Jan. 15, 1952 E. D. DALL 2,582,237

DOOR LOCK

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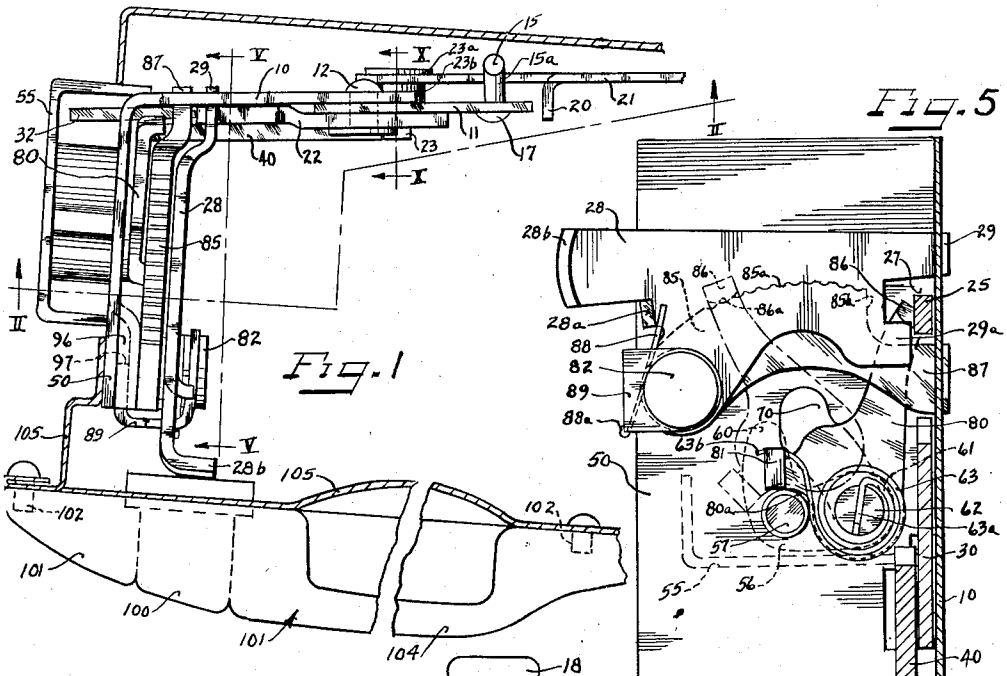


Fig. 1

Fig. 5

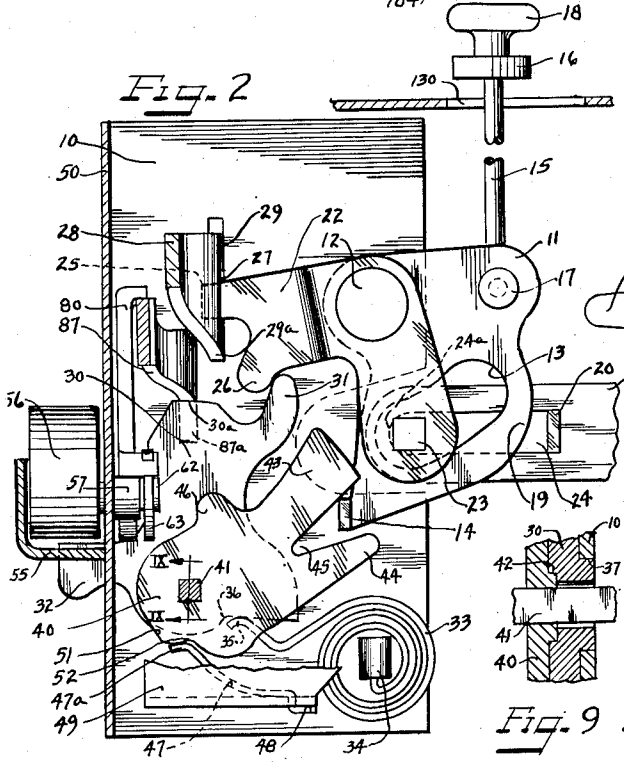
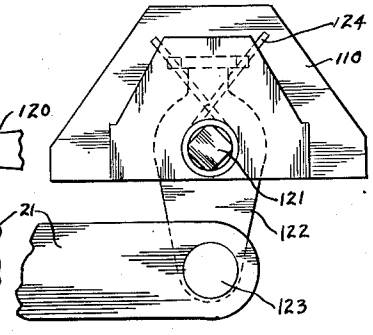


Fig. 2



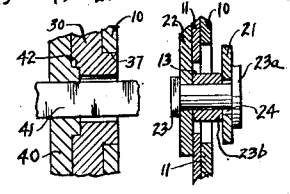


Fig. 9

Fig. 10

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DOOR LOCK

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Fig. 3

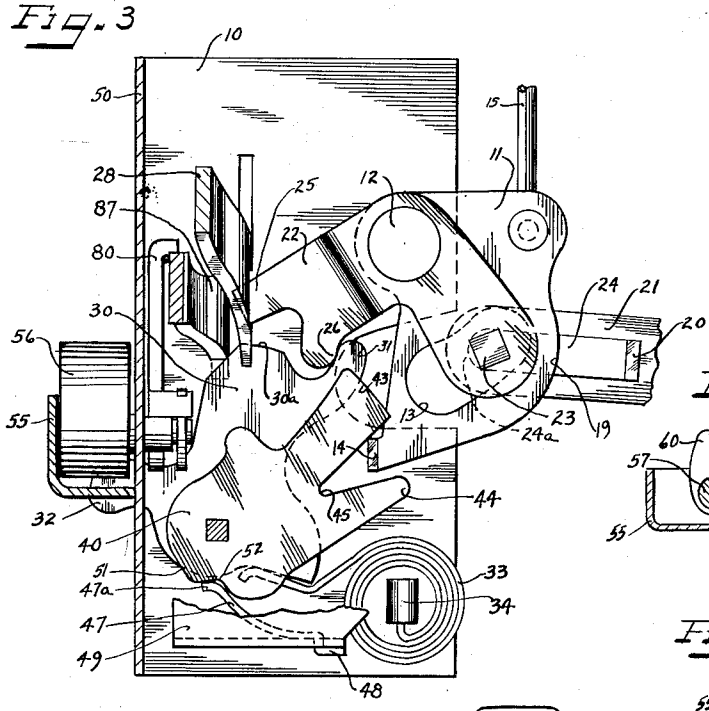


Fig. 6

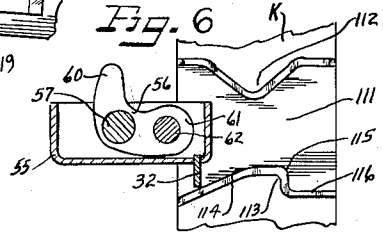


Fig. 7

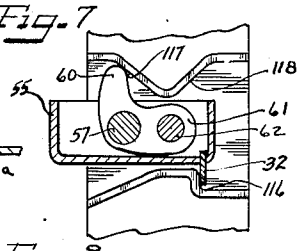


Fig. 4

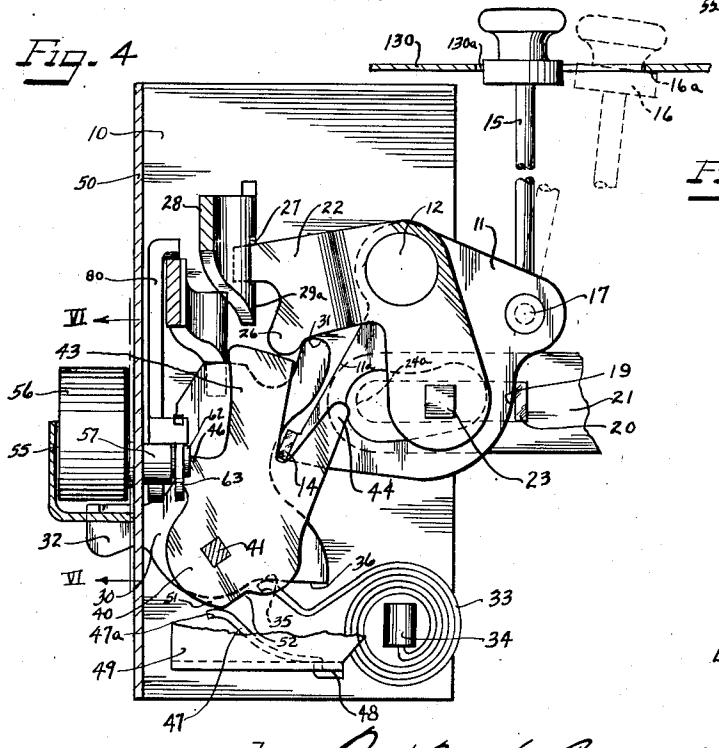
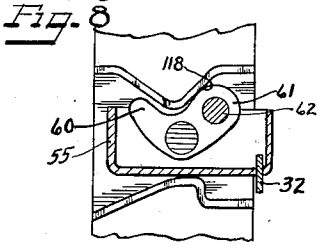


Fig. 8



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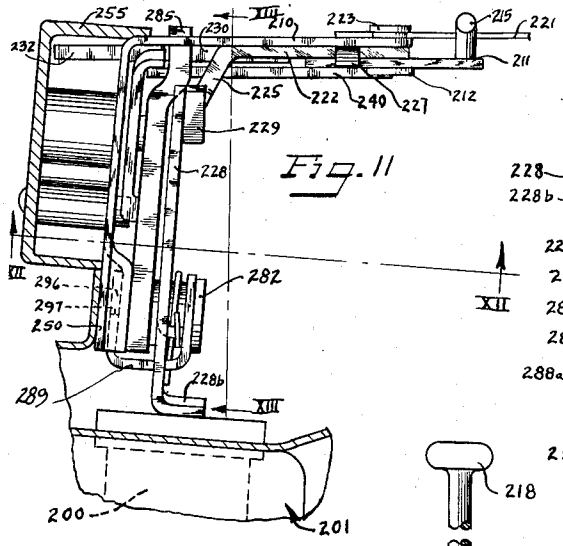


Fig. 11

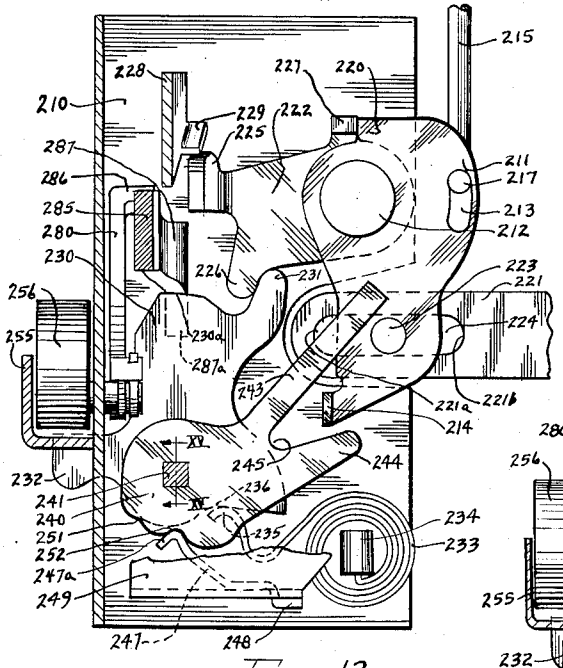


Fig. 12

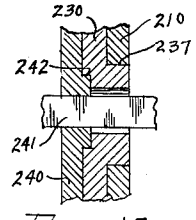


Fig. 15

Fig. 13

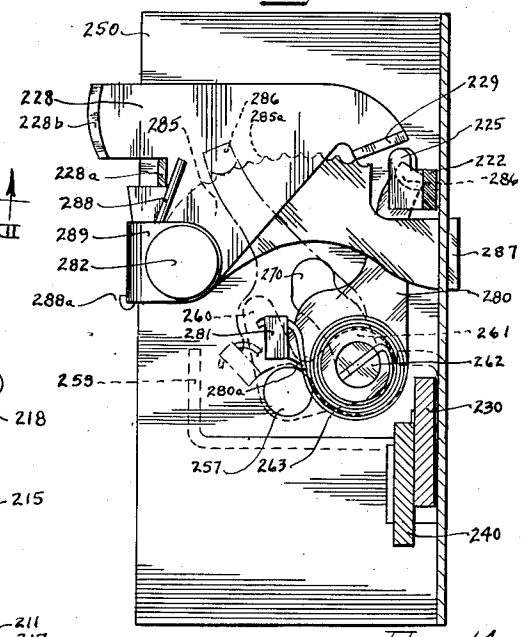
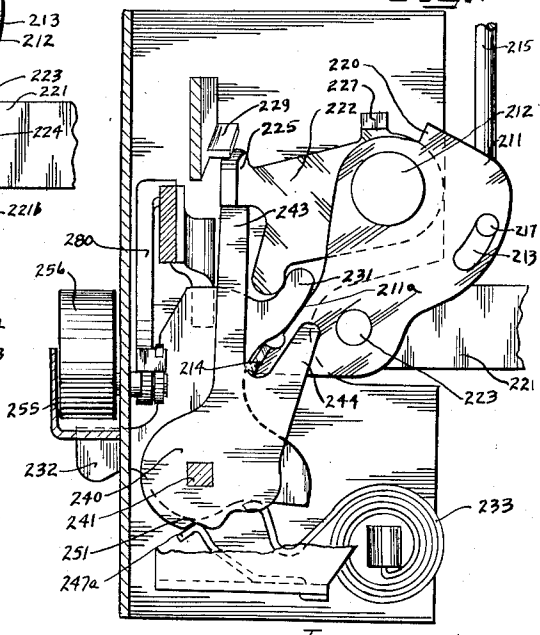


Fig. 14



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Patented Jan. 15, 1952 2,582,237

UNITED STATES PATENT OFFICE

2,582,237

DOOR LOCK

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Application March 8, 1946, Serial No. 653,047

27 Claims. (Cl. 70—153)

1

This invention relates to a door lock, and more particularly to a door lock structure for use on automobile doors.

In accordance with the principles of my present invention, I provide an automobile door locking structure that is so constructed and arranged as to offer certain novel advantages over heretofore known door locks. In the past, difficulty has sometimes been experienced when the door locking structure is inadvertently placed in its locked position while the door is open. If the door is slammed shut under these conditions, the lock is likely to become jammed or at least injured. My present invention makes it impossible for the locking structure to be operated into its locked position while the door is open, thus eliminating any possible damage under the conditions mentioned.

A further feature of my invention is the provision of means for effectively rendering both the inside door handle mechanism and the outside door unlatching mechanism incapable of operation to open the door. This is principally for the purpose of preventing children on the inside of the car from opening the door accidentally, or when they should not do so. At the same time, if it should be desirable, the outside door latching mechanism can be locked from the outside without locking the inside handle mechanism, so as to prevent anyone from being locked on the inside of the car, or to prevent the possibility of keys being locked in the car.

It is therefore an important object of this invention to provide a door locking structure for automobiles and the like, in which are incorporated certain novel safety features, including a construction preventing the locking of the door, either by the key operated outside locking mechanism or by the inside door handle locking mechanism, while the door is in its open position, thereby safe-guarding the door locking mechanism against injury in case the door should be slammed shut with the locking mechanism in its locked position.

It is a further important object of this invention to provide a door locking mechanism for automobiles and the like, in which there is provided means on the inside that cannot easily be operated by children and that serves the purpose of locking together the inside handle mechanism and the outside latching mechanism, thereby further insuring against an unwitting or accidental opening of the door from the inside.

Other and further important objects of this invention will be apparent from the disclosures in the specification and the accompanying drawings.

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On the drawings:

For a better understanding of the drawings, which will be presently described, it may be pointed out that the locking structure is assembled on a base plate formed to provide two plate portions approximately at right angles to each other. The plate portion which is to be mounted on the opening edge of the door and which carries the rotor assembly for contacting the striker plate on the door post will hereinafter be called the rotor plate. The other plate portion, which fits into position parallel to the inside wall of the door and on which is mounted the roll back means, will hereinafter be called the roll-back plate.

Fig. 1 is a broken top plan view of a locking structure embodying the principles of my invention, showing the locking structure mounted in place relative to the door frame and the outside push-button opening mechanism.

Fig. 2 is a sectional view taken substantially along the broken line II—II of Fig. 1 showing the locking mechanism mounted on the roll-back plate with the lock in the latched but unlocked position and also showing, with parts broken away, the door operating mechanisms actuated, respectively, by the inside door handle and by a button-operated lever.

Fig. 3 is a sectional view, similar to Fig. 2, showing the locking mechanism mounted on the roll-back plate, but with the lock in the unlatched, unlocked position.

Fig. 4 is a sectional view, similar to Figs. 2 and 3, but showing the locking mechanism in the latched and locked position and also showing in dotted lines the provision made in the door moulding for holding the mechanism in locked position.

Fig. 5 is a sectional view, taken substantially along line V—V of Fig. 1, of the locking mechanism mounted on the rotor plate, showing in full lines the rotor lever out of engagement with the cam surface as is the case when the door is open, and showing in dot-dash lines the position of the rotor lever on the cam surface when the door is closed.

Fig. 6 is a fragmentary sectional view taken substantially along line VI—VI of Fig. 4 in association with an elevational view of the striker plate or keeper structure mounted on the door post, illustrating the position of the rotor and safety-catch arm as the door approaches a closed position.

Fig. 7 is a fragmentary sectional view with the keeper structure in elevation, similar to Fig. 6 but showing the relative positioning of the parts just prior to the door becoming latched yet in safety-catch position.

Fig. 8 is a fragmentary, sectional view with the keeper structure in elevation, similar to Figs. 6 and 7 but with the parts in their relative positions after the door has been fully latched.

Fig. 9 is a fragmentary sectional view taken on line IX—IX of Fig. 2.

Fig. 10 is a fragmentary sectional view taken on line X—X of Fig. 1.

Fig. 11 is a plan view of a modified form of locking structure embodying the principles of my invention, showing the locking structure mounted in place relative to the door frame and the outside push-button mechanism.

Fig. 12 is a sectional view taken substantially on line XII—XII of Fig. 11 showing the locking mechanism mounted on the roll-back plate with the lock in the latched but unlocked position and also showing, with parts broken away, the door operating mechanisms actuated, respectively, by the inside door handle and by a button-operated lever.

Fig. 13 is a sectional view, taken substantially along line XIII—XIII of Fig. 11 showing the locking mechanism mounted on the roll-back plate with the lock in the unlatched, unlocked position.

Fig. 14 is a sectional view similar to Fig. 12 but showing the lock in the latched and locked position.

Fig. 15 is a fragmentary sectional view taken on line XV—XV of Fig. 12.

With reference to Figures 1–8, inclusive, the locking mechanism of my invention here shown is one adapted to be used on either the front or rear doors of automobiles. My invention is not limited, however, to automobile door locking mechanisms but includes locking mechanisms for other types of doors, such as refrigerator doors. The main locking structure is assembled on a base plate formed to provide two plate portions disposed at approximately right angles to each other. Although these plate portions are ordinarily formed from a single base plate by bending the plate, they will be herein referred to as though they were separate plates, one being identified as the rotor plate and the other as the roll-back plate. As shown in Figures 2, 3 and 4, the roll-back plate is indicated by the reference numeral **10** and comprises a rectangular plate that may suitably be formed from a light-gauge metal sheet. The rotor plate, later to be described, is indicated by the reference numeral **50**.

A lever **11** is mounted for pivotal movement upon plate **10** about a pin **12**. Said lever **11** is provided with an arcuate-shaped opening **13**. At the lower extremity of said lever **11** is an outturned edge **14**. A rod **15** is connected to the upper corner of lever **11**. For this purpose said rod is provided with a lower offset end **15***a* (Fig. 1) which extends outwardly at right angles through an opening in said lever **11** and is retained therein by the button head **17** formed on said end. Said rod **15** extends upwardly through the window moulding of the door and carries at its upper end a push button **18** to facilitate manual manipulation of the rod in the locking and unlocking operations, details of which will be apparent as the description proceeds. When rod **15** is pushed down it tends to rotate the lever **11** clockwise about the pin **12**. A projecting edge **19** on one side of the lever **11** is directly in the path of the outturned flange **20** on a strap **21**. Said strap **21** is connected to the inside door handle means, indicated generally by the numeral **110** and to be described later on. As the outturned flange **20** moves to the left it contacts the edge **10** and thereby tends to rotate the lever **11** in a clockwise direction about the pin **12**. When the lever **11** is rotated in a clockwise direction, either by means of the rod **15** acting through its offset end **15***a* or by means of strap **21** acting through upturned edge **20**, the locking mechanism is brought into locked position as illustrated in Fig. 4.

A roll-back lever **22** is mounted on top of the lever **11** for pivotal movement about the pin **12**. A square-headed pin **23** is rigidly fastened in the lower part of the roll back lever **22**. Said pin **23** extends through the arcuate opening **13** in the lever **11** and through a slot **24** in the strap **21**, being retained therein by the head **23***a* of said pin **23** (Fig. 10).

When the strap **21** is moved to the right, as shown in Fig. 2, the end **24***a* of the slot **24** bears against the pin **23**, causing it to rotate the roll-back lever **22** in a counterclockwise direction. As shown in Fig. 2, an arm **25** of the roll-back lever **22** extends into an opening **27** of a push-button lever **28** which is mounted on the rotor plate and which will be described later. When the roll-back lever **22** is revolved counterclockwise, either by means of the strap **21** acting through the pin **23** or by means of the push-button lever **28** acting through its arm **29**, the locking mechanism is brought into its unlatched, unlocked position, as illustrated in Fig. 3.

A dogging lever **30** is mounted upon said roll-back plate **10**. Said dogging lever **30** has an upwardly projecting tongue **31** for cooperation with the downwardly projecting tongue **26** formed on roll-back lever **22**. Said dogging lever **30** also has a latching arm **32** which extends through a slot in the rotor plate **50** and acts as a safety-catch arm, as well as acting as a means for rotating the dogging lever **30**. A spring **33**, anchored at **34** on the roll-back plate **10**, has a free end **35** biased against the under side **36** of the dogging lever **30** to resist any clockwise rotation of said dogging lever **30**. As shown in Fig. 9, said dogging lever **30** has a cylindrical boss **37** which extends rearwardly through an opening in the roll-back plate **10** thus forming a pivoting means for said dogging lever **30**.

A locking lever **40** is mounted on top of dogging lever **30**. Said locking lever **40** is provided with a square aperture for receiving a square spindle **41** which constitutes the shank of the outside key-operated lock. A suitable type of key-operated lock is illustrated in my Patent No. 2,246,781. The construction of said locking lever **40** is such that it is rotated by the key-operated spindle independently of the dogging lever **30**. As shown in Fig. 9, said locking lever **40** has a rearwardly extending cylindrical boss **42** which fits into a cylindrical opening in the dogging lever **30** thus providing a pivoting means for the locking lever **40**.

Said locking lever **40** has two arms **43** and **44** which provide therebetween a pocket **45** for reception of the bent-up flange or edge **14** of the lever **11**. The locking lever **40** is rotated counterclockwise by said edge **14** as the latter is rotated in a clockwise direction. Also, if the locking lever **40** is in locked position as shown in Fig. 4 it can be rotated clockwise out of locked position by the

action of the edge 14 on the arm 44 as said edge 14 is rotated counterclockwise. A spring 47, anchored at one end, as at 48, between the roll-back plate 10 and the cover-plate 49, bears at its free end 47a against the lower edge of locking lever 40. Said locking lever 40 is provided with a pair of spaced notches 51 and 52, into one of which the free spring end 47a is adapted to be selectively positioned on rotation of the locking lever 40. Both the dogging lever 30 and the locking lever 40 are held in place on the roll-back plate by means of the cover plate 49.

Referring to Figures 2 to 8, a rectangular housing 55 is mounted on the outside of the rotor plate 50. Mounted in said housing 55 is a rotor 56 which rotates upon a pin 57 the ends of which are anchored, respectively, in the outer wall of the housing and in the rotor plate 50. Said rotor 56 has a locking arm 61 and a setting arm 60, best shown in Figs. 6 to 8. A stud 62, anchored at one end in the locking arm 61, projects through an arcuate slot 70 in the rotor plate 50.

Immediately adjacent the inside wall of the rotor plate 50, a rotor locking lever 80 is fulcrumed on the stud 62 (Fig. 5). A coiled spring 63 surrounds and is anchored at one end, as at 63a, to the stud 62, with its free end 63b held against an inwardly projecting arm 81 of the rotor locking lever 80. The action of said spring 63 tends to revolve said locking lever 80 in a counterclockwise direction about the stud 62. The inner end of the rotor fulcrum pin 57 acts as a stop tending to limit the rotating effect of spring 63, and when the stud 62 is at the lower end of the slot 70, as shown in Fig. 5, the rotor locking lever 80 is in contact with the pin 57 and the spring 63 is prevented from rotating the rotor lever further in a counterclockwise direction about stud 62.

A stud 82 extends inwardly from the rotor plate 50 adjacent the outer edge thereof to form a fulcrum support for the outer end of a holding and take-up lever 85. The upper edge of said lever 85 is provided with a notched or serrated surface, as at 85a. The rotor lever 80 has at its upper end an inwardly projecting tongue 86 having a curved edge 86a adapted to engage the upper edge 85a of the take-up lever 85. Said lever 85 has an arm 87 that is downwardly offset from the upper edge 85a and that extends through a slot 87a in the roll-back plate 10. When the dogging lever 30 is in its dogging position, the end of the arm 87 rests thereon, as illustrated in Fig. 2, to prevent downward movement of said arm 87, whereas when the dogging lever 30 is out of its dogging position, as illustrated in Fig. 3, the arm 87 is free to drop and thereby effect a disengagement between the tongue 86 and the upper edge 85a of take-up lever 85, whereupon the rotor lever 80 is free to move out of engagement with said take-up lever 85.

The push-button lever 28 is mounted on top of the take-up lever 85 (Fig. 5) for pivotal movement about the pin 82. A spring 88 is anchored at 88a to a strap 89. Said strap 89 is wrapped around the outer edge of the rotor plate 50 and is fastened at one end, as by welding in an offset pocket 96 of said rotor plate 50, as at 97 (Fig. 1). The other end of said strap 89 is positioned under the head of the pin 82. Said pin 82 is also anchored in the offset pocket 96. One end of the spring 88 abuts against the bent-up edge 28a (Fig. 5) of the push-button lever 28 and tends to rotate the lever 28 in a counterclockwise direction. As may be seen in Fig. 1 this action of the spring 88 will tend to keep the offset end 28b of the lever 28 in contact with a push button 100 and will also return said push button 100 to its normal position after it has been depressed. When the push button lever 28 is rotated clockwise, its arm 29 will contact arm 25 of the roll-back lever 22, causing said lever 22 to be rotated in a counterclockwise direction.

A handle assembly 101 includes a door handle 104 which a person may grip while pressing the push-button 100. Said assembly 101 is fastened to the main door structure 105 by means of screws 102.

The operation of the locking mechanism will now be described.

Latching of the door is accomplished in the following manner. Let us assume that the door is open. The relative positions of the elements of the locking mechanism will then be as illustrated in Fig. 2. The dogging lever 30 assumes the position there shown due to the counterclockwise torque imposed upon it by the spring 33. On closing the door, the arm 32 of the dogging lever 30 is brought into contact with the keeper structure mounted on the door post.

As illustrated in Figs. 6 to 8 inclusive, the keeper structure K is of U-shape and provides a channel 111, the middle portion of the upper wall of which is deflected downwardly to provide a V-shaped camming projection 112 in the channel. The lower wall of the channel is deflected upwardly to provide a camming projection 113 having a gradually inclined guide surface 114 along its outer end and provided with a shoulder 115 along its inner end in advance of a recess 116.

When the door is swung from open position for closing thereof, the projecting safety-catch arm 32 on the dogging lever 30 will encounter the inclined surface 114, thereby causing the dogging lever 30 to be rocked in a clockwise direction against the resistance of the spring 33. As closing of the door continues, the arm 32 rides up along the guide surface 114 and along the intermediate horizontal portion of the camming surface 113 until it reaches the shoulder 115, whereupon the safety-catch arm 32 is free to drop and under the positive action of spring 33 is caused to drop down into the recess 116 (Fig. 7).

The door is now in its closed, latched but unlocked position with the relative positions of the elements of the locking mechanism as shown in Fig. 2. From the instant that the safety catch arm 32 drops down in back of shoulder 115, the door will be safety-latched and cannot be opened from this position until the safety-catch arm 32 is swung out of the recess 116 by means of the release action of either the inside door handle or of the outside push-button.

After the safety-catch arm has dropped into recess 116 and the movement of the door is continued toward full latched position, the setting arm 60 of the rotor 56 comes into engagement with the inclined outer face of the projection 112 in the keeper channel, as shown in Fig. 7. Further closing movement of the door causes the rotor 56 to be rocked upon its fulcrum pin 57, thereby rotating the locking arm 61 in a counterclockwise direction. Due to the fact that spring 63 tends to rotate the lever 80 in a counterclockwise direction and thereby to keep the lower edge 80a against the stud 57, said rotor locking lever 80 will also revolve as a unit in a counterclockwise direction about stud 57 when the rotor arm 61 is so revolved. However, when tongue 86 of the rotor locking lever 80 hits the side of the take-up lever 85 at 85b (Fig. 5), it will be forced upwardly in substantially a vertical direction

upon continued rotation of the rotor arm 61. Thus, the lower edge 80a of the rotor locking lever 80 is pulled away from the stud 57 against the action of the spring 63. When, in its upward movement, the curved surface 86a reaches the top of the cam surface 85a, the action of the spring 63 will move the tongue 86 to the left along said cam surface 85a. The cam surface 85a is designed with an arc such that the further the tongue 86 moves to the left along the cam surface the closer the spring 63 will come to restoring the lower edge 80a of rotor locking lever 80 on the stud 57. However, in the total travel across said cam surface the edge 80a will not quite come to rest on the stud 57 and therefore there is, for any position of the tongue 86 on the cam surface, a force due to the spring 63 tending to press said tongue 86 against said cam surface 85a.

At the same time as the tongue 86 is starting to move to the left across the cam surface 85a, the end of the rotor locking arm 61 moves into engagement with the rear inclined surface 118 of the projection 112 on the keeper K until it reaches the position illustrated in Fig. 8. In this position the door is latched and cannot be opened until the rotor 56 is free to revolve about its fulcrum pin 57 in a clockwise direction. In the latched position, the rotor 56 cannot revolve in a clockwise direction because the tongue 86, which is an integral part of rotor locking lever 80, is now up on the cam surface 85a of the take-up lever 85. Said take-up lever, in turn, cannot move in a clockwise direction, or downwardly, because its projecting arm 87 is prevented from moving in a vertical direction by the dogging lever 30, the under surface of the arm 87 then resting upon the upper edge 30a of said dogging lever as shown in Fig. 2.

With the locking mechanism in the position illustrated in Fig. 2 and the rotor lever 56 in the position illustrated in Fig. 8, the total effect of the action of the inclined surface 118 of the keeper against the locking arm 61 is to press the tongue 86 more firmly down upon the camming surface 85a of the take-up lever 85 whenever a force is exerted against the door tending to open it, provided there is no concurrent use of the door handle release means. Such a force, for instance, would be exerted against the door if a person or object were accidentally to lean or be thrown against the inside of the door. At any position that the tongue 86 may assume along the camming surface 85a of the take-up lever 85, it will be held tightly in place by the action of the inclined surface 118 of the keeper against the locking arm 61. Thus, while the tongue 86 will move across the camming surface only as far as is dictated by the amount of force used in closing the door jamb, said tongue 86 will nevertheless be held in tight engagement with the camming surface 85a for any position therealong that the tongue 86 may assume. The provision of a serrated, notched or wavy cam surface 85a on the take-up lever 85 nullifies the effect of vibration on the holding qualities of tongue 86, so that no amount of vibration by itself can loosen the engagement of the tongue 86 with the cam surface 85a although such vibration may produce a tightening effect due to the continued biasing action of the spring 63 tending to move the tongue 86 into tighter and tighter engagement with the camming surface 85a.

The pressure which the tongue 86 of locking lever 80 exerts on the camming surface 85a acts through a moment arm about the center of the stud 82 and thus causes the take-up lever 85 to exert a pressure on the dogging lever 30. The tighter the door is closed, the shorter will be this moment arm since the tongue 86 will move further up along the camming surface 85a. However, at the same time the moment arm is being shortened, the pressure of the tongue 86 on the camming surface 85a is being increased due to the tighter closing of the door, and as a result the pressure of arm 87 of lever 85 on the dogging lever 30 will remain substantially constant. Therefore the force required for releasing the dogging lever 30 from under the arm 87 will remain nearly constant for all closed positions of the door.

The unlatching and opening of the door will now be described. From the preceding discussion it is evident that the one way in which the door may be unlatched is to move the dogging lever 30 from under the arm 87 of the take-up lever 85. This will allow the take-up lever 85 to swing downwardly about the stud 82, permitting the tongue 86 to slide back along the cam surface 85a whenever the surface 118 of the keeper exerts a force on the rotor locking arm 61 that tends to rotate said rotor locking arm in a clockwise direction. The dogging lever 30 may be withdrawn from under the arm 87 by either one of two methods.

In accordance with one of these methods, the dogging lever 30 may be rotated from under the arm 87 by the outside push button 100 (Fig. 1) acting through the push-button lever 28 and the roll-back lever 22. When the push button 100 is pressed in, it pushes in the offset end 28b of the push-button lever 28, causing said lever 28 to be rotated in a clockwise direction about its fulcrum pin 82. The arm 29 of the push-button lever 28 thereupon bears down upon the arm 25 of the roll-back lever 22 to force it downwardly, thus causing said roll-back lever 22 to be rotated in a counterclockwise direction about pin 12. The abutting arm 26 of the roll-back lever 22 is thus urged against arm 31 of the dogging lever 30, causing it to rotate said dogging lever 30 in a clockwise direction about its cylindrical boss 37 (Fig. 9). As a result, edge 30a of said dogging lever 30 is withdrawn from under the arm 87 of the take-up lever 85, and at the same time the safety-catch arm 32 is raised above the level of the shoulder 115 of the keeper K. When the locking mechanism is in this position (Fig. 3), the door can be opened by an outward pull of the handle 104, outward movement of the door causing the surface 118 of the keeper to rotate the locking arm 61 in a clockwise direction to permit the door to open.

A second method of unlatching the door is by means of the inside door handle mechanism. As illustrated in Fig. 2, the inside door handle mechanism 110 includes an inside door handle 120, extending from a shaft 121. A downwardly extending lever arm 122 is mounted upon said shaft 121 and at its lower end is pivotally connected, as at 123, to the free end of the strap 21. A spring 124 tends to maintain the shaft 121 and the inside door handle 120 in the position indicated in Fig. 2.

When said door handle 120 is rotated by hand pressure in a counterclockwise direction about the shaft 121, the strap 21 will be moved to the right. When the edge 24a of the strap 21 contacts the pin 23 it will pull said pin 23 in a counterclockwise direction about the pin 12 and, since pin 23 is rigidly fastened to the roll-back lever

22, said roll-back lever 22 will be rotated in a counterclockwise direction about the pin 12. The abutting arm 26 of said roll-back lever 22 will contact the arm 31 of the dogging lever 30 and cause said dogging lever to be rotated clockwise about its cylindrical boss 37 (Fig. 9). Thus the edge 30a will be withdrawn from under the arm 87 of the take-up lever 85. When this occurs, the door is free to be pushed open from the inside.

It should be noted that if the door had been partially closed with the safety-catch arm 32 lying in the recess 116 of the keeper K, either of the above-mentioned releasing methods will result in the withdrawal of the arm 32 from said recess 116, since the arm 32 is an integral part of the dogging lever 30 and rotates when said dogging lever rotates. The unlatched position is shown in Fig. 3.

The operation of the locking means will now be described. Referring to Fig. 4, the door may be locked by any of three methods. From the outside, locking may be accomplished by revolving the square spindle 41 by means of a key. When the spindle 41 is rotated in a counterclockwise direction, the locking lever 40 will also be rotated in a counterclockwise direction about its cylindrical boss 42 (Fig. 9) and arm 43 of said locking lever 40 will be rotated into a position directly under arm 29a of the push button lever 28, thus limiting the downward movement of said arm 29a. Since the outside push-button 100 acts through the push-button lever 28 to effect the unlatching of the door, this means of unlatching the door is rendered inoperative when said push-button lever 28 is prevented from moving downward. Thus the door may be locked against entry from the outside. It should be noted, however, that restricting the downward movement of push-button lever 28 does not effect the operation of the roll-back lever 22 or dogging lever 30 and therefore the door may still be unlatched from the inside by means of the inside door handle 120 acting through said roll-back lever 22 to rotate dogging lever 30.

A second method of locking the door is by means of the inside door handle 120. By lifting up the end of said handle 120 to turn it about its fulcrum 121, the arm 122 is rotated clockwise and the strap 21 is pushed to the left thru the action of the pin 123. The upturned edge 29 of said strap 21 contacts the lever 11 along the edge 19 and causes said lever 11 to be rotated clockwise about the pin 12. The upturned edge 14 of said lever 11 contacts the arm 43 of the locking lever 40 and thus rotates said locking lever 40 into the locked position (Fig. 4). In this manner the door can be locked from the inside against entry from the outside.

A third method of locking the door is by means of the push-rod 15 which extends up through the window moulding of the door. In Fig. 2 the unlocked position of said push rod 15 is shown. In Fig. 4 the push rod 15 has been pressed down causing the lever 11 to be rotated clockwise about the pin 12. The upturned edge 14 of said lever 11 has contacted arm 43 of the locking lever 40 and rotated it counterclockwise into the locked position under arm 29a of the push-button lever 28. This is another method of locking the door from the inside against entry from the outside.

As has been explained, the door may be locked from the outside by means of a key or from the inside by means of the push rod 15 or the inside door handle 120. Locking the door by any of these methods will prevent unlatching of the door from the outside. However, in all cases the door may still be unlatched from the inside by means of the inside door handle 120. For normal operation this arrangement affords maximum convenience and utility. However, in case small children are riding in the car it is desirable that they cannot open the door accidentally while playing with the inside door handle. To meet this situation I have provided a slot 130a (Fig. 4) in the window moulding 130 of the door. When the push rod 15 is depressed straight down the door is locked as previously explained. If said push rod 15 is now pushed to the right so that it pivots about pin 17 the upper edge 16a of collar 16 takes up a position under the edge of the window moulding 130, as illustrated in dotted lines in Fig. 4, and thus is restrained from upward movement. With the push-rod 15 in this position it is impossible to rotate the lever 11 in a counterclockwise direction by any means. Since an edge 11a of lever 11 is then abutting the arm 31 of the dogging lever 30, said dogging lever 30 is prevented from clockwise movement. Thus the arm 26 of the roll-back lever 22 is not able to rotate the dogging lever 30 and therefore the inside door handle means of opening the door is rendered inoperative.

When the locking mechanism is in its locked position with the collar 16 of the push rod 15 in place under the moulding of the door, all movable parts mounted on the roll-back plate 10 are locked in position as shown in Fig. 4. If the door should be open when the collar 16 is put in place under said moulding 130, upon closing the door there is the possibility that the locking mechanism will get jammed or that some parts will be broken due to the fact that the safety-catch arm 32 of dogging-lever 30 will be urged up the sloping surface 114 of keeper K. Since said dogging lever 30 is prevented from rotating by the shoulder 11a of lever 11, the safety-catch arm 32 will not be able to rotate clockwise as it normally does upon the door being closed. To avoid this stress on the working parts, I have designed the mechanism so that it cannot be put into locked position while the door is open.

As shown in Fig. 5, when the rotor locking lever 80 is in the unlatched position, the spring 63 is in a position near the roll-back plate 10. When the rotor locking lever 80 is in the latched position as shown in dotted lines, the spring 63 has been rotated away from the roll-back plate 10, leaving an opening into which the arm 46 of the locking lever 40 will move when said locking lever 40 is rotated counterclockwise toward the locked position (Fig. 4). When the door is open, the rotor locking lever 80 is in the unlatched position. If an attempt is made to rotate the locking lever 40 into locked position said arm 46 will strike the spring 63 and thus be prevented from reaching the locked position. Thus the possibility of damaging the locking mechanism by slamming the door after it has been locked is eliminated.

From the foregoing description, it will be evident that, since the door cannot be put into locked position while it is open and since it can be locked from the outside only by means of a key, no one can lock himself out of the car by slamming the door while the keys are on the inside.

Figures 11, 12, 13 and 14 illustrate a modified form of my invention of a locking structure as applied to an automobile door. In this modification the principle of operation is substantially

the same as already described in connection with Figures 1 to 10 inclusive.

As shown in Fig. 12 the numeral 210 designates a roll-back plate on which is mounted a roll-back lever 222 for pivotal movement about a pin 212. On the upper portion of said roll-back lever 222 is an upturned edge 227 and on the left side of said roll-back lever 222 is another upturned edge 225. The roll-back lever 222 also has a downwardly projecting arm 226.

A lever 211 is mounted on top of the roll-back lever 222 and also pivots about the pin 212. An arcuate opening 213 is provided in said lever 211 (Fig. 12) which serves as a guide for the travel of a pin 217 projecting inwardly from a rod 215. Said rod 215 extends upwardly through the window moulding of the door and carries at its upper end a push-button 218 to facilitate manual manipulation of the rod in the locking or unlocking operation, details of which will be explained later. A shoulder 220 of the lever 211 is so situated that it will contact the upturned edge 227 of the roll-back lever 222 when said lever 211 is rotated in a counterclockwise direction. A bent-up edge 214 is provided at the lower extremity of lever 211. A pin 223 is rigidly secured to the lever 211 and projects inwardly into a slot 224 provided in a strap 221. Said strap 221 is connected to the inside handle mechanism, identical with the handle mechanism 110 previously described in connection with Fig. 2.

A dogging lever 230 is mounted on the roll-back plate 210. As shown in Fig. 15, said dogging lever 230 has a cylindrical boss 237 which extends rearwardly through an opening in the roll-back plate 210 thus forming a pivoting means for said dogging lever 230. Said dogging lever 230 has an upwardly projecting tongue 231 for cooperation with the downwardly projecting tongue 226 formed on the roll-back lever 222. A latching arm 232 is also provided which extends through the rotor plate 250 and acts as a safety catch arm, as well as acting as a means for rotating the dogging lever 230. A spring 233, anchored at 234 on the roll-back plate 210, has a free end 235 biased against the under side 236 of the dogging lever 230 to resist any clockwise rotation of said dogging lever 230.

A locking lever 240 is mounted on top of the dogging lever 230. Said locking lever 240 is provided with a square aperture for receiving a square spindle 241 which constitutes the shank of the outside key-operated lock. As shown in Fig. 15, said locking lever 240 has a rearwardly extending cylindrical boss 242 which fits into a cylindrical opening in the dogging lever 230, thus providing a pivoting means for said locking lever 240.

Said locking lever 240 has two arms 243 and 244 which provide therebetween a pocket 245 for reception of and engagement by the bent-up flange or edge 214 of lever 211. The locking lever 240 may be rotated counterclockwise by the contact of said edge 214 against the arm 243 as said lever 211 is rotated clockwise. Said locking lever 240 may be rotated clockwise by the contact of said edge 214 against the arm 244 of said lever 240 when the lever 211 is rotated in a counterclockwise direction. A spring 247, anchored at one end, as at 248, between the roll-back plate 210 and the cover-plate 249, bears at its free end 247a against the lower edge of the locking lever 240. Said locking lever 240 is provided with a pair of spaced notches 251 and 252, into one of which the free spring end 247a is adapted to be selectively positioned on rotation of locking lever 240. Both the dogging lever 230 and the locking lever 240 are held in place on the roll-back plate by means of the cover-plate 249.

The positioning of the parts of the locking mechanism upon the rotor plate 250 is quite similar to that already described in connection with Fig. 5. On the outer side of said rotor plate 250 is secured a rectangular housing 255 for the rotor 256. Said rotor 256 is identical in form and construction with the rotor 56 previously described. The rotor 256 is mounted for rocking movement upon a pin 257 and is provided with a locking arm 261 and a setting arm 260. A stud 262 extending from the end of the arm 261 projects through an arcuate slot 270 in the rotor plate 250. A rotor locking lever 280 is fulcrumed upon the stud 262. A coiled spring 263 surrounds the stud 262 and is anchored at one end thereto, the free end being held against an abutment arm 281 of the rotor locking lever 280.

The fulcrum pin 257 provides a stop for the counterclockwise rotation of the rotor locking lever 280 when the stud 262 is at the lower end of the slot 270. As the rotor locking lever 280 is carried upwardly by the counterclockwise movement of arm 261 of the rotor 256 acting through the stud 262, the edge 280a of said rotor locking lever 280 is forced away from the pin 257. When the tongue 286 of rotor locking lever 280 is raised to the edge of the cam surface 285a, the action of the spring 263 tending to rotate said rotor locking lever 280 about stud 262 will move the tongue 286 to the left along the cam surface 285a of the take-up lever 285. Said take-up lever 285 is mounted on the rotor-plate 250 for pivotal movement about the pin 282. The other end of said take-up lever 285 is provided with an arm 287 that extends through a slot 287a in the roll-back plate 210. Said arm 287 is prevented from dropping down when it rests on the upper edge 230a of the dogging lever 230, as illustrated in Fig. 12.

A push-button lever 228 is mounted on top of the lever 285 for pivotal movement about the pin 282. A spring 288 is anchored at 288a to a strap 289. Said strap 289 is wrapped around the outer edge of the rotor plate 250 and is secured at one end, as by welding in an offset pocket 296 of said rotor plate 250, as at 297 (Fig. 11). The other end of the strap 289 is positioned under the head of the pin 282. Said pin 282 is also anchored in the offset pocket 296. One end of said spring 288 abuts against the upturned edge 228a of push-button lever 228 and tends to keep the bent-over edge 228b in contact with the push-button 200 (Fig. 11). This spring action will also return said push-button 200 to its normal position after it has been pressed inwardly to unlatch the door. When the push-button lever 228 is rotated in a clockwise direction, the upturned edge 229 (Fig. 12) will contact the edge 225 of roll-back lever 222, causing said lever 222 to be rotated in a counterclockwise direction.

As shown in Fig. 11, the push-button lever 228 has an offset end 228b in contact with the outside push-button 200. Due to this contact the push-button lever 228 is rotated clockwise when the push-button 200 is pressed inwardly. The hand assembly 201 associated with said push button 200 is identical with that described in connection with Fig. 1.

In the case of the modification of my locking mechanism illustrated in Figures 11 to 15, in-

clusive, latching of the door is accomplished in the following manner. Let us assume that the door is open. The locking mechanism will then normally be in the position illustrated in Figures 12 and 13. Upon closing the door, the safety catch arm 232 of the dogging lever 230 comes into contact with the keeper structure, such as the keeper structure K (Figures 6, 7 and 8) already described. When the door is swung from open position to closed position, the projecting safety-catch arm 232 encounters the inclined surface 114 of the keeper structure, causing the dogging lever 230 to be rocked in a clockwise direction against the resistance of the spring 233. The safety-catch arm 232 rides along the surface 114, on to the horizontal portion of projection 113 until the shoulder 115 is reached, whereupon the arm 232 under the action of spring 233 is caused to drop down into the recess 116. The dogging lever 230 is thereby allowed to swing back into its normal position and if the movement of the door toward closing is stopped at this point, the door will then be safety-latched and cannot be opened until the safety-catch arm 232 is swung out of the recess 116 by means of the release action of the inside door handle (not shown) or the outside push-button 200 acting thru levers 228 and 222.

During the closing of the door, the setting arm 260 of the rotor 256 comes into engagement with the inclined outer face 117 of the projection 112 in the keeper channel. As the rotor 256 is rocked on its fulcrum pin 257, the locking arm 261 of the rotor 256 swings upwardly, causing the rotor locking lever 280 to move bodily along the slot 270. Such movement brings the locking lever tongue 285 above the camming surface 285*a* of the take-up lever 285, whereupon the spring 283 urges said tongue 286 along said camming surface for engagement therewith. At the same time, the end of the locking arm 261 moves into engagement with the rear inclined surface 118 of the projection 112 in the keeper channel as the door reaches its closed position. In this position the door is latched but not locked, the locking machanism being in the position shown in Fig. 12.

The door can be unlatched by pushing in the outside push button 200, thereby rotating in a clockwise direction the push-button lever 228 which in turn, by the action of the edge 229 of said push-button lever on the upturned edge 225 of the roll-back lever 222, rotates said roll-back lever in a counterclockwise direction. Arm 226 of said roll-back lever 222 contacts the upwardly projecting arm 231 of the dogging lever 230 and thereby causes said dogging lever 230 to be rotated clockwise out from underneath the arm 287 of the take-up lever 285. As soon as said dogging lever 230 has been rotated out of supporting position with respect to the arm 287, said arm is free to drop and release the tongue 286 from engagement with the camming surface 285*a*, thereby also permitting the rotor 256 to rock about its fulcrum whenever an outward pressure is put on the door to open it.

The door may be unlatched also by means of the inside door handle mechanism (not shown) acting thru strap 221 (Fig. 12). As said strap 221 is moved to the right the inner edge 221*a* of the slot 224 contacts the pin 223 of the lever 211. Further movement of said strap 221 to the right causes said lever 211 to be rotated counterclockwise about the pin 212. The shoulder 220 thereupon contacts the upturned edge 227 of the roll-back lever 222, causing said roll-back lever to be rotated counterclockwise. Arm 226 of said lever 222 will contact arm 231 of dogging lever 230 and thus rotate said lever 230 from underneath the arm 287 of the take-up lever 285. This will permit said arm 287 to drop down in the slot 287*a*, whereupon the tongue 286 is released from binding engagement with the cam surface 285*a*. With this pressure released the rotor 256 will be readily rocked about its fulcrum 257 when an outward pressure is put on the door tending to open it—and the door will open.

If the door should be partly closed with the safety-catch arm 232 in the recess 116 of the keeper structure, either of the above mentioned releasing methods will withdraw the safety-catch arm 232 from said recess, since the arm 232 is part of the dogging lever 230 and will rotate with it.

The locking mechanism may be put into locked position by either of three methods. From the outside, locking may be accomplished by revolving the square spindle 241 by means of a key. When the spindle 241 is rotated in a counterclockwise direction the locking lever 240 is also rotated in a counterclockwise direction about its cylindrical boss 242 (Fig. 15) and arm 243 of said locking lever 240 is rotated into a position directly under the upturned edge 225 of the roll-back lever 222, thus preventing the downward movement of said edge 225. Since all unlatching operations depend upon the downward movement of the edge 225 of the roll-back lever 222 as said roll-back lever is rotated in a clockwise direction, the positioning of arm 243 under said edge 225 effecitvely locks the mechanism. The locking lever 240 is held in this position by the action of spring 247, the end 247*a* of which has now been positioned in the detent 251 of said locking lever 240. The locked position is illustrated in Fig. 14.

The door may be locked from the inside by means of the inside door handle mechanism acting thru the strap 221. When said strap 221 is moved to the left by the action of the inside door handle the edge 221*b* of the slot 224 will come into contact with the pin 223 of the lever 211. Further movement to the left causes said lever 211 to be rotated clockwise about the pin 212. The upturned edge 214 of said lever 211 will contact arm 243 of the locking lever 240 and cause it to be rotated into the locked position under the edge 225 of roll-back lever 222 as shown in Fig. 14. Thus the door may be locked from the inside against entry from the outside.

The third method of locking the door is by use of the push-rod 215 which extends up through the window moulding of the door. When the push-rod 215 is pushed down, pin 217 will contact the lower edge of slot 213 in the lever 211. Further downward movement will cause said lever 211 to be rotated clockwise and the upturned edge 214 will force the arm 243 of the locking lever 240 into locked position under the edge 225 of lever 222.

It is to be noted that while locking the door from the outside with a key will prevent opening the door by means of the outside push-button mechanism, it will not prevent opening by use of the inside door handle. When the lever 211 is rotated in a counterclockwise direction by the action of the strap 221 acting through the pin 223, the upturned edge 214 of said lever 211 will contact arm 244 of the locking lever 240 and will rotate it out of locked posiiton. This occurs

before the shoulder 220 of said lever 211 has made contact with the upturned edge 227 of the roll-back lever 222 preparatory to rotating said lever in a counterclockwise direction and thereby unlatching the door. Thus, one continuous movement of strap 221 to the left will cause first the unlocking of the lock and then its unlatching.

Also, if the locking lever 240 should be put into locked position while the door is open, it will be moved to its unlocked position when the door is closed due to the safety-catch arm 232 riding up the inclined surface 114 of the keeper and causing the dogging lever 230 to be rotated clockwise. Arm 231 of said dogging lever will contact the edge 211a of lever 211 and cause the latter to be rotated counterclockwise. The upturned edge 214 will contact arm 244 of the locking lever 240 and rotate said lever out of locked position.

Consequently, since the only method of locking the door from the outside is by means of the key, one cannot lock himself out of the car by slamming the door when the keys are on the inside.

The rotary bolt, the pawl arm pivotally mounted on the bolt, and the pivoted ratchet lever whose movable end is supported on the safety latch, are features shown in my prior filled application Serial No. 632,302, filed December 3, 1945, and which features are claimed in said prior application.

It will, of course, be understood that various details of construction may be varied through a wide range without departing from the principles of this invention and it is, therefore, not the purpose to limit the patent granted hereon otherwise than necessitated by the scope of the appended claims.

I claim as my invention:

1. A door locking mechanism comprising a casing having a roll-back plate extending parallel to the plane of the door and a rotor plate extending along the edge of the door, a latch bolt pivoted on said rotor plate, a dogging lever therefor pivoted on said rollback plate for rocking movement in the plane of the door and having a safety-catch arm extending therefrom through said rotor plate, for cooperation with a keeper and holding the door latched when closed, means for releasing said latch bolt and safety catch arm including a push-button slidably mounted on the outside of the door and a push-button lever engaged thereby and mounted for rocking movement on said rotor plate in a plane perpendicular to the plane of the door, and a second lever pivotally mounted on said rotor plate for movement in a plane parallel to the plane of the door and interposed between said push-button lever and dogging lever for releasably rocking said safety-catch arm upon depression of said push-button.

2. A door locking mechanism comprising a rotatable dogging lever having a safety-catch arm, a spring biasing said dogging lever arm into safety-catch position, a roll-back lever arranged for cooperation with said dogging lever, and a plurality of independently actuatable means for operating said roll-back lever to release said safety-catch arm, said means including a lever and a push-button for operating said lever from the outside of the door.

3. A door locking mechanism comprising a rotatable dogging lever having a safety-catch arm, a spring biasing said dogging lever arm into safety-catch position, a roll-back lever arranged for cooperation with said dogging lever, and a plurality of independently actuatable means for operating said roll-back lever to release said safety-catch arm, said means including a lever and a push-button for operating said lever from the outside of the door and also including an inside door handle and strap connected to said roll-back lever.

4. A door lock structure comprising a rotor locking bolt, a take-up lever, a rotor locking lever cooperating with said take-up lever to lock said bolt, a dogging lever having a safety-catch arm, said dogging lever cooperating with said take-up lever and rotor locking lever to hold said bolt in locked position, and means including a push-lever having a push-button for positioning on the outside of a door and engageable with said push-button lever for actuating said push-lever to move said dogging lever out of its bolt holding cooperating position when the bolt is in locked position to release both said bolt and said safety-catch arm.

5. A door lock structure comprising a locking bolt, a first means including a safety-catch arm, a second means cooperating with said first means to hold said bolt in locking position, and releasing means acting through said first means for releasing both said bolt and said arm, said releasing means including a push-lever and an actuating button therefor for positioning on the outside of the door.

6. A door lock structure comprising a locking bolt, a first means including a safety-catch arm, a second means cooperating with said first means to hold said bolt in locking position with said arm in safety-catch position, outside releasing means for releasing said bolt, said releasing means including a push-lever and an actuating button therefor for positioning on the outside of the door, and means operable from the inside of the door for releasing said bolt independently of said outside releasing means.

7. A door lock structure comprising a locking bolt, members movable into cooperative engagement as said locking bolt moves into latching position, a lever having an arm movable into safety-latching position upon closing the door, said lever being simultaneously movable into position to hold said members in engagement and thus hold said locking bolt in latching position, and means including a push-lever operable from the outside of the door for moving said first lever out of latching position to thereby release both said locking bolt and said safety-catch arm to permit the door to be opened.

8. A door lock structure comprising a rotor type locking bolt, a member carried by said locking bolt for movement therewith, a second member for cooperation with said first member, said members being movable into cooperative engagement as said locking bolt moves into latching position, a lever having an arm movable into safety-latching position upon closing the door, said lever being simultaneously movable into position against said second member to hold said members in engagement and thus hold said locking bolt in latching position, and means including a push-lever operable from the outside of the door for moving said first lever out of holding position to thereby release both said locking bolt and said safety-catch arm to permit the door to be opened.

9. A door lock structure comprising a rotor, a rotor locking arm carried by said rotor, a movable take-up lever, a spring operative upon movement of said rotor into door latching position to move said arm into engagement with said take-up lever

in rotor locking position, a key-operated locking lever movable for locking said arm in said locking position when said door is closed said spring being movable with said locking arm when moving from latched to unlatched position into the path of movement of said key operated locking lever, and said locking lever having an arm engageable with said spring when the door is open, blocking said locking lever from being moved into locking position when said door is open.

10. In a door lock structure including a rotor bolt rockable into latching position upon closing the door, means including a spring carried by and movable with said rotor bolt for holding said rotor bolt in door latching position, and manually operable means movable when said door is closed to lock said door, the first means being positioned when the rotor is in unlatched position to block the movement of said locking means into door locking position.

11. In a door lock structure including a rotor bolt rockable into latching position upon closing the door, means including a spring carried by and movable with said rotor bolt for holding said rotor bolt in door latching position, and means including a rotatable locking lever operable when said door is closed to lock said door, the improvement comprising providing said locking lever with a projecting portion which when the door is open will contact said spring and prevent said locking means from being operated into door locking position.

12. A door lock structure comprising a latch bolt pivoted for movement in planes parallel to the edge of the door, take-up means therefor, a dogging lever for said take-up means movable in planes parallel to the plane of the door and having a safety latch thereon, and means for releasing said take-up means, latch bolt and safety-latch to permit opening of the door from its closed position, said releasing means including a pivoted push-button actuated lever pivotally movable in planes parallel to the edge plane of the door and a cooperating lever actuated thereby and rockable in planes parallel to the plane of the door and operatively connected with said dogging lever to actuate the same to move to a released position.

13. A door locking mechanism comprising a keeper, a bolt rockable into latching engagement by said keeper upon door closing movement, a ratchet pivotally mounted at one end, a pawl movably mounted on said bolt and bodily movable therewith engageable with said ratchet for opposing unlatching movement of the bolt, means retaining the free end of the ratchet in bolt-holding position when the bolt is in latching position, and means including a member operable from the outside of the door movable in a plane parallel to the door edge for releasing said retaining means.

14. A door locking mechanism comprising a keeper, a bolt rockable into latching position by the keeper, a ratchet pivotally mounted at one end, a pawl movably mounted on said bolt and bodily movable therewith for engagement with the ratchet for opposing unlatching movement of the bolt, means yieldably urging the pawl toward the ratchet, means retaining the free end of the ratchet in bolt-holding position when the bolt is in latching position, and means including a member operable from the outside of the door movable in a plane parallel to the door edge for releasing said retaining means.

15. A door locking mechanism comprising a keeper, a bolt rockable into latching position by the keeper, a ratchet pivotally mounted at one end, a pawl movably mounted on said bolt and bodily movable therewith for engagement with the ratchet for opposing unlatching movement of the bolt, means yieldably urging the pawl toward the ratchet, means limiting the movement of the pawl toward said ratchet, means retaining the free end of the ratchet in bolt-holding position when the bolt is in latching position, and means including a member operable from the outside of the door movable in a plane parallel to the door edge for releasing said retaining means.

16. A door locking mechanism comprising a keeper, a bolt rockable into latching engagement by said keeper upon door closing movement, a ratchet pivotally mounted at one end, a pawl movably mounted on said bolt and bodily movable therewith engageable with said ratchet for opposing unlatching movement of the bolt, means retaining the free end of the ratchet in bolt-holding position when the bolt is in latching position, means including a member operable from the outside of the door movable in a plane parallel to the door edge for releasing said retaining means, and inside handle-controlled means for releasing said retaining member including an element movable in a plane parallel to the plane of the door.

17. In a latching mechanism, a pivotally mounted bolt, means for positively restraining pivotal unlatching movement of the bolt, means for releasing said restraining means, and a locking member movable into the path of releasing movement of said releasing means to block said movement, said locking member and said restraining means having mutually intersecting paths of movement whereby said locking member is movable into locking position only when said restraining means is in bolt restraining position.

13. In a latching mechanism, a pivotally mounted bolt, means for positively restraining pivotal unlatching movement of the bolt, means for releasing said restraining means, and a movable locking member for directly blocking releasing movement of said releasing means when said restraining means is in bolt restraining position, said locking member and said restraining means having mutually intersecting paths of movement whereby said locking member is blocked by the restraining means from moving into locking position when the restraining means is out of bolt restraining position.

19. In a latching mechanism, a pivotally mounted bolt, means rendered operative by rotation of the bolt into latched position for positively restraining pivotal unlatching movement of the bolt, means for releasing said restraining means, and a locking member movable into the path of releasing movement of said releasing means when said restraining means is in bolt restraining position, said locking member and said restraining means having mutually intersecting paths of movement whereby said locking member is movable into locking position only after said restraining means has been moved from non-bolt restraining position into bolt restraining position.

20. In a latching mechanism, a pivotally mounted main bolt for holding a door in normally latched position, a spring pressed safety latch bolt for holding the door in partially closed position, means rendered operative by rotation of the main bolt into latching position for posi-

tively restraining pivotal unlatching movement of the main bolt, outside controlled operating means for releasing said restraining means, a manually movable locking member for directly blocking releasing movement of said releasing means when said restraining means is in bolt restraining position, said locking member and said restraining means having mutually intersecting paths of movement whereby said locking member is movable into locking position only when said restraining means is in bolt restraining position, said inside control means for shifting said locking member to and from locking position.

21. A door lock mechanism comprising a rotary bolt, a safety catch arm and means cooperating with said arm for holding said bolt in latched position, a safety catch release member, a key controlled lock member movable for blocking release movement of said release member, an inside hand-operated mechanism effective for actuating said release member and actuating said key controlled lock member to and from blocking position, and an inside lever-operated mechanism operative in one position to block unlocking movement of said lock member either by key operation or by the inside handle mechanism.

22. A door lock mechanism comprising a rotary bolt, a safety catch arm and means cooperating with said arm for holding said bolt in latched position, a safety catch release member, a key controlled lock member movable for blocking release movement of said release member, an inside band-operated mechanism effective for actuating said release member and actuating said key controlled lock member to and from blocking position, and an inside lever-operated mechanism operative in one position to block release movement of said release member.

23. A door lock mechanism comprising a rotary bolt, a safety catch arm and means cooperating with said arm for holding said bolt in latched position, a safety catch release member, a key controlled lock member movable for blocking release movement of said release member, an inside hand-operated mechanism effective for actuating said release member and actuating said key controlled lock member to and from blocking position, and an inside lever-operated mechanism movable into interlocking engagement with a portion of a door molding for blocking unlocking movement of said lock member either by key operation or by the inside handle mechanism.

24. A door lock mechanism comprising a rotary bolt, a safety catch arm and means cooperating with said arm for holding said bolt in latched position, a safety catch release member, a key controlled lock member movable for blocking release movement of said release member, an inside hand-operated mechanism effective for actuating said release member and actuating said key controlled lock member to and from blocking position, and an inside lever-operated mechanism movable into interlocking engagement with a portion of a door molding for blocking release movement of said release member.

25. In a door locking structure for mounting on an automobile door and having parts for cooperation with the inside molding of the door, the structure including a rotor bolt having a setting arm and a locking arm, a rotor locking lever pivotally connected to said locking arm, a movable take-up lever for cooperation with said rotor locking lever to hold said bolt in latched position, spring means for urging said rotor locking lever into holding engagement with said take-up lever, a dogging lever having an arm for movement into safety-latching position and having a portion operative for holding said take-up lever immovable, a locking lever key-operated from the outside and having a projecting portion arranged to strike said spring means when said bolt is in unlatched position and said locking lever is moved toward locking position to prevent movement of said locking lever into full locking position, a releasing lever for cooperation with said dogging lever to move its said arm out of safety-latching position, a lever movable parallel to the door edge operable from the outside for actuating said releasing lever, an immobilizing lever having a portion for engagement with said key-operated locking lever to actuate the same and a portion cooperating with said dogging lever to immobilize the same, means operable by the inside door handle to actuate said immobilizing lever and means for moving said immobilizing lever into engagement with said locking lever and into immobilizing position with respect to said dogging lever, said means being adapted to thereupon be engaged with the inside door molding to hold all parts of said locking structure immobilized and incapable of being moved by said key-operated locking lever or by said inside door handle operated means.

26. A door latch mechanism comprising a rotary bolt mounted for pivotal movement parallel to a door edge for engagement with a keeper to hold the door in latched and locked position, a ratchet lever pivotally mounted at one end thereof, a pawl arm pivotally mounted on said bolt engageable with said ratchet lever for holding the bolt in latched position, spring means for urging said pawl arm into operative engagement with said ratchet lever, a pivoted safety latch member mounted for pivotal movement perpendicular to the door edge having a safety catch nose for engagement with a safety catch projection on a keeper, an operating arm on said safety latch member, a dogging shoulder on said safety latch member for holding the unpivoted end of said ratchet lever immovable during the latched position of said bolt, a safety latch release member pivotally mounted for movement perpendicular to the door edge engageable with said operating arm, and an outside latch operator pivotally mounted for rocking movement parallel to the door edge operable through said latch release member for unlatching and undogging movement of said safety latch member.

27. A door latch mechanism comprising a rotary bolt mounted for pivotal movement parallel to a door edge for engagement with a keeper to hold the door in latched and locked position, a ratchet lever pivotally mounted at one end thereof, a pawl arm pivotally mounted on said bolt engageable with said ratchet lever for holding the bolt in latched position, spring means for urging said pawl arm into operative engagement with said ratchet lever, a pivoted safety latch member mounted for pivotal movement perpendicular to the door edge having a safety catch nose for engagement with a safety catch projection on a keeper, an operating arm on said safety latch member, a dogging shoulder on said safety latch member, for holding the unpivoted end of said ratchet lever immovable during the latched position of said bolt, a safety latch release member pivotally mounted for movement perpendicular to the door edge engageable with said operating arm, an outside latch operator pivotally mounted for rocking movement parallel to the door

edge operable through said latch release member for unlatching and undogging movement of said safety latch member, and inside handle-operated means acting on said latch release member for operating the latter.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,738,338	Wells	Dec. 3, 1929
2,094,413	Schonitzer	Sept. 28, 1937
2,234,810	Simpson	Mar. 11, 1941
2,246,784	Dall	June 24, 1941
2,246,785	Dall	June 24, 1941
2,270,559	Rolph et al.	Jan. 20, 1942
2,301,559	Marple	Nov. 10, 1942