

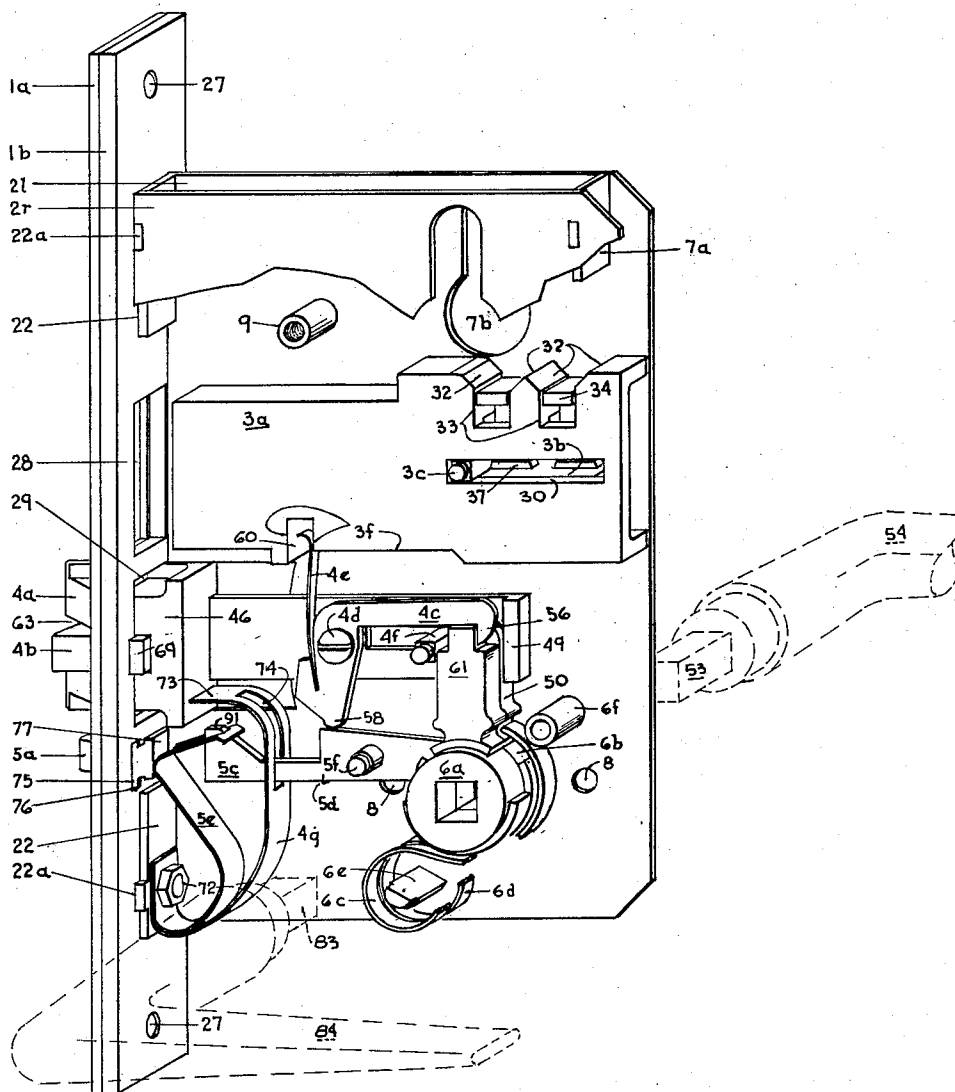
Sept. 15, 1964

L. YULKOWSKI
LEVER LOCK FOR DOORS

3,148,524

Filed Sept. 26, 1961

3 Sheets-Sheet 1



INVENTOR.
LEON YULKOWSKI
BY
Robert G. Sloman
ATTORNEY

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3 Sheets-Sheet 2

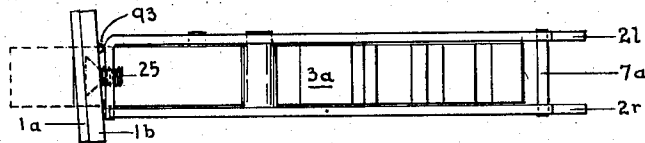


FIG. 3

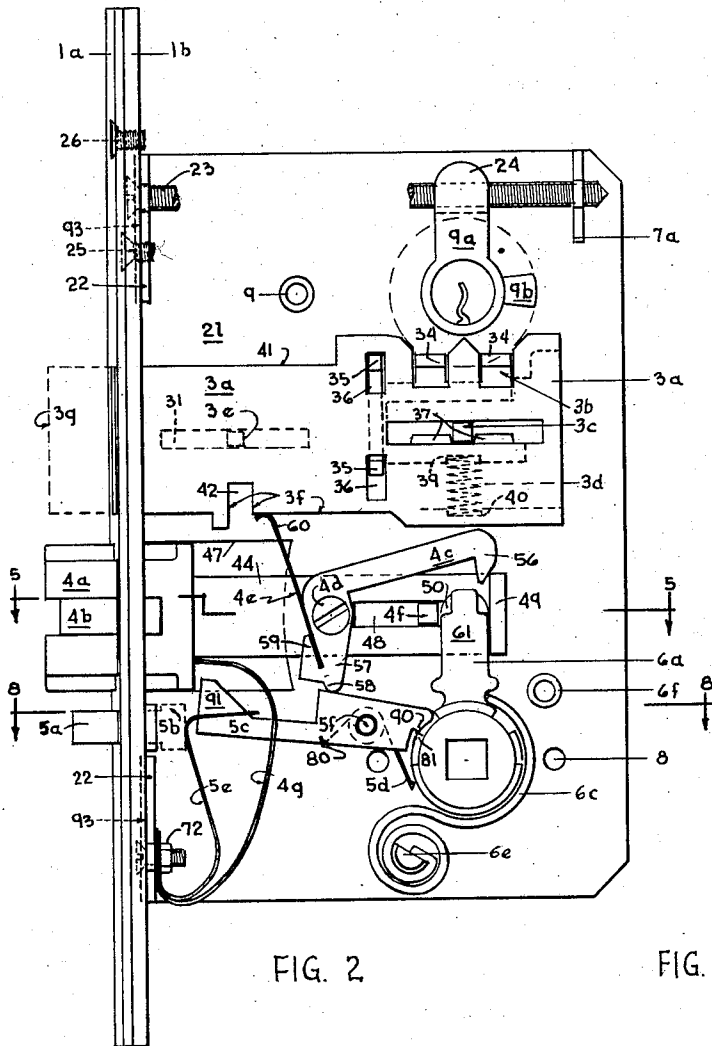


FIG. 2

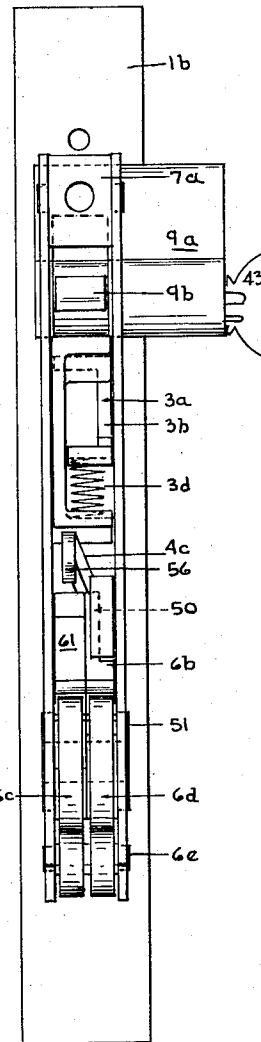


FIG. 4

INVENTOR.
LEON YULKOWSKI
BY
Robert A. Sloman
ATTORNEY

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3 Sheets-Sheet 3

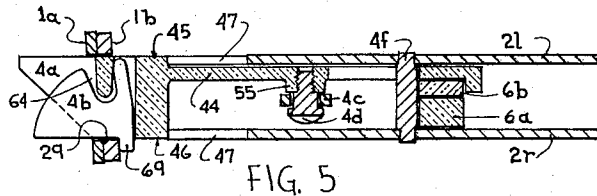


FIG. 5

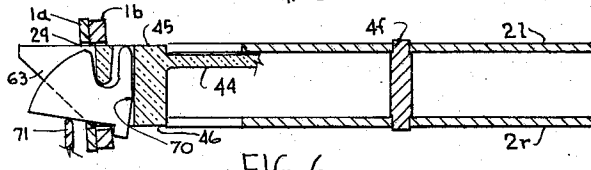


FIG. 6

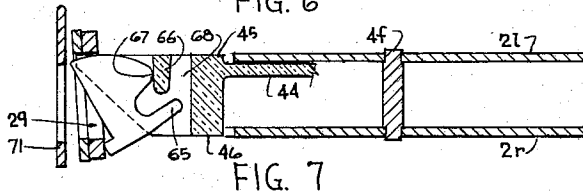


FIG. 7

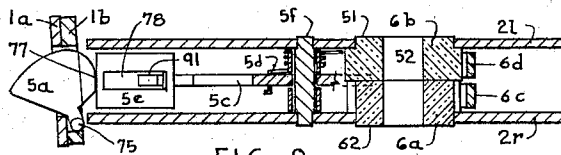


FIG. 8

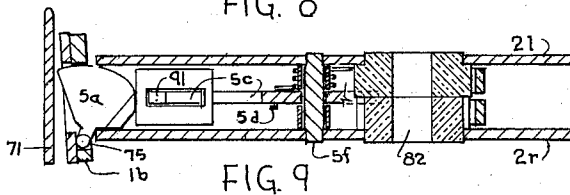


FIG. 9

INVENTOR.
LEON YULKOWSKI
BY
Robert A. Sloman
ATTORNEY

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3,148,524

LEVER LOCK FOR DOORS

Leon Yulkowski, 536 S. Telegraph Road, Pontiac, Mich.
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17 Claims. (Cl. 70—107)

The present invention resides in the manufacture of a lock which will provide reliable operation of lever handles and knobs with latches and locks of a wide variety of functions with a minimum of parts and tooling and with a maximum use of identical parts in a wide variety of functions.

The objects of the present invention are:

To provide a lock which can be economically converted into a variety of backsets by simple hand tools.

To provide a lever handle or knob lock which can function as a passage latch, as a latch by dead bolt, as a dead bolt only, and/or as an egress lock with the inner lever always retracting the latch even when the outer lever or knob is locked.

To provide a mechanism for disengaging the opening action of the outer lever rather than locking the knob or lever in a rigid position as has been done in the past, an unauthorized person may freely turn outer lever or knob which is disconnected.

To provide at the same time a simple and direct means of securing the extended position of the latch within the strike by means of an auxiliary locking latch.

To provide a lock which permits the distributor to change hands, bevel or functions of lock simply and easily.

To provide a lock which has features of reversibility and bevel of face with positive bevel control.

To provide a lock whose design permits use of economical flat shell castings with consequent accuracy and long life.

To provide a lock which has a minimum of parts and required assembly operations.

To provide a lock which can be fabricated in a number of ways from a maximum variety of materials.

To provide a lock which would use identical working parts for either a domestic mortise cylinder or a European type built in cylinder of the "Hahn profile."

Further objects are:

To provide a lock making ingenious use of castings and stampings to accomplish a variety of functions as follows:

(1) Dead bolt plate with integral latch control surface, guide holes for locking plate and dead bolt head.

(2) Dead bolt locking plate which is self-guiding, self-centering and positions positively with aid of side case, the location of the loading spring.

(3) Latch bolt with integral head and tail and also with guide slot, and pad for mounting of latch engaging plate.

(4) Hub with cam for operation of the latch bolt and also shoulder for disengaging auxiliary latch locking lever.

(5) Use of auxiliary latch spring to provide load on auxiliary latch and also to guide position of auxiliary latch lever by use of slot in spring.

(6) Use of auxiliary latch lever to provide a stop behind the extended latch bolt and also to provide a stop for the extreme retracted position of the auxiliary latch.

Another object is:

To provide a latch bolt head which uses an auxiliary tongue of plastic or metal to accomplish the following:

(a) Easy depressing of the latch bolt by the strike plate through use of the tongue which uses its base, or toe, as a fulcrum and applies the force of the strike to the latch by application of forces at first to the base of the latch bolt slot and then at the projections in the slot to provide an approximately even application of force to secure depressing of latch bolt.

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The force required is nearly constant since the mechanical advantage of the action of the tongue is high at first and then decreases as the angle of contact of strike and tongue decreases resulting in a component vector higher than the force of the strike directly.

(b) To provide a tongue which is self positioning and which in the assembled position can not be removed and which can be assembled without any tools or fastenings.

(c) To provide a tongue which absorbs the force of the forward motion of the latch bolt when engaging the strike to provide a reduction in noise.

(d) To provide a tongue which does not have to be attached to the lock case or face plate to function smoothly.

Other objects are to:

(I) Provide a latch engaging plate which through the use of a single flat leaf spring provides positive engagement with the hub or positive disengagement and simultaneously is the cause of this engagement or disengagement through action of the contour on the dead bolt and the dead bolt position.

(II) In addition, the latch engaging plate when engaged displaces the auxiliary latch locking lever so that when the lock is unlocked the outer lever or knob can retract the latch even though the auxiliary latch is depressed normally freeing the auxiliary latch locking lever to move up behind the base of the latch bolt head.

(III) To provide a lock case which is narrow and yet has a wide latch bolt.

(IV) To provide a lock case which can have a long life using two hubs side by side, and each having its own heavy leaf type spring to furnish resisting force necessary to support long and heavy lever handles or knobs.

These and other objects will be seen in the following specification and claims in conjunction with the appended drawings in which:

FIG. 1 is a side perspective view of the present lock partially broken away for illustration and with the handles in exploded relation.

FIG. 2 is a side elevational view of the present lock with the right side plate removed for clarity.

FIG. 3 is a plan view thereof, but with the right side plate in position.

FIG. 4 is a right end elevational view thereof.

FIG. 5 is a fragmentary section taken on line 5—5 of FIG. 2.

FIG. 6 is a similar view to FIG. 5, but more fragmentary, primarily to illustrate intermediate positioning of the latch bolt tongue.

FIG. 7 is a similar view showing the innermost position of the latch bolt tongue, corresponding to FIG. 5.

FIG. 8 is a fragmentary section taken on line 8—8 of FIG. 2 showing the auxiliary latch in its normally inoperative position.

FIG. 9 is a similar view, but showing the auxiliary latch in its operative inwardly projected or pivoted position.

It will be understood that the above drawings illustrate merely a preferred embodiment of the invention and that other embodiments are contemplated within the scope of the claims hereafter set forth.

Referring to the drawings, the present lock includes the upright rectangular leftside plate 2l, from which projects adjacent its top and bottom, the spacer and screw guide 7a suitably secured thereto and the bent up ears or spacers 22 at their outer upright edges including laterally projecting bosses 22a adapted for locating positioning within similarly shaped recesses formed in the right side plate 2r.

Stud 9, FIG. 1 projects from the plate 2l for engaging registry with the right hand plate 2r, being interiorly threaded for the reception of a fastening screw by which

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the plate 2l and 2r are secured together in a conventional manner.

There is also shown in FIG. 1, the hub limit pin 6f, which also is secured to and projects from the left side plate 2l for registry with the interior surface or right side plate 2r for securing thereto by an additional screw in a conventional manner. The upper flanges 22 and 7a are transversely apertured to receive the elongated bolt 23, which is threaded through a portion of the cylinder 9a, as at 24 for anchoring the same in position with respect to the keyhole cutouts 7b, FIG. 1, formed in plates 2l and 2r for the reception of the "Hahn" profile cylinder, for illustration.

It is contemplated in this connection that any other form of cylinder could be employed and with the corresponding plates similarly cut to receive the said cylinder, and with the bolt 23 employed in the same manner for fixedly securing the cylinder in place within and between the respective plates 2l and 2r.

A conventional face plate 1b is arranged across the one end of the assembled plates 2l-2r, as shown in FIG. 2, and fixedly secured thereto by the fasteners 25, best shown in FIG. 3. A conventional scalp, 1a, is juxtaposed over the outer surface of the face plate 1b and suitably secured thereto in a conventional manner, as by fasteners 26, FIG. 2.

Both of the plates 1a and 1b have formed therethrough adjacent their upper and lower ends, the transverse apertures 27 providing the means by which the lock is secured to the particular door whereinto it is projected and secured in a conventional manner.

Both of the plates 1a and 1b have formed transversely therethrough the aligned registering apertures 28 to receive the dead bolt 3a, and the apertures 29 to receive the latch bolt 4a.

An improved type of dead bolt is positioned upon the interior of the lock housing defined by the plates 2l and 2r, as shown at 3a, and is substantially of U-shape in cross section, being longitudinally slotted therethrough adjacent one end as at 30 for cooperative sliding engagement with respect to the transverse dead bolt guide stud 3c, which is anchored to and which extends between plates 2l and 2r.

The outer portion of the dead bolt 3a has a lateral projection 3e shown in dotted lines in FIG. 2, which is co-operatively slidable within the elongated slot 31 formed in the left side plate 2l to accordingly provide a means for guiding the transverse longitudinal adjustments of the dead bolt 3a from the position shown in FIG. 1 to the secondary position shown in FIG. 2, or the dotted line position, also shown in FIG. 2.

Referring to FIG. 1 dead bolt 3a has formed upon its upper surface adjacent one end a series of angularly related cam surfaces 32 between the lower edge portions of pairs of which are the upright slots 33, which are adapted to slidably receive the lateral bosses 34 projecting from the dead bolt locking plate 3b. Said locking plate also includes an additional pair of vertically spaced laterally extending bosses 35, which are cooperatively and slidably received within corresponding upright grooves 36, formed in the interior surface portion of the dead bolt 3a for guiding the vertical adjustments of the dead bolt locking plate 3b under the action of the rotative cam 9b connected with a plug in cylinder 9a, which plug may be rotated from the outside of the door by the application of a suitable key within the keyhole of the plug, and which may be rotated upon the inside of the door by the handturn or key 43, shown in FIG. 4.

The dead bolt locking plate also includes a pair of laterally extending spaced bosses 37, which normally register upon opposite sides of the dead bolt guide pin 3c, but which are downwardly movable upon application of cam 9b against the bosses 34 for disengaging the said bosses 37 from the said guide pin 3c so that the said cam 9b may operatively and effectively engage the cam surfaces

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32 upon the upper edge portion of the dead bolt for projecting the dead bolt from the position shown in FIG. 1 to the solid line position shown in FIG. 2, upon one complete rotation of the said cam 9b.

A further complete rotation of the cylinder assembly, including the cam 9b will project the dead bolt 3a from the solid line position, FIG. 2 to the dotted line position shown at 3g and wherein the said dead bolt has projected movably through the corresponding apertures 28 in the plates 1a and 1b.

Coiled spring 3d is interposed between the interior bottom wall portion of the dead bolt 3a, as at 40 and an undersurface portion 39 of the said dead bolt locking plate 3b for normally maintaining the locking plate in the dead bolt retaining position shown in FIG. 1 and FIG. 2. Accordingly, the said dead bolt 3a may be moved by the cam 9b to the positions of adjustments above described, once the locking plate 3b has been depressed by the action of the cam 9b upon the bosses 34.

For example, in the illustration shown in FIG. 1, both of the bosses 37 are on one side of the guide pin 3c. After the dead bolt 3a has been moved a certain distance to the position shown in FIG. 2, then in that case the bosses 37 on the locking plate are now arranged on opposite sides of the guide pin 3c.

When the bosses 34 are depressed a second time on the second rotation of the cam 9b on the cylinder 9a, the dead bolt 3a is projected to the dotted line position shown in FIG. 2, with the said bosses 37 temporarily clearing the guide pin 3c.

For the reverse action, and in rotating the plug in cylinder 9a and the cam 9b in the opposite direction, a first rotation 360 degrees of said cam will return the deadbolt 3a to the solid line position shown in FIG. 2, with the cam 9b operatively engaging the corresponding bosses 34, temporarily depressing the same and at the same time camming against the cam surfaces 32. A further rotation 360 degrees of the cam 9a will return the dead bolt 3a to the inoperative position shown in FIG. 1.

The intermediate control position of the dead bolt 3a is designated at 41, FIG. 2. The dead bolt 3a upon its undersurface has a control contour for the latch engaging plate or lever 4c, hereafter described, which contour includes the surfaces 3f and the adjacent slot 42, FIG. 2, also called cam means.

The latch bolt 4a, FIG. 1 and FIG. 2 has a head which is laterally enlarged on its opposite sides at 45-46 for transverse sliding movements within the cutouts 47 formed through the plates 2l and 2r, as best shown in FIGS. 2 and 5. The said latch bolt 4a also includes a rearwardly extending elongated guide plate 44, which has an elongated slot 48 there-through to cooperatively receive the latch bolt guide stud 4f, which extends between the plates 2l and 2r for guiding the adjusting movements of the said latch bolt 4a.

Plate 44 includes the laterally extending flange 49 at one end which is so located as to receive the lever arm 50, which projects from the inner hub 6b and which includes the circular boss 51, projecting from one side thereof, normally journaled within the corresponding aperture, as shown in FIG. 8, within the plate 2l. The inner control hub 6b has a central aperture 52 which is square in cross section, adapted to cooperatively receive the square shank 53 of the lever handle 54, shown in FIG. 1, which normally is in upright position shown when assembled with respect to said hub and for controlling rotary arcuate movements thereof, for manually retracting the latch bolt as desired to permit opening of the door. This is in effect withdrawing the headed portion 4a of the latch bolt from a corresponding aperture formed through the conventional strike plate shown at 71, FIGS. 7-9, for illustration.

As shown in FIG. 5, the latch bolt plate 44 includes the apertured boss 55, adapted to receive the latch engaging plate screw 4d, which projects through and journals the latch engaging plate or latch lever, also shown in

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FIGS. 1 and 2. The latch engaging plate 4c at one end includes the downwardly depending hook or claw 56, which as shown in FIG. 1, is interlocked with the upper end of the arm 61 on the rotative outer hub 6a. This outer hub includes a circular boss 62, FIG. 8, which is normally nested and journaled within a corresponding aperture in the side plate 2r. It is otherwise in transverse registry with the corresponding inner hub 6b above described, and includes a central aperture 82 square in cross section, adapted to receive the square shank 83 of the outside door control handle or lever 84, shown in the exploded view, FIG. 1.

The latch engaging plate 4c also includes at its opposite end the lever extension 57 terminating in the control boss 58, and includes the transverse slot 59 adapted to receive and support and secure the lower end of the auxiliary latch spring 4e which is identified as the latch engaging plate spring, and its upper curved end as at 60, as shown in FIG. 1, projects within the aperture 42 in the under-surface of the dead bolt 3a.

As shown in FIG. 1, with the dead bolt in its inoperative position the upper end of spring 4e is biased within the said aperture 42, so that the latch engaging plate 4c is extended horizontally so as to interlock with the outer hub arm 61. Under this condition, with the dead bolt unlocked, the latch 4a may be retracted by the outer handle 84 on activation thereof.

When the dead bolt 3a has been adjusted to position 41 shown in FIG. 2, or position 3g shown in dotted lines, FIG. 2, then in that case the upper end 60 of the spring 4e has been displaced from the recess 42, and has been cammed downwardly so as to tilt the latch engaging plate 4c to the position shown in FIG. 2. Accordingly, it is seen that the upper end of the arm 61 of the outer hub is now disconnected from the claw 56 on the said latch engaging plate 4c so that while the handle 84 is free to be rotated from the outside, it is ineffective for withdrawing the latch bolt 4a.

The handle 54, upon the interior of the door is always in condition for retracting the latch bolt inasmuch as the upper end of the arm 50 of the inner hub 6b is at all times in registry with the flange 49 on the latch bolt plate 44.

The formed leaf spring 4g, shown in FIG. 1 is reverse-curved at its outer end and secured by the fastener 72 to the flange 22 and extends upwardly and is curved outwardly as at 73 for operative retaining engagement with the latch bolt 4a for normally retaining the same in the extended locking position shown in FIG. 1, said leaf spring having an elongated central slot 74 formed there-through, adapted to loosely and cooperatively receive the auxiliary latch lever 5c, hereafter described.

The latch bolt head 4a has a horizontally disposed slot 63 therethrough adapted to cooperatively receive the latch bolt tongue 4b, which in the preferred embodiment is non-metallic, and is constructed, for example, of nylon, or other non-metallic material or fibrous material, as desired. The said tongue is irregularly shaped, as best illustrated in FIGS. 5, 6, and 7, and includes the slotted portion 64 whose inner end portion is positioned around the inwardly extending boss 66, forming a part of the latch bolt. The said latch bolt tongue 4b also includes, defined by the slot 64, the tail end 65, or arm, which is normally projected within the slot 68, defined within the latch bolt.

FIG. 5 shows the relationship of the latch bolt tongue 4b when the latch is fully open in locked position, or with the door swung open, spaced from the conventional strike plate 71, shown for illustration in FIG. 7. The said tongue also includes the retaining boss 69, also shown in FIG. 1, which cooperatively and retainingly engages the inner surface of the face plate 1b, for limiting the outward positioning of the said tongue with respect to the latch bolt, and also serves as a stop for the return outward movement of the said bolt with respect to the face plate.

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Inasmuch as the said tongue is constructed of a non-metallic material, such as nylon, for example, it provides for a noiseless expansion, or outward movement of the latch bolt to the operative position shown, under the action of the leaf spring 4g.

FIG. 6 shows the relative positioning of the latch bolt tongue with respect to the latch bolt with the door in the process of closing against the strike plate 71, wherein it is noted that in the initial relative pivotal movement of the said tongue about the boss or fulcrum 69, the base of the leg 65 on the said tongue operatively engages a portion of the latch bolt as at 70 for a maximum mechanical advantage in transmitting the force of engagement of the strike plate 71 to the right angular withdrawing movement of the latch bolt.

As the closing of the door is completed, it is noted that the tongue has rotated to the position shown in FIG. 7, wherein the strike plate 71 is effective for pivoting the said tongue so that for the remainder of the rearward movement of the latch bolt, the boss as at 67 on the said tongue operatively engages the boss 66 on the latch bolt for completing the withdrawing or retracting operation of the latch bolt to permit the latch bolt and associated tongue to clear the strike plate, after which on complete closing of the door, said latch bolt and tongue are free to return to the position shown in FIG. 5, or FIGS. 1 and 2.

Arranged below the latch bolt 4a, movably positioned within the aperture formed through the scalp 1a and face plate 1b, and side case 2l or 2r there is provided an auxiliary latch 5a, which is also preferably constructed of a non-metallic material, such as nylon or fibre, and which includes at one side the trunnion supports 75 whose respective upper and lower ends are nested within slots 76 formed on the interior surface of the face plate adjacent the aperture therein, which receives the auxiliary latch to thus provide a pivotal mounting for the said auxiliary latch 5a.

This auxiliary latch is normally biased to its outermost position, as shown in FIGS. 1 and 2 by the second leaf spring 5e, which is anchored as at 72, FIG. 1 to the said face plate, and which is reverse curved so as to engage the said auxiliary latch intermediate its ends, as shown in FIG. 1, as at 77, FIG. 8 and including an upwardly extending free end portion which is slotted as at 78 to cooperatively and retainingly receive the formed upper end portion 91 of the auxiliary latch lever 5c arranged upon the interior of the lock and pivoted intermediate its ends upon the auxiliary latch lever stud 5f.

The auxiliary latch lever has a formed cam end 90 at the right end thereof, as best shown in FIG. 2 and which is adapted for operative engagement with the cam formation 81 on the inner hub 6b in the relationship of the parts shown in FIG. 2. The said auxiliary latch lever 5c is normally spring-biased to assume the angular position shown in FIG. 2 under certain conditions hereinafter described so that the end portion 91 is normally positioned in the path of return movement of the latch bolt 4a or the head thereof to positively restrain the same against unauthorized retracting movement.

As shown in FIG. 2, it is seen that rotative movement of the outside handle 84 may cause a rotation of the outer hub 6a, but the outer hub is disengaged from the latch bolt 4a by virtue of the fact the latch engaging plate 4c has been tilted to the angular position shown in FIG. 2. This is because the dead bolt 3a has been moved from the position shown in FIG. 1 to an intermediate position 41, shown in FIG. 2 which has cammed the spring 4e so as to tilt the latch engaging plate 4c to the angular position shown, disengaging the same from the arm of the outer hub 6a.

In the absence of the auxiliary latch lever, however, a means may be employed for forcing the latch bolt 4a to be retracted, such as a stiff card projected between the scalp and the strike plate. The presence of the boss 91

on the auxiliary latch lever at a position shown in FIG. 2, positively prevents an unauthorized retraction of the latch bolt 4a. This corresponds also to the positioning of the auxiliary latch 5a to the dotted line position shown at 5b, FIG. 2, wherein said auxiliary latch has operatively engaged the leaf spring 5e, moving the same rearwardly from the position shown in FIG. 1 to thus permit an upward movement of the auxiliary latch lever 5c from the position shown in FIG. 1 to the position shown in FIG. 2, under the action of the spring 5d which is supported as at 5f, around the auxiliary latch lever stud, and which is biased against the auxiliary latch lever as at 80, FIG. 2.

Accordingly, with the strike plate forcing the auxiliary latch 5a to the dotted line position shown at 5b, the control spring 5e is moved inwardly from the position shown in FIG. 1 to the position shown in FIG. 2, so that its slot 78 is so positioned as to permit upward movement of the boss 91 to the position shown in FIG. 2 in order to deadlock the latch 4a.

This positioning also corresponds to the disengaged positioning of the latch bolt control plate 4c, in the angular position shown in FIG. 2. It is seen from FIG. 1 that with the dead bolt 3a in its inoperative position, the upper end of the spring 4e is biased within the aperture 42 and the latch engaging plate 4c remains in the operative position shown in FIG. 1. Here the boss 53 at the lower end of the arm 57 on plate 4c operatively and retainingly engages the auxiliary latch lever 5c, maintaining the same in the position shown, so that the latch may be retracted.

It is only where the dead bolt has been moved to the two adjusted positions, i.e., either position 41 shown in solid lines in FIG. 2, or the dotted line position shown at 3g in FIG. 2, that the auxiliary latch lever will move into dead lock or locking position, shown in FIG. 2 to positively prevent retraction of the latch 4a from the outside through the activation of handle 84. This is seen because, with the dead bolt 3a in either of the two positions above mentioned, the spring 4e is cammed downwardly, causing a pivotal movement of the latch engaging plate 4c to the position shown in FIG. 2 disengaging the outer hub arm 61 therefrom.

Accordingly, manual rotation of the outer lever 84 is free to rotate the outer hub and the associated arm 61. However, it is ineffective for retracting the latch bolt 4a.

It is noted that in this position of the latch engaging plate 4c, the boss 58 at the lower end of the arm 57 forming a part of said plate will permit the upward angular adjustment of the auxiliary latch lever from the position shown in FIG. 1 to the position shown in FIG. 2, so that the upper forward end portion 91 of the auxiliary latch lever will block a retracting movement of the latch bolt 4a against unauthorized forcing thereof.

There is another condition of operation required, however, before the auxiliary latch lever will tilt to the dead lock position shown in FIG. 2. In the present construction where the auxiliary latch 5a is employed with the associated control spring 5e, it is seen in the position of the auxiliary latch 5a, shown in FIG. 1, that a portion of the spring 5e, being the free end portion thereof, slotted at 78, controls and retains the auxiliary latch lever 5c in the position shown in FIG. 1.

When the door is closed against the strike plate 71, as shown in FIG. 9, the auxiliary latch 5a is retracted to the position shown at 5b, FIG. 2. This moves the free end portion of the leaf spring 5e to the right, being the slotted part thereof, to provide a clearance and to permit the upward tilting movement of the auxiliary latch lever 5c to the FIG. 2 position, under the action of its biasing coiled spring 5d.

A third condition which must be satisfied, in order for the auxiliary latch lever to tilt in the locking position shown in FIG. 2 is that the inner hub 6b must be in its inoperative upright position, as shown in FIG. 1, with

its cam surface 81 spaced away from the projection or boss 90 on the right end of the auxiliary latch lever 5c.

The latch 4a is always retractable from the inside of the door because the inner hub 6b is at all times through its control arm 50 in engagement with the flange 49 on plate 44, forming a part of the latch bolt 4a.

Assuming that the auxiliary latch lever is in the position shown in FIG. 2, and it is desired to open or retract the latch bolt 4a from the inside of the door, the handle 54 is rotated and the cam surface 81 on the inner hub operatively engages the boss 90 on the auxiliary latch lever for rotating the same in a counterclockwise direction back to the position shown in FIG. 1, so as to be out of the way and out of locking position with respect to the head of the latch bolt 4a.

Referring to FIGS. 1 and 2, projecting from the left side plate 2l adjacent its lower end is a hub spring stud 6e which anchors the lower free reverse-turned ends respectively of the pair of inner and outer hub springs 6d and 6c. These springs extend upwardly, and at their upper free ends operatively and retainingly engage intermediate portions of the respective arms 61 and 50, of the respective inner and outer hubs, retaining the same normally against rotary movement in a clockwise direction, and normally maintaining the said hubs in the inoperative upright position shown in FIG. 1.

Hub limit pin 6f is also secured to and projects from the left side plate 2l for limiting the rotary movement of the respective inner and outer hubs.

Referring to FIGS. 1 and 2, the plates 2l and 2r have formed therethrough the opposed pairs of apertures or holes 8 for the through bolting of supporting rosettes on opposite sides of the door into which the present lock is projected, which rosettes normally are in cooperative engagement with the respective handles 84, 54, shown in FIG. 1 and may provide the means for retaining the said handles and their respective studs 53 and 83 in assembled relation with respect to the corresponding control hubs, above described, without depending upon door surface mounting of the rosettes.

Operation

The mechanisms of the lock are operated by cylinder key 43 or the inner or outer handles 54 and 84.

The cylinder by key or thumb turn operates dead bolt 3a which—

(A) Controls the engagement or disengagement of the latch engaging plate 4c through the latch engaging plate spring 4e.

(B) Projects the dead bolt to or beyond face plate 1b and scalp 1a and by depressing the dead bolt locking plate 3b against the dead bolt locking plate spring 3d and transporting the dead bolt by means of the cam 9b connected with the plug in the cylinder 9a or thumb turn.

The inner lever 54 or knob operates the inner hub 6b and retracts the latch bolt 4a at all times. If the latch bolt is dead locked in the extended position by the auxiliary latch lever 5c, then the shoulder 81 on the inner hub 6b (at about 10 o'clock) rotates the auxiliary latch lever 5c so that the latch bolt is free to be retracted, FIG. 1.

The outer hub 6a operates the latch bolt 4a through the use of the latch engaging plate 4c only when it is held in the engaged position by the dead bolt and the latch engaging plate spring 4e.

The auxiliary latch lever 5c is operated and positioned in three different ways:

(a) Auxiliary latch lever 5c is held inoperative by (a) the extended auxiliary latch 5a, (b) the foot 58 of the latch engaging plate 4c, when it is in the engaged position or (c) by the action of the shoulder 81 on the inner hub 6b.

(b) The auxiliary latch lever 5c is held in the blocking position by the spring 5d when the following conditions are met:

(a) The auxiliary latch 5a is held depressed to position 5b by the strike plate 71.

(b) The latch engaging plate 4c is disengaged.

(c) The inner hub 6b is in the normal or upright position.

From the above it is possible to use the locks:

(a) As a passage set i.e., unlocked in either direction and with auxiliary latch 5a, latch lever 5c and control spring 5e omitted if desired.

(b) As an egress lock i.e., locked outside, unlocked from inside, with dead bolt in position 41, FIG. 2.

(c) As a dead lock i.e., locked from both sides by action of the dead bolt 3a.

One of the primary objects of the present invention was the provision of a simplified mortise type of door lock, which should be durable, have a low number of parts and be inexpensive to manufacture, and would be quite versatile in its operation, as above described.

The operation of the lock is quiet, due to the fact that both the latch bolt tongue 4b and the auxiliary latch 5a are preferably non-metallic, such as constructed of nylon. The dead bolt has a novel and simplified construction which incorporates a spring biased dead bolt locking plate assembly under the control of key 43 or thumb turn and associated cam 9b. This is an improvement over the prior art and is the essence of simplicity, and low cost of manufacture.

The latch bolt is of a simplified construction, while providing a narrow housing, including the plates 2l and 2r. By virtue of the oppositely arranged slots 47 formed in the said plates, a wider than ordinary latch bolt head 4a may be employed to give increased mass thereto.

Another advantage of the present construction resides in the fact that when the door is locked from the outside, corresponding to the arrangement of parts shown in FIG. 2, with the dead bolt 3a in either the solid line position 41 shown or the dotted line position 3g, an unauthorized person can not open the door from the outside merely by forcing the handle 84 to the bending or breaking point. The psychological advantage in this resides in the fact that that the outside handle 84 is free to rotate, but will have no control function with respect to the latch bolt 4a in view of the elevated condition of the control plate 4c, shown in FIG. 2. Thus the ineffectiveness of the outer hub is not dependent upon blocking (which can be forced, thus gaining entry) but rather upon removing the actuating means 4c.

A safety mechanism is also provided in the nature of the present auxiliary latch 5a, which provides a control means for positively locking the latch 4a from unauthorized retraction from the outside of the door by the use of a stiff card applied to the latch bolt head between the strike plate 71 and the scalp 1a, which is a means often employed for effecting a retraction of the latch bolt 4a, even though the door is supposedly locked from the outside.

The present auxiliary latch lever 5c positively prevents this, being spring-biased to the angular position shown in FIG. 2, whenever the dead bolt 3a is in either of the positions shown in FIG. 2 and with the latch engaging plate 4c accordingly in the disengaged position shown and additionally with the auxiliary latch 5a in retracted position, as indicated at 5b, so that the control spring 5e may permit the end portion 91 of the auxiliary latch lever adequate clearance to move to the position shown in FIG. 2 to positively prevent unauthorized retraction of the latch bolt 4a independent of the outer control hub 61.

At the same time, the present construction is so arranged that a means are provided whereby in spite of the depressed or retracted condition of the auxiliary latch 5a to the position shown at 5b, the door may always be opened from the inside, merely by rotating the knob or handle 54. This controls, or effects a rotation of the inner hub 6b and a clockwise rotation of its cam surface 81 so that it operatively engages the end boss 90 on the auxiliary latch lever 5c, positively rotating the same to the position shown in FIG. 1 against the action of its biasing spring 5d.

Accordingly there has been provided a very versatile lever type lock, or mortise lock for doors designed to accomplish all the objects above set forth, and by substitution of a minimum number of parts, or by deletion of parts, or by addition of a transmission bar to permit the lock to be used as any function similar to the following Federal specification numbers (Federal Supply Service, General Services Administration, FF-H-106a) 86N, 87N, 86C, 86B, 86L, 86T, 86P, 86S, 86D, 86DW, 86E, 87E, 86J, 86EW, 86A, 86H, 86G, 87G and other functions not defined by FF-H-106a.

One of the advantages of the present lock construction is that the distributor of the lock may easily change hands, the bevel or functions of the lock. The feature of reversability built into the lock construction includes the ability to provide bevel control. For this purpose the face plate 1b and the apertures 28 and 29 therein, apertures 27 are symmetrically arranged about a horizontal line. Accordingly, the face plate 1b may be reversed if desired without otherwise affecting the operation of the lock.

As shown in FIG. 3, as well as FIG. 2, there are formed into the face plate 1b a pair of vertically spaced upright lands 93, which project outwardly from the inner face of said plate and are arranged to one side of the vertical axis of the plate for the purpose of achieving a bevel or angular arrangement of the said face plate with respect to the body of the lock, also shown in FIGS. 5 through 9. Should it be desired to reverse the bevel, all that is necessary is to rotate the face plate 180 degrees from the position shown in FIG. 2. This thus provides for a positive bevel control without employing a pivotal mounting.

Having described my invention, reference should now be had to the following claims.

I claim:

1. In a lock for doors including a housing, a face plate and a lock cylinder with rotatable cam; the improvement comprising an elongated reciprocal dead bolt guidably mounted within the housing having an inoperative position, a locking position, and an intermediate control position, means on said dead bolt operatively engaged by said cylinder cam on rotation thereof for movement relative to the housing, cam means on said dead bolt, an elongated reciprocal latch bolt guidably mounted within the housing having a normal spring-biased operative position and a retracted position, inner and outer manually rotatable spring-biased control hubs journaled within the housing, the inner hub continuously in operative engagement with the latch bolt for retracting the same, latch bolt engaging means movably mounted on the latch bolt and having a control means movable into and out of engagement with the outer hub on movement of said latch bolt engaging means, resilient means interposed between said latch bolt engaging means and said cam means on the dead bolt, said cam means receiving said resilient means when said dead bolt is in its inoperative position with the control means on said latch bolt engaging means operatively engaging the outer hub, said dead bolt cam means operatively depressing said resilient means to disengage said latch bolt control means from the outer hub, when said said dead bolt is in locking and control positions.

2. In the lock of claim 1, an auxiliary spring-biased latch lever pivotally mounted within and upon the housing, an auxiliary latch pivotally mounted upon said face plate and extending therethrough and retractable on engagement with the strike plate in the door frame, resilient control means on the housing normally biasing said auxiliary latch outwardly of said face plate and retaining said auxiliary latch lever in neutral position, inward movement of said auxiliary latch moving said resilient control means releasing said auxiliary latch lever so that it is free to rotate into a position blocking said latch bolt against retraction.

3. In the lock of claim 1, an auxiliary spring-biased latch lever pivotally mounted intermediate its ends within and upon the housing, an auxiliary latch pivotally mounted upon said face plate and extending therethrough

and retractable on engagement with the strike plate in the door frame, resilient control means on the housing normally biasing said auxiliary latch outwardly of said face plate and retaining said auxiliary latch lever in neutral position, inward movement of said auxiliary latch moving said resilient control means releasing said auxiliary latch lever so that it is free to rotate into a position retaining said latch bolt against retraction, said inner hub having a cam means, and operating means on the one end of said auxiliary latch lever operatively engaged by said cam means on rotation of said inner hub to tilt said auxiliary latch lever out of the latch bolt obstructing position.

4. In the lock of claim 1, an auxiliary spring-biased latch lever pivotally mounted within and upon the housing, an auxiliary latch pivotally mounted upon said face plate and extending therethrough and retractable on engagement with the strike plate in the door frame, resilient control means on the housing normally biasing said auxiliary latch outwardly of said face plate and retaining said auxiliary latch lever in neutral position, inward movement of said auxiliary latch moving said resilient control means releasing said auxiliary latch lever so that it is free to rotate into a position retaining said latch bolt against retraction, said latch bolt engaging means having a cantilever arm operatively retaining said auxiliary latch lever in neutral position when the control means on said latch bolt engaging means is connected with the outer hub, said cantilever arm releasing said auxiliary latch lever for movement into latch bolt obstruction position, when the control means on said latch bolt engaging means is disengaged from said outer hub.

5. In a lock for doors including a housing, and a face plate; the improvement comprising an elongated reciprocal dead bolt guidably mounted within the housing having an inoperative position, and a locking position, cam means on said dead bolt, an elongated reciprocal latch bolt guidably mounted within the housing having a normal biased operative position and a retracted position, inner and outer manually rotatable spring-biased control hubs journaled within the housing, the inner hub continuously in operative engagement with the latch bolt for retracting the same, a latch bolt engaging means movably mounted on the latch bolt and having a control means movable into and out of engagement with the outer hub on movement of said latch bolt engaging means, resilient means interposed between the said latch bolt engaging means and said cam means, said cam means receiving the said resilient means when said dead bolt is in inoperative position with the control means on said latch bolt engaging means operatively engaging the outer hub, said dead bolt cam means operatively depressing said resilient means to disengage said control means from the outer hub when said dead bolt is in locking position.

6. In a lock for doors including a housing and a face plate, an elongated reciprocal latch bolt including a head guidably mounted within said housing and normally biased outwardly through said face plate, there being a slot formed into said head and transversely therethrough, a cam shaped latch bolt tongue loosely and movably nested within said slot and at one edge having projecting means loosely fulcrumed upon and against said face plate and spaced between said face plate and latch bolt, said tongue having a first face normally on the exterior of said face plate extending in a direction between 45 to 135 degrees to the plane of a strike plate in a door frame for engagement therewith, and a second face at an angle between 45 to 135 degrees to the first face and normally registerable with said latch bolt for effecting initial retraction thereof, said tongue including a cam surface outwardly of said second face for successive operative engagement with said latch bolt for further retracting the same as the angle of contact of said strike plate and first face decreases.

7. In the lock defined in claim 6, said latch bolt tongue being non-metallic.

8. In the lock of claim 6, said latch bolt tongue being constructed of nylon.

9. In the lock defined in claim 6, inner and outer manually rotatable spring-biased control hubs journaled within the housing, the inner hub continuously in operative engagement with the latch bolt for retracting the same, a latch bolt engaging plate movably mounted on the latch bolt and having a control means movable into and out of engagement with the outer hub on movement of said latch bolt engaging plate, and control means connected to said latch bolt engaging plate for determining one of two positions of adjustment thereof, the control means on said latch bolt engaging plate operatively engaging the outer hub when said plate is in one position and disengaged therefrom when the plate is in a second position.

10. In a lock for doors including a housing, and a face plate; the improvement comprising an elongated reciprocal latch bolt guidably mounted within the housing having a normal spring-biased operative position and a retracted position, inner and outer manually rotatable spring-biased control hubs journaled within the housing, the inner hub continuously in operative engagement with the latch bolt for retracting the same, a latch bolt engaging means movably mounted on the latch bolt and having a control means movable into and out of engagement with the outer hub on movement of said latch bolt engaging means, a second control means connected to said latch bolt engaging means, an auxiliary spring-biased latch lever pivotally mounted within and upon the housing, an auxiliary latch movably mounted upon said face plate and extending therethrough and retractable on engagement with the strike plate in the door frame, resilient control means on the housing normally biasing said auxiliary latch outwardly of said face plate and retaining said auxiliary latch lever in neutral position, inward movement of said auxiliary latch moving said resilient control means releasing said auxiliary latch lever so that it is free to rotate into a position blocking said latch bolt against unauthorized retraction.

11. In the lock defined in claim 10, said inner hub having a cam surface, and operating means on one end of said auxiliary latch lever operatively engaged by said cam surface on rotation of said inner hub to tilt said auxiliary latch lever out of latch bolt obstructing position.

12. The lock of claim 10, said latch bolt engaging means having a cantilever arm operatively retaining said auxiliary latch lever in neutral position, when the control means on said latch bolt engaging means is connected with the outer hub, said cantilever arm releasing said auxiliary latch lever for movement into latch bolt obstructing position, when the control means on said latch bolt engaging means is disengaged from said outer hub.

13. The latch bolt of claim 10, said auxiliary latch being cam shaped, its pivotal mounting including a pair of opposed trunnion supports at one corner thereof loosely nested within opposed slots in the inner surface of said face plate.

14. In a lever lock for doors including a housing, a face plate, and a lock cylinder with rotatable cam; the improvement comprising an elongated reciprocal dead bolt guidably mounted within the housing having an inoperative position, and control position, cam means on said dead bolt operatively engaged by said cylinder cam on rotation thereof for movement relative to the housing, second cam means on said dead bolt, an elongated reciprocal latch bolt guidably mounted within the housing having a normal biased operative position and a retracted position, inner and outer manually rotatable biased control hubs journaled within the housing, the inner hub continuously in operative engagement with the latch bolt for retracting the same, latch bolt engaging means movably mounted on the latch bolt and having a control means movable into and out of engagement with the outer

hub on movement of said latch bolt engaging means, resilient means interposed between said latch bolt engaging means and said second cam means on the dead bolt, said second cam means receiving said resilient means when said dead bolt is in its inoperative position with the control means on said latch bolt engaging means operatively engaging the outer hub, said dead bolt second cam means operatively depressing said resilient means to disengage said latch bolt control means from the outer hub when said dead bolt is in control position.

15. In a lock for doors including a housing, a face plate and a lock cylinder with rotatable cam; the improvement comprising an elongated reciprocal dead bolt guidably mounted within the housing having an inoperative position and a locking position, cam means on said dead bolt operatively engaged by said cylinder cam on rotation thereof for movement relative to the housing, a dead-bolt locking plate movably mounted within the dead bolt, normally retaining the dead bolt against movement, and cam means on said locking plate registerable with and operatively engaged by said cylinder cam for movement relative to the dead bolt to a position releasing said dead bolt, said face plate having formed upon its inner surface a pair of vertically spaced aligned inwardly directed lands arranged upon one side of the vertical axis of said face plate for cooperative registry with said housing for defining a bevel relation of said face plate relative to said housing, said face plate being reversible 180 degrees relative to said housing for reversing said bevel relation.

16. In a lock for doors including a housing, a face plate; the improvement comprising an elongated reciprocal dead bolt guidably mounted within the housing having an inoperative position, a locking position, and an intermediate control position, means on said housing for effecting longitudinal adjustments of the dead bolt relative to the housing, cam means on said dead bolt, an elongated reciprocal latch bolt guidably mounted within the housing having a normal spring-biased operative position and a retracted position, inner and outer manually rotatable spring-biased control hubs journaled within the housing, the inner hub continuously in operative engage-

ment with the latch bolt for retracting the same, latch bolt engaging means movably mounted on the latch bolt and having a control means movable into and out of engagement with the outer hub on movement of said latch bolt engaging means, resilient means interposed between said latch bolt engaging means and said cam means on the dead bolt, said cam means receiving said resilient means when said dead bolt is in its inoperative position with the control means on said latch bolt engaging means operatively engaging the outer hub, said dead bolt cam means operatively depressing said resilient means to disengage said latch bolt control means from the outer hub, when said dead bolt is in locking and control positions.

17. In a lock for doors including a housing and a face plate, an elongated reciprocal latch bolt including a head guidably mounted within said housing and normally biased outwardly through said face plate, there being a slot formed into said head and transversely therethrough, a cam shaped latch bolt tongue loosely and movably nested within said slot and at one edge having projecting means loosely fulcrumed upon and against said face plate and spaced between said face plate and latch bolt, said tongue having a first face normally on the exterior of said face plate extending in a direction between 45 to 135 degrees to the plane of a strike plate in a door frame for engagement therewith, and a second face at an angle between 45 to 135 degrees to the first face and normally registerable with said latch bolt for effecting initial retraction thereof.

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