July 12, 1960 J. H. ROETHEL 2,944,850

DOOR LOCK

Filed Feb. 17, 1956 2 Sheets-Sheet 1

Fig. 1.

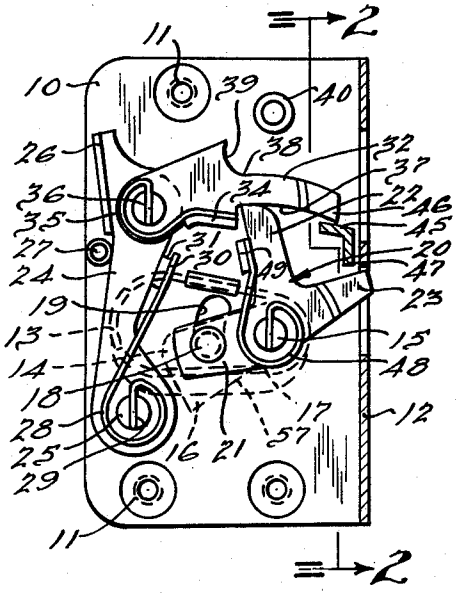


Fig. 2.

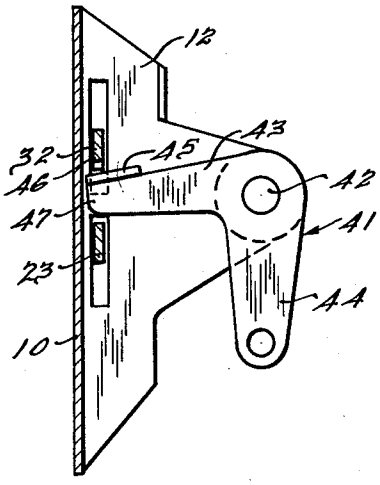


Fig. 3.

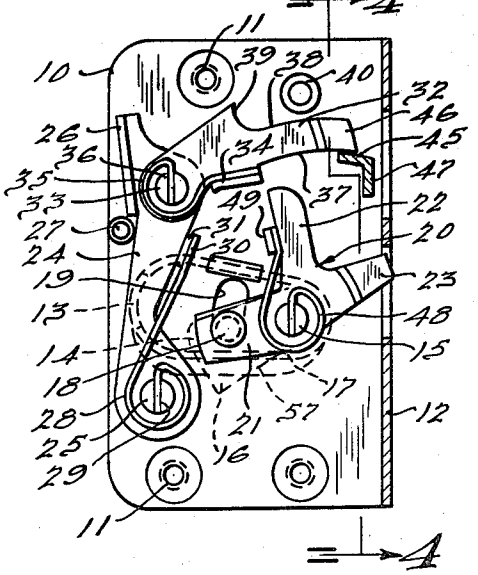
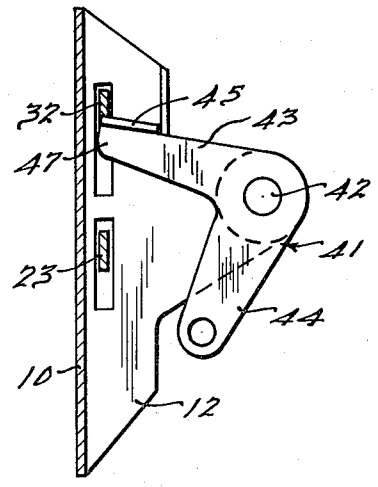


Fig. 4.



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Fig. 5.

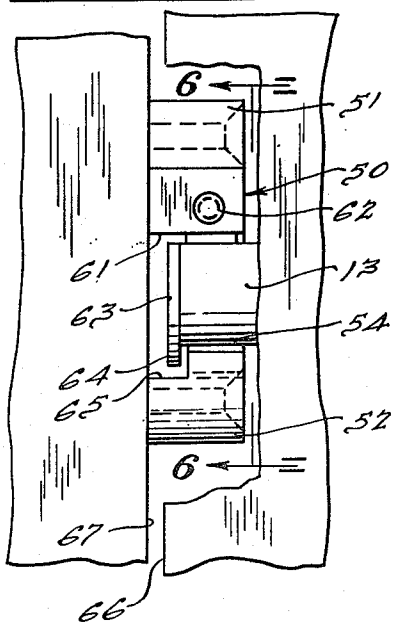
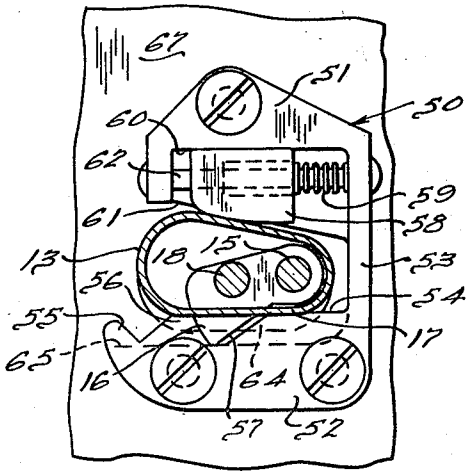


Fig. 6.



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2,944,850

DOOR LOCK

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8 Claims. (Cl. 292—223)

This invention relates to a latch control mechanism for swinging doors, particularly the doors of automobile or other vehicle bodies, an object of this invention being to provide an improved door latch mechanism which is characterized by its simplicity and compactness in construction and which is economical to manufacture, comparatively quiet in operation and efficient in use.

The improved door latch mechanism of the present invention comprises a pivoted latch bolt spring urged into latching engagement with a striker or keeper device mounted on a body pillar, latch device release means for disengaging the latch device from the keeper or striker device, said release means including an actuator which is preferably a pivotally mounted lever, and a pivoted member or lever actuatable to render the latter inoperative to effect disengagement of the latch device from the striker or keeper device.

More particularly the door latch mechanism embodied in the present invention comprises a support having a first and second plate portions angularly related to each other. The first or main plate portion has secured to the outer face thereof a combination bolt housing and dovetail structure, the latch bolt in door latched position projecting through an aperture in said housing for engagement with the striker or keeper device and being retractible within said housing to permit unlatching of the door.

The latch bolt is provided with a pin or the like projecting through a slot in the main plate portion. In the preferred embodiment of the invention the pin or the like is coupled to one arm of a multi-arm lever means mounted on the inner side of said main plate portion, said lever means being adapted to be swung to move the latch bolt from door latched to door unlatched position by either an outer manually operable means actuatable by an outside operator, such as a push button, pull-out handle or the like mounted on the outside of a vehicle door, or by an inner manually operable means actuatable through a remote control means controlled by an operator mounted on the inside of the vehicle door. The outer manually operable means includes a member swingable into and out of abutting relation to a part of the multi-arm lever means. When the swingable member is in abutting relation to the lever means part, the outside operator is effective to cause retracting movement of the latch bolt and, conversely, when the swingable member is out of abutting relation to the lever means part, the outside operator, although being freely movable, is ineffective to cause retracting movement of the latch bolt.

The inner manually operable means for swinging the multi-arm lever means includes a lever means mounted on the second plate portion, which latter lever means has a dual function. When swung in a first direction, the second plate portion lever means is effective to swing the multi-arm lever means to cause retraction of the latch bolt. When swung in a second or opposite direction said lever means is effective to swing the swingable member out of abutting relation to the multi-arm lever means

part thereby rendering the outer manually operable means ineffective to cause retraction of the latch bolt.

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

Fig. 1 is an elevation illustrating the mechanism mounted on the inner side of the main plate portion of a door latch mechanism constructed in accordance with one embodiment of 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 view in part similar to Fig. 1 illustrating some of the latch mechanism in a second operative position.

Fig. 4 is a view in part sectional taken substantially through line 4—4 of Fig. 3 looking in the direction of the arrows.

Fig. 5 is a side elevation illustrating the relationship in latched position of the latch bolt of the latch mechanism to a striker or keeper device mounted on a vehicle body pillar.

Fig. 6 is a view in part sectional taken substantially through line 6—6 of Fig. 5 looking in the direction of the arrows.

Before explaining in detail the present invention it is to be understood that the invention is not limited in its application to the details of construction and arrangement of parts illustrated in the accompanying drawings, since the invention is capable of other embodiments and of being practiced or carried out in various ways. Also, it is to be understood that the phraseology or terminology employed herein is for the purpose of description and not of limitation.

In the drawings there is illustrated, by way of example, a preferred embodiment of the present invention as applied to the door and frame structure of an automobile body. The embodiment illustrated in Figs. 1 to 4, inclusive, comprises a case plate or main plate portion **10** provided with screw bosses **11** adapted to receive screws for fastening the case plate to the jamb portion or free edge wall of a vehicle door. The case plate **10** is provided with a flange or second plate portion **12** adapted to be positioned along the inner panel of the door.

The case plate **10** has secured to the front face thereof a combination housing and dovetail structure **13**. Pivotally mounted within the housing, as best viewed in Fig. 6, is a latch bolt **14**, the latter being pivoted on a pivot stud **15** mounted on the case plate **10**. It will be noted that the latch bolt **14** comprises a finger or lever element having a toothlike projection **16** at the free end thereof. The toothlike projection **16** normally projects through an aperture in the lower wall **17** of the housing **13** where it is adapted to engage a striker device, as will be more fully explained.

The latch bolt **14** carries a pin **18** which projects through a slot **19** in the case plate **10**. The pin **18** provides the means for coupling the latch bolt **14** to its operating mechanism. Referring to Fig. 1, it will be noted that a multi-arm lever, generally designated **20**, is provided which is pivoted on the same pivot or shoulder stud **15** carrying the latch bolt **14**. The multi-arm lever **20** is provided with three arms. The first arm **21** extends in a generally horizontal direction, the second arm **23** is slightly upwardly inclined and the third arm **22** extends in a generally vertical direction.

The first arm **21** overlies the latch bolt **14** and is directly coupled thereto by the pin **18** which projects through an aperture in the arm. Thus, upon the multi-arm lever **20** being swung in a clockwise direction as

viewed in Fig. 1, the latch bolt 14 will also be swung in the same direction and the tooth-like projection 16 thereon will be retracted into the housing 13.

The multi-arm lever 20 is swingable in bolt retracting direction by either outer or inner manually operable means, the terms outer or inner referring to the means actuatable from the outside or inside of the door, respectively.

The outer manually operable means comprises a generally vertically extending lever 24 pivotally mounted at its lower end on the case plate 10 on a pivot stud 25. The lever 24 is swingable in a plane parallel to the plane of the case plate 10. At its upper end the lever 24 is provided with a flange 26 adapted to be engaged by an operator mounted on the outside of the vehicle door, which operator might be a plunger device operated by a push button, pull out handle or the like. The case plate 10 is provided with a stop 27 which may be in the form of a pin having a rubber sleeve thereon. The stop 27 limits the swinging position of the lever 24 in an outward direction. The lever 24 in its normal rest position is maintained in abutting relation to the stop 27 by a semi-coil spring 28. The spring 28 has its inner end wound about and interlocked with a kerf 29 in the pivot stud 25. The free end 30 of the spring 28 acts against a lug 31 on the lever 24.

At its upper or free end the lever 24 carries a generally horizontally extending link 32, the link 32 being pivotally connected to the lever 24 by a pivot stud 33. The link 32 extends toward the case plate flange 12. At its lower edge and intermediate the ends thereof the link 32 is provided with an abutment lug 34 projecting away from the surface of the case plate 10. In Fig. 1, the link 32 is shown in its normal operative position with the lug 34 thereon lying in abutting relation to the upper end of the arm 22 of the multi-arm lever 20. The link 32 is normally maintained in this relationship by a semi-coil spring 35 having its inner end wound about and interlocked with a kerf 36 in the pivot stud 33. The free end of the spring 35 overlies the lug 34 on the link 32 normally urging the latter downwardly with the lower edge 37 of the link resting on top of the multi-arm lever arm 23.

With the link 32 in the position shown in Fig. 1, the latch mechanism may be said to be inoperative or unlocked condition. That is, actuation of the outside operator, such as the push button or pull out handle, will cause the lever 24 to be swung about its pivot stud 25 in a clockwise direction causing the link 32 to be bodily shifted to the right, as viewed in Fig. 1. The abutment 34 will abut the upper end of the arm 22 causing the multi-arm lever 20 to be swung in a clockwise direction. Because the latch bolt 14 is coupled to the multi-arm lever arm 21 by the pin 18, the latch bolt 14 will be swung upwardly and retracted into its housing 13. The vehicle door may then be swung open.

The upper edge 38 of the link 32 may be provided with a curved abutment portion 39 adapted to engage a stop 40 mounted on the case plate 10. The stop 40 is provided only to prevent excessive travel of the link 32 toward the flange 12 when it is in the position shown in Fig. 3. It will be noted that the link 32 when in the position shown in Fig. 3 has no part thereof in abutting relation to arm 22 of the multi-arm lever 20. In this position of the link 32, the lock mechanism may be said to be free floating. That is, actuation of the outside operator, such as the push button or pull out handle, is ineffective to cause clockwise movement, as viewed in the drawing, of the multi-arm lever 20 and, therefore, the latch bolt 14 cannot be retracted.

If it were desired to make the latch mechanism of the present embodiment of the type wherein the outside operator is blocked against movement when the latch mechanism is in door locked condition, it would only be necessary to move the stop 40 to a position in which it would lie in abutting relation to the link abutment 39 when the link 32 was in the position shown in Fig. 3, thereby blocking swinging movement of the lever 24. When the link 32 was in the position shown in Fig. 1, the abutment 39 thereon would pass beneath the stop 40 and would not interfere with swinging movement of the lever 24.

The link 32 of the present embodiment is adapted to be swung from the position shown in Fig. 1 to its position shown in Fig. 3 by a bell crank lever 41 mounted on the case plate flange 12. The bell crank lever 41 is actuatable through a remote control mechanism (not shown) of conventional and known construction wherein the door handle on the inside of the vehicle door is swingable in a first direction to cause the door to be unlatched and is swingable in the opposite direction into a position to cause the latch mechanism to be placed in latch locked condition. Provision is made in the mechanism to retain the handle and linkage in said second or latch locked position.

The bell crank lever 41 is pivotally mounted on the case plate flange 12 on a pivot stud 42 and is provided with a generally horizontally extending arm 43 and a generally vertically extending arm 44. The arm 44 is adapted to be connected in any suitable manner to the vehicle door remote control mechanism. The arm 43 is provided with a short flange portion 45 positioned to underlie the free end 46 of the link 32. It will be noted that the free end 47 of the bell crank arm 43 overlies the end of arm 23 of the multi-arm lever 20.

Thus, if the bell crank lever 41 is swung in a clockwise direction from the position shown in Fig. 2 to the position shown in Fig. 4, the arm 43 is effective to lift the link 32 from its multi-arm lever 20 operating position, shown in Fig. 1 to its non-operating position shown in Fig. 3. It will be understood that the spring 35 is a relatively weak spring and has insufficient force to overcome the spring or other device in the remote control mechanism effective to hold the bell crank lever 41 in the position shown in Fig. 4.

If the bell crank lever 41 is swung in a counterclockwise direction as viewed in Fig. 2, the under-edge of the free end 47 of the arms 43 will abut the lever arm 23 causing the multi-arm lever 20 to be swung in a clockwise direction, as viewed in Fig. 1 causing the latch bolt 14 to be retracted within its housing 13. The bolt 14 may always be retracted through the medium of the bell crank lever 41 regardless of whether or not the link 32 is in operative or inoperative position.

After retraction into the housing 13 the latch bolt 14 is restored to its normal position by a semi-coil spring 48 having its inner end secured to the pivot stud 15 and its free end engaging a lug 49 on the arm 22 of the multi-arm lever means 20. As viewed in Figs. 1 and 3, the spring 48 urges the multi-arm lever means 20 in a counter-clockwise direction thereby urging the latch bolt in the same direction.

Referring next to Figs. 7 and 8, they illustrate the cooperative relationship between the latch bolt 14 and its housing 13 with a keeper or striker device, generally designated 50. In general, the keeper or striker 50 comprises a C-shaped structure having upper and lower body portions 51 and 52, respectively, joined by a vertical rib or wall 53. The striker or keeper 50 is mounted on the vehicle body pillar with the opening of the C-shape facing outwardly.

The lower body portion 52 is formed in its upper surface 54 with two integral rack teeth, a safety locking tooth 55 and final locking tooth 56. The teeth 55 and 56 are depressed with respect to the upper surface 54 of the body portion 52. When the latch bolt projection 16 engages the striker or keeper 50 behind the tooth 55 the vehicle door, while not tightly closed, is said to be in safety latched position. And when the latch bolt pro-

jection 16 engages the striker or keeper behind the tooth 56, the vehicle door is in final latched position.

The upper surface 54 of the lower body portion forms a ramp engaged by the underside of the housing 13. It will be understood that as the housing slides on the ramp 54, the latch bolt 14 will retract against the resistance of the spring 48 as the projection 16 engages the teeth 55 and 56, the projection 16 having an angularly inclined leading surface 57. The foregoing, of course, only occurs as the door is moved from an open to a closed position. Movement of the door from a closed to an open position is inhibited unless the latch bolt 14 is manually retracted into the housing 13, as has been explained.

A yieldable wedging means is carried on the underside of the upper body portion 51 of the striker device and engages the upper surface of the housing 13 to firmly hold the door against vibratory movement in a vertical plane. The wedging means in the present instance comprises a slidable wedge block 58 controlled by a compression spring 59, the wedge block and spring being retained within a recess 60 in the lower surface 61 of the upper body portion 51 by means of a guide rod 62 fastened to the end walls of the recess 60. The spring 59 is installed under initial compression and constantly urges the wedge block 58 outwardly or to the left as viewed in Fig. 6. During closing movement of the door the wedge block 58 is carried inwardly to some extent against the resistance of the spring 59, the wedge block tending to tighten itself against the upper surface of the housing 13 thereby urging the housing under side in tight engagement with the surface 54 to minimize any possible vibratory movement of the door.

The housing 13 and striker or keeper device 50 embody a particular safety feature. It will be noted that the front face of the housing 13 comprises a plate 63 having a portion or flange 64 projecting below the level of the under side of the housing. As best seen in Fig. 5, the flange 64 enters into an undercut 65 behind the teeth 55 and 56 of the keeper. Thus, should any force be exerted on the vehicle body tending to separate the free edge wall 66 of the door from the body pillar 67 in a lateral direction, that is, a direction normal to the usual direction of engagement and disengagement, the flange 64 abutting the teeth will resist such separation. It will be readily apparent that without the safety flange 64 disengagement of the latch bolt and striker could occur if the two are laterally separated under abnormal conditions such as is exist when a vehicle is upset or involved in a collision.

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 pivoted latch means mounted on the outer face of said plate portion, a lever means pivotally mounted on the inner face of said plate portion for swinging movement about a common pivot axis with said latch means, coupling means fixedly coupling said lever means to said latch means whereby both are swingable in unison upon actuation of either one, said lever means having an arm extending upwardly from the pivotal axis thereof, outer manually operable means for pivotally actuating said lever 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 portion and having a part arranged in operative relationship with a part of said arm and being shiftable upon swinging said lever to cause said lever means to swing, said coupling means transmitting swinging movement of said lever means to said latch means to swing the same from door latched to door unlatched condition, control means movably mounted on said support, and inner manually operable means for moving said control means to render said link means ineffective to swing said lever means.

2. 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 pivoted latch means mounted on the outer face of said plate portion, a lever means pivotally mounted on the inner face of said plate portion for swinging movement about a common pivot axis with said latch means, said lever means comprising a unitary member having at least two arms, coupling means projecting through an aperture in said plate portion fixedly coupling one arm of said lever means to said latch means whereby both are swingable in unison upon actuation of either one, a second arm of said lever means extending upwardly from the pivotal axis thereof, outer manually operable means for pivotally actuating said lever means and including a lever pivotally mounted on said plate portion having a portion movable toward said flange upon swinging said lever, link means pivotally mounted on said lever portion and having a part arranged in operative relationship with a part of said second arm and being shiftable upon swinging said lever to cause said lever means to swing, said coupling means transmitting swinging movement of said lever means to said latch means to swing the same from door latched to door unlatched condition, control means movably mounted on said support, and inner manually operable means for moving said control means to render said link means ineffective to swing said lever means.

3. 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 pivoted latch means mounted on the outer face of said plate portion, a lever means pivotally mounted on the inner face of said plate portion for swinging movement about a common pivot axis with said latch device, said lever means comprising a unitary member having a plurality of arms, means fixedly coupling one arm of said lever means to said latch means whereby both are swingable in unison upon actuation of either one, a second arm of said lever means extending upwardly from the pivotal axis of said lever means, and a third arm of said lever means extending toward said flange, outer manually operable means for pivotally actuating said lever means and including a lever pivotally mounted on said plate portion movable toward said flange upon swinging said lever, link means pivotally mounted on said lever portion and having a part arranged in operative relationship with a part of said second arm and being shiftable upon swinging said lever to cause said lever means to swing, said coupling means transmitting swinging movement of said lever means to said latch means to swing the same from door latched to door unlatched condition, and inner manually operable means including a bell crank lever movable in one direction to render said link means ineffective to swing said lever means, said bell crank lever being movable in the opposite direction to engage said third arm to swing said lever means independently of said outer manually operable means.

4. 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 pivoted latch device mounted on the outer face of said plate portion, a lever means pivotally mounted on the inner face of said plate portion to swing about a common pivot axis with said latch device, coupling means fixedly coupling said lever means to said latch device whereby both are swingable in unison upon actuation of either one, an arm of said lever means extending upwardly from the pivotal axis of said lever means, outer manually operable means for pivotally actuating said lever 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 portion and having a part normally arranged in operative relation to a part of said arm and being shiftable upon swinging said lever to cause said parts to abut and swing the lever means thereby to move the latch device from door latched to door unlatched condition, and inner manually operable means having a lever movably mounted on the support and engageable with the link means to shift the same to position said parts out of operative relation.

5. 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 pivoted latch device mounted on the outer face of said plate portion, a lever means pivotally mounted on the inner face of said plate portion, said lever means comprising a unitary member having at least two arms, coupling means projecting through an aperture in said plate portion fixedly coupling one arm of said lever means to said latch device whereby both are swingable in unison upon actuation of either one, a second arm of said lever means extending upwardly from the pivotal axis of said lever means, outer manually operable means for pivotally actuating said lever 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 portion and having a part normally arranged in operative relation to a part of said second arm and being shiftable upon swinging said lever to cause said parts to abut and swing the lever means thereby to move the latch device from door latched to door unlatched condition, and inner manually operable means having a lever movably mounted on the support and engageable with the link means to shift the same to position said parts out of operative relation.

6. 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 pivoted latch device mounted on the outer face of said plate portion, a lever means pivotally mounted on the inner face of said plate portion to swing about a common pivot axis with said latch device, said lever means comprising a unitary member having at least two arms, coupling means projecting through an aperture in said plate portion fixedly coupling one arm of said lever means to said latch device whereby both are swingable in unison upon actuation of either one, a second arm of said lever means extending upwardly from the pivotal axis of said lever means, outer manually operable means for pivotally actuating said lever 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 portion and having a part normally arranged in operative relation to a part of said second arm and being shiftable upon swinging said lever to cause said parts to abut and swing the lever means thereby to move the latch device from door latched to door unlatched condition, and inner manually operable means having a lever movably mounted on the support and engageable with the link means to shift the same to position said parts out of operative relation.

7. 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 pivoted latch device mounted on the outer face of said plate portion, a lever means pivotally mounted on the inner face of said plate portion to swing about a common pivot axis with said latch device, said lever means comprising a unitary member having at least two arms, coupling means projecting through an aperture in said plate portion fixedly coupling one arm of said lever means to said latch device whereby both are swingable in unison upon actuation of either one, a second arm of said lever means extending upwardly from the pivotal axis of said lever means, outer manually operable means for pivotally actuating said lever 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 portion and having a part normally arranged in operative relation to a part of said second arm and being shiftable upon swinging said lever to cause said parts to abut and swing the lever means thereby to move the latch device from door latched to door unlatched condition, inner manually operable means having a lever movably mounted on the support and movable in a first direction to engage the link means to shift the same to position said parts out of operative relation, said last mentioned lever being movable in a second direction and engageable with said lever means for swinging the same independently of said outer manually operable means to move said latch device into unlatched position.

8. 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 pivoted latch device mounted on the outer face of said plate portion, a lever means pivotally mounted on the inner face of said plate portion to swing about a common pivot axis with said latch device, said lever means comprising a unitary member having a plurality of arms, coupling means projecting through an aperture in said plate portion fixedly coupling one arm of said lever means to said latch device whereby both are swingable in unison upon actuation of either one, a second arm of said lever means extending upwardly from the pivotal axis of said lever means, and a third arm extending toward said flange, outer manually operable means for pivotally actuating said lever 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 portion and having a part normally arranged in operative relation to a part of said second arm and being shiftable upon swinging said lever to cause said parts to abut and swing the lever means thereby to move the latch device from door latched to door unlatched condition, inner manually operable means having a lever movably mounted on the support and movable in a first direction to engage the link means to shift the same to position said parts out of operative relation, said last mentioned lever being movable in a second direction and engageable with said third arm for swinging said lever means independently of said outer manually operable means to move said latch device into unlatched position.

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