Feb. 28, 1950 J. H. ROETHEL 2,499,111

DOOR LOCK

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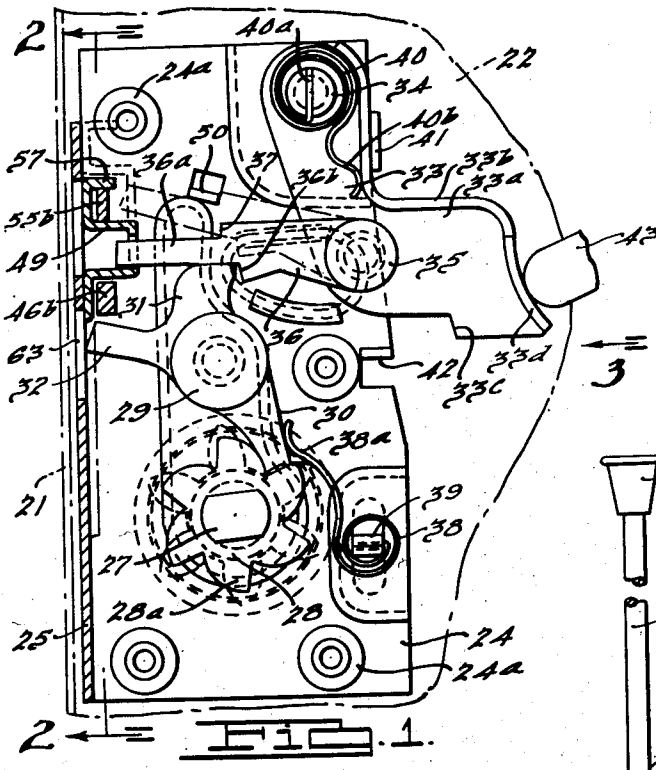


Fig. 1.

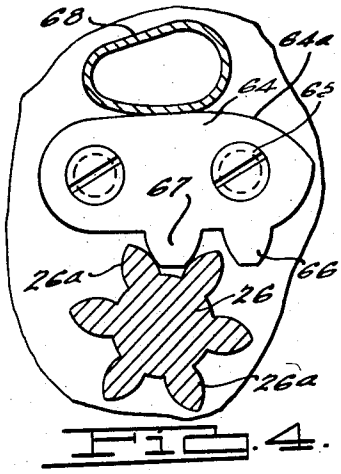


Fig. 4.

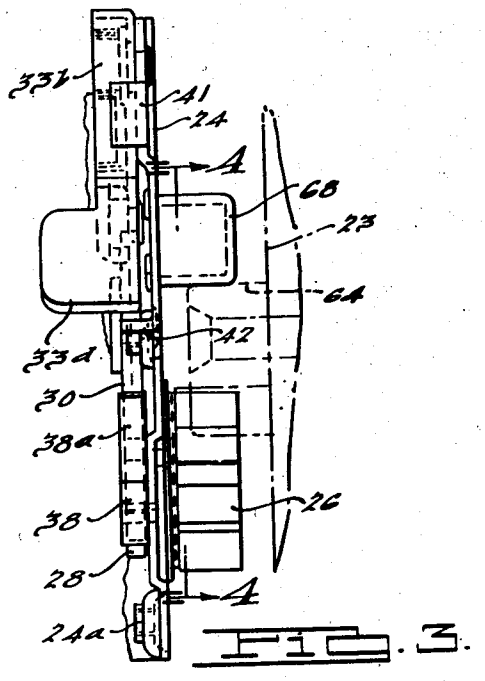


Fig. 3.

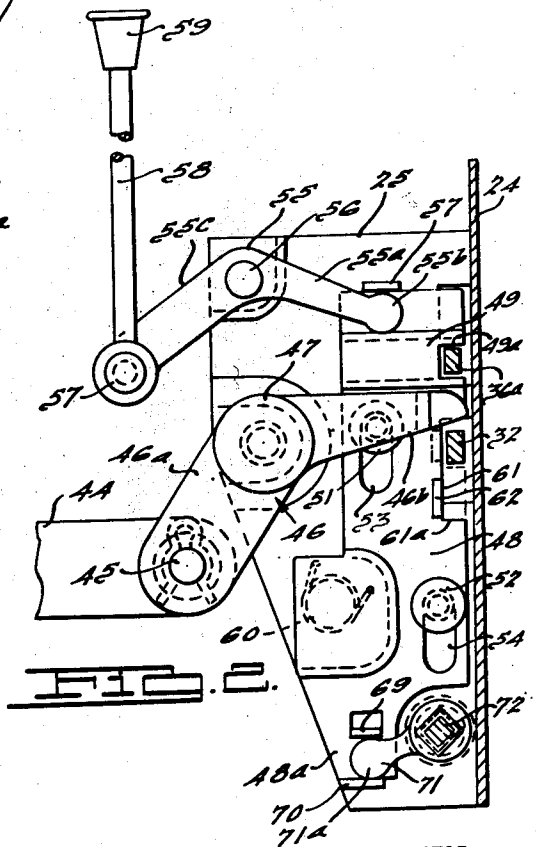


Fig. 2.

INVENTOR.

John H. Roethel.

BY

Elmer Jamison Gray

ATTORNEY.

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DOOR LOCK

John H. Roethel, Detroit, Mich.

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7 Claims. (Cl. 292—280)

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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 not only relatively small in size, simple, compact and economical to manufacture, but also durable and efficient as well as comparatively quiet in operation.

Another object of the invention is to provide an improved door latch mechanism having a rotatable latch device controlled by means of a detent or the like together with inside and outside manually operable means for disengaging the detent from the latch device, the latch mechanism being provided with improved inside manually controllable means for causing operation of the outside manually operable means to be restrained or blocked. More specifically an object of the invention is to incorporate in the outside manually operable means a connection, such as pivoted link means, with the detent which normally is effective to disengage the detent, said connection however being movable from a detent operating position to a position in which it is restrained or blocked thereby preventing the door from being unlatched from the outside thereof.

A further object of the invention is to provide an improved door latch mechanism of the kind having a rotatable bolt and a rotatable detent engaging member controlled by means of a pivotally mounted detent or the like, the mechanism being provided with a shiftable release member, preferably pivoted on the latch support to swing, and a link connection, preferably mounted to swing up and down, between said release member and detent and effective to disengage the latter upon actuating the release member from the outside of the door, said latch mechanism also being provided with inside manually operable means, such as a vertically shiftable slide, for moving said link connection vertically or upwards from a detent operating position to a position in which the link connection and, hence, the release member are restrained or blocked against actuation from the outside of the door.

Other objects of this 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 looking toward the front inside face of the latch device and illustrating one embodiment of the present invention.

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

Fig. 3 is a fragmentary side elevation looking from the right in Fig. 1 in the direction of the arrow numbered 3.

Fig. 4 is a section taken substantially through lines 4—4 of Fig. 3 looking in the direction of the arrows.

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 herein is for the purpose of description and not of limitation.

The latch device constructed in accordance with the particular embodiment of the invention herein illustrated, by way of example, is shown mounted on an automobile door having the usual inner door panel 21 terminating in a transverse jamb edge 22 facing the fixed jamb face or edge 23 (Fig. 3) of the door frame post or body pillar.

The present latch device comprises a case plate 24 provided with screw bosses 24a by means of which the case plate is secured to the inner side of the jamb portion 22 of the door. The case plate terminates at its inner edge in a flange 25 facing the inner door panel 21. The latch device is preferably provided with a rotatable toothed latch or bolt 26 positioned at the outer face of the case plate 24, this latch or bolt having an integral projecting shaft or shank 27 extending through an aperture in the case plate which is formed with a bearing for the bolt shank. The inner end of the shank 27 of the bolt is flattened and extended through a correspondingly shaped aperture in a rotatable toothed detent engaging member or ratchet member 28 and is riveted thereto.

The rotatable latch 26, as shown in Fig. 4, is formed with a number of radially projecting tooth-like projections 26a, preferably six, which are spaced equally around the periphery of the latch so as to provide in effect a gear type latch or bolt. The ratchet member 28 is also formed around its periphery with a number of tooth-like abutments or projections 28a which correspond in number to the tooth like projections 26a of the bolt.

Pivotally mounted on a shoulder rivet 29 secured to the case plate 24 is a swinging detent,

pawl or dog which has a downwardly extending detent arm 30 cooperable with the teeth or projections 28a of the ratchet member 28. The detent arm 30 is engageable with any one of the teeth 28a in the manner shown in Fig. 1 to hold the ratchet member and, hence, the bolt 26 in locking position against rotation in a counterclockwise direction as viewed in Fig. 1. The detent is also provided with an upwardly projecting arm or extension 31 and also an inwardly extending arm or extension 32. Thus, the detent in the embodiment herein shown is provided with three arms 30, 31 and 32 and is preferably formed from a single piece of flat metal stock.

Associated with the detent is a detent actuating or release lever 33 which is pivoted at its upper end upon a shoulder rivet or stud 34 secured to the case plate. The lever 33 in the present instance has an outward extension 33a and is flanged at 33b along its outer edge. Pivoted at 35 to the side of the lever 33 below the pivot 34 thereof is a detent operating link 36, this link in the present instance extending inwardly from the lever 33 and having a narrowed extension 36a overlying and normally slidingly engageable with the detent arm 31. It will be seen that from this construction the link 36 is mounted so as to swing up and down about its pivot 35. The link is formed at its lower edge with an abutment or shoulder 36b adapted to engage the upper end of the detent arm 31 when the link 36 is shifted inwardly by swinging the lever 33 inwardly. The link 36 is also provided at its upper edge with an abutment or shoulder 37 for a purpose hereinafter described.

The detent arm 30 is yieldingly urged toward the ratchet plate 28 by means of a coiled spring 38 anchored at its inner end to a lug 39 lanced out of the case plate. This spring has an upwardly extending arm 38a engageable with the edge of the detent arm 30 so as to yieldingly hold the arm in latching engagement with a tooth 28a of the ratchet plate 28. The lever 33 is urged outwardly toward its normal position shown in Fig. 1 by means of a coiled spring 40 having its inner end 40a anchored in a kerf in the stud 34. The spring 40 has a downward extension 40b engaging behind the flange 33b of the lever 33. The spring 40 thus urges the lever outwardly to a position governed by a stop 41 which is in the form of a lug struck out from the case plate and positioned for engagement by the flanged edge of the lever, as shown in Fig. 1. Inward movement of the lever when swung to disengage the detent is limited by means of a stop 42 in the form of a lug struck out from the case plate which is engaged by an offset shoulder 33c on the lever. The flanged edge 33b of the lever is widened to provide a flanged extension 33d engageable by a plunger 43 which may be shifted inwardly to swing the lever 33 by any suitable outside operator on the door such, for example, as a push button or a pull-out type handle.

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 25. The lever is provided with a projecting arm 46b overlying at its inner end the detent arm 32, see Fig. 2.

In accordance with the present embodiment of the invention means is provided for swinging the

operating link 36 upwards to a restrained or blocked position and also for effecting the operative connection between the link 36 and the detent arm 31. This is accomplished in the present instance through the medium of a manually operable slide 48 which may be shifted either by manually operable means at the inside of the door or by a key operated lock from the outside of the door. The slide 48 is embossed at its upper end to provide an outwardly extending channel shaped projection 49 notched at 49a to receive the inner end of the extension 36a of the link 36. The lower edge of the channel shaped projection 49 overlies the lever arm 46b and the latter in turn overlies the detent arm 32. Since the extension 36a of the operating link 36 projects within the notch 49a in the vertically shiftable slide 48, an interlocking connection is thus provided between the link extension 36a and the slide so that upward movement of the slide will raise the link 36, and reverse movement of the slide will position the link 36 with its abutment 36b in operative relation to the upper end of the detent arm 31.

When the slide 48 is shifted upwardly so as to swing the link 36 to the broken line position shown in Fig. 1, the upper abutment shoulder 37 on the link will move into abutting relation to a stop 50 on the case plate. This stop in the present instance is in the form of a lug lanced out of the case plate. Thus, with the link 36 raised so as to engage the shoulder 37 on the link with the stop 50, the link will be blocked and, hence, neither the link 36 nor the lever 33 can be shifted inwardly by actuating the outside operator. The present construction is such that when the link 36 is raised to its broken line position in Fig. 1 so as to coact with the stop 50 the lower abutment shoulder 36b on the link is moved upwardly above the upper edge of the detent arm 31.

From the foregoing it will be seen that the slide 48 on the case plate flange 25 may be shifted up and down to move the operating link 36 in one direction into blocked or restrained position so as to prevent disengagement of the detent from the outside of the door and in the opposite direction into operating position with respect to the detent arm 31. The slide 48 is guided on the case plate flange 25 by means of upper and lower headed guide studs 51 and 52 extending through vertical guide slots 53 and 54 in the slide. The slide 48 may be shifted upwardly to the dotted line position shown in Fig. 1 and downwardly to its full line position by means of a lever 55 pivotally mounted on a stud 56 secured to the case plate flange 25. This lever has a projecting arm 55a terminating in a round end 55b lying between the upper edge of the channel shaped projection 49 on the case plate and a lug 57 bent over from the upper edge of the slide. The lever 55 also has a lever arm 55c pivotally connected at 57 to a vertically shiftable rod or plunger 58 which extends upwardly through the garnish molding at the inner side of the glass panel of the door. This rod carries at its upper end a knob 59 which may be grasped at the inside of the door to shift the plunger vertically in either direction.

From the foregoing construction it will be apparent that by pressing the knob 59 downwardly the lever 55 will be rocked thereby raising the slide 48, and conversely when the rod 58 is pulled upwardly the slide 48 will be shifted downwardly. The slide is yieldingly held and urged toward its upper and lower limits of movement by means of a snap-over spring 60 of suitable strength attached at one end to the slide and at the opposite

end to the case plate flange 25. As shown in Fig. 2, the slide 48 is notched or cut away at 61 to provide clearance for the detent arm 32. Projecting outwardly from the side edge of the notch 61 in the slide is a flange or lug 62 which, when the slide is shifted upwardly, is moved into position, as shown in dotted lines in Fig. 2, to underlie and substantially engage the lever arm 46b. Thus, with the slide in its uppermost position the lever arm 46b will contact the lug 62 when the lever arm is swung downwardly, thereby returning the slide to its lowermost position. The case plate flange 25 is provided with an aperture 63 to receive the end of the detent arm 32.

In the present embodiment the height of the slot 61 in the slide 48 is such that when the slide is shifted to its uppermost position the lower edge 61a of the slot 61 will be positioned immediately beneath the detent arm 32 as shown in dotted lines in Fig. 2. Thus, if the slide is shifted to its uppermost position when the door is open and the door is then closed, the detent arm 32 will swing downwardly by reason of the pivotal motion imparted to the detent by the teeth 28a of the ratchet member due to rotative motion imparted to the bolt 26 by the striker or keeper. This downward motion of the detent arm 32 will cause the detent arm to shift the slide 48 downwardly by engagement of the detent arm with the lower edge 61a of the notch 61 in the slide. Thus, the detent will restore the slide and the operating link 36 to their normal positions. This construction is usually provided in one or both of the front door locks which are provided with key-actuated mechanism for locking or unlocking the door. In connection with the rear doors where it is usually desirable to provide a construction in which the door may be closed and set in locked condition, the slot 61 may be lengthened so that the edge 61a of the notch 61 in the slide will be sufficiently below the detent arm 32 so that the latter will not engage the edge 61a when swung downwardly upon pivotal motion of the detent. With such construction the slide 48 may be shifted to its uppermost position when the door is open, and thereafter upon closing the door the slide will remain in its uppermost position with the link 36 held in its raised position in blocking relation to the stop 50.

It will be understood that the draft link 44, forming part of the inside remote control mechanism, is shiftable by means of a suitable inside operator remotely located with respect to the latch mechanism. This operator may take the form of the usual spring controlled handle mounted on the inside of the door. When the handle is turned in one direction the draft link 44 will be shifted to the left in Fig. 2, thereby swinging the lever arm 46b downwardly so as to depress the detent arm 32 and disengage the detent arm 30 from the toothed ratchet member 28. This operation may be performed irrespective of the position of the slide 48 since the detent, as viewed in Fig. 1, may be swung in a counterclockwise direction relatively to the operating link 36. As previously described, the downward movement of the lever arm 46b will restore the slide to its normal lowermost position by engagement of the lever arm with the lug 62 on the slide.

The present construction is such as to permit the slide 48 to be shifted upwardly and downwardly by means of the lever 46. This may be accomplished by utilizing an inside door handle which may be swung in opposite directions. Thus, when the inside handle is swung in one direction it will depress the lever arm 46b, and when swung in the opposite direction it will shift the draft link 44 to the right in Fig. 2 and raise the lever arm 46b. Since the lever arm is positioned beneath the channel portion 49 in the slide, upward movement of the lever arm will raise the slide 48 to its uppermost position through engagement of the lever arm with the underside of channel portion 49. When the latch mechanism is equipped with an inside door handle of the foregoing type adapted to raise and lower the slide 48, the lever 55, plunger or rod 58, and button 59 may be dispensed with.

In the present embodiment of the invention the rotary toothed latch or bolt 26 is actuated when the door is closed by means of a striker or keeper device 64 which is rigidly mounted on the jamb edge 23 of the body pillar or fixed upright member of the door frame, as by means of screws 65. The striker member is formed at its lower edge with two integral spaced tooth-like projections 66 and 67 with which the teeth 26a of the latch bolt mesh to hold the door in either a final or safety locking position. When an adjacent pair of teeth 66a embrace and engage the tooth 66 the door is in safety locking position, and when an adjacent pair of teeth 26a engage and embrace the tooth 67 of the striker member the latch bolt is in final locking position as shown in Fig. 4. The upper surface 64a of the striker member forms an inclined ramp engaged by a dovetail shoe or guide block 68 rigidly secured to the case plate and cooperable with the bolt by engagement with the striker member casing so as to hold the door against vertical movement when in its fully closed position.

Where a key controlled device is incorporated with the door lock, the slide 48 is provided with a depending extension 48a having spaced lugs 69 and 70 pivotally receiving a rounded end 71a of a swinging crank arm 71. This arm is connected to the end 72 of a key actuated shaft, the shaft in turn being connected to the cylinder mechanism of any conventional lock having the usual key control. By turning the key in the lock on the outside of the door the crank arm 71 may be swung to shift the slide 48 vertically in one direction or the other, thereby to shift the detent operating link 36 into or out of operative relation of the detent arm 31. The key control means for the slide 48 is usually embodied in one or both of the front door locks of an automobile body but is usually omitted from the locks used on the rear doors.

I claim:

1. 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 portion movable toward said flange upon swinging said lever, link means pivotally connected to said lever portion and having a part normally arranged in opposing relation to a part of said detent means and being shiftable upon swinging said lever to cause said parts to abut and disengage the detent means from said latch device, a fixed stop on said plate portion, and inner manually operable means for

pivotally moving said link means in a generally vertical direction to position a second part of said link means in opposing relation to said stop thereby to cause said stop to block such shiftable movement of said link means as would cause the latter to disengage said detent means.

2. 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 movable toward said flange upon swinging said lever, link means pivotally connected to said 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, and inner manually operable 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.

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 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, link means pivotally connected to said 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.

4. 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 portion movable toward said flange upon swinging said lever, link means pivotally connected to said lever portion and having

a part normally arranged in opposing relation to a part of said detent means and being shiftable upon swinging said lever to cause said parts to abut and disengage the detent means from said latch device, a fixed stop on said plate portion, a vertically shiftable slide on said flange connected to said link means for pivotally moving said link means in a generally vertical direction to position a second part of said link means in opposing relation to said stop thereby to cause said stop to block such shiftable movement of said link means as would cause the latter to disengage said detent means.

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 movable toward said flange upon swinging said lever, a vertically shiftable member mounted on said flange, pivotally mounted link means connected at opposite ends to said lever part and said shiftable member, and inner manually operable means for shifting said member vertically in one direction to swing said link means into one position in which said lever is free to be swung to move its said part toward said flange, said inner manually operable means being operative to shift said member vertically in the opposite direction to swing said link means into a blocking position with respect to said lever, and means on said plate portion for blocking said link means and thereby causing said link means to block said lever in said blocking position.

6. In a door 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 door latching position, outer manually operable means for pivotally actuating said detent means to disengage the same from said latch device and including a manually operable detent operating member on said plate portion having a part movable toward said flange, link means pivotally connected to said part, a vertically shiftable slide on said flange connected to said link means for swinging the same vertically, a fixed stop, said link means having abutments at two opposite sides thereof, one abutment being normally positioned in opposing relation to said detent means to abut and disengage the same from said latch device upon moving said member to shift said link means endwise and the other abutment being engageable with said stop to block said shiftable movement of said link means upon shifting said slide vertically to swing said link means about its pivotal connection, and inner manually operable means for shifting said slide.

7. 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, pivotally mounted link means connected to said lever for operation thereby and having a part normally arranged in opposing relation to a part of said detent means and being shiftable upon swinging said lever to cause said parts to abut and disengage the detent means from said latch device, 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 said 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.

JOHN H. ROETHEL.

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