

[54] **INCREMENTAL DEAD BOLT LATCH**

[75] Inventors: **Vernard W. Sanders**, Los Angeles, Calif.; **Dennis G. Potter**, Delta, B. C., Canada

[73] Assignee: **Norris Industries, Inc.**, Los Angeles, Calif.

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[51] Int. Cl. .... **E05c 1/06**

[58] Field of Search..... 292/140, 169, 143, 292/169.15, 173, 187, 188, DIG. 52; 70/129, 134

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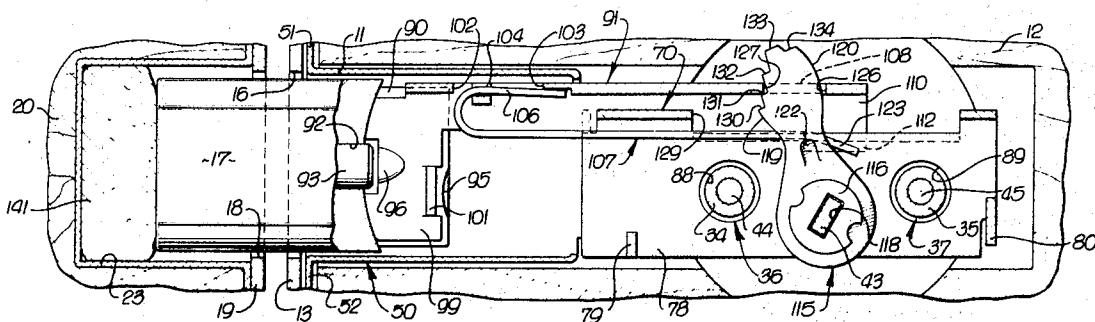
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*Primary Examiner*—Albert G. Craig, Jr.  
*Attorney*—Vernon D. Beehler et al.

[57] **ABSTRACT**

A dead bolt latch for a door has a rotating cam lever action for extending the bolt into a strike plate recess in the door frame. The cam has the form of a pivoted arm and is rotated by the tail piece of a lock device. The pivot axis is near one edge of a lock case and engages a cam opening in an actuator slide at the opposite side of the latch case, the actuator slide being attached to the latch bolt. A series of stepped shoulders on the cam lever serve as blockers to prevent retraction of the actuator slide by pressure against the latch bolt so that the latch bolt can be locked in any one of several extended positions and need not occupy a fully extended position to be assured of there being no unauthorized retraction which might otherwise be possible with a partially extended latch bolt.

**3 Claims, 9 Drawing Figures**



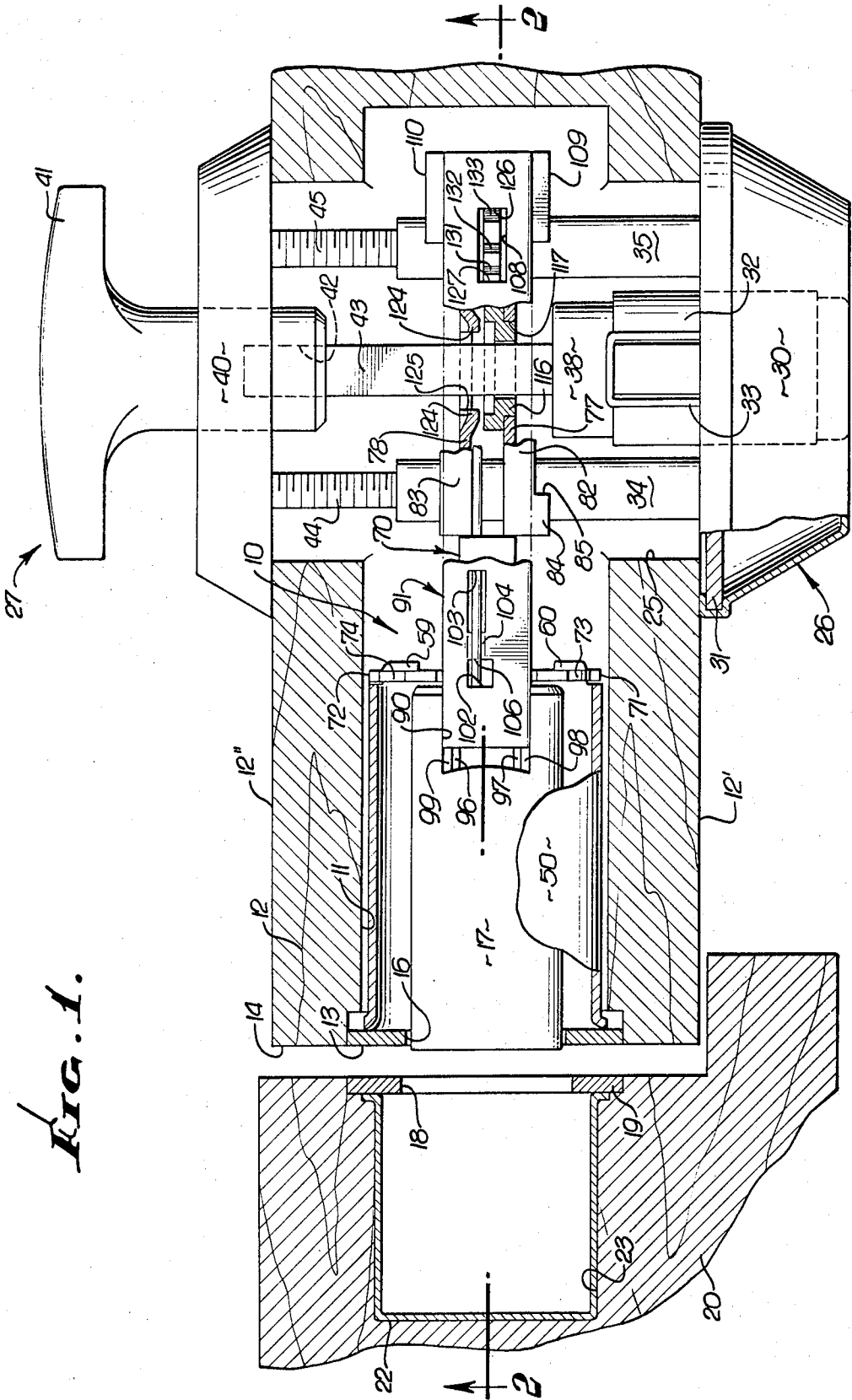


FIG. 1.



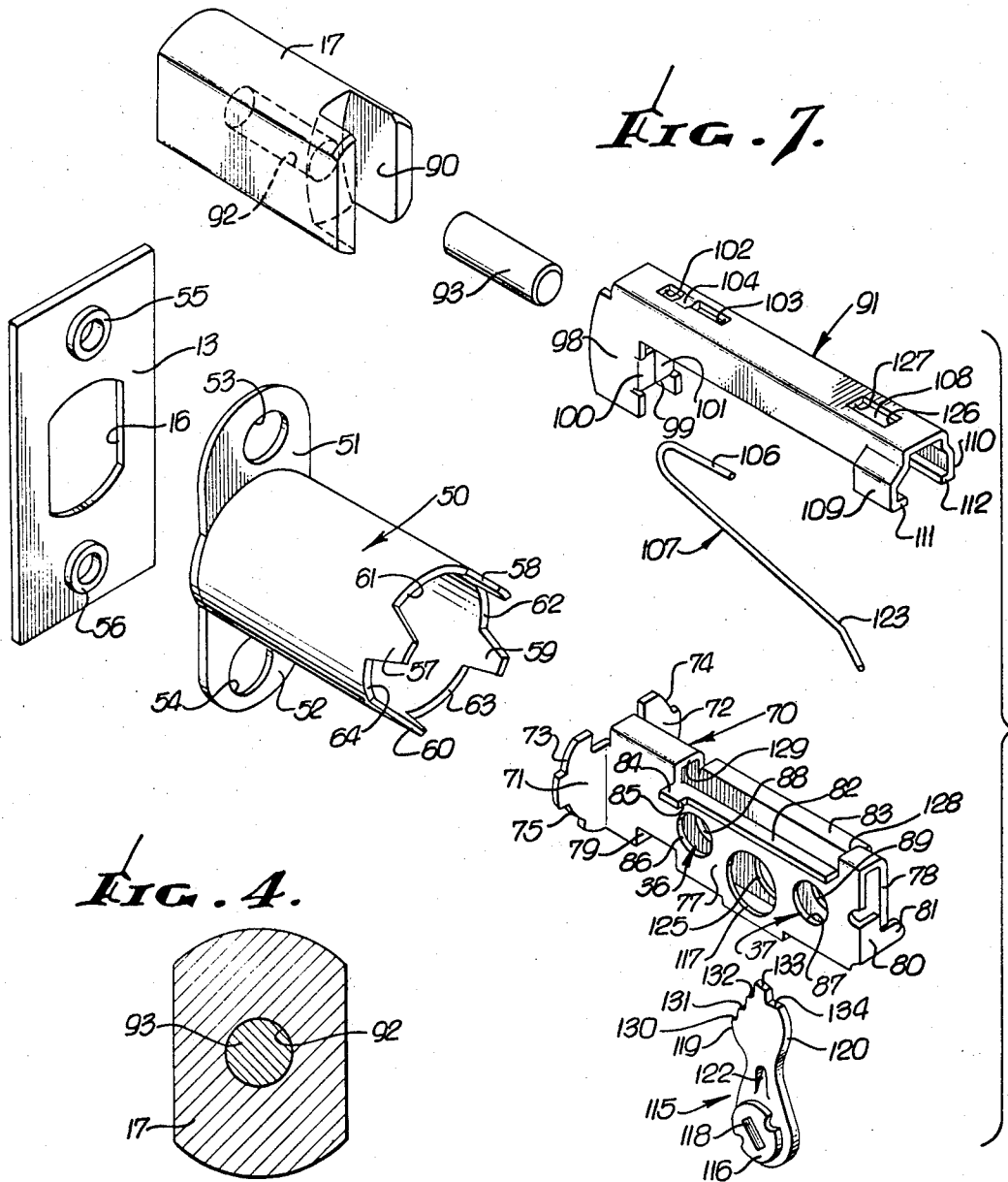


**FIG. 4.**

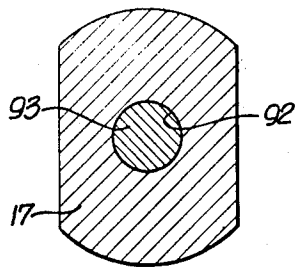


**FIG. 5.**

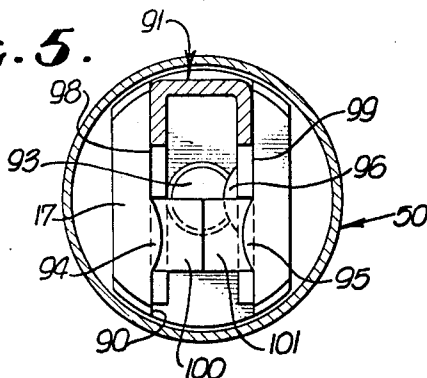


**FIG. 6.**

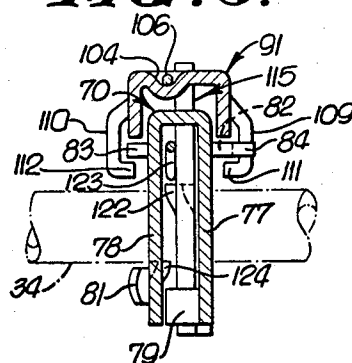


FIG. 8.

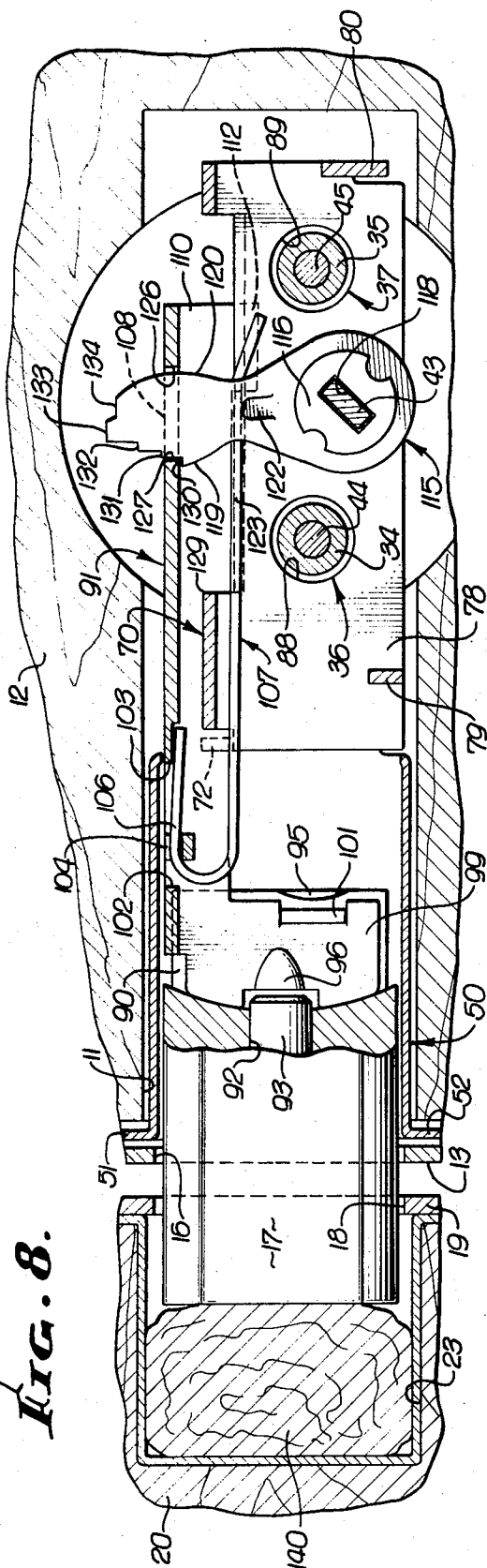
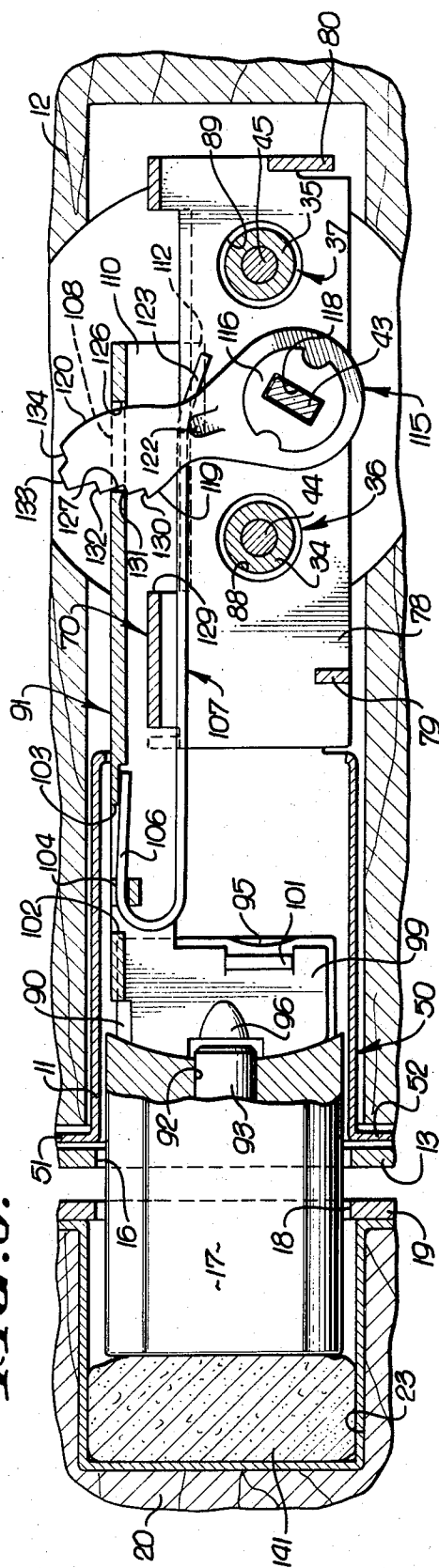


FIG. 9.



**INCREMENTAL DEAD BOLT LATCH**

The invention relates generally to door locks and particularly to a type commonly termed an auxiliary lock. Of this type are those known as bore-in cylinder deadlocks which consist of a dead bolt latch unit mounted within an edge bore of a door and these are normally operated by means of a key actuated cylinder assembly from the outside of the door and by a turn knob or second key actuated cylinder assembly from the inside. Operating devices as described are normally attached to the door by providing a cross bore which intersects the edge bore allowing the parts to intermember and operatively couple the operating device with the dead bolt latch. The present invention encompasses the dead bolt portion of this type of auxiliary lock and particularly one having a bolt projection of as much as one inch in extent.

With an increasing need to provide additional security for doors, it is now a common practice to install within a door, a second or auxiliary lock in addition to one of the more usual forms of locksets, the second lock being commonly termed a dead bolt. Because dead bolts having the customary limited projection of one-half to five-eighths inch are not sufficient to prevent disengagement by forcing the adjacent door frame laterally with an appropriate tool, dead bolts which provide a longer minimum projection of as much as one inch become advisable. Approved dead bolts may be additionally equipped with a hardened insert within the bolt itself to repel cutting tool attack.

When a door is hung there is invariably a gap between the door edge and its adjacent frame. This circumstance taken in combination with the flexibility of certain types of construction, make a longer dead bolt throw necessary.

The present invention, therefore, encompasses improvements for a dead bolt latch which offer the desirable characteristics required for additional security.

A 1 inch projection dead bolt latch made possible by the present invention complies with all of the customary requirements and yet maintains an overall size that is in keeping with prior existing products having lesser projection and security. Such construction provides a unit which can replace existing installations and at the same time provide increased security.

Another element affecting security of even a special dead bolt latch is the propensity of unauthorized persons to tamper with the operating of a latch in advance of an unauthorized entry using some means to unobtrusively prevent proper operation at a later time thereby to enable the unauthorized person to release the dead bolt at leisure without forcing the door frame.

The structure of the present invention makes use of improvements which provide the required strength and ease of operation over a long life span yet are such that all of the components may be created by low cost high production means which are easily assembled into the complete dead bolt latch. The approach to low cost manufacture without sacrifice of quality is a primary consideration in view of keen competition currently existing within the builders hardware industry. The present structure is, therefore, designed to be fabricated predominantly from low-cost metal stampings and turned parts.

Among the objects of the invention is therefore to provide a new and improved dead bolt latch having a projection of length exceeding previous capabilities but

which can be installed in a bore of the same dimensions as those already in use.

Another object of the invention is to provide a new and improved dead bolt latch mechanism such that proper operation of the bolt can not be impaired in advance thereby to prevent a later unauthorized unlocking operation by manipulation of the mechanism itself.

Still another object of the invention is to provide a new and improved dead bolt latch mechanism which is such that unauthorized withdrawal of the latch bolt can be prevented even though the latch bolt has not been locked at its maximum extended position.

Another object of the invention is to create the necessary components of a dead bolt latch mechanism by low-cost means, the components being adapted to be easily assembled into a complete latch.

A further object is to provide a new and improved dead bolt latch capable of utilizing a minimum number of components and which will provide the required function without sacrifice of strength, life or ease of operation.

An additional object of the invention is to provide a new and improved dead bolt latch which incorporates a positive blocking means capable of deadlocking the bolt when projected, to prevent unauthorized manipulation.

With these and other objects in view, the invention consists in the construction, arrangement and combination of the various parts of the device, whereby the objects contemplated are attained, as hereinafter set forth, pointed out in the appended claims and illustrated in the accompanying drawings.

In the drawings:

FIG. 1 is a longitudinal cross-section view of the dead bolt latch and its operating device in place on a door.

FIG. 2 is a longitudinal sectional view on the line 2—2 of FIG. 1 with the dead bolt retracted.

FIG. 3 is a longitudinal sectional view similar to FIG. 2 with the dead bolt extended.

FIG. 4 is a cross-sectional view taken along the line 4—4 of FIG. 3.

FIG. 5 is a cross sectional view taken on the line 5—5 of FIG. 3.

FIG. 6 is a cross sectional view taken on the line 6—6 of FIG. 2.

FIG. 7 is an exploded view of the separate parts of the latch bolt mechanism.

FIG. 8 is a view similar to FIG. 3 with the latch bolt in one partially extended position.

FIG. 9 is a view similar to FIG. 3 with the latch bolt in another partially extended position.

In an embodiment of the invention chosen for the purpose of illustration as shown in FIGS. 1 and 2, a dead bolt latch mechanism is indicated generally by the reference character 10, mounted in an appropriate edge bore 11 of a door 12. The latch 10 has a face 13 which provides means for fastening the latch 10 to an edge 14 of the door by use of the screws 15. The face 13 has a central opening 16 through which the bolt head 17 may be projected for cooperative engagement within an opening 18 of the strike plate 19 which is mounted in properly aligned relationship with the latch 10 and secured to a frame 20 by means of the screws 21. Behind the strike plate 19 is shown a stike box 22 which serves to neatly trim the required cutout in the frame 20 and also assures that the cutout provides a

hole 23 of sufficient depth to accommodate the bolt 17 when in a fully extended position.

A cross bore 25 between outer and inner faces 12' and 12'' of the door 12 provides for attachment of appropriate actuating means for the latch 10 such for example as a key operated cylinder assembly 26 on the outer face and a turn knob assembly 27 on the inner face.

The edge bore 11 in which latch mechanism 10 is mounted is perpendicular to the edge 14 of the door 12 and the outer and inner actuating means 26 and 27 intermember and operatively couple with the latch mechanism 10.

The cylinder assembly 26 is substantially conventional and includes an outer shell 30 crimped to a mounting plate 31 and adapted to retain a pin tumbler mechanism 32 by means of the clip 33. Affixed to the mounting plate 31 is a pair of internally threaded mounting posts 34, 35 which intermember a portion of the latch 10 by means of appropriate spaced openings 36, 37 therein which properly align and prevent rotation of the cylinder assembly 26.

The pin tumbler mechanism 32 is of conventional construction having a plug 38 that is rotatable by the agency of a proper key (not shown). At the inner end of the plug 38 is tailpiece 43. A lost motion type of action is employed to allow the key to be returned to a normal or key out position after actuating the dead bolt mechanism 10.

The turn knob assembly 27 has a rose 40 adapted to rotatably retain a knob 41 whose inner end is configured with an opening 42 for telescopically receiving a tailpiece 43 in operative engagement. The previously mentioned lost motion coupling allows the turn knob 41 to actuate the latch bolt mechanism 10 when the pin tumbler mechanism 32 is in a locked condition. The rose 40 is also provided with mounting screws 44, 45 which treadably engage the mounting posts 34, 35 and securely clamp the cylinder assembly 26 and the turn knob assembly 27 to the outer and inner faces respectively of the door 12.

Referring also to FIG. 7, the latch bolt mechanism 10 has a case 50 with upper and lower front flanges 51 and 52 respectively, having openings 53 and 54 therein for stakably retaining the face 13 by means of tubular extruded portions 55 and 56. At the rearward end of the case 50 is a series of tabs 57, 58, 59 and 60 between which are end face segments 61, 62, 63 and 64 the purpose of which is to locate and retain a case extension 70 as an elongation of the case 50, as best seen in FIGS. 2 and 3.

The case extension 70 is of a modified box like form and at the end adjacent the case 50 has outwardly formed foreward portions 71, 72 (see FIG. 7) that contain arcuate recesses 73, 74, 75 and 76 etc. for intermemberment with the tabs 57, 58, 59 and 60. Side walls 77, 78 of the extension 70 are maintained in parallel spaced relationship by a forward tab 79 and a rearward tab 80 on which is an extension 81 bent downwardly when in assembled position, to securely tie the side walls 77, 78 together. Adjacent the upper area of the side walls 77, 78 are a pair of outwardly formed guide rails 82, 83 that extend for a portion of the length of the case extension 70. A further outward extending portion 84 of the guide rail 82 provides a stop 85. Aligned openings 86, 87, 88 and 89 are provided in the side walls 77, 78 respectively of the case extension 70

to allow intermemberment of the latch bolt mechanism 10 with the posts 34, 35 of the cylinder assembly 26.

The bolt head 17 has a rearward facing slot 90 for reception of the forward end of an actuator slide 91. The bolt head 17 has also a blind hole 92 opening at the rear into the slot 90, the hole 92 being of a size slightly larger in diameter and length than that of a hardened steel roller 93 which is entrapped in the hole 92 when the actuator slide 91 is intermembered with the bolt 17 and retained by staking portions 94, 95 of the bolt 17 adjacent the slot 90 as viewed in FIGS. 2, 3 and 5. To ensure axial retention of the roller 93, an inwardly formed area 96 is provided on the downward foreward extending portion 99 of the actuator slide 91. The slide 91 is formed with a channel like shape having downwardly extending forward portions 98, 99 that intermember the slot 90 of the bolt 17 and contain inwardly directed tabs 100, 101 that abut at a central point to maintain the spacing of the forward portions 98, 99. On the upper surface of the slide 91 near its foward end are openings 102, 103 and deformed areas 104, 105 for the purpose of anchoring the short leg 106 of a hairpin shaped detent spring 107 (see FIGS. 2 and 3). The rearward portion of the actuator slide 91 contains a cam opening 108 and a pair of outwardly formed guides 109, 110 having respective inwardly formed projections 111, 112 that intermember with the guide rails 82, 83 of the case extension 70.

A cam 115 in the form of a lever has a circular offset bearing portion 116 that intermembers an opening 117 in the side wall 77 of the case extension 70 and contains a centrally located slot 118 for reception of the tailpiece 43. The upper area of the cam 115 has a forwardly facing cam face 119 and a rearwardly facing arcuate cam face 120 for reciprocatably moving the actuator slide 91 by engagement with respective shoulders 126 and 127 at opposite ends of the cam opening 108. The upper portion of the fowardly facing cam face 119 has steps 130, 131, and 132 and an end face 133. Rearwardly of the end face 133 is an additional step 134.

A detent lug 122 is offset in a direction opposite the bearing portion 116 and located approximately half way between the slot 118 and the cam faces 119, 120. The detent lug 122 is in contact with the long leg 123 of the detent spring 107.

To properly retain the cam 115 in its bearing opening 117 are provided inward offsets 124 adjacent a clearance hole 125 (see FIG. 1) in the side wall 78 of the case extension 70, the hole 125 being in coaxial alignment with the bearing opening 117.

As represented in FIGS. 2 and 3, the slide 91 rides upon the guide rails 82 and 83 and its rearward end is prevented from any lifting action by the cam 115 as a result of the projections 111, 112 underlying the guide rails 82, 83.

For shifting the bolt head 17 from a retracted position to an extended position or from extended back to retracted position the cam 115 is rotated clockwise, or counter clockwise as the case may be. This is accomplished by rotation of the tailpiece 43 either by a proper key in cylinder plug 38 of the cylinder assembly or the turn knob 41.

FIGS. 2 and 3 show the mechanism respectively in retracted and extended positions. Action of the detent spring 107 is such that its bias against the detent lug 122 of the cam 115 causes the cam 115 to be biased downward whereby the rearward cam face 120 or the

forward cam face 119 is in contact with the rearward shoulder 126 or forward shoulder 127 respectively of the opening 108 of the actuator slide. During this operation the cam lever swings in an opening created by the outwardly formed guide rails 82, 83 of the actuator extension 70. When in the retracted position of FIG. 2, the bolt head 17 is deadlocked against retraction by engagement of the rearward face of the bolt head 17 with the forward portions 71, 72 of the extension 70 and the rearward shoulder 126 of the cam opening 108 with the end face 133 of the cam lever 115.

In extended position of FIG. 3, the bolt head 17 is deadlocked against movement by the guide 109 of the actuator slide 91 being in contact with the stop 85 of the outwardly extending portion 84 of the guide rail 82 on the case extension 70, in cooperation with the forward shoulder 127 of the cam opening 108 in contact with the end face 133 of the cam 115. Any attempt to dislodge the bolt head is prevented by the force moving through the cam lever and against its bearing because the detent action of the spring 107 will not allow the cam 115 to rotate.

When an unauthorized person wishes to prevent proper deadlocking of the dead bolt a common practice is to place in the hole 23 a wad of paper 140, for example, as shown in FIG. 8, or a wad of chewing gum 141 as shown in FIG. 9. In either event the latch bolt head 17 is prevented from reaching its fully extended position. Irrespective of the reliance on such an expedient the latch bolt remains dead locked in whatever the position may be.

Should the paper wad 140 be as big as illustrated in FIG. 8 the shoulder 127 will become engaged against the riser behind the step 130 and dead locking will take place. Should the wad of gum 141 be as small as shown in FIG. 9 the shoulder 127 will become engaged against the riser behind the step 131 and dead locking will take place there. A still smaller wad may cause engagement with the riser behind the step 132. Wherever such dead locking may take place, the latch bolt can always be withdrawn by rotation of the cam lever 115 in a withdrawing or clockwise direction as viewed in FIGS. 8 and 9, in the normal fashion.

Although the mechanism of the latch mechanism just

described offers great resistance to bolt movement in the deadlocked position, its action through normal cam rotation is one of ease and smoothness because the arcuate cam faces 119, 120 have a form which provides a low pressure angle against the shoulders 126 and 127 of the cam opening 108.

Having described the invention, what is claimed as new in support of Letters Patent is:

1. A dead bolt latch mechanism for installation in a door and for cooperation with a strike hole in a door frame when in locked position, said mechanism comprising a tubular case for mounting on a door at a free edge thereof,

a longitudinal guide means at the inside end of the case adjacent one edge thereof,

a cam arm pivotally mounted on a transverse pivot axis at the other edge of the case,

said cam arm having oppositely facing cam faces,

a bolt assembly including a bolt head reciprocatably mounted in the case and extendable to a position adjacent the bottom of the strike hole in fully extended position,

an actuator portion of said bolt assembly having a guide retention means in sliding engagement with the guide means,

shoulder means on the actuator having positions of engagement with said cam faces,

the cam face which is on the side of the cam lever facing said bolt assembly having a plurality of shoulders thereon spaced at intervals outwardly from the axis rotation, each shoulder being engageable with the respective shoulder on the actuator whereby to lock the latch bolt in each of a plurality of different partially extended positions.

2. A dead bolt latch mechanism as in claim 1 wherein there is a yieldable detent acting on the cam lever in all positions of engagement of said cam lever with said latch bolt assembly.

3. A dead bolt latch mechanism as in claim 2 wherein the yieldable detent is a bent spring having one end in engagement with the bolt assembly and the other end in engagement with the cam lever.

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