United States Patent

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[54] **MOMENTARY PUSHBUTTON SWITCH WITH BRIDGING BLOCK, RAMP AND CAM MEANS**
1 Claim, 5 Drawing Figs.

[52] **U.S. Cl.** **200/160**
[51] **Int. Cl.** **H01h 3/12,**
H01h 13/56
[50] **Field of Search** 200/160,
159(Cursory), 153.13(Cursory), 16.1, 166B3, 77

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ABSTRACT: Switch with reciprocal plunger on which is mounted a leaf spring which, during one direction of movement of plunger, brushes a bridging conductor out of position whereat two terminals are connected. A ramp is used to disengage the leaf spring from the bridging conductor after the latter has been displaced. Switch is used to actuate an alarm by disconnecting the two terminals which being disconnected only briefly can be jumped by a second switch to avoid actuation of the alarm when so desired.

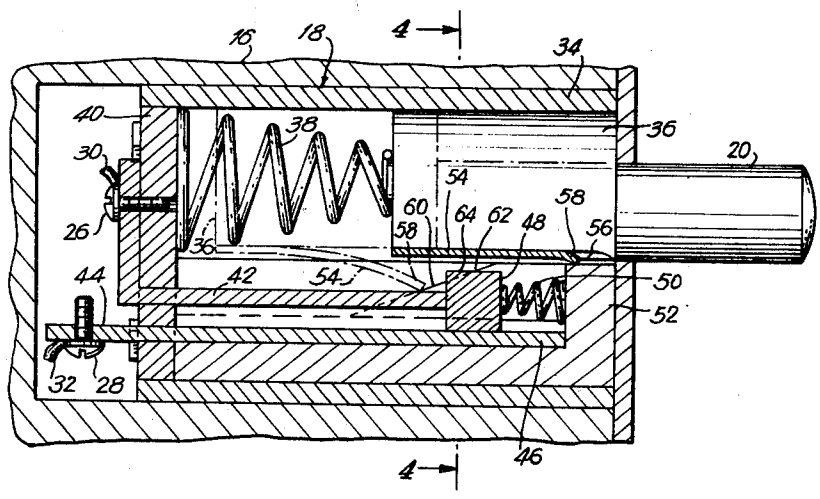


FIG. 1

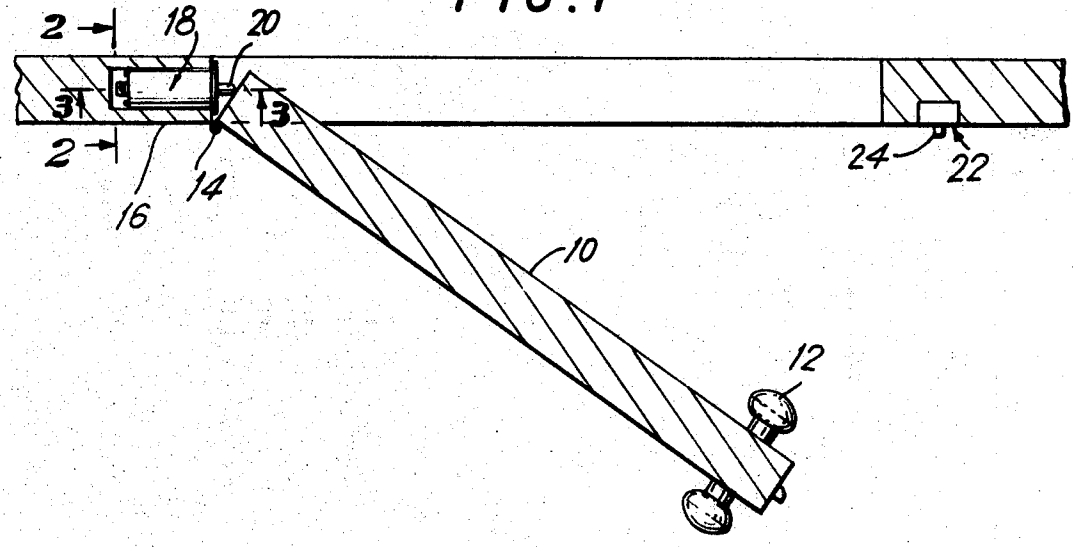


FIG. 2

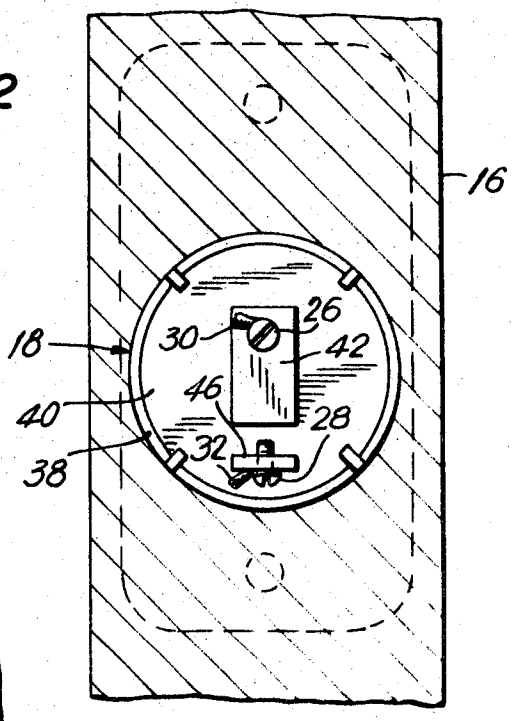
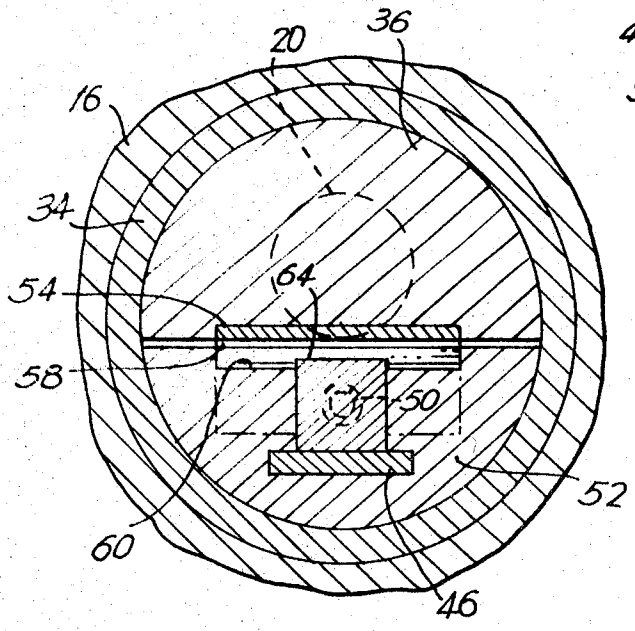


FIG. 4



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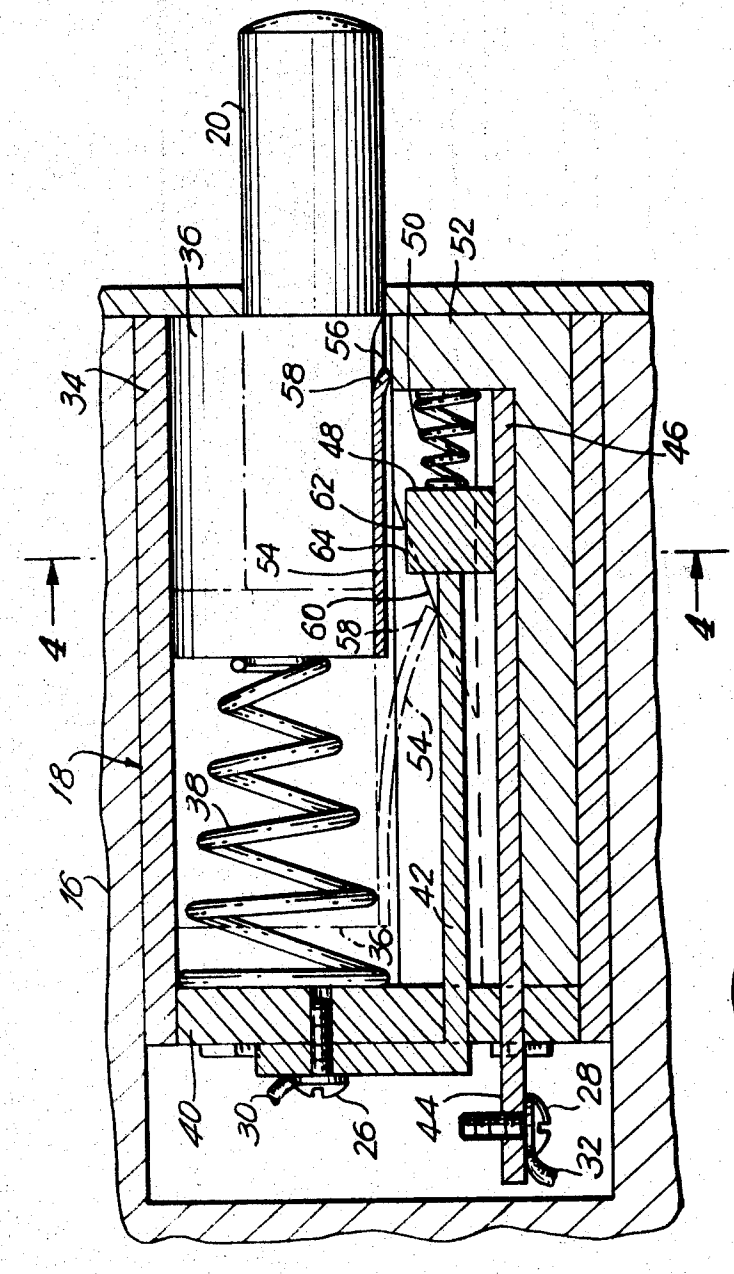


FIG. 3

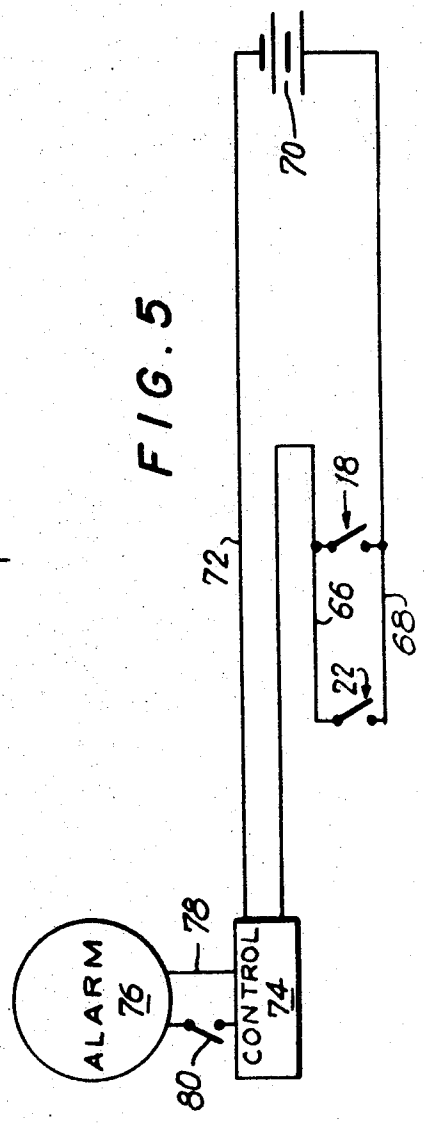


FIG. 5

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MOMENTARY PUSHBUTTON SWITCH WITH BRIDGING BLOCK, RAMP AND CAM MEANS

DRAWING

FIG. 1 is a cross-sectional view from above of a door in which a portion of an alarm system has been installed in accordance with the invention;

FIG. 2 is a cross-sectional view on enlarged scale taken along line 2–2 of FIG. 1 illustrating a rear view of a switching device provided in accordance with the invention;

FIG. 3 is a cross-sectional view taken along line 3–3 of FIG. 1 on enlarged scale illustrating a longitudinal cross section of said switching device;

FIG. 4 is a cross-sectional view taken along line 4–4 of FIG. 3; and

FIG. 5 is a schematic diagram diagrammatically illustrating the circuit in which the switching device of FIGS. 2—4 is incorporated, as well as the circuit associated with the access of FIG. 1.

DETAILED DESCRIPTION

In the security field and more particularly in the art of providing alarms for preventing unauthorized access to protected areas, there exists the problem that the alarm system dominates its environment and therefore sometimes becomes an inconvenience which lessens its overall value. For example, an alarm system which has been placed in operative condition to detect unauthorized access will also sound an alarm if actuated by an authorized penetration of the protected perimeter. It is therefore necessary to provide means for the convenient and temporary deactivation of such alarm systems so that authorized access is permitted without sounding an alarm.

The above problem will be best understood by reference to a specific example and, for this purpose, the situation will be considered in which a housewife is at home with a protective system which has been energized to perform an alarm sounding function. It will be obvious, under these conditions, that an alarm will be sounded if the housewife voluntarily opens the door for various reasons unless some provision is made for deactivating the system temporarily. Moreover, unless the provision is convenient, it is likely that the housewife will tend to keep the system more or less permanently deactivated while she is at home thereby decreasing the overall value of the system.

One known technique for the temporary deactivating of alarm systems has involved the use on doors of a magnetic element consisting of two parts mounted respectively on the door and on the door frame. Normally, these two parts are juxtaposed with the door closed and this prevents a sounding of the alarm until the door is opened at which time said parts are separated and the alarm sounded. In this arrangement, a pushbutton can be provided on one of the parts for temporarily deactivating the associated system so that the door can be opened without sounding the alarm.

One disadvantage of this known technique is that both of the aforesaid parts are readily visible which is unacceptable in some decorative schemes. It is accordingly an object of the invention to avoid this disadvantage and to provide an improved switch in which the component parts can be readily concealed from view.

Another disadvantage of the known technique is that the control must be mounted on one of the aforesaid parts so that the possibilities of remote control are nil. It is an object of the invention to avoid this latter disadvantage and to provide an improved switch in association with which the control can be located remotely of the access for purposes of remote control and for esthetic reasons.

Still another disadvantage of the known technique is that the control is provided in two parts, one of which is installed on the access means such as a door, while the other part is installed on the surrounding structure in such a manner that when the access is closed the two parts are juxtaposed. It is a further object of the invention to avoid this disadvantage and

to provide an improved switching means in which the entire operation of actuating the alarm is performed within a single unit which is readily and conveniently installed and relative to which a temporary deactivating device can be remotely mounted.

In achieving the above and other objects of the invention, there is proposed a switch apparatus comprising two electrical terminals, a movable actuator and a means for electrically connecting the aforesaid terminals, said means being responsive to movement of said actuator for electrically isolating the terminals for a limited period during such movement. More particularly, the actuator is preferably adapted for reciprocal movement in opposite directions and the aforesaid means is responsive to movement of this actuator in only one of said directions to effect the isolating of the terminals, this isolating action being effected for a relatively small fraction of said movement in the one direction between the end limits of this movement.

In connection with the aforesaid construction an alarm device is coupled to the above noted terminals and is actuated, for example, upon the terminals being electrically isolated. A further switch can be connected across the terminals and will be operable to connect the same independently of the first described structure to prevent operation of the alarm means.

As will become apparent from the detailed description which follows, the second switch can be installed in a position which is remote from the position of the first switch. Moreover, it will become apparent that all of the elements necessary for sounding the alarm in the absence of actuation of the second switch is included in the first switch. Still further, it will become apparent that it is readily possible to install both of the aforesaid switches in such a manner that they are readily concealed as is useful both esthetically and from the security viewpoint.

Referring next to FIG. 1 of the drawing, an access is illustrated with consists of a door **10** having knobs **12** and mounted by a hinge **14** in turn mounted on the frame **16** of a dwelling or other such enclosure with respect to which unauthorized access is to be prevented. Concealed within the door frame is a first switch **18**, the details of which will hereinafter be described with greater particularity, this switch including a plunger **20** responsive to the opening of the door **10** for operating the switch. Also illustrated is a second switch **22** having a pushbutton **24**, the switch **22** being mounted in the frame **16** adjacent the door **10** for purposes of illustration, it being understood that the location of this switch can be varied at will and can be completely independent of the location of switch **18**.

In the rear view of the switch **18** appearing in FIG. **2**, it is seen that the switch includes a terminal **26** and a terminal **28**, electrical conductors **30** and **32** being respectively connected thereto. Terminals **26** and **28** also appear in FIG. **3** wherein is also shown the plunger **20**.

As appears in FIG. **3**, the switch **18** comprises a casing or housing **34** within which is slidably accommodated the enlarged base **36** of plunger **20**. A spiral compression spring **38** is sandwiched between part **36** and the rear portion **40** of the housing so that the plunger **20** is urged under the influence of said spring to the illustrated position. Normally, however, in the preferred embodiment the location of the plunger **20** is such that it is maintained in displaced position as shown by the phantom lines under the influence of the closed condition of door **10**.

Terminal **26** is connected to an L-shaped conductor **42**. Terminal **28** is mounted on the tongue **44** of a conductor **46**. Conductors **42** and **46** are in spaced parallel alignment which alignment is parallel to the axis and direction of movement of the plunger **20**.

A block **48** is provided which is of conductive material and which is usually supported by the conductor **46**. A spring **50** installed between the block **48** and insulating member **52** normally urges block **48** against conductor **42** which engages the block in endwise manner. With the block **48** in the illustrated

position, a circuit is complete between terminals **26** and **28** via conductor **42**, block **48** and conductor **46**. The switch is therefore normally closed.

With the switch is installed as indicated in FIG. **1** and with the door **10** closed, the plunger **20** is depressed. The base part **36** is therefore also displaced from the illustrated position to the position indicated by phantom lines. It carries with it a leaf spring **54** mounted on part **36** in a recess **56** provided for this purpose. As shown in phantom lines, the leaf spring **54** is of such a construction as normally to curl away from the base part **36**. To perform its function adequately, the leaf spring **54** will normally be of metal. However, the leaf spring operates to perform a mechanical function as will hereinafter be indicated with greater particularity and therefore it is not essential that the leaf spring **54** be a conductor. Since it normally will be fabricated of a conductive metal, however, and to prevent the electrical coupling of the plunger **20** thereto, the base part **36** may preferably be fabricated of an insulating material or, alternatively, an insulated mounting will normally be provided between leaf spring **54** and part **36**.

In the displaced condition of leaf spring **54**, its end **58** will normally have a position of interference with respect to block **48** when the plunger **20** is released and moves away from terminal **26** in FIG. **3** under the influence of spring **38**. The spring **54** will thus dislodge the block **48** from its engagement against the end of conductor **42**. The circuit between terminals **26** and **28** will be opened on this occasion.

There is, however, provided a ramp **60** in two parts straddling and guiding the block **48** and it will be understood that the ramp **60** performs the function of raising the end **58** of spring **54** as the spring moves to the right with the plunger **20** as illustrated in FIG. **3**.

When the end **58** moves to the intersection **62** between the plane of the top of block **48** and the plane of ramp **60**, the end **58** of spring **54** will be disengaged from block **48**. Block **48** will thus be freed of forces opposing that of the spring **50** and will be urged by the latter said spring back to the position in which it engages conductor **42**. The circuit will once again be completed as between terminals **26** and **28**.

Further movement of plunger **20** away from terminal **26** in FIG. **3** as the door **10** is further opened will enable end **58** to pass to the top of ramp **60** and to occupy the position illustrated in solid lines.

Thereafter when the plunger **20** is depressed as will occur when the door **10** is closed, the spring **54** will be carried along and will trail down the ramp **60**. It will, of course, brush against and over the corner **64** of block **48** but will not in this instance have the effect of dislodging the block **48** so that the circuit between terminals **26** and **28** is not interrupted. The spring **54** will then return to the position illustrated in phantom lines.

From what has been stated above, it will be understood that the plunger **20** and the spring **54** have a reciprocating movement in two opposite directions and that during a relatively small fraction of the movement in one of these directions the circuit between terminals **26** and **28** will be opened. Such opening does not occur during the return movement of the plunger **20** and spring **54**. The extent of the opening of the circuit is controlled by the contacting of the end **58** of the spring **54** with the exposed corner of block **48** and the disengaging of end **58** at point **62** of ramp **60**. This contact of the spring **54** with block **48** may thus, for example, occur during one-tenth of the total extent of the movement of plunger **20**.

Reference is next made to FIG. **5** illustrate how the aforegoing switching elements are incorporated into an alarm system to obtain the desired results.

In FIG. **5** are illustrated the switch **18** and switch **22**, these switches being connected in parallel by lines **66** and **68**. Line **68** leads to a power supply **70** which is connected via line **72** to an alarm control **74**. Line **66** is also connected to control **74** and completes a circuit therewith. An alarm **76** is connected via a line **78** on the one hand and a switch **80** on the other hand to control **74**. The alarm **76** can be a conventional bell alarm of known construction. Switch **80** will be a key operated switch of known type by means of which the alarm can be deactivated. The control **74** will be a known type of control including, for example, a relay which once operated has to be manually reset to its original condition. Therefore, assuming switch **80** to be closed if the control **74** is actuated, the alarm **76** will inturn be actuated and the alarm will be sounded until the switch **80** is opened or the control **74** is reset.

Preferably, control **74** will be of the type which when supplied with current by source **70** will prevent alarm **76** from sounding and will only cause alarm **76** to be operated when the supply of current via lines **72** and **76** is terminated. This arrangement is preferred so that should a person seeking unauthorized access attempt to deactivate the alarm by cutting line **66** or **72** he will cause the alarm to be sounded and will therefore defeat his own purpose.

To maintain a supply of current to control **74**, it will be apparent that one of the two switches **18** or **22** or both must be closed. Switch **18** will normally be closed since the plunger **20** (FIG. **3**) will be depressed by the door **10**. Should, however, the door **10** be opened, the switch **18** will be opened for the relatively short period of ti time referred to hereinabove. The lock-in nature of the relay of control **74** will respond to this brief opening of switch **18** to initiate the sounding of alarm **76** which will continue to operate as aforesaid despite the fact that switch **18** is immediately closed after it has once been opened.

For such circumstances in which it is desired that the door **10** be opened without sounding the alarm it is of course possible to operate the key switch **80**. This, however, necessitates that a key be readily available for such operation. Moreover, the key turns off the entire system and not just a part. To avoid the need for being constantly in possession of such a key and to avoid turning off the entire system, the above noted switch **22** is provided. This switch can be any conventional switch such as, for example, a spring-loaded pushbutton switch, the temporary depression of which will maintain a closed circuit despite the opening of switch **18** whereupon the sounding of the alarm can be avoided. It will be further apparent that since the switch **18** is only open for a brief instant, the switch **22** need only be operated for this brief instant whereafter the door can be further opened and subsequently closed without requiring the continued operation of switch **22**.

Due to the fact that the operation of switch **18** does not require the juxtapositioning of switch **22**, the latter said switch can be located in any position consistent with esthetic requirements. Switch **22** can in fact be located completely independently of the location of switch **18** and door **10** as to permit a remote control of access via door **10** without operating alarm **76**. In addition, since switch **18** is completely self-contained and need not be formed as two separate elements, it is possible to install the switch **18** in such a manner that it is completely concealed from view when the door **10** is closed.

From what has been stated above, it will appear that a switch is provided wherein an actuator or plunger is adapted for reciprocal movement in opposite directions and alarm means are provided s responsive to the movement of the actuator in only one of these directions to effect an isolating of the terminals of the switch, the isolating being effected for a relatively small fraction of the movement of the plunger in the one direction. Such means as are provided in this switch include a block or bridging conductor **48** engaged by a leaf spring which brushes the block out of engagement in which it bridges parallel conductors respectively connected to the aforesaid terminals.

It will also appear from the above that a cam arrangement is provided in the form of a ramp in order to displace the leaf spring from its attitude of interference with the bridging conductor after the latter has been displaced.

There will now be obvious to those skilled in the art many modifications and variations of the construction and elements set forth hereinabove. These modifications and variations will not however depart from the scope of the invention if defined by the following claims.

I claim:

1. Switch apparatus comprising two electrical terminals, a movable actuator, and means for electrically connecting said terminals, said means being responsive to movement of said actuator for electrically isolating the terminals for a limited period of said movement, said actuator being adapted for reciprocal movement in opposite directions and said means being responsive to movement of said actuator in only one of said directions to effect said isolating of the terminals, the isolating being effected for a relatively small fraction of said movement is in said direction between the end limits thereof, said actuator being a plunger comprising a spring urging said plunger to one of said end limits, said terminals including spaced conductors and said means including a bridging conductor in a position contacting both said conductors, a spring holding the bridging conductor in said position, and means on said plunger to brush the bridging conductor out of engagement with at least one of the first said conductors during movement of said plunger in said one direction, the first said means including cam means to remove the second said means from engagement with said bridging conductor after the latter had lost contact with said one conductor whereupon the second said spring returns the bridging conductor to the position in which it engages both the first said conductors, the second said means being ineffective to remove the bridging conductor from said position during the movement of said plunger in the other of said directions, the second said means being a leaf spring including a portion having a position of interference with said bridging conductor during said one direction of movement of said plunger and said cam means being a ramp adjacent said position to displace the leaf spring from said position of interference after the bridging conductor has been displaced, said bridging conductor being a block and said ramp being in two parts straddling said block, the first said conductors being in parallel alignment, one supporting said block and the other having endwise engagement therewith, said plunger moving in parallel with said alignment.