

PATENT SPECIFICATION (11)

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(54) LOCK

(71) I, BRUCE SAMUEL SEDLEY, a citizen of the United States of America, of R.R.1, Box 96, Koloa, Kauai, Hawaii 96756, United States of America, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to a lock structure operated by a pushing instrument such as a magnetic card key and which structure is adapted to be employed with a conventional door lock having therein the usual latchbolt retracting mechanism and a rotatable driver bar for translating the retractor mechanism to retract the bolt. The main object of the present invention is the provision of a pushing instrument actuated lock adapted to be employed with a conventional outside door knob with no modification of the knob structure or deadbolt.

In some respects the present invention is similar to that disclosed in U.S. patent No. 3,993,460 to which reference is made for details not disclosed herein. The present invention is, in some respects, an improvement over the structure in this U.S. Patent.

The invention provides a lock structure having an unlocking member adapted to be rotated about an axis; a housing rotatable about the said axis; and a slide in the housing mounted for sliding movement transversely of the said axis, the unlocking member and the slide being formed with interengaging elements; and means being provided in the housing for preventing relative rotational movement of the slide and housing and permitting sliding movement of the slide from a normal locking position with the elements out of engagement, to an unlocking position with the elements in engagement for connecting the member and slide together for rotating the unlocking member upon rotation of the housing, the housing being formed with an opening permitting the insertion of a pushing instrument therethrough for pushing the slide to its unlocking position.

Preferably said means includes a locking magnet positioned in the slide and normally holding the slide fixed relative to the housing

and movable to an unlocking position under the influence of a magnetic key inserted in the housing to allow movement of the slide by the key to the unlocking position.

Alternatively said means can be a conventional cylinder lock body.

The housing by means of which the unlocking member is rotated can be freely rotatable in its locked condition so as to prevent unauthorized opening of the lockset by wrenching—that is, by applying an inordinately heavy torque to the structure.

The invention will be described further, by way of example, with reference to the accompanying drawings wherein:—

Fig. 1 is a vertical cross section through the knob spindle of a conventional door lock showing device of the invention mounted thereon in locked condition;

Fig. 2 is a fragmentary view similar to Fig. 1 showing the device unlocked;

Fig. 3 is a cross sectional view taken in a plane indicated by lines 3-3 of Fig. 1 and showing the means for interconnecting a slide and a driver member;

Fig. 4 is a view similar to Fig. 2 but taken in a plane at right angles thereto; and

Fig. 5 is a fragmentary sectional view taken in a plane indicated by lines 5-5 of Fig. 4.

In detail the device of the invention is adapted to be employed with a conventional door lock structure mounted on a door 10 and which lock structure includes an escutcheon plate 11 through which is received a spindle 12 to which the conventional knob is usually secured. The lock structure also includes a rotatable member 14 associated with the retracting mechanism of the lock and which member is rotated to unlock the lockset by rotation of an unlocking member in the form of a driver bar 15. In the conventional lockset the driver bar 15 is connected to a rotatable plug of a conventional cylinder lock body, which plug is rotated by means of a proper metal key inserted in the keyway. By the present invention the driver bar 15 is similar to the corresponding conventional driver bar but is rotated in a manner to be described.

Mounted on spindle 12 is a sleeve 18 which is formed with an opening 19 adapted to

receive therethrough a projection 20 on a conventional knob catch 21 carried by spindle 12. The sleeve 18 is secured to the spindle 12 by said knob catch in the conventional manner. As is well known in the art, the knob catch 21 is urged into slot 19 by a flat spring (not shown) and, in an unlocked condition the knob catch may be depressed in spindle 12 to permit removal of sleeve 18. Said knob catch performs no part of the present invention except in combination with the structure to be disclosed. The outer end of sleeve 18 is formed to provide a radially extending flange 25 on which is rotatably mounted a housing generally designated 26. Between the housing 26 and the door 10 there is provided a modified knob 28 conforming in shape to a portion of a conventional knob and provided with central aperture 29 for receiving the sleeve 18 therethrough. A washer 32 may be interposed between the wall of aperture 29 and sleeve 18 to facilitate rotatably supporting said modified knob 28 on sleeve 18.

The housing 26 includes a relatively thick plate 35 which is provided with a large central circular recess 36 receiving the flange 25 of sleeve 18 therein (Fig. 1). Interposed between the outer end of flange 25 and the bottom of recess 36 is an antifriction washer 38 and on the opposite side of washer 38 is another washer 40 engaging the inner face of flange 25.

The plate 35 is rotatably secured on flange 25 by means of an inner clamping plate 42 which is provided with a pair of apertures through which extend securing bolts 44 (Fig. 4). The housing 26 is formed to provide a pair of radially inwardly projecting bosses 43 into which the bolts 44 are threadedly secured. The plate 35 is formed with bosses 39 is provided with apertures 48 for receiving the shanks of bolts 44 therethrough so that the plate 35 is clamped in a fixed position relative to housing 26.

The housing 26 includes a cylindrical sidewall 60 and an end wall 59 on which are formed the bosses 43 which define at their inner sides a pair of opposed parallel sidewalls 52, 53 (Fig. 4) between which is provided a shield plate 54 of steel or other magnetizable material. Said plate 54 is yieldably urged inwardly of the structure by means of a flat spring 55. Along-side shield plate 54 is a cover plate of nonmagnetic material, such as stainless steel, and indicated at 57. The cylindrical sidewall 60 of housing 26 is provided with a slot 61 which is adapted to receive therethrough a card key indicated at 62. When the card key 62 is inserted in the slot it urges the shield plate 54 outwardly toward end wall 58 against the urgency of spring 55 as best seen in Fig. 2.

Inwardly of cover plate 57 is a locking plate 64 which is provided with a plurality of apertures 65 as disclosed in greater detail in

the above noted U.S. Patent. Said apertures 65 are adapted to receive therein one end of one or more locking magnets indicated at 67. Plates 57, 64 are shaped so as to be held in place by bosses 46 integral with bosses 43 (Fig. 5).

The cover plate 57 and locking plate 64 are clamped along their outer marginal portions between bosses 39 and bosses 43 at assembly by bolts 44.

Said locking magnets 67 are contained within outwardly opening recesses 68 in a slide 90 which is positioned alongside the locking plate 64. This slide 90 is normally urged upwardly to the position shown in Fig. 1 by means of a non-magnetic compression spring 91 received in an outwardly opening bore 92 on one end of slide 90 with the outer end of said spring 91 being received in a plunger 93 bearing at its outer end against the inner side of cylindrical sidewall 60 of housing 26. Slide 90 is provided with an offset flange 95 engageable by the inner end of the card 62. At this point it will be noted that the magnets 67 are normally urged into locking position in holes 65 of locking plate 64 because of the magnetic attraction to the steel shield plate 54. However, when card 62 is inserted in the housing 26 so as to move slide 90 to the position shown in Fig. 2 the magnets 67 are first repelled by predetermined magnetic spots on the card into the recesses 68 so as to unlock the slide 90 and permit the same to be urged against the inner side of housing 26 as shown in Fig. 2.

On the side of slide 90 opposite the flange 95 there is provided an integral rectangular projection 98 which is adapted to cooperate with a member generally designated 100 which is fixedly secured to the outer end of driver bar 15 by means of a pin 101. The cooperation between projection 98 and member 100 is best shown in Fig. 3 wherein it is seen that the member 100 includes a circular plate 102 which is formed with a plurality of axially extending trapezoidal shaped teeth 103 which are formed so as to provide a plurality of radially extending slots 104. When the slide 90 is moved toward its unlocking position of Fig. 2 it enters one of said slot 104 so that upon rotation of housing 26 the member 100 and the driver bar attached thereto are rotated to unlock the lockset. It should be noted in Fig. 3 that the teeth 103 in effect provide shoulders 105 and it is one of said shoulders which cooperates with projection 98 as an abutment to permit rotating the member 100 and driver bar 15 in the unlocking direction. Since the housing 26 is rotatable at all times it will be apparent that only one such shoulder 105 is required to effect unlocking. However, it has been found that the structure of Fig. 3 insures that the projection 98 enters one of the slots 104 so that there is a minimum amount of lost motion in a circumferential direction

between the projection 98 and the shoulder that it engages.

An antirap device is incorporated in the present invention for the purpose of preventing release of the locking magnets 67 by applying an impact to the end wall 59 to retract said magnets out of locking plate 64. Such antirap device includes an antirap magnet 80 which is normally held by the attraction of plate 54 within a recess 81 opening outwardly of the opposite side of slide 90 from recesses 68. The heavy plate 35 is formed with a rib 82 providing a shoulder 83 (Fig. 3) which is adapted to abut magnet 80 when the latter is in its outer position shown in dotted lines in Fig. 1. Thus, if the housing 26 is impacted to move the magnet 80 to its outer position, downward movement of slide 90 is prevented.

If it is desired not to have the modified knob 28 free spinning on spindle 12 said modified knob may be secured to said spindle in any desired manner.

It will be noted that the provision of eight slots 104 (Fig. 3) allows the insertion of the card through card slot 61 at numerous points so that the unit does not need to be made especially for left or right hand use.

In order to prevent circumvention of the lock by forcing a tool through card slot 61 and applying an inordinate force on flange 95 of slide 90 the juncture between said flange 95 and the main body portion of slide 90 may be weakened by providing a groove 110 (Fig. 2) so as to insure that the flange 95 breaks off before the locking magnets 67 fail.

The steel plate 54 not only performs the function of attracting the locking magnets 67 to their locking position but also prevents one from discerning the code of the lock by applying a detector to outer wall 59. In addition, the plate 54 in cooperation with cover plate 57 prevents foreign material from entering the device.

WHAT I CLAIM IS:—

1. A lock structure having: an unlocking member adapted to be rotated about an axis; a housing rotatable about the said axis; and a slide in the housing mounted for sliding movement transversely of the said axis, the unlocking member and the slide being formed with interengaging elements; and means being provided in the housing for preventing relative rotational movement of the slide and housing and permitting sliding movement of the slide from a normal locking position with the elements out of engagement, to an unlock-

ing position with the elements in engagement for connecting the member and slide together for rotating the unlocking member upon rotation of the housing, the housing being formed with an opening permitting the insertion of a pushing instrument therethrough for pushing the slide to its unlocking position.

2. A lock structure according to claim 1 wherein said means includes a locking magnet positioned in the slide and normally holding the slide fixed relative to the housing and movable to an unlocking position under the influence of a magnetic key inserted in the housing to allow movement of the slide by the key to the unlocking position.

3. A lock structure according to claim 1 wherein the interengaging elements comprise an axially outwardly projecting shoulder on the member and a projection on the slide in registration with the shoulder when the slide is in its unlocking position.

4. A lock structure according to claim 1 wherein the interengaging elements comprise a circular row of radially inwardly opening recesses on the member and a projection extending outwardly of the slide and adapted to enter one of the recesses when the slide is moved perpendicular to the axis to the unlocking position.

5. A lock structure according to claim 1 and including a knob spindle, the housing being rotatably mounted on the knob spindle whereby, in its normal locking condition, the housing is freely rotatable on the spindle.

6. A lock structure according to claim 1 wherein the slide is formed with a flange adapted to be abutted by the key for moving the slide, the juncture between the flange and the slide being weakened to ensure failure of the flange before failure of the remainder of the structure.

7. A lock structure according to claim 1 and mounted on a door, a knob member rotatably supported on the structure being interposed between the housing and the door whereby wrenching of the structure is prevented.

8. A lock structure substantially as hereinbefore described with reference to and as illustrated in the accompanying drawings.

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