June 24, 1941. E. D. DALL 2,246,783

AUTOMOBILE DOOR LOCKING STRUCTURE

Filed Feb. 23, 1940 2 Sheets-Sheet 1

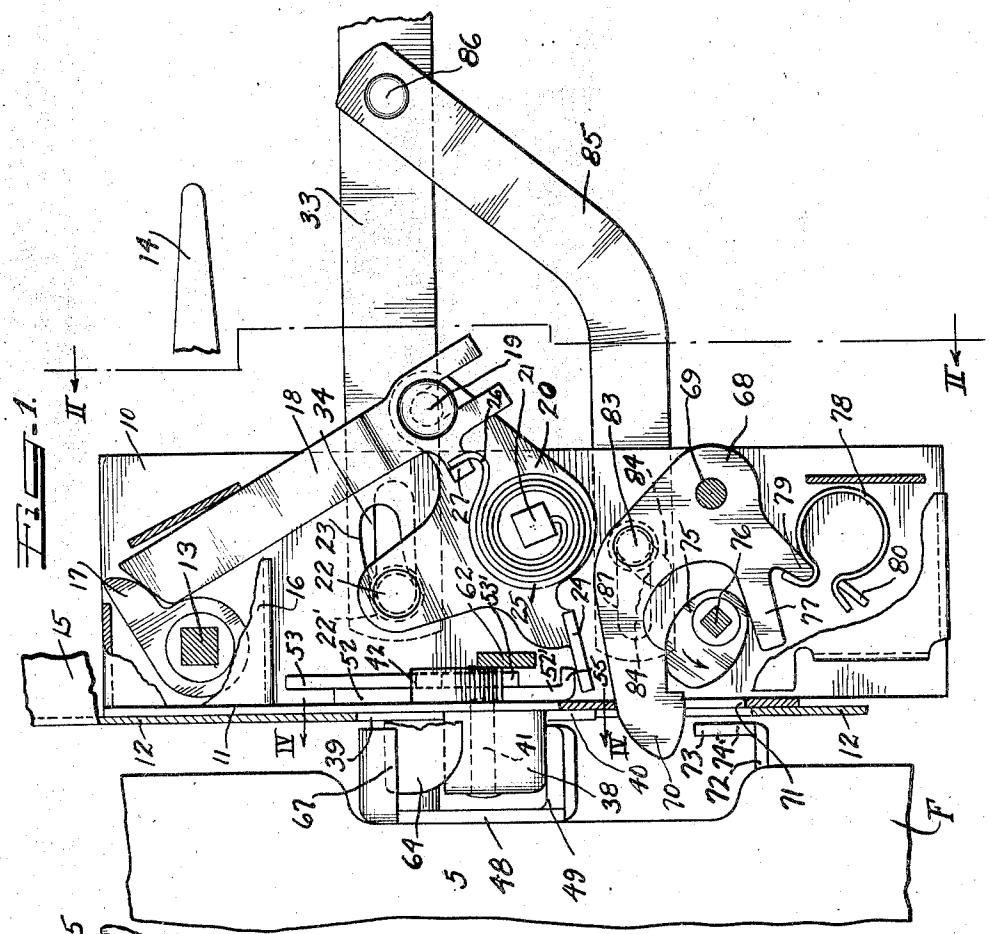


Fig. 1.

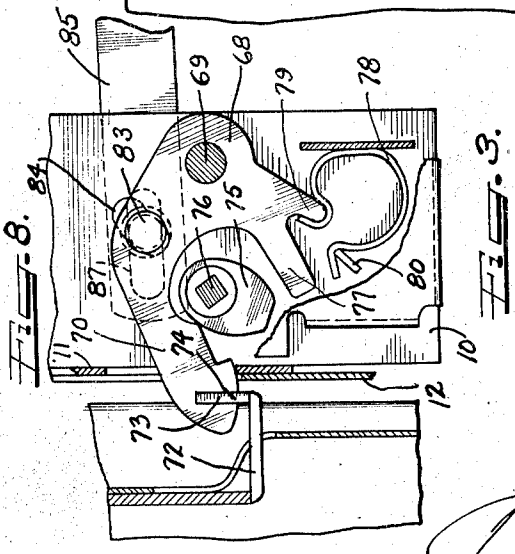
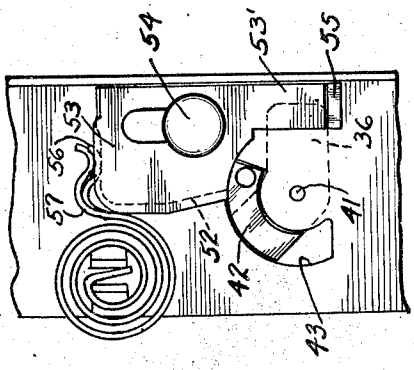


Fig. 3.

Fig. 8.



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Fig. 5.

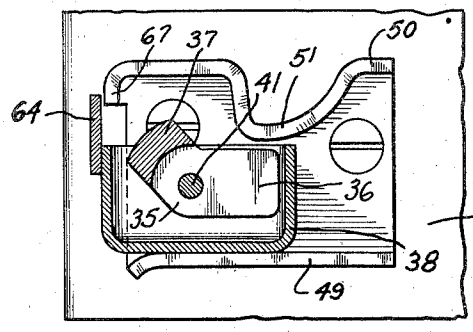


Fig. 2.

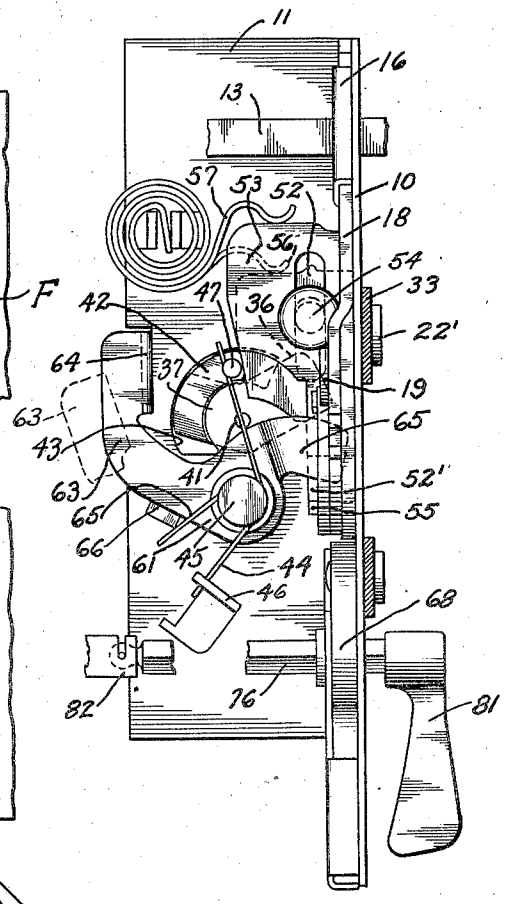


Fig. 4.

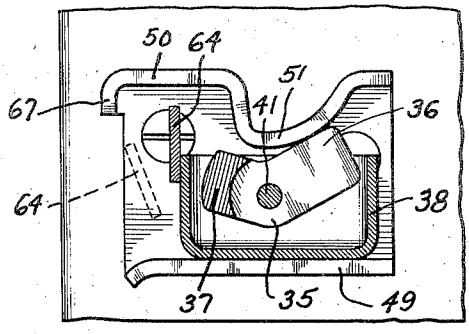


Fig. 7.

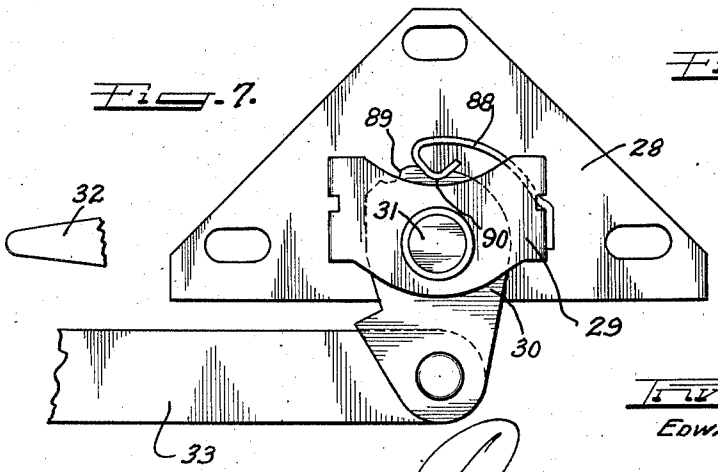
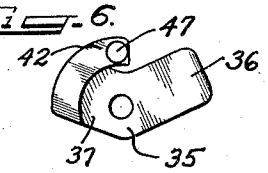


Fig. 6.



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2,246,783

AUTOMOBILE DOOR LOCKING STRUCTURE

Edward D. Dall, Detroit, Mich., assignor to Walter F. Wright, Cleveland Heights, Ohio

Application February 23, 1940, Serial No. 320,250

4 Claims. (Cl. 292—11)

My invention relates to locking structure adapted particularly for doors of automotive vehicles such as automobiles.

An important object of the invention is to provide lock structure for a door in which latch bolt elements are controllable by operation of the outside or inside handle of the door for latching or unlatching of the door, and with additional means for locking the door independently of the latch bolt elements.

A further object of the invention is to provide for locking or unlocking of the additional bolting mechanism by a key from the outside of the door or by a lever on the inside of the door operable independently of the door handle.

Another important object is the provision of additional means whereby the locking or unlocking of the additional lock bolt structure may be accomplished by manipulation of the door inside handle and so that by manipulation of the door inside handle the latch bolt elements may be unlatched and the additional lock bolting structure unlocked for opening of the door.

The invention also includes other features of arrangement and operation, and all the various features are incorporated in the drawings, in which drawings:

Figure 1 is an outside elevation of the locking structure on a door and cooperating parts on a door post or frame;

Figure 2 is a section on plane II—II of Figure 1;

Figure 3 is a view similar to Figure 2 but showing the latching controlling elements in a different position;

Figure 4 is a section on plane IV—IV of Figure 1 showing the latching elements in latching position;

Figure 5 is a view similar to Figure 2 but showing the latching elements on their way toward latching engagement;

Figure 6 is a rear elevation of the main latch bolt structure;

Figure 7 is a front elevation of inside door handle assembly; and

Figure 8 is a front elevation of the additional lock bolt structure showing it in locking position.

The various operating parts for the lock structure shown are mounted on a supporting frame of angular cross-section comprising the wall 10 extending substantially parallel with the plane of the door, and the wall 11 which is parallel with the free edge of the door and is secured to the edge wall 12 of the door as by screws, rivets, or other means.

The spindle 13 for the outside door handle 14 is journalled in any suitable manner in the lock housing wall 10 and the outer wall 15 of the door frame, and between the wall 10 and a cover plate 16 secured thereto is a roll back 17 secured to the spindle 13. A transmission link 18 extends into the cover structure 16 for engagement and longitudinal downward shift by the roll back when the outside handle is swung downwardly. At its lower end the link 18 is forked to receive a pin 19 extending from one leg of a bell crank lever 20 which is pivoted on the wall 10 by a suitable support 21. The other leg of the lever 20 has a pin 22 extending therefrom through an arcuate guide slot 23 in the wall 10. The lever 20 near its lower end has a forwardly extending abutment 24 for engagement with latch bolt controlling mechanism to be described later. A spring 25 anchored to the pivot support 21 and engaging the abutment 24 tends to hold the lever 20 swung to its normal position with the pin 22 engaging the outer end of the slot 23. Another spring 26 is anchored to the support 21 and engages an abutment 27 on the link 18 and tends to hold the link in its upper position in engagement with the roll back 17. Upon downward swing of the outside handle 14 the downward shift of the link by the roll back will effect clockwise (Figure 1) rotation of the lever 20 against the resistance of the springs 25 and 26.

Figure 27 shows an inside handle assembly for the door, the assembly shown comprising a plate 28 secured to the door frame and having secured thereto a cover structure 29 between which and the plate is received the arm 30 which is secured to the shaft 31 on the inside of which is mounted the inside handle 32. A strap 33 extends from the lower end of the arm 30, the link at its outer end extending behind the lock structure 10 and having a longitudinal slot 34 which receives the pin 22 extending from the lever 20, the head 22' on the pin holding the link to the pin. In a normal position of the inside handle assembly the outer end of the strap slot 34 will be engaged by the pin 22, and when the inside handle 32 is swung downwardly for shift of the strap 33 rearwardly, the lever 20 will be rotated in clockwise direction. The lever 20 may therefore be swung either by operation of the outside handle or the inside handle of the door.

Describing now the latching elements and control elements, the main latch bolt 35 is of the rocking type and is substantially U-shaped as

shown on Figure 6 to provide the latching leg 36 and setting leg 37. The latch bolt is within a rectangular cup-shaped housing 38 on the wall 11 and extending outwardly through the opening 39 provided in the door edge wall 12. The housing may have a flange 40 by which it is secured to the wall 11 by welding, riveting, or otherwise. A pin 41 extends transversely through the housing and is secured at its ends to the wall 11 and to the outer wall of the housing 38, the main latch bolt 35 receiving this pin for rocking movement thereon.

The setting leg 37 of the latch bolt has an arcuate lug 42 thereon concentric with the pin 41 and extending inwardly through the arcuate slot 43 in the wall 11. The spring 44 is anchored on a post 45 on the wall 11 and has one end engaging the abutment 46 on the wall 11 and its other end engaging a pin 47 on the lug 42 of the latch bolt, this spring tending to swing the latch bolt structure in clockwise direction (Figure 2) toward the upper end of the slot 43, for positioning of the latch bolt in cocked position with its latching leg 36 extending horizontally and its setting leg 37 inclined, as shown on Figures 3 and 5.

The main latch bolt 35 cooperates with a keeper structure 48 secured to a door post or frame F adjacent to the door. The keeper structure is of U-shaped cross-section, its lower wall 49 being horizontal and straight, the upper wall 50 intermediate its ends being deflected downwardly to form a latching abutment 51. Figures 3 and 5 show the latch bolt in cocked position and Figure 5 shows the door being closed, the latch bolt housing 38 entering the keeper and moving therein between the lower wall 49 and the abutment 51. As the door continues its closing movement, the setting leg 37 of the latch bolt will encounter the front side of the latching abutment 51 and the latch bolt will be rocked to swing its leg 36 into latching engagement with the latching abutment 51 at the rear side thereof as shown on Figure 4.

To hold the latch bolt in its cocked position or in its latching position, inner and outer dogging elements 52 and 53 are provided, these elements being in the form of plates slotted to receive guide posts 54 extending from the wall 11, the plates having the downwardly extending legs 52' and 53' respectively, the plates and legs at their inner edges engaging the wall 11. The lower edges of the plates are arcuate for engagement with the top of the abutment 42 on the latch bolt 35, and the outer edges of the plates are beveled to provide wedging surfaces for engagement with the upper end of the abutment 42. The leg 52' of the plate 52 has its lower end 55 deflected inwardly to be below the lower end of the leg 53' of the outer plate, as shown on Figure 1, the end 55 being above the abutment 24 on the setting lever 20 so that when this lever is rotated in clockwise direction either by operation of the outside or inside door handle, the dogging elements 52 and 53 will be shifted upwardly to carry their lower edges above the path of the latch bolt abutment 42 so that the latch bolt may assume its cocked position shown on Figure 5. Springs 56 and 57 tend to shift the dogging elements downwardly so that when they are released from the lever 20 they will be shifted down for engagement against the top of the abutment 42 to hold the latch bolt in its cocked position as shown on Figure 3. When the door is swung shut for latching swing of the latch bolt 35, the springs will shift the dogging elements downwardly with their wedging edges engaging with the upper end of the latch bolt abutment 42 to shift the latch bolt around to its final latching position for complete closure of the door and then the dogging elements will lock the latch bolt in its latching position shown on Figures 2 and 4. The dogging elements and their wedging surfaces are so related that during the latching operation of the door by the latch bolt the inner dogging element 52 will first engage its wedging edge with the abutment 42 and then the outer dogging element applies its wedging edge to the abutment and both springs 56 and 57 will then exert downward pressure for wedging the latch bolt around to its final latching position for complete closure of the door and thereafter the door will be held securely latched and against rattling.

In order to prevent the door from swinging open in case it has not been moved sufficiently relative to the keeper for latching engagement of the main latch bolt 35, safety latch bolt means are provided. This safety latch structure is in the form of a lever 61 fulcrumed on the post 45, the lever having the inwardly extending leg 62 which terminates above the abutment 24 on the setting lever 20, the outer leg 63 of the lever being deflected to provide the latching plate 64 cooperable with the keeper structure 48. A spring 65 anchored on the post 45 engages the abutment 46 on the plate 11 and the abutment projection 66 on the lever 61 and tends to hold this lever in the position shown in Figure 2 with the latching end or plate 64 substantially in the plane of the door. At its forward end the upper wall 50 of the keeper structure 48 is deflected downwardly a distance to form a keeper lip 67. When the door is swung shut, the latch plate along its upper portion will encounter the keeper lip 67, as indicated on Figure 5, and the lever 61 will be rotated in anti-clockwise direction (Figure 2) to carry the latch plate to the dotted position shown until its upper edge is below the keeper lip 67, and then the spring 65 will swing the lever 61 back so that the upper portion of the latch plate 64 will be above and behind the keeper lip as indicated on Figure 5. Thus, if the door is not sufficiently closed for latching engagement of the main latching bolt 35 with the keeper structure, the safety latch bolt will hold the door against swinging open. This safety latch bolt operates independently of the main latch bolt.

When the door is in locked position as shown in Figures 1 and 2, and either the door inside handle or outside handle is operated for unlatching and opening of the door, the dogging elements 52 and 53 and the safety latch bolt lever 61 will be operated for release of the main latch bolt and the safety latch bolt from the keeper structure. As shown on Figure 1, when the door is locked, the extension 55 at the lower end of the inner dogging member 52 is a distance below the end of the outer dogging element 53, and the end 62 of the safety latch lever is a distance above the extension 55. Now when either door handle is swung for unlatching of the door, the abutment 24 on the setting lever 20 will first engage with the deflection 55 at the lower end of the inner dogging element 52 and this element will be raised to withdraw its wedging edge from the abutment 42 on the main latch bolt 35. When the end 55 reaches the lower end of the outer dogging element 53 both dogging elements will be shifted upwardly until their lower edges are above the abutment 42 for release of the main latch bolt, and just before such release,

the abutment 24 on lever 20 engages the end 62 of the safety latch lever 61 for unlatching swing of the lever 61. However, the sequence is such that the safety latching lever will not be shifted sufficient for unlatching engagement until the main latch bolt has been fully released. The final movement of the setting lever 20 will then swing the safety latch lever for clearance of the latching plate 64 of the keeper lip 67, so that the door can then be swung open. Now when the door is again swung shut, the safety latch structure will be the first to reach its latching position and then the main latch bolt will assume its latching position.

In the structure thus far described, the door may be unlatched by operation of either the inside or outside handle and when closed the latch elements will hold the door in closed position. It may be desirable to provide additional locking structure for locking the door closed independently of the latching elements. The locking structure shown comprises a substantially V-shaped lever 68 pivoted on a support 69 on the plate 10. The upper leg 70 of the lever forms a lock bolt which projects at its end through and a distance beyond the passageway 71 provided in the walls 11 and 12. On the door post or door frame F is secured a keeper fitting 72 which at its outer end provides an upstanding keeper wall 73 whose rear edge is substantially vertical and whose front edge forms an inclined surface 74. When the locking lever 68 is in unlocking position as shown on Figure 1, the end of the locking leg 70 will be above the keeper wall 73 so that the door can be opened. When the lever 68 is rotated in counter-clockwise direction, as shown on Figure 8, the end of the leg 70 engages behind the keeper wall 73 so that the door is locked against opening. When the lever 68 is in its locking position while the door is open, and the door is swung shut, the end of the leg 70 will encounter the inclined front edge 74 of the keeper wall and the lever will be cammed to swing in clockwise direction for passage of this leg 70 past the keeper wall.

For operating the lever 68 a cam 75 is provided, this cam being substantially oval shape and mounted at its one end on a spindle 76 which, when turned, will swing the cam between the locking leg 70 of the lever 68 and the lower leg 77 thereof. Normally the cam is in engagement at its outer end with the locking leg 70 of the lever 68, and when the spindle 76 is turned counter-clockwise the cam end will engage with the leg 77 for swing of the locking lever into the locking position shown on Figure 8. A cross center spring 78 engages the extension 79 on the lever 68 and a tongue 80 on the wall 10. When the spindle 76 is turned in anti-clockwise direction (Figure 1) for locking of the door, the cam will engage the leg 77 for rotation of the lever 68 and downward swing of the lock bolt leg 70 behind the keeper wall 73, and as soon as the upper leg of the spring 78 crosses the spring center, the spring will quickly rotate the lever 68 to its locked position as shown on Figure 8. When the cam is turned in clockwise direction (Figure 8) for unlocking of the lever 68, the cam engages the leg 70 and rotates the lever until the spring crosses its center and the lever will then be quickly swung to its unlocked position as shown on Figure 1.

The outer end of the spindle 76 is preferably connected with a cylinder or tumbler lock (not shown) so that the cam may be operated by the turning of a key from the outside of the vehicle for locking or unlocking of the door by the lever structure 68. At its inner end the spindle 76 may be provided with an operating lever 81 so that the lever 68 may be actuated for locking or unlocking of the door from the inside of the vehicle. The connection of the spindle with the outside key operable means could be by a swivel or by lost motion connection 82 (Figure 2) so that if the key operated means on the outside is set for locking of the door, the lever 81 will be free to be turned from the inside of the vehicle for unlocking of the door.

I also provide means whereby the lock bolt lever 68 may be set to locking or unlocking position by operation of the door inside handle. The lock bolt leg 70 of the lever 68 has a pin 83 thereon extending through a slot 84 in the wall 10. A link 85 is pivoted at 86 to the strap 33 operable by the inside handle, and at its outer end this link has the longitudinally extending slot 87 receiving the end of the pin 83 on the lever 68. When the lever 68 is in unlocking position as shown on Figure 1, the pin 83 is at the inner end of the slot 87 and when the inside handle 32 is swung upwardly for outward shift of the strap 33, the engagement of the link 85 with the pin 83 will cause the lever 68 to be swung down to its locking position. This outward shift of the strap 33 is independent of the setting lever 20 for the latch bolt structure by virtue of the slot 34 in the strap which receives the pin 22 of the lever 20. Referring to Figure 7, when the strap 33 has been shifted outwardly, a detent spring 88 engages in a notch 89 in the arm 30 to hold the inside handle assembly and the link 85 for maintaining the lock bolt lever 68 in locking position. Upon swing of the inside handle 32 back to normal position, in which the spring 88 engages in the notch 90 in the arm 30, the lock bolt lever 68 will remain in its locking position.

If the lock bolt lever 68 has been set to locking position by operation of the outside key means, or by operation of the inside lever 81, downward swing of the inside handle 32 from its normal position will cause rotation of the setting lever 20 by the inside handle strap 33 for release of the main latch bolt and safety latch bolt, and the movement of the link 85 with the strap 33 will effect swing of the lock bolt lever 68 to its unlocking position, and the door has been fully unlocked for opening movement. If the lock lever 68 be inadvertently set to locking position while the door is open, and the door then slammed shut, the end of the lock bolt leg 70 will encounter the inclined surface 74 of the keeper wall 73 and the lever will be automatically set to unlocking position.

In automobiles, key means is usually provided on only one of the front doors for locking or unlocking of that door from the outside. The driver, before leaving the vehicle, will lock the left front door by setting the lock bolt lever 68 to locking position either by the lever 81 on the inside of the left front door or by reverse operation of the inside handle for that door, and then after he leaves the vehicle he will close the right front door and lock it by swinging the lever 68 to locking position by the key means. It may be desirable to lock or unlock either of the front doors from the outside, and after leaving by one front door and locking it, the driver may desire to re-enter through the other front door. Under these conditions, supposing that he will leave by the right front door, he first locks the left front door from

the inside and then after leaving through the right front door he closes it and locks it by the key. Then if he desires to re-enter by the left front door he uses the key for opening of that door, and the right front door, which is then locked from the outside, can be unlocked by operation of the lever 81 on the right front door or by reverse swing of the inside handle. The driver can not therefore lock himself out and after re-entering the vehicle he can leave it through either door, even if such door has been locked from the outside. Locking or unlocking of a door from the inside is readily and easily accomplished by the lever 81, and ordinarily this lever will be used for this purpose, and the inside handle operation will be used for setting the lock bolt lever 63 to locking or unlocking position only when no inside lever 81 has been provided, or when it is desired to effect both unlatching and unlocking for opening of the door from the inside for the purpose of leaving the vehicle.

I have shown a practical and efficient embodiment of the features of my invention but I do not desire to be limited to the exact construction, arrangement and operation as shown and described as changes and modifications may be made without departing from the scope of the invention.

I claim as my invention:

1. Locking means for an automobile door comprising locking structure on the door and keeper structure mounted adjacent to the door, said locking structure comprising a rockable latch bolt engageable with said keeper structure to be rocked thereby into latching engagement therewith when the door is swung shut, dogging means in the locking structure for dogging said latch bolt in latching position, releasing means in said locking structure for said dogging means, a lock bolt element in said locking structure cooperable with said keeper structure to lock the door against opening, an inside handle for the door, means effective upon movement of said inside handle in one direction for setting said locking bolt element in locking engagement with said keeper structure independently of movement of said releasing means, and means whereby movement of said inside handle in the opposite direction will coincidentally effect release of said dogging means and setting of said locking bolt element to unlocking position.

2. Locking means for an automobile door comprising lock structure on the door and cooperating keeper structure on the door frame, main latch bolt means and safety latch bolt means on the lock structure independently cooperable with said keeper means for latching the door against opening movement, an inside handle on the door, releasing means operable by said handle for effecting release of said main latch bolt means and said safety latch bolt means for opening of the door, lock bolt means on the lock structure for cooperating with the keeper structure to lock the door closed independently of said main and safety latch bolt means, setting means for setting said lock bolt means to locked position, and means adapted upon release of said main and safety latch bolt means by said inside handle for effecting resetting of said lock bolt structure to unlocking position.

3. Locking means for an automobile door comprising lock structure on the door and cooperating keeper structure on the door frame, a main latch bolt on the latch structure cooperable with said keeper means for latching the door in closed position, safety latch bolt means on the lock structure cooperable with said keeper means for latching the door in nearly closed position, lock bolt means on the lock structure for cooperating with the keeper structure to lock the door closed independently of said main and safety latch bolt means, and a common control for said three bolt means.

4. Locking means for an automobile door comprising lock structure on the door and cooperating keeper structure on the door frame, main latch bolt means on the lock structure cooperable with said keeper means for latching the door in closed position, safety latch bolt means on the lock structure independently cooperable with said keeper means for latching of the door in nearly closed position, lock bolt means on the lock structure for cooperating with the keeper structure to lock the door closed independently of said main and safety latch bolt means, handle means on the door, and means controlled by said handle means for effecting simultaneous release of said three bolt means from said keeper structure for opening of the door.

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