two shutter plates, adjacent the two major faces of the shutter unit 30, so that the unit is universal, being suitable for installation in doors hung in either sense.

Claims

1. A lock unit for installation in a door of the like, the lock unit being for use in association with a cylinder lock and including a channel within which the cylinder lock is, in use, received, wherein the lock unit comprises a shutter element arranged to occlude the channel in the event that the cylinder lock is forcibly removed therefrom.
2. A lock unit as claimed in Claim 1, wherein the shutter element is a plate that is of sufficient dimensions that it is capable of completely occluding the channel in which the cylinder lock is received within the lock unit.
3. A lock unit as claimed in any preceding claim, wherein the channel is defined by a pair of corresponding openings in opposite faces of the lock unit.
4. A lock unit as claimed in any preceding claim, wherein the shutter element is disposed such it is aligned flush with the internal surface of the lock unit, at the side of lock unit that, in use, is towards the external side of the door.
5. A lock unit as claimed in any preceding claim, wherein the shutter element is biased towards the position in which it occludes the channel in the lock unit.
6. A lock unit as claimed in Claim 5, wherein biasing of the shutter element to its operative position is preferably brought about by means of a resilient member that acts upon the shutter element.

7. A lock unit as claimed in Claim 6, wherein the resilient member is a compression spring.
8. A lock unit as claimed in any preceding claim, wherein means are provided for restraining the shutter element in an inoperative position, in which the channel in the lock unit is not occluded, for the purposes of installation of the lock unit. 5
9. A lock unit as claimed in Claim 8, wherein the restraining means comprises a pin mounted transverse to the shutter element and which locates in a recess formed at the edge of the shutter element. 10
10. A lock unit as claimed in Claim 9, wherein the tip of the pin and the recess in which it locates are so shaped that the pin can be removed from the recess, thereby releasing the shutter element, by rotation of the pin. 15
- 20
11. A lock unit as claimed in any preceding claim, wherein the shutter element, in addition to occluding the channel, also engages the locking mechanism within the lock unit, thereby further inhibiting its operation. 25
12. A lock unit as claimed in Claim 11, wherein the leading edge of the shutter element is provided with a detent or other formation that engages a component of the locking mechanism and prevents or restricts movement of it. 30
13. A lock unit as claimed in any preceding claim, which includes two shutter elements.
14. A lock assembly comprising a lock unit as claimed in any preceding claim and a cylinder lock. 35
15. A door or the like in which is installed a lock assembly as claimed in Claim 14. 40

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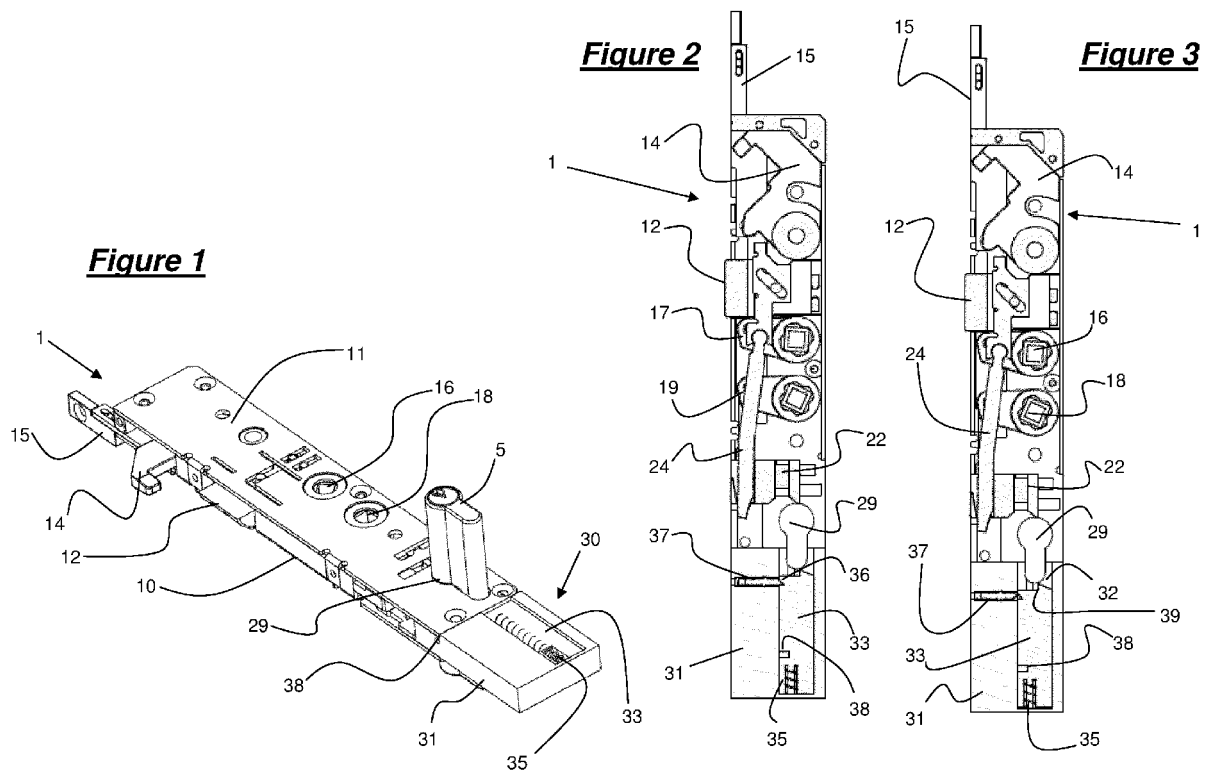


Figure 4

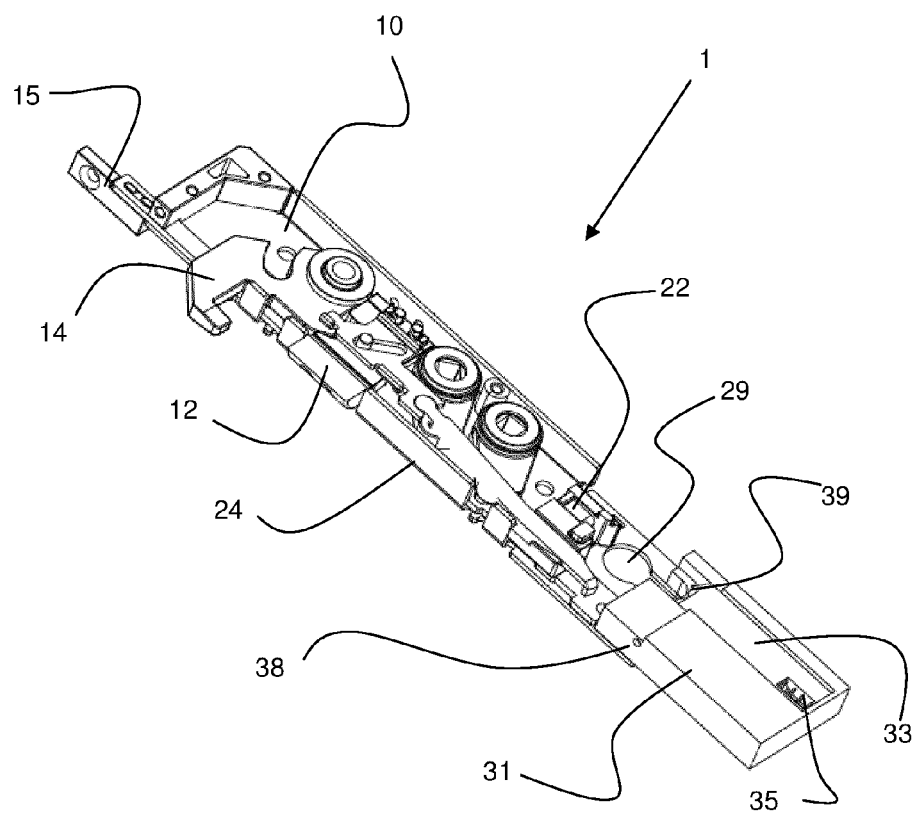


Figure 5

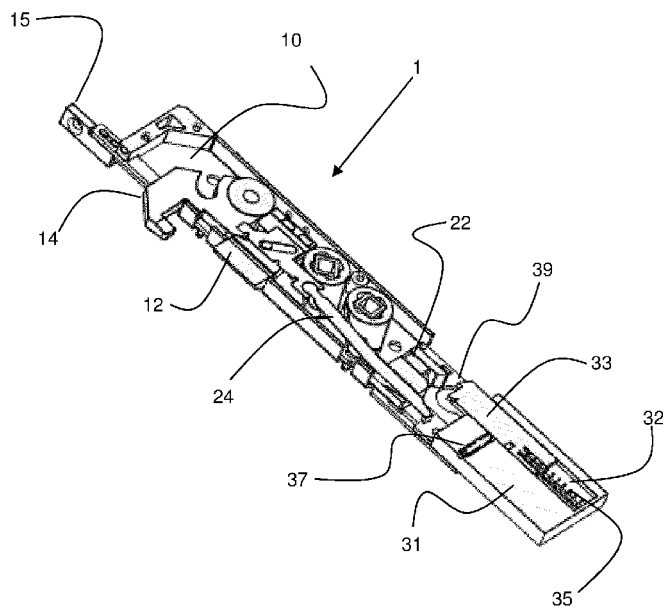


Figure 6

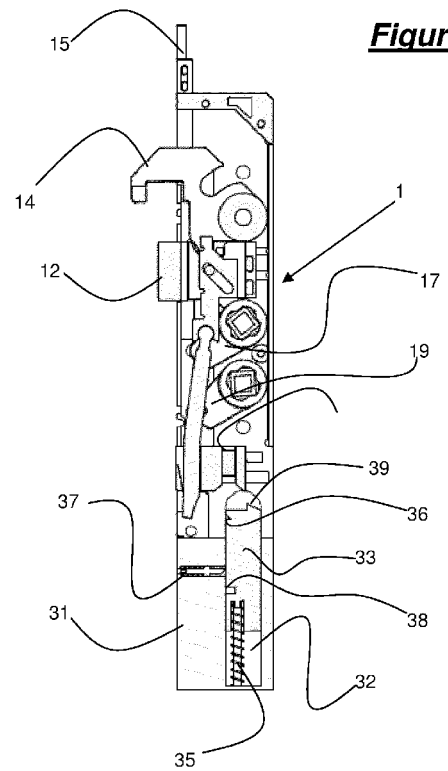


Figure 7

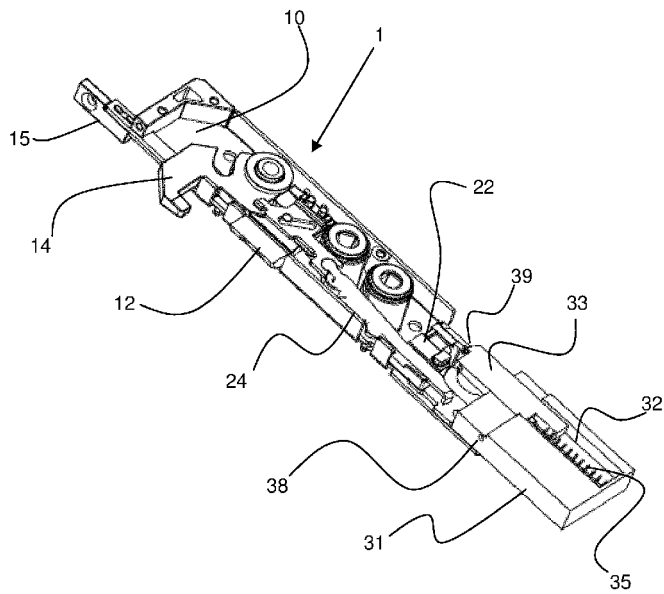
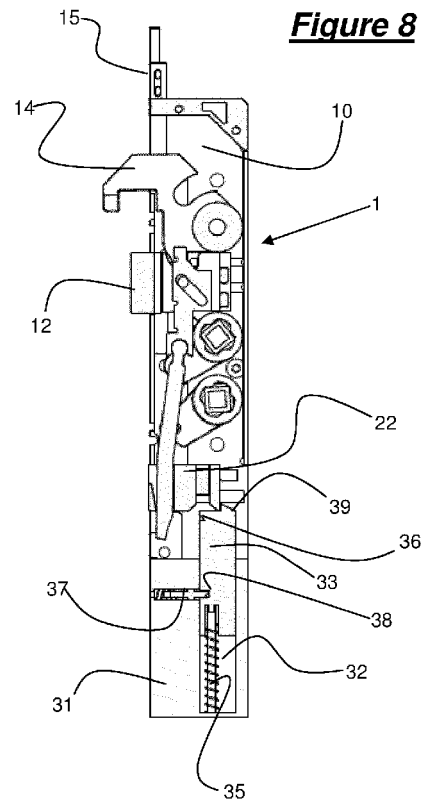


Figure 8



REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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