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Babb, Jr. et al.

[11] **3,799,592**

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[54] **DEAD BOLT AUXILIARY LATCH**

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[52] **U.S. Cl.**..... **292/140,** 292/169.15, 292/DIG. 52

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

[58] **Field of Search**..... 70/129, 133, 134; 292/138, 292/140, 169.15

[56] **References Cited**

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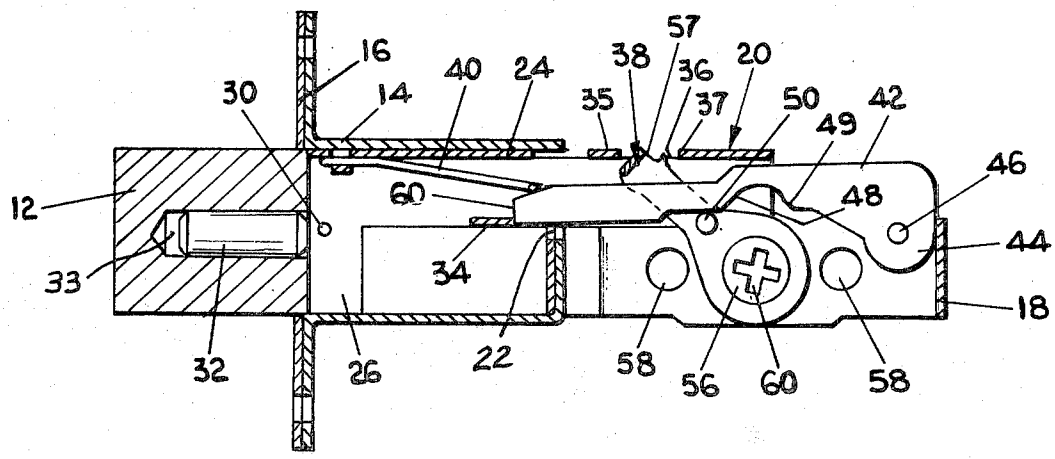
[57] **ABSTRACT**

A dead bolt lock mechanism having a locking bolt extendable by a rotary drive arm and locked into extended position by a special latching means. Spring biasing means acting on the latch holds it in position to thereby allow the mechanism to be mounted in virtually any orientation within a panel. A double latch of the bolt is achieved with a combination of the noted latching means with an over-center latch provided by the rotary drive arm.

7 Claims, 5 Drawing Figures



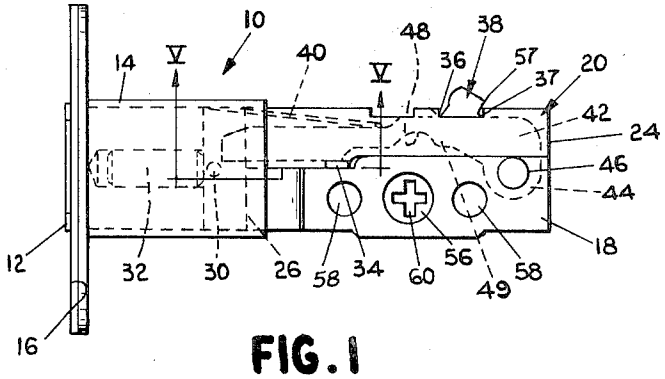


FIG. 1

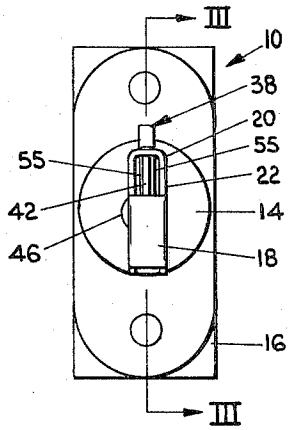


FIG. 2

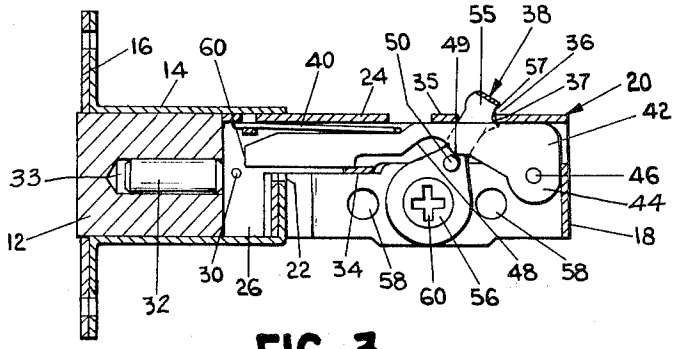


FIG. 3

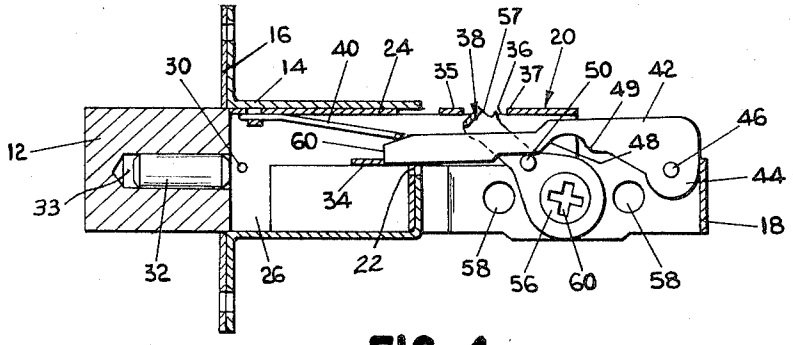


FIG. 4

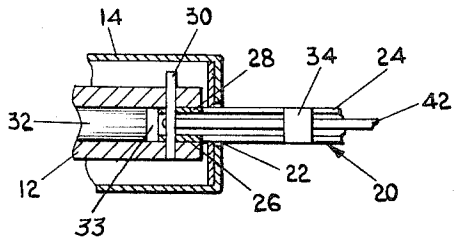


FIG. 5

DEAD BOLT AUXILIARY LATCH

BACKGROUND OF THE INVENTION

This invention relates to locking mechanisms and particularly to dead bolt locking mechanisms as used, for example, in a door panel to supplement the conventional door lock. In a typical installation, the dead bolt is manually extendable into and out of locking engagement with a cooperative recess in a door jamb. Locking means within the housing prevents bolt retraction other than by a key from the outside or a turn control on the inside.

Various dead bolt locking mechanisms exist in the prior art. Reference may be had, for example, to commonly assigned U.S. Pat. No. 2,803,479 to H. W. Young et al., issued Aug. 20, 1957, entitled LOCK MECHANISM, wherein a locking mechanism is provided which includes a radius arm actuable by a shaft and operating against cam surfaces on a retractor member to transfer rotary forces from the radius arm to the bolt stem. There are additionally, many other prior art dead bolt locking mechanisms available which operate in a somewhat similar fashion wherein a radius arm operates against an extension of the bolt or on a retractor bar to extend and retract the bolt.

In the above-mentioned devices, to prevent retraction of the bolt when it is in a locking position, an end of the radius arm or swivel abuts against a portion of the retractor to prevent the bolt from being pushed back inside the housing by an external force. This requires that the radius arm be held or otherwise locked into an abutting relationship with the bolt retractor when it is extended. Locks of this type must be mounted in a particular orientation within the door frame. If inadvertently mounted upside down (and specific instructions are generally placed on the latch to caution the installer against such inadvertent installation) the latch will generally operate satisfactorily for a time but as the various operating parts wear, it is not at all uncommon for the radius arm to fall out of abutting relationship with the retractor ant the bolt may be retracted upon application of an external force. Moreover, these problems become more acute in dead bolt devices which are now required to shift the bolt an inch or so for extra security, in contrast to the fraction of an inch formerly required.

SUMMARY OF THE INVENTION

The present invention provides a dead bolt locking mechanism which includes a pivotally mounted cam-actuated, spring-biased auxiliary locking mechanism or locking bar. The locking bar is operable against the bolt actuating mechanisms to lock the bolt and securely hold it in its extended position. When installed in a panel, the locking bar can be released only by retraction of the bolt in a conventional manner, i.e., rotation of the radius arm by a key or inside-mounted knob. The locking bar is spring biased into locking position with the bolt when in its extended position such that the bolt may be mounted in virtually any position within a door panel and yet remain operative as the various component parts wear. Moreover, the novel dead bolt lock mechanism possesses a double lock feature relative to the dead bolt since, not only is the dead bolt secured against retraction by this locking bar, but also the retractor bar or bolt extension for the dead bolt is prevented from retracting by the over-center rotary radius arm. In addition, when the bolt is retracted, the radius arm cooperates with the bolt extension to hold the bolt in retracted position.

It is therefore a primary object of the present invention to provide a dead bolt lock having a unique auxiliary locking mechanism for the bolt.

It is another object of the present invention to provide a dead bolt lock which may be mounted in a panel in any orientation.

It is a further object of the present invention to provide a dead bolt lock having a cam-operated, spring-biased locking bar therein operable to lock the bolt in an extended position.

Another object of the present invention is to provide a dead bolt lock having a locking bar therein operable to lock the bolt in a retracted position.

Another object of this invention is to provide an effective one inch throw dead bolt mechanism with unique bolt locking features.

Another object of this invention is to provide a novel dead bolt structure achieving a double lock for the extended bolt to prevent its forceful or accidental retraction.

These and other important objects, features, and advantages of the present invention will be readily understood by those skilled in the art upon reading the following description with reference to the accompanying drawings illustrating a preferred embodiment of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a plan view of the dead bolt lock of the present invention;

FIG. 2 is an end view of the dead bolt lock mechanism shown in FIG. 1;

FIG. 3 is a cross-sectional view taken along the plane III—III of FIG. 2 illustrating the lock mechanism with the bolt in a retracted position;

FIG. 4 is a cross-sectional view similar to FIG. 3 illustrating the bolt in an extended position; and

FIG. 5 is a cross-sectional view taken along the plane V—V of FIG. 1.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings, in the dead bolt lock assembly generally indicated by numeral **10**, a movable bolt **12** is generally contained within a tubular housing **14** having a face plate **16** fixed to the outer end, i.e., front end thereof in a conventional manner. A U-shaped channel-like housing extension **18** projects from the lower rear of the opposite end of housing **14**. Extension **18** is secured to the tubular housing as by riveting, welding, or the like. An elongated bolt extension or retractor bar **20** is slidably mounted on an upper edge of extension **18** and extends through an opening **22** in the rear of the tubular housing **14**.

The bolt extension **20** is an elongated U-shaped channel member with an upper leg or sliding portion **24** slidably mounted on the extension **18**. A shorter leg **26** depending downwardly is in a slot **28** (FIG. 5) formed in the rear portion of bolt **12**. The retractor bar is secured to bolt **12** by having this leg **26** attached to the bolt in this slot **28** by a roll pin **30**. A hardened steel bolt pin **32** is placed within an opening **33** located along the axial length of bolt **12**. The pin **32** is free to rotate in

the opening 33 and is provided as a security measure to prevent the bolt from being cut as by a saw.

Along the length of the sliding portion of leg 24 at the opened side of the U-shaped channel a slight distance rearwardly from its connection with the bolt, a transverse abutment tab 34 is formed across the open side of the channel. An opening 36 is provided in the upper portion of leg 24 to receive the extended end of a radius arm or rotary drive arm 38 as will be more fully described hereinafter. A bias spring 40 is fixed at one of its ends in an upper portion of leg 24 near the intersection with shorter leg 26. The opposite or free end of the bias spring extends outwardly away from the bolt between the legs of the bolt extension 20 and downwardly to bias an auxiliary latch member or locking bar 42 downwardly onto tab 34.

As best illustrated in FIG. 3, the locking bar 42 is an elongated plate member that extends along the length of the bolt extension 20 and extension 18 and between the side walls of the bolt extension. The locking bar 42 is provided with a downwardly turned mounting flange 44 at the rearward end thereof by which it is pivotally mounted and secured to housing extension 18 by a pin 46. A curved concave cam-follower surface 48 is formed along a portion of the underside length of the locking bar for cooperative engagement with a pin 50 forming a cam mounted in radius arm 38. The cam follower surface 48 tapers upwardly and then downwardly forming a step 49 adjacent the surface 48 toward the pivoted end of the bar. Specifically, the pin 50 and radius arm 38 are rotatably mounted in extension 18.

The radius arm 38 includes a pair of upstanding legs 55 (FIG. 2) connected together at their upper portion and extending through opening 36 in bolt extension 20. The upper extremity of the legs 55 includes aligned notches 57 which are adapted to engage the sidewall 37 of opening 36 when the bolt is retracted. The locking bar 42 passes between legs 55 such that they are free to travel and rotate along a portion of its length. The radius arm 38, at its lower extremity, includes a pair of axially outwardly directed bosses or hubs 56 on each leg 55 which are journaled in the sides of housing extension 18. Mounting holes 58 in extension 18 are in alignment with an opening 60 provided in boss 56. The openings in the bosses or hubs 56 are provided for driving engagement with a drive bar (not shown) connected to an external key-operated lock mechanism and an internal manual lock actuating knob or turn control for operating the mechanism in a conventional manner.

The pin 50 is staked between the legs 55 of radius arm 38 and pivots in an arc with rotation of the hubs 56 in housing extension 18. The pin forms a cam between the legs of radius arm 38 and engages cam follower surface 48 of locking bar 42.

OPERATION

In a retracted position as shown in FIG. 3, radius arm 38 is rotated to its extreme clockwise position so that notch 57 abuts against the side of opening 36 in bolt extension 20. This prevents the bolt from being extended accidentally as by slamming the door. The free end of bias spring 40 is positioned on the upper portion of the locking bar 42 such that the bar is biased into contact with the top surface of abutment 34 positioned on the retractor bar. To extend the bolt, radius arm 38 is rotated in a counterclockwise direction (FIG. 4) so that the end of radius arm 38 will abut the lefthand side of opening 36 in retractor bar 20 and move bolt extension 20 and the bolt fixed thereto to the left. The bolt is thus shifted out of the housing into its extended dead bolt lock position. With this movement, pin 50 acting on cam surface 48 simultaneously lifts locking bar 42 slightly upwardly against the bias of spring 40 as the pin 50 passes along curved surface 48. As the pin reaches the end of cam follower surface 48 and the bolt reaches its extended position, end 60 of locking bar 42 is biased downwardly by spring 40 and into abutment with the righthand side of tab 34. The abutting of end 60 of locking bar 42 behind tab 34 prevents any inwardly directed forces acting on the bolt from sliding the bolt back into the housing. In addition to this bolt locking action between locking bar 42 and abutment 34, there is the second bolt locking feature that is achieved by the over-center position of actuator or radius arm 38. That is, when arm 38 is rotated sufficiently to throw the dead bolt to its extended position, arm 38 is over center such that its radially outer end drops in behind the upper crosspiece 35 of bolt extension 20, i.e., immediately ahead of opening 36. Hence, any attempt to push bolt 12 back into its housing will not only cause tab 34 to strike surface 60 of arm 42, but also would cause crosspiece 35 to strike the radially outer end of arm 38. Since arm 38 is then over center, the force will be along its length to its rotational mounting axis preventing the retractor and bolt from being so pushed. This not only provides a double lock safety when the bolt is fully extended, it also effects a latch if the bolt accidentally is not fully extended. Specifically, if the arm 38 is rotated sufficiently to throw the bolt only about 95 per cent of its full extension and latch arm 42 is not dropped behind tab 34, still arm 38 can be over center and behind crosspiece abutment 35 to resist the bolt being pushed back into its housing. While this is not as effective as the main latch noted, still a certain degree of safety is provided.

When the bolt is purposely retracted, a clockwise rotation of the radius arm causes the pin 50 to lift end 60 of locking bar 42 slightly above tab 34 while simultaneously, the end of the radius arm acting against opening 36 in retractor bar 20 draws bolt 12 inwardly to assume the position shown in FIG. 3. Cam surface 48 is provided in locking bar 42 so that, as the pin 50 passes from extreme counterclockwise to an extreme clockwise position, the latch will not be lifted an excessive amount as only a slight movement of end 60 is required to shift between engaging and disengaged positions with tab 34.

As the bolt is shifted into retracted position as shown in FIG. 3, the pin 50 completes its clockwise travel along cam surface 48 and below the step 49. Simultaneously, the radius arm 38 acts against the side wall 37 of opening 36 in the bolt extension. With complete retraction of the bolt, the notches 57 at the end of the radius arm fall into abutting position with the side wall 37 of opening 36. At the same time the locking bar 42 is turned downwardly by spring 40 such that step 49 on cam surface 48 acts against pin 50 holding the radius arm in position. This double locking action prevents any forces acting on the mechanism from inadvertently extending the bolt.

From the foregoing description and drawings, it will become readily apparent to those skilled in the art that the present invention provides a novel latch mechanism

for use in a dead bolt lock construction. The latch is relatively simple in construction. It is cam actuated and spring biased into position such that it may be mounted in relatively any orientation without fear of the consequences of improper installation. The component parts making up the completed latch assembly are formed by relatively inexpensive manufacturing techniques as by stamping and bending, thereby resulting in a latch assembly which is relatively low in cost. The device is effective even for a large bolt throw of say, about 1 inch. It effects a double lock against inadvertent or unauthorized dead bolt retraction and inadvertent extension.

While a preferred embodiment of the invention has been described and illustrated in detail, it will be recognized that other embodiments and modifications of this invention incorporating the teachings hereof may be readily made in the light of this disclosure. Therefore, all modifications employing the principles of this invention are to be considered as included in the appended claims unless these claims by their language expressly state otherwise.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows.

1. In a dead bolt lock construction having a frame; a bolt housing; a bolt shiftable between extended and retracted positions; a bolt extension slidably mounted on said frame connected to said bolt, extending along said frame; and actuating means operating on said bolt extension for shifting said bolt between said positions, the improvement comprising:

latching means for said bolt shiftable between latching and nonlatching positions to hold said bolt in extended position, said latching means including abutment means on said bolt extension;

an arm member slidably received in said bolt extension;

means pivotally mounting said arm member on said frame at a rearward portion thereof, said arm member extending toward said bolt and shiftable into abutting relationship with said abutment means when said bolt is in extended position, said actuating means having radially outwardly extending arms thereon straddling said arm member and extending into operative engagement with said bolt extension for shifting same;

means for shifting said arm member out of abutting relationship with said abutment means with shifting of said bolt to retracted position.

2. The lock construction as defined in claim 1 wherein said shifting means includes a cam fixed on said actuating means, said arm member engageable with said cam to pivot said arm about said frame in response to movement of said actuating means to thereby shift said latching means between said positions.

3. The lock construction as defined in claim 2 and further including biasing means operative against said latching means to hold said latching means in abutting relationship with said abutment means.

4. The apparatus as defined in claim 1 wherein said actuating means comprises a radius arm having one end thereof pivotally mounted in said frame; and cam means extending radially outwardly from said one end for operative engagement with said arm member to shift same between latching and nonlatching positions.

5. The apparatus as defined in claim 4 and further including means on the other end of said radius arm engaging said bolt extension for shifting same between said positions, said means including engaging means cooperably engageable with said bolt extension for locking said bolt in said positions.

6. The latch bolt mechanism as defined in claim 3 and further including second latching means for said bolt, said second latching means including second abutment means on said bolt extension cooperably engageable with said extending arm member on said actuator means when said bolt is extended, shiftable out of abutting relationship when said bolt is retracted.

7. The dead bolt lock construction as defined in claim 6 and further including third latching means for said bolt; third abutment means on said retractor bar for said third latching means, said third latching means including means on said actuating means engageable with said third abutment means when said bolt is retracted holding same in retracted position to thereby prevent inadvertent extension thereof.

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