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DOOR LOCK

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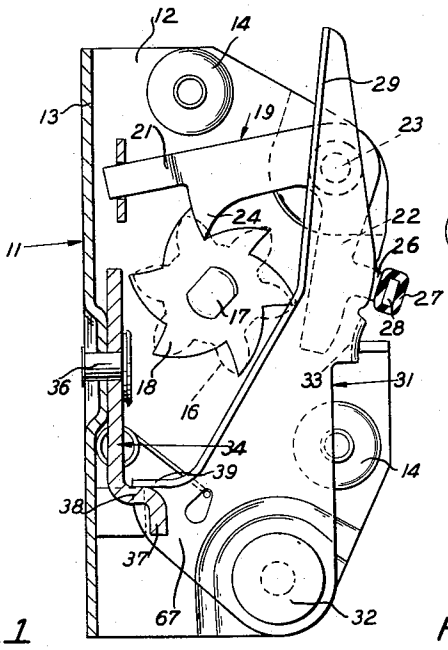


FIG. 1

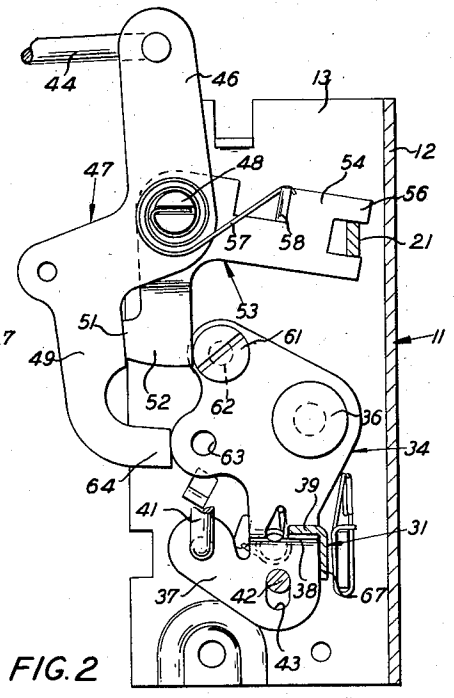


FIG. 2

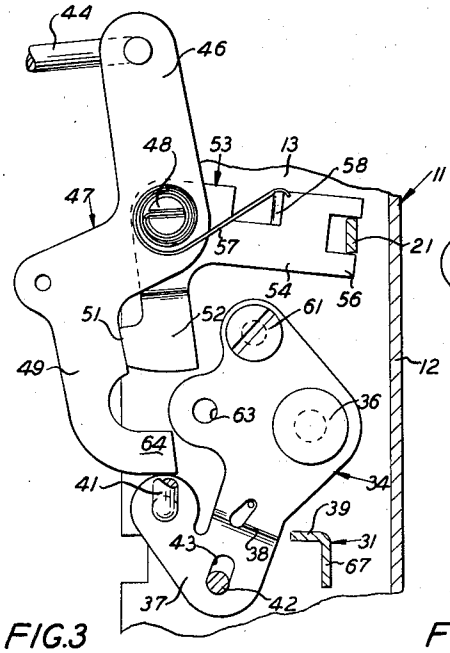


FIG. 3

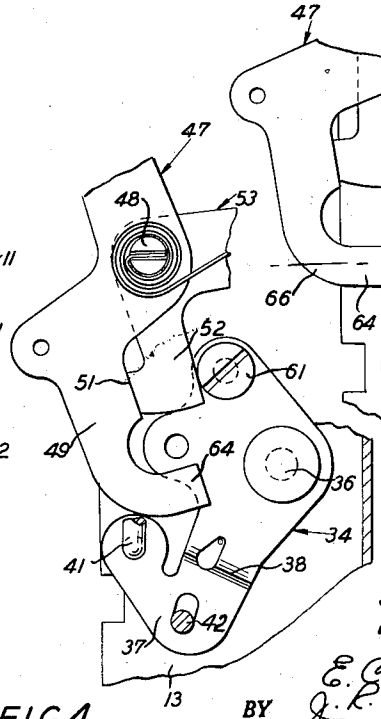


FIG. 4

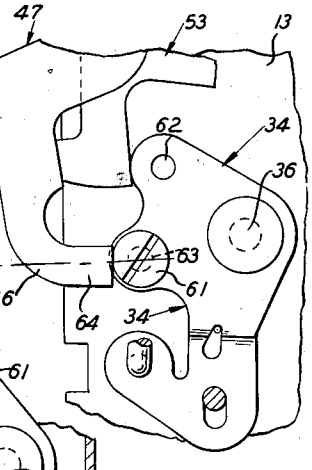


FIG. 5

J. E. MARTENS
D. C. BEYER
INVENTORS.

BY E. C. McRae
J. R. Faulkner
L. M. Oster

ATTORNEYS

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DOOR LOCK

Jack E. Martens, Detroit, and Donald C. Beyer, Dearborn, Mich., assignors to Ford Motor Company, Dearborn, Mich., a corporation of Delaware

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This invention relates generally to latch mechanisms for doors and particularly to latch mechanisms of the rotatable bolt type for motor vehicle doors.

An object of this invention is to provide an improved door latch mechanism of the type having a rotatable bolt and a rotatable ratchet controlled by means of a pivotally mounted pawl, the latter being engaged by a suitable actuating member to release the bolt from the associated keeper. The latch mechanism also incorporates means adapted to be actuated by a remotely controlled inside door handle and additional means adapted to be actuated either by a key actuated lock cylinder or by an interior lock button to suitably actuate and control the latch mechanism.

Another object of the invention is to provide a lock of this type which can be used either as a front door lock or a rear door lock by the change of a single part of the mechanism.

Other objects and advantages of this invention will be made more apparent as this description proceeds, particularly when considered in connection with the accompanying drawings, wherein:

Figure 1 is an elevational view looking toward one flange of the door lock case of a front door lock, with the other flange broken away and in section.

Figure 2 is an elevational view looking toward the other flange of the door lock case, with the first flange broken away and in section, and with the latch mechanism in locked position.

Figure 3 is a view similar to Figure 2 but showing the locking lever moved to an unlocked position.

Figure 4 is a view similar to Figures 2 and 3 but showing the mechanism in an unlocked and unlatched position as a result of the operation of the inside door handle.

Figure 5 is a view similar to Figure 2 but with the mechanism adapted for use in connection with the rear door of a motor vehicle.

The embodiment of the invention shown is designed particularly for the left front door of a motor vehicle. Referring first to Figure 1, the lock mechanism is mounted upon an L-shaped mounting plate **11** having flanges **12** and **13** extending substantially at right angles to each other. The flange **12** of the mounting plate is provided with screw bosses **14** by means of which the mounting plate may be secured to the inner side of the jamb face of the door. The flange **13** of the plate extends generally parallel to the inner and outer door panels.

The lock mechanism is provided with a rotatable toothed latch or rotor **16** rotatably mounted upon the flange **12** of the lock mounting plate. The shank **17** of the rotor extends through the flange **12** and nonrotatably supports a toothed ratchet **18** at the side of the flange **12** opposite the rotor **16**. The rotor **16** and ratchet **18** are formed with an equal number of teeth. The teeth of the rotor **16** are adapted to engage a conventional keeper (not shown) mounted upon the adjacent door pillar of the vehicle, while the teeth of the ratchet **18** are adapted to be engaged by a pawl **19**.

The pawl **19** is in the form of a bell crank having arms **21** and **22** and is pivotally mounted upon the flange **12** of the mounting plate by means of a pivot stud **23**. The arm **21** of the pawl has a downwardly depending

projection **24** adapted to engage the teeth of the rotor **18** to prevent rotation of the latter in an unlatching direction. The arm **22** of the pawl **19** is formed intermediate its ends with a flange **26** adapted to engage a rubber bumper **27** carried by a flange **28** struck up from the edge of the mounting plate to provide a cushioned stop for the pawl.

The pawl **19** is adapted to be operated either by means of an exterior push button or an interior handle. The exterior push button (not shown) engages the upper flange **29** of a release lever **31** pivotally mounted upon the lower portion of the flange **12** of the mounting plate by means of a pivot stud **32**. Intermediate its ends the release lever **31** has a flange **33** overlapping the lower arm **22** of the pawl **19** to engage the latter and swing the pawl in a clockwise direction as seen in Figure 1 upon actuation of the release lever **31** in a counterclockwise direction by means of the exterior push button. This action of course lifts the arm **21** and its depending projection **24** out of engagement with the ratchet **18** to release the rotor **16** for free rotation, permitting the door to be opened.

Referring now to Figure 2 as well as to Figure 1, it will be noted that a locking lever **34** is pivotally mounted upon the flange **13** of the mounting plate by means of a pivot stud **36**. The lower portion of the locking lever **34** has an offset flange **37** forming a generally horizontal shoulder **38**. The shoulder **38** is adapted, in the locked position of the locking lever, to be positioned beneath the lower flange **39** of the release lever **31** to block the latter and prevent actuation of the release lever in a direction to swing the pawl **19** to an unlatched position.

The locking lever **34** is adapted to be swung between between the locked position shown in Figure 2 and the unlocked position shown in Figure 3. In the latter position it will be noted that the blocking flange **38** is out of engagement with the flange **39** of the release lever so that the latter may be operated to swing the pawl out of latching engagement with the ratchet.

The locking lever may be swung between its locked and unlocked positions by means of an interior locking control (not shown) connected by means of a rod **41** to the offset flange **37** of the locking lever and also by means of a conventional lock cylinder having a crank arm **42** engageable within a slot **43** in the flange **37** of the locking lever. As will be described hereinafter, the locking lever for the front door lock may also be moved from its locked to its unlocked position as the result of the rotation of the rotor and ratchet when the door is closed and also by the operation on the interior door handle.

The interior door handle (not shown) is connected by means of a rod **44** to the upper arm **46** of a lever **47** pivotally mounted upon the flange **13** of the mounting plate by means of a pivot stud **48**. The lower arm **49** of the lever **47** has an abutment edge **51** adapted to engage the lower arm **52** of a bell crank lever **53** also pivoted upon the flange **13** of the mounting plate by means of the pivot stud **48**. The upper arm **54** of the bell crank lever **53** has a bifurcated end portion **56** embracing the outer end of the upper arm **21** of the pawl **19** to insure simultaneous rotation of the bell crank lever **53** and the pawl.

It will be noted that counterclockwise rotation of the lever **47**, as seen in Figure 2, under the actuation of the interior door handle, effects a counterclockwise rotation of the bell crank lever **53** to move the arm **21** of the pawl upwardly out of engagement with the ratchet **18**, thus releasing the ratchet and rotor and permitting the vehicle door to be opened. A spring **57** is anchored

at one end upon the pivot stud 48 (which is nonrotatably mounted upon the flange 13 of the mounting plate) and has its opposite end engaging a flange 58 struck out from the arm 54 of the bell crank lever 53 to urge the bell crank lever and the interconnected pawl 19 in a direction to effect engagement between the pawl and the ratchet.

It will be noted, in the case of the front door shown in Figures 1 to 4 inclusive, that the counterclockwise rotation of the lever 47 and bell crank lever 53, under the actuation of the interior door handle, results in engaging the lower end of the arm 52 of the bell crank lever with a stud 61 carried by the locking lever 34. This results, as best seen in Figure 4, in swinging the locking lever 34 to an unlocked position simultaneously with the unlatching of the door. The stud 61 is in the form of a cylindrically headed screw insertable into a tapped hole 62 formed in the locking lever 34. The stud 61 may be removed and inserted into an alternate tapped hole 63 in the locking lever when the lock is to be used in connection with the rear door, as described later.

It will also be noted that, in the front door, the locking lever will automatically be moved to unlocked position, should it be locked, by the closing of the door. The rotor 16 and ratchet 18 are rotated in a counterclockwise direction as seen in Figure 1 when the door is closed, and the engagement of the ratchet teeth with the projection 24 of the pawl swings the pawl upwardly to automatically rotate the bell crank lever 53 in a direction to move the locking lever to unlocked position.

Referring now to Figure 5, it will be noted that the stud 61 has been moved to the lower hole 63 in the locking lever 34 in alignment with the lower return bent flange 64 of the lever 47 which is operated by the inside door handle. When the locking lever is in locked position, by reason of the operation of the inside locking button acting through the rod 44 upon the locking lever, any attempt to open the door by the inside door handle will be thwarted, since the attempted counterclockwise rotation of the lever 47 is blocked by engagement of the lower flange 64 of the lever with the stud 61, and since the line of force 66 passes beneath the pivotal mounting point 36 of the locking lever, the lever 47 cannot be operated to release the pawl. It will be noted in this connection that the offset flange 37 and shoulder 38 of the locking lever 34 engage the lower portion 67 of the release lever 31 (Figure 1) to block any attempt to rotate the locking lever in this direction. This forms a safety feature in that children cannot open the rear door of the vehicle by the inside handle when the inside locking control is moved to a locked position.

It will also be noted that the removal of the stud 61 from the upper hole 62 in the locking lever prevents the automatic unlocking of the locking lever when the door is closed, since the lower arm 52 of the bell crank lever 53 passes freely over the upper portion of the locking lever 34 when the bell crank lever 53 and the pawl 19 are actuated by the rotation of the rotor and ratchet during door closing movement. Thus, the rear doors can be locked by operation of the inside locking control and then closed, and then they will remain locked.

Thus it will be seen that the different requirements of the front and rear door locks of a motor vehicle can be met with a single door lock mechanism, simply by the alternate positioning of the stud 61. Economies in manufacture and assembly are thus obtained.

It will be understood that the invention is not to be limited to the exact construction shown and described, but that various changes and modifications may be made without departing from the spirit and scope of the invention, as defined in the appended claims.

What is claimed is:

1. In a latch mechanism for a motor vehicle door, an L-shaped support mounted upon said door adjacent an edge thereof, a toothed rotor rotatably mounted upon one flange of said support on one side thereof, a toothed ratchet on the opposite side of said support from said rotor and mounted for rotation with said rotor as a unit, a pawl mounted on said support on the same side as said ratchet and adapted to engage one of the teeth of said ratchet to hold said ratchet and rotor against rotation in one direction, a manually operable release lever pivotally mounted upon said support and having a part engageable with said pawl to swing the latter out of engagement with said ratchet upon actuation of said lever, a locking lever pivotally mounted upon the other flange of said L-shaped support and having a blocking portion engageable in one position of said locking lever with said release lever to prevent actuation of said release lever in a direction to release said pawl from said ratchet, a manually operable lever pivotally mounted upon said last mentioned flange, an intermediate lever pivotally mounted upon said other flange coaxially with said manually operable lever, said intermediate lever having a first portion engageable with said pawl and a second portion in abutting relationship with a part of said manually operable lever to be rotated thereby in a direction to release said pawl from said ratchet, means for rotating said pivotally mounted locking lever between blocking and unblocking positions of said locking lever with respect to said manually operable release lever, and additional means on said locking lever in the path of movement of the second portion of said intermediate lever to rotate said locking lever from blocking to unblocking position upon rotation of said intermediate lever in pawl releasing direction, said additional means being removable to permit movement of said intermediate lever independently of said locking lever.

2. In a latch mechanism for a motor vehicle door, an L-shaped support mounted upon said door adjacent an edge thereof, a toothed member rotatably mounted upon one flange of said support, a pawl pivotally mounted upon said one flange of said support and adapted to engage said toothed member to hold the latter against rotation in one direction, a manually operable release lever pivotally mounted upon said one flange of said support and having a part engageable with said pawl to swing the latter out of engagement with said ratchet upon actuation of said lever, a locking lever pivotally mounted upon the other flange of said L-shaped support and having a blocking portion engageable in one position of said locking lever with said release lever to prevent actuation of said release lever in a direction to release said pawl from said toothed member, a manually operable lever pivotally mounted upon said other flange of said support and having a pair of radially spaced abutment portions, an intermediate lever pivotally mounted upon said other flange of said support and having spaced parts adapted to engage said pawl and one of the abutment portions of said manually operable lever, and abutment means on said pivoted locking lever adapted to be engaged by a part of said intermediate lever when the latter is rotated by said manually operable lever to simultaneously release said pawl from said toothed member and move said locking lever to a position out of blocking relationship with said manually operable release lever.

3. In a latch mechanism for a motor vehicle door, an L-shaped support mounted upon said door adjacent an edge thereof, a toothed member rotatably mounted upon one flange of said support, a pawl pivotally mounted upon said one flange of said said support and adapted to engage said toothed member to hold the latter against rotation in one direction, a manually operable release lever pivotally mounted upon said one flange of said support and having a part engageable with said pawl to swing the latter out of engagement with said ratchet upon actuation of said lever, a locking lever pivotally mounted upon the other flange of said L-shaped support and having a blocking portion engageable in one position of said lock-

ing lever with said release lever to prevent actuation of said release lever in a direction to release said pawl from said toothed member, a manually operable lever pivotally mounted upon said other flange of said support and having a pair of radially spaced abutment portions, an intermediate lever pivotally mounted upon said other flange of said support and having spaced parts adapted to engage said pawl and one of the abutment portions of said manually operable lever, and abutment means on said pivoted locking lever adapted to be engaged by that one of the abutment portions on said manually operable lever which is not in abutting relationship with said intermediate lever.

4. In a latch mechanism for a motor vehicle door, an L-shaped support mounted upon said door adjacent an edge thereof, a toothed member rotatably mounted upon one flange of said L-shaped support, a pawl mounted upon said one flange and adapted to engage said toothed member to hold the latter against rotation in one direction, a manually operable release lever pivotally mounted upon said one flange and having a part engageable with said pawl to swing the latter out of engagement with said toothed member upon actuation of said lever, a locking lever pivotally mounted upon the other flange of said L-shaped support and having a blocking portion positioned in vertical alignment with the pivotal mounting of said locking lever in one position of said locking lever, said abutment portion in said position of said locking lever being engageable with a part of said manually operable release lever to block the latter and prevent rotation of said release lever in a direction to release said pawl from said toothed member, a manually operable lever pivotally mounted upon said other flange of said support and having a pair of vertically spaced abutment portions, and moveable abutment means on said locking lever selectively moveable between two positions in the path of movement of the two abutment portions of said manually operable lever, the direction of force application between the two abutment portions of said manually operable lever and the corresponding positions of said abutment means on said locking lever passing on opposite sides of the axis of the pivotal mounting of said locking lever on said support.

5. In a latch mechanism for a motor vehicle door, a support mounted upon said door adjacent an edge thereof, a toothed member rotatably mounted upon said support, a pawl pivotally mounted on said support and adapted to engage said toothed member to hold the latter against rotation in one direction, a manually operable release lever pivotally mounted upon said support and having a part engageable with said pawl to swing the latter out of engagement with said toothed member upon actuation of said lever, a locking lever pivotally mounted upon said support and having a blocking portion engageable in one position of said locking lever with said release lever to prevent actuation of said release lever in a direction to release said pawl from said toothed member, a manually operable lever pivotally mounted upon said support and having a pair of spaced abutment portions, connection means between said manually operable lever and said pawl, and abutment means upon said locking lever selectively moveable between two positions in the paths of movement of the two abutment portions of said manually operable lever, the direction of force application between the two abutment portions of said manually operable lever and the corresponding positions of said abutment means on said locking lever passing on opposite sides of the axis of pivotal mounting of said locking lever on said support.

6. In a latch mechanism for a motor vehicle door, a support mounted upon said door adjacent an edge thereof, a toothed member rotatably mounted upon said support, a pawl pivotally mounted on said support and adapted to engage said toothed member to hold the latter against rotation in one direction, a manually operable release lever pivotally mounted upon said support and having a part engageable with said pawl to swing the latter out of engagement with said toothed member upon actuation of said lever, a locking lever pivotally mounted upon said support and having a blocking portion engageable in one position of said locking lever with said release lever to prevent actuation of said release lever in a direction to release said pawl from said toothed member, a manually operable lever pivotally mounted upon said support for shifting said locking lever from a non-blocking position to said one position, said locking lever and said manually operable lever having cooperating abutment portions, the line of force application between said abutment portions passing between the pivotal mounting of said locking lever on said support and the blocking portion of said locking lever, said locking lever abutment portion in locking position blocking operation of said manually operable lever.

7. The structure defined by claim 6 which is further characterized in that means are provided for independently rotating said pivotally mounted locking lever between blocking and unblocking positions of said locking lever with respect to said manually operable release lever, the abutment portion of said locking lever in the unblocking position of said locking lever being offset with respect to the abutment portion of said manually operable lever to permit movement of said manually operable lever in lock releasing direction when said locking lever is in unblocking position.

8. In a latch mechanism for a motor vehicle door, an L-shaped support mounted upon said door adjacent an edge thereof, a toothed rotor rotatably mounted upon one flange of said support on one side thereof, a toothed ratchet on the opposite side of said support from said rotor and mounted for rotation with said rotor as a unit, a pawl mounted on said support on the same side as said ratchet and adapted to engage one of the teeth of said ratchet to hold said ratchet and rotor against rotation in one direction, a manually operable release lever pivotally mounted upon said support and having a part engageable with said pawl to swing the latter out of engagement with said ratchet upon actuation of said lever, a locking lever pivotally mounted upon the other flange of said L-shaped support and having a blocking portion engageable in one position of said locking lever with said release lever to prevent actuation of said release lever in a direction to release said pawl from said ratchet, a manually operable lever pivotally mounted upon said last mentioned flange, an intermediate lever pivotally mounted upon said other flange coaxially with said manually operable lever, said intermediate lever having a first portion engageable with said pawl and a second portion in abutting relationship with a part of said manually operable lever to be rotated thereby in a direction to release said pawl from said ratchet, means for rotating said pivotally mounted locking lever between blocking and unblocking positions of said locking lever with respect to said manually operable release lever, said manually operable lever being provided with an abutment portion radially spaced from said part of said manually operable lever which is arranged in abutting relationship with the second portion of said intermediate lever, and a shiftable abutment on said locking lever selectively moveable between two positions, the abutment on said locking lever in one position being in alignment with a part of said intermediate lever and in said second position being in alignment with the last mentioned abutment portion of said manually operable lever.

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