Dec. 5, 1933. J. M. MARATECK 1,938,150

ELECTRIC KEYLESS LOCK

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Fig. 1.

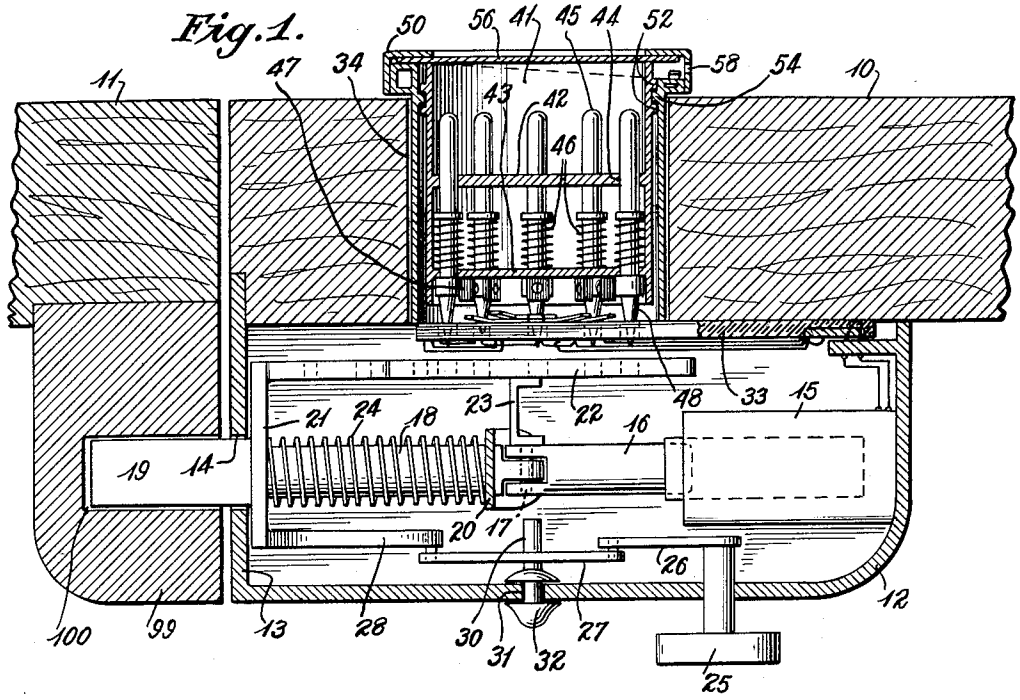
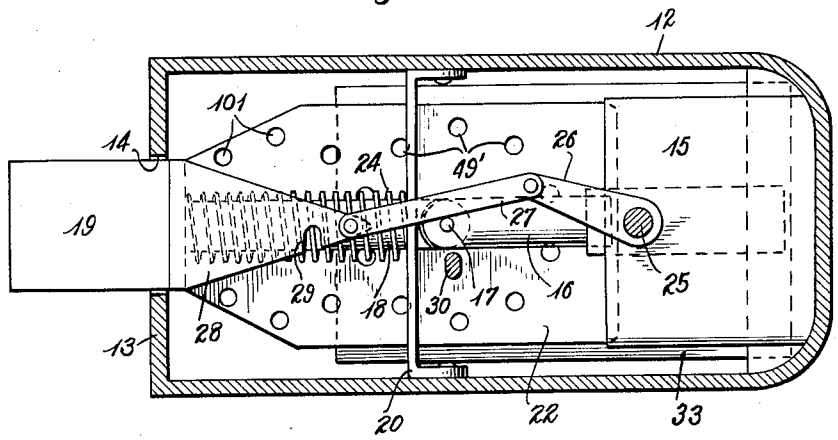


Fig. 2.



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Fig. 3.

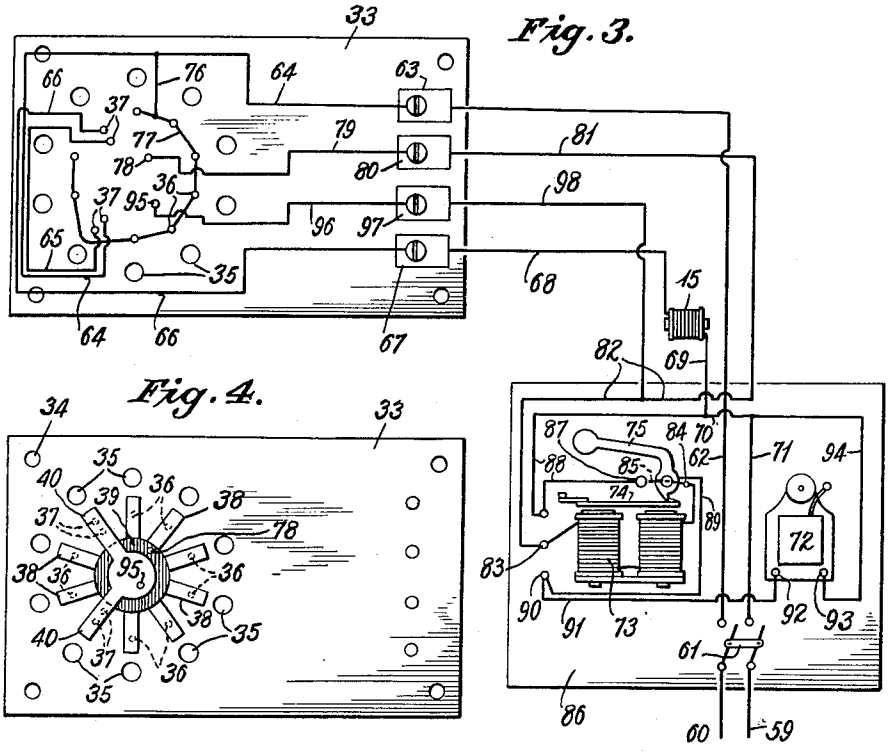


Fig. 4.

Fig. 5.

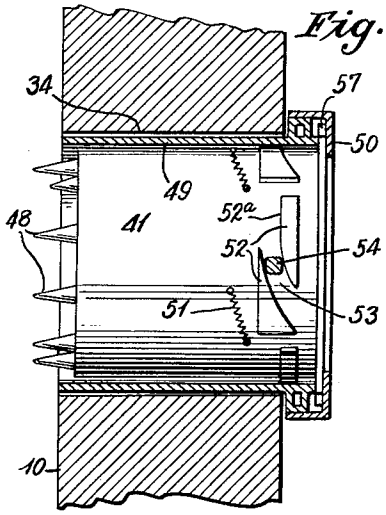
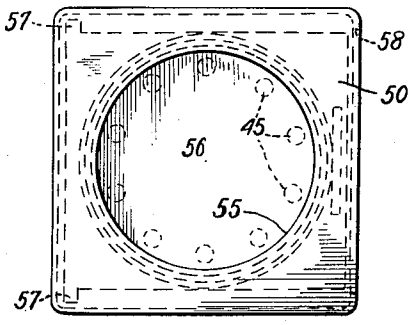


Fig. 6.



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UNITED STATES PATENT OFFICE

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ELECTRIC KEYLESS LOCK

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Application April 1, 1933. Serial No. 664,011

4 Claims. (Cl. 70—63)

This invention relates to new and useful improvements in electric keyless locks.

The primary object of this invention is to provide a lock which employs electricity as the source of power for actuating the bolt to accomplish unlocking of the same.

A more specific object of the invention is to provide an electric keyless lock which is controlled by predetermined push buttons of a series of buttons and wherein manipulation of any of the remaining buttons either individually or in combination with any or all of the predetermined or selected buttons will prevent operation of the lock.

A further object of the invention is to provide novel means for mounting and housing the series of push buttons which control the lock mechanism.

Other objects and advantages of the invention will be apparent during the course of the following description.

In the accompanying drawings forming a part of this specification and in which like numerals are employed to designate like parts throughout the same.

Figure 1 is a horizontal sectional view of the electric keyless lock embodying this invention and shown mounted upon a door or other closure to be controlled thereby.

Figure 2 is a vertical sectional view of the lock mechanism shown in Fig. 1,

Figure 3 is a diagrammatic view of the wiring for the lock mechanism and the burglar alarm operatively associated therewith,

Figure 4 is a detail view of the panel for mounting the switch mechanism of the lock and the alarm,

Figure 5 is a partly sectional view and partly elevational view of the housing for the circuit actuating push buttons of the mechanism shown in Fig. 1, and

Figure 6 is a plan view of the cap portion of the housing shown in Fig. 5.

In the drawings, wherein for the purpose of illustration is shown a preferred embodiment of this invention, the numeral 10 designates a door or other closure with which the lock mechanism embodying this invention is associated. This door cooperates with a suitable jam or frame 11 shaped to form the opening closed by the door.

Suitably mounted upon the inner face of the door 10 is a lock casing 12 having an end face 13 formed with a bolt receiving opening 14. Suitably mounted within the casing 12 is an encased solenoid coil 15 which has operatively associated therewith an armature 16 pivotally attached at 17 to the shank 18 of the bolt 19. A transverse brace or guide 20 is suitably mounted within the casing 12 and is centrally apertured to slidably receive and guide the shank 18 of the bolt 19. An angularly arranged plate 21 is rigidly fixed to the bolt 19 and shank 18 and has rigidly connected to one edge of the same a plate 22 which extends longitudinally through the casing 12 in parallelism with the shank 18 of the bolt and the armature 16 for the solenoid. A brace 23 is provided to interconnect the plate 22 and the armature 16. This plate also functions to limit the movement of the armature 16 into the bore of the solenoid 15. Interposed between the guiding bracket or brace 20 and the end plate 21 is a compression spring 24 which functions to normally urge the bolt 19 outwardly of the casing 12.

For the purpose of manually retracting the bolt 19 from the inner side of the door 10, an operating knob 25 is journaled in an aperture in the casing wall 12 and is provided with a lever arm 26 pivotally connected at its outer end to a link 27 which in turn is pivotally connected at its opposite end to a rigid arm 28 attached to the plate 21 of the bolt. By rotating the knob 25, the bolt 19 may be retracted against the pressure of the spring 24. Fig. 2 discloses the arm 28 as having a notch 29 formed therein. This notch functions to receive a keeper pin 30 which is vertically slidably mounted in a slot 31 formed in the wall of the casing 12. When the bolt is retracted the pin 30 may be moved vertically upwardly, by means of the operating button 32, until the pin occupies the notch 29 in the arm 28.

For the purpose of operating the bolt 19 from the outside of the door 10 without the use of a key, there has been provided an electric control for the solenoid 15. This control includes a mounting panel 33, opposite faces of which are shown in Figs. 3 and 4. This panel is secured to the inner face of the door 10 within the casing 12 by means of bolts, screws, or the like passing through the apertures 34 formed in the panel corners. This panel is clearly illustrated in Fig. 1 as being properly associated with the lock mechanism. The door 10 has formed therein a circular opening 34 and the mounting panel 33 is arranged in a predetermined manner with respect to this opening so that the circular series of apertures 35, formed in the panel 33, is concentrically arranged with respect to said opening 34. The panel 33 is

formed of insulating material and has embedded therein a circular series of contacts 36. These stationary contacts are arranged in radial alignment with certain ones of the apertures 35. In the preferred embodiment of the invention, two of the apertures 35 do not have the single contacts 36 radially aligned therewith. Each one of these two apertures 35 has radially aligned therewith a pair of spaced, stationary contacts 37. It is to be understood that each one of the contacts 36 and 37 extends entirely through the mounting panel 33 and has an end exposed at each face of the panel. A switch spider is rigidly mounted on the outer face of the panel 33 and is provided with a resilient switch blade 38 for each one of the contacts 36. These resilient switch blades or arms overlie the contects 36 and are normally set to occupy positions in spaced relation to the adjacent ends of the contacts 36. A second spider is superimposed upon the first spider and insulated therefrom by means of the insulating disc 39. This second spider has a pair of resilient switch blades or arms 40 which are arranged to overlie the two pairs of spaced contacts 37 and to normally be arranged in spaced relation thereto.

Suitably mounted within the opening 34 of the door 10 is a cylindrical casing 41. This casing has mounted therein the spaced partitions 42 and 43. The partitions 42 and 43 are provided each with a series of apertures 44. These apertures are intended to be arranged in alignment with the apertures 35 of the panel 33. Slidably positioned in each aligned pair of apertures 44 in the partitions 42 and 43 is a push button 45. Each push button 45 is normally urged outwardly by a spring 46. Inwardly of the inner partition 43, each push button has mounted thereon a block of insulating material 47. By inspecting Fig. 1, it will be seen that the block 47 of each one of the push buttons 45 will engage a switch blade 38 and 40 when the button is moved inwardly against the tension of its spring. The various switch blades therefore may be moved into engagement with their respective contacts 36 or 37 by actuating the various push buttons. Fig. 1 discloses each one of the push buttons as having a pointed inner end 48. Each one of these pointed ends normally occupies one of the apertures 35 in the mounting panel 33. The plate 22, movable with the bolt 19, has a circular series of apertures 49 which, when the bolt 19 projects outwardly of the casing 12, is arranged in axial alignment with one of the push buttons 45 and its associated aperture 35 of the panel 33. The second push button from the left in Fig. 1 is illustrated as having its inner pointed terminal 48 of less length than the terminals 48 of the remaining push buttons illustrated in this figure. It further will be seen that the insulating block 47 for this particular short push button overlies one of the switch blades 40 for the second spider. In the whole series of push buttons, there is a short button for each one of the two blades 40. When any of the remaining push buttons are moved inwardly, their inner pointed ends 48 will pass entirely through the apertures 35 of the panel 33 and will project into apertures 49' of the bolt plate 22. The two short push buttons 45, associated with the plates 40, are not of sufficient length to project into apertures 49' of the plate 22 when these push buttons are moved inwardly. It will be seen, therefore, that the two short push buttons associated with the switch blades 40 only function to move these blades into engagement with their contacts 37 when the said buttons are moved inwardly. The remaining push buttons, when they are moved inwardly, not only function to actuate their respective switch blades 38 to move the same into engagement with their respective contact 36 but further function to occupy apertures 49' in the bolt plate 22 with the result that the bolt cannot be retracted when any of the longer push buttons are pushed inwardly.

For the purpose of preventing ready access to the numerous push buttons 45, the casing 41 is surrounded by the sleeve portion 49 of a cap 50. The casing 41 and the sleeve portion 49 have connected thereto the opposite ends of a series of springs 51 which function to normally arrange the cap in a predetermined position with respect to the casing 41. The periphery of the casing 41 has mounted thereon a series of circumferentially extending pairs of abutments 52 which are arranged with respect to each other to provide a camming groove 53. The sleeve 49 has formed on its inner surface a projection 54 for each one of the camming grooves 53. When the cap 50 is arranged in its normal, closed position, each one of the projections 54 occupies a position underlying the flat portion 52*a* of one of its respective abutments. The interlocking relation between the projections 54 and the flat surfaces 52*a* retain the cap 50 in its closed position, as shown in Figs. 1 and 5. By rotating the cap 50 in the proper direction, the projections 54, carried by the cap, are moved through the camming grooves 53 resulting in an axial outward movement of the cap and sleeve with respect to the casing 41. The outer face of the cap is formed with a circular opening 55 which is closed by means of a sliding plate 56. This plate is formed with lateral ears 57 at its inner end while its outer end is intended to cooperate with a slot 58 formed in one side wall of the cap 50. It will be seen that this slot 58 is spaced inwardly from the outer face or wall of the cap so that the slot normally is out of alignment with the plate 56. When the cap is rotated to bring about the aforementioned axial outward movement thereof with respect to the casing 41, the plate 56 is permitted to move inwardly at its outer end until this end is in alignment with the slot 58 formed in the wall of the cap. The person desiring to gain access to the push buttons 45, after the cap has been rotated in the proper direction to bring about the aforementioned axial outward movement of the cap, may slide the plate 56 laterally through the slot 58 in the cap by merely engaging the plate with a finger and through suitable pressure cause the plate to slide transversely of the cap. The ears 57 function to prevent the entire withdrawal of the plate 56 from the cap. With the various push buttons 45 exposed, proper manipulation of the same will cause the energization of the solenoid 15 for retracting the bolt 19.

The circuit for the solenoid 15, actuated by the short push buttons 45 will be described in connection with Fig. 3. Current is supplied to the device by the main feed lines 59 and 60 which are selectively connected to the system by the switch 61. The current for the solenoid coil 15 flows from the switch 61 through the wire 62 to the binding post 63 on the panel 33 and from this binding post through the wire 64 to one contact 37 of one of the pairs of contacts

associated with one of the switch blades 40. This switch blade, when depressed, connects these two contacts 37 and the current flows from the second contact through the wire 65 to one contact of the second pair of contacts 37 associated with the second switch blade 40. When this second switch blade 40 is depressed, the current then will flow through the wire 66 to the binding post 67 and from this binding post through the wire 68 to one side of the solenoid coil 15. The wire 69 carries the current from the other side of the coil to the wire 70 which is connected to a wire 71 leading back to the second terminal of the switch 61. It will be seen that both of the switch blades 40 must be depressed to actuate the lock solenoid 15 for the contacts 37 are connected in series through the blades 40.

It is deemed desirable to actuate an alarm when any of the remaining push buttons 45 are depressed so that the authorized user of the lock mechanism may be advised when an unauthorized person is tampering with the lock. For that reason, an alarm 72 is provided. In this alarm circuit there is arranged a magnet 73 employed for actuating the armature 74 which controls the drop arm 75 employed to close the circuit to the alarm 72.

The current for the alarm flows from the switch 61 through the wire 62, the binding post 63, and the wire 64 to a branch wire 76. This wire 76 is connected to a wire 77 which joins all of the contacts 36 in parallel. When any of the long push buttons 45 are depressed, their switch blades or arms 38 are moved into engagement with their respective contacts 36 and the current then will flow from the wire 77 through the one or more contacts 36 to the depressed switch blades 38 and from these switch blades, which are all joined together by a hub structure positioned in back of the insulating disc 39, to the connecting post 78. This post 78 has connected thereto a wire 79 extending to a binding post 80. From the binding post 80, the current flows through a wire 81 to a wire 82 which is connected to one terminal 83 of the magnet winding 73. The second terminal 84 of this magnet winding is connected by a wire 85, extending in back of the panel 86 which supports the alarm 72 and magnet 73, to a terminal 87. This terminal has a wire 88 connected thereto which in turn is connected to the wire 70 leading to the wire 71 connected to the second side of the switch 61. It now will be seen that by depressing any one of the long push buttons 45 a circuit will be established through the windings of the magnet 73. Energization of this magnet will attract the armature 74 for moving the catch carried by the same out of the path of the drop arm 75 to permit the weighted end of this arm to move the same so that its shank portion will contact with the terminal 85. The pivot for this drop arm 75 is connected to a wire 89 which extends to a terminal 90 having a wire 91 connected thereto and extending to one post 92 of the alarm 72. The second post 93 of this alarm has connected thereto a wire 94 which in turn is connected to the wire 71. It now will be seen that energization of the winding of the magnet 73 will trip the weighted arm 75 for closing the circuit to the alarm 72.

While it is not essential that the system be hooked up to actuate the alarm 72 when the short buttons are depressed to retract the bolt 19, the system is illustrated as being wired to accomplish this purpose. A terminal 95 is connected to the two switch blades 40 at the hub of the same. When either or both of the switch blades 40 are depressed, the current will flow through the wire 62, the binding post 63, the wire 64 and the contact 37 connected to this wire 64 to the switch blade 40 associated with this contact. The current will flow through this blade 40 to the terminal or contact 95 connected to the hub of this blade and from this terminal 95 through the wire 96 to the binding post 97. A wire 98 connects this binding post 97 to the wire 82 and the current then flows through the previously described circuit for the magnet winding 73 to energize this winding.

A keeper 99 is properly mounted upon the frame 11 of the door 10. This keeper has formed therein a depression 100 for receiving the bolt 19. It will be noted that the spring 24 normally functions to urge the bolt 19 into its locked position with respect to the keeper 100. The bolt can be retracted from the keeper by a person on the inside of the door 10 by manipulating the knob 25 or by a person on the outside of the door 10 by depressing the short push buttons 45. With the alarm connected up in the manner illustrated in Fig. 3, the alarm will be actuated when the shorter push buttons 45 are depressed. To stop this alarm, regardless of which push buttons are depressed to close the circuit for the same, the drop arm 75 must be returned to the position illustrated in Fig. 3 where it will engage the catch on the armature 74 for holding it in its normal position. It will be apparent, therefore, that a person moving from the inside to the outside of the door 10 should be able to hold the bolt 19 retracted until the door is again closed and then to release the bolt. This may be accomplished by removing one of the insulating blocks 47 from one of the long push buttons 45 so that when the bolt is retracted by actuating the knob 25, this push button without an insulating block 47 may be depressed so that its point of terminal 48 will occupy one of the second series of apertures 101 formed in the plate 22. The bolt, therefore, will be held in its retracted position until this push button, without an insulating block 47, is released when the spring 24 will project the bolt into the keeper 99.

It is to be understood that the form of this invention herewith shown and described is to be taken as a preferred example of the same, and that various changes in the shape, size, and arrangement of parts may be resorted to without departing from the spirit of the invention or the scope of the subjoined claims.

Having thus described the invention, I claim:

1. In combination with a closure member and its frame, a lock casing fastened to the closure member, a keeper fastened to the frame, a bolt carried by the casing, a spring for projecting the bolt from the casing into the keeper, electrical means for retracting the bolt from the keeper against the pressure of the spring, said electrical means including a series of push buttons and a circuit controlled by predetermined ones of said series of push buttons, and means connected to the bolt to move therewith and engageable by any one or more of the remaining push buttons of said series, when depressed, for positively holding the bolt against retraction.

2. In combination with a closure member and its frame, a lock casing fastened to the closure

member, a keeper fastened to the frame, a bolt carried by the casing, a spring for projecting the bolt from the casing into the keeper, electrical means for retracting the bolt from the keeper against the pressure of the spring, said electrical means including a series of push buttons and a circuit controlled by predetermined ones of said series of push buttons, and an apertured plate fastened to the bolt to move therewith, the apertures of said plate being arranged to receive portions of the remaining push buttons of said series, when depressed, to hold the bolt against retraction.

3. In combination with a closure member and its frame, a lock casing fastened to the closure member, a keeper fastened to the frame, a bolt carried by the casing, a spring for projecting the bolt from the casing into the keeper, electrical means for retracting the bolt from the keeper against the pressure of the spring, said electrical means including a series of push buttons of two different lengths and a circuit controlled by the shorter ones of said push buttons, and means engageable by any of the longer push buttons of said series, when depressed, for preventing retraction of said bolt.

4. In combination with a closure member having an opening therethrough and a frame for the closure member, a lock casing fastened to the closure member to overlie said opening and having its side presented to the opening covered by the closure member, a keeper fastened to the frame, a bolt movably mounted in the casing, a spring for projecting the bolt from the casing into the keeper, a solenoid positioned in the casing and operatively connected to the bolt to retract the bolt from the keeper against the pressure of the spring, an insulating panel positioned within the casing and overlying the opening in the closure member, a plurality of circuit making and breaking devices carried by the panel in alignment with said opening, an electric circuit for connecting said devices to said solenoid, and a series of push buttons mounted in said opening so that said devices will be actuated by predetermined ones of said buttons, when depressed, for closing said circuit to energize said solenoid.

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