July 6, 1937. N. J. DARDEN 2,086,405

COMBINED FIRE AND BURGLAR ALARM

Filed Aug. 30, 1935 4 Sheets-Sheet 1

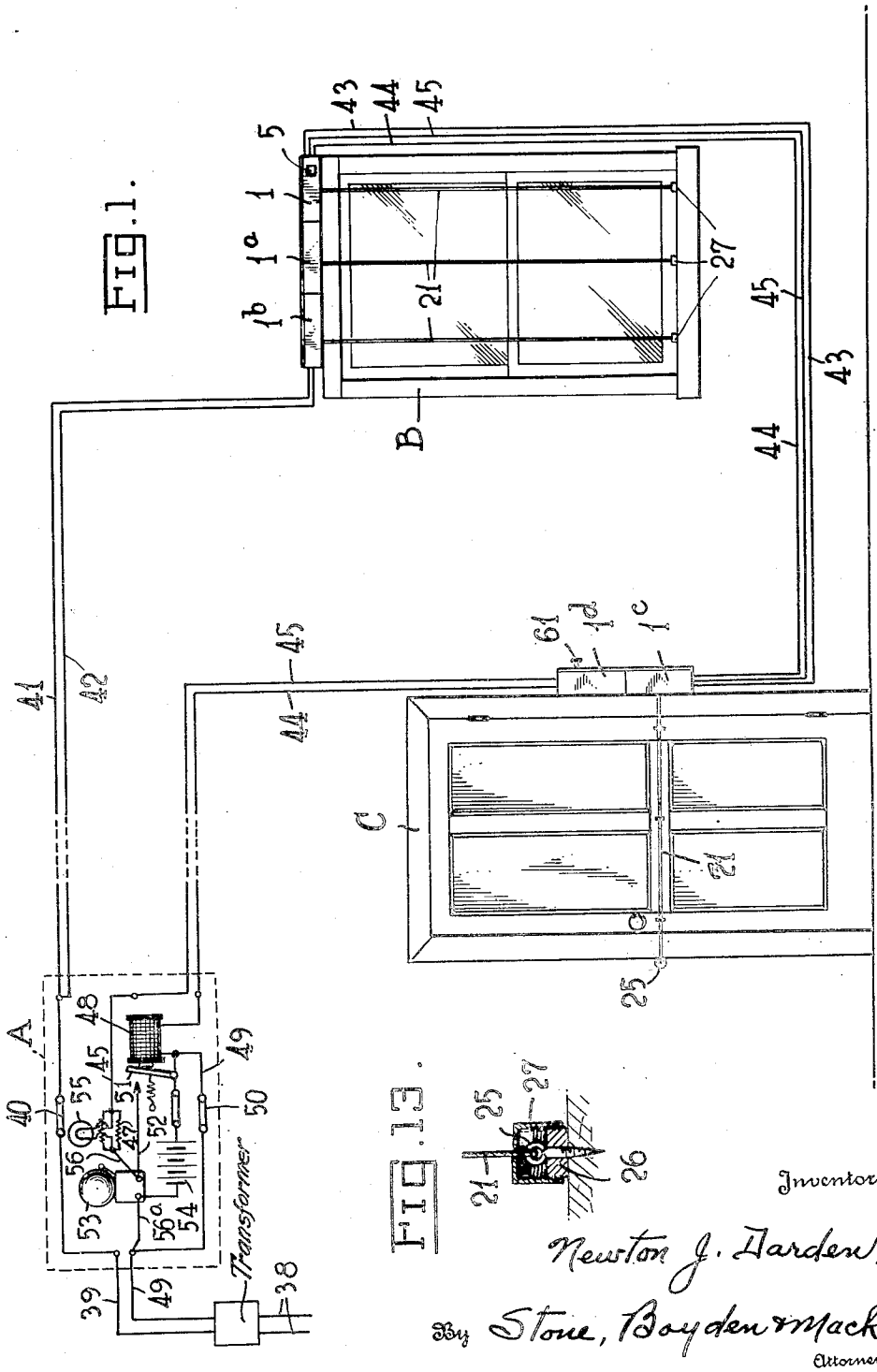



FIG. 1.



FIG. 1a.

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Filed Aug. 30, 1935 4 Sheets-Sheet 2

FIG. 2.

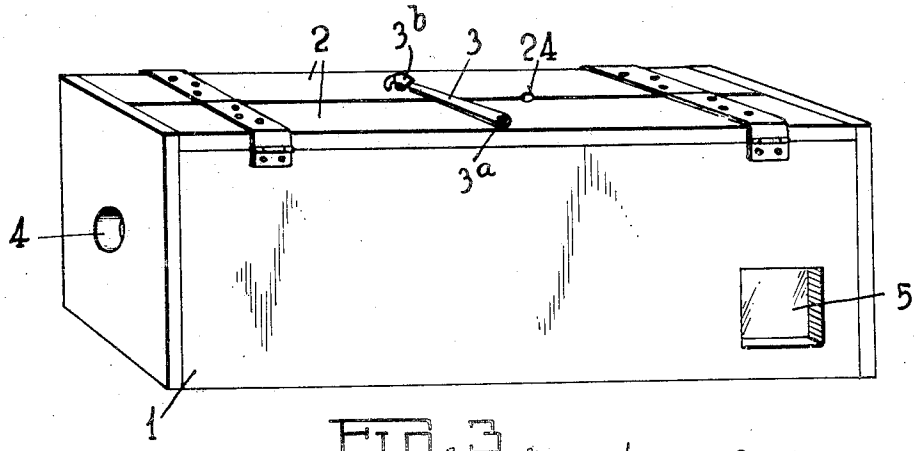



FIG. 3.

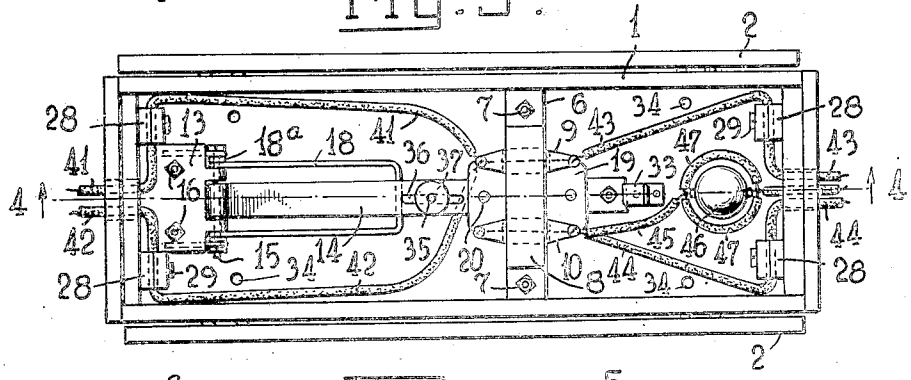
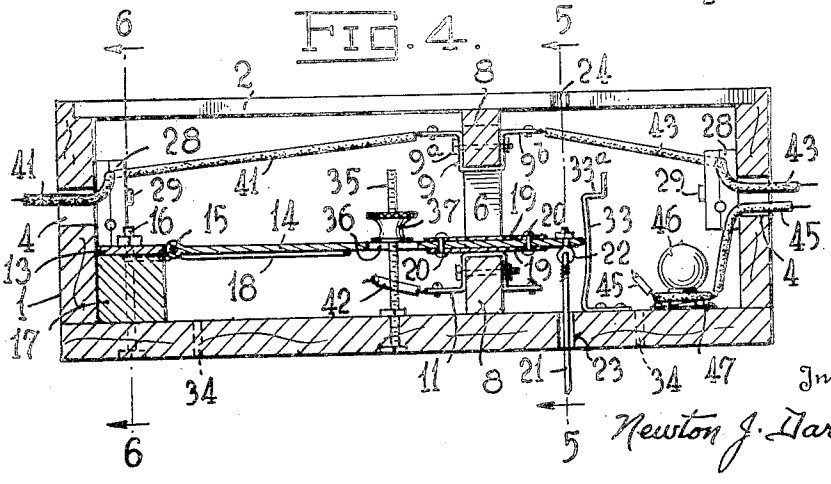



FIG. 4.




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July 6, 1937. N. J. DARDEN 2,086,405

COMBINED FIRE AND BURGLAR ALARM

Filed Aug. 30, 1935 4 Sheets-Sheet 3

Fig. 5.

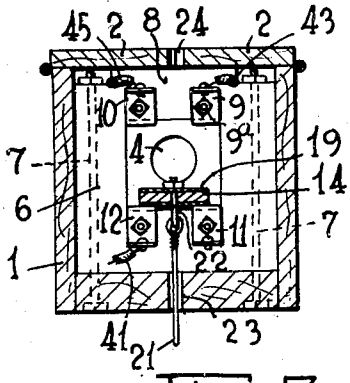



Fig. 6.

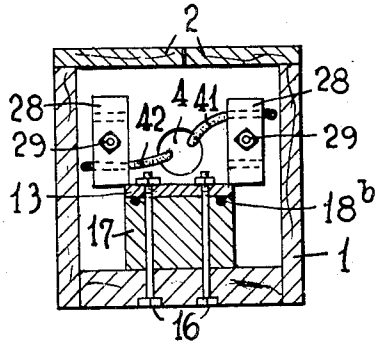



Fig. 7.

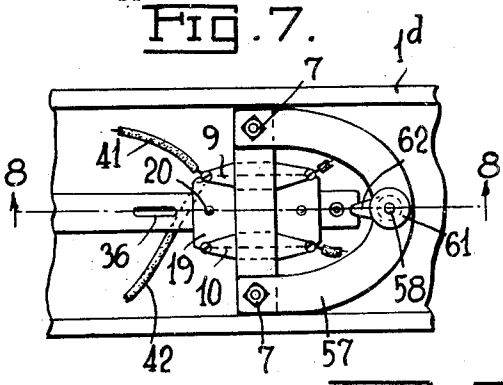



Fig. 8.

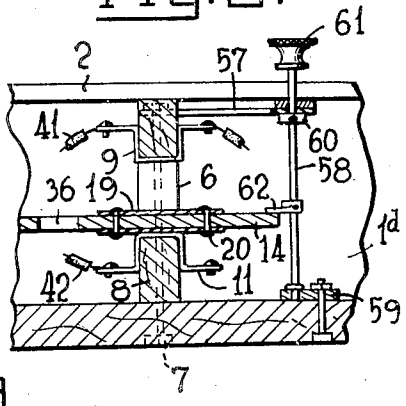
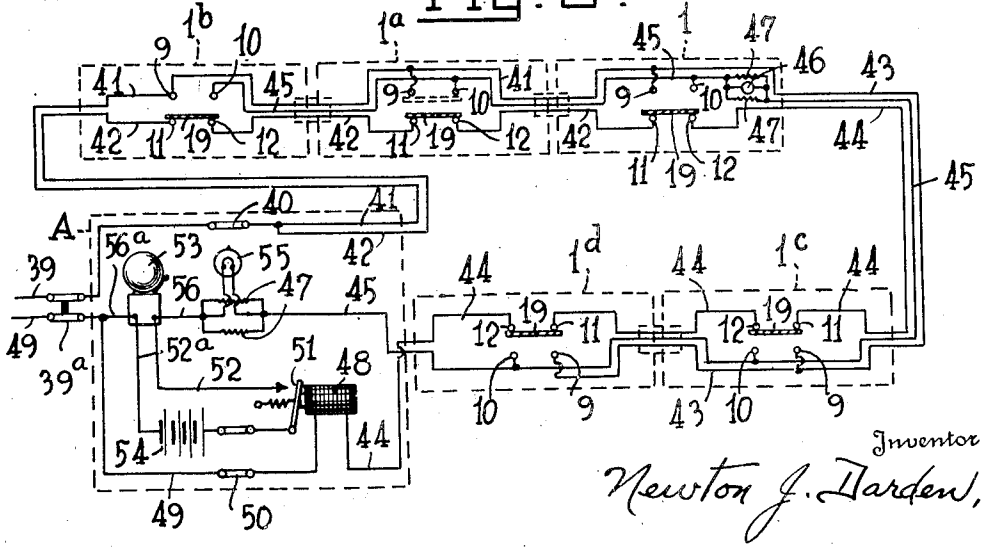



Fig. 9.




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July 6, 1937. N. J. DARDEN 2,086,405

COMBINED FIRE AND BURGLAR ALARM

Filed Aug. 30, 1935 4 Sheets-Sheet 4

FIG 10

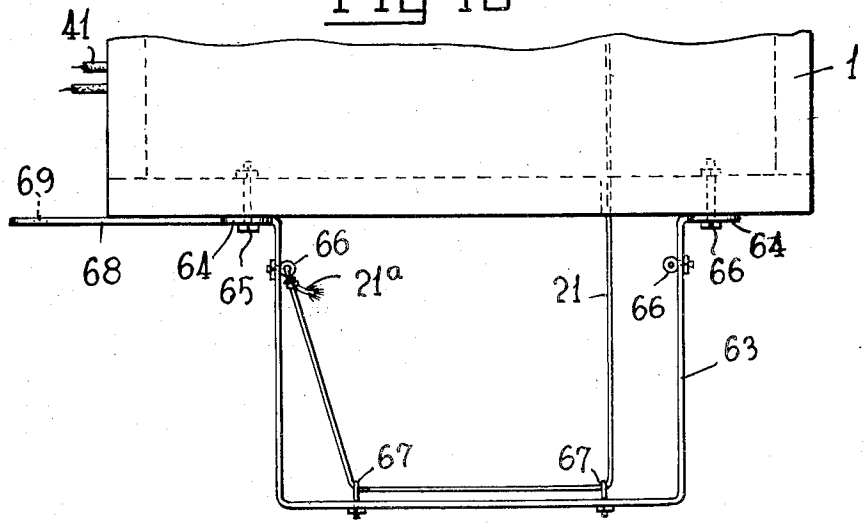



FIG. 11.

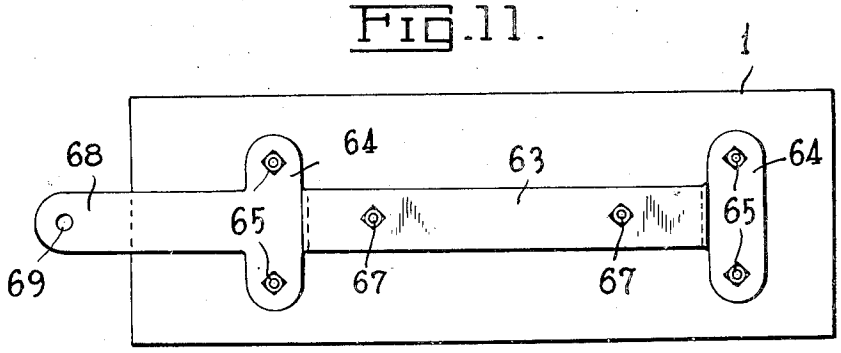
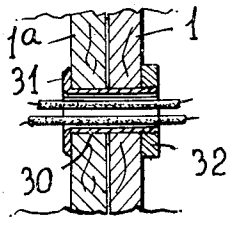



FIG. 12




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Patented July 6, 1937 2,086,405

# UNITED STATES PATENT OFFICE

2,086,405

## COMBINED FIRE AND BURGLAR ALARM

Newton J. Darden, Washington, D. C.

Application August 30, 1935, Serial No. 38,623

6 Claims. (Cl. 200—142)

This invention relates to electric signalling systems, and more particularly to a combined fire and burglar alarm.

Among the objects of the invention are to provide a system, the control apparatus for which is portable and may be mounted in any desired location adjacent doors, windows, or other openings, or may be placed at various points in storage rooms, warehouses, stores, etc., as desired; to provide control apparatus made in the form of interchangeable units, any desired number of which may be assembled to form a series as required, to meet different conditions; to provide control units of this character which are reversible and adaptable for use in different positions, according to conditions; to provide a system in which dual circuits, extending to all points to be protected, are employed and which control two separate signal devices; and to provide a system and apparatus of the type above referred to which shall be cheap and simple to construct, inexpensive to maintain, and positive, efficient and reliable in operation.

Other objects and advantages of the invention will hereinafter more fully appear as the description proceeds.

In order that the invention may be readily understood, reference is had to the accompanying drawings, forming part of this specification, and in which:

Fig. 1 is a conventional view showing the signals and circuits employed in my improved system and illustrating, by way of example, the manner in which the invention may be applied to the protection of door and window openings;

Fig. 2 is a perspective view of one of my improved control units;

Fig. 3 is a plan view thereof, with the top opened;

Fig. 4 is a longitudinal section on the line 4—4 of Fig. 3, looking in the direction of the arrows;

Fig. 5 is a transverse section on the line 5—5 of Fig. 4;

Fig. 6 is a transverse section on the line 6—6 of Fig. 4;

Figs. 7 and 8 are fragmentary plan and sectional views corresponding to Figs. 3 and 4 but showing a slightly modified construction;

Fig. 9 is a diagram showing in detail the electric circuits which I employ;

Fig. 10 is a side elevation showing a modified construction which may be employed in some cases in connection with one of my improved control units;

Fig. 11 is an inverted plan of the same;

Fig. 12 is a fragmentary longitudinal section through the meeting ends of two of my control units showing how these units may be coupled together; and

Fig. 13 is a detailed sectional view showing a method of anchoring the cords employed in connection with the invention.

Referring to the drawings in detail, and more particularly first to Figs. 2 to 6 thereof, I employ as the basis of my system signal control units such as illustrated in perspective in Fig. 2. This control unit comprises an elongated box case or cabinet 1, of rectangular form and constructed of any suitable insulating material such as hard rubber, bakelite or the like. The case is provided with a top or closure formed of two sections 2, hinged to the side walls, as shown, and locked in closed position as by means of a latch or hook 3, pivoted to one section as at $3^a$ and engaging a keeper $3^b$ on the other section.

Each end of the box or cabinet is provided with an opening 4, shown as centrally located and preferably circular in shape.

The unit illustrated in Fig. 2 is also shown as provided with a window 5 in one side near one end, for a purpose which will be hereinafter described.

Secured within the cabinet is a transverse partition comprising side members 6 and top and bottom cross members 8, the partition being secured in position as by means of bolts 7 extending down through the members 6 and the bottom of the cabinet. As clearly shown in Figs. 4 and 5, this partition constitutes a frame having a rectangular opening at the center.

Mounted on the upper and lower cross members 8 of this frame are two pairs of electrical contacts 9, 10 and 11, 12. Each of these four contacts is substantially of U-shape, embracing the cross members 8 and secured in position by means of bolts such as shown at $9^a$ in Figs. 4 and 5. The ends of these contact members extend horizontally at each side of the cross members 8, as indicated at $9^b$ in Fig. 4, and preferably carry binding screws by means of which the various circuit wires may be attached thereto.

Cooperating with these two pairs of contacts is a switch member in the form of a hinge comprising a base or fixed section 13 and a movable section or arm 14 pivotally connected by means of a hinge pin 15. The base section 13 is rigidly anchored by means of bolts 16 to a supporting block 17 at one end of the cabinet, and the arm 14 extends longitudinally of the cabinet and through the central opening in the partition or

frame 6. A spring 18 is provided for urging the switch arm about its pivot in one direction. As shown, this spring comprises a loop of resilient wire, the mid portion of which engages the arm 14 and the ends are given one or more turns about the pivot pin 15, as shown at 18a, and are anchored under the hinge section 13, grooves being preferably formed in the top of the block 17 to receive them, as shown at 18b in Fig. 6. While the spring 18 is shown as disposed on the under side of the arm 14 so as to urge it upwardly, it will be readily understood that by removing the hinge pin 15, the spring may be taken off and reversed so as to bear against the upper side of the arm 14 and thus urge it downwardly. I provide this improved reversible arrangement because, under different conditions, it may be desirable to arrange the spring on different sides of the switch arm.

Secured to the switch arm 14 near its forward end are a pair of contact plates 19, preferably of copper or the like, one lying on each side of the arm 14 and secured thereto as by means of rivets 20.

By reference to Fig. 5, it will now be seen that these contact plates 19 are adapted to engage and bridge the pairs of upper and lower contacts 9, 10 and 11, 12.

Attached to the end of the switch arm 14, as by means of an eye-bolt 22 is a combustible cord 21 which, as shown in Fig. 4, extends down through an opening 23 formed in the bottom of the box or cabinet. A similar opening 24 is formed in the top of the cabinet so that, when the spring 18 is reversed as described, the cord 21 may also be reversed and will pass out through the hole 24.

I contemplate extending this cord 21 across a door, window or other opening to be protected, and securely anchoring the same at its free end, as by means of the device shown in Fig. 13. This device comprises a screw eye 25, adapted to be screwed into the wall, door or window frame, window sill or the like. The end of the cord 21 is attached to this screw eye, and the screw eye is then enclosed by means of a cap 27, having internal threads engaging an externally threaded block 26 through which the screw eye passes. In some cases, this screw cap 27 may be omitted.

Mounted on the inside of the end walls of the box or cabinet are divided porcelain clamps or cleats 28 secured by bolts 29 and adapted to hold the insulated conductors constituting the circuit wires used in connection with the control units. Preferably these insulating clamps are arranged one on each side of the opening 4, as shown.

As mentioned in the preamble and as shown in Fig. 1, I contemplate employing a series of my improved control units in connection with the protection of window openings and the like, and in order to firmly couple these units together and protect the circuit wires passing from one to the other, I preferably employ the coupling device shown in Fig. 12. This coupling device comprises a hollow tubular bolt 30, having on one end a flange 31 and having the other end threaded and adapted to receive a nut 32. This hollow bolt is passed through openings 4 in the end walls of adjacent units 1 and 1a, so as to lock them together, and the wires are led through the hollow bolt, as shown in Fig. 12.

From the foregoing, it will be understood that with the spring 18 and cord 21 arranged as shown in Fig. 4, the tension on the cord serves to maintain the arm 14 in the position illustrated, in which it engages and bridges the lower contacts 11 and 12. Should this cord 21 be severed as by being burnt or broken, the spring 18 will immediately swing the switch arm 14 upwardly until the plate 19 engages and bridges the upper contacts 9 and 10. In order to make it impossible to restore the switch arm to its original position by means outside of the cabinet, as for example by pulling on the cord 21, I provide a safety catch 33, as shown in Fig. 4. This comprises a strip of resilient metal mounted on the bottom of the cabinet and extending upwardly adjacent the end of the switch arm 14. The upper end of the catch is provided with an offset or shoulder 33a so arranged that it will snap over and engage under the end of the arm 14, after it has been swung upwardly, so as to lock it and prevent it from being reset in its original position. In order to reset the arm, it is necessary for an authorized person to open the cabinet and release the safety catch.

In order to mount my improved cabinet or control unit on a window frame, door frame or other desired support, I provide screw holes 34 in the bottom thereof, two of these screw holes being preferably located adjacent each longitudinal side thereof. By this arrangement, the unit may be attached to the upper edge of the ordinary trim or molding surrounding a door or window opening, and either side of the unit may be so attached, as conditions may require.

Under certain conditions, as where it is desired to cut one or more units out of operation, I arrange to lock the switch arm down and thus prevent it from moving under the influence of spring 18, when cord 21 is detached from the screw eye 25. For this purpose, I mount a threaded stud or post 35 in the bottom of the cabinet directly under the switch arm 14, which stud or post extends through a slot 36 in the switch arm. A thumb nut 37 works on the threaded post 35 and by screwing this down against the arm 14, as shown in Fig. 4, the arm is locked in position and the circuit maintained at the contacts 11, 12. It will be understood, of course, that when the control unit is in normal service, the nut 37 is taken off or at least run up to the top of the post, whereby it does not interfere with the free movement of the arm.

For emergency signalling while the system is operating, and so as not to disrupt the protective circuits at doors and widows, I provide a control unit in which the switch arm is not held by a cord, but is locked in position by means of a manually releasable latch. Such an arrangement is shown by way of illustration in Figs. 7 and 8. In adapting a unit for use with an attachment of this kind, I provide a U-shaped bracket 57 mounted just beneath the top or cover 2 of the cabinet and secured in position by the bolts 7, which hold the frame 6 in place. The central portion of this bracket constitutes the upper bearing for a shaft 58, journalled at its lower end in a bearing 59, on the bottom of the cabinet and having a collar 60 engaging beneath the bracket 57 and secured to the shaft by means of a set screw. The shaft passes up through the top of the box or cabinet and has a thumb nut 61 secured to the upper end thereof, where it may be turned. Rigidly mounted on the central portion of the shaft is a latch member 62, placed at such a height as to engage over the end of the arm 14 and hold it down in normal position. By turning the knob 61, the latch 62 may be swung to one side or the other, thus

releasing the arm 14 and permitting the spring to move it up into engagement with the contacts 9, 10. A unit equipped with a manually releasable latch of this kind is designated in its entirety by the reference numeral 1d.

Referring now to Figs. 1 and 9, the manner in which my improved control units may be utilized and operated will be described.

In Fig. 1, I have shown a central signal station designated in its entirety by the character A, at which station the signal devices are located. I have also shown, by way of illustration, a window B and a door C to be protected.

In the case of the window, I contemplate arranging a number or series of my improved control units end to end across the top of the window, as illustrated at 1, 1a and 1b in Fig. 1. In the drawings, three such units are shown, but it will, of course, be understood that any desired number may be employed. It will also be clear that I contemplate making these units of such length that the cords 21 extending therefrom and stretched across the window opening will be close enough together to prevent an intruder from entering the opening without breaking one or more of the cords. These cords are anchored at their lower ends on the window sill by means of the device shown in Fig. 13.

In the case of a door such as illustrated at C, I provide only a single normal control unit 1c, but have illustrated in connection with this unit another unit 1d of the type illustrated in Figs. 7 and 8, having a manually releasable latch operated by knob 61. By releasing this latch, emergency signals may be sent as above described.

A single cord 21 extends from the unit 1c across the door and is anchored at one side by means of a screw eye 25, as above described.

Current for operating my improved system may be conveniently obtained from a suitable transformer connected to ordinary alternating current mains 38, as shown in Fig. 1. One wire 39 from this transformer, after preferably passing through a main switch 39a, as shown in Fig. 9, and a switch 40 on the signal panel, is split into two parallel connections comprising the conductors 41 and 42.

In Fig. 9, the outline of the various control units 1, 1a, 1b, 1c and 1d, as they appear in Fig. 1, is shown in dotted lines.

The wire 41 entering the end opening of unit 1b passes directly through units 1b, 1a and 1 and is connected to the contact 9 in each of these units. From contact 9 of unit 1 extends a wire 43, which emerges from the right hand end of the unit, as shown in Figs. 1, 3, 4 and 9. This wire 43 continues around to the door to be protected and enters the units 1c and 1d where it is connected to the contact 9 of each.

The wire 42 entering the left hand end of unit 1b is attached to contact 11 thereof. From contact 12, this wire continues to contact 11 of the next unit, and so on through the series. From the contact 12 of unit 1 emerges wire 44 and this is carried on through units 1c and 1d in the same way, emerging finally from the far end of unit 1d.

A third wire 45 beginning at contact 10 of unit 1b, and constituting the return conductor, coordinated with conductor 41, extends through all five of the units and, after being connected with the contact 10 of each of said units, emerges from the far end of unit 1d.

The wire 44 extends to the central signal station and is connected to one side of the winding of a relay 48, the other side of which is connected by wire 49 and switch 50 to the other side of the transformer, (see Fig. 1). By reference to Fig. 9, it will be seen that the wires 39, 42, 44 and 49 constitute a loop or series circuit including all of the contacts 11 and 12 therein, each pair of these contacts being normally bridged and connected by the contact plate 19. Thus, this is a normally closed circuit, and the relay 48 is normally energized, thus holding its armature 51 in attracted position. This armature is connected with one side of a battery 54, the other side of which is connected by a wire 52a with an electric bell 53 or other audible signal. The other side of this bell is connected by wire 52 with the back stop of the armature 51. Thus, when the above described closed circuit is broken at any point, as by means of the plate 19 moving away from the contacts 11 and 12, the relay 48 is de-energized and the armature 51 moves over against its back stop and closes the bell circuit, thus sounding an alarm.

The wires 41 and 43, together with the wire 45, provide, on the other hand, a normally open circuit to which all of the pairs of contacts 9 and 10 of the various units are connected in multiple. This open circuit is co-extensive with the closed circuit above described and, like it, passes by all of the points to be protected.

At the central signal station, the wire 45 is connected to one side of a lamp 55 or other visible signal, the other side of which is connected by wire 56 through the bell 53 and wire 56a to the wire 49 extending to the other side of the transformer. Thus, whenever any pair of contacts 9 and 10 are closed or bridged, as by the contact plate 19 moving into engagement with them, the open circuit above described is closed and the lamp 55 lighted. The current flowing through this lamp also flows through the bell 53 and assists in operating it. This is desirable in case the battery 54 should not be in good condition, or if the open circuit should fail.

It will thus be seen that upon the breakage of any one of the cords 21 due to force or fire, the plate 19 will move from the position shown in full lines at 1a in Fig. 9 to that shown in dotted lines, thus simultaneously breaking the closed circuit at the contacts 11, 12 and closing the open circuit at the contacts 9, 10. By this dual circuit arrangement, the relay 48 is de-energized, the bell circuit closed through the battery and at the same time current from the transformer is sent through both the lamp and the bell, thus insuring both a visible and audible signal.

In connection with the lamp 55, I now wish to point out what I regard as an important feature of the system. This lamp is preferably of small wattage and low voltage, and I connect it as shown in Fig. 9 in parallel with two or more shunts 47. These shunts have a resistance suitably proportioned to that of the lamp in accordance with the voltage of the transformer so that the current flowing through wires 45 and 56 will divide, part going through the lamp itself and part through the shunts 47. By properly proportioning the resistance of these shunts, the lamp will be given the voltage for which it is designed. Should the lamp become broken or burnt out, the shunts will still maintain the circuit intact so that it will function the same as before.

In the drawings, I have also illustrated the use of a small lamp, as shown at 46 in the control unit 1, this lamp being so located as to be visible through the window 5. This lamp 46 is also connected in the open circuit formed by the wire 45

and, like the lamp 55, is also provided with shunts 47. These shunts are clearly shown in Figs. 3 and 4, as well as being diagrammatically illustrated in Figs. 1 and 9.

In addition to protecting door, window and similar openings, as above described, I also contemplate employing improved control units as fire alarm devices to be located in obscure corners or other desired points of buildings, stores, warehouses, etc. To this end, I provide an arrangement such as shown in Figs. 10 and 11. To the bottom of one of my improved control units, I attach a U-shaped bracket 63, the attachment being made by means of bolts 65 passing through enlarged ends 64 formed on said bracket.

A plurality of eye-bolts 66 and 67 are secured to the several sides of this bracket, and the cord 21 is drawn down from the unit and passed through two or more of the eye-bolts 67 and then anchored to one of the eye-bolts 66. The free end $21^a$ of the cord, after having been knotted in the eye-bolt, is preferably left in a frayed or unravelled condition so as to ignite easily in case of fire.

As above stated, I contemplate placing units thus equipped at any places whatsoever which it is desired to protect, and in order to facilitate supporting the control unit, I preferably extend the bracket 63 to form a strap 68 provided at its end with an eye 69, by means of which the unit may be conveniently hung upon a nail or hook.

It will of course be understood that the dual circuit arrangement above described is also used when only a single control unit is employed, the contacts 9, 10, 11 and 12 of such unit being connected to control the audible and visible signals at the central station, the same as described in connection with Fig. 9. It will also be understood that the various circuit wires extending from the central station to the points to be protected, and between one point and another, are preferably enclosed in suitable conduit or armored cable in order to safeguard them against injury or tampering.

What I claim is:

1. Control apparatus for electric signal systems comprising a closed cabinet, a switch arm pivotally mounted therein, and capable of occupying either one of two positions, a pair of circuit controlling contacts engaged by said arm when in one position, and a different pair of circuit controlling contacts engaged by said arm when in the other position, automatic means for swinging said arm away from the first pair of contacts and into engagement with the second pair, and means inaccessible from outside of the cabinet for locking said arm in engagement with said second pair of contacts.

2. Control apparatus for electric signal systems comprising a cabinet, a switch arm pivotally mounted therein, and capable of occupying either one of two positions, a pair of circuit controlling contacts engaged by said arm when in one position, and a different pair of circuit controlling contacts engaged by said arm when in the other position, means constantly tending to swing said arm away from one pair of contacts and into engagement with the other, and means comprising a swinging latch for locking said arm in engagement with said first pair of contacts when desired.

3. Control apparatus for electric signal systems comprising two pairs of contacts, spaced apart, a switch arm adapted to swing between said pairs of contacts so as to engage either pair, a spring tending to urge said arm toward a pair of said contacts, said spring being reversible, so that it may be set to urge the arm toward either pair of contacts desired, and releasable means serving to normally maintain said arm in engagement with the other pair.

4. Control apparatus for electric signal systems comprising an elongated cabinet, a switch arm pivotally mounted near one end and extending longitudinally thereof, two pairs of contacts, spaced apart, between which said arm is arranged to swing, a cord under tension attached to said arm and operable in either of two directions therefrom as desired, opposite walls of said cabinet being formed with openings through which said cord may pass, and a spring tending to urge said arm toward one pair of said contacts, said spring being reversible so that it may be set to urge the arm in either direction, in accordance with the direction in which said cord extends.

5. A control unit for electrical alarm systems comprising an elongated closed cabinet having a transverse partition therein having an opening therethrough, dual pairs of electrical contacts mounted on said partition at opposite edges of said opening and means for connecting wires of a plurality of electrical circuits thereto, said cabinet having openings in its end walls for the passage of circuit wires; a movable switch member mounted in said cabinet and extending into said opening and adapted to engage said pairs of contacts, and means for supporting said cabinet adjacent to any opening of a building that it is desired to protect.

6. Control apparatus for electric signal systems comprising a cabinet, a transverse partition therein having an opening therethrough, dual pairs of electrical contacts supported within said opening and means for connecting wires of a plurality of electrical circuits thereto, a switch arm pivotally mounted near one end of said cabinet and extending longitudinally thereof through said opening, said arm adapted to swing between and engage either of said pairs of contacts, and a cord under tension attached to said switch arm and serving to maintain it in engagement with one pair of contacts.

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