June 29, 1943. R. W. SPRINGER 2,322,892

DOOR LOCK MECHANISM

Filed Aug. 29, 1940 2 Sheets-Sheet 1

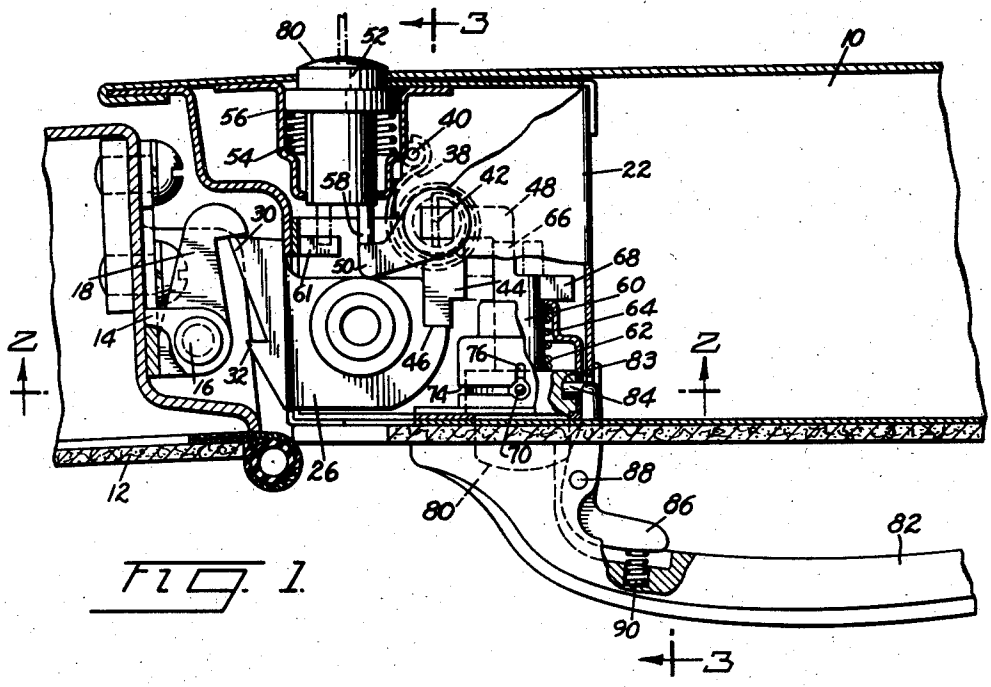


FIG. 1.

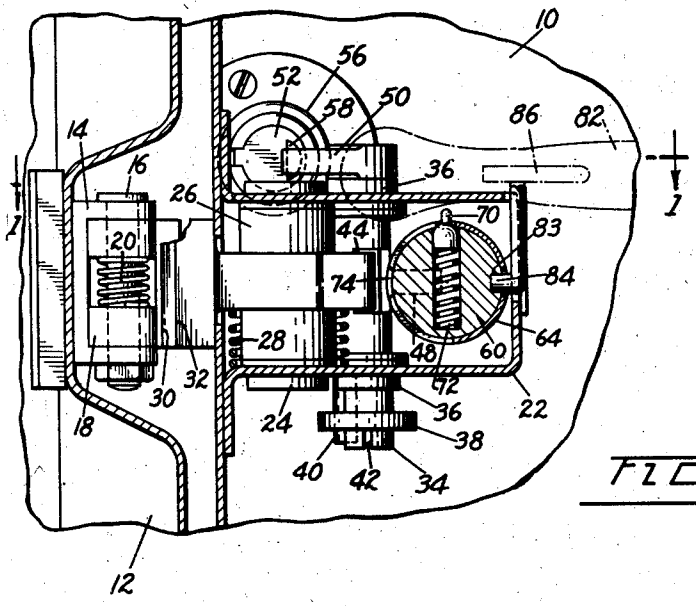


FIG. 2.

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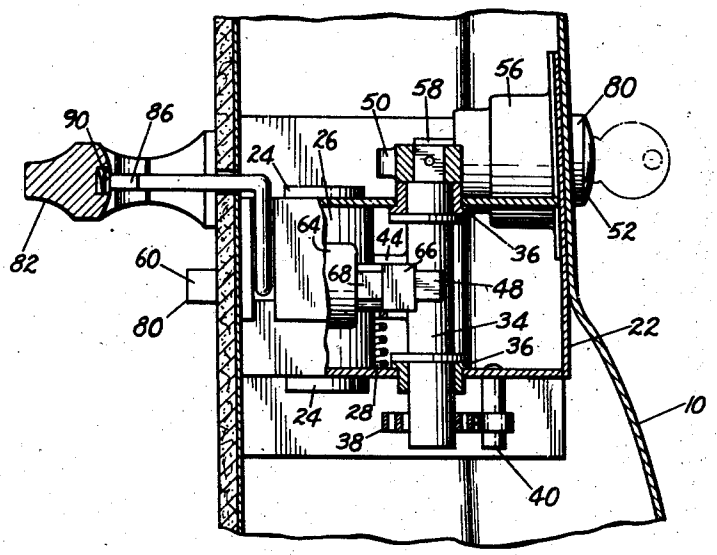


FIG. 3.

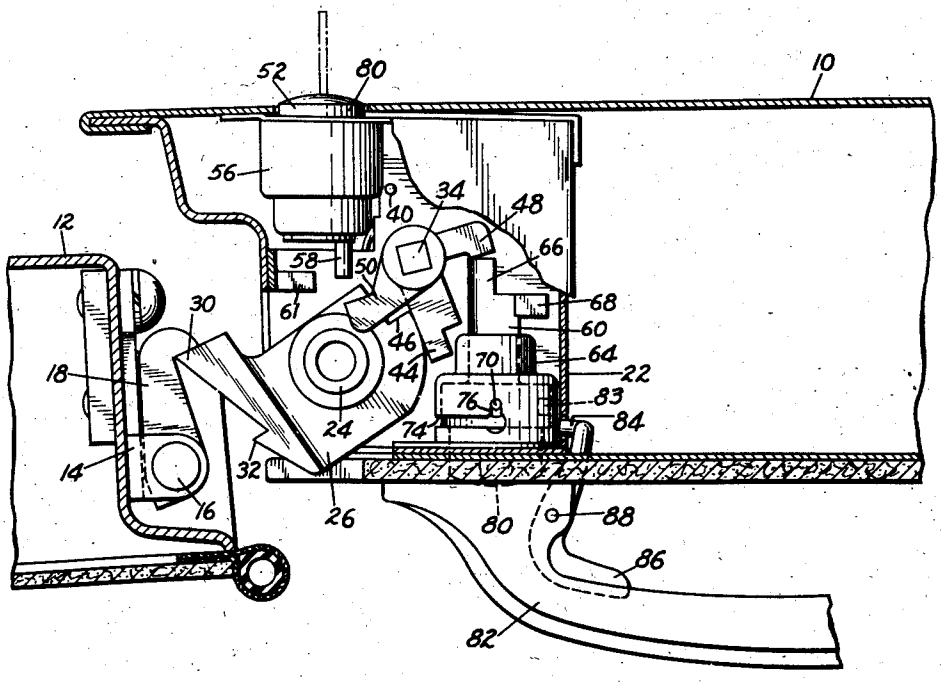


FIG. 4.

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DOOR LOCK MECHANISM

Ray W. Springer, Detroit, Mich.

Application August 29, 1940, Serial No. 354,680

4 Claims. (Cl. 70—149)

This invention relates to an improved door latching and locking mechanism which is illustrated and particularly adapted for use in automobile body doors. It constitutes an improvement upon the structure of application Serial No. 190,436, filed February 14, 1938, by this applicant, which has become Patent No. 2,218,183, October 15, 1940.

An object of the invention is to provide locking mechanism of the type described which mechanism is simple and rugged in construction and which is readily operable and adapted to hold the door securely locked against disengagement or rattle of parts. The mechanism does not make use of manually operable parts that project objectionably beyond the door surfaces or that project when the lock is operated.

The door lock is capable of being operated from the outside or the inside of the door. It is released by axial movement of a plunger or push button which may stand when inoperative substantially flush with the door surface. The push button construction is such that the button may be axially depressed at any time but it is only when it occupies a certain position of rotation that its axial depression will release the lock mechanism. Its depression at other times produces no result and prevents breakage which might result in case unauthorized pressure were exerted against a button locked against depression. The push button on the outside of the door is key controlled. The push button on the inside of the door is operable to lock the mechanism against release by movement of the outer push button.

This improved lock mechanism includes a rotatable latch plate which is spring urged toward the projected position and a strike bolt which is spring urged toward engagement by the latch plate. A locking element is provided which is spring urged toward engagement with the latch plate to hold it in the projected position against withdrawal upon pressure being applied to the door to open it. Each push button element is independently operable to move the locking element to release the latch plate. One push button element is provided with a part which is adapted to engage the locking element when it is interlocked with the latch plate to hold it against release movement.

The outside of the door may be provided with an undercut handle which can be grasped to pull the door open. The inside of the door may be provided with a handle that may be grasped to pull the door closed or to exert outside pressure to open it. The inner pull handle is positioned in proximity to but slightly above the interior push button so that when the handle is grasped by the hand of an operator the thumb is in position to actuate the push button.

Means is provided to lock the inner push button against axial movement so that it may not be accidently depressed or may not be depressed by a child pushing against it without an additional simultaneous operation being carried out. This control of the inner push button is performed by trigger mechanism, which trigger mechanism is associated with the inner pull handle. The trigger mechanism is so associated with the pull handle that when the handle is grasped by the hand of one seeking to open the door pressure may be exerted by the hand on the trigger mechanism depressing the same and as it is held depressed the push button may be actuated to release the latch plate. So long as the trigger mechanism is not depressed the push button can not be actuated.

Other objects, advantages, and meritorious features of this invention will more fully appear from the following description, appended claims, and accompanying drawings wherein:

Figure 1 is a horizontal sectional view on line 1—1 of Fig. 2 looking downwardly upon my improved lock mechanism which is shown as associated with a door structure, the lock mechanism being broken away in part to illustrate the locking construction and showing the latch plate as locked against releasable rotation and the inner plunger locked against axial movement but with the door not yet completely closed,

Fig. 2 is a vertical sectional view taken on line 2—2 of Fig. 1,

Fig. 3 is a vertical sectional view taken on line 3—3 of Fig. 1,

Fig. 4 is a horizontal sectional view taken somewhat on the line of Fig. 1 but showing the door locking mechanism with the inner push button depressed to permit retractable rotation of the latch plate and showing the latch plate retracted almost to the point of release, the door having been moved outward but not completely into the open position.

In the drawings the door is indicated as 10. The cooperating jamb portion of the body is indicated as 12. A spring projected strike bolt of a finger shape is pivotally secured to the jamb face as shown particularly in Figs. 1, 2 and 4. There is a bracket 14 which is secured to the jamb face and which is of a general U-shape and carries a pivot pin 16. The strike bolt 18 is mount-

ed upon this pivot pin. A spring 20 is coiled about the pin and engages the strike bolt to hold it normally projected to the position shown in Fig. 1. The lock mechanism is carried by the door. There is a housing 22 which is secured to the jamb face of the door and which carries the locking mechanism. This housing comprises a pair of upper and lower plates shown in Figs. 2 and 3 between which are journalled the trunnion ends 24 of a latch plate 26. This latch plate is urged by a coil spring 28 toward the projected position as shown in Fig. 1. The latch plate is provided with strike bolt engaging catch parts 30 and 32 shown praticularly in Figs. 1 and 4.

A locking element is provided which comprises a shaft 34 journalled through bearings 36 in the upper and lower walls of the housing 22. This shaft extends through both of these walls. Below the lower wall a coil spring 38 has one end secured to a fixed pin 40 and the opposite end secured within a notch 42 in the shaft to exert a torque upon the shaft tending to rotate it so that a lug or arm 44 is rotated counterclockwise as viewed in Fig. 1 to be brought into engagement with the shoulder 46 on the latch plate to hold the latch plate against retractable rotation.

This lock shaft 34 carries an arm 48 which projects radially from an intermediate portion of the shaft and also carries an arm 50 which is mounted upon the upper end of the shaft as shown in Figs. 2 and 4. These arms are so secured to the shaft that pressure exerted against their outer ends in a counterclockwise direction so rotates the shaft as to move the lug 44 out of engagement with the shoulder 46 of the latch plate to release the latch plate for reversible rotation. These two arms are adapted to be engaged by axially shiftable push buttons or plungers. One plunger is disposed on the inside of the door and the other is disposed on the outside of the door.

The outer plunger is indicated generally by the numeral 52. This plunger is held outwardly by a spring 54 which is mounted within a cylinder casing 56 within which the plunger is slidably disposed as shown in Fig. 1. The cylindrical casing is secured to the lock casing. The plunger is provided with a shoulder against which one end of the spring bears. The opposite end of the expansion spring bears against a constricted portion of the casing. The plunger is provided with a projecting axially offset extension 58 shown in Figs. 1, 2 and 4. This extension is adapted to engage the arm 50 of the lock shaft as shown in Figs. 1 and 2 so that depression of the plunger moves the lock shaft to the position shown in Fig. 4. In Fig. 4 the lock shaft is being actuated by the inside plunger but it is apparent that depression of the outer plunger would move it in the same manner.

This outer plunger has two positions of rotation. Its effective position of rotation is shown in Figs. 1 and 2 in solid line. Its ineffective position of rotation is shown in Fig. 1 in dotted outline. Fig. 4 also shows it in the effective position of rotation. When the plunger is rotated from the position shown in solid line in Figs. 1, 2 and 4 through an arc of 180° there is a stop to determine this position inside of the lock cylinder. At such position the plunger is ineffective to actuate the lock shaft even though it may be axially shiftable. Provision for axial shifting of the plunger at all times prevents any damage resulting from an unauthorized attempt to axially shift the plunger when it is in the ineffective position. The position of this outside plunger is determined by a key which rotates a lock barrel of conventional construction.

The part 61 is a wedge shape reinforcement within the casing to support the casing at the point where it is contacted by the latch plate.

The inner plunger is indicated generally as 60. It is held projected outwardly by a spring 62 which encircles it and is seated within a housing 64. This plunger has an axially offset projecting portion 66 which corresponds to the portion 58 of the outer plunger and which is shown in Figs. 1 and 4 as in the effective position to engage the arm 48 of the lock shaft to rotate the shaft to release the latch plate to reversible rotation. This plunger is also rotatable to two positions 180° apart. It is shown in one of these positions in solid line in Fig. 1 and in the other position in dotted line in Fig. 1. It will be noted that this plunger is provided with a detent or lug 68 which is adapted when the plunger is rotated to the position shown in dotted line in Fig. 1 to engage the lug 44 and thereby prevent reversible rotation of the lock shaft by the outer plunger. In other words in this position it is not possible to unlock the door from the outside. The outer plunger is opposed by the lock interposed by the inner plunger.

The two positions of rotation of the inner plunger 60 within the casing 64 are determined by a spring pressed tit like element 70 held outwardly by a spring 72 which rides within a channel 74 formed in the casing 64 and which channel extends 180° about the casing, terminating at its ends in angular extensions 76. These angular extensions 76 permit axial movement of the plunger. The tit element 70 rides through the extensions during this axial movement and otherwise it rides through the circumferential extension to permit rotation of the plunger through the arc of 180°. The inner plunger preferably may terminate at its outer end in a portion 80 which is adapted to be engaged by the thumb of an operator and which may extend diametrically across the circumference of the plunger providing a wing adapted to be grasped for rotation.

There is a pull handle 82 secured to the inner face of the door in proximity to but slightly above the inner push button or plunger 60. An operator desiring to open the door may grasp this pull handle with the hand at which time the thumb of the hand is in position to engage the outer end 80 of the inner plunger to push the plunger 60 inwardly to rotate the locking shaft 34 counter to its spring. Means is provided as follows to lock the inner plunger against such axial movement when it is in the effective position of rotation shown in solid line in Fig. 1.

The inner plunger has a portion of relatively large diameter which forms a snug sliding fit within the casing 64 and to which extent it resembles the outer plunger. This portion of enlarged diameter is provided with a notch or recess 83 which is adapted to receive the end 84 of a trigger 86, which trigger is pivoted at 88 within a cut out in the handle. This trigger is held as shown in Fig. 1 by a spring 90 so that the end portion 84 is held to engage within the recess 83 of the plunger 60. When the end 84 of the trigegr is seated within the recess 83 of the plunger it is not possible to axially actuate the plunger.

When an operator grasps the door handle 82 pressure of the finger thereabout will actuate the trigger much the same as a safety catch on an

automatic pistol is actuated. Such pressure holds the trigger against the spring 90 and withdraws the end portion 84 from the recess 83 of the plunger so that pressure of the thumb against the plunger will actuate the lock shaft and withdraw the lug 44 from its engagement against the shoulder 46 of the latch plate releasing the latch plate to reversible rotation whereby upon pressure being exerted upon the door to swing it outwardly the latch plate will rotate counter its spring 28 and the strike bolt 18 will swing counter its spring 20 and permit opening of the door.

What I claim is:

1. In door lock mechanism having a strike bolt, a rockably supported latch plate spring urged toward interlocking engagement with the bolt, a rockably supported locking element spring urged toward interlocking engagement with the latch plate to prevent withdrawal movement of the plate from interlocking engagement with the bolt, a rotatable axially shiftable plunger, said plunger adapted in one position of rotation to engage the locking element against release of the latch plate, said plunger being axially shiftable in a second position of rotation to release the locking element from engagement with the latch plate, a door pull handle disposed in proximity to said plunger, bell crank shaped trigger mechanism pivotally disposed in proximity to the door pull handle and spring urged to engage the plunger in the second position of rotation to prevent axially shiftable movement of the plunger, said trigger mechanism manually operable to release said plunger.

2. In door lock mechanism having a strike bolt, a rockably supported latch plate spring urged toward interlocking engagement with the bolt, a rockably supported locking element spring urged toward interlocking engagement with the latch plate to prevent withdrawal movement of the plate from interlocking engagement with the bolt, a rotatable axially shiftable plunger, said plunger adapted in one position of rotation to engage the locking element against release of the latch plate, said plunger being axially shiftable in a second position of rotation to release the locking element from engagement with the latch plate, a door pull handle disposed in proximity to said plunger, bell crank shaped trigger mechanism supported upon the underside of said handle having a detent at one end engageable with the plunger in the second position of rotation to lock the same against axial movement, spring means urging the trigger toward such engagement, the opposite end of the trigger shaped to overlie the underside of the handle, said handle being recessed to receive said opposite end of the trigger.

3. In door lock mechanism having a strike bolt, a rockably supported latch plate spring urged toward interlocking engagement with the bolt, a rockably supported locking element spring urged toward interlocking engagement with the latch plate to prevent withdrawal movement of the plate from interlocking engagement with the bolt, a rotatable axially shiftable plunger, said plunger adapted in one position of rotation to engage the locking element against release of the latch plate, said plunger being axially shiftable in a second position of rotation to release the locking element from engagement with the latch plate, a door pull handle mounted on the door above and in close proximity to said plunger, bell crank trigger mechanism pivotally supported upon the underside of the handle and having a part at one end adapted to engage the plunger against axially shiftable movement, and having a manually engageable portion at the opposite end held outwardly from the underside of the handle by a spring to cause the part at the other end to engage the plunger, said handle being recessed to receive said portion and said portion being receivable therein to actuate said trigger mechanism to release said plunger.

4. In door lock mechanism having a strike bolt, a rockably supported latch plate spring urged toward interlocking engagement with the bolt, a rockably supported locking element spring urged toward interlocking engagement with the latch plate to prevent withdrawal movement of the plate from interlocking engagement with the bolt, a rotatable axially shiftable plunger, said plunger adapted in one position of rotation to engage the locking element against release of the latch plate, said plunger being axially shiftable in a second position of rotation to release the locking element from engagement with the latch plate, trigger mechanism spring urged to engage the plunger against axially shiftable movement and manually operable to release the plunger to axially shiftable movement, a second rotatably axially shiftable plunger operable in one position of rotation upon axially shiftable movement to actuate the locking element to release the latch plate, and key control mechanism for said second plunger.

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