Feb. 28, 1956 J. H. ROETHEL 2,736,590

VERTICAL SLIDE BOLT DOOR LOCK

Filed Sept. 9, 1954 2 Sheets-Sheet 1

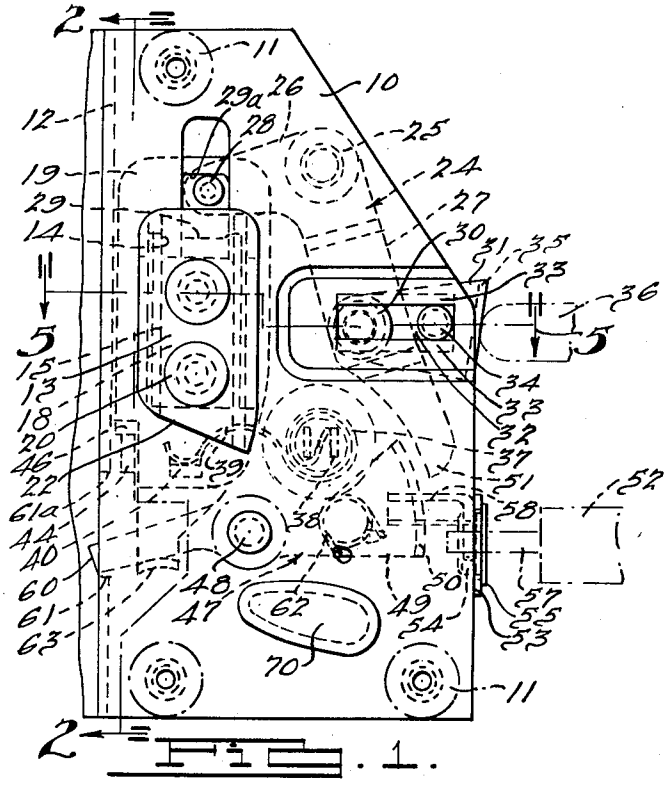


Fig. 1.

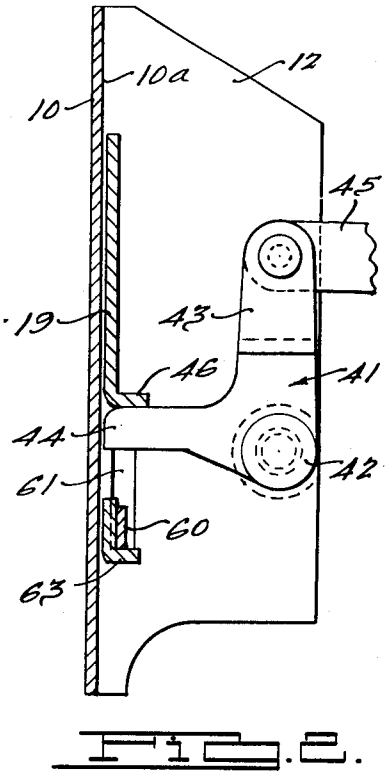


Fig. 2.

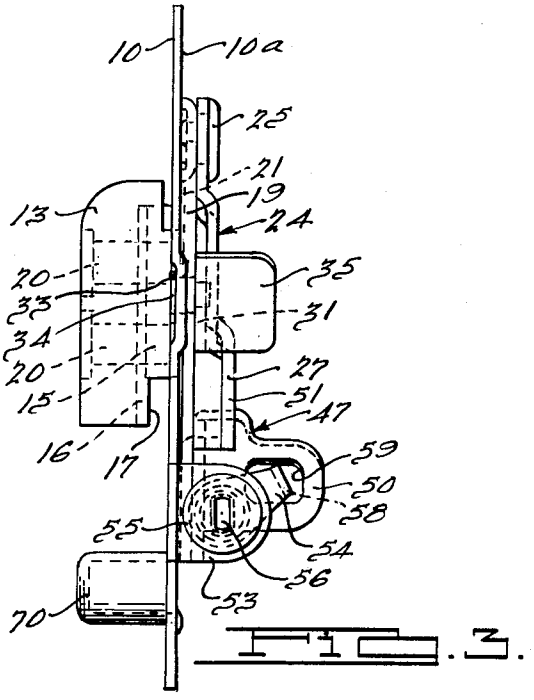


Fig. 3.

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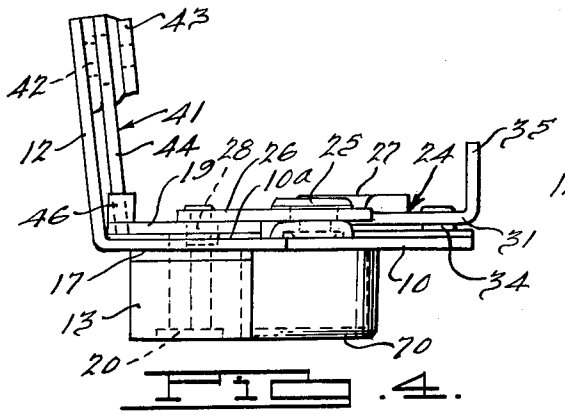



FIG. 4.

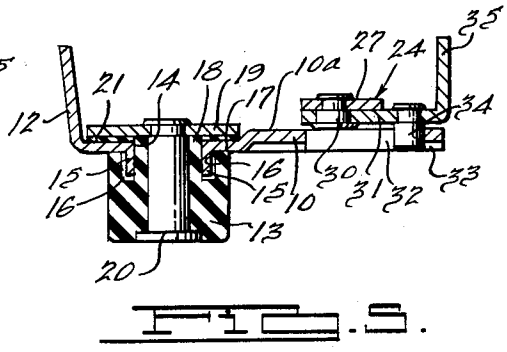



FIG. 5.

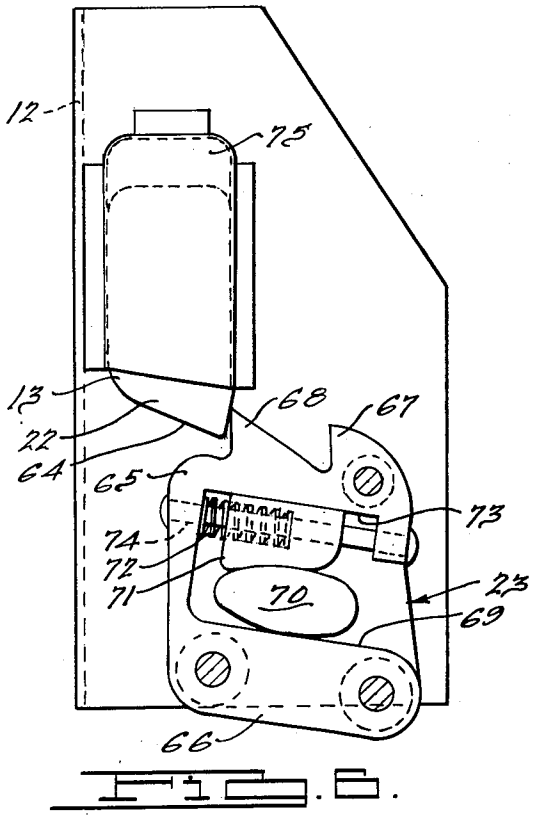



FIG. 6.

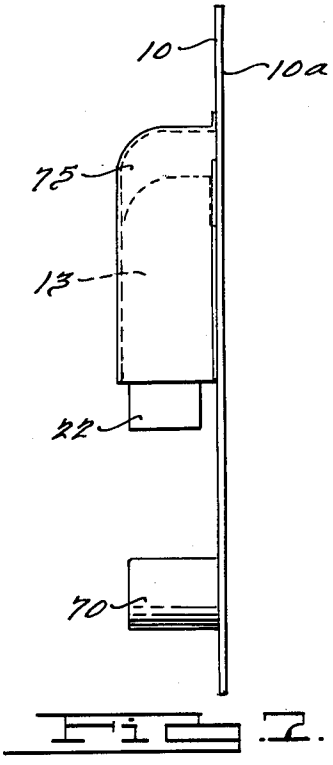



FIG. 7.

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# VERTICAL SLIDE BOLT DOOR LOCK

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Application September 9, 1954, Serial No. 454,940

6 Claims. (Cl. 292—165)

This invention relates to a latch control mechanism for swinging doors, particularly the doors of automobile or other vehicle bodies, an object of the invention being to provide an improved door latch mechanism which is characterized by its simplicity and compactness in construction, which is economical to manufacture, comparatively quiet in operation and efficient in use.

The improved door latch mechanism of the present invention comprises a substantially vertically slidable latch bolt normally urged into latching engagement with a striker or keeper device mounted on the body pillar, latch bolt release means for disengaging the latch bolt from the striker or keeper device, said release means including an actuator which is preferably a pivotally mounted lever, and a pivoted member having blocking means which may be positioned in blocking relation to a blocking portion on the release means actuator to render the latter inoperative to effect disengagement of the latch bolt from the striker or keeper device.

More particularly the door latch embodied in the present invention comprises a support having a main plate portion. A slidable latch bolt is mounted in a novel and improved manner on the plate portion for movement in a vertical direction, said bolt having a tooth like portion thereof normally projecting into keeper or striker engaging position. An actuator, preferably a pivotally movable lever, is mounted on the rear side of said plate portion, said actuator having a part thereof in opposing relation to a part of the means mounting said latch bolt for vertical movement. The actuator is adapted to be moved by outer manually operable means, such as a push button mounted in the outside door handle, and when so moved its part will abut the latch bolt and thereby lift the latch bolt in unlatching direction. The actuator is provided with a blocking portion thereon. A blocking means is mounted on the support, said blocking means preferably being a member pivotally mounted on the rear side of said plate portion, and being shiftable into blocking relation to the actuator blocking portion by manually operable means.

Other objects and features of this invention will appear in the following description and appended claims, reference being had to the accompanying drawings forming a part of the specification wherein like reference characters designate corresponding parts in the several views.

Fig. 1 is a front elevation of the latch mechanism of the present invention.

Fig. 2 is a view in part sectional taken substantially through line 2—2 of Fig. 1 looking in the direction of the arrows.

Fig. 3 is a side elevation of Fig. 1.

Fig. 4 is a top elevation of Fig. 1 and Fig. 2 combined.

Fig. 5 is a sectional view taken substantially through line 5—5 of Fig. 1 looking in the direction of the arrows.

Fig. 6 is a view illustrating the relationship in latched position of the latch bolt to the striker or keeper device.

Fig. 7 is a side elevation of a portion of Fig. 6.



Before explaining in detail the present invention it is to be understood that the invention is not limited in its application to the details of construction and arrangements of parts illustrated in the accompanying drawings, since the invention is capable of other embodiments and of being practiced or carried out in various ways. Also it is to be understood that the phraseology or terminology employed herein is for the purpose of description and not of limitation.

In the drawing there is illustrated, by way of example, a particular embodiment of the present invention as applied to the door and frame structure of an automobile. The embodiment of the invention herein illustrated comprises a case plate 10 provided with screw bosses 11 which are adapted to receive screws for fastening the case plate to the jamb portion or free edge wall of the door, the case plate 10 having a flange 12 which is adapted to be positioned along the inner panel of the door. The case plate when mounted on the door has its longitudinal axis extending substantially in the direction of the substantially vertical longitudinal axis of the door.

The present latch mechanism is preferably provided with a vertically slidable latch bolt 13 positioned at the outer face of the case plate 10. The illustrated latch bolt 13 is preferably molded of plastic material such as nylon, which is characterized by its low coefficient of friction when sliding on steel and which has low adhesion to ice and therefore will not readily freeze to the case plate under adverse moisture accumulation during cold weather.

The manner in which the latch bolt 13 is retained and guided for up and down movement on the case plate 10 is best seen in Fig. 5. The case plate 10 is provided with a vertically extending aperture 14, each vertical edge of the aperture having an outwardly projecting flange 15. The latch bolt 13 is provided with two parallel recesses 16 in the inner face 17 thereof to accommodate the flanges 15, the bolt 13 thus being guided in its up and down movement by the relationship between the flanges 15 and the wall surfaces of the recesses 16. The center section 18 of the bolt projects through the aperture 14 beyond the inner face 10*a* of the case plate 10. A metal plate 19 is provided to retain the bolt 13 on the plate portion 10. Two rivets 20 project through the body of the bolt 13 and the metal plate 19 to secure the two together. To ensure that the metal plate 19 will slide on the inner face 10*a* of the plate portion 10 with a minimum of friction, a nylon shim 21 is interposed therebetween. The latch bolt 13 is provided with a toothlike projection 22 on the lower edge thereof, the toothlike projection being adapted to engage a striker or keeper, as illustrated in Fig. 6, the keeper being generally designated 23.

Associated with the bolt is a latch bolt release actuator which is preferably a lever, generally designated 24, which is pivoted upon a shoulder rivet or stud 25. The release lever 24 is mounted on the inner face 10*a* of the case plate and is provided with two arm portions, one arm portion 26 extending at a slight angle below the horizontal from the pivot stud 25 toward the flange 12 and the second arm portion 27 extending in a substantially vertical direction downwardly. The arm portion 24 has mounted on the swingable end thereof a horizontally extending roller 28 adapted to project through aligned apertures in the plate 19, the shim 21 and the case plate 10. The roller 28 underlies the upper edge 29*a* of the aperture 29 in the plate 19. By virtue of this construction, the release lever 24 and the plate 19 are so related that if the release lever is swung in a clockwise direction as used in Fig. 1, the roller 28 will abut the edge 29*a* of the plate causing the same to be lifted upwardly. Since the nylon bolt 13 is secured to the plate 19, upward move-

ment of the metal plate 19 will result in movement of the latch bolt 13 in unlatching direction.

The downwardly extending arm 27 of the lever 24 has pivotally mounted thereon by a pivot stud 30 an extension member 31. The extension member 31 is pivotally mounted on the lever arm 27 intermediate the ends thereof. Provision is made for guiding the extension member 31 for in and out movement in a substantially horizontal direction. A horizontally extending aperture 32 having outwardly extending horizontal flanges 33 at the edges thereof is provided in the case plate 10. The extension member 31 is provided with a pin 34 which projects between the flanges 33 thereby being guided for movement in a substantially horizontal direction. The extension member 31 is provided at the outer edge thereof with a flange 35, this flange being adapted to be engaged by an outside manually operable means, such as a push button 36. Upon the extension member 31 being pushed inwardly upon engagement of the flange 35 thereof by the push button 36, pivotal or swinging movement will be imparted to the release lever 24 thereby causing the same to be swung in a clockwise direction to cause unlatching movement of the latch bolt 13.

The latch bolt 13 is yieldingly urged toward the latching direction, that is, downwardly, and the release lever 24 is urged toward its normal position shown in Fig. 1 by a single spiral spring 37. The spring 37 is anchored at its inner end to a kerf 38 formed from lugs lanced out of the surface of the case plate 10. The spring has a horizontally extending arm 39 engageable with a projection 40 extending laterally from the surface of the plate 19. The spring 37 urges the plate 19 downwardly at all times, thereby urging the latch bolt downwardly at all times so as to yieldingly maintain the toothlike projection 22 thereon in striker or keeper device 23 engaging position. Because of the abutting relation of the metal plate edge 29*a* with the roller 28 on the end of the release lever arm 26, the spring 37 will also function to urge the release lever 24 in a counterclockwise direction, as viewed in Fig. 1, about the lever or pivot axis 25. Thus, the single spring 37 is utilized to maintain the latch bolt 13 and the release lever 24 in their normal positions.

The present latch mechanism incorporates a remote control mechanism so constructed as to permit movement of the latch bolt 13 independently of the release lever 24. This remote control mechanism comprises a bell crank lever 41 preferably manually actuatable from the inside of the door remote from the case plate 10 by means of a door handle (not shown) mounted on the inner panel of the vehicle door. Referring particularly to Fig. 2, the bell crank lever 41 is shown pivotally mounted on a flange 12 by means of a pivot or shoulder stud 42. The bell crank lever 41 is provided with a substantially upwardly extending arm 43 and a substantially horizontally extending arm 44, the arm 43 being adapted to be connected by a draft link 45 to the inside door handle mechanism. The bell crank lever arm 44 at its free or swingable end underlies a lug 46 located at the lower left corner of the plate 19, as viewed in Fig. 1. Movement of the bell crank lever 41 in a clockwise direction, as viewed in Fig. 2, will cause the end of the arm 44 to abut the lug 46 thereby to lift the plate 19 and the latch bolt 13 upwardly against resistance of the spring 37.

In the present embodiment means is provided for restraining or blocking the release lever 24 against operation from the outside of the door. The blocking means comprises a lever 47 pivoted intermediate its ends on a shoulder stud 48 secured to the inner face 10*a* of the case plate 10. As best seen in Fig. 1, the pivot axis of the blocking lever 47 is located below the pivot axis of the release lever 24. The lever 47 extends in a substantially horizontal direction. On one end 49 the lever is provided with a flange 50, which flange, when the blocking lever 47 is in the position shown in Fig. 1, lies in the path of inward swinging movement of the lower end or blocking portion 51 of the lever arm 27 and thereby blocks swinging movement of the lever arm in a clockwise direction, as viewed in Fig. 1. Since it is necessary for the release lever 24 to swing in such clockwise direction in order that the lever roller 28 will abut the metal plate edge 29*a* to raise the plate 19 and the latch bolt 13, the relationship of the flange 50 to the blocking portion 51 of the lever arm, as shown in Fig. 1, renders the outer manually operable means, such as the push button 36, inoperative to release the latch mechanism from the outside of the door and the door cannot be opened.

In the present embodiment the blocking lever 47 may be shifted into or out of blocking position from either the inside or the outside of the vehicle door. From the outside of the door this movement is accomplished by turning a key in a conventional key operated cylinder locking mechanism, a portion of which is schematically shown and designated 52. As best viewed in Fig. 3, the plate portion 10 is provided with a small flange 53 having pivotally mounted thereon a crank arm 54. The crank arm 54 is rigidly secured to a tubular rivet 55 which is rotatably secured to the flange 53. The tubular rivet is provided with a rectangular aperture 56 adapted to receive the conventional rectangular cross-section shaft 57 of the key cylinder mechanism 52. The crank arm 54 is provided at the free or swingable end thereof with a projection 58 engageable with the edge walls of a rectangular aperture 59 in the blocking lever flange 50. By turning the key in the key cylinder mechanism the crank arm 54 may be swung to shift the blocking member 47 in one direction or the other either to position the blocking lever blocking flange 50 in its blocking position shown in Fig. 1 or in its non-blocking position. The key control means is usually embodied in the front door latch mechanism of an automobile body but is usually omitted from the latch mechanism used on the rear doors.

In the present embodiment the remote control operated bell crank lever 41 is utilized to swing the blocking lever 47 into blocking position on the inside of the vehicle door. The blocking lever 47 is provided with a horizontal arm or extension 60 which extends in the general direction of the flange 12 of the case plate 10. When the blocking lever 47 is in non-blocking position, the arm or extension 60 will immediately underlie the lower edge of the bell crank lever arm 44. When in such relationship, movement of the bell crank lever 41 in a counterclockwise direction, as viewed in Fig. 3, by manipulation of the inside door handle in the direction opposite to that in which it is normally swung to open the vehicle door, will cause the lower edge of the bell crank arm 44 to abut the arm or extension 60 and thereby swing the blocking lever 47 in a counterclockwise direction as viewed in Fig. 1, thereby positioning the blocking flange 50 thereon in blocking position relative to the lever 24.

It will be noted that the end of the blocking lever arm 60 extends through an aperture 61 in the flange portion. The upper and lower edges of the aperture 61 limit the range of movement of the blocking lever 47. A toggle spring 62 is provided having one end seated in an aperture in the case plate and its other end in an aperture in the blocking lever. The toggle spring 62 yieldingly urges and holds the blocking lever 47 toward its upper and lower limits of movement.

The plate 19 is provided with a downwardly extending portion having a horizontally extending lug 63 turned away from the flange thereon. As shown in Figs. 1 and 2, the lug 63 is adapted to underlie the arm or extrusion 60 of the blocking lever 47. The lug 63 is adapted to automatically swing the blocking lever 47 from release lever blocking position to non-blocking position in the event that the latch mechanism is released by actuation of the door handle on the inside of the vehicle door while

the blocking lever is in blocking position or in the event that the blocking lever is placed in blocking position while the vehicle door is in an opened position and the vehicle door is then swung shut. This feature of construction is referred to as the kick-out means, that is, a means for automatically restoring the blocking lever to non-blocking position to prevent the vehicle door from being inadvertently locked. When the lug 63 and the blocking lever arm or extension 60 are in the relative positions shown in Figs. 1 and 2, upward movement of the plate 19 and therefore of the lug 63 will cause it to abut the blocking lever arm or extension 60 and will cause the blocking lever 47 to be swung downwardly to a position in which the toggle spring 62 will cross its dead center position and urge the blocking lever 47, and, accordingly, the blocking flange 50 thereon, to its fully non-blocking position as governed by the edge 61*a* of the aperture 61 in the case plate flange 12.

It will be noted that the latch bolt projection 22 has an inclined leading edge 64 which upon engagement with the striker or keeper device 23 as the vehicle door is moved from an open to a closed position acts to cam the latch plate upwardly. Since the release lever roller 28 lies below the abutting edge 29 of the plate 19 and the bell crank lever arm 44 lies below the abutting edge or lug 45 on the plate 19, upward movement of the latch plate or bolt upon engagement with the striker or keeper 23 is independent of and does not result in any movement of the release lever 24 or bell crank 41. This independent movement of the latch bolt 13, through the abutting relation of the lug 63 to the blocking lever 47, if the latter is in blocking position, as shown in Figs. 1 and 2, will automatically restore the blocking lever to non-blocking position.

Fig. 6 illustrates the cooperative relationship between the latch bolt 13 and the keeper or striker device hereinbefore generally designated 23, to hold the vehicle door in latched position. In general, the keeper or striker 23 comprises a C-shaped structure having upper and lower body portions 65 and 66 respectively. The upper body portion 65 is formed at its upper edge with two integral upstanding toothlike projections 67 and 68 which the latch bolt projection 22 is adapted to engage to hold the door in either safety or final locking position. When the projection 22 is in engagement with the keeper tooth 67 the door is in safety latching position and when the projection 22 is in engagement with the tooth 68 the door is in final latching position.

The upper surface 69 of the lower body portion 66 forms a ramp engageable by a suitable contoured dovetail or abutment 70 fastened to the front face of the case plate 10. A yieldable wedging means is carried on the underside of the upper body portion 65 of the striker device and engages the upper surface of the dovetail or abutment 70 to firmly hold the door against vibratory movement in a vertical plane. The wedging means in the present instance comprises a wedge block 71 controlled by a compression spring 72, the wedge block and spring being slidably retained within a recess 73 in the lower surface of the upper body portion 65 by means of a guide rod 74 fastened to the end walls of the recess 73. The spring 72 is installed under initial compression and urges the wedge outwardly or to the right as viewed in Fig. 6. During closing movement of the door, the wedge block 71 is carried inwardly to some extent against the resistance of the spring 72, the wedge block tending to tighten itself against the upper surface of the abutment 70 and hence maintain the latch bolt projection 22 in engagement with the striker or keeper tooth 68 and also minimizing any possible vibratory movement of the vehicle door.

It will be noted that, although a compression spring 37 is provided to urge the latch bolt 13 downwardly into latching engagement with the striker or keeper 23, the latch bolt 13 being movable in a substantially up and down direction will normally tend to maintain itself in latching engagement with the striker or keeper. Thus, even if the spring 37 should ultimately fail, the vehicle door may still be latched so as to be maintained in a closed position until repairs can be made. This will, of course, be recognized as being an important feature from a safety standpoint.

If it is desired to cover up the latch bolt 13, a shell-like housing 75 having an opening 76 at the lower end thereof may be readily affixed in any convenient manner to the front face of the case plate 10, as shown in Figs. 6 and 7.

I claim:

1. In a latch mechanism for a swinging door, a support having a plate portion for disposition at the jamb edge of the door, a vertically slidable latch device, said latch device comprising a bolt member projecting from the outer face of said plate portion, said bolt member having a part thereof projecting through an aperture in said plate portion, a plate member, means securing said plate member to said bolt member part, said bolt member and plate member each being retained in slidable association with the outer and inner faces respectively of said plate portion, said bolt member having a striker engaging portion at the lower end thereof, spring means for urging said plate member and thus said bolt member downwardly, a bolt release member mounted on said plate portion and having a part extending in opposing relation to a part of said plate member, said release member having a portion shiftable by outer manually operable means transversely of the door in the direction of the inner edge of the plate portion to cause said parts to abut and raise the plate member and thereby the bolt member out of striker engagement, and means movable into and out of position for blocking operation of said release member.

2. In a latch mechanism for a swinging door, a support having a plate portion for disposition at the jamb edge of the door, a latch device, said latch device comprising a bolt member projecting from the outer face of said plate portion and having a part thereof projecting through an aperture in said plate portion, said aperture having vertically extending flanges at the vertical edges thereof, a plate member, means securing said plate member to said bolt member part and retaining both in slidable association with the inner and outer faces respectively of said plate portion, means on said bolt member cooperating with said vertically extending flanges thereby guiding said bolt member and plate member for movement in a substantially up and down direction, said bolt member having a striker engaging portion at the lower end thereof, spring means engageable with said plate member for urging the same and thereby said bolt member downwardly, a bolt release member mounted on said plate portion and having a part extending in opposing relation to a part of said plate member, said release member having a portion shiftable by outer manually operable means transversely of the door in the direction of the inner edge of the plate portion to cause said parts to abut and raise the plate member and thereby the bolt member out of striker engagement, and means movable into and out of position for blocking operation of said release member.

3. In a latch mechanism for a swinging door, a support having a plate portion for disposition at the jamb edge of the door, a latch device, said latch device comprising a bolt member projecting from the outer face of said plate portion and having a part thereof projecting through an aperture in said plate portion, said aperture having vertically extending flanges at the vertical edges thereof, a plate member, means securing said plate member to said bolt member part and retaining both in slidable association with the inner and outer faces respectively of said plate portion, means on said bolt member cooperating with said vertically extending flanges thereby guiding said bolt member and plate member for movement in a substantially up and down direction, said bolt member

having a striker engaging portion at the lower end thereof, spring means engageable with said plate member for urging the same and thereby said bolt member downwardly, a lever means pivotally mounted on said plate portion, said lever means having a first arm engageable by outer manually operable means and a second arm having a part thereof arranged in opposing relation to a part of the plate member, said lever means being swingable by said outer manually operable means to cause said parts to abut and raise the plate member and thereby the bolt member out of striker engagement, one of said lever means arms having a blocking portion, and a swingable member mounted on said support and having a part movable in a substantially up and down direction having blocking means for cooperation with said blocking portion, said swingable member being movable to dispose said blocking means in position to be engaged by said blocking portion thereby to block said lever and render the same ineffective to move said latch device into door unlatched position.

4. In a latch mechanism for a swinging door, a support having a plate portion for disposition at the jamb edge of the door, a latch device, said latch device comprising a bolt member projecting from the outer face of said plate portion and having a part thereof projecting through an aperture in said plate portion, said aperture having vertically extending flanges at the vertical edges thereof, a plate member, means securing said plate member to said bolt member part and retaining both in slidable association with the inner and outer faces respectively of said plate portion, means on said bolt member cooperating with said vertically extending flanges thereby guiding said bolt member and plate member for movement in a substantially up and down direction, said bolt member having a striker engaging portion at the lower end thereof, spring means engageable with said plate member for urging the same and thereby said bolt member downwardly, a lever means pivotally mounted on said plate portion, said lever means having a first arm engageable by outer manually operable means and a second arm having a part thereof arranged in opposing relation to a part of the plate member, said lever means being swingable by said outer manually operable means to cause said parts to abut and raise the plate member and thereby the bolt member out of striker engagement, one of said lever means arms having a blocking portion, a swingable member mounted on said support and having a part movable in a substantially up and down direction having blocking means for cooperation with said blocking portion, said swingable member being movable to dispose said blocking means in position to be engaged by said blocking portion thereby to block said lever and render the same ineffective to move said latch device into door unlatched position, and means on said latch device operative upon independent actuation of the latch device for moving said swingable member out of blocking position with respect to said lever means.

5. In a latch mechanism for a swinging door, a support having a plate portion for disposition at the jamb edge of the door, a vertically slidable latch device, said latch



device comprising a bolt member projecting from the outer face of said plate portion and having a part thereof projecting through an aperture in said plate portion, a plate member, means securing said plate member to said bolt member part and retaining both in slidable association with the inner and outer faces respectively of said plate portion, said bolt member having a striker engaging portion at the lower end thereof, spring means for urging said plate member and thus said bolt member downwardly, a bolt release member mounted on said plate portion and having a part extending in opposing relation to a part of said plate member, said release member having an extension member pivotally mounted thereon, cooperative means on said plate member and said extension member guiding the latter for movement in a substantially horizontal direction, said extension member being engageable by an outer manually operable means to shift a portion of said release member transversely of the door in the direction of the inner edge of the plate portion to cause said parts to abut and raise the plate member and thereby the bolt member out of striker engagement, and means movable into and out of position for blocking operation of said release member.

6. In a latch mechanism for a swinging door, a support having a plate portion for disposition at the jamb edge of the door, a vertically slidable latch device, said latch device comprising a bolt member projecting from the outer face of said plate portion and having a part thereof projecting through an aperture in said plate portion, a plate member, means securing said plate member to said bolt member part and retaining both in slidable association with the inner and outer faces respectively of said plate portion, said bolt member having a striker engaging portion at the lower end thereof, spring means for urging said plate member and thus said bolt member downwardly, a bolt release member mounted on the inner side of said plate portion and having a part extending in opposing relation to a part of said plate member, said release member having an extension member pivotally mounted thereon, cooperative means on said plate member and said extension member guiding the latter for movement in a substantially horizontal direction, said extension member being engageable by an outer manually operable means to shift a portion of said release member transversely of the door in the direction of the inner edge of the plate portion to cause said parts to abut and raise the plate member and thereby the bolt member out of striker engagement, swingable means movable on the inner side of said plate portion into and out of position for blocking operation of said release member, and means on said plate member operative upon independent actuation of said latch device for moving said swingable means from blocking position to non-blocking position when in position to block operation of said release member.

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