Dec. 3, 1946. R. F. SMITH 2,411,941

DOOR LOCK

Original Filed Sept. 15, 1944 5 Sheets-Sheet 1

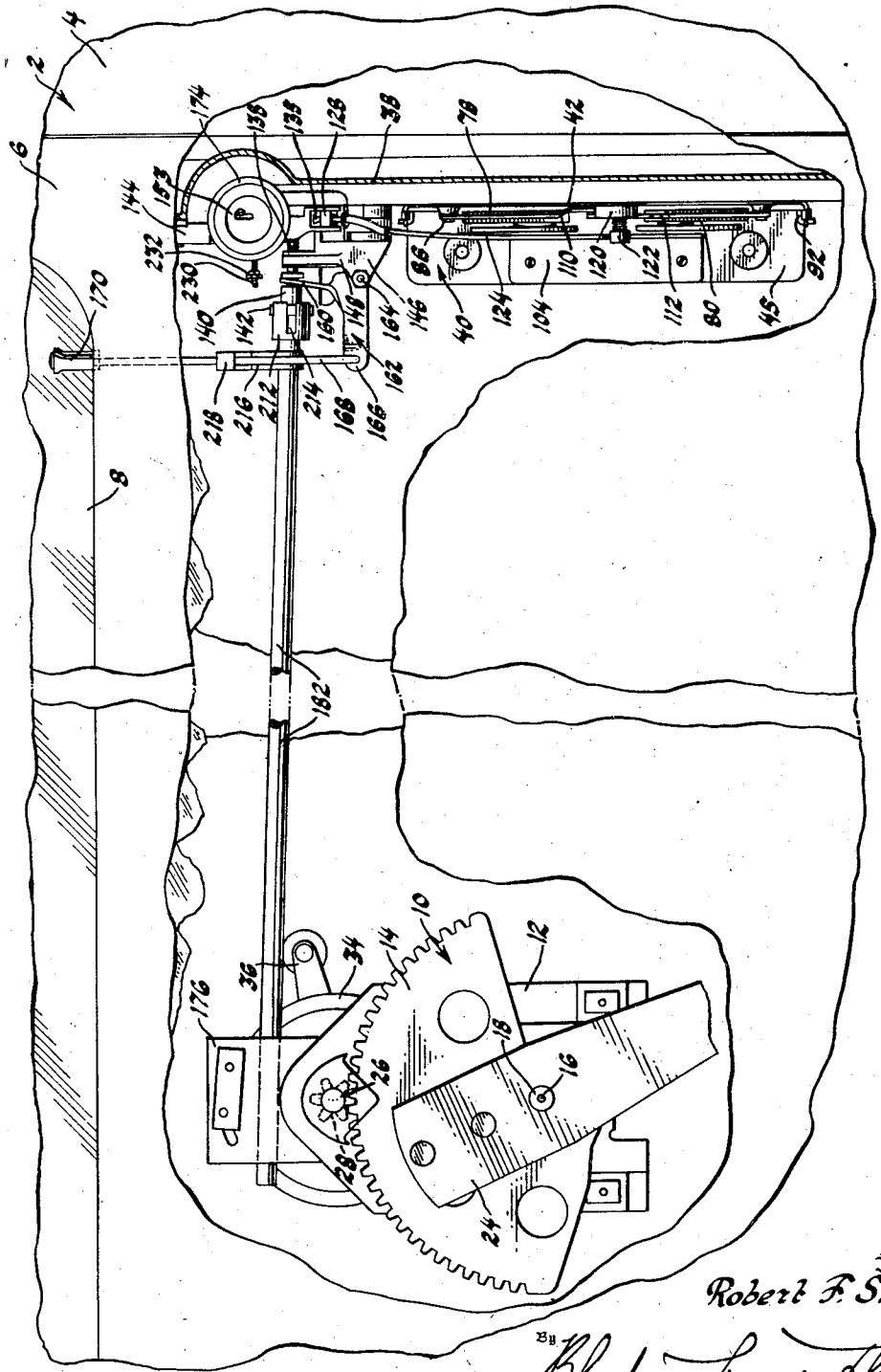


Fig. 1

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DOOR LOCK

Original Filed Sept. 15, 1944 5 Sheets-Sheet 2

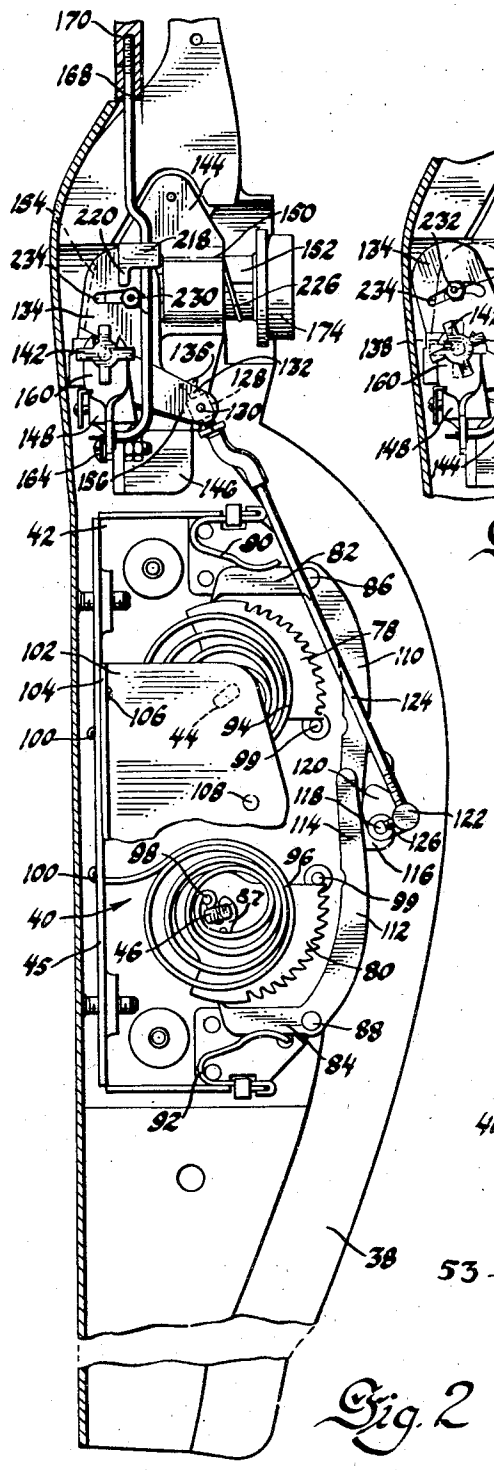


Fig. 2

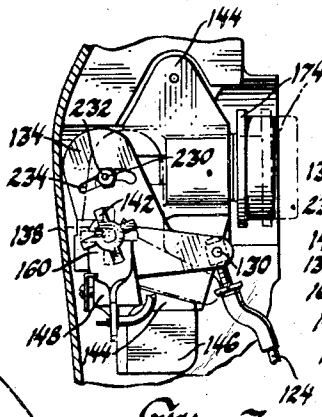


Fig. 3

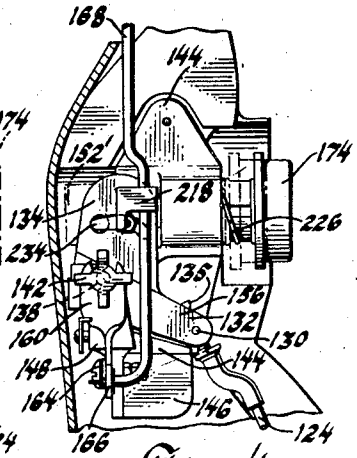


Fig. 4

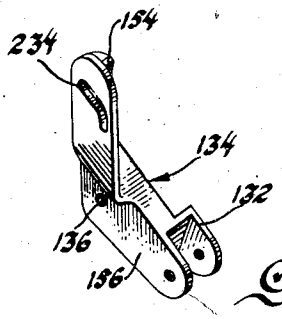


Fig. 5

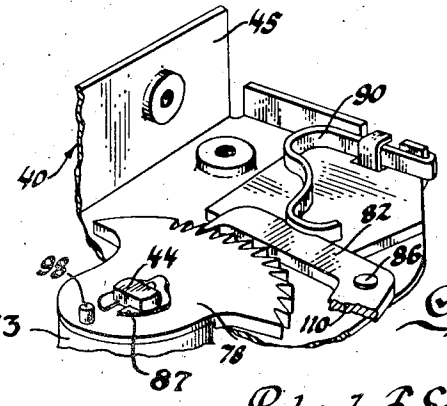


Fig. 6

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DOOR LOCK

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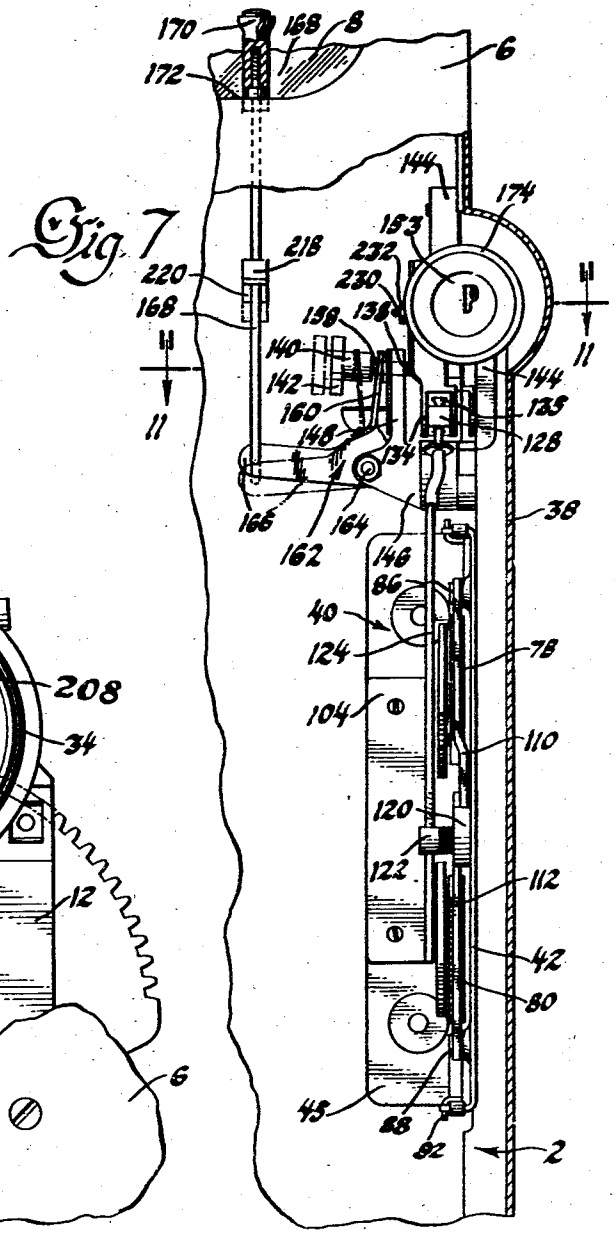


Fig. 7

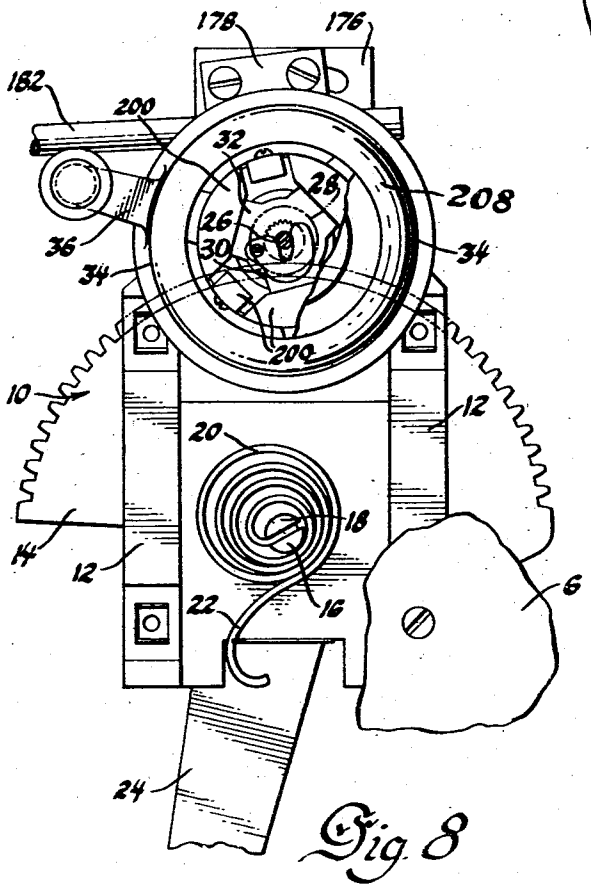


Fig. 8

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DOOR LOCK

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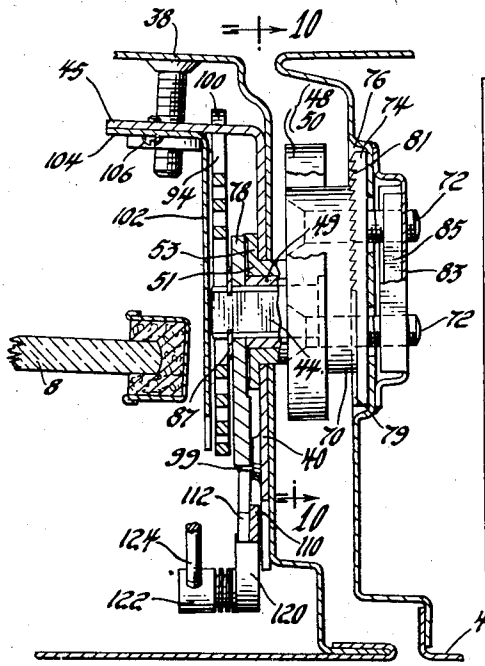


Fig. 9

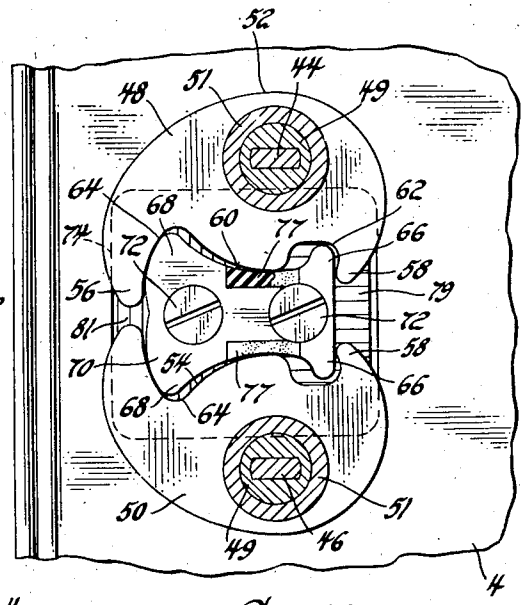


Fig. 10

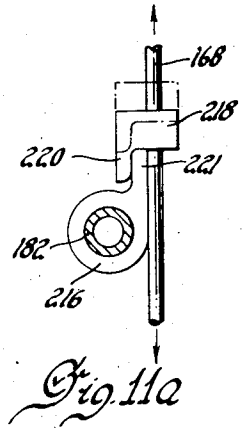


Fig. 11a

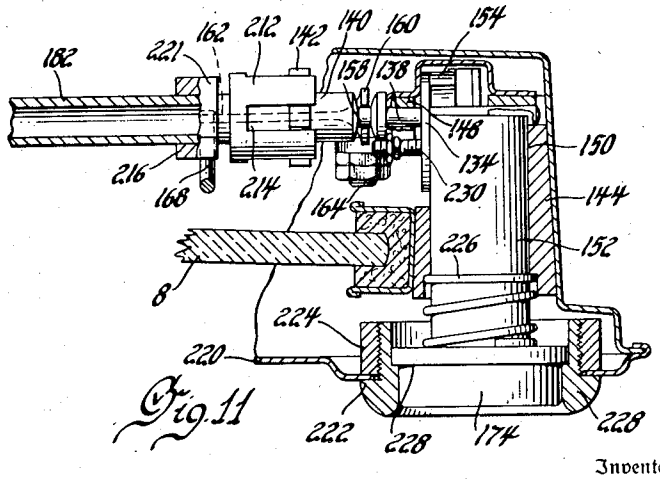


Fig. 11

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DOOR LOCK

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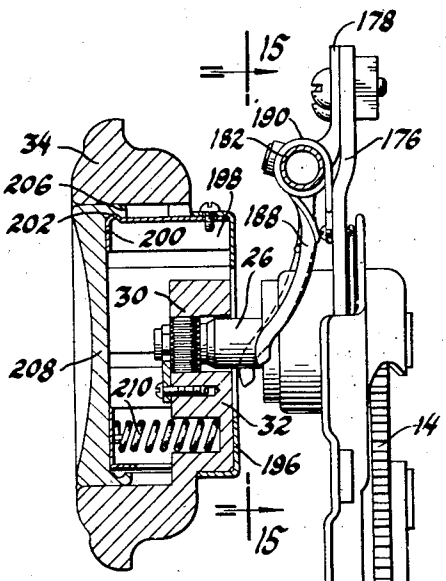


Fig. 13

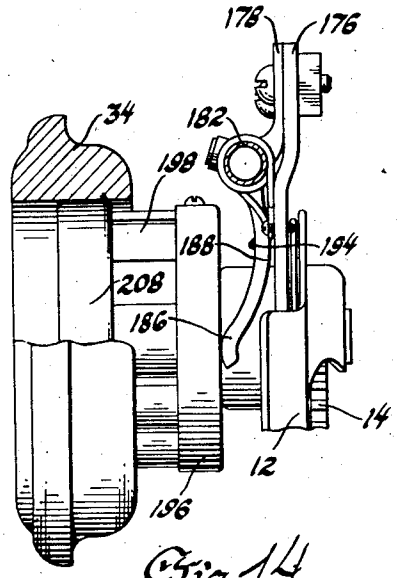


Fig. 14

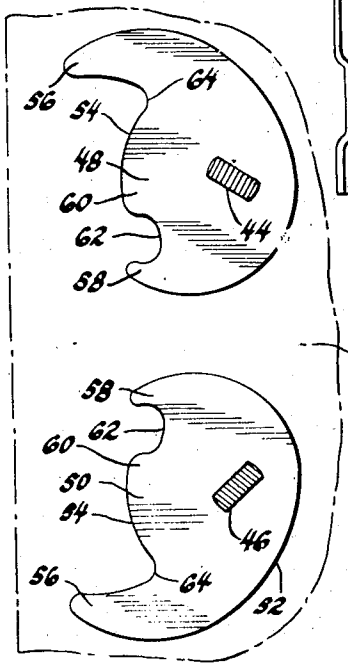


Fig. 12

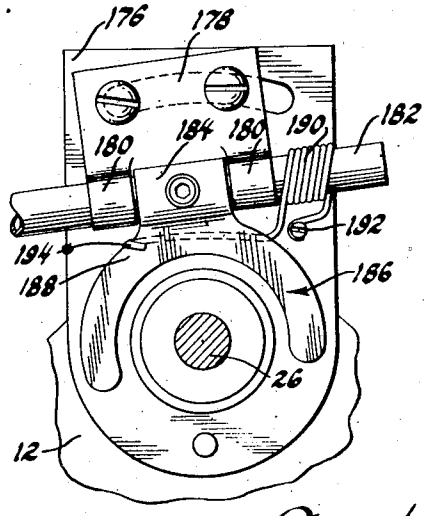


Fig. 15

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UNITED STATES PATENT OFFICE

2,411,941

DOOR LOCK

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Continuation of application Serial No. 554,175, September 15, 1944. This application January 4, 1945, Serial No. 571,275

9 Claims. (Cl. 292—25)

1

This application is a continuation of my application Serial Number 554,175, filed September 15, 1944.

This invention relates to locks or latching mechanisms, particularly applicable to automotive vehicle doors and rear deck lids.

The object of the invention is to construct a lock which is operable by a push button from the inside of the vehicle and by a push button from the outside of the vehicle, the push button on the outside of the vehicle having a key operated lock barrel therein. A further object of the invention is the elimination of the usual slidable latch bolt and the usual dovetail. In place of the latch bolt there are substituted two throw-out latches which engage with a stationary keeper secured to the door post. This stationary keeper also acts as a dovetail and performs the usual functions thereof. A further object of the invention is the combining of the push button on the interior of the vehicle with the window raising mechanism and thereby eliminating one projecting element or handle from the inside of the door.

Further objects of the invention relate to the specific details of the construction of the lock and latch mechanism.

On the drawings:

Figure 1 is a view of the lock mechanism applied to the door and looking from the outside of the door, parts of the door being broken away to illustrate the construction.

Figure 2 is a detailed view of the lock and latch mechanism attached to the door pillar and looking at the edge of the door from the inside, a part being broken away better to illustrate the construction.

Figure 3 is a detailed view of the parts shown in the upper part of Figure 2 but showing the push button depressed and the parts in position for the release of the lock. The dotted outlines show the position of the parts before the button is depressed.

Figure 4 is a view similar to the upper part of Figure 2 but showing the inner latching member depressed and the parts shifted to the latch depressed position. The dotted outline shows the shell moved to its extreme inward position and being out of engagement with the bell crank lever.

Figure 5 is a perspective view of the bell crank lever operated by the push button and shell from the outside of the door.

Figure 6 is a detailed perspective view of the ratchet and pawl mechanism associated with each of the throw-out latches.

Figure 7 is an enlarged detailed view of the

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parts shown at the right of Figure 1. The dotted outline shows the position of the parts with the inside lock knob depressed.

Figure 8 is an enlarged detailed view of the structure shown at the left of Figure 1 but looking from the inside of the vehicle.

Figure 9 is a sectional detailed view of the lock mechanism and the keeper on the door post taken through the door pillar and the door post.

Figure 10 is a detailed view on the line 10—10 of Figure 9.

Figure 11 is a sectional detailed figure on the line 11—11 of Figure 7.

Figure 11a is a detailed view showing the inside locking mechanism in the locked position.

Figure 12 is a detailed view similar to Figure 10 but showing the throw-out latches in their extreme released position.

Figure 13 is a detailed view partly in section of the mechanism at the inside of the door for operating the door latch and for raising and lowering the door window.

Figure 14 is a view similar to Figure 13 but showing the push button in the depressed position.

Figure 15 is a detailed view on the line 15—15 of Figure 13.

An automotive vehicle (only a part of which is shown) is indicated as a whole at 2. The vehicle has the usual door post 4 and the door 6. The door is provided with the usual window 8 and the usual window raising and lowering mechanism indicated as a whole at 10.

The window raising and lowering mechanism includes the mounting frame 12 rigidly secured to the door and the segment 14 pivoted at 16 to the frame 12. The shaft 18 of the pivot has secured thereto one end of a coil spring 20 while the other end is held at 22 to a part of the frame 12. The coil spring 20 always acts in a direction to raise the window 8. The segment 14 has rigidly secured thereto an arm 24 to the end of which there is attached the mechanism connected to the window 8 to raise and lower it. A shaft 26 is journalled in the frame 12 and has mounted on the end thereof a small gear wheel 28 which meshes with the gear segment 14. The other end of the shaft 26 (see Fig. 13) is knurled and has rigidly mounted thereon the central part 30 of a spider 32 which forms the bottom of a hub 34 having a handle 36 secured thereto. By operating the handle 36 and turning the hub 34 the shaft 26 will be rotated to operate the gear segment 14 and to cause the operation of the window raising and lowering mechanism.

The door 6 has the metal pillar 38 at its edge and to the pillar 38 there is secured the lock and latch mechanism 40 of the invention. The lock and latch mechanism comprises the base plate 42 having a right angularly bent flange 45 which is secured to the inner part of the pillar 38.

The pillar 38 and the plate 42 have mounted therein the shafts or studs 44 and 46 which extend through the edge face of the pillar 38 and have secured thereto at the ends thereof the throw-out latches 48 and 50, best shown in detail in Figures 10 and 12. The studs 44 and 46 are generally rectangular in cross section and pass through conformable openings in bushings 49. The bushings 49 in turn are rotatably mounted in bearing and spacer members 51, provided with a head 53. The members 51 are inserted through openings in the plate 42 and pillar 38 with the heads 53 abutting the plate and being welded thereto. The shank portion of the members 51 and the bushings 49 extend into abutting relation with the throw-out latches 48 and 50 only and serve as distance pieces or spacers for the throw-out latches. These throw-out latches are duplicates of each other and are of the shape shown in Figures 10 and 12 and each comprises the outer arcuate edge 52 and the inner more or less E shaped edge 54. The edge 54 comprises the inner finger 56, the outer finger 58 and the intermediate finger 60. Between fingers 56, 58 and 60 there are depressions 62 and 64 in which there are received the tongues 66 and 68 of a keeper 70 rigidly secured to the door post 4. The keeper 70 is mounted by means of the bolts 72 to a plate 74 set in and welded to a depression 76 in the post 4. This plate 74 has horizontal serrations 79 on one-half and vertical serrations 81 on the other half thereof which mate with like serrations formed on the keeper 70. These serrations make the keeper 70 adjustable both horizontally and vertically within very narrow limits with reference to the base plate 74. Hard rubber or fibre members 77 are provided on the sides of the keeper where it contacts with the tongues 60 to prevent rattle and noise. The keeper 70 acts as a dovetail holding the door in its normal position with reference to all directions.

At the inside of the post 4 and opposite the plate 74 a pocket 83 is welded in place. A floating type nut member 85 fits loosely in the pocket 83 and receives the threaded end of the bolts 72 removably to hold the keeper on the plate 74.

On the inside of the pillar 38 there is rigidly mounted on each of the shafts 44 and 46 a toothed segment 78 or 80 and with which there is adapted to engage a pawl 82 or 84. Retainers (C-washers) 87 fit in a groove in the shaft 44 or 46 and hold the throw-out latches 48 or 50 and the segments 78 or 80 in place. The pawls are pivoted at 86 and 88 and suitable springs 90 and 92 mounted to the plate 42 constantly urge the pawls 82 or 84 against the toothed edge of the segments 78 and 80. A coil spring 94 surrounds the shaft 44 and is secured at one end to the segment 78 and a second coil spring 96 surrounds the shaft 46 and is secured at one end 98 to the segment 80. The other ends of the coil springs 94 and 96 are secured at 100 to the flange 45 of the plate. The springs 94 and 96 constantly urge the segments 78 and 80 and the throw-out latches 48 and 50 to released or door opened position. Stops 99 limit the movement of the segments by the springs.

Over and closely adjacent to the springs 94 and 96 an auxiliary plate 102 is positioned. This plate has an edge flange 104 secured by means of the screws 106 to the edge flange 45 of the plate 42. A retaining screw 108 passes through the plate 42 and into the spring retainer or cover plates 42 and 102 to hold the plate in position. The purpose of the plate 102 is to protect the springs 94 and 96 and retain them in their operative position.

Each pawl 82 and 84 has a long arm 110 or 112, the ends of which extend adjacent to each other at 114. The plate 42 has an extending finger 116 to receive a pivot stud 118 to which there is pivoted a cam 120. The cam has mounted thereon a projecting stud 122 into which there is screw-threaded an operating rod 124. A set screw 126 secures the end of the rod in the stud 122. By pulling on the rod 124 the cam 120 will depress the arms 110 and 112 at the point 114 to cause the pawls 82 and 84 to be moved on their pivots 86 and 88 and to be released from the teeth of the segments 78 and 80 to enable the springs 94 and 96 to move the segments and thereby operate the throw-out latches 48 and 50 to release them from the keeper 70. The reaction of the throw-out latches on the keeper will partially open the door.

The other end of the rod 124 passes freely through a small block 128 journally mounted at 130 in the forked end 132 of a bell crank lever 134 shown in detail in Figure 5. The end of the rod 124 has an enlarged head 135 to prevent it from being pulled through the block 128. This bell crank lever is rigidly mounted at its bore 136 to a longitudinally shiftable shaft 138 having an enlarged head 140, the end of which is a cruciform shape, as indicated at 142 in Figures 2, 3 and 4. The shaft 138 has one end slidably mounted in a mounting bracket or fixture 144 rigidly secured to the door post 38. The fixture 144 has a small bracket 146 rigidly mounted thereon and this bracket 146 has the integral arm 148 through the end of which the shaft 138 slidably passes.

The bracket 144 has a circular bore 150 in which there is slidably received the casing 152 having the lock barrel 153 mounted therein. The lock barrel 153 (Fig. 1) is of the conventional key operated type. The bell crank lever 134 has one arm 154 thereof positioned in the path of the rear end of the casing 152 and by pushing the casing 152 from the dotted line position of Figure 3 to the full line position, the end of the casing 152 will strike against the arm 154 to rock the lever 134 and its shaft 138. This will move the second arm 156 of the lever and pull the rod 124 to operate the cam 120 to release the pawls from the segments and cause the operation of the throw-out latches as has been described in the foregoing.

The shaft 138 is provided with a reduced portion 158 in which there is received the forked end 160 of a bell crank lever 162 (Fig. 1) pivoted at 164 to the bracket 146. The second arm 166 of the bell crank lever 162 has attached thereto one end of a throw-out rod 168 the top of which is provided with an operating button or knob 170 which projects above the garnish moulding at the lower edge 172 of the window opening in the door 6. By pushing the button downwardly (Figures 1 and 7) the bell crank lever 162 is moved from the full line position in Fig. 7 to the dotted line position to cause the forked end 160 to shift the shaft 138 to the left, to the dotted line position.

The bell crank lever 134 will move with the

shaft 138 and thereby move the arm 154 from the path of movement of the casing 152. This will prevent the operation of the latch mechanism from the outside of the door for the reason that depressing the push button 174 will not operate the bell crank lever 134 because the arm 154 is out of the path movement of the casing 152. By pressing downwardly on the knob 170 the occupant of the vehicle can lock the door from the inside. The position of the parts before the downward movement of the throw-out rod 168 is shown in Figures 1, 2 and 7 while their position after the operation of the rod is shown in Figure 4 and in dotted outline in Figure 7. As will be seen by the dotted outline 152', Figure 4, the end of the casing 152 projects past the lever arm 154, without moving the arm.

The mechanism for operating the lock and latch mechanism from the inside of the door is best shown in Figures 1, and 11 to 15. The frame 12 has a mounting bracket 176 rigidly secured thereto and on the end of this bracket there is rigidly mounted a smaller bracket 178 which has two eyes 180 formed in the end thereof. In the eyes 180 there is turnably mounted tube 182. Between the eyes 180 there is rigidly secured to the tube 182 an eye 184 of a lever 188 having a forked end 186. A spring 190 has one end 192 rigidly secured to the bracket 176 and the other end 194 secured to the lever 188 and constantly urges the lever away from the bracket 176.

The free ends of the tines of the fork 186 are constantly urged by the spring 190 against the bottom of a cup 196 which is mounted in the hub 34. The cup 196 has secured to the flanges thereof the shell 198, the outer edge of which is inturned as at 200 and is provided with a rib 202 over which there is snapped the edge 206 of a button 208 which fits into the hollow hub 34. The bottom of the cup 196 is retained against the bottom of the spider 32 and the arms of the shell 198 pass through the spaces between the spider arms. A suitable number of coil springs 210 (preferably three) mounted in recesses in the spider arms constantly urge the flange 202 and the shell 198 and the cup 196 to the position shown in Figure 13. By depressing the button 208 the shell 198 and cup 196 are moved from the position of Figure 13 to that of Figure 14 and in this movement the tines of the fork 186 are moved from the position of Figure 13 to that of Figure 14 to cause the rotation of the rod 182.

The other end of the rod 182 (see Figures 1 and 11) is provided with a hollow head 212 which is slotted at 214 to conform to the shape of the cruciform head 142. The cruciform head 142 is received in the slots 214 and a sufficient amount of lost motion in the longitudinal direction is allowed by the connection between the heads 142 and 212. The reason for this lost motion connection is to enable the operating rod 168 to shift the head 142 and lever 134 with reference to the tube 182. The movement of the lever 188 from the position of Figure 13 to that of Figure 14 will rock or rotate the tube 182 to cause the head 212 to rotate the cruciform head 142 and its shaft 138. This will cause the operation of the lever 134 and thereby cause the operating rod 124 to operate the throw-out latches. In this manner the depression of the push button 208 from the inside of the vehicle will operate the latch mechanism to release the door.

The rod 182 has rigidly mounted thereon a retaining member 216 which is adapted to cooperate with a mating retaining member 218 rigidly

secured to the operating rod 168. The retaining member 218 has a tongue 220 which mates with the corresponding tongue 221 on the retaining member 216 and when the parts 216 and 218 are in engagement the rod 182 is prevented from turning. Therefore, the movement of the button 170 to its downward position will not only prevent the operation of the lock and latch mechanism from the outside of the door but also prevent its operation from the inside of the door.

Referring to Figure 11 the outside panel of the door is indicated at 220. The panel is provided with an opening in which there is positioned the mounting hub 222 for the enlarged head or push button 174 of the slidable shell 152. The hub 222 is held in place by means of the nut 224 screw threaded to the hub 222 on the inside of the panel 220. A coil spring 226 is positioned between the bracket 144 and the head 174 and constantly urges the head against the shoulder 228 on the hub 222 to limit the outward movement of the shell 152.

The door-open position of the throw-out latches 48 and 50 is as shown in Figure 12. When the operator closes or slams the door the fingers 58 on the throw-out latches will strike the forward edge of the keeper 70 and cause the throw-out latches to turn and to rotate the shafts 44 and 46. This movement of the shafts 44 and 46 will cause a rotation of the segments 78 and 80 and as the segments rotate the pawls 82 and 84 will engage in the toothed edge to prevent the segments from returning. In the full door-closed position the throw-out latches have been moved from the position shown in Figure 12 to the position shown in Figure 10 and the pawls 82 and 84 will be in engagement with the teeth of the segments to a position corresponding to the position of the throw-out latches shown in Figure 10. The movement of the throw-out latches and the segments will have wound up or energized the coil springs 94 and 96. Now when the operator presses either the button 174 or the button 208, the bell crank lever 134 will be operated to shift the rod 124 which causes the cam 120 to depress the arms 110 and 112 to pull the pawls 82 and 84 away from the toothed racks on the segments. When the pawls are released the springs 94 and 96 will again throw the throw-out latches to the position shown in Figure 12 which will unlatch or release the mechanism from the keeper 70. The springs 94 and 96, which have been energized by closing the door, release this energy through the shafts 44 and 46 causing the fingers 58 of the latches or cams 48 and 50 to bear against keeper 70 with such force that the door is moved outwardly to partially open position. The energy required due to different weight of doors will be supplied by the use of springs 94 and 96 having a suitable strength.

The movement of the throw-out latches 48 and 50 from the position shown in Figure 10 to that shown in Figure 12 will give the door 6 a small opening movement.

A threaded stem 230 (Figs. 1 to 4, 7 and 11) has a nut 232 locked thereon near its outer end and has its inner end in engagement with the lock mechanism in the lock barrel 153. The stem 230 passes through a slot 234 in the lever 134. When the key operates the lock barrel to lock the door a head or a nut (not shown) on the inner end of the stem 230 moves the lever 134 outwardly or away from the barrel to move the lever arm 154 out of the path of movement of the casing 152. When the key is turned to unlock

the door the stem 230 will be moved in the opposite direction to cause the nut 232 to pull the lever 134 toward the casing to again move the arm 154 into the path of operation of the casing 152.

I claim:

1. In a lock for the door of an automotive vehicle, a pair of throw-out latches on the door adapted to engage with a keeper when the door is in closed position, springs operatively connected to the latches and constantly urging said throw-out latches to door-open position, means to restrain the springs from moving the throw-out latches, and means operable from the outside of the door and means operable from the inside of the door to release said restraining means to enable the springs to move the throw-out latches to release the door.

2. In a lock for the door of an automotive vehicle, a plate secured to the door, a pair of throw-out latches pivotally mounted on the plate and adapted to engage with a keeper on the door post to hold the door in closed position, springs mounted on the plate operatively connected to the latches and constantly urging said throw-out latches to door-open position, releasable means mounted on the plate and restraining said springs from releasing said latches, means simultaneously to release both of said restraining means to enable the springs to move the throw-out latches to release the door, and means operable from the inside of the door and means operable from the outside of the door to operate said releasing means.

3. In a lock for the door of an automotive vehicle, a pair of throw-out latches mounted on the door and adapted to engage with a keeper mounted on the door post, a spring for each latch operatively connected to the latch and constantly urging said latches to door-open position, releasable means interrelated with each spring to restrain said springs from moving said throw-out latches, and a push button operable on the outside of the door and interconnected with said releasable means to cause the release of said means to enable the throw-out latches to react on the keeper to enable the door to be opened.

4. In a lock for the door of an automotive vehicle, a pair of throw-out latches mounted on the door and adapted to engage with a keeper mounted on the door post, a spring for each latch operatively connected to the latch and constantly urging said latches to door-open position, releasable means interrelated with each spring to restrain said springs from moving said throw-out latches, a link connected at one end to said releasable means, a lever connected to the other end of said link, and a push button operable from the outside of the door and adapted to operate said lever to cause a release of the springs to enable the throw-out latches to unlatch the door.

5. In a lock for the door of an automotive vehicle, a pair of throw-out latches rotatably mounted on shafts journalled in the door and adapted to engage with a keeper on the door post, a plate mounted on the inside of the door opposite the latches, said shafts mounted in said plate, a spring operatively connected to each shaft and adapted constantly to urge the latches to door-open position, a pawl and segment mechanism associated with each shaft and releasably holding said springs, mechanical means for simultaneously operating said pawls to cause said throw-out latches to operate in unison, a push button on the outside of the door, means interconnecting the push button and the said mechanical means to operate said mechanism from the push button to cause the throw-out latches to be released from the keeper, and means operable from the inside of the vehicle to disconnect said interconnecting means from the push button to render the push button inoperative.

6. In a lock for the door of an automotive vehicle, a pair of throw-out latches rotatably mounted on shafts journalled in the door and adapted to engage with a keeper on the door post, a spring operatively connected to each shaft and constantly urging said shafts and latches to door released position, said springs mounted inside the door, a segment rigidly mounted on each shaft, a pawl for each segment, said pawls pivotally mounted on the door, said segments and pawls restraining the springs from moving said latches, means for simultaneously operating said pawls to release the segments and the springs to enable the springs to operate the latches, an operating rod connected to said means, a lever pivotally mounted on the door, said rod connected to said lever, means exterior to the door to operate said lever and means on the interior of the door to operate said lever, the operation of said lever moving said rod and causing the operation of said means to release the pawls and enable the springs to move the latches to door-open position.

7. In a lock for the door of an automotive vehicle, a pair of throw-out latches rotatably mounted on shafts journalled in the door and adapted to engage with a keeper on the door post, a spring operatively connected to each shaft and constantly urging said shafts and latches to door-released position, said springs mounted inside the door, a segment rigidly mounted on each shaft, a pawl for each segment, said pawls pivotally mounted on the door, said segments and pawls restraining the springs from moving said latches, means for simultaneously operating said pawls to release the segments and the springs to enable the springs to operate the latches, an operating rod connected to said means, a lever pivotally mounted on the door, said rod connected to said lever, a rod rotatably mounted in the door, means connecting the rotatable rod to the lever, means inside the vehicle connected to the rotatable rod and movable to turn the rod to operate the lever, the operation of said lever moving said operating rod and causing the operation of said means to release the pawls and enable the springs to move the latches to door-open position.

8. In a lock for the door an an automotive vehicle, a pair of throw-out latches rotatably mounted on shafts journalled in the door and adapted to engage with a keeper on the door post, a spring operatively connected to each shaft and constantly urging said shafts and latches to door-released position, said springs mounted inside the door, a segment rigidly mounted on each shaft, a pawl for each segment, said pawls pivotally mounted on the door, said segments and pawls restraining the springs from moving said latches, means for simultaneously operating said pawls to release the segments and the springs to enable the springs to operate the latches, an operating rod connected to said means, a lever pivotally mounted on the door, said rod connected to said lever, means exterior to the door to operate said lever and means on the interior of the door to operate said lever, the operation of said lever moving said rod and caus-

ing the operation of said means to release the pawls and enable the springs to move the latches to door-open position and means bodily to shift said lever and remove it from the field of operation of the means exterior to the door which operates the lever.

9. In a lock for the door of an automotive vehicle, a pair of throw-out latches rotatably mounted on shafts journalled in the door and adapted to engage with a keeper on the door post, a spring operatively connected to each shaft and constantly urging said shafts and latches to door-released position, said springs mounted inside the door, a segment rigidly mounted on each shaft, a pawl for each segment, said pawls pivotally mounted on the door, said segments and pawls

restraining the springs from moving said latches, means for simultaneously operating said pawls to release the segments and the springs to enable the springs to operate the latches, an operating rod connected to said means, a lever pivotally mounted on the door, said rod connected to said lever, means exterior to the door to operate said lever and means on the interior of the door to operate said lever, the operation of said lever moving said rod and causing the operation of said means to release the pawls and enable the springs to move the latches to door-open position and means movable to engage with the said rotatable rod to prevent the rotation of said rod and the operation of the lever.

ROBERT F. SMITH.