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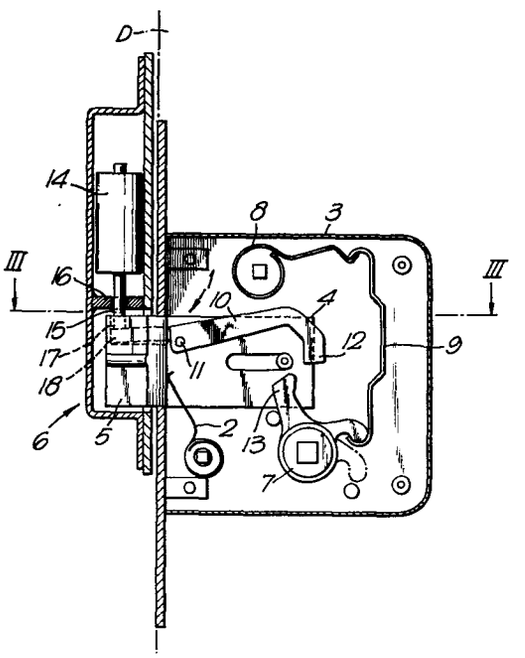
(54) Locks.

(57) A remote-controlled door lock designed for use in access-control systems has a spring bolt 1 adapted to be withdrawn by a handle-driven follower 12 (or a keylock cylinder). The bolt head 5 engages in a keeper 6 and can be retainded in the locked condition by a pin 15 driven by a double-acting solenoid 14 to engage in a slot 17 in the bolt. In this condition the pin 15 also depresses one end of a pivoted bar 10 by which the follower 13 is linked to the bolt so that no forcing load can be applied to the solenoid locking mechanism through the handle. Opening of the door from this condition can only be achieved by release of the pin 15 by the solenoid 14 on recognition of a correct code presented to an associated card reader or similar device (not shown).



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Locks

The present invention relates to locks.

In particular, the invention is concerned to provide a lock usable for example in a system to control access through doorways in offices or other premises and which is adapted to provide two different levels of security at the selection of a central or remote control station. That is to say, during specified "off guard" periods the lock may be operated for example as a simple latch by any person wishing to gain access through the door - or in an alternative embodiment operated like a conventional key-releasable lock during these periods - while during other "on guard" periods, under the control of the remote station, it can only be released on recognition of a (or an additional) correct code presented to the system.

The invention accordingly envisages a lock comprising an extendable and retractable bolt, and a keep assembly for the reception of said bolt when extended; mechanism within the lock for retracting the bolt in response to a user-operable control member, said mechanism including a link member movable between positions in which it respectively engages and disengages the operative connection between said bolt and control member; and the keep assembly including an electromagnetic actuator selectively actuable to engage said bolt when received in the keep assembly thereby to resist the retraction thereof, and simultaneously to operate said link member to disengage the operative connection between said bolt and control member.

Such a lock can be used in two distinct modes, in accordance with the aim of providing two selectable levels of security, as follows. With the electromagnetic actuator of the keep assembly set to release the lock bolt and link member, the bolt can be retracted at any time by the user-operable control member, which member may simply comprise the follower of a handle or knob in the case of a spring-bolt lock (or, more properly, latch), or which may comprise a key-driven thrower in the case of a key-releasable latch or deadlock. On the other hand, when the electromagnetic actuator is set to engage the lock bolt and operate the link member, operation of the handle, thrower or other user-operable control member is not transmitted into retraction of the bolt, by virtue of the disconnection function of the link member, and furthermore the engagement of the actuator with the bolt within the keep assembly will resist any other attempts to force the bolt in its retracting direction;

under these circumstances a further operation, such as the recognition of a correct code by means controlling the electromagnetic actuator, will be required to release the actuator and thereby permit bolt-retraction.

The invention therefore also embraces an access-control system in which a lock as defined above is fitted to a door or other like closure, comprising means effective to actuate said electromagnetic actuator to engage the bolt and operate the link member of the lock as aforesaid during selected "on guard" periods; and further comprising means effective to actuate said electromagnetic actuator to release the bolt and link member during such periods only in response to the recognition of a correct code presented to the system.

In a preferred embodiment of the lock, the aforesaid link member is in the form of a bar pivoted to the bolt and engageable at one end by a rotatable said user-operable control member, whereby rotation of that control member retracts the bolt; the opposite end of the bar being engageable by the electromagnetic actuator within the keep assembly when actuated as aforesaid, thereby to pivot the bar and remove its said one end from engageability by said control member.

These and other aspects of the invention will now be more particularly described, by way of example, with reference to the accompanying schematic drawings, in which:

Figure 1 is a vertical section through a preferred embodiment of a lock in accordance with the invention, in an "off-guard" condition;

Figure 2 is a view similar to Figure 1 of the lock in its "on-guard" condition; and

Figure 3 is a section on the line III-III of Figure 2.

Referring to Figure 1, the illustrated lock is in the form of a mortice latch having a bolt 1 biased by a spring 2 to extend from the lockcase 3. The bolt 1 comprises a slidable plate 4 upon which is fixed the usual bevelled head 5 (see also Figure 3), so that a door D fitted with the latch can slam shut with the bolt head engaging in an associated keep assembly 6. For withdrawing the bolt to permit door-opening there is a rotatable follower 7 within the lockcase which can be turned by handles (not shown) provided on each side of the door. This follower is biased to its rest position shown in Figure 1 by a spring 8 connected to it through a tie 9. A link bar 10 is pivoted to the bolt by a pin 11, and has a hooked tail portion 12 which in the condition of Figure 1 lies in the path of movement of an arm 13 extending from the follower 7. Accordingly, turning the follower 7 clockwise (in the sense of Figure 1) by either of the external handles causes the arm 13 to pick up the tail 12 of the bar 10, and continued turning of the follower thereby withdraws the bolt from the keep assembly 6 through the bar 10 and pin joint 11. Thus it will be seen that in the "off-guard" condition depicted in Figure 1 the lock functions as a normal doorlatch permitting passage through the doorway by any person operating the follower 7.

The keep assembly 6 of this lock also houses a double-acting solenoid 14. This solenoid is used to drive a vertically-reciprocable pin 15, the lower end of which is guided by a rigid plate 16 in the keep assembly, and the upper and lower limits of movement of which are indicated respectively in Figures 1 and 2. The solenoid is of a known type equipped with a pair of permanent magnets arranged to retain the pin 15 in whichever of its two positions it has been set until the next actuation of the solenoid's field coil(s). In the upper position of the pin, as shown in Figure 1, it has no effect upon the bolt 1 nor any other part of the lock mechanism, so that the mechanism remains free for operation as a simple latch as described above.

If, however, with the bolt head 5 received in the keep assembly 6 the solenoid 14 is actuated to drive the pin 15 to its lower position, as shown in Figures 2 and 3, the lower end of the pin is caused to enter a slot 17 provided in the non-bevelled side of the bolt head. This has two effects. Firstly, the bolt is now blocked by the pin 15 from retracting into the lockcase 3, ie the door is now deadlocked. Secondly, since a nose portion 18 of the link bar 10 is arranged also to lie within the bolt slot 17 the entry of the pin 15 into this slot causes the bar 10 to pivot to the position shown in Figure 2, by engagement of the pin 15 with the nose 18. In this position it will be seen that the end 12 of the bar has been lifted clear of the path of the follower arm 13, so if the cam is turned by a person operating either door handle no load can be transmitted to the bolt 1 or pin 15. If, however, an attempt is made by some other means to put force on the bolt 1 in its retracting direction, this will be securely resisted by the end of the pin 15 held in the plate 16 and engaging in the bolt head 5.

In practice, the illustrated lock forms part of an electronic access-control system for the door D intended to operate at different levels of security at different times. That is to say during "off-guard" periods access is permitted through the doorway to all persons encountering the door. During "on-guard" periods, however, access is to be restricted only to duly authorised personnel. The "off-guard" and "on-guard" periods may be preprogrammed (for example to accord with the normal opening times of a suite of offices) and/or selectable at will at a central control station, in accordance with the parameters of the particular system installed, the details of which do not form part of the present invention. Suffice it to say, when the lock is to be "off-guard" the solenoid 14 is pulsed to raise the pin 15 to its Figure 1 position and the mechanism then operates in its above-described latch mode. When it is required to be "on-guard" the solenoid 14 is pulsed in the opposite sense to lower the pin 15 into the bolt head 5 and thereby deadlock/disengage the mechanism also as described above. In this condition access can only be obtained through the door on receipt of a signal to raise the pin 15 once more. This may be derived for example from an associated infra-red or magnetic card reader 19 on the outside of the doorway, schematically depicted in Figure 3 as integrated with the keep assembly 6, or from any other suitable code-input device known to those skilled in the art, it being understood that the code to enable release of the pin 15 in this mode will be issued only to those persons authorised to gain access during this period.

Raising the pin 15 from its Figure 2 position of course releases the bolt 1 for retraction and re-establishes the operative connection between the bolt and the door handles. After any authorised door-opening during an "on-guard" period the solenoid

14 is automatically pulsed again on closure of the door to return the pin 15 into engagement with the bolt head 5. For this and for other monitoring purposes micro-switches (not shown) will be fitted in the keep assembly 6 to detect the presence or absence of the bolt head within the keep and to detect in which of its two positions the pin 15 lies at any time.

For emergency opening of the door D in the event of an electrical power failure occuring with the pin 15 deadlocking the bolt 1, a lever or other suitable manually- operable mechanism (not shown), accessible only from the inside of the doorway, may be provided on the keep assembly to raise the pin.

CLAIMS

1. A lock comprising an extendable and retractable bolt (1), and a keep assembly (6) for the reception of said bolt (1) when extended; mechanism (10) within the lock for retracting the bolt (1) in response to a user-operable control member (7); and the keep assembly (6) including an electromagnetic actuator (14) selectively actuable to engage said bolt (1) when received in the keep assembly (6) thereby to resist the retraction thereof; characterised in that said retracting mechanism includes a link member (10) movable between positions in which it respectively engages (Fig. 1) and disengages (Fig. 2) the operative connection between said bolt (1) and control member (7) and said electromagnetic actuator (14) is actuable to operate said link member (10) to disengage the operative connection between said bolt (1) and control member (7) simultaneously with its (14) engagement of the bolt (1) to resist the retraction thereof.

2. A lock according to claim 1 wherein said link member is in the form of a bar (10) pivoted to the bolt (1) and engageable at one end (12) by a rotatable said user-operable control member (7), whereby rotation of the control member (7) retracts the bolt (1); the opposite end (18) of said bar (10) being engageable by said electromagnetic actuator (14) within the keep assembly (6) when actuated as aforesaid, thereby to pivot the bar (10) and remove its said one end (12) from engageability by said control member (7).

3. A lock according to claim 2 wherein said bar (10) is pivoted to the bolt (1) about an axis (11) transverse to the direction of movement of the bolt (1) and lies generally in a plane parallel to said direction; the said opposite end (18) of the bar (10) lying in a slot (17) in the head (5) of the bolt (1) into which slot (17) an element (15) of said actuator (14) extends when actuated as aforesaid.

4. An access-control system in which a lock according to any preceeding claim is fitted to a closure (D), comprising means effective to actuate said electromagnetic actuator (14) to engage the bolt (1) and operate the link member (10) of the lock as aforesaid during selected periods; and further comprising means effective to actuate said electromagnetic actuator (14) to release said bolt (1) and link member (10) during such periods only in response to the recognition of a correct code presented (19) to the system.

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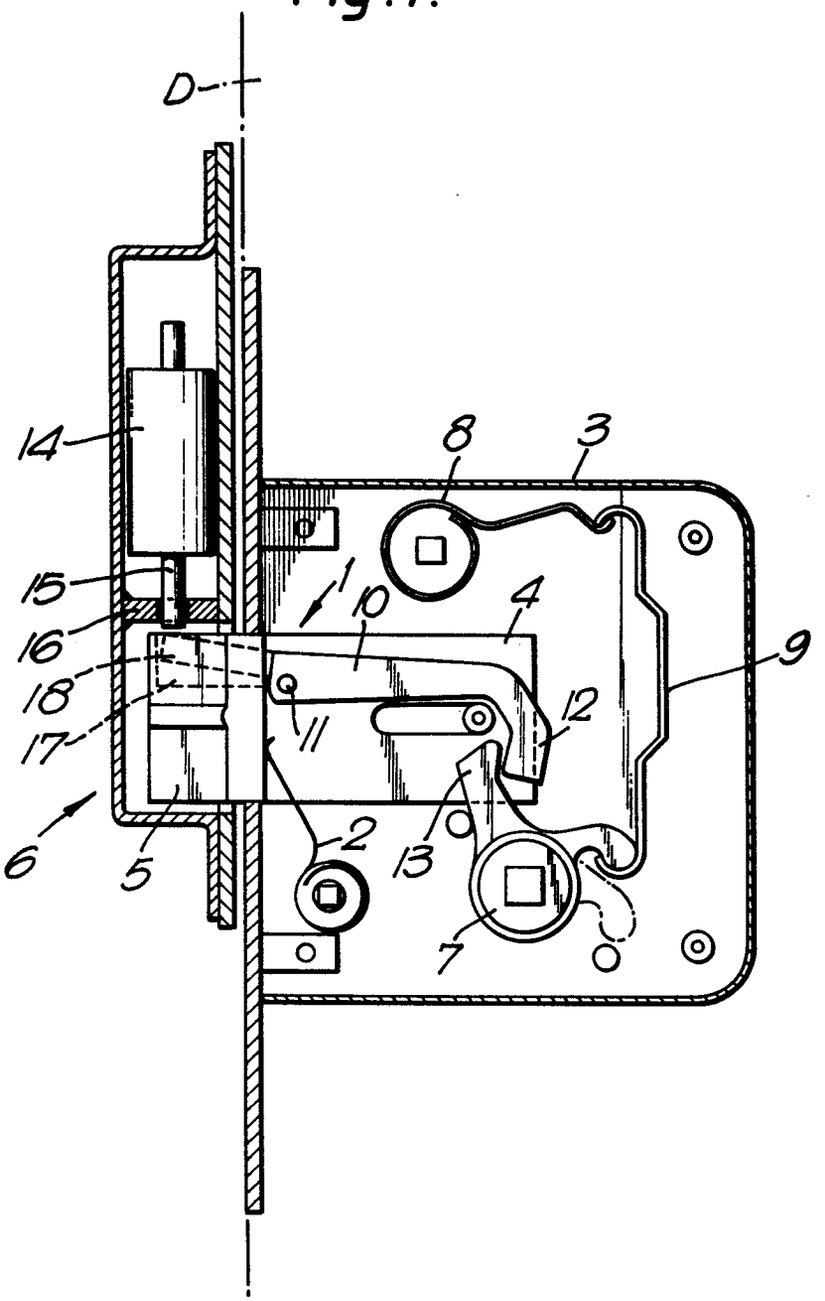
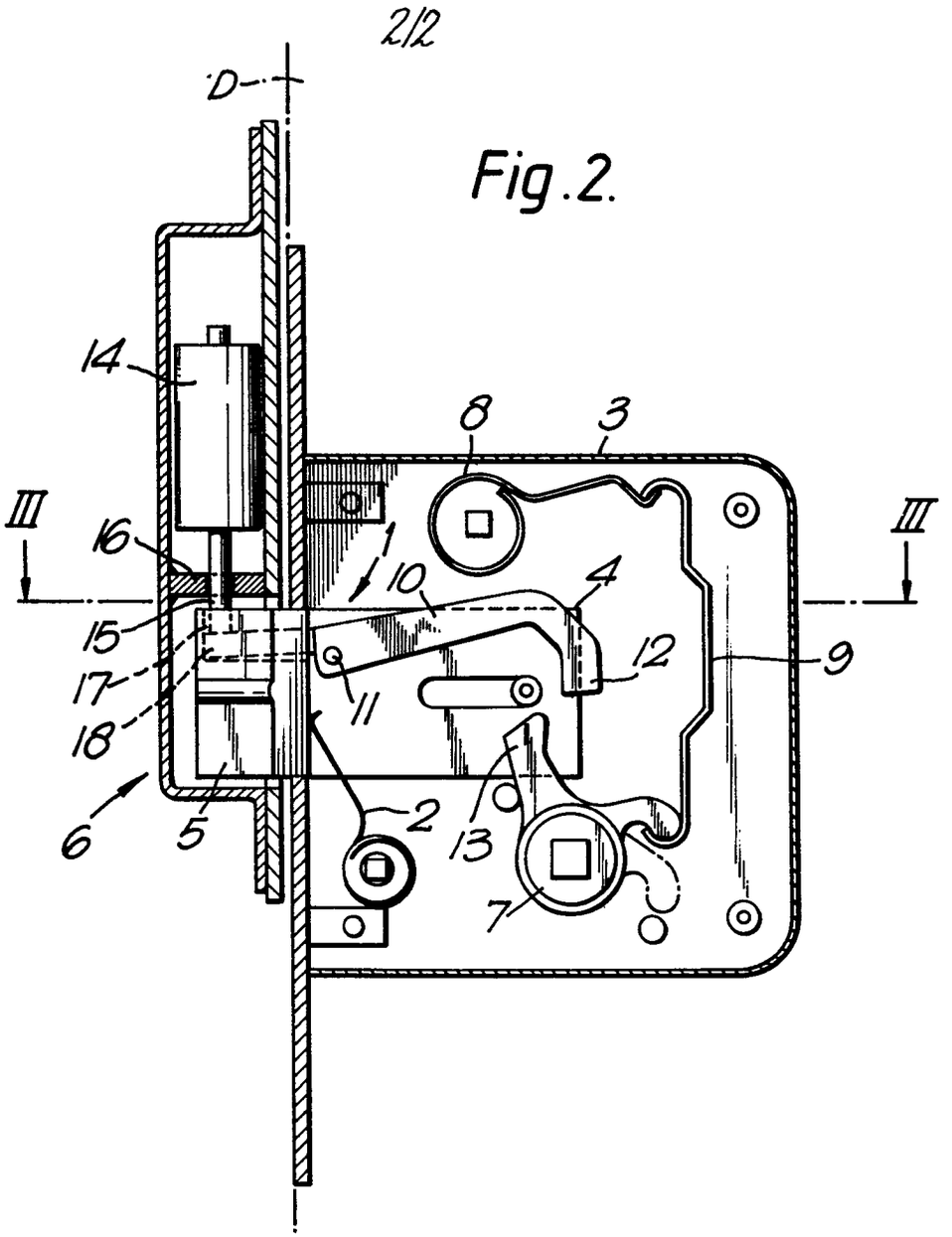
Fig.1.




2/2
D
14
8
3
III
III
16
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15
12
9
17
11
18
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5
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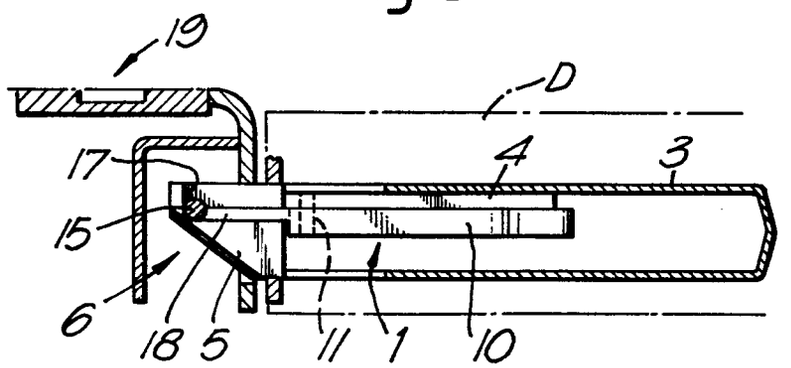
13
7

Fig.2.


19
D
17
4
3
15
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1
10

Fig.3.