March 27, 1962 L. H. CARY 3,026,702

COMPACT LATCH AND LOCK STRUCTURE

Filed Aug. 6, 1959 2 Sheets-Sheet 1

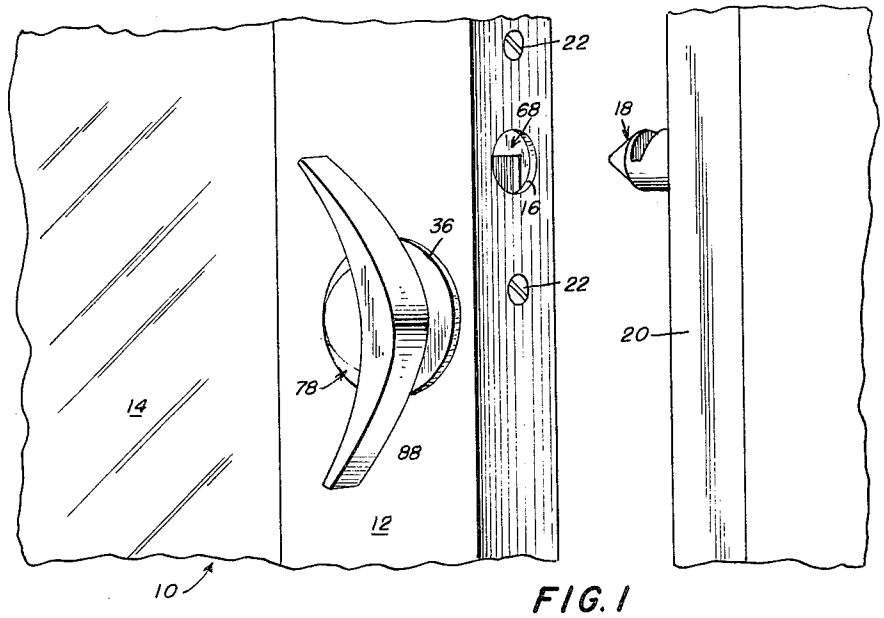


FIG. 1

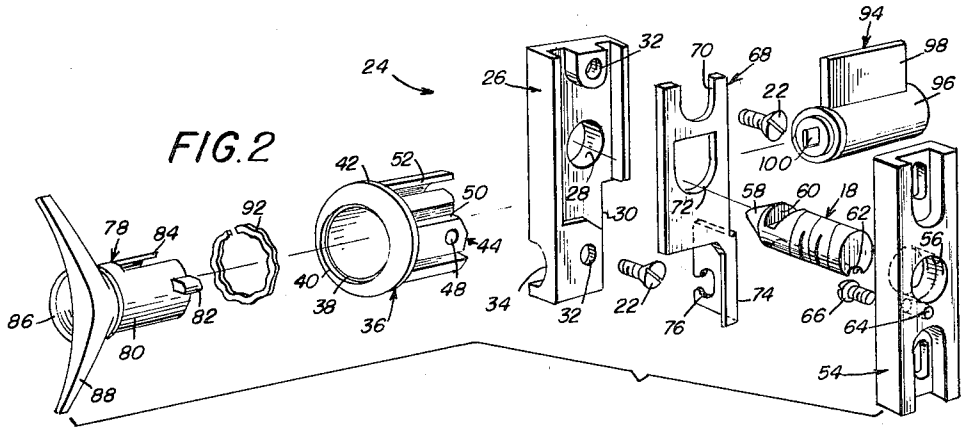


FIG. 2

FIG. 17

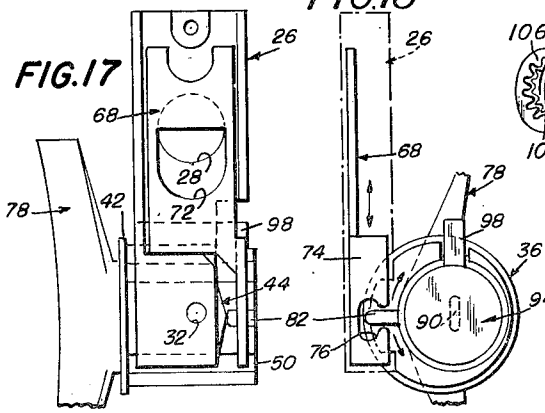
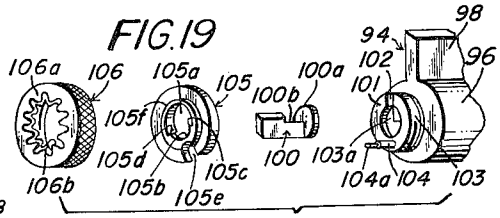


FIG. 18

FIG. 19



INVENTOR

LLOYD H. CARY

BY Beale & Jones

ATTORNEYS

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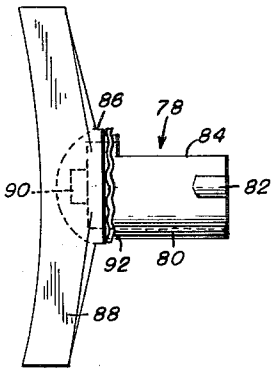


FIG. 3

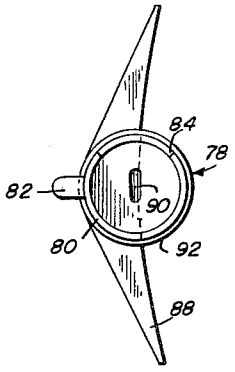


FIG. 4

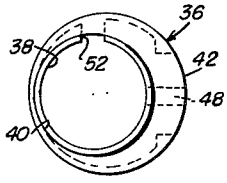


FIG. 5

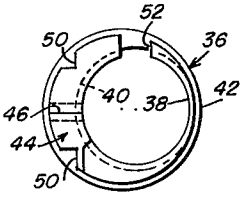


FIG. 6

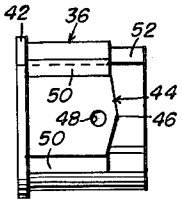


FIG. 7

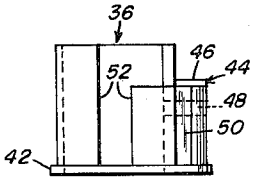


FIG. 8

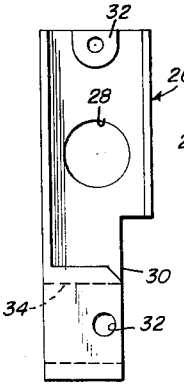


FIG. 9

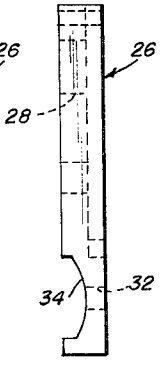


FIG. 10

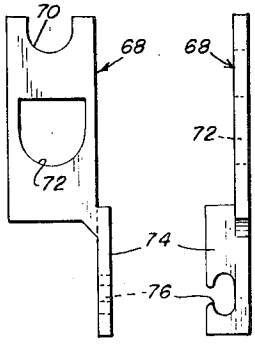


FIG. 11

FIG. 12

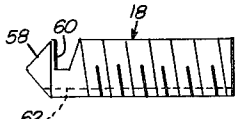


FIG. 13

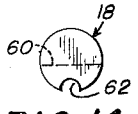


FIG. 14

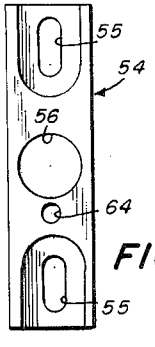


FIG. 15

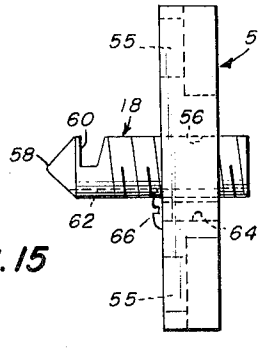


FIG. 16

INVENTOR

LLOYD H. CARY

BY Beale & Jones

ATTORNEYS

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3,026,702

COMPACT LATCH AND LOCK STRUCTURE

Lloyd H. Cary, Magnolia, Ark., assignor to Southern Extrusions, Inc., Magnolia, Ark., a corporation of Arkansas

Filed Aug. 6, 1959, Ser. No. 832,090
3 Claims. (Cl. 70—97)

This invention relates to a latch and lock structure. More specifically, this invention relates to a compact, mortised-type latch and lock structure adapted to be used with sliding doors. It comprises a dead bolt mounted in the door frame and a sliding latch plate mounted in the end of the door behind an aperture aligned with the dead bolt. The lock includes key-operated means for moving the latch plate from one side of the door and manually operated means for moving the latch plate from the other side of the door.

An object of this invention is to provide a mortised-type latch and lock of extremely compact structure that is adapted to be used in modern metal doors having thin rails.

Another object of the invention is to provide a latch and lock structure for sliding doors having hollow rails wherein the walls of a rail themselves constitute portions of the latch housing.

A further object of this invention is to provide for sliding doors in the thin rail type, a latch and lock structure which requires a minimum number of apertures to be cut in the door rail for installation.

A still further object of the invention is to provide a latch and lock structure incorporating means offering a varying resistance to the turning of the operator. This imparts a "feel" to the assembly as the operator is turned from the latched to the unlatched position.

This invention embodies other novel features, details of construction and arrangement of parts which are hereinafter set forth in the specification and claims, and illustrated in the accompanying drawings wherein:

FIG. 1 is a perspective fragmentary view of a door and a door jamb having the latch and lock of the invention installed;

FIG. 2 is an exploded view of the latch and lock assembly;

FIG. 3 is a side elevational view of the manual operator;

FIG. 4 is a front elevational view of the manual operator;

FIG. 5 is a front elevaitonal view of the stationary cylinder block;

FIG. 6 is a rear elevational view of the stationary cylinder block;

FIG. 7 is a side elevational view of the stationary cylinder block;

FIG. 8 is a top plan view of the stationary cylinder block;

FIG. 9 is a front elevational view of the stationary housing block;

FIG. 10 is a side elevational view of the stationary housing block;

FIG. 11 is a front elevational view of the latch plate;

FIG. 12 is a side elevational view of the latch plate;

FIG. 13 is a side elevational view of the dead bolt;

FIG. 14 is a rear elevational view of the dead bolt;

FIG. 15 is a rear elevational view of the dead bolt mounting plate;

FIG. 16 is a side elevational view of the dead bolt assembly;

FIG. 17 is a fragmentary front elevational view of the latch and lock assembly;

FIG. 18 is a fragmentary side elevational view of the latch and lock assembly with the stationary housing block shown in broken lines; and

FIG. 19 is an exploded view of the key-lock cylinder and its operating bar.

More specifically referring to the drawings, FIG. 1 shows a door 10 of the sliding type having a rail 12 and a panel member 14. The rail is preferably of the hollow extruded type having walls of uniform thickness. The end wall has a central opening 16 adapted to receive the dead bolt 18 which is installed in the door jamb 20. Two flush head bolts 22 extend through countersunk bolt holes on either side of the opening 16 and securely hold the lock and latch assembly in position.

The lock and latch assembly 24 (FIG. 2) comprises a stationary housing block 26 which in horizontal section is of channel shape. In installation the edges of the flanges of the channel engage the inside surface of the end wall of the rail 12. The block has a central aperture 28 of the same size as opening 16 in the end wall of the rail and positioned in horizontal alignment with that opening. As shown in FIGS. 1, 9 and 10, the lower end of the housing block is formed with a notch 30, and either end has tapped bores 32 which threadedly receive the mounting bolts 22. FIG. 10 shows that the rear surface of the lower end of the block is formed with a transverse recess 34.

A stationary cylinder block 36 is provided. As shown in FIGS. 5 through 8, it is formed with an offset hole 38 running in a direction axial of the block. The area about the hole is concentrically recessed as at 40 to form a shoulder. The front end has an outwardly extending flange 42. The rear end is stepped off steeply over almost one-half of its radial surface, and the stepped off portion carries a radial cam surface 44 inclining from either end rearward toward a crest 46 in its center as shown in FIG. 7. Adjacent the crest 46 of this cam surface, the cylinder block has a threaded hole 48 extending in a radial direction. Flanking this hole are heavy V-shaped grooves 50 running longitudinally of the cylinder block 36. A longitudinal slot 52 extends from the rear end and runs up to the flange 42.

In assembly, the mounting bolt 22 engaging the lower end of the stationary housing block 26 extends through the housing block and threadedly engages the holes 48 in the stationary cylinder block. The sidewalls of the recess 34 fit into the heavy grooves 50 to hold effectively the cylinder block 36 and the housing block 26 as a unit. The front end of the cylinder block 36 is exposed through a hole cut in the front wall of the rail 12.

As shown in FIG. 1, the door 10 is mounted in a frame having the vertical side member of jamb 20. In the jamb is installed a mounting plate 54 having, as shown in FIG. 15, mounting holes 55 and a central tapped aperture 56. The dead bolt 18 shown in FIG. 13 has a pointed end 58 with a transverse slot 60 thereadjacent and has a threaded body portion. Dead bolt 18 is threadedly received into the tapped aperture 56. The dead bolt 18 has a spline 62 running longitudinally thereof and the mounting plate 54 has a small tapped aperture 64 adjacent the larger aperture 56. The second tapped aperture receives a small screw 66 which has a head adapted to fit in the spline 62 on the threaded dead bolt to block the latter from turning. The jamb 20 is apertured in alignment with the aperture 16 in the door rail and through the aperture protrudes the end of the dead bolt 18. The extent to which the dead bolt protrudes may be adjusted by screwing the dead bolt 18 inwardly or outwardly of the mounting piece 54 and securing it in the desired relation by the small screw 66.

In the door rail a latch plate 68 is provided. It fits slidably within chamber defined by the walls of the chan-

nel in the housing block 26 and the end wall of the door rail 12. Thus the door rail itself forms part of the latch housing. As shown in FIGS. 2, 11 and 12, the latch plate 68 has a thickness of almost the depth of the housing block channel and a width almost equal to that of the channel. The length of the main body portion of the plate 68, however, is considerably less than the length of the channeled area thereby permitting reciprocation of the latch plate in the area. The upper end of the plate has a central notch 70 to accommodate the mounting boss of the housing block 26. The plate 68, in the embodiment shown, has a central aperture 72 having a straight horizontal upper margin and a substantially semicircular lower margin. The relationship of the aperture 72 to the length of the latch plate 68 and the vertical travel of the latch plate is such that in the lowermost position of the plate the area of the plate above the upper margin of the aperture 72 partially occludes the opening 16 in the rail 12. In the uppermost position of the plate 68 the plate does not occlude opening 16. When the dead bolt 18 is introduced through the hole 16 in the end rail and the latch plate 68 is in this uppermost position, the distal end of the dead bolt may also be received freely through the aperture 72 in the latch plate and into the hole 28 in the housing block. If the latch plate 68 is then lowered, the area above the upper margin of the aperture of the latch plate fits into the slot 60 in the dead bolt. This locks the door against sliding movement to open position.

The means for operating the latch plate 68 to move it from its upper to its lower position comprises a downwardly and rearwardly extending arm 74 which is part of the latch plate. In assembly, as shown in FIG. 2, the arm extends out of the housing block 26 through the notched-out portion 30. As shown in FIG. 12, the rearward portion of the arm 74 is formed with an elliptical cutout 76.

Means for operating the latch plate from the interior of the door comprises a manually operated piece or thumb piece 78 as shown in FIGS. 3 and 4. The thumb piece has a sleeve or substantially cup-shaped portion 80 with a radially outwardly extending lug 82 disposed adjacent its rear end. The distal end of the lug 82 may be rounded. The sleeve portion 80 is formed with a relatively wide longitudinally extending slot 84 which extends from the rear end almost to the front end thereof. Adjacent the front end is a flange portion 86, and the front end terminates preferably in a hub having a stylized wing member 88 by which the thumb piece may be manually operated. The inside radial surface of the front end is formed with a central slot 90. A corrugated washer 92 abuts the rear surface of the flange portion 86.

In assembly, the sleeve portion 80 of the thumb piece is angled into the hole 38 in the stationary cylinder block, the lug 82 fitting into the slot 52 in the cylinder block. In final position, the flange 86 on the thumb piece 78 is adjacent the shoulder 40 of the cylinder block. The corrugated lockwasher 92 interposes the flange 86 and the shoulder 40 to minimize rattle. The lug 82 is received into the elliptical cutout 76 in the rearward extending arm 74 of the latch plate. By means of this assembly, as the wing 88 is oscillated, the latch plate 68 reciprocates up and down to lock or unlock the door.

The means for operating the latch plate 68 from the exterior of the door is key operated. It comprises a conventional key-lock cylinder 94. The key-receiving end of the cylinder is exposed through an aperture in the exterior side of the door rail 12 (not shown). The aperture is only large enough to expose the end of the cylinder. Because of this minimal size and because of the presence of the integral tongue 98 on the cylinder, the cylinder may not be surreptitiously removed from the lock. The key-turned portion of the cylinder is enclosed in a body member 96 which has an upwardly extending radial tongue 98. The rear end of the cylinder has an operating bar or tailpiece 100. In assembly, the lock cylinder 94 is axially telescoped into the thumb piece sleeve 80, with the tongue 98 sliding into the longitudinal slots 84 and 52 in both the thumb piece sleeve and the cylinder block. The tailpiece 100 in the rear end of the lock cylinder fits into the slot 90 in the rear surface of the front end of the thumb piece 78. It is to be understood that in various cylinder lock constructions there is a limited lost motion between the key-operated plug and the bar or tailpiece 100, which lost motion is adequate to permit the shifting of the member 78 for a release of the bolt. Typically shown in FIG. 19 is such a mechanism. The key-turnable portion includes the central cylinder 101 whose rear end is shown having the rear end of its key-way shown at 102, a cylindrical protruding exterior threaded portion 103, a recess 103*a* to receive a disc end 100*a* of the operating bar or tailpiece 100 and a movable post 104 received in a recess and having a spring therebehind (not shown). The post 104 has a reduced outer end 104*a*. Received in the recess 103*a* is the transverse circular disc end 100*a* of the operating bar 100. The operating bar 100 has a notch 100*b* in an edge thereof adjacent the circular disc. The operating bar 100 is held in place in recess 103*a* by a special washer-like retainer member 105. Retainer member 105 has a half-moon shaped opening 105*a* with a lower flat portion having a recess 105*b* at the center and an adjacent flat portion thereof to either side at 105*c* and 105*d*. The bar portion 100 is of rectangular shape and protrudes through the half-moon shaped opening 105*a*. The notch 100*b* rides in the recess 105*b* although it is shown turned up 180° in FIG. 19 from its normal attitude so as to depict the notch. The periphery of the circular disc portion 100*a* rides behind the adjacent portion of the rear of the retainer 105. The retainer 105 has a notch 105*e* in the periphery which is received over the post 104 so that the retainer 105 is turned in unison with cylinder 101 which is turned by a key. The operating bar will thus rotate with its circular disc portion 100*a* turning in recess 103*a* until one face of the protruding rectangular shaped bar 100 strikes flat portion 105*c* of the retainer 105 and then it can rotate the other way until the opposite face of bar 100 strikes the flat portion 105*d* of the retainer 105. Thus there is lost motion between the operating bar 100 and the cylinder 101. The retainer 105 has a reduced portion 105*f* which receives thereover an internally threaded cap 106 that is in turn threadedly received on the threaded portion 103 of cylinder 101. The cap 106 has an outer annular face 106*a* extending radially inwardly to hold the retainer in place on the end of cylinder 101. The annular face 106*a* has serrations 106*b* on the inner periphery thereof to receive the reduced portion 104*a* of the movable post 104. Post 104 is pressed in against its spring (not shown) in cylinder 101 so as to permit screwing on and off of the cap 106. The shoulder on post 104 adjacent the reduced end 104*a* rides against the inner adjacent portion of face 106*a* at the selected serration which comes up when the cap is fully screwed into place on cylinder 101. This arrangement of the operating bar with respect to the key-turnable cylinder 101 provides for the lost motion therebetween. Thus with an appropriate key, the key-turned portion of the lock cylinder may be rotated to turn the tailpiece 100. The tailpiece in turn rotates the thumb piece 78 which moves the latch plate 68 as above described.

It will be noted that as the thumb piece 78 is turned, the forward surface of the lug 82 rides on the cam surface 44 of the cylinder block. The cam-riding surface of the lug may be beveled off as shown in FIG. 3 to ride more smoothly on the cam. As the thumb piece approaches the center of its rotary travel, the crested cam draws the thumb piece 78 inwardly against the force of the corrugated lock washer 92 making the thumb piece harder to turn. This imparts to the latch and lock a

desirable "feel" whereby the operator senses he is turning the device from the locked to the unlocked position or vice versa.

By means of the inventive telescoping of the various parts, the present invention boasts a compactness enabling installation completely within the thin-railed doors or windows used in modern construction. The inventive combination of parts by which the door rail itself is used as part of the housing, makes unnecessary the intricate and complicated arrangements of the prior art involving many more parts. Also made unnecessary are the large number of holes in the rail which were needed for installation of earlier latch and lock structures of the manually operated and key-operated type.

While this invention has been shown in but one form, it will be obvious to those skilled in the art that it is not so limited but is susceptible of various changes and modifications without departing from the spirit and scope of the claimed invention.

I claim:

1. A compact latch and lock structure comprising: a latch plate adapted to be reciprocably mounted in a plane parallel to the end surface of a sliding door and adapted to engage lockingly and disengage a notched dead bolt projecting perpendicularly from the jamb of such door, a substantially cup-shaped member adapted to be rotatably mounted in such door adjacent said latch plate and having on the closed end thereof manually operable rotating means adapted to be disposed on one side of such door, said substantially cup-shaped member having a radial outwardly directed lug disposed loosely in an opening in said latch plate, said substantially cup-shaped member having a slot disposed axially in the inside face of its closed end, and a lock cylinder having a key-turnable face on one end adapted to be exposed on the other side of said door and having an axially extending key turnable operating bar on the other end, lost-motion means connecting said operating bar and the key-turnable portion of said lock cylinder said lock cylinder being disposed in said substantially cup-shaped member and having its operating bar slidably disposed in said slot to rotatably link the key-turnable portions of said lock cylinder and said substantially cup-shaped member, said lost-motion means permitting turning of the cup-shaped member without rotation of said key-turnable portion of said lock cylinder.

2. A compact latch and lock structure comprising: a channel-shaped housing, a latch plate reciprocably disposed in the channel of said housing, a block mounted on the opposite side of said housing from the channel, a substantially cup-shaped member mounted in said block adjacent said latch plate for rotation on an axis longitudinal of said block, said substantially cup-shaped member having manually operable rotating means on the closed end thereof disposed on one side of the block, said substantially cup-shaped member having adjacent its open end a radial outwardly directed lug extending out through an opening in said block and disposed loosely in a notch in the latch plate, a margin in the opening in said block extending generally transverse of the block and comprising a cam surface, biasing means urging said lug against said cam surface, said substantially cup-shaped member having a slot disposed axially in the inside face of its closed end, and a lock cylinder having a key-turnable face on one end and an axially extending key-turnable operating bar on the other end, said lock cylinder being disposed in said substantially cup-shaped member and having its key-turnable face disposed on the opposite side of said block and having its bar slidably disposed in said slot to rotatably link the key-turnable portions of said lock cylinder and said substantially cup-shaped member, lost-motion means connecting said operating bar and the key-turnable portion of said lock cylinder whereby said lost-motion means permits turning of the cup-shaped member without rotation of said key-turnable portion of said lock cylinder and whereby as said cup-shaped member is turned, said cam surface moves the cup-shaped member axially to vary the resistance to turning imparted by said biasing means.

3. A compact latch and lock structure as described in claim 2 wherein said substantially cup-shaped member has an annular shoulder thereon adjacent the manually operable rotating means and said biasing means comprises a corrugated washer surrounding said cup-shaped member between said shoulder and said block.

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