Sept. 9, 1947. W. BILLMAN 2,427,040

ELECTRICAL LOCK AND INDICATOR SYSTEM

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Fig. 1.

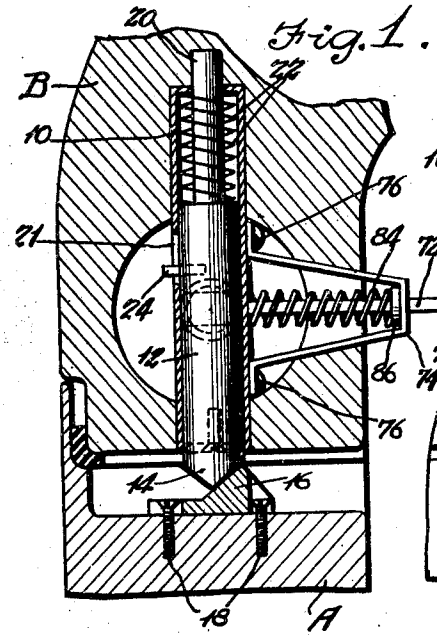


Fig. 2.

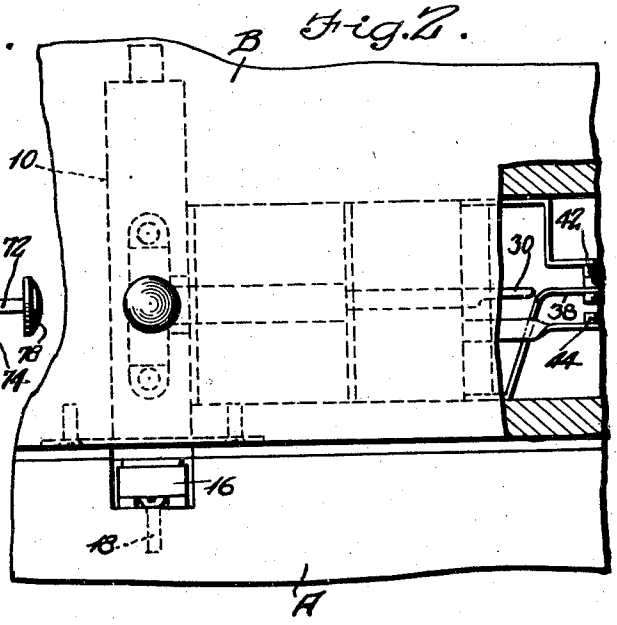


Fig. 3.

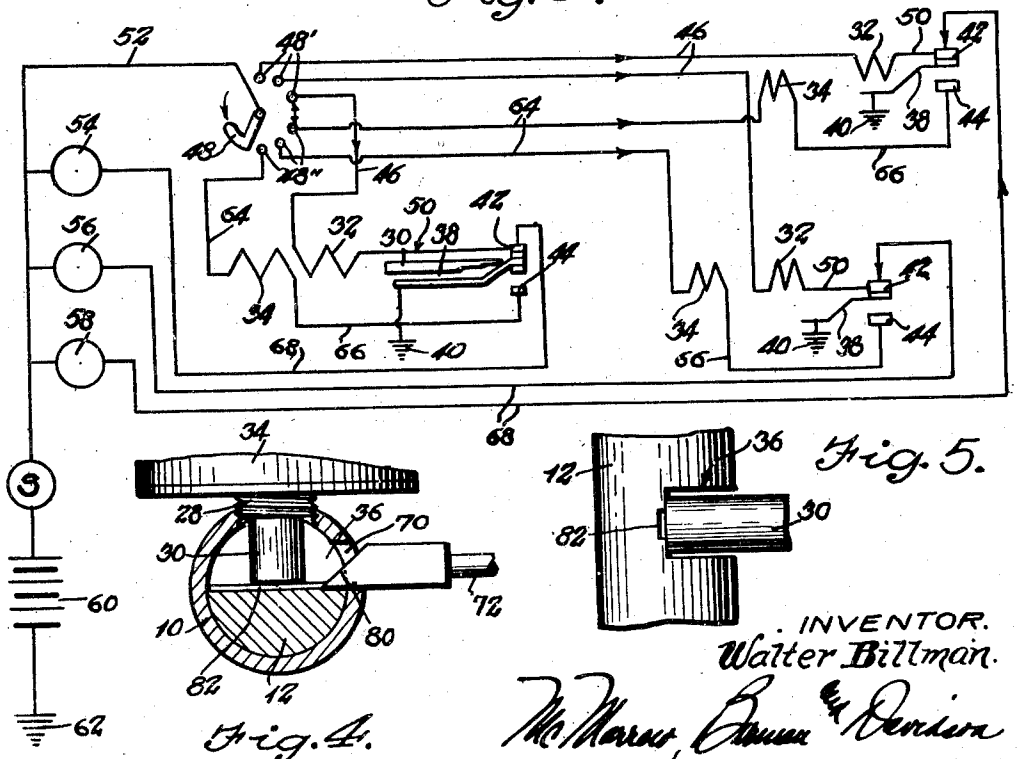


Fig. 4.

Fig. 5.

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ELECTRICAL LOCK AND INDICATOR SYSTEM

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1 Claim. (Cl. 292—74)

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This invention appertains to an electrical lock and indicator system, and has for one of its several objects to provide an electrically operated means to effect the simultaneous locking and unlocking the locks of two or more doors, particularly the doors of an automobile, from a single point of control, i. .e, the instrument board or steering column in the case of an automobile, in order that the opening and closing of the doors may be effected, except in cases of extreme emergency, only at the direction of the person in charge.

Another object of the invention has to do with the provision of a visual telltale means in the control circuit of the lock system, to indicate the locked or unlocked condition of each of the doors equipped with the electrically controlled locks.

A further object of the invention lies in the provision of a manually actuated means for emergency use, in unlocking any one of the doors, after they have previously been electrically locked from the point of control.

With these and other objects and advantages in view, the invention resides in the certain new and useful combination, construction, and arrangement of parts and circuits, as will be hereinafter more fully described, set forth in the appended claim, and illustrated in the accompanying drawing, in which:

Figure 1 is a vertical transverse section through the top part of a door of an automobile and the adjacent portion of the body thereof, showing the lock structure, partly in cross-section and partly in side elevation;

Figure 2 is an inner side elevation, partly in section, of the automobile door and body parts of Figure 1, showing the lock and the electromagnetically controlled locking bolt therefor in broken outline and the circuit and switch connections for the latter in unbroken lines;

Figure 3 is a diagrammatical view of the circuit connections of a three door lock and indicator system;

Figure 4 is a sectional detail, partly in elevation, showing the relative positions of the locking bolt and the emergency release plunger therefor; and

Figure 5 is an enlarged, fragmentary, detail, in side elevation, of the latch and lock bolts at their engaged positions.

Referring in detail to the drawing, the invention, as it is exemplified therein, is embodied, in part, in a latch device for each door A of an automobile, for instance, a four door type thereof, except the door nearest the driver's seat,

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which may be locked and unlocked in the usual manner, i. e., with a key, of the front right hand door, as at present. This latch device is comprised in a tubular casing 10 which is preferably mounted in the top edge of a door opening of the automobile body B, with its outer open end set flush with the surface of that edge. Slidable in the open end of the casing 10, is a latch bolt 12 which has its outer end oppositely beveled, as at 14, for riding over a similarly beveled keeper 16, fastened, as by the screws 18, to the top edge of the door. The inner end of the latch bolt 12, is formed to provide a reduced extension 20, which projects outwardly through an aperture, formed centrally of a wall at the inner end of the casing 10. Engaged on the extension 20, within the casing 10, is a coiled spring 22, which allows for automatic keeper engaging and disengaging movements of the latch bolt 12; the spring being under compression, with its rear end bearing against the rear end wall of the casing and its forward end against the inner end of the larger portion of the latch bolt. The movements of the latch bolt 12, relatively to the casing 10, are limited by means of a pin 24, projecting sidewise from the latch bolt and outwardly through a slot 21, formed longitudinally in the side wall of the casing; the pin, additionally, acting as a guide to maintain the beveled outer end 14, of the latch bolt, in proper position to engage with and disengage from the keeper 16.

Formed in the side wall of the casing 10, at right angles to the slot 21, is an opening which is screw threaded to receive an end of a tube 26, of a non-magnetic metal, in which a movable core 30 is supported for sliding movements and about which are two windings 32 and 34, to form a plunger-magnet, or solenoid. The movable core or plunger 30 constitutes a locking bolt for the latch bolt 12 and, to such end, the latter is provided with a notch or recess 36 to be engaged by the inner end of the core or plunger, in one of the operative positions thereof, thus holding the latch bolt against movement when its beveled end 14 is engaged with the keeper 16. The windings 32 and 34 are oppositely wound and are positioned on the tube 26 in a manner that the winding 32, when energized, will establish a magnetic field that will cause the core or plunger 30 to disengage from the notch or recess 36 to release the latch bolt 12, while the winding 34, when subsequently energized, moves the core or plunger 30 in a reverse direction to cause it to re-engage with the notch or recess 36, to again lock the latch bolt 12 against movement.

Cooperative with the plunger-magnet or solenoid of each of the door locks to be electrically controlled, is an automatic switching means, which is comprised in a spring contact arm 38, that is grounded, as at 40, and is supported from one of its ends in the path of movement of the core or plunger 30 and has its other end movable between a pair of stationary contacts 42 and 44. With the core or plunger 30 disposed in locking engagement with the latch bolt 12, the contact arm 38 is engaged with the stationary contact 42 and, upon the energizing of the winding 32, the core or plunger is caused to disengage from the latch bolt and is moved toward and against the contact arm, forcing it from the stationary contact 42 and over against the stationary contact 44. With the opening of the contact 42, the circuit is broken on the winding 32, as well as on a set of indicator devices, such as the lamps 54, 56, and 58, so that there is no drainage of current from the battery 60, at this time, the lamps, when lighted, indicating the locked state of the doors. Thus, the unlocked condition of the doors will be indicated when the lamps are extinguished, and the contact arm 38 will remain engaged with the stationary contact 44, until the core or plunger 30 is actuated in a reversed direction, which is accomplished by the energizing of the winding 34. With the return movement of the core or plunger 30 to locking engagement with the latch bolt 12, the contact arm 38 snaps back into engagement with the stationary contact 42, closing the circuit on the lamps 54, 56, and 58, and the winding 32.

In order to energize the windings 32 and 34, to control the locking and unlocking of the door latching bolts 12 and the lighting and extinguishing of the lamps, each of the windings 32 has one of its terminals connected by a conductor 46 to one of a group of three stationary contacts 48', arranged in cooperative relation with a movable contact member 48, and its other terminal, by a conductor 50, to a stationary contact 42, of the aforesaid automatic switching means. The movable contact member 48, in turn, is connected, by a conductor 52, to one side each of the lamps 54, 56, and 58, the ignition switch S and the battery 60 of the automobile, and to a ground 62. One terminal of each of the windings 34 is connected, by a conductor 64, to one of a second group of three stationary contacts 48'', associated with the movable contact member 48, while the other terminal thereof is connected, by a conductor 66, to a stationary contact 44, and the opposite sides of the indicator lamps are each separately connected, by a conductor 68, to a stationary contact 42, of the automatic switching means.

With the switch member 48 engaged with the contacts 48', the cores or plungers 30 will have forced the contact arms 38 from engagement with the stationary contacts 42 and into engagement with the stationary contacts 44, where they will be held until released by a reversed movement of the cores or plungers, which movement is to be effected by moving the switch member 48 onto the other group of stationary contacts 48'', when the cores or plungers 30 will be moved to the left as viewed in Figure 3, by the energizing of the windings 34, and into engagement with the notches 36, in the latch bolts 12. When released by the cores or plungers 30, the contact arms 38 will snap back against the stationary contacts 42 and close the circuit on the

lamps 54, 56, and 58, to light the same and thereby give indication that the doors are locked.

If desired, however, the doors may be held closed by the use of the latch bolts 12 only, temporarily at least, without resort to the locking bolts 30, in which case, the latter will be set at their unlocked positions to hold the contact arms 38 on the stationary contacts 44 and thereafter the movable switch member 48 put on open circuit, when all of the windings 32 and 34 will be deenergized and the lamps 54, 56, and 58, extinguished. In this instance, the doors may be opened and closed merely by pulling and pushing the same, since the latch bolts 12 will snap past the keepers 16, in each direction of door movement, by reason of the camlike action therebetween; suitable hand grips (not shown) being provided on the outer sides of the doors for the purpose, with the hand grips in no way connected with the latch bolts. However, with the latch bolts 12 secured against movement by the locking bolts 30, the doors cannot, under any circumstances, be opened from either the outside or the inside of the automobile, until the locking bolts 30 are released from the latch bolts at the will of the driver, or, in cases of extreme emergency, by the independent release of the locking bolts from inside the automobile, as will presently be explained.

In operation, with the three doors locked, as indicated by the lamps 54, 56 and 58, being on closed circuit as in Figure 3, to unlock the latch bolts 12 at all three of the doors, the driver will manipulate the switch member 48 from its "off" position to successively bridge the several stationary contacts 48', after first having closed the ignition switch S, when current will flow from the battery 60, by way of the ignition switch S, the conductor 52, the switch member 48, the contacts 48', the conductors 46, the windings 32, the conductors 50, the stationary contacts 42, the spring contact arms 38, the grounds 40 and 62, and back to the battery. With the energizing of the windings 32, the cores or locking bolts 30 will be withdrawn from engagement with the notches 36, in the latch bolts 12, thus releasing the latch bolts for freedom of movement, as before stated. In their withdrawing movements, the cores or locking bolts 30 will engage with the contact arms 38 and force them from the stationary contacts 42 and into engagement with the stationary contacts 44, thus extinguishing the lamps and de-energizing the windings 32. To lock the latch bolts 12 and, consequently, the doors, the driver will move the switch member 48 onto the group of stationary contacts 48'', after having closed the ignition switch S, when the current will flow from the battery 60, by way of the conductor 52, the switch member 48, the stationary contacts 48'', the conductors 64, the windings 34, the conductors 66, the stationary contacts 44, the spring contact arms 38, the grounds 40 and 62, and back to battery. With the energizing of the windings 34, the cores or locking bolts 30 will be moved into engagement with the notches 36, in the latch bolts 12, and out of engagement with the spring arms 38, when the latter will snap back onto the stationary contacts 42 and thereby close the circuit on the lamps 54, 56, and 58, and on the windings 32, causing the lamps to light up to indicate the locked condition of the doors and putting the windings 32 in condition to be energized only when the switch member 48 is moved into bridging relation with the stationary contacts 48'.

To unlock the latch bolts 12 at any one of the doors in cases of emergency, without recourse to the control switch 48 at the driver's position within the automobile, each of the latch devices has its casing 10 provided with an opening 70 (Figure 4) in its side wall, at a point opposite the slot 21 therein, for the movement therethrough of a plunger 72, which is slidably mounted in a supporting frame 74, fastened to the casing 10, by means of screws 76, and provided with an operating knob 78, at its outer end. The inner end of the plunger 72 is beveled, as at 80, to engage beneath the end of the locking bolt 30, to forcibly dis-engage the same from the notch 36, thus freeing the latch bolt 12, to allow the particular door to be opened; a shallow groove 82 being provided in the bottom of the notch 36, to facilitate the passage of the beveled end to pass beneath the engaged end of the locking bolt 30. When the plunger 72 is freed from the hand pressure, a coiled spring 84, engaged on the same, between the casing 10 and a collar 86, fixed on the plunger inwardly of the outer end of the frame 74, acts to return the plunger to its normally inoperative position, with its inner end disengaged from the latch bolt 12.

Without further description, it is thought to be obvious that the disclosed embodiment of my invention provides for a maximum of safety to the passengers, particularly children, in automobile travel, especially with regard to the prevention of accidents resulting from the opening of the doors adjacent the seats of the occupants, other than the driver, while the automobile is in motion. Also, it is to be understood that changes in design and minor details of construction and arrangement of the devices, both mechanical and electrical, may be resorted to, without departing from the limitations to be determined from the scope of the appended claim.

What I claim is:

In an electrically controlled lock system an automatic latch device mounted in an edge of the door opening, a plunger-magnet for engaging the latch to lock the same and for disengaging therefrom a first coil having one end connected to a first contact and when energized moving the plunger to retracting position, a second coil having one end connected to a second contact and when energized moving the plunger from said position to latch-locking position, a source of current, a first switch when closed connecting one side of the source to the other end of the first coil, indicating means connected to the first contact and the first-named side of the source, a resilient contact arm normally contacting the first contact and connected to the other side of the source, a second switch when closed connecting the first-named side of the source to the other end of the second coil, and means carried by the plunger for moving the contact of the arm from the first contact to the second contact during the retraction of the plunger from the latch.

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