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2,521,005

DOOR SWITCH FOR BURGLAR ALARM SYSTEMS

Filed April 8, 1947

4 Sheets-Sheet 3

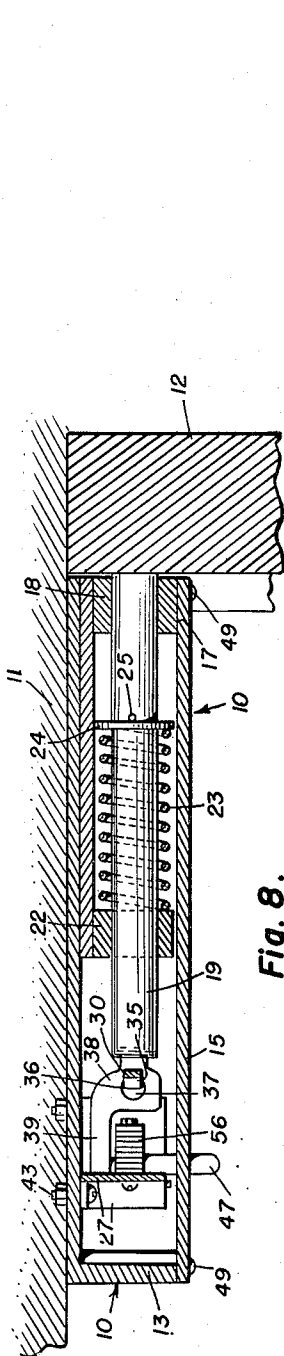


Fig. 8.

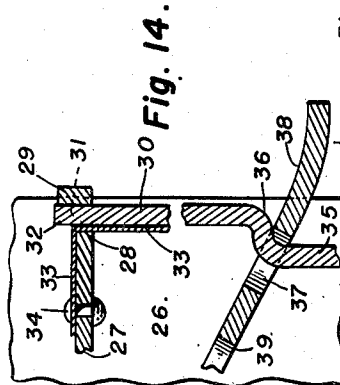


Fig. 14.

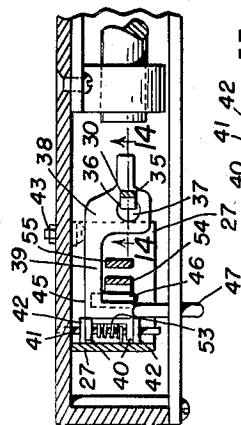


Fig. 9.

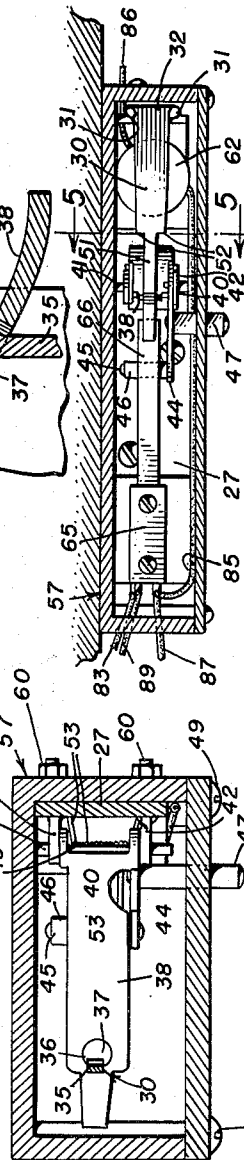


Fig. 5.

Fig. 4.

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4 Sheets-Sheet 4

Fig. 15.

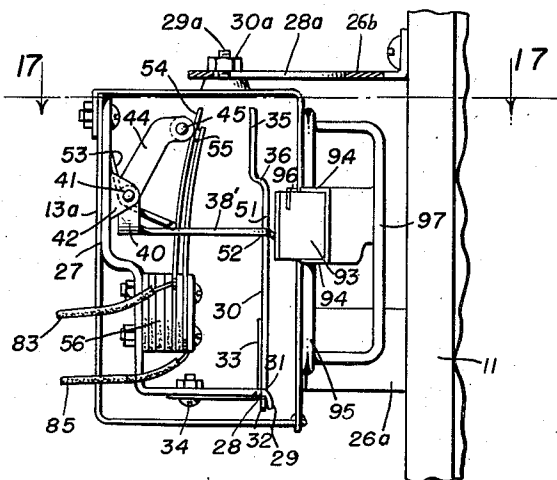


Fig. 16.

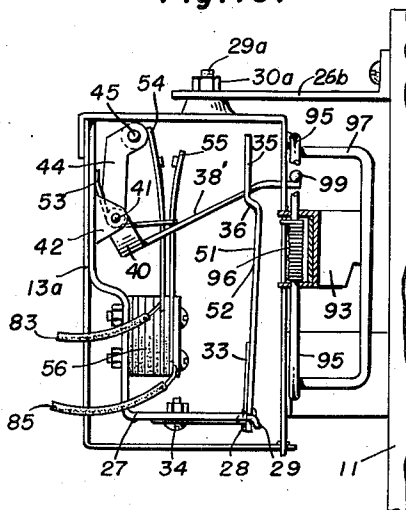


Fig. 17.

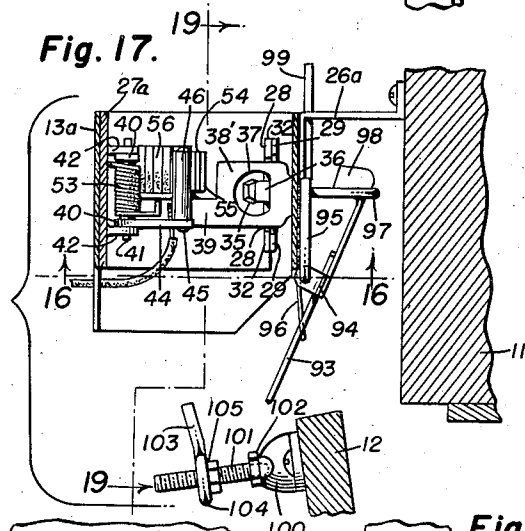


Fig. 18.

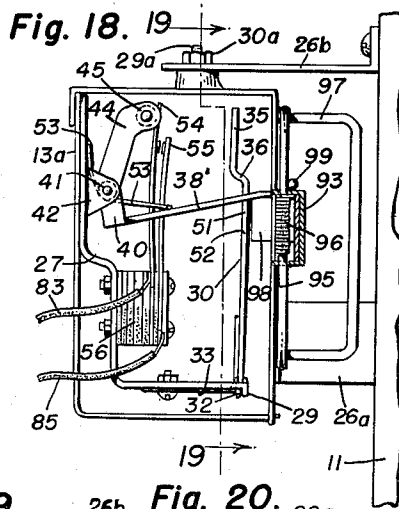


Fig. 19.

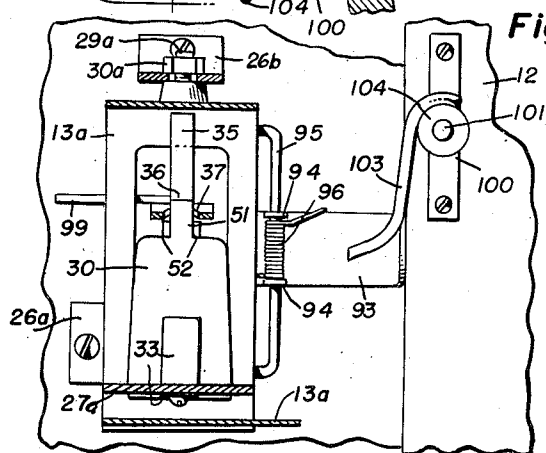
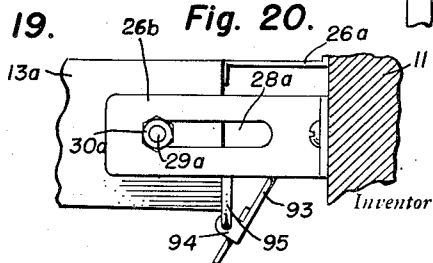


Fig. 20.



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UNITED STATES PATENT OFFICE

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DOOR SWITCH FOR BURGLAR ALARM SYSTEMS

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Application April 8, 1947, Serial No. 740,108

5 Claims. (Cl. 200—54)

1

This invention relates to a burglar alarm system for homes, adapted to sound an alarm to indicate the opening of a door or window, when unwarranted entrance is being made.

An object of the invention is to provide a burglar system which can be operated either on a battery, or from the wiring circuit of a house or building by the use of a transformer. Preferably a six volt dry cell battery or a six volt transformer reducing the line voltage of the house wiring to six volts, is used.

Another object of the invention is to provide novel door and window switches, normally open, when the doors and windows are closed, but adapted to close, upon the opening of the doors or windows, the circuit of an electro-magnetic device, operating an alarm circuit.

Another object of the invention is to provide a door switch, which can be readily applied to a door jamb in a horizontal or vertical position and which comprises contacts normally open and held by a plunger which releases the switch when the door is opened.

Another object of the invention is to provide a switch adapted for application to a window sill, and normally held open by means arranged on a window sash when the window is closed, but closed upon the opening of the window, said switch when energized, closing an alarm circuit.

Another object of the invention is to provide switches for controlling the circuits including the door and window switches and the magnetically operated switch said switches being manually operated to render the alarm circuit inoperative when it is not desired to operate the alarm, and to open the alarm circuit after the alarm has sounded, so that continued operation thereof will be prevented.

A still further object of the invention is to provide an alarm system for doors and windows which will not operate until they are actually opened and which provides for momentarily operating a magnetic switch circuit in order to close a circuit to an alarm, whereby the drain on the battery or current is only actually taking place when the alarm is sounded, and momentarily, when the switches are closed to close the circuit to the magnetic device which, in turn, closes the circuit to the alarm, thereby rendering the device economical to operate.

A still further object of the invention is to provide an alarm system which can be easily applied to doors and windows without requiring holes or special equipment to install the same or holes to be drilled into the door jamb, which

2

does not need an electrical certificate or to be approved by fire underwriters, which requires no electrical knowledge to install and which operates on a minimum of electrical current, and which can be controlled by manually operated knife switches at convenient points, in addition to being economical to manufacture and install.

Other objects and advantages reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming part hereof, wherein like numerals refer to like parts throughout, and in which:

Figure 1 is a diagrammatic view of an alarm system constructed in accordance with the invention, as applied to a door and a window.

Figure 2 is a sectional elevation, showing the door operated switch applied to a door jamb or frame and door.

Figure 3 is a sectional elevation showing a magnetically operated switch controlled by the door switch for closing a circuit to an alarm.

Figure 4 is a sectional view taken on the line 4—4 of Figure 3.

Figure 5 is an enlarged sectional view taken on the lines 5—5 of Figures 3 and 4.

Figure 6 is a view similar to Figure 2 but showing the switch thereof in position when the same is set with the door closed.

Figure 7 is a view similar to Figure 6, but showing the switch closed when the door is opened.

Figure 8 is a sectional view taken on the line 8—8 of Figure 2 but with the door closed.

Figure 9 is a sectional view taken on the line 9—9 of Figure 2.

Figure 10 is an elevation showing a window switch applied to a window frame and sash at the sill of the window with the switch open when the window is closed.

Figure 11 is a sectional elevation taken on the line 11—11 of Figure 10.

Figure 12 is an elevation of the casing of the switch shown in Figure 2.

Figure 13 is an enlarged bottom view showing the means for setting the switch shown in Figure 2.

Figure 14 is a sectional view taken on the line 14—14 of Figure 9.

Figure 15 is an elevation partly in section of a door operated switch adapted for doors opening inwardly and showing the switch closed when the door is open.

Figure 16 is a sectional view taken on the line 16—16 of Figure 17 with the switch set as in Figure 2 when the door is closed.

Figure 17 is a horizontal sectional view taken on the line 17—17 of Figure 15.

Figure 18 is a view similar to Figures 15 and 16 with the switch in position when the door is closed and before release by opening the door.

Figure 19 is a sectional view taken on the line 19—19 of Figure 18, and

Figure 20 is a fragmentary top plan view of the switch.

Referring to the drawings in detail, a switch 10 is adapted to be mounted vertically or horizontally in a door frame or jamb 11 so as to be engaged by the door 12 when closed and released when the same is opened. For this reason, the switch 10 comprises a casing or base 13 of suitable configuration to house the mechanism which is attached to the door frame or jamb as at 14 by screws or the like so as to be easily installed, without drilling holes in the door jamb or special equipment and provided with a removable cover plate 15. The end toward the door 12 has a reduced tapered neck portion 16 terminating in a cylindrical portion 17, in which a bearing collar 18 is mounted to slidably receive a plunger 19, the projecting end of which is adapted to be engaged by the face of the door 12 near its free edge usually equipped with a lock and door knobs and opening outwardly. The bearing sleeve or collar 18 is provided at the outer end of a base plate 20 detachably mounted at the base of the casing 13 as indicated at 21 or directly mounted thereon if desired. The plunger has its inner end movable in a bearing sleeve 22 on the base or attaching plate 20, and the plunger is normally projected or held outwardly by a biasing or expansible coil spring 23 mounted on the plunger 19 between the sleeve or collar 22 and a stop or washer 24 forming an enlargement on the plunger held by a cotter pin 25 or otherwise, so that the plunger is held outward toward the sleeve 18 but adapted to be pressed inwardly to its retracted position by the door when closed. The base or casing 13 may have the bottom thereof of insulating material or include an attaching plate 26 of such material detachably secured therein and mounting a switch including a bracket 27 similar to that used on magnetic relays or telephone switches having a bifurcated end 28 with spaced laterally bent lugs 29 in and beneath which an armature-like plate 30 is fulcrumed at a reduced portion formed by opposite edge recesses 31 at the bifurcation 28 forming outwardly extending lugs 32 engaging beneath the lugs 29 and held outward by a spring 33 anchored as at 34. The plate 30 has a reduced portion 35 with an adjacent right angularly bent portion 36 forming a stop shoulder for engagement through an opening 37 in a lever 38 having a reduced free end and a reduced inner portion 39 at one side as seen in Figure 9 beyond which its normal widened portion is provided with lateral pivot ears 40 fulcrumed on a pivot pin 41 held in apertured ears 42 of the bracket 27 attached to plate 26 as at 43. One of the ears 40 is formed with an arm 44 having a lateral pin 45 bearing an insulating roller 46 and inwardly thereof, with a lateral arm 47 extending through an arcuate slot 48 in the cover plate 15 to set the lever 38 and arm 44 so that the edge of the opening 37 will engage the shoulder 36 as will be later described. This may be done with the cover plate 15 in position secured as at 49 to the open side of the casing 13 which may be anchored on a baseboard 50 attached to the door jamb of the

frame 11. The arm 44 is rigid with and extends at an acute angle to the lever 38 and is resiliently held over the reduced portion 51 of the plate 30 to engage either the shoulder 36 or shoulders 52 formed by the reduced portion 51, by means of a coil spring 53 on the pivot pin 41 with the ends thereof bearing against the bracket 27 and the inside of the lever 38. A pair of spring contacts 54 and 55 are mounted in normally spaced relation between insulating or fiber blocks 56 attached to the bracket 27 and connected in circuit as will be later defined.

The system also includes an electro-magnetic switch 57 shown in Figure 1 and Figures 3, 4 and 5. The electro-magnetic switch 57 is placed at any convenient position in a house or building away from a door or window in connection with which the system works. It comprises a casing 58 suitably anchored and having a cover plate 59 detachably secured in position and has a bracket 27' secured therein as at 60, the bracket 27' corresponding to the bracket 27 except that one end 61 instead of extending parallel to the opposite end, extends at right angles thereto and is offset from the attaching portion and parallel thereto. A similar plate 30 is fulcrumed to the adjacent end of the bracket as described in connection with Figure 2 and cooperates under pressure of a spring 33 with a similar lever 38' except that the reduced portion 39 and recess extending into one side of edge to accommodate the resilient switch contacts 54 and 55 as shown in Figure 9 of the switch 10 is omitted. Lever 38' has the arm 44 and is similarly spring-pressed to cooperate with the plate 30, which in this instance forms an armature for attraction by the core of an electro-magnet 62 mounted on the correspondingly offset portion of the bracket 27' opposite the portion 61. A pair of normally separated spring contacts 63 and 64 are mounted in spaced relation between fiber blocks 65 of insulating material secured to the portion 61. Spring contact 64 is engaged by the roller 56 of the arm 44 when the arm 38' is held by the shoulder 36 of the armature plate 30. Another pair of similar mounted contacts 66 and 67 are also mounted in normally separated relation between the fiber blocks 65 to be moved in contact by engagement with the roller 46 of the arm 44 when the lever 38' is released from the shoulder 36 by attraction of the armature 30 to the core of the magnet 62 upon energization of the coil thereof. The lever 38' is adapted to be manually moved and set together with the arm 44 as is the lever and arm of Figure 2, as shown and described in connection with Figures 12 and 13 of the drawings.

In Figures 10 and 11 of the drawings, a switch is shown for employment in connection with windows in which 68 is the frame in which a lower sash 69 is movable or slidable and mounted on the same, is an angle bracket 70 secured in position in any suitable manner as by screws 71. The outstanding portion of the bracket 70 is provided with an elongated vertical slot 72 to which an insulation plate 73 having a tapered bottom edge 74 is adjustably bolted as at 75 so as to be capable of vertical adjustment to properly cooperate with the spaced contacts 76 and 77 anchored to an insulation block 78 mounted on a sill 79 of the window frame as by screws 80 and 81 forming the terminals of the contacts 76 and 77, which latter are normally adapted to spring into engagement with each other. That is, when the window sash is raised the tapered lower edge 74

5

of the insulation plate 73 moves out of the space between the contacts 76 and 77 and permits them to spring together, whereas when the sash is closed, said tapered edge will force the contacts 76 and 77 apart to open the normally closed circuit therethrough.

The switch elements or units and cooperating parts are duplicated for each door and window of a house or building and the alarm system to prevent unwarranted entrance or burglary, is set in an electrical circuit as shown in Figure 1 of the drawings, in which a source of electrical energy which may be a six volt dry cell battery 82, is connected in circuit at its positive or feed side through a conductor 83 with an interposed knife switch 84 or other form of control switch for the circuit to the contact 54 of the door switch unit 10. Of course, a six volt transformer such as used on bells or signals may be connected to the house wiring as a substitute for the battery. The contact 55 is connected by a conductor 85 to one terminal of the coil of the electro-magnet 62, the other terminal or end of which is connected by a conductor 86 to the contact 63 of the electro-magnetic switch 57 positioned at any convenient place desired in a home or building. The other contact 64 cooperating with the contact 63 is connected by a return wire or conductor 87 to the other terminal of the battery or transformer, such as the negative pole. The conductor 83 through a branch wire, also connects to the contact 66 of the electro-magnetic switch element 57 with an interposed control or knife switch 88 and the contact 67 is connected by a wire or conductor 89 with a suitable alarm, such as a bell, 90 with the return through the wire 87 to the negative pole of the battery or transformer. The conductor 85 also leads to the contact 76 of the window switch, with the return from the contact 77 through a conductor 91, through an interposed knife or other switch 92, to the conductor 83 which supplies current to said switch. The contact 76 is thus connected through the conductor 85 to the electro-magnet 62. Thus, in the operation of the system, the door 12 is opened until the plunger 19 is pushed back by the spring 23, the lever 38 of the door switch unit 10 is then moved over until it engages behind the shoulder 36 of the plate 30 and then the switch 84 is closed. The corresponding lever 38' of the electro-magnetic switch unit 57 is correspondingly moved to engage behind the shoulder 36 of the armature plate 30 and then the switch 88 in the alarm or bell circuit is closed. Thus, when the door 12 is closed against the plunger 19 at the door frame or jamb, it pushes the plunger in against the coil spring 23 to engage the inner end of the plunger with the plate 30 to swing the same inwardly against the spring 33 and unseat the shoulder 36 from the outer edge of the opening 37 in the lever 30, thus releasing the latter so that it will swing over the reduced portion of the plate 30 against the side of the bolt 13 as shown in Figure 6 of the drawings under the tension of the spring 53 while still maintaining the contacts 54 and 55 out of engagement. Also, when the windows are closed, the sash 69 will move the plate 73 between the normally engaged contacts 76 and 77 to electrically separate the latter. By holding or stopping the lever 38 against the inner side of the bolt 19, it will be prevented from going any further unless the door is opened. However, if the door is opened, the spring 23 will force the bolt outwardly to release the lever 38 and permit the spring 53 to move the arm 44 against the contact

6

54 and move it into engagement with the contact 55 as shown in Figure 7 of the drawings, when the lever 38 will move over the reduced portion 51 of the plate 30 to engage the shoulders 52 where further movement of the lever is prevented. With contacts 54 and 55 engaged, the circuit from the battery or transformer 82 with the switch 84 closed, is closed through the conductor 85 through the coil 62, conductor 86, contacts 63 and 64 closed by setting the lever 38 of the electro-magnetic switch unit 57 against the shoulder 36 of the armature plate 30 when set for operation, with the return through the conductor 87 to the source of electrical energy. This momentarily energizes the magnet 62 to attract the armature 30 thereof and release the lever 38 from the shoulder 36 so that its corresponding arm 44 will move against the contact 67 and close the same against the contact 66 while at the same time releasing the contact 64 to separate from the contact 63 and open the magnetic circuit. The alarm or bell circuit will then be closed through the conductor 83, switch 88, contacts 66 and 67, conductor 89, alarm 90 and return conductor 87 to the source 82 to sound the alarm, which can be cut off at the switch 88 at a convenient place. The same operation takes place when the window is raised to raise the plate 73 and permit the contacts 76 and 77 to engage to momentarily energize the electro-magnet 62 with the same result as when the door 12 is opened, except that in this case, the circuit to the magnet 62 is closed through the conductors 83, 91 and 85 through the switch 92 momentarily, to close the alarm or bell circuit at the contacts 66 and 67 as previously described. To again reset the system, the switches 84 and 92 are opened as well as the switch 88 and the switch units reset as previously described.

Thus, it will be seen that the door or window, of which there may be any number connected in the circuit, must be opened before the alarm will go off, but once the alarm sounds, it cannot be shut off by closing a door or window but only by opening the knife switch 88 in the alarm circuit which will be at some convenient point for the operator distant from the windows and doors. When the switch units at the doors or windows are closed, the circuit to the electro-magnet 62 is only momentarily closed to close the alarm circuit only for such period that it is permitted to operate and until the switch 88 is opened, thus economizing in the use of current. The device is also easy to install without requiring special preparation or fittings, does not need an electrical certificate or approval by fire underwriters and no special electrical knowledge in order to install the same. Obviously, the door switch can be placed horizontally or vertically on a door jamb and is in one complete unit so as to fit any door opening outwardly, as described above, or for doors opening inwardly as hereinafter described.

In Figures 15 to 20 inclusive, I have shown the switch adapted for use in connection with doors opening inwardly in connection with the system and circuit as shown in Figure 1 together with the magnetically operated switch as shown in Figure 3. In this form, the circuit closer or switch 10 is adapted to be mounted vertically or horizontally on the inside of a door frame or jamb 11, with which the door 12 cooperates.

In this form, it comprises a casing or base frame 13a connected at one side by an angular bracket or attaching portion 26a secured to the door frame or jamb detachably as shown at the side or top. In case the frame is mounted at the

side of the door opening, the top is mounted by means of a bracket 26b having an elongated slot 28a through which a clamping screw 29a carried by the frame 13a is extended and adjustably held by a nut 38a with a sliding adjustment to allow for any deviation on the surface of the door frame. The device embodies a similar bracket 27a having a bifurcated end 28 with spaced laterally bent lugs 29 in and beneath which an armature like plate 30 is fulcrumed at a reduced portion formed by opposite edge recesses 31 at the bifurcation 28 forming outwardly extending lugs 32 engaging beneath the lugs 29 and held upward by a spring 33 anchored as at 34. This switch also embodies the parts 35 to 56 inclusive as described in connection with Figures 1, 2, 6 and 7, as well as Figure 14 and corresponding parts of the magnetically operated switch or unit 57 as described in connection with Figures 3, 4 and 5 of the drawings and specifically, the structure shown in Figure 9 with respect to the switch proper. However, in order to set the plate 30 and the lever 38 as previously described, without the use of a bolt 19 adapted for doors opening outwardly, so that the right angularly bent portion 36 at the end 35 will engage the opening 37 to form a stop shoulder in the lever 38 and release the same when the door is opened inwardly, a lever 93 is pivoted at ears 94 to the bight portion of a U-shaped support 95 mounted on the side of the frame 13a toward the door and has a spring 96 on the pivot forming portion 95 with one end engaged against the frame 13a and the other against the lever 93 to hold the latter in the position shown in Figure 17 of the drawings against a limiting member 97 also of U-shaped form disposed at right angles to the pivot member 95. The adjacent end of the lever 93 has an inward angular projection 98 disposed to engage the plate 30 so that when the lever 38 is set behind the shoulder 36 at the opening 37 in the manner shown in Figure 18 of the drawings, the arm 44 will be swung over to permit the contacts 54 and 55 to separate from the normally engaged or contacting positions shown in Figure 15. To permit this, the plate 30 may swing outwardly under the action of the spring 33 by moving the lever 38 over the shoulder 36 by means of an extension 99 projecting laterally from the free end of said lever. The lever 93 engages the bight of the limiting member 97 in its normal position but the extension 98 is adapted to be moved inwardly to engage and depress the plate 30 so as to release the shoulder 36 from the edge of the opening 37 in the lever 38 and permit the lever under the action of its spring 53 to move downwardly over the reduced end of the lever 38.

In order to actuate the lever 93 by closing the door 12, the latter is provided with a bracket 100 having a threaded socket mounting a screw stud 101 which is held by a nut 102, the stud being in the form of a bolt having its head set behind the aperture of the bracket through which the stud or bolt extends. An angular arm 103 has a head 104 provided with a threaded aperture adjustably mounting it on the stud or bolt 101 and is adapted to be held in adjusted position by means of a binding nut 105 so that when the door is closed, the arm 103 will engage the free end of the lever 93 and unseat the lever 38 from the shoulder 36 so that the lever 38 will be released therefrom and move against the end 98 as shown in Figure 18 of the drawings, in which position it will be held as long as the door remains closed and until the same is opened inwardly. When this occurs,

the arm 103 will be released from its pressure against the free or inner end of the lever 93, which will swing inwardly at its free end, thereby moving the extension 98 outwardly to permit the lever 38 to be released and dropped down on the reduced inner end 51 and against the shoulders 52 so that the contacts 54 and 55 will engage as shown in Figure 15 and close the circuit to the electro-magnetic switch 57 and consequently to the alarm 90 through the source of electrical current to sound the alarm as previously described in connection with the switch unit 10.

Thus, there is comprehended within the scope of the invention, a device for use in connection with doors opening both outwardly and inwardly, together with means for setting the switch in position to operate when the door is closed and adapted to be released for closing the circuit when the door is opened. While the device is shown on a door either at one side or at the top with the frame 13a arranged vertically or horizontally, it is to be understood that the same may be positioned as desired and that the frame or casing 13a may be entirely closed except at the side toward the door in connection with which the lever 93 is mounted, so as to enclose the parts therein with the conductors 83 and 85 extending therefrom and controlled by the knife switch 84 as heretofore described. The adjustable lever on the door will also compensate for different thicknesses of the door and the device can be set to operate on doors swinging in either direction, that is right or left hand doors.

While in the foregoing there has been shown and described the preferred embodiment of this invention it is to be understood that minor changes in the details of construction, combination and arrangement of parts may be resorted to without departing from the spirit and scope of the invention as claimed.

What I claim as new is:

1. In a burglar alarm, an actuation device comprising a hollow casing adapted to be secured to a door frame, said casing having a neck portion, a bearing collar mounted in said neck portion, said bearing collar having a plunger slidably mounted therein, the outer end portion of said plunger projecting beyond the neck portion of the casing, the inner end of said plunger being supported by and movable in a bearing sleeve, said bearing sleeve being carried by an attaching plate, resilient means urging said plunger outward of said casing; an insulated bracket mounted on said casing, a member fulcrumed on said bracket, a lever having two legs bent at an acute angle fulcrumed on a pivot pin carried by said bracket, said lever having an aperture therein, said member extending through said aperture and engaging said lever, an insulating roller pivotally secured to the second leg of said lever, a coil spring on said pivot pin having its ends respectively bearing against said bracket and said first leg of said lever; said brackets having insulating blocks attached thereto, and a pair of spring contacts mounted in normally spaced relation between said insulating blocks, said spring contacts being actuated into closed relationship by said plunger actuating said member which in turn actuates said lever which presses said contacts together.

2. The structure of claim 1 wherein said resilient means comprises a coil spring, said plunger having stop means adjacent its outer end, said coil spring biasing said bearing sleeve and said stop means.

3. In a burglar alarm system, a contact making device, said device including a contact operating arm, a pivotally mounted spring pressed member connected with said arm and provided with an opening, a spring tensioned member with a restricted tongue portion projecting through said opening of the first member and provided with a step and with shoulders, said first member being adapted to be held by the step of the second member upon manual setting of the two members for interengagement, but snapping back along the restricted portion of the second member to the shoulders upon release thus moving said contact operating arm into its final contact position.

4. In a burglar alarm system, an actuation device comprising a door operated reciprocating member, a pivotally mounted spring pressed member provided with a restricted tongue portion and with a step and shoulders adapted to cooperate with said door operated reciprocating member, a spring tensioned member with an opening, said spring pressed member projecting through said opening of said spring tensioned member, said spring tensioned member adapted to be held by the step of the spring pressed member upon setting of the two members for interengagement, but snapping back along the restricted portion of the spring pressed member to the shoulders upon actuation by said door operated reciprocating member upon closing of the door subsequent to the setting, thus moving said

spring tensioned member into a trigger position conditioned to close an alarm circuit upon opening of the door.

5. The actuation device of claim 4 wherein said door operated reciprocating member comprises a spring pressed rod adapted to project from the door jamb and adapted to be moved by the door panel into a retracted position, said position releasing said spring tensioned member from its engagement with the step of the spring pressed member yet holding said spring tensioned member so as to prevent it from snapping back as long as the door is closed, said reciprocating member moving out of engagement with said projection upon opening of the door.

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