Nov. 26, 1957 J. H. ROETHEL 2,814,519

DOOR LOCK

Original Filed July 2, 1949

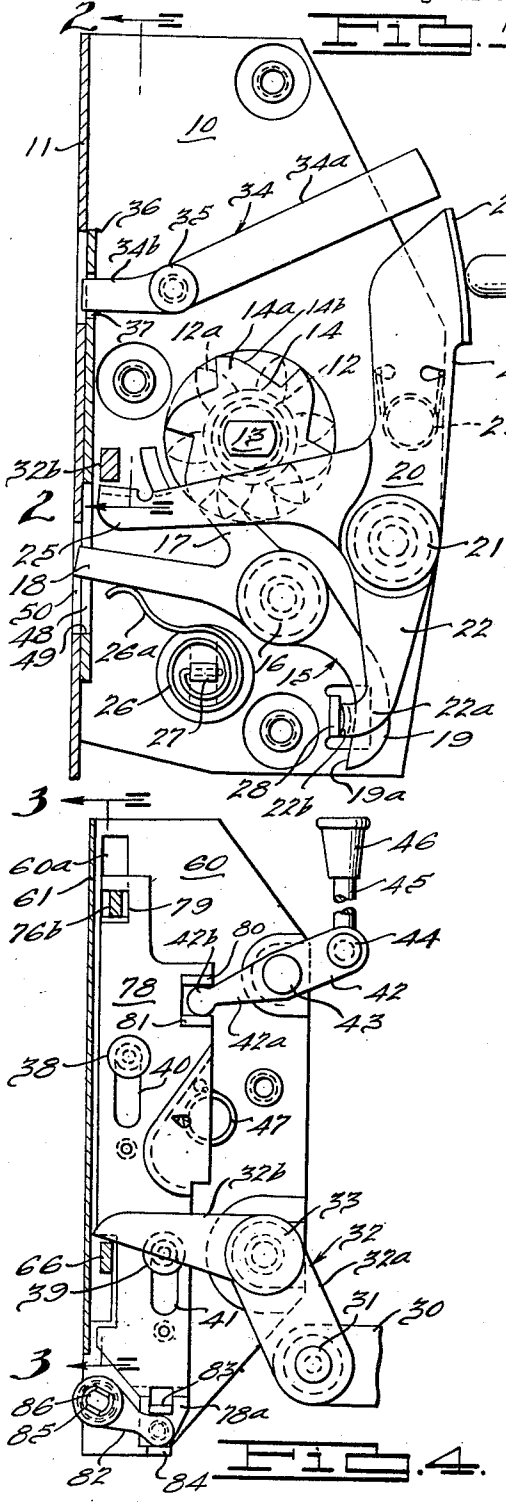


FIG. 1.

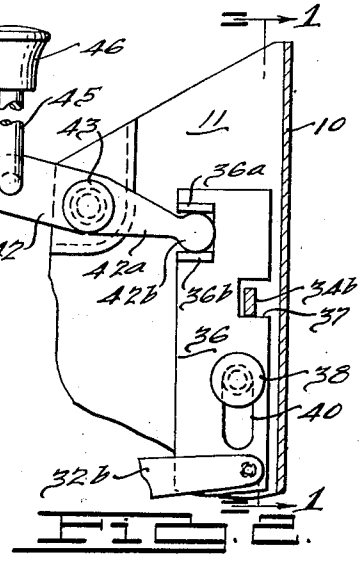


FIG. 2.



FIG. 4.

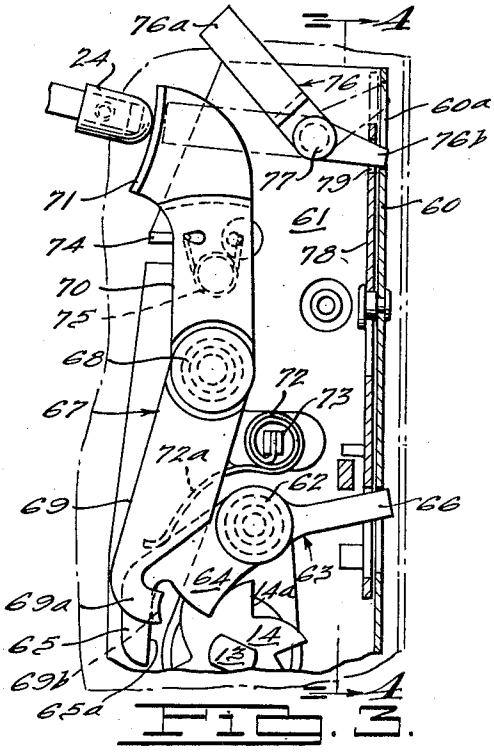


FIG. 3.

INVENTOR.
John H. Roethel.
BY
Elmer Jamison Gray
ATTORNEY.

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2,814,519

# DOOR LOCK

John H. Roethel, Detroit, Mich., assignor to Roethel Engineering Corporation, Detroit, Mich., a corporation of Michigan

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4 Claims. (Cl. 292—280)

This invention relates to a 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 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 a 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.

A further object of the invention is to provide an improved door latch mechanism having a rotatable latch device controlled by means of a pivoted detent or the like, and having a swinging lever mounted on the latch support for swinging or pivotally actuating the detent to disengage the same from the latch device, the latch mechanism embodying improved inside manually controllable means for causing operation of the outside manually operable means to be restrained or rendered inoperative, a particular object in connection with this aspect of the invention being to provide a pivotally mounted member which is shiftable into position to cause the swinging lever to be restrained against pivotally actuating the detent to disengage the same from the latch device.

Still another object of this invention is to provide an improved door latch mechanism in which the detent means for holding the rotary latch device in door latching position is pivotally actuated by outer manually operable means having a part movable toward the flange of the case plate or support, the latch mechanism embodying link means pivotally mounted on the latch support adapted to be swung into and out of blocking position with respect to the outer manually operable means through the medium of means manually operable from the inside of the door.

Other objects of this invention will appear in the following descriptions 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 illustrating a door lock constructed in accordance with one embodiment of the invention.

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



Fig. 3 is a sectional elevation taken substantially through lines 3—3 of Fig. 4 looking in the direction of the arrows and illustrating a door lock constructed in accordance with a second embodiment of the invention.

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

This application is a division of my copending application Serial No. 102,833, filed July 2, 1949, and also a continuation-in-part of my copending application Serial No. 141,125, filed January 28, 1950, now Patent No. 2,706,128, granted April 12, 1955.

In the drawings there are illustrated, by way of example, certain embodiments of the present invention as applied to the door and door frame structures of an automobile body. The latch device constructed in accordance with the embodiment of the invention shown in Figs. 1 and 2 comprises a case plate **10** which is adapted to be secured, as by means of screws, to the inner side of the jamb portion of a vehicle door, the case plate **10** having a flange **11** 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 **12** positioned at the outer face of the case plate **10**, this latch having an integral projecting stub shaft or pivot **13** extending through an aperture in the case plate which is formed with a bearing for the stub shaft. The inner end of the stub shaft **13** is flattened and extended through a correspondingly shaped aperture in a rotatable toothed detent engaging member or ratchet member **14** and is riveted thereto. From the foregoing construction it will be seen that the toothed latch or bolt **12** is rigidly secured to the detent engaging member **14**, being concentric therewith on the stud **13**.

The rotatable latch or bolt **12** is formed with a number of radially projecting tooth-like projections **12***a*, 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 member or ratchet **14** is formed around its periphery with a number of abutments or shoulders **14***a* which correspond in number to the number of tooth-like projections **12***a*. Thus, in the illustrated embodiment the latch **12** has, for example, six tooth-like projections **12***a* and the detent engaging member **14** has six equally spaced detent engaging abutments or shoulders **14***a*. The periphery of the ratchet **14** between the adjacent shoulders or abutments **14***a* is formed with inclined and preferably curved camming surfaces **14***b*, each surface connecting the outer edge of one shoulder **14***a* with the bottom edge of an adjacent shoulder.

Cooperable with the peripheral notched edge of the ratchet **14** is a swinging detent, pawl, or dog **15** pivotally mounted on a shoulder rivet **16** secured to the case plate **10**. The detent **15**, as seen in Fig. 1, is a multi-armed member having one arm **17** extending in a substantially upward direction and cooperable with the teeth or projections **14***a* of the ratchet member **14**. The detent arm **17** is engageable with any one of the teeth **14***a* in the manner shown in Fig. 1 to hold the ratchet member and hence the bolt **12** in locking position against rotation in a clockwise direction as viewed in Fig. 1. A second arm **18** of the detent member **15** extends in a substantially horizontal direction toward the flange **11** and a third arm **19** extends in a downward and outward direction. Thus,

the detent **15** in the present embodiment is provided with three arms **17**, **18** and **19** and is preferably formed from a piece of flat metal stock.

Associated with the detent is a vertically extending detent actuating or release lever **20** which is pivoted intermediate its ends upon a shoulder rivet or stud **21** secured to the case plate. This lever has a lever arm **22** extending downwardly below the pivot **21** and terminating in a hook-like projection **22***a* which overlies the downwardly extending detent arm **19**. The inner end of the hook-like projection **22***a* is embossed to form a curved lug **22***b* engaging the inner edge **19***a* of the detent arm **19**. By virtue of this construction the lever arm **22** and the detent arm **19** are interconnected so that if the lever arm is swung about its pivotal axis in a clockwise direction as seen in Fig. 1 it will swing the detent member **15** about its pivotal axis in a counterclockwise direction.

The detent release lever **20** also has an upwardly extending lever arm **23** formed with a flange **23***a* thereon. This lever arm **23** is adapted to be engaged on the outer side of the flange **23***a* by an outside manually operable means, such as a push button **24**, for importing pivotal or swinging movement to the lever **20** about its pivot **21**. The release lever **20** is also provided with a third arm **25** extending in a substantially horizontal direction toward the flange **11**. Thus the release lever **20** herein shown is provided with three arms **22**, **23** and **25** and is preferably formed from a piece of flat metal stock.

The detent arm **17** is yieldingly urged toward the ratchet **14** and the release lever **20** is similarly urged toward its normal position seen in Fig. 1 by means of a single coiled spring **26** anchored at its inner end to a retainer **27** lanced out of the case plate **10**. This spring has an upwardly extending arm **26***a* engageable with the under edge of the detent arm **18** and urges this arm and therefore the whole detent member **15** in a clockwise direction, as seen in Fig. 1, about the pivotal axis **16** so as to yieldingly hold the detent arm **17** in latching engagement with a tooth **14***a* of the ratchet **14**. Due to the interlocking connection between the hook portion **22***a* of the release lever **22** and the arm **19** of the detent member **15**, the spring **26** will also function to urge the lever arm **22** inwardly toward the flange **11** and the lever arm **23** outwardly so as to maintain them in the normal non-operating position shown in Fig. 1. Thus, a single spring **26** is utilized to maintain the detent and release lever in their normal positions. The spring **26** urges the lower arm **22** of the release lever inwardly to a position governed by a stop which is in the form of a lug **28** struck out from the case plate **10** and positioned for engagement by the outer edge of the lever arm **22**, as shown in Fig. 1. A light anti-rattle spring **29** may be provided to hold the lever arm **22** against the stop **28** when the detent arm **19** is moved relatively to the lever arm **22**. The coiled spring **29** is suitably selected as to strength and has one arm connected to the lever arm **23** and the opposite end connected to the case plate **10**.

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 **30** which is pivoted at **31** to the lower end of one arm **32***a* of a bell crank lever **32**, see Fig. 4. This lever is pivoted on the shank of a shoulder rivet **33** secured to the case plate flange **11** and is provided with a projecting arm **32***b* overlying at its inner end the release lever arm **25**, see Fig. 1. 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 which may be turned in the desired direction.

In accordance with the embodiment of the invention illustrated in Figs. 1 and 2 means is provided for restraining or blocking the detent release lever **20** against operation from the outside or inside of the door. The blocking means comprises a link **34** pivoted intermediate its ends on a stud **35** secured to the case plate **10** and controlled by means of a slide **36**. The link **34** has an arm **34***a* adapted to be moved into position to lie between the stud **35** and flange **23***a* of the lever arm **23**. The link also has inwardly extending arm **34***b* projecting into an aperture or notch **37** in the slide **36** and is thereby interlocked with the slide.



The slide **36** which controls the operation of the link **35** 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 **36** is guided on the case plate flange **11** by means of upper and lower headed guide studs or pins **38** and **39** secured to the case plate flange and extending, respectively, through vertical guide slots **40** and **41** in the slide.

The manually operable means at the inside of the door for shifting the slide upwardly to its upper limit as determined by the guide studs **38** and **39** and returning it to its normal position comprises a lever **42** pivotally mounted on a stud **43** secured to the case plate flange **11**. This lever has a projecting arm **42***a* terminating in a rounded end **42***b* lying within the space between two lugs **36***a* and **36***b* struck up from the slide. Pivoted at **44** to the outer end of the lever **42** is a vertically shiftable rod or plunger **45** which extends upwardly through the garnish molding at the inner side of the glass channel of the door. This rod carries at its upper end a knob **46** which may be manipulated at the inside of the door to shift the plunger vertically in either direction, thereby rocking the lever **42** and shifting the slide **36** vertically in either direction between limits governed by the height of the guide slots **40** and **41**. The slide **36** is yieldingly held and urged toward its upper and lower limits of movement by means of a snap-over spring **47**, see Fig. 4, of suitable strength attached at one end to the slide and at the opposite end to the case plate flange **11**. From the foregoing construction it will be apparent that by pressing the knob **46** downwardly to rock the lever **42**, the slide **36** will be raised so as to swing the arm **34***b* upwardly thus rocking the arm **34***a* downwardly and interposing it between the fixed stud **35** and the flange **23***a* of the lever arm **23**. The lever **23** will then be blocked by the arm **34***a* and stud **35**. Reverse movement of the slide **36** will, of course, restore the link **34** to its normal position and unblock the release lever.

To ensure that the door cannot be inadvertently locked when opened, there is provided a kickout means which will restore the shiftable link **34** to a position wherein the arm **34***a* thereon is not in opposing relation to the flange **23***a*. In Fig. 1 the slide **36** is shown notched at **48** to provide clearance for the end of the detent arm **18**. However, the bottom edge **49** of the notch **48** is positioned so that with the slide **36** in its uppermost position the edge **49** is almost in contact with the lower edge of the detent arm **18**. The detent arm **18** is of sufficient length to ensure contact with the edge **49** and the case plate flange **11** is notched as at **50** to provide the necessary clearance for the end of the detent arm **18**. Thus, in the event the slide **36** is shifted upwardly when the door is open and the door is swung to closed position, rotation of the ratchet member **14** will cause one of the cam surfaces **14***b* to engage the detent arm **18** and by camming action swing the detent and therefore the detent arm **18** in a counterclockwise direction as viewed in Fig. 1. The downward movement of the detent arm **18** will force the slide **36** downwardly resulting in the link **34** 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.

If it is desired to eliminate the kickout means from the lock either one or two simple modifications may be made in the lock structure. The length of the detent arm **18** may be shortened thus allowing this arm to swing downwardly without contacting the edge **49** of the notch **48** in the slide **36** or the depth of the notch **48** may be increased so that the edge **49** will not underlie the lower

edge of the arm **18** thus allowing the arm **18** to swing freely within the notch **48**.

The embodiment of the invention illustrated in Figs. 3 and 4 is in many respects similar to that heretofore described with respect to Figs. 1 and 2, differing therefrom mainly in the location of the detent and the release lever. It comprises a case plate **60** adapted to be secured to the jamb portion of a vehicle door and having a flange portion **61** adapted to be positioned along the inner panel of the door in the same manner as the case plate **10** and its flange **11**. The present latch device is also provided with a rotatable toothed latch or bolt **12** positioned on the lower portion and at the outer face of the case plate **60**, this latch having an integral projecting stub shaft or pivot **13** extending through an aperture in the case plate which is formed with a bearing for the stub shaft. A toothed detent engaging member or ratchet member **14** is fastened on the inner end of the stub shaft **13** as in the previously described embodiment. Pivotally mounted on a shoulder rivet **62** secured to the case plate **60** above the pivotal axis of the latch bolt **12** is a swinging detent, pawl or dog **63** which has a downwardly extending detent arm **64** cooperable with the teeth or projections **14***a* of the ratchet member **14**. Extending from the outer part of the detent arm **64** in an outward and downward direction is a hook-like arm **65**, this arm lying substantially in the plane of the ratchet member **14** and spaced outwardly therefrom. The detent is also provided with an inwardly extending arm or extension **66**. The detent **63** thus is provided with three arms **64**, **65** and **66** and is preferably formed from a piece of flat metal stock.

Associated with the detent is a vertically extending detent actuating or release lever **67** which is pivoted intermediate its ends upon a shoulder rivet or stud **68** secured to the case plate. This lever has a lever arm **69** extending downwardly below the pivot **68** and terminating in a hook-like portion **69***a* which overlies the detent arm **65**. The inner end of the hook-like projection **69***a* is embossed to form a curved lug **69***b* engaging the inner edge **65***a* of the detent arm **65**. By virtue of this construction the lever arm **69** and detent arm **65** are interconnected by means of the lug or projection **69***b* on the hook-like portion **69***a* engaging beneath an extended portion of the detent arm **64**. The detent release lever **67** also has an upwardly extending lever arm **70**. The upper end of the lever arm **70** is enlarged and formed with a widened flange **71**.

The detent arm **64** is yieldingly urged toward the toothed latch member or ratchet **14** and the release lever **67** is similarly urged toward its normal position shown in Fig. 3 by means of a single coiled spring **72** anchored at its inner end to a retainer **73** lanced out of the case plate. This spring has a downwardly extending arm **72***a* engageable with the upper edge of the detent arm **64** so as to yieldingly hold the arm in latching engagement with the tooth **14***a* of the ratchet **14**. Due to the interlocking connection between the hook portion **69***a* of the release lever arm **69** and the extension **65** of the detent arm **64**, the spring **72** will also function to urge the lever arm **69** inwardly and the lever arm **70** outwardly so as to maintain them in the normal non-operating position shown in Fig. 3. Thus a single spring **72** is utilized to restore the detent and release lever to their normal positions. The spring **72** thus urges the upper lever arm **70** of the release lever **67** outwardly to a position governed by a stop **74** which is in the form of a lug struck out from the case plate and positioned for engagement by the outer edge of the lever arm **70** as shown in Fig. 3. A light anti-rattle spring **75** may be provided to hold the lever arm **70** against the stop **74** when the detent arm **64** is swung upwardly relative to the lever arm **69**. The coiled spring **75** is suitably selected as to strength and has one arm connected to the lever arm **70** and the opposite end connected to the case plate **60**.



The present latch device, as in the previously described embodiment, is preferably operated from the inside of the door through the medium of a remote control mechanism comprising a longitudinally shiftable draft link **29** which is pivoted at **30** to the lower end of one arm **31***a* of a bell crank lever **31**. This lever is pivoted on the shank of a shoulder rivet **32** secured to the case plate flange **61** and is provided with a projecting arm **31***b* overlying at its inner end the detent arm **66**, see Figs. 3 and 4. The remote control mechanism is preferably manually actuated from the inside of the door remote from the case plate **60** 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 **67** against operation from the outside of the door only. This embodiment differs from the previous embodiment illustrated in Figs. 1 and 2 in that the blocking means illustrated therein was effective to block operation of the detent release lever against operation from the outside or the inside of the door. In the present embodiment operation of the detent release lever from the outside of the door only is blocked since the detent is disengageable from the ratchet by the inside remote control means independently of the detent release lever. The blocking means comprises a link **76** pivoted intermediate its ends on a stud **77** secured to the case plate **16** and controlled by means of a slide **78**. The link **76** has an arm **76***a* adapted to be moved into position to lie between the stud **77** and the flange **71** of the lever arm **70**. The link also has an inwardly extending arm **76***b* projecting into an aperture or a notch **79** in the slide **78** and is thereby interlocked with the slide. The case plate **60** is notched as at **60***a* to provide clearance for the end of the arm **76***b*. The slide **78**, which controls the operation of the link **76**, may be shifted either by manually operable means in the inside of the door or by a key operated lock from the outside of the door. The manually operable means at the inside of the door for shifting the slide is similar to that described for shifting the slide **36** of the embodiment of the invention illustrated in Figs. 1 and 2. The rounded end **42***b* of the lever **42** is positioned between two upstanding lugs **80** and **81** positioned at the uppermost end of the slide **78**.

In Fig. 4 is illustrated the construction utilized to provide a means for actuating the slide **78** through a key controlled device operable from the outside of the door. The slide **78** is provided with a depending extension **78***a* which is operatively engaged by a swinging crank arm **82**. The end **82***a* of the crank arm lies between two spaced apart lugs **83** and **84** struck up from the slide extension **82***a*. The crank arm **82** is pivoted at **85** to the case plate **60** and is provided with a substantially rectangular opening **86** at the locality of its pivot to receive the key actuated shaft on any conventional lock having the usual key control. By turning the key in the lock in the outside of the door the crank arm **82** may be swung to shift the slide vertically in one direction or the other either to shift the link **76** in opposing relation to the lever arm flange **71** or to restore it to its normal position as shown in Fig. 3. It will be understood that the construction just described is applicable for shifting the slide **36** of the embodiment illustrated in Figs. 1 and 2.

I claim:

1. In a latch mechanism for a swinging door, a support having a main portion for disposition at the free edge wall of the door and terminating at its inner edge in a flange portion, a rotatable latch device mounted on said main portion, detent means pivotally mounted on said main portion and having an arm engageable with said latch device for holding the same in latching position, a generally vertically extending swinging lever pivotally mounted intermediate its ends on said main portion and having a blocking portion, push button means adapted to be mounted on the outer panel of the door for swinging

the upper end of said lever toward said flange portion thereby swinging the lower end away from said flange portion, the lower end of said lever having a part adapted to engage said detent means arm upon swinging movement of said lower end away from said flange thereby to swing said detent means to disengage it from the latch device, inner manually operable means operative through said lever for pivotally moving said detent means out of holding position with respect to said latch device and including a bell crank lever pivotally mounted on said flange, means for simultaneously blocking pivotal movement of said vertically extending lever and said bell crank lever, said last named means including a member pivotally mounted on said support for swinging movement, said member having blocking means for cooperation with said blocking portion, and inner manually operable means connected to said member for swinging the same into and out of blocking position.

2. In a latch mechanism for a swinging door, a support having a main portion for disposition at the free edge wall of the door and terminating at its inner edge in a flange portion, a rotatable latch device mounted on said main portion, detent means pivotally mounted on said main portion and having an arm engageable with said latch device for holding the same in latching position, a generally vertically extending swinging lever pivotally mounted intermediate its ends on said main portion and having a blocking portion, push button means adapted to be mounted on the outer panel of the door for swinging the upper end of said lever toward said flange portion thereby swinging the lower end away from said flange portion, the lower end of said lever having a part adapted to engage said detent means arm upon swinging movement of said lower end away from said flange thereby to swing said detent means to disengage it from the latch device, inner manually operable means operative through said lever for pivotally moving said detent means out of holding position with respect to said latch device and including a bell crank lever pivotally mounted on said flange, pivotally movable means for simultaneously blocking pivotal movement of said vertically extending lever and said bell crank lever, said pivotally movable means including blocking means for cooperation with said blocking portion, and inner manually operable means connected to said pivotally movable means and operative to pivotally actuate the same to simultaneously block pivotal movement of said vertically extending lever and said bell crank 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 angularly from said plate portion, a rotatable latch device mounted on said plate portion, a lever pivotally mounted intermediate its ends on said plate portion, a flange on said lever providing a blocking portion, detent means engageable with said latch device for holding it in door latching position, said detent means being pivotally mounted on said 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, outer manually operable means cooperable with said lever at the other side of the pivotal axis thereof for swinging the same in said one rotative direction, inner manually operable means operative through said lever for pivotally moving said detent means in said rotative direction out of holding position with respect to said latch device and including a bell crank lever pivotally mounted on said flange, means for simultaneously blocking pivotal movement of said outer manually operable lever and said bell crank lever, said last named means including a blocking member pivoted on said plate portion intermediate its ends to provide two arm portions, one arm portion having blocking means for cooperation with said blocking portion, and inner manually operable means acting on said other arm portion for swinging said blocking member to dispose said blocking means in opposing relation to said blocking portion thereby to block swinging movement of said outer manually operable lever and said bell crank lever in said one rotative direction and render the same ineffective to move said detent means out of holding position with respect to said latch device.

4. In a latch mechanism for a swinging door, a support having a plate portion for disposition at the door jamb and terminating at its inner edge in a flange portion, a latch device pivotally mounted on said plate portion, detent means pivotally mounted on said plate portion for holding said latch device against rotation in its unlatching direction, a generally vertically extending swinging lever pivotally mounted intermediate its ends on said plate portion and having a blocking portion, the pivot axis of said lever being spaced from the pivot axis of said latch device, outer manually operable means for swinging the upper end of said lever in one direction thereby swinging the lower end of the lever away from the pivot axis of said latch device, said lower end of the lever having a part arranged in opposing relation to said detent means and effective to abut said detent means to pivotally move the same out of holding position with respect to said latch device upon swinging said lever in said one direction, inner manually operable means for pivotally moving said detent means in said one rotative direction out of holding position with respect to said latch device and including a bell crank lever pivotally mounted on said flange, said bell crank lever having an arm thereon in opposing relation to an arm on said lever, pivotally movable means for blocking pivotal movement of said vertically extending lever to thereby simultaneously render said outer manually operable means and said bell crank lever ineffective to swing said vertically extending lever, said pivotally movable means including blocking means for co-operation with said blocking portion, and inner manually operable means connected to said pivotally movable means for swinging the same to position said blocking means into and out of blocking position.

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