Aug. 13, 1957 P. I. CASH 2,802,358

ELECTRIC DOOR LOCK FOR AUTOMOBILES

Filed Sept. 30, 1954 2 Sheets-Sheet 1

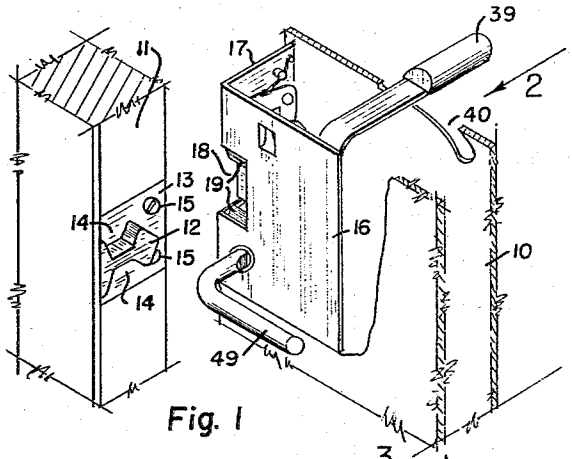


Fig. 1

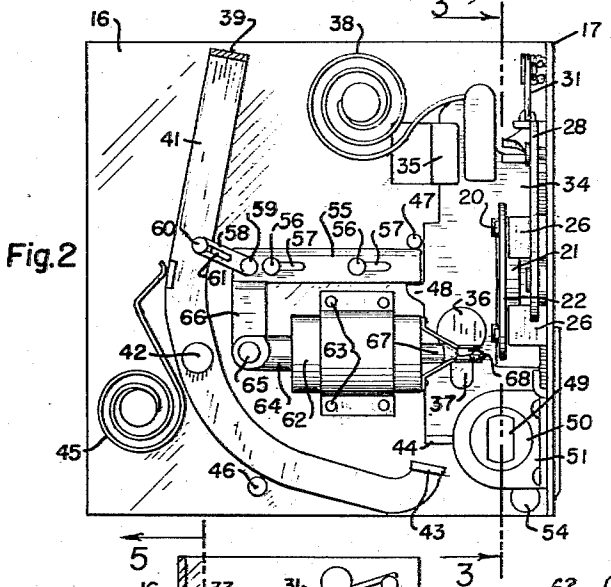


Fig. 2

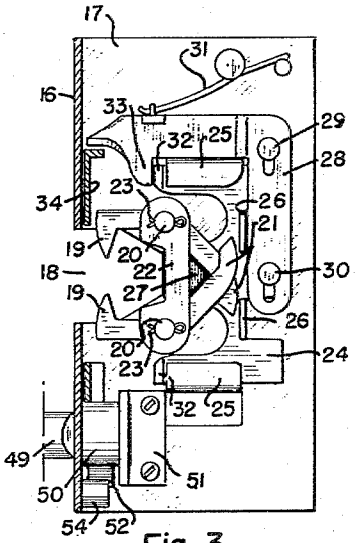
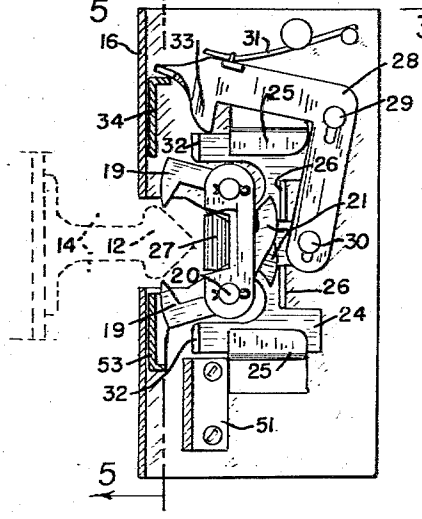


Fig. 3



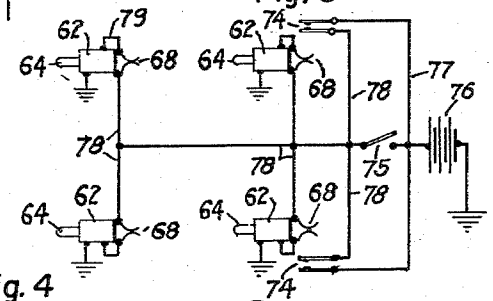


Fig. 4

Fig. 9

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ELECTRIC DOOR LOCK FOR AUTOMOBILES

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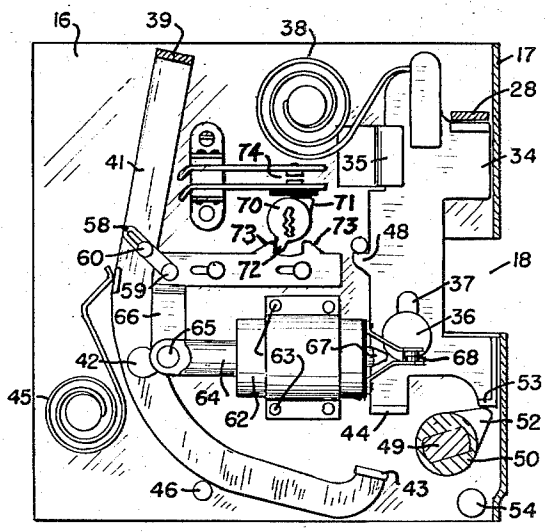


Fig. 5

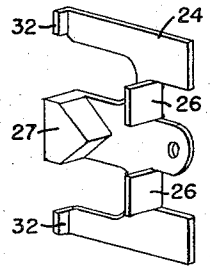


Fig. 7

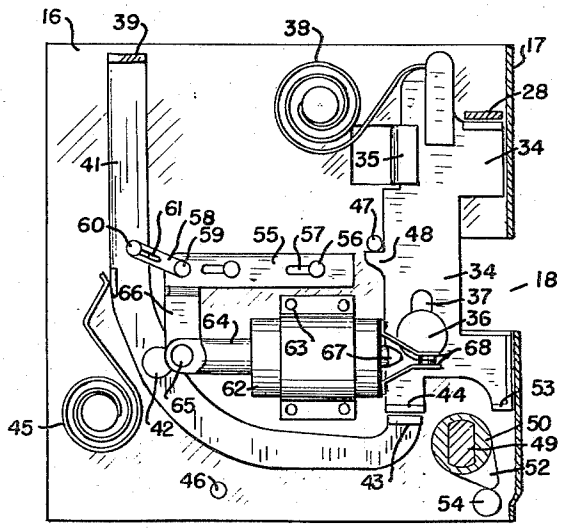


Fig. 6

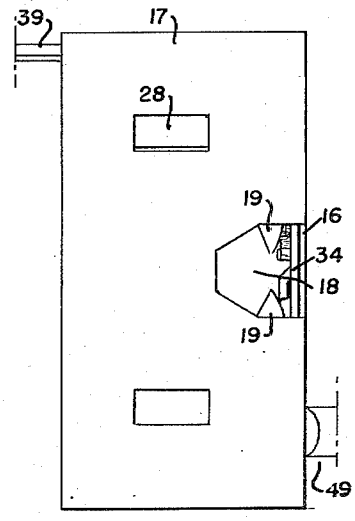


Fig. 8

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ELECTRIC DOOR LOCK FOR AUTOMOBILES

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Application September 30, 1954, Serial No. 459,334

3 Claims. (Cl. 70—283)

This invention relates to a door lock, more particularly for use on automotive vehicles, and is designed as an improvement over the door locks illustrated and described in prior Patents Numbered 2,181,393 and 2,224,671, of which the present applicant is the owner.

The principal object of the invention is to provide a highly efficient automobile door lock which will allow the door to close easily without slamming and which when closed will securely latch the door against vibration and against accidental opening and which when locked will act to efficiently resist unauthorized entering of the automobile.

Another object is to provide an electrically-operated lock by means of which all of the doors of an automobile can be locked simultaneously from the interior by a simple electrical contact to protect the passengers from intrusion when desired and which, when one door is locked from the exterior will act to simultaneously lock the remaining doors of the car.

Another object of the invention is to provide a lock which will tend to force the door open as it is unlocked so as to give a positive indication that the door is unlatched, and which will assist in opening the door.

Other objects and advantages reside in the detail construction of the invention, which is designed for simplicity, economy and efficiency. These will become more apparent from the following description.

In the following detailed description of the invention, reference is had to the accompanying drawing which forms a part hereof. Like numerals refer to like parts in all views of the drawing and throughout the description.

In the drawing, the improved lock has been illustrated without a key mechanism for use on the rear doors of an automobile and with a key mechanism for use on the front doors of an automobile.

In the drawing:

Fig. 1 is a diagrammatic, perspective view, illustrating the position of the improved lock relative to a door and its frame;

Fig. 2 is an inside face view of the improved lock removed from the door, as it would appear without a key mechanism when looking in the direction of the arrow 2 in Fig. 1, illustrating the mechanism in the locked position;

Fig. 3 is a cross-section through the keyless form of the improved lock, taken on the line 3—3, Fig. 2, illustrating the locked position thereof;

Fig. 4 is a similar cross-section, illustrating the keyless form of the mechanism in the unlocked and released position;

Fig. 5 is a longitudinal section, taken on the line 5—5, Fig. 4, illustrating the lock with a key-actuated mechanism applied and as it would appear when released by an outer door handle;

Fig. 6 is a similar section, illustrating the keyless form of the lock as it would appear when released by means of an inner door handle;

Fig. 7 is a detail, perspective view of a slide plate employed in the improved lock;

Fig. 8 is a front edge view of the improved lock; and

Fig. 9 is a circuit diagram illustrating the electrical circuits required for installing the improved lock in a four door automotive vehicle.

In Fig. 1 a door has been diagrammatically indicated at 10, and a door frame or jamb at 11. The improved lock is designed for use with a spear-headed keeper 12 formed or mounted on a keeper plate 13 and provided on its upper and lower edges with jaw notches 14. The keeper plate 13 is recessed into and secured to the door jamb 11 by means of suitable attachment screws 15.

The improved lock mechanism is mounted on a case plate 16, the forward vertical edge of which is turned at 90° to form a door edge flange 17. The door edge flange and the adjacent extremity of the case plate 16 are notched to form a keeper opening 18 into which the keeper 12 is received when the door is closed. A pair of vertically aligned, hooked jaws 19 are mounted in the opening 18 so that the hooked outer extremities of the jaws 19 will engage in the notches 14 of the keeper 12.

Each of the hooked jaws 19 is pivotally mounted on a pivot pin 20 projecting inwardly from the door edge flange 17, and are held in place on their pivot pins by means of a holding bar 22 and suitable cotter keys 23. The inner extremities of the jaws 19 extend angularly into overlapped relation and are formed with rounded cam-shaped extremities 21.

The hooked jaws are actuated to their open and closed positions by means of a slide plate 24 which is slidably retained against the door edge flange 17 by means of guide flaps 25 stamped and turned from the metal of the edge flange 17. The slide plate 24 is provided with flange tabs 26 which, when the slide plate is moved toward the opening 18, contact the cam-shaped extremities 21 of the hooked jaws 19 to swing the hooked extremities thereof apart. The slide plate 24 is also provided with a wedge shaped boss 27 positioned between the overlapped rear extremities of the hooked jaws so that when the slide plate is moved away from the opening 18, the wedge-shaped boss will pry the rear extremities apart to close and lock the forward or hooked extremities of the jaws 19 into the keeper 12.

The slide plate 24 is moved back and forth to and from the locking position by means of a bell-crank lever 28 which is pivoted on a pivot pin 29 fixed in the edge flange 17 and the lower leg of which engages a hinge pin 30 on the slide plate. A leaf spring 31 constantly urges the slide plate 24 towards the locking position in which position it is stopped by means of upturned stop flanges 32 on the plate 24 which engage the guide flaps 25. A stop hook 33, whch is formed on the upper leg of the bell-crank lever, drops in front of the upper stop flange 32 to prevent unlocking movement of the slide plate until the bell-crank lever 28 is lifted. The pin openings in the bell-crank lever are elongated to allow the lever to be lifted to release the stop hook 33. The forward extremity of the upper leg of the bell-crank lever 28 overlaps a lift plate 34 by means of which the bell-crank lever is lifted and rotated.

The lift plate 34 is held in vertically slidable engagement with the case plate 16 by means of a guide member 35 and a headed pin 36. The member 35 and the headed pin 36 are secured to the case plate 16 and the lift plate is provided with a vertically-elongated slot 37 for the pin 36 to allow a limited vertical movement of the plate 34. The lift plate is constantly urged downwardly by means of a helical leaf spring 38.

As thus far described, the structure is very similar to that illustrated and described in prior Patent No. 2,224,671. The principal novelty in this application resides

in the means for actuating, controlling and locking the lift plate **34** both mechanically and electrically.

When the lift plate is lifted, it first lifts the stop hook **33** to release the slide plate **24** and it will then swing the bell-crank lever **28** to actuate the slide plate inwardly to separate the hooked jaws **19** to release the keeper **12** and to force the keeper partially from the opening **18** as shown in Fig. 4. The lift plate **34** can be lifted from either the inside or the outside of the automobile or other enclosure and can be mechanically or electrically locked against lifting when desired.

To lift the lift plate **34** from the inside of the automobile, an inner handle **39** is provided. The inner handle extends through an arcuate slot **40** in the door **10** and is formed on the upper extremity of a swinging handle lever **41**. The swinging handle lever **41** is pivotally mounted on a fixed pivot member **42** which is secured in the case plate **16** and acts to hold the lever **41** in frictional rotative engagement with the plate **16**.

The lower extremity of the lever **41** extends forwardly to a position beneath the lift plate **34**, where it terminates in a lifting pad **43** positioned to engage a lifting flange **44** on the lower extremity of the lift plate **34**. A second spiral leaf spring **45** constantly acts against the lever **41** to urge it toward the released position of Fig. 2 against a suitable stop abutment **46**.

It can be seen that if the inner handle **39** is actuated counter-clockwise to swing the lever **41** from the locked position of Fig. 2 to the released position of Fig. 6, the pad **43** will contact the flange **44** to lift the lift plate **34** to release the hooked jaws **19** as previously described.

Upward movement of the lift plate is limited by means of a limit boss **47** affixed in the case plate **16** and a limit tongue **48** formed on the lift plate **34**. The lift plate **34** can also be lifted from the exterior of the automobile or other enclosure by means of an outer handle **49** which is rotatably mounted in the case plate **16**, and the other extremity of which is rotatably mounted in a bearing bracket **51** secured on the door edge flange **17**.

The trunnion **50** is provided with a projecting cam **52** which, when the handle **49** is depressed or rotated, will swing upwardly against a bottom flange **53** on the lift plate **34** to lift the latter to the previously described releasing position, as shown in Fig. 5. Downward movement of the cam **52** is limited by means of a cam stop lug **54** mounted in the case plate **16**.

Thus, it can be seen that the keeper **12** can be released and the door forced partially open either by actuation of the inner handle **39** or the outer handle **49**. It can also be seen that if means are provided for preventing lifting of the lift plate **34**, it will be impossible to unlock or release the door.

The lift plate **34** can be mechanically locked against lifting movement by means of a horizontally movable interponent bar **55** which is held against the case plate **16** by means of rivets **56** extending through elongated rivet openings **57** in the interponent bar **55**. A connecting link **58** is hingedly secured to the interponent bar **55** upon a suitable hinge rivet **59** and extends about a link rivet **60** in the lever **41**, an elongated rivet slot **61** being provided to allow relative movement between the lever **41** and the interponent bar **55**. The elongated slot **61** allows the lever **41** to be swung from the latched position of Fig. 5 to the released position of Fig. 6 without imparting movement to the interponent bar **55**.

Movement may be imparted to the interponent bar **55** through the medium of a solenoid **62** positioned below the latch bar and secured to the case plate **16** by means of rivets **63** or other suitable attachment devices. The solenoid acts to attract a magnetic plunger **64** which is connected through the medium of a wrist pin **65** with a bracket arm **66** which fixedly projects from the latch bar **55**.

A non-metallic, switch-opening pin **67** is mounted in the other extremity of the plunger **64** and arranged to

enter between two resilient switch contact blades **68** to separate the latter. The electric circuit to the solenoid is in series with the blades **68** so that when the latter are separated, the circuit to the solenoid will be broken.

Let us assume that the lift plate **34** is in its lowermost or locked position, and that current is supplied to the solenoid **62**. This will cause the plunger **64** to be attracted so as to slide the latch bar **55** toward the lift plate **34** above lug **48** which is formed on the edge of the plate **34**, as shown in Fig. 2. It will now be impossible to lift the lift plate **34** through the medium of the external handle **49**. It is still possible, however, to lift the lift plate by actuation of the inner handle **39**, for movement of the lever **41** from the position of Fig. 2 to the position of Fig. 6 will retract the interponent bar **55** from the path of the locking lug **48**.

It will be noted that as soon as the plunger **64** of the solenoid is actuated to the locked position of Fig. 2, the switch-opening pin **67** will separate the blades **68** to break the current to the solenoid to prevent burning out the latter and to prevent unnecessary use of electric current.

In Fig. 5, the improved lock structure above described has been illustrated with a key actuated lock cylinder **70** applied thereto. The cylinder may be any of the conventional lock cylinders rotatably mounted in the case plate **16** above the latch bar **55** and accessible for rotation by insertion of the proper key. The cylinder **70** carries a first projecting lug **72** and a second projecting lug **71** affixed thereon.

The first lug **72** extends toward the latch bar **55** and is positioned between two spaced-apart teeth **73** on the latch bar so that when the cylinder is turned in one direction it will slide the interponent bar to the locked position of Fig. 2 and when turned in the other direction, it will slide the latch bar to the released position of Fig. 5. The second lug **71** is positioned beneath a pair of normally-open switch contacts **74** and arranged so that when the cylinder is rotated to the locked position, the lug **71** will force the contacts together to close an electrical circuit.

In a four door automotive vehicle, the locks are electrically connected, as shown in the diagram of Fig. 9, wherein one side of the car battery, indicated at **76**, is grounded; the other side is connected by means of a conductor **77** to one contact of each pair of contacts **74** in the locks of the two front doors and to one side of a main locking switch **75** located at any convenient point in the automobile. The other contact **74** of each pair of front door contacts and the other side of the main locking switch are connected by means of a second conductor **78** to one of the switch contact blades **68** at the solenoid **62** of each of the four doors. The other switch contact blade **68** of each pair is connected to one side of the adjacent solenoid **62** by a connection **79** at each solenoid. The opposite side of each solenoid is grounded.

It will be noted from the diagram that if the main locking switch **75** is closed, all four solenoids will be energized simultaneously to slide the latch bars of all locks to the locking position and as each bar reaches the latter position, its circuit will be broken at its contact blades **68**, thus securely locking the car from outside intrusion.

It will also be noted that should the driver park the automobile and lock the front door through which he leaves, the lock cylinder **70** of that door will close the adjacent contacts **74** thus closing a circuit to all solenoids and locking all of the doors simultaneously. Upon his return to the car, he simply inserts his key and rotates the lock cylinder in the opposite direction to cause the first lug **72** on the cylinder to engage one of the teeth **73** to manually withdraw the interponent bar from the locked position so that the door may be opened by actuation of the outer door handle **49**.

While a specific form of the improvement has been described and illustrated herein, it is desired to be understood that the same may be varied within the scope of

the appended claims, without departing from the spirit of the invention.

Having thus described the invention, what is claimed and desired secured by Letters Patent is:

1. A lock for a door latch comprising a supporting plate; a vertically movable plate mounted on said supporting plate; means actuated by said movable plate adapted for releasing a door latch; a projection extending from said movable plate, a stationary stop engageable by said projection to limit the vertical movement of said plate; an interponent bar slidably mounted adjacent said movable plate adapted to be inserted between said projection and said stop to lock said movable plate in latch locking position; electromagnetically actuated plunger means connected to said interponent bar adapted to move said bar into locking position; a manually operable lever pivotally mounted on said supporting plate adapted to engage said movable plate for actuating the same to operate said latch releasing means; yieldable means for urging said manual lever into plate disengaging position; and a lost motion connection between said lever and said interponent bar whereby said bar is moved to unlocking position by said lever when said lever is operated to release said latch releasing means, while permitting locking movement of said interponent bar by said electromagnetic means when said lever is returned to said plate disengaging position.

2. A door lock as described in claim 1 having a rotatable lock cylinder positioned adjacent said interponent bar; and a circuit closing switch actuated in consequence of rotation of said lock cylinder for closing the electrical circuit to said solenoid.

3. A lock as described in claim 2 having a lock lug projecting from said lock cylinder; and abutments on said interponent bar positioned to be engaged by said lock lug so that said interponent bar will be slid horizontally to and from the locking and unlocking positions in consequence of rotation of said cylinder.

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