

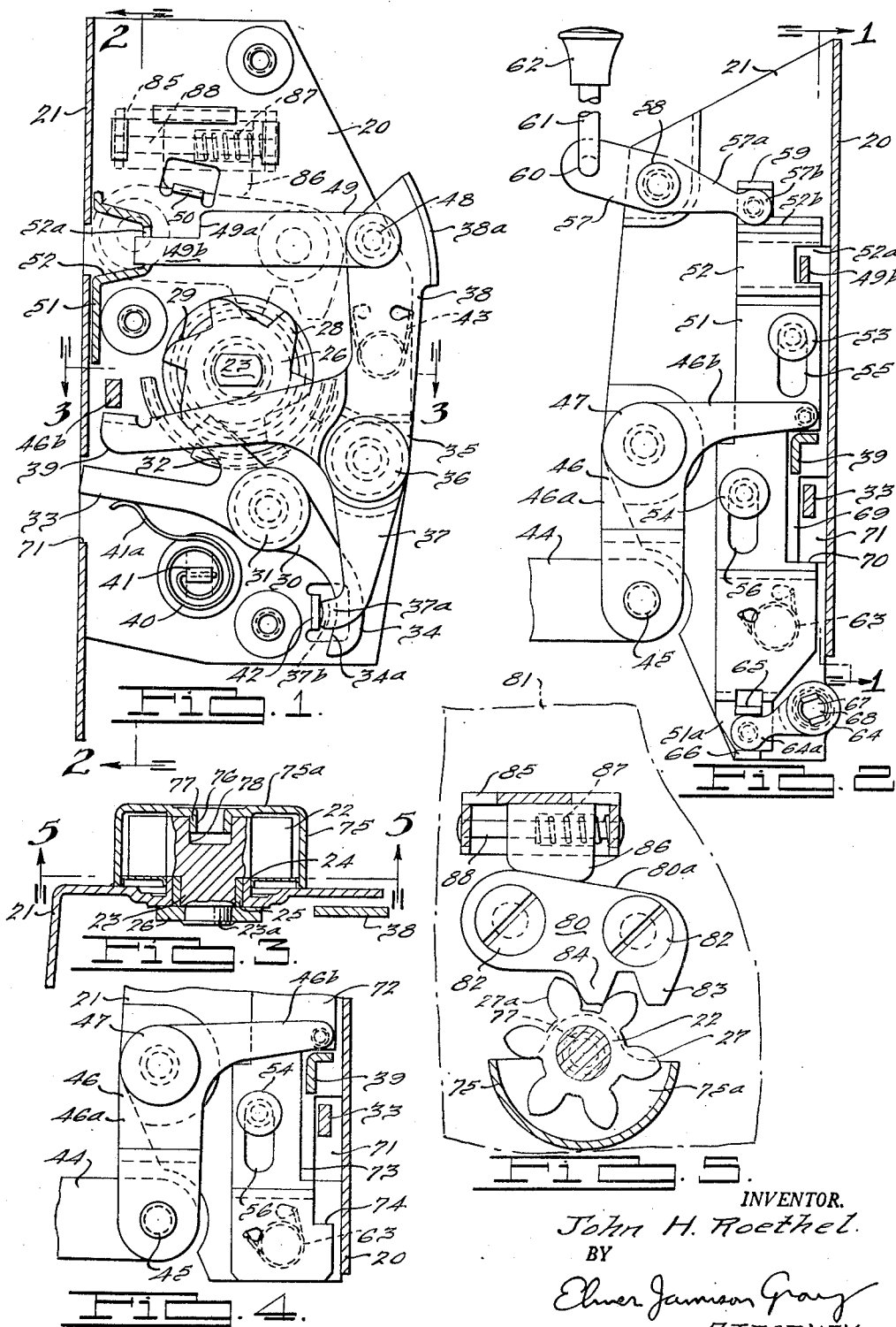
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DOOR LOCK

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2,706,128

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.

Another object of the invention is to provide an improved rotary bolt latch mechanism for a swinging door, especially an automobile door, embodying a swinging lever mounted on the latch support adapted to be operated by outer manually operable means, such as a push button, as well as by inner manually operable means, such as a remote controlled device, for disengaging a pivoted detent from the rotatable latch device, the improved construction being such that by rendering the lever ineffective to disengage the detent both the outer and inner manually operable means are at the same time rendered ineffective to unlatch the door.

A further object of the invention is to provide an improved means in the form of a multi-armed swinging lever mounted on the latch support for swinging or pivotally actuating the detent to disengage the same from the latch device, such lever having one arm engageable with the detent and other arms adapted to be engaged by outer and inner manually operable means, one of said arms also being operatively connected to a member adapted to be shifted into opposing relation to a blocking means carried on the support, such shifting of the member being accomplished in various ways, such as by means of an inside manually shiftable plunger, or by a key operated device, whereby when said member is shifted in opposing relation to said blocking means swinging movement of the lever is blocked thereby rendering the outer and inner manually operable means ineffective to unlatch the vehicle door. In accordance with one aspect of the invention the shiftable member as well as the inside manually shiftable plunger may be simultaneously moved into normal unblocked position when the door latch is moved to latching position and regardless of the fact that such member may have been previously shifted into opposing relation to the blocking means when the door is in open position.

A further object of this invention is to provide an improved door latch mechanism in which the detent means for holding the rotary latch device in latching position is pivotally actuated by a swinging lever mounted on the plate or jamb portion of the latch support or case plate, the lever having a part cooperable with the detent means and a second part movable toward the flange of the case plate upon swinging the lever, the latch mechanism also embodying pivotally mounted link means adapted to be swung into a blocking position with respect to said lever by means manually operable from the inside of the door.

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

Fig. 1 is a sectional elevation taken substantially through lines 1—1 of Fig. 2 looking in the direction of the arrows and showing in particular the mechanism of the door lock mounted adjacent the door jamb.

Fig. 2 is a section taken substantially through lines 2—2 of Fig. 1 looking in the direction of the arrows.

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Fig. 3 is a section taken substantially through lines 3—3 of Fig. 1 looking in the direction of the arrows.

Fig. 4 is a view in part similar to the lower portion of Fig. 2 but illustrating a modification.

Fig. 5 is a fragmentary elevational view taken substantially through lines 5—5 of Fig. 3 looking in the direction of the arrows illustrating the operative relationship of the wedge member and the rotary latch bolt carried on the front face of the latch mechanism support with the striker device carried on the body post or pillar.

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 arrangement 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 therein is for the purpose of description and not of limitation.

In the drawings there are illustrated, by way of example, certain embodiments of the present invention as applied to the doors and door frame structures of an automobile body. Adapted to be secured, as by means of screws, to the inner side of the jamb portion of a vehicle door is a case plate 20 having a flange 21 which is adapted to be positioned along the inner panel of the door. The present latch device is provided with a rotatable toothed latch or bolt 22 positioned at the outer face of the case plate 20, this latch having an integral projecting stud shaft or pivot 23 extending through an aperture in the case plate and having a bearing in the annular flanged edge 24 of this aperture, see Fig. 3. In Fig. 3 a bushing 25 is shown interposed between the stud shaft 23 and the annular flanged edge 24 of the case plate aperture. The bushing 25 is preferably a lubricant impregnated metal bushing to eliminate the necessity of applying lubrication to the stud shaft after the latch device is assembled. The inner reduced end 23a of the stud 23 is flattened and rigidly anchored within an aperture in a rotatable detent engaging latch carrying plate or member 26. From the foregoing construction it will be seen that the toothed latch or bolt 22 is rigidly secured to the detent engaging member 26, being concentric therewith on the stud 23.

The rotatable latch or bolt 22 is formed with a number of radially projecting tooth-like projections 27, such as six, which are spaced equally entirely around the periphery of the latch so as to provide in effect a gear type latch. The detent engaging plate or member 26 is formed around its periphery with a number of abutments or shoulders 28 which correspond in number to the number of tooth-like projections 27. Thus, in the illustrated embodiment the latch 22 has, for example, six tooth-like projections 27 and the detent engaging plate 26 has six equally spaced detent engaging abutments or shoulders 28. The periphery of the plate 26 between the adjacent shoulders or abutments 28 is formed with inclined and preferably curved camming surfaces 29, each surface connecting the outer edge of one shoulder 28 with the bottom edge of an adjacent shoulder.

Cooperable with the peripheral notched edge of the plate 26 is a swinging detent, pawl, or dog 30 pivotally mounted on a shoulder rivet 31 secured to the case plate 20. The detent 30 as seen in Fig. 1 is a multi-armed member having one arm 32 extending in a substantially upward direction and cooperable with the teeth or projections 28 of the peripherally notched plate or ratchet member 26. The detent arm 32 is engageable with any one of the teeth 28 in the manner shown in Fig. 1 to hold the ratchet member and hence the bolt 22 in locking position against rotation in a clockwise direction as viewed in Fig. 1. A second arm 33 of the detent member 30 extends in a substantially horizontal direction toward the flange 21 and a third arm 34 extends in a downward and outward direction. Thus, the detent 30 in the present embodiment is provided with three arms 32, 33, and 34 and is preferably formed from a single piece of flat metal stock.

Associated with the detent is a vertically extending detent actuating or release lever 35 which is pivoted intermediate its ends upon a shoulder rivet or stud 36 secured to the case plate. This lever has a lever arm

37 extending downwardly below the pivot 36 and terminating in a hook-like projection 37a which overlies the downwardly extending detent arm 34. The inner end of the hook-like projection 37a is embossed to form a curved lug 37b engaging the inner edge 34a of the detent arm 34. By virtue of this construction the lever arm 37 and the detent arm 34 are interconnected so that if the lever arm is swung about its pivotal axis in a counterclockwise direction, as seen in Fig. 1, it will swing the detent member 30 about its pivotal axis in a counterclockwise direction also.

The detent release lever 35 also has an upwardly extending lever arm 38 formed with a flange 38a thereon. This lever arm 38 is adapted to be engaged by an outside manually operable means, such as a push button, for imparting pivotal or swinging movement to the lever 35, about its pivot 36. The release lever is also provided with a third arm 39 extending in a substantially horizontal direction toward the flange 21. Thus the release lever 35 herewith shown is provided with three arms 37, 38 and 39 and is preferably formed from a single piece of flat metal stock.

The detent arm 32 is yieldingly urged toward the ratchet plate 26 and the release lever 35 is similarly urged toward its normal position seen in Fig. 1 by means of a single coil spring 40 anchored at its inner end to a retainer 41 lanced out of the case plate 20. This spring has an upwardly extending arm 41a engageable with the under edge of the detent arm 33 and urges this arm and therefore the whole detent member 30 in a clockwise direction, as seen in Fig. 1, about the pivot axis 31 so as to yieldingly hold the detent arm 32 in latching engagement with a tooth 28 of the ratchet plate 26. Due to the interlocking connection between the hook-portion 37a of the release lever 35 and the arm 34 of the detent member 30, the spring 40 will also function to urge the lever arm 37 inwardly toward the flange 21 and the lever arm 38 outwardly so as to maintain them in the normal non-operated position shown in Fig. 1. Thus a single spring 41 is utilized to maintain the detent and release lever in their normal positions. The spring 41 thus urges the lower arm 37 of the release lever inwardly to a position governed by a stop which is in the form of a lug 42 struck out from the case plate 20 and positioned for engagement by the outer edge of the lever arm 37, as shown in Fig. 1. A light anti-rattle spring 43 may be provided to hold the lever arm 37 against the stop 42 when the detent arm 34 is moved relatively to the lever arm 37. The coiled spring 43 is suitably selected as to strength and has one arm connected to the lever arm 38 and the opposite end connected to the case plate 20.

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 44 which is pivoted at 45 to the lower end of one arm 46a of a bell crank lever 46. This lever is pivoted on the shank of a shoulder rivet 47 secured to the case plate flange 21. The lever is provided with a projecting arm 46b overlying at its inner end the release lever arm 39, see Figs. 1 and 2. The remote control mechanism is preferably manually actuated from the inside of the door remote from the case plate 20 by means of a door handle which may be turned in the desired direction.

In accordance with the present embodiment of the invention means is provided for restraining or blocking the detent release lever 35 against operation from the outside or inside of the door. Pivoted at 48 to the lever arm 38 near the upper end thereof is a link 49, this link in the present instance extending inwardly toward the case plate flange 21. The link 49 is formed at its upper edge with an abutment or shoulder 49a adapted to engage a stop in the form of a lug 50 lanced out of the case plate in a position to engage the link abutment 49a when the stop and the link abutment are placed into opposing relation.

The link 49 is swung into a position where the abutment 49a thereon is placed in opposing relation to the stop 50 through the medium of a manually operable slide 51 which may be shifted by manually operable means at the inside of the door or by a key operated lock. The slide 51 is embossed near its upper end to provide an outwardly extending channel shaped projection 52 which is notched at 52a to receive the inner end

49b of the link 49. The slide 51 is guided on the case plate flange 21 by means of upper and lower headed guide studs or pins 53 and 54 secured to the case plate flange and extending, respectively, through vertical guide slots 55 and 56 in the slide. By shifting the slide to its upper limit the abutment 49a on the link 49 will be swung into opposing relation to the stop 50 on the case plate 20.

In the present embodiment the slide 51 may be shifted upwardly to its upper limit as determined by the guide studs 53 and 54 and thence returned to its normal position shown in Fig. 2 by means of a lever 57 pivotally mounted on a stud 58 secured to the case plate flange 21. This lever has a projecting arm 57a terminating in a rounded end 57b lying in the space between the upper outer edge 52b of the channel shaped projection 52 on the slide 51 and a lug 59 projecting upwardly from the surface of the slide at the upper end thereof. Pivoted at 60 to the outer end of the lever 57 is a vertically shiftable rod or plunger 61 which is adapted to extend upwardly through the garnish molding at the inner side of the glass panel of the vehicle door. This rod carries at its upper end a knob 62 which may be grasped at the inside of the door to shift the plunger vertically in either direction, thereby rocking the lever 57 and shifting the slide 51 vertically in either direction between limits governed by the length of the guide slots 55 and 56. The slide 51 is yieldingly held and urged toward its upper and lower limits of movement by means of a snap-over spring 63 of suitable strength attached at one end to the slide and at the opposite end to the case plate flange 21.

From the foregoing construction it will be apparent that by pressing down the knob 62 to rock the lever 57, the slide 51 will be raised so as to swing the link 49 and position the abutment 49a thereon in opposing relation to the stop 50.

Where a key controlled device is used with the present embodiments the slide 51 is provided with a depending extension 51a which is operatively engaged by the end 64a of a swinging crank arm 64. The end 64a of the crank arm 64 lies between two spaced apart lugs 65 and 66 struck up from the slide extension 51a. The crank arm 64 is pivoted at 67 to the case plate flange 21 and provided with a substantially rectangular opening 68 at the locality of its pivot to receive the key actuated shaft of any conventional lock having the usual key control. By turning the key in the lock in the outside of the door the crank arm 64 may be swung to shift the slide vertically in one direction or the other either to shift the link abutment 49a into opposing relation to the stop 50 or to restore it to its normal position as shown in Fig. 1. The key control means for the slide 51 is usually embodied in the front door locks of an automobile body but is usually omitted from the locks used in the rear doors.

The embodiment of the device shown in Figs. 1 and 2 is preferably intended to be used on the front doors of the vehicle since it includes the key control means. To ensure that the door cannot be inadvertently locked when open, there is provided a kick-out means which will restore the shiftable link 49 to a position wherein the abutment 49a thereon is not in opposing relation to the stop 50. In Fig. 2 the slide 51 is shown notched at 69 to provide clearance for the end of the lever arm 39 and the end of the detent arm 33. However, the bottom edge 70 of the notch 69 is positioned so that with the slide 51 in its uppermost position the edge 70 is almost in contact with the lower edge of the detent arm 33. The detent arm 33 is of sufficient length to ensure contact with the edge 70 and the case plate flange 21 is notched at 71 to provide the necessary clearance for the end of the detent arm 33.

Thus, in the event the slide 51 is shifted upwardly when the door is open and then the door is swung to closed position, rotation of ratchet member 26 will cause one of the cam surfaces 29 to engage the detent arm 32 and by camming action swing the detent and therefore the detent arm 33 in a counterclockwise direction as viewed in Fig. 1. The downward movement of the detent arm 33 will force the slide 51 downwardly resulting in the link 49 being returned to the unblocked or normal position. With this construction the vehicle door can only be locked from the outside when in the closed position.

As has been stated, usually only the front door of the

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vehicle is provided with a key lock mechanism. Fig. 4 illustrates the construction of the lower portion of the case plate flange 21 and of the slide for shifting the link 49 when used on a door not having a key lock mechanism. The slide 72 in Fig. 4 has a notch 73 similar to the notch 69 of the slide 51 to provide clearance for the swinging movement of the release lever arm 39 and the detent arm 33. The slide 72 has a second notch 74 which provides clearance for the swinging movement of the detent arm 33 even when the slide is in its uppermost position, thus eliminating the kick-out described in connection with Figs. 1 and 2. Elimination of the kick-out on the rear door has the advantage that with the door open the button 62 may be conveniently manipulated to shift the slide 72 upwardly to the locking position, whereupon when the door is closed it will remain locked, the rotation of the latch bolt being ineffectual to cause the detent arm 33 to return the slide to normal position.

From the foregoing description, it will be understood that when the link 49 has been shifted into a position where the abutment 49a and the stop 50 are in opposing relation the release lever 35 will be blocked against manipulation by both the outside and inside manually operable means, such as a push button and a remote control mechanism, respectively. An important advantage of this construction is that if the vehicle doors are locked they can never be opened from the inside by inadvertent manipulation of the inside manual operator, such as the inside door handle, as frequently occurs when children are carried as passengers in the vehicle.

In Fig. 3 there is illustrated a construction in which the rotary latch bolt 22 is provided with an outer support bearing to minimize the torsional stresses on the shaft 23. Substantially surrounding approximately the lower two-thirds of the rotary latch bolt 22 is a semi-cylindrical casing 75 which is fastened to the front face of the case plate 20 in any suitable manner. The front face 75a of the casing 75 is formed in a die so that it has an aperture 76 therein with the metal from the aperture being used to form an inwardly projecting annular ring or flange 77 which provides a bearing lug for the rotary bolt. The front face of the rotary latch bolt is provided with a circular recess 78 into which the lug 77 projects. Thus, the bearing lug 77 fitting into the circular recess 78 provides the outer support bearing for the latch bolt.

In the present embodiment of the invention the rotary toothed latch or bolt 22 is actuated when the door is closed by means of a keeper or striker device 80 which is rigidly mounted on the jamb edge 81 of the body pillar or fixed upright member of the door frame, being secured to the pillar by means of screws 82. The striker member 80 is formed at its lower edge with two integral tooth-like projections 83 and 84 with which the teeth 27 of the latch bolt 22 mesh to hold the door in either a final or safety locking position. When an adjacent pair of teeth 27 embrace and engage the tooth 83 the door is in safety locking position, and when an adjacent pair of teeth embrace the tooth 84 of the striker member the bolt is in final locking position. It will be seen from Fig. 5 that the door is held in the final locking position by the engagement of tooth 27a with the inner side of the tooth 84.

The upper surface 80a of the striker body forms an inclined ramp engaged by a yieldable wedging means. As shown in Figs. 1 and 5, the wedging means in the present instance comprises a stamped hollow casing 85 of generally rectangular shape open at its bottom and rigidly secured to the case plate but projecting at the outer side of the door jamb. Slidably mounted within this casing is a wedge block 86 controlled by means of a compression spring 87, the wedge block and spring being retained within the casing by means of a guide rod 89 fastened to the end walls of the casing. This spring is mounted under initial load and constantly urges the wedge block to the left in Fig. 5. During closing movement of the door the wedge block 86 engages the inclined surface 80a of the striker and, due to frictional contact, is forced back to some extent against the action of the spring 87. Due to the action of this spring the wedge block 86 will constantly tend to tighten itself against the surface 80a and hence to maintain the bolt 22, especially the tooth 27a, firmly in engagement with the tooth 84 on the striker thus minimizing vibratory movement of the door in a vertical direction.

I claim:

1. In a latch mechanism for a swinging door, a sup-

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port having a plate portion for disposition at the door jamb and having a flange extending from the inner edge of said plate portion, a rotatable latch device mounted on said plate portion, detent means pivotally mounted on said plate portion for holding said latch device in latching position, outer manually operable means for pivotally actuating said detent means to disengage the same from said latch device and including a lever pivotally mounted on said plate portion and having a part engageable with said detent means, said lever also having a part movable toward said flange upon swinging said lever, link means pivotally connected to said second named lever part and extending along the inner side of said plate portion and being shiftable in the direction of said flange upon swinging said lever, a fixed stop on said plate portion normally positioned out of the path of said link means to permit the latter to be freely shifted by swinging said lever, a vertically shiftable slide on said flange cooperable with said link means for pivotally moving said link means in a generally vertical direction to position a part of said link means in opposing relation to said stop thereby to cause said stop to block said shiftable movement of said link means and said swinging movement of said lever.

2. In a door latch mechanism for a swinging door, a support comprising a plate portion for disposition at the door jamb and having a flange extending from the inner edge thereof, a rotatable latch device mounted on said plate portion, detent means pivotally mounted on said plate portion for holding said latch device in latching position, outer manually operable means for pivotally actuating said detent means to disengage the same from said latch device and including a lever pivotally mounted on said plate portion and having a part movable toward said flange upon swinging said lever and a second part engageable with said detent means, pivotally mounted link means connected to said lever for operation thereby, inner manually operable means for swinging said link means in one direction into one position in which said lever is free to be swung to move its first named part toward said flange, said inner manually operable means also being operative to swing said link means in the opposite direction into a blocking position, and means for blocking said link means in said blocking position.

3. In a latch mechanism for a swinging door, a support having a plate portion for disposition at the door jamb and having a flange extending from the inner edge of said plate portion, a latch device pivotally mounted on said plate portion, a detent pivotally mounted on said plate portion to swing about a generally horizontal axis and comprising a unitary member having a plurality of arms, one of said detent arms extending into position to hold said latch device in door latching position, a release lever pivotally mounted on said plate portion to swing about an axis parallel to the detent axis and also comprising a unitary member having a plurality of arms, one of said lever arms extending downwardly from the pivotal axis of the lever and operatively engageable with an arm extending downwardly from the pivotal axis of the detent, a second arm on said lever extending upwardly from said lever pivotal axis and engageable by outside manually operable means, blocking means on said plate portion, a shiftable member carried by said second lever arm and adapted to abut said blocking means when said member is shifted into opposing relation to said blocking means, and means carried on said flange for shifting said last mentioned member into and out of blocking position with respect to said blocking means.

4. In a latch mechanism for a swinging door, a support having a plate portion adapted to face the jamb of the door and provided at its inner edge with a flange portion, a latch device pivotally mounted on said plate portion, a multi-armed detent means pivotally mounted on said plate portion having a first arm engageable with said latch device to hold the same in latching position, a multi-armed lever pivotally mounted on said plate portion having one arm engageable with a second arm of the detent means for pivotally actuating the same to release said first arm from said latch member, said lever having a second arm engageable by outer manually operable means and swingable toward said flange, said lever having a third arm engageable by inner manually operable means for swinging said lever, blocking means on said support, a shiftable member on said support, a member pivotally connected at one end to one of said

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lever arms and coupled at its other end to said shiftable member and adapted to be pivotally actuated by shifting the shiftable member in one direction to engage said blocking means thereby blocking said lever and rendering the same ineffective to disengage said detent means from the inside and outside of the door.

5. In a latch mechanism for a swinging door, a support having a plate portion for disposition at the door jamb and having a flange extending from the inner edge of said plate portion, a rotatable latch device mounted on said plate portion, detent means pivotally mounted on said plate portion for holding said latch device in latching position, outer manually operable means for pivotally actuating said detent means to disengage the same from said latch device and including a lever pivotally mounted on said plate portion and having a part engageable with said detent means, link means pivotally connected to a second part of said lever, an abutment on said plate portion normally positioned out of the path of said link means to permit the latter to be freely shifted by swinging said lever, a control member on said support cooperating with said link means for pivotally moving said link means in a direction to position a part thereof in opposing relation to said abutment to cause said abutment to block movement of said link means and thereby block swinging movement of said lever.

6. In a door latch mechanism for a swinging door, a

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support comprising a plate portion for disposition at the door jamb and having a flange extending from the inner edge thereof, a rotatable latch device mounted on said plate portion, detent means pivotally mounted on said plate portion for holding said latch device in latching position, outer manually operable means for pivotally actuating said detent means to disengage the same from said latch device and including a lever pivotally mounted on said plate portion and having a part engageable with said detent means upon swinging movement of said lever, pivotally mounted link means connected to said lever for operation thereby, inner manually operable means for swinging said link means in one direction into one position in which said lever is free to be swung, said inner manually operable means also being operative to swing said link means in the opposite direction into a blocking position, and means for blocking said link means in said blocking position.

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