June 25, 1957 J. H. ROETHEL 2,797,120

DOOR LOCK

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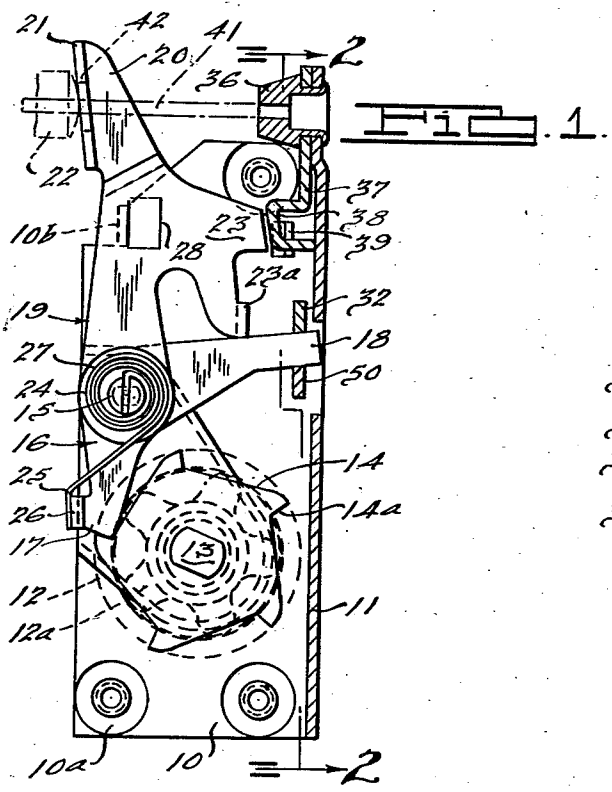


Fig. 1.

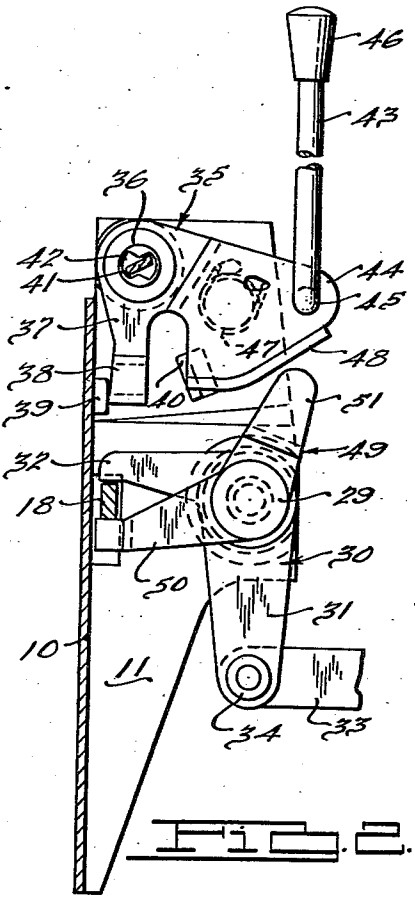


Fig. 2.

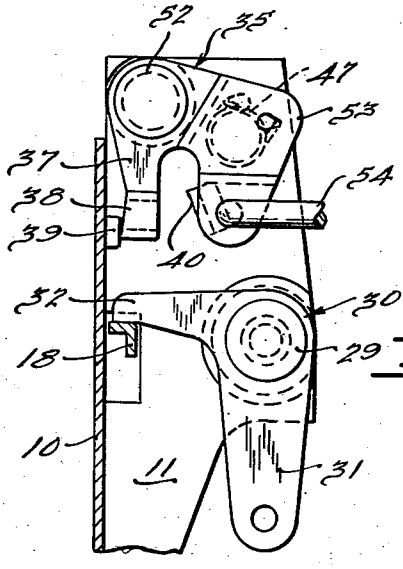


Fig. 3.

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DOOR LOCK

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This invention relates to latch 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 and which is relatively small in size, economical to manufacture, comparatively quiet in operation and efficient in use.

In general, the improved door latch mechanism of the present invention comprises a rotary latch device, detent means for holding the rotary latch device in door latching position, means manually operable from the outside of the door for disengaging the detent means from the latch device, said manually operable means including a detent release lever pivotally mounted on the case plate portion of the latch mechanism, means manually operable from the inside of the door for releasing the detent means independently of the detent release lever, and means to prevent actuation of the detent release lever, said last mentioned means comprising a member or lever pivotally mounted and swingable into blocking position relative to the detent release lever thereby to render the means manually operable from the outside of the door inoperable to release the detent from the latch device.

It is an object of the present invention to provide an improved construction and arrangement of the detent means, the detent release lever, and the pivoted blocking member for blocking the movement of the detent release lever, which improved construction and arrangement provides a highly positive blocking action of the detent release lever by an easily manipulable blocking member when it is desired to render the means manually operable from the outside of the door inoperative.

In accordance with one of the illustrated embodiments of the present invention, it is a further object to provide an improved means for restoring the pivoted member automatically to non-blocking position upon movement of the detent means independently of actuation by the outer manually operable means, e. g., by operation of means manually operable from the inside of the door. The improved restoring means comprises a bell crank lever having one arm in abutting relation to the detent means and a second arm in abutting relation to a part of the blocking member. If, when the blocking member is in blocking position relative to the detent release lever, the detent means is disengaged from the latch device by manipulation of the means manually operable from the inside of the door, the detent means will engage the one arm of the pivoted restoring member and cause pivotal movement thereof and the second arm of the restoring member thereupon will abut the blocking member causing the latter to be swung out of blocking position.

The construction and arrangement wherein the detent means is in abutting relation to the one arm of the pivoted restoring member provides an automatic means to prevent a person from being inadvertently locked outside the vehicle in the event that the blocking member is placed in blocking relation to the detent release lever

while the vehicle door is in an open position and the door is then closed. The construction and arrangement of the latch device and detent means is such that the detent means releasably restrains rotation of the rotary latch device only in one direction of rotation. When the latch device is rotated in its unrestrained direction of rotation, such as occurs when the latch device engages a keeper device as the door is moved from an open to a closed or latched position, a portion of the latch device engages the detent means and pivotally moves the same in the same direction as moved when disengaged from the latch device by either of the manually operable means. Thus, if the pivoted blocking member is placed in blocking position relative to the detent release lever when the door is in an open position, rotation of the latch device upon engagement with the keeper device as the door is moved to a closed position results in a pivotal movement of the detent means, and upon such pivotal movement the detent means engages the one arm of the pivoted restoring member causing the second arm thereof to abut part of the pivoted blocking member and swing the same into non-blocking position thereby restoring the effectiveness of the means manually operable from the outside of the door to release the detent means from the latch device.

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

Fig. 1 is a sectional elevation illustrating the parts of the latch mechanism mounted on the case plate of a door latch mechanism constructed in accordance with the present invention.

Fig. 2 is a section taken substantially through lines 2—2 of Fig. 1 illustrating the mechanism mounted on the flange portion of the case plate of a door latch mechanism constructed in accordance with one embodiment of the present invention.

Fig. 3 is a view in part similar to Fig. 2 illustrating the mechanism mounted on the flange portion of the case plate of a door latch mechanism constructed in accordance with a second embodiment of the present invention.

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 drawings there is illustrated, by way of example, particular embodiments of the present invention as applied to the doors and frame structures of an automobile body. The latch device embodied in the modification of the invention shown in Figs. 1 and 2 comprises a case plate **10** provided with screw bosses **10***a* by means of which the case plate is secured to the inner side of the jamb portion of a vehicle door. The case plate **10** terminates at its inner edge in a flange **11** which is adapted to be positioned along the inner panel of the door. The latch device is preferably provided with a rotatable toothed latch or bolt **12** positioned at the outer side of the case plate **10**, this latch or bolt having an integral projecting shaft or shank **13** extending through an aperture in the case plate which is formed with a bearing for the bolt shank. The inner end of the shank **13** of the bolt is flattened and extended through a correspondingly shaped aperture in a rotatable toothed detent engaging member or ratchet **14** and is riveted thereto.

The rotatable latch **12**, as shown in dotted outline in

Fig. 1, is formed with a number of radially projecting tooth-like projections 12*a*, preferably five, which are spaced equally around the periphery of the latch so as to provide in effect a gear type latch or bolt. The toothed member 14 is also formed around its periphery with a number of tooth-like abutments or projections 14*a* which correspond in number to the tooth-like projections 12*a* of the latch bolt.

Pivotally mounted on a shoulder rivet 15 secured to the case plate 10 is a swinging detent, pawl or dog 16 which has a downwardly projecting detent arm 17 cooperable with any one of the projections 14*a* of the ratchet member 14. The detent arm 17 is engageable with any one of the projections 14*a* in the manner shown in Fig. 1 to hold the toothed member 14 and, hence, the bolt 12 in locking position against rotation in a clockwise direction as viewed in Fig. 1. The detent 16 is also provided with an inwardly extending arm or extension 18.

Associated with the detent 16 is a detent actuating or release lever 19 which is pivoted at its lower end upon the shoulder rivet 15 so as to turn or swing about the axis of the detent 16. The release lever 19 has an upwardly extending arm 20 terminating in a lateral flange 21 positioned for engagement by a plunger or the like 22 which may be shifted inwardly to swing the lever 19 on its pivot 15 by any suitable manually operable means on the outside of the door such, for example, as a handle or by any other preferred means such as a push button associated with an outside door handle. The release lever 19 has an inwardly extending arm or portion 23 having appended thereto a downwardly extending part 23*a* in abutting relation to the detent arm 18.

The detent arm 17 is yieldingly urged toward the toothed member 14 and the detent release lever 19 is urged outwardly toward its retracted position shown in Fig. 1 by means of a common spring 24. This spring has a depending arm 25 the end of which engages a lug 26 on the detent arm 17. The spring has an upper spirally wound coiled portion 27 secured to a notched portion of the pivot stud 15. The effort exerted by the spring 24 in urging the detent arm 17 into engagement with the ratchet member 14, as shown in Fig. 1, will be transmitted through the detent arm 18 to the abutting portion 23*a* of the detent release lever 19, thereby urging the latter toward its retracted position. The final retracted position of the release lever 19 is determined by a stop 10*b* in the form of a lug struck up from the upper edge of the case plate 10 in position to engage a depressed portion 28 of the release lever 19.

Pivoted to the case plate flange 11 by means of a pivot stud or shoulder rivet 29 is a bell crank lever 30 having a depending arm 31 and a generally horizontal arm 32 extending in the direction of the case plate 10 and of sufficient length to overlie the detent arm 18.

The present latch device is preferably operated from the inside of the door through the medium of a remote control mechanism comprising a longitudinally shiftable draft link 33 which is pivotally connected by a rivet 34 to the lower end of the bell crank arm 31. The remote control mechanism is preferably manually actuated from the inside of the door remote from the case plate 10 by means of a door handle (not shown) which may be turned in a desired direction. It will be understood that by swinging the lever 30 in a counterclockwise direction as viewed in Fig. 2, the arm 32 will engage and depress the detent arm 18 causing the detent 16 to pivot about its pivotal axis 15 thereby disengaging the detent arm 17 from the ratchet 14. A similar detent disengaging movement occurs when the release lever 19 is swung inwardly, as viewed in Fig. 1, by operation of the outside door handle, push button or the like, the motion of the release lever being transmitted to the detent through the abutting relationship of the detent arm 18 and the detent release lever portion 23*a*.

In accordance with the embodiments of the invention herein illustrated, means is provided for restraining or blocking the detent release lever 19 against movement in detent disengaging direction by the means manually operable from the outside of the door, such as the push button 22. The blocking means comprises a lever or member 35 pivoted on a special stud 36 secured to the case plate flange 11. As illustrated in Figs. 1 and 2, the pivot axis of the blocking lever 35 is at the upper end of the flange 11. The blocking lever 35 has a depending arm 37 having a formed blocking section 38 on the end thereof. The formed blocking section 38 is adapted to be swung toward the case plate 10 into abutting relation to a lug or stop 39 projecting from the case plate. When in this position, the formed section 38 of the arm 37 is adapted to block swinging movement of the detent release lever 19 in detent disengaging direction. A second lug 40, upstanding from the flange 11, is provided to limit swinging movement of the arm 37 and therefore the lever 35 in the direction out of blocking position.

The blocking lever 35 is adapted to be swung into and out of blocking position either from the outside or inside of the door. The present latch mechanism is adapted to be used with a conventional type outside push button door handle in which the usual key control mechanism is mounted in the push button, the shaft 41 of the key control mechanism passing through an aperture 42 in the flanges 24 of the release lever 19. The special pivot stud 36, to which the blocking member 35 is attached for movement therewith, has formed therein an aperture 42 adapted to receive the shaft 41. The aperture 42 is shaped to permit lost motion of the shaft 41 relative to the stud 36 thereby to permit the shaft 41 to be restored to a centered position after having moved the blocking member into or out of blocking position, restoration of the shaft 41 to a centered position being necessary to permit withdrawal of the key from the key cylinder mechanism. The key actuated shaft 41 thus provides a means operable from the outside of the door for shifting the blocking member 35 and particularly the blocking portion 38 thereon into and out of blocking position relative to the detent release lever 19.

In the present invention the blocking member 35 may be pivotally moved to place the arm 37 in blocking relation to the release lever 19 as shown in Figs. 1 and 2 and thence returned to its normal position by means of a vertically shiftable rod or plunger 43 accessible from the inside of the door. The lever 35 has a substantially horizontally projecting portion 44 to which the vertically shiftable rod or plunger is pivotally connected at 45. The rod 43, which extends upwardly through the garnish molding at the inner side of the glass panel of the vehicle door, carries at its upper end a knob 46 which may be grasped to shift the rod or plunger 43 in either direction, thereby rocking the blocking member 35 about its pivotal axis 36 and shifting the arm 37 and the blocking portion 38 thereon to position it in blocking relation to the release lever 19 or to restore it to non-blocking position.

The blocking lever 35 is yieldingly held and urged toward either of the stops 39 or 40 by means of a snap over spring 47 of suitable strength attached at one end to the lever and at its opposite end to the case plate flange 11. The lower edge of the blocking lever portion 44 is provided with a flange 48 for a purpose to be hereinafter explained.

The latch mechanism embodied in Figs. 1 and 2 includes a means for automatically restoring the blocking member 35 to non-blocking position under certain circumstances. This restoring means comprises a bell crank lever 49 pivotally mounted in the present instance on the case plate flange 11 by the pivot stud 29, the same pivot stud utilized to mount the bell crank 30 on the flange 11. The bell crank lever 49, however, has an inverted appearance relative to the bell crank lever 30. One arm 50 of the bell crank lever 49 extends in a substantially horizontal direction toward the case plate 10 to a position in

which the end thereof underlies the arm **18** of the detent means. The second arm **51** of the bell crank lever **49** extends upwardly . As shown in Fig. 2, when the blocking lever **35** is in blocking position, the end of the arm **51** is adapted to lie in substantially abutting relation to the flange portion **48** of the blocking lever. Upon movement of the restoring member **49** in a counterclockwise direction as viewed in Fig. 2, the arm **51** thereof will abut the flange **48** of the blocking member **35** and pivotally actuate the latter so as to move the blocking portion **38** out of blocking position with respect to the arm **22** of the detent release lever **19**. Movement of the restoring member **49** is always in response to movement of the detent means **16**. Movement of the detent means may occur, independently of actuation thereof by the detent release lever, in two ways.

First, the detent means **16** may be moved independently of actuation by the detent release lever **19** by actuation of the inside remote control mechanism to cause swinging movement of the bell crank lever **30**. Secondly, it will be noted with particular reference to Fig. 1, that if the ratchet **14** is rotated in a clockwise direction, as occurs when the latch bolt engages a keeper device as the door is moved from an open to a closed position, the detent arm **17** will be engaged by the ratchet abutments **14*a*** and will be swung in the same direction it is swung by the means manually operable from either the inside or outside of the door when the latter are operated to release the latch mechanism. The foregoing pivotal movements of the detent means **16** independently of actuation by the detent release lever **19** provides for the motivation of the restoring member **49**. Thus, if the blocking member **35** is placed in blocking position after the vehicle door is closed, persons inside the vehicle need only actuate the iner door handle to restore the latch mechanism to unlocked condition simultaneously with unlatching movement of the door. Should the blocking member be placed in blocking position with the door open, rotation of the latch device upon engagement thereof with a keeper device upon closing movement of the door causes correlated movements of the detent means **19** and restoring member **49** and results in the blocking member **35** being restored to non-blocking position. The parts of the latch mechanism are thus automatically placed in unlocked position thereby preventing an inadvertent lock-out occurring.

Fig. 3 illustrates a modification of the door lock mechanism of the present invention particularly adapted for use on the rear doors or any doors of a vehicle not usually provided with a key cylinder locking mechanism. The embodiment of Fig. 3 differs from the embodiment of Figs. 1 and 2 in the construction and arrangements of the parts mounted on the flange **11**. The primary difference is that in the embodiment of Fig. 3 the restoring member **49** is omitted. With this member omitted it is possible to place the latch mechanism parts in locked position when the door is in open position and to then close the door without disturbing the position of the blocking arm **37** which remains in blocking position relative to the detent release lever **19**.

Other changes to be noted are, for example, the substitution of an ordinary pivot stud **52** for the special stud **36** since no provision is made for a key shaft such as the key shaft **41**. Also, a change in the shape of the one arm, herein designated **53**, of the blocking member **35** is shown. This change is made to accommodate a horizontally extending actuating rod **53** in place of the vertically extending rod **43**. The actuating rod for locking the rear doors of vehicles generally extends horizontally across the inner door panel and is connected to a bell crank lever (not shown) swingable by a vertically extending rod extending through the garnish molding to place the knob, similar to knob **46**, nearer to the reach of the occupants of the front seat of the vehicle.

I claim:

1. In a latch mechanism for a swinging door, a support having a first plate portion for disposition at the free edge wall of the door and a second plate portion angularly related to said first plate portion, a latch device pivotally mounted on said first plate portion having a peripheral series of tooth-like abutments, detent means pivotally mounted on said first plate portion and engageable with said abutments for holding said latch device in door latching position, outer manually operable means including a lever pivotally mounted on said first plate portion, said detent means being pivotally mounted on said first plate portion to swing independently of said lever, said lever at one side of the pivotal axis thereof being provided with a part arranged in opposing relation to a part of said detent means to abut the same at the same side of the pivotal axes of said lever and detent means upon swinging movement of said lever in one rotative direction thereby to pivotally move said detent means in the same rotative direction out of holding position with respect to said latch device, a blocking member mounted for swinging movement about a fixed pivot axis on said second plate portion, manually operable means for swinging said blocking member into a position in which a portion thereof will block swinging movement of said lever thereby to render said outer manually operable means ineffective to effect disengagement of said detent means, and a pivoted member pivoted intermediate its ends on said second plate portion to provide a first arm and a second arm extending in non-related directions, said first arm being normally disposed in abutting relation to said detent means, said blocking member having a part disposed in the path of movement of said second arm when said blocking member portion is disposed in blocking relation to said lever, said detent means being engageable with said pivoted member to pivotally move the same to cause said pivoted member part to abut said blocking member and shift the same out of blocking position upon pivotal movement of the detent means independently of actuation thereof by said outer manually operable means.

2. In a latch mechanism for a swinging door, a support having a first plate portion for disposition at the free edge wall of the door and a second plate portion angularly related to said first plate portion, a latch device pivotally mounted on said first plate portion having a peripheral series of tooth-like abutments, detent means pivotally mounted on said first plate portion and engageable with said abutments for holding said latch device in door latching position, outer manually operable means including a lever pivotally mounted on said first plate portion and swingable toward said second plate portion, said detent means being pivotally mounted on said first plate portion to swing independently of said lever, said lever at one side of the pivotal axis thereof being provided with a part arranged in opposing relation to a part of said detent means to abut the same at the same side of the pivotal axes of said lever and detent means upon swinging movement of said lever in one rotative direction thereby to pivotally move said detent means in the same rotative direction out of holding position with respect to said latch device, a blocking member mounted for swinging movement upon a fixed pivot axis on said second plate portion, manually operable means for swinging said blocking member into a position in which a portion thereof will block swinging movement of said lever toward said second plate portion thereby to render said outer manually operable means ineffective to effect disengagement of said detent means, and a pivoted member pivoted intermediate its ends on said second plate portion to provide a first arm and a second arm extending in non-related directions, said first arm being normally disposed in abutting relation to said detent means, said blocking member having a part disposed in the path of movement of said second arm when said blocking member portion is disposed in blocking relation to said lever, said detent means being engage-

able with said pivoted member to pivotally move the same to cause said pivoted member part to abut said blocking member and shift the same out of blocking position upon pivotal movement of the detent means independently of actuation thereof by said outer manually operable means.

3. In a latch mechanism for a swinging door, a support having a first plate portion for disposition at the free edge wall of the door and a second plate portion angularly related to said first plate portion, a latch device pivotally mounted on said first plate portion having a peripheral series of tooth-like abutments, detent means pivotally mounted on said first plate portion and engageable with said abutments for holding said latch device in door latching position, outer manually operable means including a lever pivotally mounted on said first plate portion, said detent means being pivotally mounted on said first plate portion to swing independently of said lever, said lever at one side of the pivotal axis thereof being provided with a part arranged in opposing relation to a part of said detent means to abut the same at the same side of the pivotal axes of said lever and detent means upon swinging movement of said lever in one rotative direction thereby to pivotally move said detent means in the same rotative direction out of holding position with respect to said latch device, a blocking member mounted for swinging movement about a fixed pivot axis on said second plate portion, manually operable means for swinging said blocking member into a position in which a portion thereof will block swinging movement of said lever thereby to render said outer manually operable means ineffective to effect disengagement of said detent means, and a restoring member pivoted for swinging movement on said second plate portion, said restoring member comprising a bell crank lever having at least two arms extending in substantially opposite directions, said blocking member having a part disposed in the path of swinging movement of one of said restoring member arms when said blocking member portion is disposed in blocking relation to said lever, the other arm of said restoring member being normally disposed in the path of swinging movement of a part of said detent means whereby upon movement of said detent means independently of actuation by said outer manually operable means said detent means will engage and swing said restoring member and the latter in turn will engage and swing said blocking member out of blocking position.

4. In a latch mechanism for a swinging door, a support having a first plate portion for disposition at the free edge wall of the door and a second plate portion angularly related to said first plate portion, a latch device pivotally mounted on said first plate portion having a peripheral series of tooth-like abutments, detent means pivotally mounted on said first plate portion and engageable with said abutments for holding said latch device in door latching position, outer manually operable means including a lever pivotally mounted on said first plate portion, said detent means being pivotally mounted on said first plate portion to swing independently of said lever, said lever at one side of the pivotal axis thereof being provided with a part arranged in opposing relation to a part of said detent means to abut the same at the same side of the pivotal axes of said lever and detent means upon swinging movement of said lever in one rotative direction thereby to pivotally move said detent means in the same rotative direction out of holding position with respect to said latch device, a blocking member mounted for swinging movement about a fixed pixot axis on said second plate portion, manually operable means for swinging said blocking member into a position in which a portion thereof will block swinging movement of said lever thereby to render said outer manually operable means ineffective to effect disengagement of said detent means, and a restoring member mounted for swinging movement on said second plate portion, said restoring member comprising a bell crank lever having a pair of arms extending in substantially opposite directions, said blocking member having a part disposed in the path of swinging movement of one of said restoring member arms when said blocking member portion is disposed in blocking relation to said lever, the other arm of said restoring member being normally disposed in the path of swinging movement of a part of said detent means whereby upon movement of said detent means independently of actuation by said outer manually operable means said detent means will engage and swing said restoring member and the latter in turn will engage and swing said blocking member out of blocking position, said independent actuation of the detent means being caused by said latch device abutments striking said detent means upon rotation of the latch device by engagement with a keeper device as the door is moved to a closed position.

5. In a latch mechanism for a swinging door, a support having a first plate portion for disposition at the free edge wall of the door and a second plate portion angularly related to said first plate portion, a latch device pivotally mounted on said first plate portion having a peripheral series of tooth-like abutments, detent means pivotally mounted on said first plate portion and engageable with said abutments for holding said latch device in door latching position, outer manually operable means including a lever pivotally mounted on said first plate portion, said detent means being pivotally mounted on said first plate portion to swing independently of said lever, said lever at one side of the pivotal axis thereof being provided with a part arranged in opposing relation to a part of said detent means to abut the same at the same side of the pivotal axes of said lever and detent means upon swinging movement of said lever in one rotative direction thereby to pivotally move said detent means in the same rotative direction out of holding position with respect to said latch device, a blocking member mounted for swinging movement about a fixed pivot axis on said second plate portion, manually operable means for swinging said blocking member into a position in which a portion thereof will block swinging movement of said lever thereby to render said outer manually operable means ineffective to effect disengagement of said detent means, and a restoring member mounted for swinging movement on said second plate portion, said restoring member comprising a bell crank lever having a pair of arms extending in substantially opposite directions, said blocking member having a part disposed in the path of swinging movement of one of said restoring member arms when said blocking member portion is disposed in blocking relation to said lever, the other arm of said restoring member being normally disposed in the path of swinging movement of a part of said detent means whereby upon movement of said detent means independently of actuation by said outer manually operable means said detent means will engage and swing said restoring member and the latter in turn will engage and swing said blocking member out of blocking position, and bell crank means mounted on said second plate portion and adapted to engage said detent means to swing the same independently of said outer manually operable means.

6. In a latch mechanism for a swinging door, a support having a first plate portion for disposition at the free edge wall of the door and a second plate portion angularly related to said first plate portion, a latch device pivotally mounted on said first plate portion having a peripheral series of tooth-like abutments, detent means pivotally mounted on said first plate portion and engageable with said abutments for holding said latch device in door latching position, outer manually operable means including a lever pivotally mounted on said first plate portion, said detent means being pivotally mounted on said first plate portion to swing independently of said lever, said lever at one side of the pivotal axis thereof

being provided with a part arranged in opposing relation to a part of said detent means to abut the same at the same side of the pivotal axes of said lever and detent means upon swinging movement of said lever in one rotative direction thereby to pivotally move said detent means in the same rotative direction out of holding position with respect to said latch device, a blocking member mounted for swinging movement about a fixed pivot axis on said second plate portion, manually operable means for swinging said blocking member into a position in which a portion thereof will block swinging movement of said lever thereby to render said outer manually operable means ineffective to effect disengagement of said detent means, and a restoring member mounted for swinging movement on said second plate portion, said restoring member comprising a bell crank lever having a pair of arms extending in substantially opposite directions, said blocking member having a part disposed in the path of swinging movement of one of said restoring member arms when said blocking member portion is disposed in blocking relation to said lever, the other arm of

said restoring member being normally disposed in the path of swinging movement of a part of said detent means whereby upon movement of said detent means independently of actuation by said outer manually operable means said detent means will engage and swing said restoring member and the latter in turn will engage and swing said blocking member out of blocking position, and bell crank means mounted on said second plate portion and adapted to engage said detent means to swing the same independently of said outer manually operable means, said restoring member bell crank lever and said bell crank means being mounted to swing about a common pivot axis.

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