March 26, 1957 W. A. ENDTER 2,786,348

CAR DOOR LOCK

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Fig. 3.

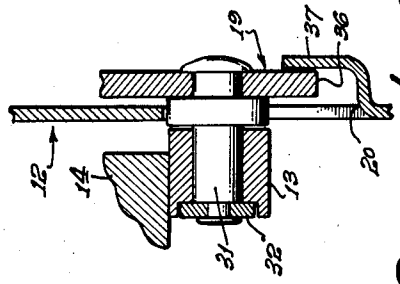


Fig. 1.

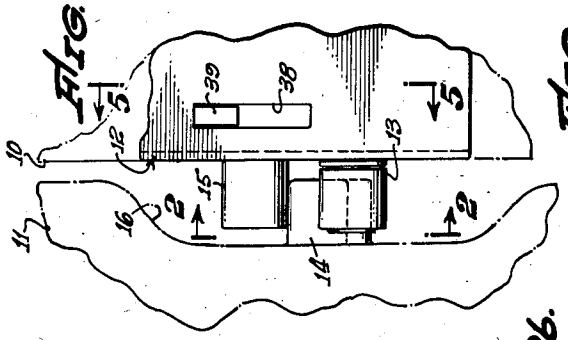


Fig. 12.

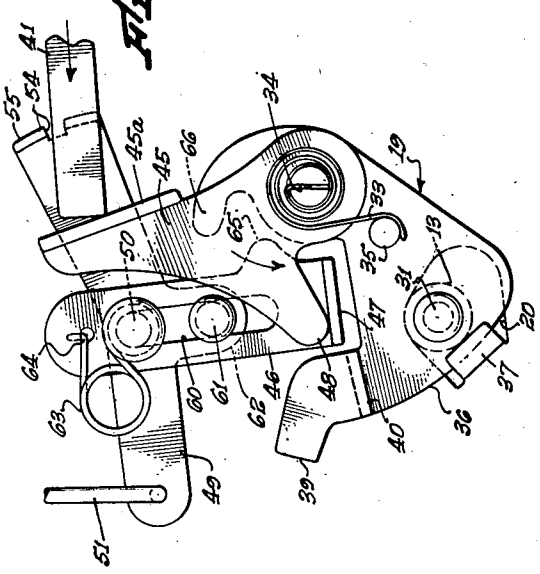


Fig. 2d.

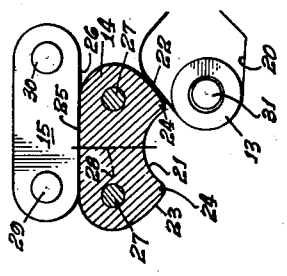


Fig. 2c.

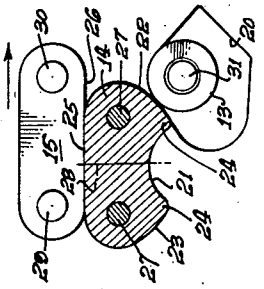


Fig. 2b.

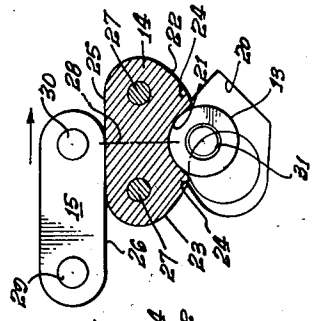
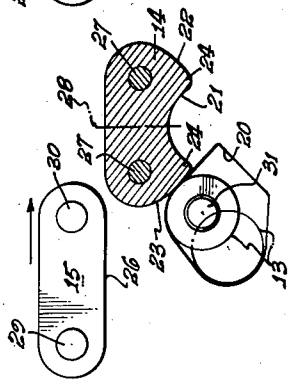


Fig. 2a.



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FIG. 5.

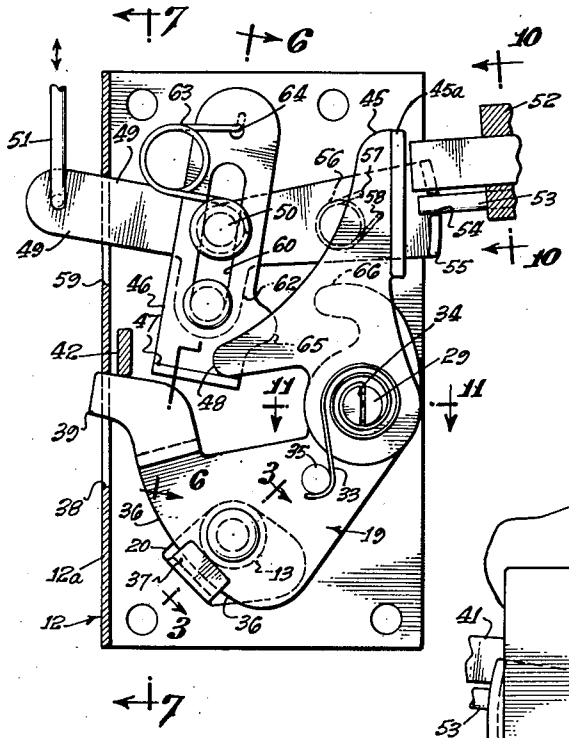


FIG. 6.

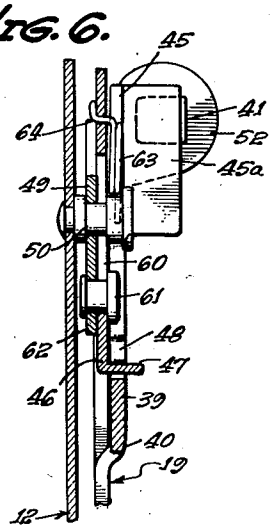


FIG. 7.

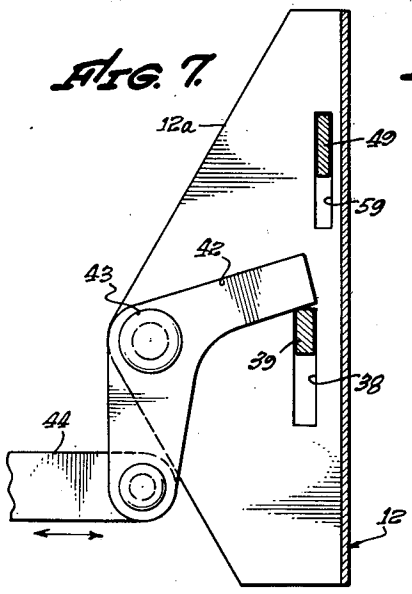
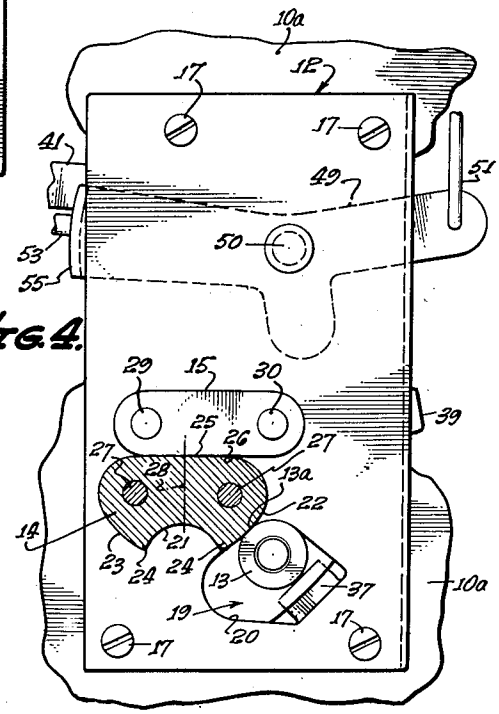


FIG. 4.



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FIG. 8.

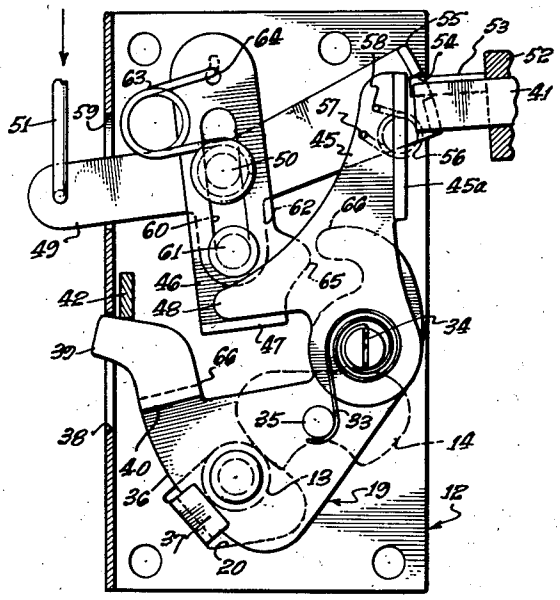


FIG. 10.

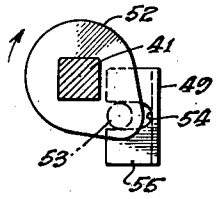


FIG. 10a.

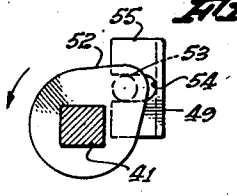


FIG. 9.

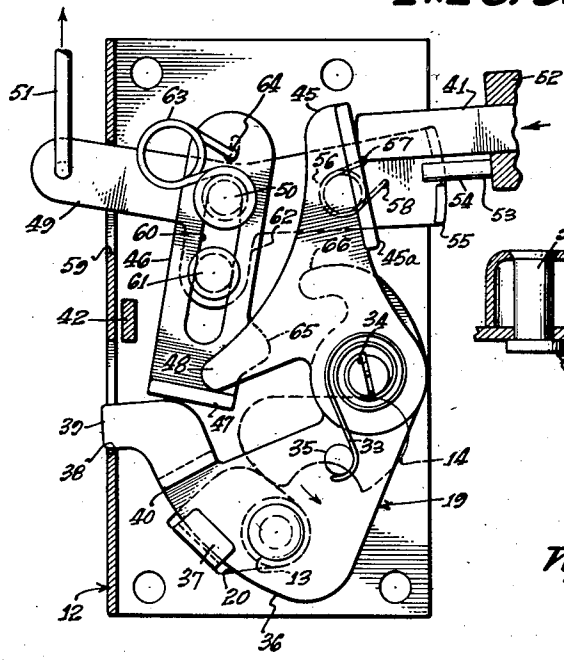
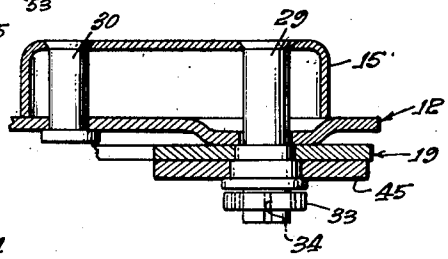


FIG. 11.



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United States Patent Office 2,786,348 Patented Mar. 26, 1957

2,786,348

CAR DOOR LOCK

Waldemar A. Endter, Long Beach, Calif.

Application June 14, 1954, Serial No. 436,460

5 Claims. (Cl. 70—149)

This invention relates to improved latch mechanisms of a type particularly adapted for use as automobile door locks.

The invention is especially concerned with the general type of door lock which is commonly referred to as a "free wheeling" mechanism, i. e., one in which the act of locking the device does not serve to secure the outer operating handle or push button against actuation, but merely renders it ineffective, even though actuated, to release the latch or bolt. This result is attained by employment, in the bolt releasing mechanism, of a connector element, which normally acts to transmit bolt releasing movement between two parts, but is movable by locking of the mechanism to an inactive position in which the connector ceases to transmit such motion.

A major object of the invention is to provide a "free wheeling" lock mechanism of the above described type, which is very positive and direct acting, and yet which at the same time is structurally much simpler than prior devices of the same general character. Particularly contemplated is an improved way of mounting the releasable connector element in such a device, in a manner simplifying the shifting movement of the element between active and inactive positions. This connector element is preferably actuated by a swinging locking member, which is pivotally actuable between locked and unlocked positions, and can be controlled from both the inside and outside of the door.

In accordance with the invention, the connector element is mounted to swing with the locking member about the axis of that member, to lock and unlock the mechanism. In addition, the connector is mounted for a second type of movement, relative to the locking member, in a direction for releasing the bolt. This second type of movement is desirably a sliding movement transversely of the axis about which the locking member and connector swing. For best operation, the connector is movable in one direction relative to the locking member by bolt releasing movement of an outside operator, and is spring urged in an opposite retracting direction.

Preferably, the locking member and connecting member are adapted to be automatically actuated from locked to unlocked position, if the door is closed with the mechanism locked. For this purpose, the bolt may be so positioned as to be deflectable by engagement with an associated keeper when the door is closed, with that deflection of the bolt being utilized to swing the connector and locking member to unlocked condition. More specifically, the bolt may be carried by a pivotally movable member, having a portion which engages and moves the connector member in response to keeper induced deflection of the bolt. Also, the parts may be so designed that, if the door is closed with the mechanism locked, but with the outside operating handle or push button actuated, the keeper induced bolt deflection is then no longer effective to unlock the device. To attain this result, the actuation of the outside operator may

serve to move the connector member relative to the locking member to a position at which movement of the bolt carrying part can no longer serve to deflect the connector to unlocked position.

The above and other features and objects of the present invention will be better understood from the following detailed description of the typical embodiment illustrated in the accompanying drawings, in which:

Fig. 1 is a view showing fragmentarily portions of an automobile door and adjacent stationary pillar, and their carried interengageable bolt and keeper parts;

Figs. 2*a*, 2*b*, 2*c* and 2*d* are enlarged vertical sections taken on line 2—2 of Fig. 1, and showing the keeper and bolt in four different relative positions;

Fig. 3 is an enlarged fragmentary section through the keeper engaging bolt, and taken on line 3—3 of Fig. 5;

Fig. 4 is a view taken on line 2—2 of Fig. 1, and showing more of the door carried mechanism than is visible in Figs. 2*a*, 2*b*, 2*c* and 2*d*;

Fig. 5 is a vertical section taken on line 5—5 of Fig. 1, and showing the various parts which are hidden within the door, the parts being illustrated in their unlocked condition;

Fig. 6 is a section taken on line 6—6 of Fig. 5;

Fig. 7 is a vertical section taken on line 7—7 of Fig. 5;

Fig. 8 is a view corresponding to Fig. 5, but showing the parts in locked condition;

Fig. 9 is a view corresponding to Fig. 5, but showing the parts as they appear when actuated to release the bolt and permit opening movement of the door;

Figs. 10 and 10*a* are sections taken on line 10—10 of Fig. 5, and showing the key controlled lock element in unlocked and locked positions respectively;

Fig. 11 is a section taken on line 11—11 of Fig. 5; and

Fig. 12 is a fragmentary view of the internal mechanism as seen in Fig. 5, but showing the mechanism in locked condition, and with the outside operator or push button actuated.

Referring first to Fig. 1, I have shown fragmentarily a portion of a conventional automobile swinging door 10, and a portion of an adjacent vertical stationary pillar or supporting structure 11. To the edge of the door is mounted a carrier plate or body 12, which carries a movable bolt 13 for engaging in latched relation with a keeper 14 stationarily carried by pillar 11. Bolt 13 engages the underside of keeper 14, with the upper side of the keeper being engageable by a lug or bearing member 15 carried by plate 12. The pillar 11 may be recessed at 16 to receive keeper 14 and the associated door carried parts. As seen in Fig. 4, plate 12 may be rectangular, and is connected into a correspondingly shaped opening in the body surface 10*a* of the door. A number of screws 17 may be employed for thus attaching the plate 12 to the door. Bolt element 13 may comprise an externally cylindrical roller, which is attached to a carrying part 19 mounted at the inner side of plate 12. The bolt projects from part 19 through opening 20 formed in plate 12, this opening being shaped as shown to allow for limited downward movement of bolt 13 between the latching position of Fig. 2*c* and the released position of Fig. 2*d*.

The vertical sectional configuration of keeper 14 is illustrated in Figs. 2 and 4. As seen in those figures, the keeper has a cylindrical downwardly facing recess 21 at the center of its underside, this recess being curved in correspondence with the outer surface of bolt 13, and adapted to receive the bolt in the safety catch position of Fig. 2*b*. Horizontally beyond recess 21 in a latching direction, keeper 14 has an inclined surface 22, which is engaged by bolt 13 in the latched position shown in Figs. 2*c* and 4. At the opposite side of recess 21, the keeper

has an oppositely inclined surface 23, which acts to engage the bolt, and cam it or deflect it downwardly (see Fig. 2a), as the bolt and keeper move into interengagement. The recess 21 and surfaces 22 and 23 are desirably joined smoothly by curved surface portions 24 of relatively small radii of curvature. At its upper side, keeper 14 has an upper horizontal surface 25, which slidably engages a horizontal undersurface 26 of door carried lug 15, as the door closes, to support the door on the keeper. The keeper may be rigidly attached to the pillar by a pair of screws 27, and is preferably symmetrical at opposite sides of a vertically extending central plane 28, so that a single design of keeper may be employed for both right and left hand swinging doors. As seen in Figs. 2, 4 and 11, lug 15 is horizontally elongated, and is rigidly secured to the outer side of plate 12 by a pair of horizontally spaced pins 29 and 30.

Referring now to Figs. 5, 8, 9 and 12, the part 19 for carrying bolt 13 may be formed of rigid sheet metal, and lies in a vertical plane extending parallel to and at the inner side of plate 12. Part 19 is mounted by an inner end portion or extension of lug mounting pin 29 for swinging movement in a vertical plane and about a horizontal axis extending perpendicularly with respect to plate 12. This pivotal mounting allows part 19 and the carried bolt 13 to swing about pin 29 between their Fig. 5 and Fig. 9 positions. Bolt 13 is mounted to part 19 by a shaft 31 (see Fig. 3), about which the roller bolt is freely rotatable, and on which the bolt is retained by an outer retaining washer 32. Shaft 31 extends parallel to pin 29, so that the bolt is rotatable about an axis which extends parallel to the pivotal axis of bolt carrying part 19.

The bolt and part 19 are yieldingly urged to their latching positions of Fig. 2c and Fig. 5 by a spiral spring 33, one of whose ends is received within a transverse slot 31 formed in the non-rotatable pin 29, and the other of whose ends is received about a lug or projection 35 formed on part 19. Spring 33 thus acts to urge part 19 and the bolt in a clockwise direction as seen in Fig. 5. Beyond bolt 13, part 19 may have an arcuate edge 36, which is centered about the axis of pin 29. Adjacent this edge, mounting plate 12 may have a rigid portion 37, which is turned first inwardly and then upwardly (see Fig. 3), to form a guide element for retaining part 19 against movement inwardly away from plate 12. To supplement this guiding effect, plate 12 may have a vertical flange portion 12a turned inwardly at right angles to the main rectangular portion of plate 12, and containing a vertical slot 38 for movably receiving and guiding a projection 39 formed at the outer end of part 19 (see Figs. 5 and 7). The end portion 39 of part 19 may be offset somewhat inwardly with respect to the main portion of that part, by turning the part first inwardly and then upwardly at 40.

The bolt 13 is preferably adapted to be released by either an inside operator, usually a swinging handle (not shown), or an outside operator, typically a push button 41. The inside operator or handle may actuate part 19 and its carried bolt 13 by means of a bell crank 42 pivotally attached at 43 to flange 12a of plate 12. The bell crank may be connected by a strap 44 with the inside operator, so that the crank is swung in a clockwise direction (as seen in Fig. 7) upon actuation of the inside operator. Crank 42 has an arm which engages projection 39 of part 19, to actuate that part and the bolt downwardly in a bolt releasing direction upon the defined clockwise swinging movement of crank 42.

Push button 41 acts to release the bolt through an actuating part 45, and a connecting member 46, which serves as a releasable connection between parts 45 and 19. Connector 46 is actuable between active (unlocked) and inactive (locked) positions by a pivotal locking member 49. Element 45 is pivotally mounted by pin 29 for swinging movement about the same axis as bolt carrying part 19. The upper portion of element 45 may have an inturned flange 45a, which is engageable by push button 41 so

that leftward sliding movement of the push button (as seen in Fig. 5) acts to swing element 45 in a counterclockwise direction about pin 29. This swinging movement is transmitted to part 19 through an inturned ear or lug 47 of connector part 46, which lug is engaged at its upper side by a projection 48 of element 45, and at its underside is engageable with projection 39 of part 19.

Locking part 49 is mounted for pivotal movement between its Fig. 8 and Fig. 9 positions. This mounting is effected by a pin 50, which is attached to the inner side of plate 12, and extends through an opening in element 49. Pin 50 extends parallel to pin 29, to mount element 49 for swinging movement about a horizontal axis parallel to the axis of pivotal movement of the other parts.

Locking part 49 is actuable between its Fig. 8 and Fig. 9 positions by vertical movement of an inner control element 51, or swinging movement of an outer key controlled element 52. The inner element 51 is connected at its upper end to the usual depressible garnish mold button. The outer key controlled element 52 extends about push button 41, and guides that push button for its essentially horizontal sliding movement. Element 52 and push button 41 are adapted to swing about the axis of the push button between the Fig. 10 unlocked position and the Fig. 10a locked position, this swinging movement being effected by turning of a proper key inserted in a key controlled lock structure accessible from the outer side of the door.

Element 52 carries a pin 53, which is receivable within a recess 54 formed in a turned end portion 55 of element 49, so that the defined swinging rotary movement of element 52 acts to move locking element 49 between its Fig. 8 and Fig. 9 positions. An overcenter spring 56 may have its opposite ends 57 and 58 connected into openings in element 49 and plate 12 respectively, so that this spring will act to yieldingly hold element 49 in either its Fig. 8 or Fig. 9 position. The left end portion of element 49, as seen in Fig. 5, may extend through a vertically elongated guide slot 59 in the inturned portion 12a of plate 12, to assist pin 50 in guiding element 49 for only the desired limited swinging movement.

Connecting member 46 may be formed of sheet metal extending parallel to plate 12, and may be vertically elongated, as shown. This connecting member 46 contains a vertically elongated straight slot 60, through which the previously mentioned pin 50 extends. The portion of pin 50 which is received within slot 60 is cylindrical and of an external diameter corresponding substantially to the width of the slot, to guide the connecting member 46 for transverse movement relative to element 49. An additional pin 61, also of a diameter corresponding to the width of slot 60, is carried by a downwardly extending portion 62 of element 49, and projects from that element through the slot and in parallel relation to pin 50, to coact with that pin in guiding connecting member 46. As will be understood, this pin and slot connection mounts connector member 46 for swinging movement about pin 50 with element 49, and also for essentially vertical sliding movement relative to element 49. A spring 63 is connected at one end 64 to member 46, and at its other end bears downwardly against pin 50, to yieldingly retract member 46 upwardly relative to element 49. Such upward retraction of member 46 is of course limited at the Fig. 5 position, member 46 being movable downwardly to the Fig. 12 position.

When the door is closed, the engagement of keeper 14 with bolt 13 acts to deflect the bolt downwardly and swing bolt carrying part 19 in a counterclockwise direction as seen in Figs. 5, 8, 9 and 12. I utilize this keeper induced swinging movement of parts 13 and 19 to automatically unlock the latch mechanism by virtue of closing movement of the door, to thus prevent accidental locking of the mechanism. For this purpose, part 19 has an upper projection 66, which extends upwardly and then laterally toward connecting part 46, and which is engageable with a projection 65 on part 46 to deflect the latter from its

Fig. 8 position to its Fig. 5 position as a result of the swinging movement of part **19** caused by engagement of bolt **13** with the keeper as the door is closed. Projection **65** is so dimensioned as to be movable out of the path of keeper induced swinging movement of part **19** when connecting element **46** is actuated downwardly to its Fig. 12 position. That is, when element **46** is in its Fig. 12 position, the movement of part **19** effected by engagement of the bolt with the keeper during closing of the door no longer can serve to deflect element **46** and the associated element **49** from their Fig. 8 positions to their Fig. 5 positions.

The configuration of latching surface **22** of the keeper can be defined most readily by describing its relation to the door carried parts when the keeper and bolt are in their latched relative positions of Figs. 2*c* and 4. More specifically, when the parts are in that relation, latching surface **22** of the keeper preferably extends substantially arcuately about the axis of pin **29**, that is, about the pivotal axis of bolt **13** and bolt carrying member **19**. For best results, the surface **22** may be cylindrical and very precisely centered about the defined axis, though it is possible to employ a straight rather than a curved surface, with that straight surface being tangential to an arc centered about the axis of pin **29**.

To now describe the operation of the illustrated latch mechanism, first assume that the door **10** is in open condition, and that the latch parts are in the unlocked condition of Fig. 5. As the door is then closed, bolt **13** first engages surface **23** of keeper **14**, see Fig. 2*a*, and is deflected downwardly by the keeper to override its first projection, and then move upwardly into recess **21** to the safety catch position of Fig. 2*b*. Further closing movement of the door advances the bolt past the second keeper projection, so that the bolt may move upwardly under the influence of spring **33** to the Fig. 2*c* latched position. By virtue of the described configuration of latching surface **22**, there is virtually no backlash in the mechanism as bolt **13** moves upwardly along surface **22** toward latched position.

The interengagement of bolt **13** and the keeper in their Fig. 2*c* position acts to retain the door in closed condition, until the bolt is released by either the inside operator or the outside operator. As previously described, the actuation of the inside operator serves through strap **44** and crank **42** to swing part **19** and the bolt downwardly to the Fig. 2*d* position, and thus permit opening of the door. For releasing the bolt from the outside of the door, push button **41** is pressed inwardly from its Fig. 5 position to its Fig. 9 position, to swing element **45** in a counterclockwise direction to its Fig. 9 position, with that swinging movement being transmitted through ear **47** of connector member **46** to projection **39** of part **19**. The part **19** is thus swung downwardly as seen in Fig. 9, to release the bolt and permit opening movement of the door. When the push button is released, spring **33** returns part **19** upwardly, and spring **63** returns connector member **46** upwardly relative to element **49**.

If it is now desired to lock the door, while it is closed, locking member **49** is swung to its Fig. 8 locked position by actuation of either the inner control member **51** or the outer key operated control member **52**. This swinging movement of locking member **49** correspondingly swings the carried connector member **46** to its Fig. 8 position, in which its lower turned ear **47** is moved to the right of projection **39** of part **19**. When connector member **46** is in this position, counterclockwise swinging movement of element **45** upon inward movement of push button **41** still serves to actuate connector **46** downwardly, but such downward movement of the connector member does not correspondingly actuate part **19** and the bolt. This is true because, in locked position member **46** is locked above a recessed portion **66** of part **19**, rather than above projection **39**, so that ear **47** of connector **46** does not engage and actuate downwardly the projection **39** upon downward movement of connector **46**. Inward movement of push button **41** then serves to move connector **46** to its Fig. 12 position within recess **66**, without releasing the bolt.

If the door is closed while the lock mechanism is in its Fig. 8 locked position, the keeper overriding deflection of the bolt during closing movement of the door serves to automatically actuate parts **46** and **49** to their Fig. 5 unlocked position. Specifically, as bolt **13** engages and overrides the keeper, the bolt is deflected downwardly, to correspondingly swing the bolt carrying part **19** in a counterclockwise direction as seen in Fig. 8, so that upper projection **66** of part **19** engages projection **65** of element **46**, to swing element **46** and the associated locking element **49** in a clockwise direction (as seen in Figs. 5 and 8) to the Fig. 5 position.

If, however, push button **41** is pressed inwardly during such closing movement of the door (with the mechanism locked), the keeper induced bolt deflection is then ineffective to unlock the mechanism, so that the mechanism remains in locked condition. This is true because the inward movement of push button **41** acts to move connector member **46** downwardly to its Fig. 12 position, so that projection **65** is out of the path of swinging movement of projection **64**, and the keeper induced deflection of bolt **13** and part **19** therefore has no effect on connector member **46**. As a result, the door may be locked without the use of a key, merely by depressing inner element **51** to swing locking element **49** to its Fig. 8 position, and then pressing push button **41** inwardly to its Fig. 12 position while the door is being closed.

I claim:

1. In a door lock mechanism for a swinging door, a support to be mounted to the free edge of the door, a latch unit mounted to the support to swing relative thereto about an axis extending generally perpendicular to said free edge of the door, said latch unit including a bolt projecting laterally therefrom for engagement with a coacting keeper and swinging with the latch unit about said axis in latching and antilatching directions, a manually operable lever mounted to the support for pivotal movement in a plane essentially parallel to the plane of swinging movement of said latch unit, a spring urging said latch unit in latching direction, said latch unit having an arm by which it is actuated in antilatching direction, a control member mounted to the support for pivotal movement relative thereto about an axis essentially parallel to said first axis and between locked and unlocked positions, a connecting element carried by the control member for pivotal movement therewith and slidably movable relative thereto, said connecting element having a flange portion extending therefrom into the path of swinging movement of the manually operable lever, said flange being received between the manually operable lever and said arm of the latch unit when the control member is in said unlocked position, said flange when in that position being slidably movable by said lever and being operable upon such movement to engage and move said arm and thereby swing said latch unit in antilatching direction, said lever and flange being ineffective to thus actuate the latch unit in antilatching direction when the control member and the connecting element and its flange are in said locked position, said latch unit having a second arm swinging therewith about said first axis, said connecting element having a portion positioned in the path of said second arm at a location to be engaged thereby and pivot the connecting element and flange and the control member to said unlocked position as a result of keeper induced bolt deflection upon normal closing of the door, said flange, in said locked position, being located in the path of said manually operable lever for sliding actuation thereby to a position in which said second arm of the latch unit will not engage said portion of the connecting element and move the connecting element and control mem-

ber to unlocked position upon said keeper induced bolt deflection when the door is closed.

2. A door lock mechanism as recited in claim 1 including an over center spring operable to retain the control member in either its locked or unlocked position.

3. A door lock mechanism as recited in claim 1 including an additional spring urging said connecting element slidably relative to said control member in a direction to urge said flange against said manually operable lever.

4. A door lock mechanism as recited in claim 1 including a guiding pin pivotally mounting said control member, and a second pin carried by and pivotally movable with said control member, said connecting element having a slot receiving said two pins to guide said connecting element for its sliding movement relative to said control member.

5. A door lock mechanism as recited in claim 1 including key operated means for actuating said control member from the outer side of the door, and additional means for actuating the control member from the inner side of the door.

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