May 29, 1962 A. DUBONNET 3,036,453

PUSH-BUTTON OPERATOR

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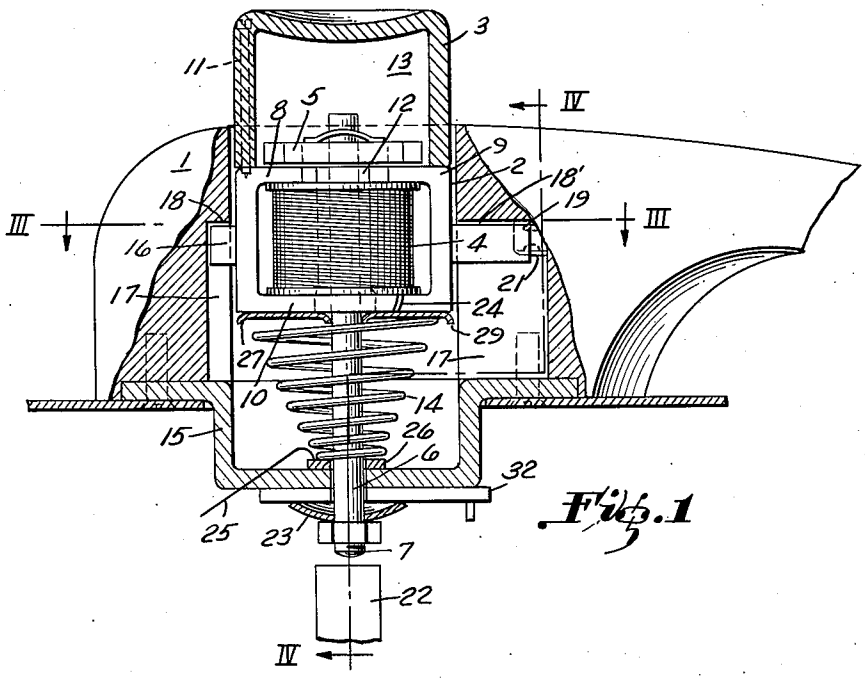

Fig. 1

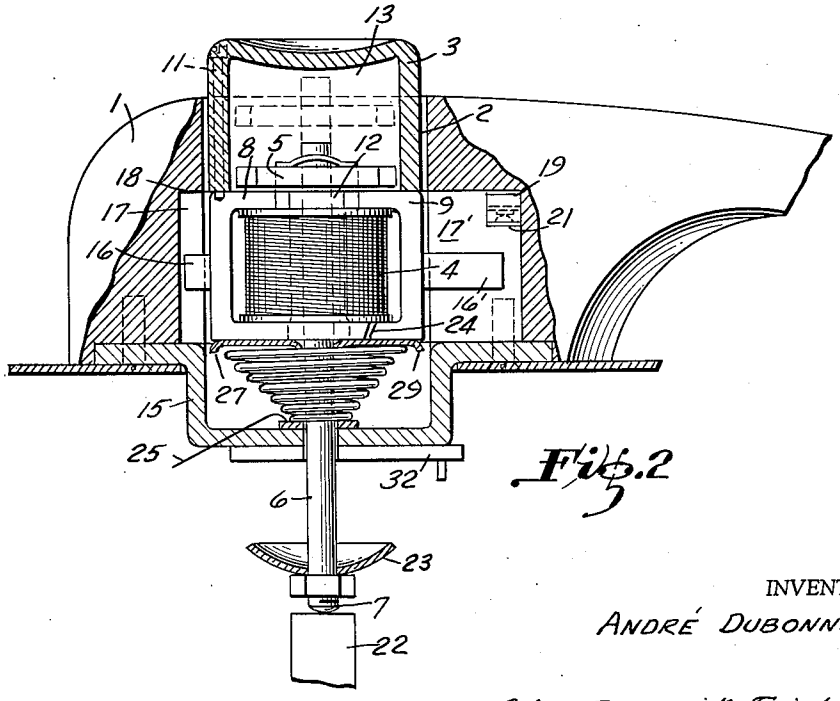

Fig. 2

INVENTOR
ANDRÉ DUBONNET

BY Blum, Moscovitz, Friedman and Blum
ATTORNEY

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Fig. 3

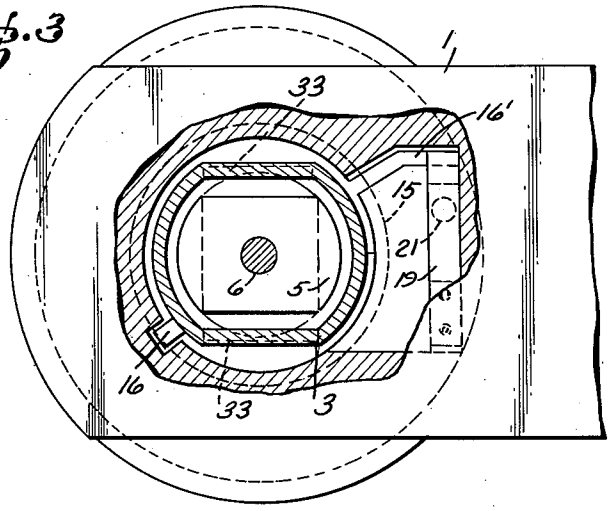


Fig. 4

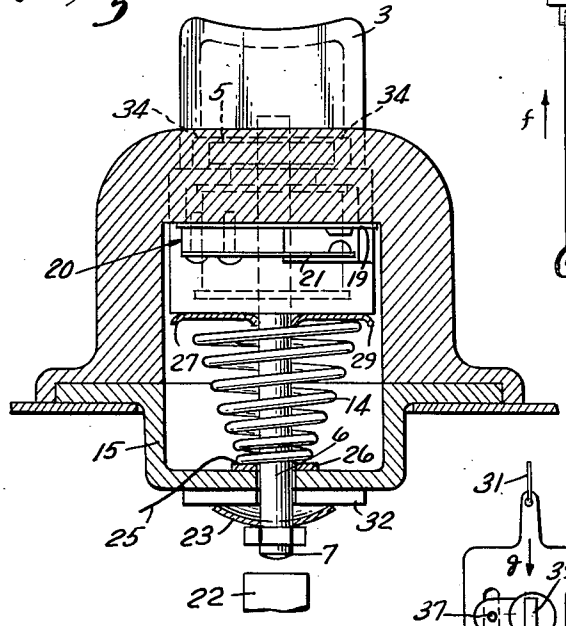


Fig. 5

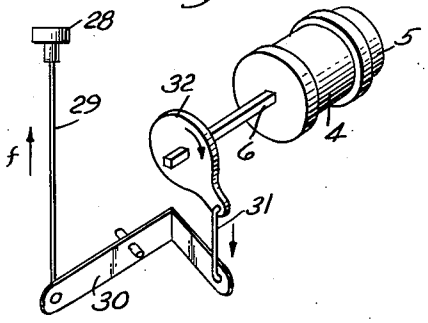


Fig. 6

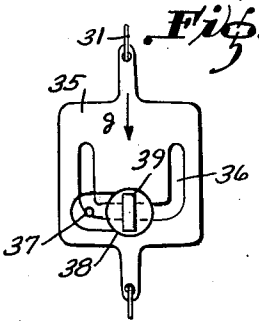
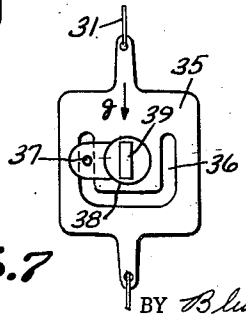


Fig. 7



INVENTOR

ANDRÉ DUBONNET

BY Blum, Moscovitz, Friedman and Blum

ATTORNEY

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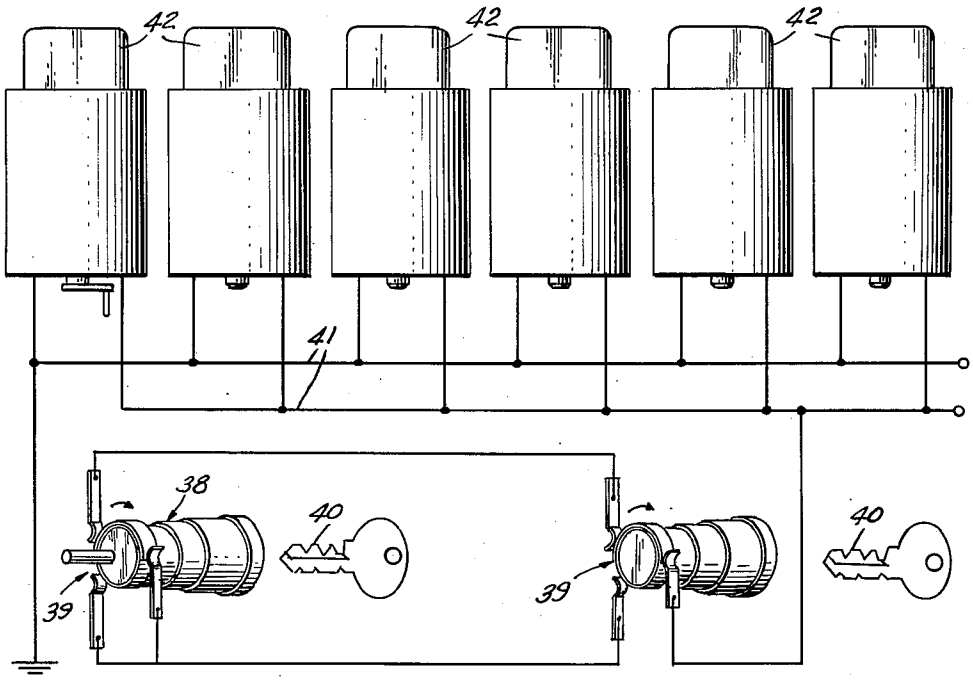

Fig. 8

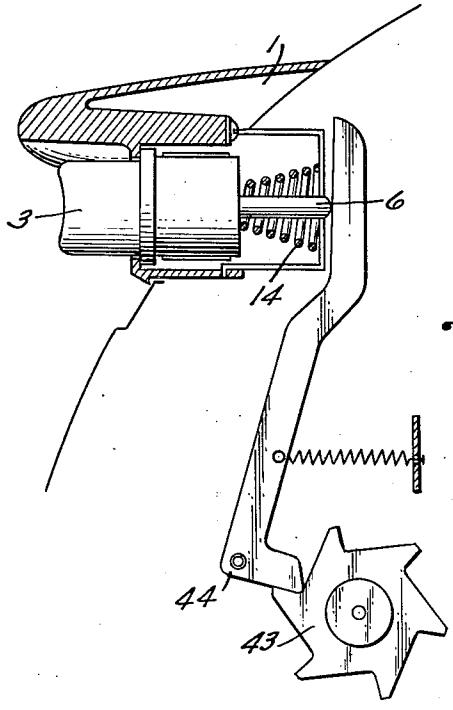

Fig. 9

INVENTOR
ANDRÉ DUBONNET

BY Blum, Moscovitz, Friedman and Blum

ATTORNEY

United States Patent Office 3,036,453
Patented May 29, 1962

3,036,453

PUSH-BUTTON OPERATOR

André Dubonnet, Havana, Cuba, assignor to Societe Anonyme pour l'Exploitation de Brevets d'Appareils Electroniques Codelec, Vaduz, Liechtenstein, a body corporate of Liechtenstein

Filed Mar. 26, 1958, Ser. No. 724,027
Claims priority, application France Mar. 17, 1958
12 Claims. (Cl. 70—207)

This invention relates in general to safety control push-buttons or the like, of the type designed for operating various mechanical members, more particularly lock bolts.

The push-button according to this invention is remarkable notably in that it actuates the member to be controlled through the medium of the movable armature of an electromagnet or like safety device associated therewith, whereby the movement effected by said push-button when the latter is depressed is transmitted to said member through the magnetic attraction applying said movable armature against an element of the stationary yoke of said electromagnet when the latter is energized.

On the other hand, when the electromagnet is de-energized, the thrust exerted on the push-button is not transmitted to the member to be controlled; thus, under these conditions, the push-button is inoperative.

As a consequence of the arrangement broadly described hereinabove, the electromagnet associated with the control push-button constitutes a safety or locking device of which the energizing circuit may be closed or opened by means of any conventional switch, or for example by one or more key-operated switches known per se, and thus the magnet is caused to control at will and in a very simple manner the action exerted by the push-button on the member to be controlled.

The thrust impressed to the push-button may be transmitted directly, that is, by inserting the movable armature of said electromagnet between the push-button proper and its actuating rod, in order to simplify the mechanism and provide a device wherein only a stress-transmitting electromagnetic force is actually employed, in the absence of any mechanical locking member.

The use of a push-button or like member for controlling the bolts of locks or like elements on doors, notably automobile doors, is particularly advantageous, were it only for its extreme constructional simplicity and the absence of any reversing members which, in all known safety devices, lead to lock mechanisms having considerable over all dimensions.

This invention is also concerned with the application of a push-button or control member of the aforesaid type to the control of bolts or ratchets of door locks, particularly in automobile door construction. In this last case, and according to another characteristic feature of this invention, the electromagnet and the armatures thereof are housed together with the push-button in the door handle.

As a matter of fact, practical tests proved that by using an electromagnet or an energizing coil of relatively small dimensions which can be housed without any difficulty in a door handle, it is possible to obtain a sticking pressure in the movable armature which is sufficient to ensure a fully reliable and satisfactory transmission of the thrust to be exerted on the push-button for controlling the lock bolt or like member.

This invention is furthermore concerned, by way of novel industrial products, with door handles and doors proper of all types incorporating a safety push-button or like sliding-action control member of the type broadly defined hereinabove.

Of course, outside the field of lock-bolt control, the

aforesaid push-button or like sliding-action control member may also be used for controlling under certain conditions the actuation of a great variety of mechanical members or devices.

Other features of this invention will become apparent as the following description proceeds with reference to the attached drawings forming part of this specification and illustrating diagrammatically by way of example a typical embodiment of the push-button control member for door locks and the like which constitutes the subject-matter of this invention. In the drawings:

FIGURE 1 is an axial section showing part of a door handle or like structure equipped with a control push-button constructed according to the teachings of this invention;

FIGURE 2 is a section similar to FIGURE 1 illustrating the same handle with the push-button in its depressed condition;

FIGURE 3 is a section taken upon the line III—III of FIGURE 1;

FIGURE 4 is another section taken upon the line IV—IV of FIGURE 1;

FIGURE 5 is an isometric illustration of the auxiliary mechanical device provided for actuating the push-button rod of FIGURE 1;

FIGURE 6 illustrates on a larger scale a detail of the device shown in FIGURE 5;

FIGURE 7 is a view similar to FIGURE 6 but showing the parts in a different position;

FIGURE 8 shows diagrammatically an electric circuit adapted to control in series, a plurality of push-buttons; and

FIGURE 9 illustrates the controlling action of a push-button on a ratchet wheel.

Referring first to the embodiment illustrated in FIGURES 1 to 3 of the drawings, the safety push-button or like control member for actuating a lock bolt or like member is housed, according to this invention, preferably in the handle **1** of the door controlled by this lock. To this end, the handle **1** is formed with a cylindrical cavity **2** extending from the front face to the rear face of the handle and having housed therein part of the push-button **3** proper and the coil **4** of an electromagnet or like safety device associated therewith, the movable armature **5** of the electromagnet being inserted between the push-button **3** and its control rod **6** so that it may transmit or not, according as the electromagnetic coil is energized or not, respectively, the thrust exerted on the push-button **3** when the latter is depressed.

To this end, the push-button rod **6**—of which the lower or inner end **7** is assumed to act directly upon the member to be controlled, for example the bolt of a lock illustrated diagrammatically at **22**—is independent of the push-button **3** and carries at its upper or outer end the movable armature **5** of the electromagnet which registers with the pole shoes **8**, **9** of the armature or stationary yoke **10** of the electromagnet, and also with the pole end of the central core **12**. This substantially U-shaped stationary yoke **10** encloses between its side arms the electromagnet coil **4** and is rigid with the push-button **3**, the latter being secured for example at its lower end by screws or like fastening members **11** on the pole shoes **8**, **9**.

Besides, the push-button rod **6** extends through the stationary yoke **10** as well as through the electromagnet coil **4** and central core **12**. The assembly consisting of the rod **6** and movable armature **5** is mounted for axial sliding movement through the electromagnet, and the assembly comprising the coil **4**, yoke **10** and push-button **3** is also mounted for sliding movement but in the bore **2** of handle **1**. These two relative sliding movements are permitted by a substantially cylindrical cavity **13** formed in the push-button proper and adapted to be engaged by

the movable armature 5 in the position illustrated in FIGURE 2.

The push-button 3 is constantly urged to its outermost position (see FIGURE 1) by a return spring or like member 14 interposed between the stationary yoke 10 and a closing or like plate 15 disposed on the inner side of the handle to close its cylindrical cavity 2. A plurality of check or stop members are provided between the stationary yoke 10 of the electromagnet and the walls forming the inner cavity 2 of handle 1 to limit the projecting position to which the push-button 3 is urged by the spring 14. These stop members comprise for example a pair of lateral lugs or studs 16, 16' carried by the stationary yoke 10 and slidably fitted in longitudinal guiding slots or grooves 17, 17' formed in the wall of the cylindrical bore 2 so as to engage the bottom 18, 18' of these guiding slots or grooves in the position illustrated in FIGURE 1.

The lug 16' of the stationary yoke 10 is so dimensioned and disposed that when the push-button 3 is moved, this lug (see FIGURE 3) actuates a movable contact strip 19 of a switch 20 inserted in the energizing circuit of the electromagnet coil 4. As illustrated in FIGURES 1 and 4, this lug 16' causes the switch 20 to open by moving the contact strip 19 away from a stationary contact strip 21 when the lug 16' engages the top of its guiding slot 17'. Conversely, when the push-button 3 is depressed in the direction of the arrow F, the lug 16' is moved away from the contact strip 19 and the latter urged by its inherent resiliency is thus free to engage the fixed contact 21 to close the energizing circuit of coil 4.

This switch closing movement is obtained for example after the push-button 3 has been depressed only one or two eighths of an inch during the initial part of its stroke a corresponding play being provided between the inner or lower end of rod 6 and the member to be actuated, for example the bolt 22. During this initial fraction of the stroke the movable armature 5 is held in contact with the pole shoes 8, 9 of the electromagnet by a spring 23 interposed between the inner or lower end 7 of rod 6 and the inner cover plate 15. Immediately as the electric circuit energizing the coil 4 is closed, the movable armature 5 is stuck against the pole shoes 8, 9 and also against the upper portion of the core 12; consequently, the push-button 3 and its control rod 6 move together as a unit. This rod 6 when actuated is moved to the position in which it is shown in full lines in FIGURE 2. On the other hand, when the push-button 3 is released, the assembly resumes its inoperative position shown in FIGURE 1 and the circuit for energizing the coil 4 is opened during the final portion of the return stroke of the push-button by reason of the opening of the switch 20.

FIGURE 2 shows in dotted lines the retracted position of the control rod 6 in the push-button 3 when the latter is depressed while the coil 4 is deenergized so that the push-button becomes inoperative.

The coil 4 may be supplied with energizing current through the return spring 14 electrically connected on the one hand through a wire 24 to the winding of this coil and, on the other hand, through a lead-in wire 25 to an electric supply circuit. In this last case, the spring 14 is insulated by providing for its lower and upper turns a pair of washers 26, 27 of insulating material, as shown in FIGURE 1.

A manually-operated control device may be associated with the push-button described hereinabove so that even in case of failure of the electric circuit the doors may be opened by momentarily providing a mechanical connection between the push-button 3 and the control rod 6. To this end, and as illustrated diagrammatically in FIGURE 5, a manually operated control button, lever or like member 28 may be provided which, through the medium of a rod 29, a rocker 30 and a link 31, is adapted to actuate a member 32 integral with the inner end of the push-button rod 6. To this end, the inner end of the rod 6 may be square-sectioned, as shown, or otherwise shaped. On the other hand, the rod 6 is rotatably mounted in the electromagnet coil 4 so that, for example by pulling the control member 28 in the direction of the arrow *f*, this rod 6 may be rotated through a certain angle about its axis. On the other hand, the movable armature 5 carried by the rod 6 consists of an elongated plate adapted, during this angular movement of the rod, to take a cross-like position as shown in FIGURE 3, wherein its ends engage cavities or recesses 33 formed in the side wall of the push-button 3 at the base thereof. In this position, the rod 6 is carried along automatically by the push-button 3 in the direction of movement due to the abutment of its ends against the wall portions 34 or bottom of the cavities or recesses 33, as shown in dotted lines in FIGURE 4.

The four doors of an automobile may be provided internally with control members 28 so that, after having stated a failure of the circuit supplying energizing current to the push-button electromagnets, the user could make rods 6 integral with the relevant push-button through said members 28 and lock or unlock, from the outside, the relevant door.

A semi-locking spring, for example of the hairpin type (not shown) may be provided to keep the assembly comprising the button 28, rod 29, rocker 30 and movable armature 5 in one or the other of its end positions (that is, with the movable armature 5 disposed either crosswise or in the retracted position within the push-button).

On the other hand, any other control system, such as flexible cable, Bowden-type cable or the like, may be substituted for the assembly described for pivoting the push-button rod 6, in order to avoid the use of a plurality of movable parts.

The manually-operated device just described may be combined, for example on the front doors of a vehicle, with the use of the key provided for actuating the locks of these doors, so that the user may penetrate into the car in case of failure of the electric system. For this purpose, a plate 35 having for example the shape shown in FIGURES 6 and 7, may be interposed between the ends of the link 31. In these figures, the intermediate plate 35 is formed notably with a U-shaped aperture 36 engaged by a pin 37 carried by the key-actuated barrel 38 of the lock, said barrel being adapted to rotate about a fixed axis 39. In the inoperative condition, that is, when the key is retracted from the barrel 38, the parts occupy the position illustrated in FIGURE 5 and the device can be actuated manually from the inside by means of the auxiliary button 28 due to the shape of the aperture 36 which, as shown more particularly in FIGURE 6 permits a movement of the plate 35 in the direction of the arrow *g* as the pin 37 slides along one arm of the aperture 36.

In case of failure of the electric system, when the key is engaged into the lock and rotated through half a revolution while closing a switch or like device controlling the circuit through which the different electromagnets of the door locks are energized, it is sufficient to rotate the key by one quarter of a revolution in the reverse direction, that is, move the pin 37 now at 37'' to a position 37' for causing the plate 35 to move downwards and place the movable armature 5 crosswise so that the door can then be opened by simply depressing the push-button. When the door is open, the key is removed from the lock and the auxiliary control button 28 is pulled to unlock the push-button.

If desired, any other manually-operated member, such as handle, lug or other sliding member may be substituted for the push-button mentioned in the above description without departing from the spirit and scope of the invention.

Different manners of mounting the electromagnet may be imagined, the same also applying to the manner in which the electromagnet is connected to the energizing circuit, for example by providing a key-actuated switch

39, 39*a*, in each front door of the vehicle so that according to the usual practice a single key **40** may be used on one or the other side of the vehicle for controlling the common feeding circuit **41** of a plurality of push-buttons **42** (FIG. 9). Finally, the push-button of the type described herein may be used for controlling mechanisms or members of any character for example a ratchet wheel **43** (FIG. 8), the control member **44** of which is to be locked or semi-locked under certain conditions.

Of course, the invention should not be construed as being limited to the specific embodiment shown and described herein, as it constitutes only a typical example of the manner in which the invention may be embodied in the practice.

I claim:

1. In a push-button arrangement for controlling a mechanical member, lock bolt or the like, a push-button having an inner cavity, an electromagnet coil, an energizing circuit for said coil, a rod means displaceable within said coil, said rod means being adapted for mechanically contacting said mechanical member, pole means integral with said coil and secured to said push-button, a spring biased movable armature carried by said rod means and located in said cavity, said armature when in its deenergized position, being biased into contact with said pole means and upon the energization of said coil, said coil causes said movable armature to be magnetically maintained in contact with said pole means so that when said pole means is moved inwardly by said push-button said rod means will control said mechanical member, said pole means comprising a double-armed yoke member and the arms of said yoke being positioned in circumjacent relation to said coil for supporting said coil in position.

2. In a push-button arrangement for actuating the bolt of a door lock, a handle formed with a hole, a push-button slidably mounted within said hole, an electromagnet coil integral with said push-button, a controlled energizing circuit for said coil, pole means embracing said coil and secured to said push-button, an inner cavity in said push-button above said pole means, a rod means displaceable within said coil, said rod means being adapted for mechanically contacting said bolt, a movable armature carried by said rod means and reciprocably mounted in said inner-cavity above said pole means, said armature being magnetically connected to said pole means when said coil is energized so that said rod means will actuate said bolt when said push-button is depressed and said push-button being movable in said hole without said rod means actuating said bolt when said coil is deenergized, a return spring for urging said pole means together with said push-buton to the position they had before the push-button was depressed, and movable contact means in said energizing circuit, said movable contact means being controlled by said push-button so as to close said energizing circuit at the beginning of the movement of said push-button as said push-button is depressed.

3. A push-button arrangement as claimed in claim 2, wherein groove means are provided inside said hole in said handle and includes a pair of diametrically disposed grooves, and a pair of laterally projecting stud means are provided on said pole means, said stud means being slidably engaged in and forming with said groove means stop means limiting the movement of said pole means and said push-button under the effect of said return spring.

4. A push-button arrangement as claimed in claim 3,

wherein said movable contact means of said energizing circuit are positioned in one of said grooves, and one of said stud means controlling the opening and closing of said movable contact means so as to control closing or opening of said energizing circuit according to the position of said push-button in said hole in said handle.

5. A push-button arrangement as claimed in claim 4, wherein a clearance is provided between said rod means and said bolt to be controlled, resilient means being provided for maintaining the engagement of said movable armature with said pole means at the beginning of the movement of said push-button.

6. A push-button arrangement as claimed in claim 5, comprising a manually operated device associated with the push-button for positively connecting said push-button to said rod means for actuating the bolt to be controlled.

7. A push-button arrangement as claimed in claim 6 wherein said rod means is rotatably mounted in the electro-magnet coil so that it may be brought by rotation to an angular position in which said movable armature engages positively said push-button and may be actuated directly by said push-button.

8. A push-button arrangement as claimed in claim 7, wherein said manually operated device comprises a control member connected through link means to a member fixedly secured to said rod means for controlling the rotation of said rod means.

9. A push-button arrangement as claimed in claim 2, wherein a switch means for opening the energizing circuit supplying the electromagnet coil of the push-button of the door of an automobile is provided on a key controlled lock for the bolt of the door lock for the door.

10. A push-button arrangement as claimed in claim 9, wherein a manually operated device is provided for positively connecting said push-button to said rod means and comprises an actuating member, means for connecting said actuating member to said rod means, manually operated means connected to said connecting means, said key controlled lock including a rotatable barrel, means for connecting said barrel to said actuating member, and a key for rotating said barrel and moving said actuating member and the means connecting said actuating member to said rod means so that said push-button can be moved to its operative position.

11. A push-button arrangement as claimed in claim 10, wherein said actuating member is provided with an aperture in which is received a pin carried by said rotatable barrel, whereby when said rotatable barrel is rotated by said key said actuating member is actuated by said rotatable barrel.

12. A push-button arrangement as claimed in claim 11, wherein said aperture is of elongated U-shaped configuration, whereby upon actuation of said barrel by said key, the pin carried by said barrel will slide in said aperture to register with one or the other of the two arms of the U-shaped aperture to cause the movement of said actuating member and the means connecting said actuating member to said rod means.

References Cited in the file of this patent

UNITED STATES PATENTS

2,783,617	Halovatch	Mar. 5, 1957
2,795,127	Gust	June 11, 1957
2,802,357	Smith	Aug. 13, 1957