

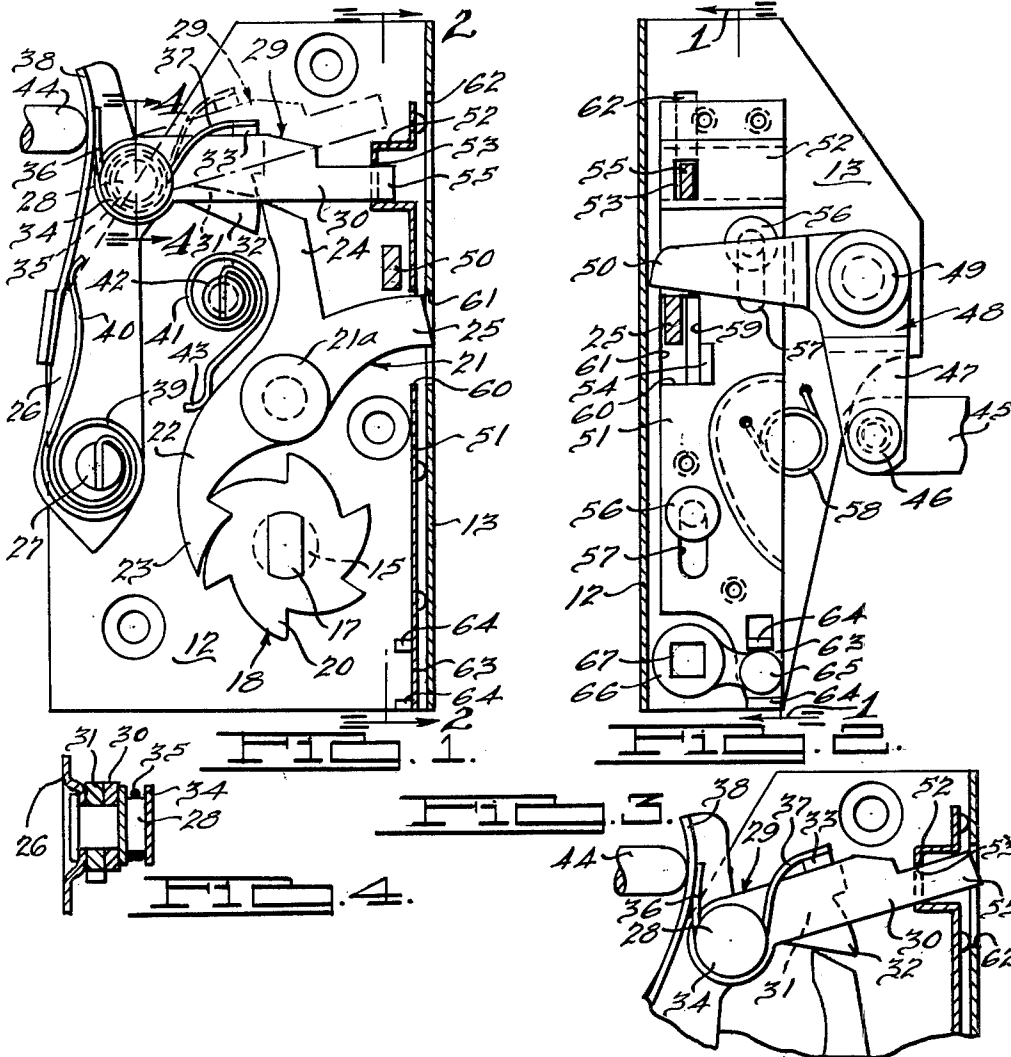
Nov. 7, 1961

J. H. ROETHEL

3,007,731

DOOR LOCK

Filed July 16, 1957



INVENTOR.

John H. Roethel.

BY

John Joseph Roethel

ATTORNEY.

1

3,007,731
DOOR LOCK
John H. Roethel, Coral Gables, Fla.
Filed July 16, 1957, Ser. No. 672,320
5 Claims. (Cl. 292—280)

This invention relates to latch mechanism for swinging doors, particularly the doors of automobile or other vehicle bodies.

It is an object of the present invention to provide an improved latch mechanism of the general type disclosed in my U.S. Patent No. 2,629,618, issued February 24, 1953. The latch mechanism disclosed therein embodies, in general, a rotatable or pivotal latch controlling member adapted to be held in latching position by a detent or dogging means. A manually shiftable means is provided for releasing the detent or dogging means through the medium of a connection which may be moved out of operative relation to the detent or dogging means. With the connection moved out of operative relation to the detent or dogging means, the latter cannot be disengaged from the latch controlling member by operation of the outside door handle, push button or the like. That is, the outside operator is said to be free floating in that it is freely operable but is not effective to cause the detent or dogging means to be disengaged from the latch controlling member. Suitable means is provided for shifting the connection member into and out of operative position, such means being operable by an inside shiftable device or by a key operated device operable from the outside of the door.

In accordance with the preferred embodiment of the latch mechanism disclosed in the above mentioned patent, the connection between the detent release means and the detent or dogging means as well as the inside shiftable device are simultaneously movable into their normal latch mechanism unlocked position by operation of the inside door handle or operator, the latter always being operative to disengage the detent or dogging means regardless of the effectiveness of the outside handle, push button or the like to do so.

A further feature of the embodiment of the latch mechanism referred to in the above mentioned patent is the provision of means for rendering operative the connection between the detent release means and the detent or dogging means when the door latch device is moved to latching position and regardless of the fact that such connection may have been previously moved out of operative relation to the detent when the door is in an open position. This feature is referred to as the "kick-out" feature. This, as the name implies, means that the latch mechanism when placed in "latch locked condition" when the vehicle door is open is "kicked out" or automatically restored to "latch unlocked condition" upon the latch device engaging the striker upon the door being moved to a closed position.

This last or "kick-out" feature created a serious objection to the latch mechanism and affected its commercial acceptability. The construction and arrangement of the operative parts of the latch mechanism is such that it could be operated in a manner to cause internal damage. Briefly, if the connection between the detent release means and detent means were placed in "latch locked" or inoperative position when the door was open and, further, if in the act of swinging the door to a closed position the outside operator or push button were held in an "in" position, the mechanism would jam. The damage would result from the fact that the connection would attempt to move back into its normal operative position but would be barred from so doing by a portion of the detent or dogging means during the operative movement of the latter. And, in view of the fact that a competitive and well known

2

latch mechanism requires the deliberate act of holding the push button in if it is desired to prevent the occurrence of a "kick-out" after the latch mechanism is placed in "latch locked" condition, the difficulty of educating the users of my latch mechanism as to the correct manner of operating the device militated against its acceptance.

Accordingly, the present invention has as its main objective the provision of an improvement to the latch mechanism embodiment disclosed in my patent whereby the latch mechanism may be placed in latch locked condition with the vehicle door standing open; and, regardless of whether the outside operator is permitted to remain in its outward position or is pushed inwardly as the door is swung shut, no damage to the mechanism will occur. In other words, the connection between the detent release means and the detent means will always automatically be restored to its normal operative position with the improved latch mechanism being so constructed and arranged that no possible damage to the latch mechanism could possibly occur if the restoration occurs with the outside operator or push-button held in an "in" position.

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

FIG. 1 is a view in part sectional taken substantially through line 1—1 of FIG. 2 looking in the direction of the arrows illustrating one embodiment of the latch mechanism embodying the present invention.

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

FIG. 3 is a fragmentary view in part similar to FIG. 1 illustrating some of the mechanism in a displaced position.

FIG. 4 is a sectional view taken substantially through line 4—4 of FIG. 1 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 arrangement of parts illustrated in the accompanying drawing, since the invention is capable of other embodiments and of being practiced or carried out in various ways. Also it is to be understood that the phraseology or terminology employed herein is for the purpose of description and not of limitation.

In the drawing there is illustrated, by way of example, a particular embodiment of the present invention as applied to the doors and door frame structures of an automobile body. Each door is provided with a transverse jamb edge or free edge wall 10 facing the fixed jamb face or edge 11 of the door frame post or body pillar.

Adapted to be secured, as by means of screws, to the inner side of the free edge wall 10 of the door is a case plate 12 having a flange 13 extending along the inner panel (not shown) of the door. The present latch mechanism is preferably provided with a rotatable toothed latch device or bolt (not shown) positioned at the outer face of the case plate 12. This latch device or bolt preferably has an integral projecting stud shaft or pivot 15 suitably journaled in a bearing or bushing means (not shown) mounted on the case plate. The inner reduced end 17 of the stud or shank of the latch device or bolt is flattened and extended through a correspondingly shaped aperture in a rotatable detent or dog engaging ratchet member 18, the inner end of the flattened portion 17 being riveted or staked over this member so as to rigidly anchor the same to the latch device or bolt.

The rotatable latch device or bolt 14 is of the type shown in my above-mentioned U.S. Patent No. 2,629,618 and is formed with a number of radially projecting tooth-like projections, preferably six, which are spaced equally

3

around the periphery so as to provide in effect a gear type latch device or bolt. The ratchet member is also formed around its periphery with a number of tooth-like abutments or projections 20 which correspond in number to the tooth-like projections of the latch device or bolt. Pivotaly mounted on a shoulder rivet 21a secured to the case plate 12 is a swinging detent, pawl or dog 21 having a substantially downwardly extending detent arm 22 terminating in a hook portion 23 cooperable with the teeth or projections 20 of the ratchet member 18. The detent arm 22 hook portion 23 is engageable with any one of the teeth 20 in the manner shown in FIG. 1 to hold the ratchet member and hence the latch device or bolt in locking position against rotation in a clockwise direction as viewed in FIG. 5. The detent 21 has an upwardly projecting arm or extension 24 and also an inwardly extending arm or extension 25. The detent is thus provided with three arms 22, 24 and 25 and is preferably formed from a single piece of flat metal stock.

Associated with the detent 21 is a detent actuating or release lever 26 which is pivoted at its lower end upon a shoulder rivet 27 secured to the case plate. Pivoted at 28 to the side of the lever near the upper end thereof is a detent operating link means 29, this link means in the present instance extending inwardly from the lever and overlying the upper end of the detent arm 24, the link means 29 thus being mounted so as to swing vertically toward and from the detent arm 24.

As distinguished from the link means disclosed in my above identified patent, the present link means 29 comprises two members capable of movement independently of each other as circumstances may require. The first member 30 extends substantially from the pivot 28 to the flange 13 for a purpose hereinafter described. The second member 31 extends from the pivot 28 to a point intermediate the ends of the first member 30. The second member has an abutment or shoulder 32 which normally projects below the lower edge of the member 30 and which is adapted to engage the upper end of the detent arm 24 when the link means 29 is shifted inwardly by means of the lever 26. It will be noted, see FIG. 1, that the member 31 is provided with a lug 33 overlying the upper edge of the member 30. As shown in FIG. 3 the pivot stud 28 has a special head 34 adapted to receive a coil spring 35 thereon. The coil spring 35 is provided with end extensions 36 and 37. It will be noted that the end 36 lies against a flange 38 on the detent release lever 26 and the end 37 of the spring hooks over the lug 33 of the member 31 for a purpose to be hereinafter defined.

The detent release lever 26 is urged outwardly toward its retracted position as shown in FIG. 1 by means of a coil spring 39 which is wound around the stud or shoulder rivet 27 and has an upward extension 40 engaging a portion of the flange 38 on the lever 26. The detent 21 is urged in ratchet member engaging direction by an independent coiled spring 41 suitably anchored to a shoulder stud 42 in the case plate 12. The spring 41 is provided with a downwardly depending arm 43 acting against the detent arm 22 to urge the detent 21 in a counterclockwise direction as viewed in FIG. 1.

The flange 38 on the lever is sufficiently wide for engagement by a plunger 44 which may be shifted inwardly to swing the lever 26 by any suitable manually operable means on the outside of the door such, for example as a push button associated with the outside door handle.

The latch mechanism incorporates a remote control mechanism so constructed as to permit release or disengagement of the detent 21 by operation of an inside door handle or other manually operable means. This remote control mechanism is preferably manually actuated from the inside of the door remote from the case plate 12 by means of a door handle which may be turned in the desired direction. Suitably connected to the inside door handle is a longitudinally extending draft link 45 which is pivotally connected at 46 to the lower end of one arm

4

47 of a bell crank lever 48. This lever is pivoted at 49 to the case plate flange 13 and is provided with a projecting arm 50 overlying at its outer end the detent arm 25. Normally, when the inside handle is turned so as to swing the lever arm 50 downwardly, the latter by engagement with the detent arm 25 will swing the detent 21 thus swinging the detent arm 22 upwardly so as to disengage the hook portion 23 from the ratchet member 18. A similar action occurs when the release lever 26 is swung inwardly by the operation of the outside door handle, push button or the like, the link means 29 being shifted inwardly toward the flange and, through its operative connection 32 with the detent arm 24, swinging the detent 21 to its disengaged position.

Means is provided for disconnecting the link means 29 and release lever 26 from the detent arm 24 and also for effecting the operative connection of these parts, this being accomplished through the medium of a manually operable slide which may be shifted either by operation of the inside door handle, by the detent arm 25, or by a key operated device. The slide, designated 51, is embossed at its upper end to provide an outwardly extending channel shaped projection 52 notched at 53 to receive the inner end of the link means member 30. The lower edge of the channel shaped projection overlies the lever arm 25 and the latter in turn overlies the detent arm, and a lug 54 on the slide, see FIG. 2. Since the inner end 55 of the link means member 30 projects within the notch 53 in the vertically shiftable slide 51, an interlocking connection is thus provided between the link means 29 and the slide so that upward movement of the slide will raise the link means 29 to disengage it from the detent arm 24 and reverse movement of the slide will position the link means with its abutment 32 in operative relation to the upper end of the detent arm. The slide 51 is guided on the case plate flange 12 by means of upper and lower guide studs 56 extending through vertical guide slots 57 in the slide. The slide is yieldingly held and urged toward its upper and lower limits of movement by means of a snap-over spring 58 of suitable strength attached at one end thereof to the slide and at the opposite end to the case plate flange 13.

The slide 51 may be shifted upwardly from the inside of the vehicle door through the medium of the bell crank lever 50. If the latter through actuation of the inside operator, is swung in a clockwise direction, as viewed in FIG. 2, the lever arm 50 will abut the lower edge of the channel shaped projection causing the slide 51 to be raised at least to the point at which the snap-over spring 58 passes its dead center position and is effective to urge the slide to its uppermost position.

As particularly shown in FIG. 2, the slide 51 is cut away or notched at 59 to receive the inner end of the detent arm 25. The depth of the notch 59 is such as to permit the lower edge 60 thereof to be moved to a position directly underlying the detent arm 25 and in substantial engagement therewith when the slide 51 is shifted upwardly. The case plate flange 13 is provided with an aperture 61 to receive the end of the detent arm and to permit vertical movement thereof. The case plate flange also has an aperture 62 to receive the inner end 55 of the operating link member 30 when the latter is shifted inwardly as shown in FIG. 3. Projecting outwardly from the side edge of the notch 59 in the slide 51 is the flange or lug 54 which is moved upwardly into position to underlie and substantially engage the lever arm 50 when the slide 51 is shifted upwardly.

Assuming that the link means 29 is in its operative position with respect to the detent arm 24, as shown in FIG. 1, upward movement of the slide 51 by actuation of the lever 50 will swing the link means 29 upwardly to the dot and dash outline position shown in FIG. 1, thereby disconnecting the link means 29 from the detent arm 24. When this occurs it will be apparent that the release lever 26 may be pushed inwardly freely without disengaging the detent 21 from the ratchet member 18,

5

since by this inward motion of the lever 26 the link means 29 will be free to move inwardly relative to the detent arm 24 without imparting any motion thereto.

With the slide 51 in its upper position the lower edge 60 of the notch 59 thereon will be positioned immediately beneath the detent arm 25 and the lug 54 on the slide will be positioned immediately beneath the remote control lever arm 50. Hence, upon operation of the inside remote control mechanism, including lever 48, so as to swing the lever arm 50 downwardly the slide 51 will be shifted downwardly by coaction of the lever arm 50 with the lug 54 on the slide. As the slide 51 is thus shifted downwardly by the lever arm 50 the latter will engage the detent arm 25, thus swinging the detent to disengaged position. Thus, it will be seen that, even though the outside release lever 26 may be disconnected from the detent 21 by shifting the slide 51 upwardly, the slide will be returned downwardly to its normal position to again connect the release lever with the detent by operation of the inside remote control mechanism accompanied by actuation of the detent to disengage it from the ratchet member 18 and permit opening of the door.

In the event the slide is shifted upwardly when the door is in an open position, closing of the door will result in the detent arm shifting the slide downwardly. When the door is closed with the slide 51 in its uppermost position, engagement of the latch device 14 with the striker will rotate the ratchet member and thus swing the detent 21 in a clockwise direction as viewed in FIG. 1. This action will swing the detent arm 25 downwardly and by its engagement with the edge 60 of the notch 59 on the slide 51 will shift the slide downwardly. During this downward movement of the slide the snap-over spring 58 will pass over its dead center position and through its action will aid the detent arm 25 in shifting the slide to its lowermost position, thereby bringing the link means 29 into operative relation to the detent arm 24 so as to permit the door to be opened from the outside.

An important feature of the construction and arrangement embodied in the present invention is, as has been stated above, the link means. The link means was described as comprising the two members 30 and 31 which are independently movable relative to one another as circumstances may require. The circumstance when this movement will and must occur is illustrated in FIG. 3. With reference to FIG. 3, it will be assumed that the vehicle door is in an open position, the slide 51 has been shifted to its upper position thereby raising the link means 29 above the detent arm 24 (see dot and dash position of link means 29 in FIG. 1), and for no particular reason the outside operated plunger 44 is being held inwardly. The result is that the parts of the latch mechanism assume the position shown in FIG. 3 with the abutment 32 directly above the detent arm 24. The door is then swung shut. As has been described above, the engagement of the latch device with the striker or keeper sets in effect a series of movements resulting in the slide 51 being moved downwardly and the link means 29 being restored to its operative position shown in solid outline in FIG. 1.

It will be readily apparent that if the link means is a one piece member as shown in my Patent 2,629,618, the mechanism would be damaged as the result of the abutting relation of the abutment 32 and the upper end of the detent arm 24. However, in the present embodiment all that happens is that the short member 31 will remain substantially stationary as the longer member 30 is moved downwardly by the slide 51. Upon the plunger 44 being released, the spring 39 will restore the lever 26 to its normal position thereby retracting the link means. As soon as the leading edge of the abutment 32 clears the detent arm 24 the spring 35 will swing the short member 31 downwardly into normal position relative to the longer member and the latch mechanism will be ready for normal operation once again.

6

The present invention thus provides a latch mechanism in which the release lever is freely disconnectable from the detent means while at the same time being freely restorable to operative connection any time the disconnection is caused with the vehicle door in an open position, such restoration occurring without internal damage to the latch mechanism regardless of the position of the outside operated plunger.

Where a key controlled device is used with the present embodiment the slide 51 is provided with a depending extension 63 having spaced lugs 64 pivotally receiving the rounded end 65 of a swinging crank arm 66. This arm is pivoted to the case plate flange 13 and provided with a square opening 67 at the locality of its pivot to receive the square portion of a key actuated shaft (not shown). This shaft is connected to the key cylinder mechanism of any conventional lock having the usual key control. By turning the key in the lock on the outside the crank arm may be swung to shift the slide 51 vertically in one direction or the other thereby shifting the link means 29 into or out of abutting relation to the detent arm 24. 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 on the rear doors.

I claim:

1. In a door latch mechanism for a swinging door, a support comprising a plate portion for disposition at the free edge wall of the door 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 to swing about a generally horizontal axis and including a unitary member having a plurality of arms, one arm extending downwardly from said axis and engageable with said latch device for holding the same in door latching position, a second arm extending upwardly from said axis, and a third arm extending inwardly toward said flange, outer manually operable means for pivotally actuating said detent means 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 mounted on said lever, said link means comprising a pair of members one of which has a part normally arranged in operative relation to a part of said second arm and the other of which extends toward said flange, said link means being shiftable upon swinging said lever to cause said parts to abut and shift the detent means thereby to disengage the detent means from said latch device, control means movably mounted on said support and having an interlocking connection with said link means, manually operable means for shifting said control means from a first position to a second position and to cause the same to pivotally move said link means into a position in which said one member part will by-pass said second arm when shifted toward said flange upon swinging said lever, said control means in said second position having a part lying in the path of swinging movement of said third arm, said control means part being engageable by said third arm to restore said control means to said first position upon pivotal movement of the detent means independently of actuation thereof by said outer manually operable means, and means yieldingly resisting movement of said link means one member relative to the other upon said one member part improperly abutting said second arm upon said control means being restored to said first position with said one member part in by-passed relation to said second arm, said independent pivotal movement of the detent means being caused by said latch device 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.

2. In a latch mechanism for a swinging door, a support having a plate portion, a latch device rotatably mounted on said plate portion, detent means pivotally mounted on said plate portion engageable with said latch device

for holding the same against rotation in a door unlatching direction, a lever pivotally mounted on said support actuatable from the outside of the door, link means pivoted to said lever and including a retractible member having a part positioned for normal lateral abutting relation with a part of said detent means, said link means being shiftable upon swinging said lever to cause said parts to laterally abut to disengage the detent means from said latch device, control means movably mounted on said support and having an interlocking connection with said link means, manually operable means for shifting said control means from a first position to a second position and to cause the same to pivotally move said link means into a position in which said retractible member part will by-pass said detent means part upon said link means being shifted by said lever, said control means in said second position having a part lying in the path of swinging movement of another part of said detent means, said control means part being engageable by said last-mentioned detent means part to restore said control means to said first position upon independent movement of the detent means, said independent movement of the detent means being caused by rotation of the latch device upon the latter striking a keeper as the door is moved to a closed position, and means yieldingly resisting retraction of said retractible member upon the latter striking said detent part when in by-passed position if said lever is in actuated position as said control means is being restored to its said first position.

3. In a latch mechanism for a swinging door, a support having a plate portion, a latch device rotatably mounted on said plate portion, detent means pivotally mounted on said plate portion engageable with said latch device for holding the same against rotation in a door unlatching direction, a lever pivotally mounted on said support actuatable from the outside of the door, link means pivoted to said lever and including a retractible member having a part positioned for normal lateral abutting relation with a part of said detent means, said link means being shiftable upon swinging said lever to cause said parts to laterally abut thereby to disengage the detent means from said latch device, control means movably mounted on said support and having an interlocking connection with said link means, manually operable means for shifting said control means from a first position to a second position and to cause the same to pivotally move said link means into a position in which said retractible member part will by-pass said detent means part upon said link means being shifted by said lever, said control means in said second position having a part lying in the path of swinging movement of another part of said detent means, said control means part being engageable by said last-mentioned detent means part to restore said control means to said first position upon independent movement of the detent means, said independent movement of the detent means being caused by rotation of the latch device upon the latter striking a keeper as the door is moved to a closed position, and means yieldingly resisting retraction of said retractible member upon the latter striking said detent part when in by-passed position if said lever is in actuated position as said control means is being restored to its said first position, said last mentioned means being effective to automatically restore said retractible means to its normal operative position upon said lever being released from its actuated position.

4. In a latch mechanism for a swinging door, a support having a plate portion, a rotatable latch device mounted on said plate portion, detent means pivotally mounted on said plate portion engageable with said latch device for holding the same against rotation in door unlatching direction, a lever pivotally mounted on said support actuatable from the outside of the door, link means, pivot means

mounting said link means on said lever at one end thereof, said link means comprising a pair of members swingable independently of each other about said pivot means, one of said members having a part thereof in abutting relation to a part of the other of said members, spring means normally maintaining said member parts in said abutting relation to cause said members to swing in unison about said pivot means, one of said members having a detent means engaging part positioned for normal abutting relation to a part of said detent means, said link means being shiftable in response to actuation of said lever to cause said detent means engaging part to abut said detent means part and pivot said detent means out of engagement with said latch device, control means movably mounted on said support and having an interlocking connection with said link means, manually operable means for shifting said control means from a first position to a second position to cause the same to pivotally move said link means into a position in which said detent means engaging part will by-pass said detent means part upon said link means being shifted by said lever, said spring means yieldingly resisting swingable movement of said one member relative to said other member upon said one member striking said detent means part when said one member detent engaging part is in by-passed relation and said lever is in actuated position as said control means is restored to its said first position.

5. In a latch mechanism for a swinging door, a support having a plate portion, a rotatable latch device mounted on said plate portion, detent means pivotally mounted on said plate portion engageable with said latch device for holding the same against rotation in door unlatching direction, a lever pivotally mounted on said support actuatable from the outside of the door, link means, pivot means mounting said link means on said lever at one end thereof, said link means comprising a pair of members swingable independently of each other about said pivot means, one of said members having a part thereof in abutting relation to a part of the other of said members, spring means normally maintaining said member parts in said abutting relation to cause said members to swing in unison about said pivot means, one of said members having a detent means engaging part positioned for normal abutting relation to a part of said detent means, said link means being shiftable in response to actuation of said lever to cause said detent means engaging part to abut said detent means part and pivot said detent means out of engagement with said latch device, control means movably mounted on said support and having an interlocking connection with said link means, manually operable means for shifting said control means from a first position to a second position to cause the same to pivotally move said link means into a position in which said detent means engaging part will by-pass said detent means part upon said link means being shifted by said lever, the abutting parts of said members and the detent means engaging part of said one member being located between the pivot means on said lever and the interlocking connection of said other member with said control means, said spring means yieldingly resisting swingable movement of said one member relative to said other member upon said one member striking said detent means part when said one member detent engaging part is in by-passed relation and said lever is in actuated position as said control means is restored to its said first position.

References Cited in the file of this patent

UNITED STATES PATENTS

2,224,512	Endter	Dec. 10, 1940
2,629,618	Roethel	Feb. 24, 1953
2,707,124	Wartian	Apr. 26, 1955
2,796,275	Roethel	June 18, 1957