March 24, 1964 W. R. ANDREWS 3,126,218

DOOR LATCH

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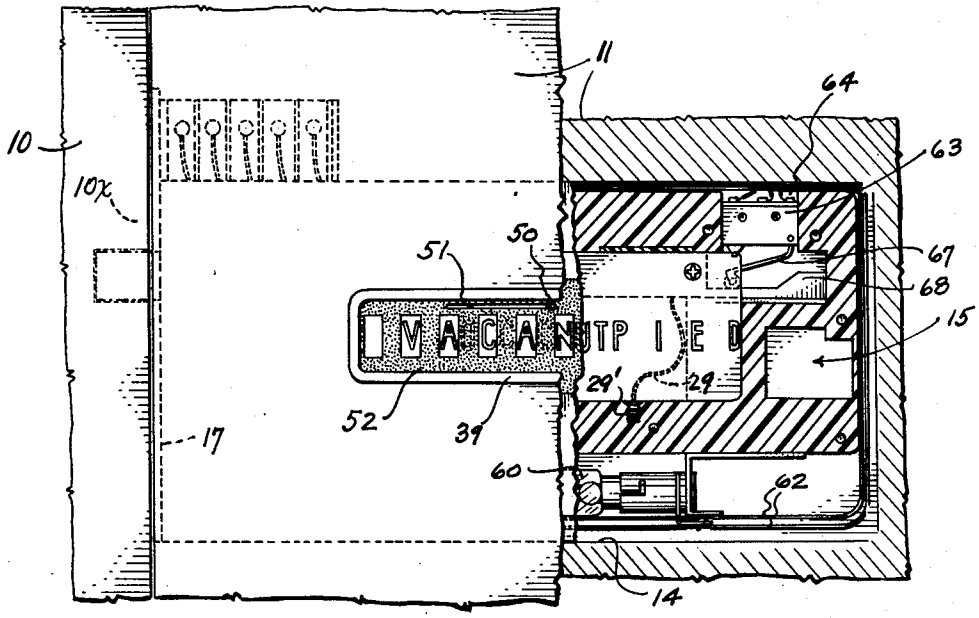


Fig. 1.

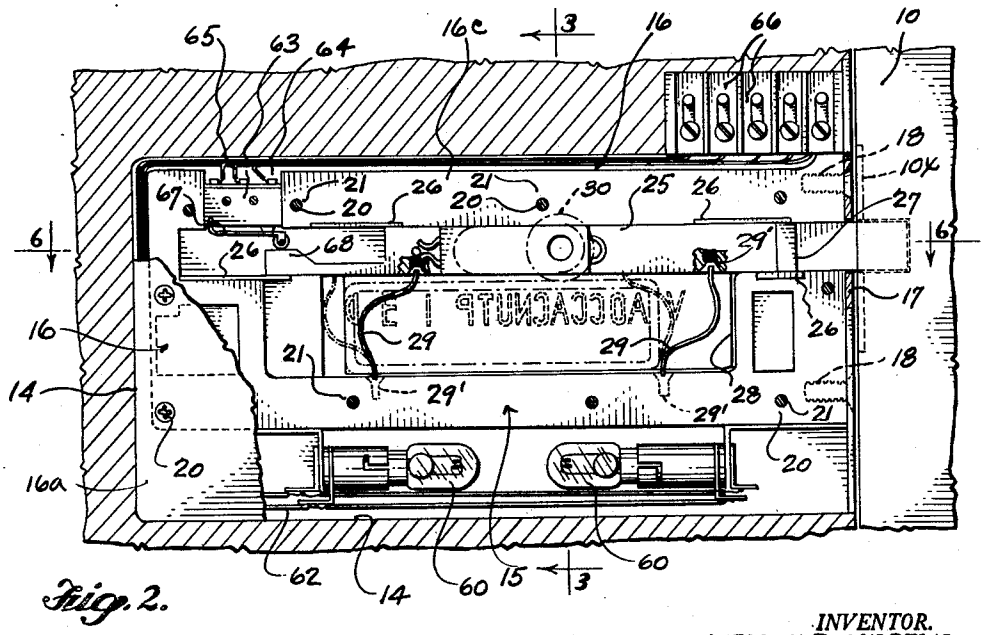


Fig. 2.

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Fig. 3.

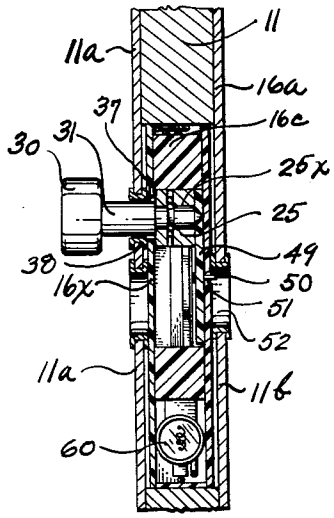
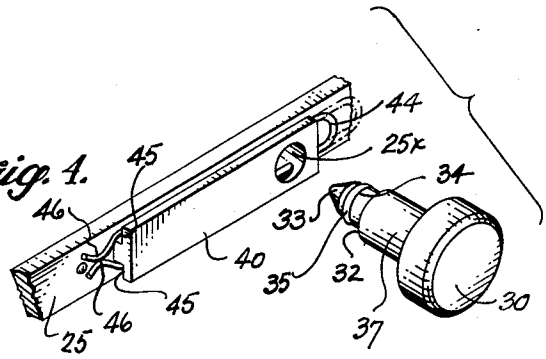


Fig. 4.



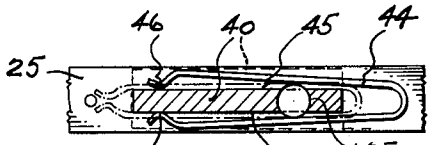


Fig. 5.

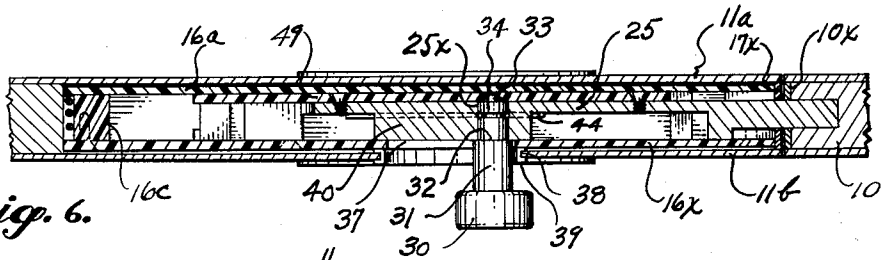
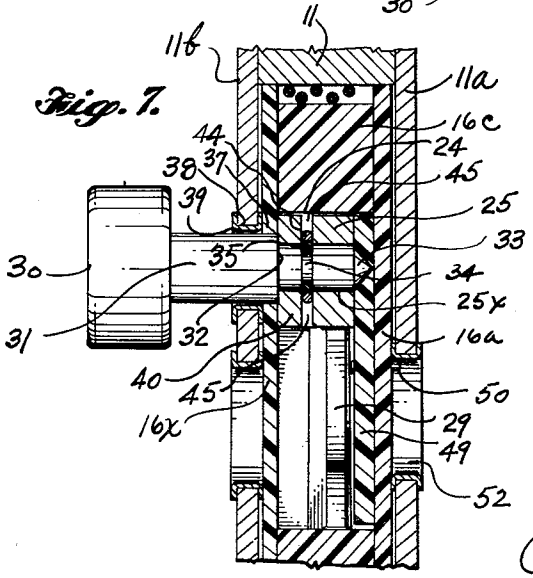


Fig. 6.

Fig. 7.



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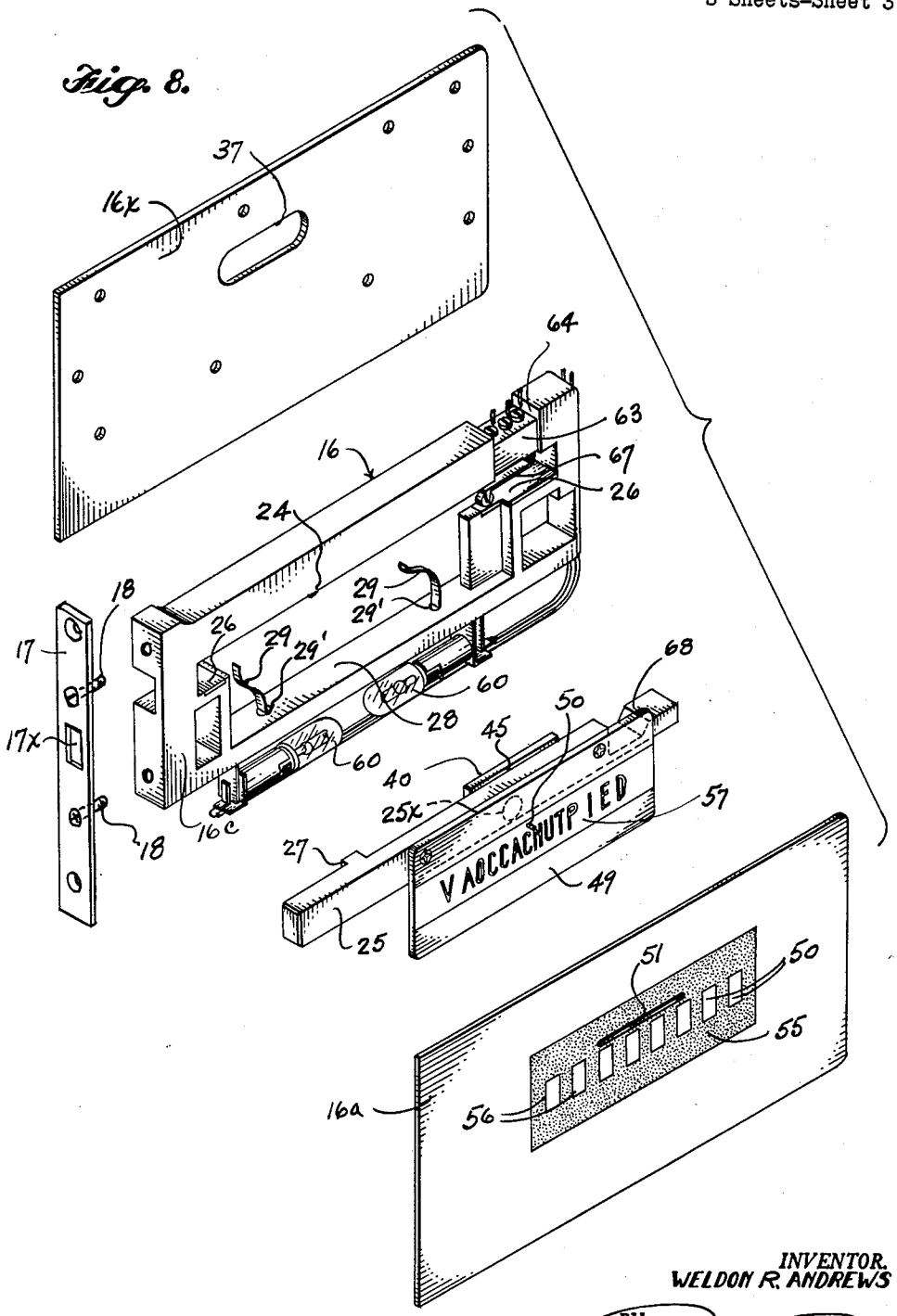
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Fig. 8.



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DOOR LATCH

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2 Claims. (Cl. 292—175)

This invention relates to improvements in door latches of sliding bolt types. More particularly, it has reference to a door latch designed for use in aircraft interiors, for example, in a lavatory door, but it is not to be restricted to doors of any particular kind or to doors applied in any particular places of use.

It is one of the principal objects of this invention to provide a door latch of sliding bolt type, with or without self illumination and which, incident to locking and unlocking movements of its sliding bolt to predetermined limits, positions visual means for designating whether the compartment which the latch serves is vacant or is occupied.

It is also an object of this invention to apply a letter card to the latch bolt, which card, upon being moved by the bolt to its opposite limits of travel will coact, respectively, with transparent and covered areas of a window overlying the latch housing, to visually establish the information of whether the compartment is occupied or vacant.

A further object of the invention is to provide the latch with a sliding bolt having a yieldable over dead-center spring action that will operate to actuate the bolt, after an initial over center moving force has been manually applied thereto, to move it to and hold it yieldingly at one or the other of its predetermined limits of sliding travel.

Another object of the invention is to provide the latch bolt with a knob for its manual actuation from inside the compartment, and also to provide the bolt with a novel emergency release pin for its actuation from outside the compartment.

Yet another object of the invention is to equip the latch housing with internal illumination for the letter card by use of incandescent lamps operable under control of switches that are located within or adjacent the latch housing for operation to "on" or "off" adjustment by means of cams that are formed on or are movable with the latch bolt.

Further objects and advantages of this invention reside in novel features of construction and mode of securement of the bolt actuating knob to the bolt; in the arrangement of circuit terminals and light controlling switches and in the providing of the latch housing with a novel mounting plate for its functional securement in a door or frame.

Still further objects of the invention reside in the details of construction and combination of parts employed and in their assembly and mode of operation, as will hereinafter be fully described.

In accomplishing these and other objects of the invention, I have provided the improved details of construction, the preferred forms of which are illustrated in the accompanying drawings, wherein:

FIG. 1 is an elevation, showing an outside view of a portion of a doorway casing and an adjacent portion of a swinging door in which the present latch mechanism has been installed; parts being broken away from the door and latch housing to better disclose the disposition of the latch in the door and the relationship of parts as contained in the latch housing.

FIG. 2 is a similar view, showing the disposition of the latch from the inside of the door; the near side wall facing of the door and a part of the cover plate of the latch

housing being broken away for better showing of parts inside the housing.

FIG. 3 is a cross-sectional view of the door and latch as contained therein, taken on line 3—3 in FIG. 2.

FIG. 4 is a perspective view of parts associated with the latch bolt for releasably securing the actuating knob thereto.

FIG. 5 is a sectional detail of parts shown in FIG. 4, particularly illustrating the positioning and use of the knob holding clip.

FIG. 6 is a horizontal section taken on line 6—6 in FIG. 2, showing the disposition of the bolt in the latch housing.

FIG. 7 is an enlarged sectional detail of parts of the bolt and knob.

FIG. 8 is an exploded view of the latch, showing various parts thereof in perspective and in separated relationship.

Referring more in detail to the drawings:

In FIG. 1, 10 designates a portion of a doorway casing and 11 designates the latch containing portion of a door that is mounted to swing between closed and open positions in the doorway. As shown in FIG. 1, the door 11 is in its closed position relative to the casing 10, and is shown as being formed with a mortise, pocket, or recess 14 in which the latch mechanism of this invention, designated in its entirety in this view by reference numeral 15, has been installed.

The latch mechanism 15 comprises a rectangular enclosing housing 16 as shown best in FIG. 8. At its outer end this housing has a metal plate 17 fixed thereto by screws 18—18 and the plate, which has its end portions extended above and below the housing, has holes therein through which suitable attaching screws may be applied to hold the housing properly in place in the door. Preferably this frame 16 is an injection molding of cellulose acetate butyrate, commonly referred to as Tenite #2.

It is further shown in FIG. 3 that the rectangular "Tenite" frame or housing 16 is approximately ½ inch thick. It comprises a core portion designated in this view by reference numeral 16*c* and this core is covered or closed at one side by a thin wall plate 16*a* which may be attached to or formed integral therewith and at its opposite side has a thin transparent cover plate 16*x* applied thereto and removably secured in place by a plurality of counter sunk screws 20, as shown in FIG. 2, these screws being threaded onto self-locking inserts 21 embedded in the marginal portion of the frame core 16*c*.

It is to be observed by reference to the core portion 16*c* of frame 16 as shown in FIG. 8 that it is formed within its boundaries with a narrow, elongated longitudinal channel or slot 24 in which a metal latch bolt 25 is reciprocally contained for predetermined endwise movement; opposite end portions of the bolt being slidably supported for their reciprocal movement on slides 26 that are fused to shouldered portions of the core block in the top and lower surfaces of the bolt containing slot 24 as seen in FIG. 2. One end of the bolt 25 is reduced in thickness and when the bolt is activated from "retracted" to "extended" or door latching position, this reduced end portion will be projected from the latch housing through an opening 17*x* in plate 17 and into the door keeper plate 10*x* that is attached to the door casing as shown in FIG. 5.

The bolt 25 is shouldered near this reduced end, as at 27 in FIG. 2 to engage with plate 17 thus to limit its outward sliding movement. The inward travel of the bolt is limited by its inner end engaging the inner end wall of the bolt guiding channel or slot 24, as has been shown in FIG. 1.

It has been shown in FIGS. 2 and 7 that the core portion 16*c* of the latch housing is formed with an elongated pocket or recess 28 immediately below and opening up-

wardly into the bolt guide slot 24 and in this pocket a pair of leaf springs 29 and 29 are contained under compression, to coact in applying moving force against the bolt 25 to actuate it to one limit of travel or the other, after it has been manually shifted, as will presently be described, over a dead-center position by means of the bolt moving knob.

These leaf springs 29—29 are shown in FIG. 2 as having their opposite end portions retained in the cross channels of screws 29′ applied to the under edge of the bolt 25 and to the top edge of the lower bounding surface of the pocket 28; the springs having such length as to cause them to be bowed, as shown in FIG. 2 and thereby to be maintained under compression for the full movement of the bolt in both directions.

The means for manually shifting the latch bolt 25 between latching and unlatching positions comprises a knob 30 that is applied to the bolt in the manner shown best in FIGS. 3 and 7. The knob 30 has a stem 31 that is formed near its inner end with an encircling shoulder 32 and which stem terminates in a conically tapered point 33. Between the shoulder 32 and point 33, the stem has a diametrically reduced portion formed with an encircling channel 34 in which a small O-ring 35 is fitted.

The transparent cover plate 16*x* applied to the knob side of the latch housing or frame 16 is formed with a horizontally directed slot 37 as observed in FIGS. 3 and 8.

It is further to be understood, particularly by reference to FIG. 3, that when the latch is properly installed in the recess 14 of the door 11, its housing is contained rather snugly between the opposite facing plates 11*a* and 11*b* of the door, covering the recess or pocket 14 as in FIG. 3, and it is further shown that the horizontal slot 37 of the housing cover plate 16*x* registers with a similar elongated slot 38 in the facing plate 11*a* of the door. Slot 38 has a grommet 39 applied to its bounding edges and it has been shown in FIG. 3 that the stem 31 of knob 30 passes through this grommet and has its diametrically reduced inner end portion fitted in a hole 25*x* in the bolt 25 for the reciprocal actuation of the bolt.

When the knob stem 31 is thus properly seated, the shoulder 32 of the stem engages a side plate 40 that is formed lengthwise of and on the bolt, as shown in FIGS. 4 and 6. The relationship of bolt, knob, stem and plate as assembled is as best shown in FIG. 6. It is also to be observed, by reference to FIGS. 3 and 8, that when the stem 31 is thus seated, it is yieldingly secured against accidental release by an elongated U-shaped spring clip 44 that is applied along plate 40 as in FIGS. 4 and 5, with its opposite leg portions slidably contained in channels 45—45 formed in and along upper and lower edges of the side plate 40 and passing through upper and lower edges of the hole 25*x*. Thus legs of the spring clip 44 as retained in the side plate channels, may yieldingly engage with and by their clamping pressure against the O-ring seated in the stem channel, hold the knob in position of use. It is further shown in FIG. 5 that the legs of the U-shaped clip 44 have inwardly formed cam-like portions 46 adjacent their ends whereby the clamping action of the clip legs may be relieved for removal of the knob by pulling the clip outwardly along the channels of the plate. When the clip, as seen in FIG. 5, is shifted to its limit to the left, these cams 46—46 disengage the plate 40 and the full clamping action of the legs of the clip are then applied to the stem of the knob. However, when the clip is pulled to the right, as to its full line showing in FIG. 5, the cams 46—46 ride into and along the bases of the channels 45—45 and as they approach the stem of the knob, they cause the clip legs to be spread apart to such extent as to release their hold on the knob stem.

If the door 11 should be locked by the latch bolt and it should become desirable that it be unlatched from the outside of the door, this may be accomplished by the following means: Fixed to the bolt 25 to extend along one side thereof is the previously mentioned letter plate 49 and fixed in this is a stud 50 which extends toward the outside of the housing and into a horizontal slot 51 formed horizontally in the cover plate 16*a* of the latch housing, to move therein with the reciprocal movements of the bolt. The letter plate 49 is positioned for exposure to the outside of the door through a horizontal window 52 provided in the facing plate 11*a* of the door 11 as shown in FIG. 1, and it is shown in this view that the slot 51 and stud 50 are exposed in the top edge portion of the window 52. Thus, if it becomes necessary to actuate the bolt 25 from outside the compartment, a pointed tool, such as a nail or screw driver bit can be applied through window 52 to the slot 51 and against the stud 50 and pressure so applied as to retract the bolt from locking position. This slot and stud are inconspicuously exposed in the window 52 and not ordinarily noticed by persons using the door.

The transparent outside cover plate 16*a* of housing 16 is formed in the area thereof that is exposed to view through the window 52 with a blackened or opaque horizontal panel 55 which is formed with a succession of spaced transparent openings 56, here shown to be eight in number. The letter plate 49 that is fixed to the bolt 25 and which underlies the plate 16*a* as shown in FIG. 3, is provided on its outside face with a panel 57 that is lettered to spell out the word "Vacant" and with another series of letters that spell out the word "Occupied." The letters of these two words alternate in the line of letters and are so arranged in spacing that when the bolt is shifted to its door locking position, only the letters of the word "Occupied" are visible through the transparent openings of the blacked panel 55; the other letters being covered by the blacked areas between the transparent openings. Likewise, when the bolt is shifted to unlocked position, the letters of the word "Vacant" are exposed to view and all others are covered. Thus when the door is unlocked, a person approaching the doorway will note the word "Vacant." When the person has entered the compartment and has moved the bolt to door locking position, the notation will read "Occupied," to persons outside the door.

The moving of the bolt between locking and open position also illuminates the letter panel so that the visual indications of the latch may be more easily noted. This is effected by the following means:

It is to be noted by reference to FIGS. 1 and 2 that two small incandencent lamps 60—60 are supported from the housing 16 within the lower portion of the pocket 14. These lamps have circuit wire connections 62 joining them in parallel with a control switch 63 that is set in a pocket 64 in the top rail portion of core 16*c*. The switch has circuit connections 65 leading to current supply terminals 66 set in the door. The switch 63 has a circuit closing lever 67 extending into the path of travel of the bolt 25, for its actuation by a cam 68 formed on the inner end portion of the bolt. The operation is such that when the bolt moves to latched position, the switch closes and energizes the lamps. Light from the lamps illuminates the letter plate through the transparency of the core members. When the bolt is unlocked, the cam allows the switch to open the lamp circuit.

It is further to be explained that when the bolt movement may also operate through this switch to control the lighting of lamps in the latch controlled compartment.

One of the advantages of the latch construction herein disclosed is that it has but one moving part. This moving part is the sliding bolt. The bolt carries the letter plate 49 and the movement of the bolt actuates the electrical switches. The simplicity of construction and elimination of numerous moving parts reduces the cost of manufacture and increases the life of the latch.

The springs 29—29 provide assurance that the bolt is moved the full distance of travel in either direction so

that the proper lettering will be fully exposed and the door fully latched or unlatched. This added feature eliminates embarrassment to occupants and assures proper operation of the latch.

Another feature is that the electrical switching mechanism is such that the lights go on only when the bolt and lettering plate carried by the bolt are in proper position. The failure of the lights to go on warns the occupant that the bolt is not properly positioned.

What I claim as new is:

1. The door latch mechanism of the character described comprising a housing, a bolt mounting frame retained in fixed position between opposite sidewalls of said housing, a bolt slidably mounted in frame between opposite sidewalls of said housing for endwise shifting between locking and unlocking positions, a spring mounting block secured to said bolt on one side thereof, said bolt and mounting block having aligned holes formed therethrough, said housing having a slot formed in a sidewall thereof with which said bolt opening registers in the endwise movement of the bolt, a bolt actuating knob having a mounting shank, a channel formed in said shank, said mounting block having longitudinal channels formed in opposite sides thereof, said channels intersecting said hole in said mounting block, a U-shaped spring clip movably mounted on said mounting block with the legs thereof positioned in said longitudinal channel whereby the leg portions of said clip intersecting said hole in the mounting block are removably seatable in the channel formed in said mounting shank.

2. The door latch mechanism recited in claim 1 wherein said U-shaped clip extends beyond opposite ends of said mounting block, and said leg portions include inwardly offset camming portions at their free ends engagable with their respective channels to thereby hold said legs in divergence incident to the movement of said camming portions into the channels and thereby serving to effect the disengagement of the legs of said clip from the channel in the bolt shank to permit removal of said bolt.

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