July 29, 1941. W. L. FOSS 2,250,828

ALARM SYSTEM CONTROL

Filed Feb. 21, 1938 3 Sheets-Sheet 1

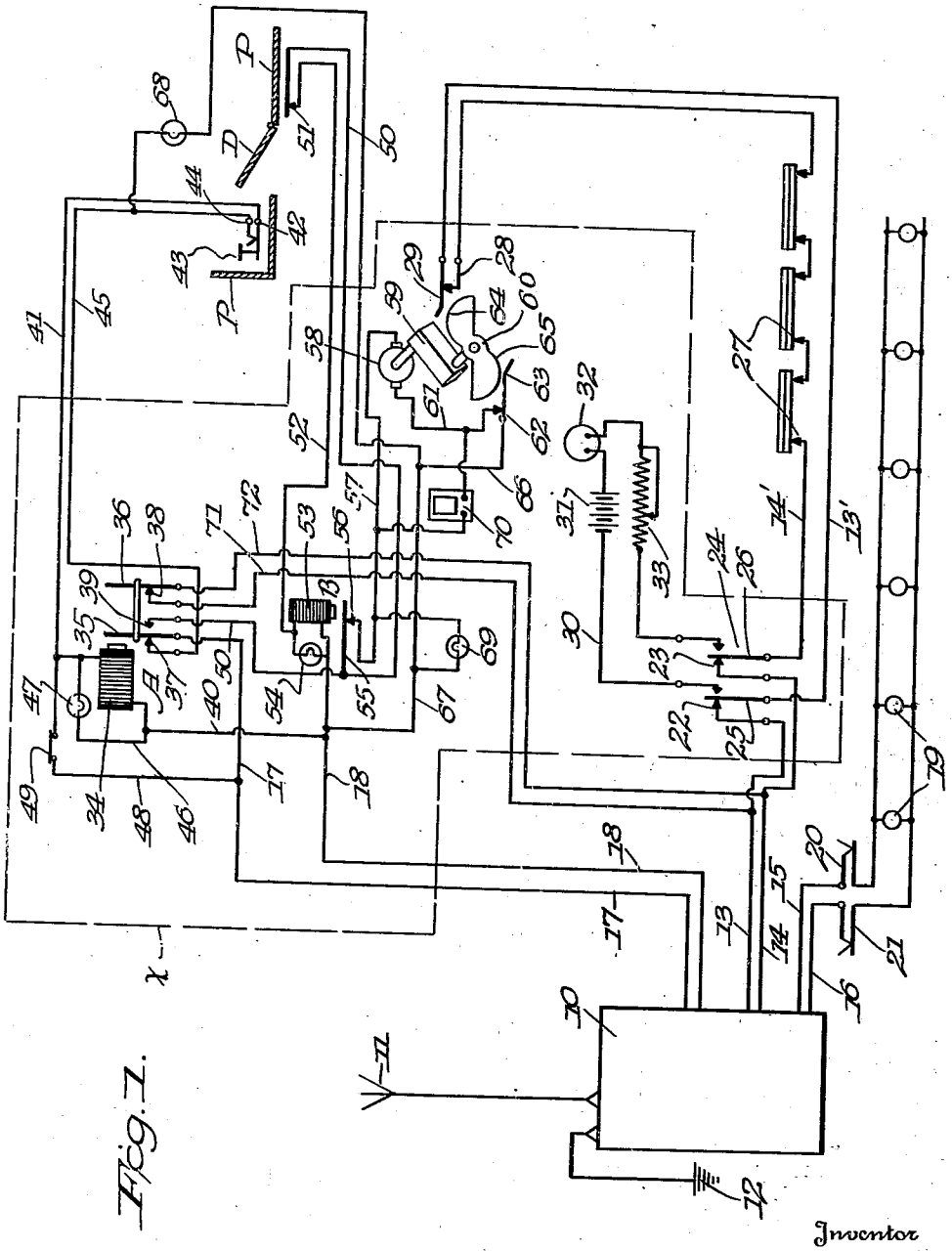


Fig. 1.

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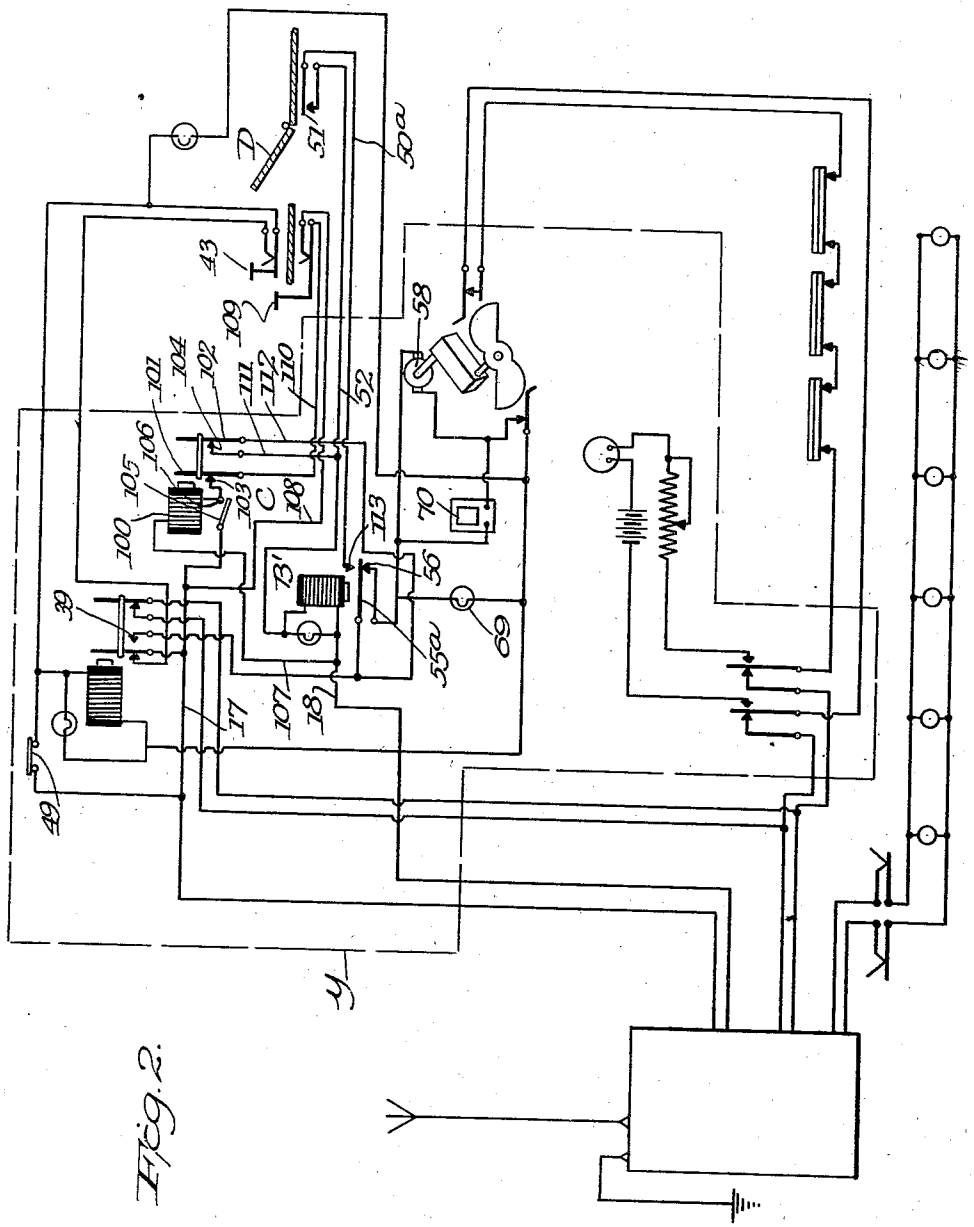


Fig. 2.

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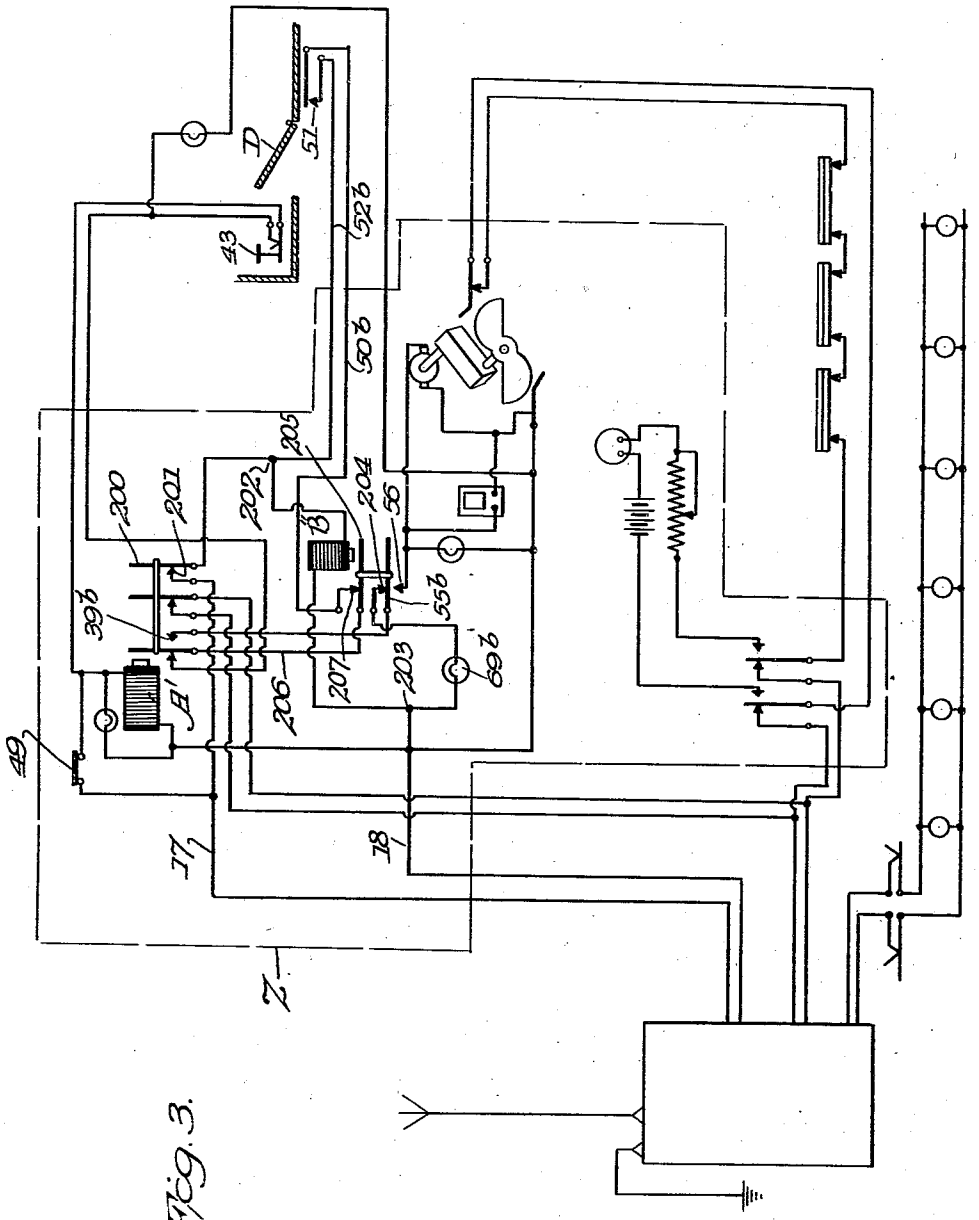


Fig. 3.

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ALARM SYSTEM CONTROL

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Application February 21, 1938, Serial No. 191,786

9 Claims. (Cl. 177—314)

This invention relates to control provisions for alarm systems and has as an object the elimination as far as possible, of the sending of a false alarm by an authorized person entering the protected premises.

According to the invention, the alarm system is preferably placed in operative condition from outside the building, or other enclosed premises, and desirably at a point convenient to the door designated for final exit and initial entrance. When this door is subsequently opened, it will immediately set in operation a time delay device which, after a predetermined period, will set off the alarm, but this period is sufficient so that an authorized person, by means known to him, but assumedly not known to an unauthorized person, will have time therein to turn off the system and thereby prevent a false alarm.

The circuits shown in the accompanying drawings, while of general application, are particularly designed for use in connection with radio alarm systems such as are shown in the copending applications of James O. Howton, Serial No. 184,713, filed January 12, 1938, and Serial No. 191,788, filed February 21, 1938.

In order that the invention may be thoroughly understood, I have shown typical embodiments in the accompanying drawings, in which:

Figure 1 shows schematically the new control system in connection with radio broadcasting apparatus;

Figure 2 shows the system of Figure 1 but with an additional safety provision; and

Figure 3 also shows the system of Figure 1 with the additional safety feature of Figure 2 applied in a different manner.

Referring to Figure 1, reference numeral 10 designates a cabinet contemplated as containing a radio transmitter in connection with an antenna 11 and ground 12 and containing also suitable connections whereby to operatively connect either the burglar circuit, including the wires 13 and 14, or the fire circuit, including the wires 15 and 16, with controls for alarm message producing means and the transmitter. Further, the cabinet 10 is here contemplated as containing a battery from which are led the positive wire 17 and the negative wire 18.

The fire circuit includes a requisite number of normally open thermostats 19 connected in parallel with wires 15 and 16, the thermostats being suitably disposed in various parts of the protected premises. For test purposes, the wires include the jacks 20 and 21.

The burglar circuit wires 13 and 14 are led to the contacts 22 and 23 of a double pole double throw switch designated generally at 24 and including the swingable arms 25 and 26. With the switch 24 set as shown, a circuit can be completed through the various window and door switches, the former being generally designated at 27, and through a switch 28 having a projecting control arm 29 normally biased to closed position.

With the switch 24 in reverse position, wires 13' and 14' are connected to a circuit 30 which includes a battery or set of batteries 31, a milliammeter 32 and a variable resistance 33 by means of which the burglar circuit may be tested when desired.

A relay A includes a coil 34 and contactor arms 35 and 36 adapted to move in unison and normally biased away from the coil. When the coil is energized, arms 35 and 36 engage relay contacts 37 and 38, respectively. When the coil is deenergized arm 35 engages a relay contact 39.

One end of coil 34 is in connection with wire 18 through a wire 40, the other end of the coil being in connection through a wire 41 with one terminal 42 of a push button 43 in an accessible position just outside the outwardly swinging door D of the protected premises whose enclosing walls are shown in part at P. The other terminal 44 of the push button is in connection with contact 37 through a wire 45. A circuit 46 around coil 34 contains a white light 47. A wire 48 connected to wire 17 in advance of relay A joins wire 41 and has interposed therein a switch 49.

Contact 39 is connected by a wire 50 with a door switch 51 which, as here shown, is so associated with door D that when the door is closed the switch is closed, and when the door is opened the switch opens. The other side of switch 51 is connected by a wire 52 with one end of the coil 53 of a relay B, the other end of the coil being in direct connection with line 18. Connected around the coil is a green lamp 54. Relay B includes a contactor arm 55 which is in connection with wire 50 and is biased to a closed position with a relay contact 56 when coil 53 is deenergized. Contact 56 is connected by a wire 57 with one brush of a motor 58 of a time delay device which includes reduction gearing 59 and an S-shaped cam 60 which is rotated at a relatively slow predetermined speed when current is supplied to motor 58. The other motor brush is connected by a wire 61 into a

normally closed switch 62 which includes a projecting control arm 63. This arm and arm 29 are positioned in the plane of cam 60 but out of its zone of immediate action. Upon a sufficiently continued rotation of the cam, arm 29 will ultimately be engaged by the cam surface 64 and arm 63 by the cam surface 63 so that the switches will be opened. The other side of the switch 62 is connected by a wire 65 with a wire 67 leading from conductor 18 to a light 66 or other local signalling device distinguishable outside the door D, and thence to wire 45. A red light 69 is connected between wires 57 and 67, and a buzzer, or similar sound signalling device 70 is connected between wires 57 and 61.

Wires 71 and 72 extend from wires 13 and 14 of the burglar circuit to contact 38 and arm 36, respectively.

The mode of operation is as follows:

The system is assumed to be in daytime position with switch 49 closed and relay A consequently energized through wires 40 and 48 and light 47 showing. Relay arm 36 is in engagement with contact 38 and consequently the burglar circuit is short-circuited through wires 71 and 72. Accordingly, any opening of windows or doors will have no effect on the broadcasting apparatus. Switch 24 is assumed to be in the position shown. Light 68 is burning.

Before leaving the premises, the operator authorized to set the system opens switch 49, relay A remaining energized by the circuit established through push button 43. The operator now leaves through door D and closes and locks the latter. Switch 51 is thus closed. The operator is reminded by light 68 that the final setting operation has to be carried out and this operation consists in the actuation of push button 43. If the operator has not opened switch 49, the status quo will not be changed by operation of the push button and the continued burning of light 68 will show the operator that switch 49 is still closed. However, with the switch 49 opened, depression of push button 43, previously without effect, will cause the deenergization of relay A so that arm 35 will move away from contact 37 and against contact 39 and arm 36 will simultaneously move away from contact 38. Light 68 will be extinguished. Due to the break at contact 37, push button 43 is without further effect, and due to the break at contact 38, the short has been removed from the burglar circuit and the latter is now in protective condition, assuming that the various protective switches, as at the windows and doors, are closed.

Due to the closing at contact 39 of relay A, a circuit is completed to coil 53 of relay B through door switch 51, and light 54 shows. Arm 55 is moved from contact 56 so that no current can reach motor 58, lamp 69 and buzzer 70.

If now door D should be opened switch 51 opens so that coil 53 of relay B is de-energized and a circuit is established through relay arm 55 and contact 56 to motor 58, lamp 69 and buzzer 70. The timing of cam 60 is such that the authorized person has an opportunity to reach switch 49 and close it, and is reminded to do this by the light 69 and the buzzer 70. The presence and/or location of switch 49 is assumedly unknown to unauthorized persons. When switch 49 is thus closed, the relay assumes the condition shown so that current supply to the motor 58, lamp 69 and buzzer 70 is broken at point 39, push button 43 is again placed in circuit, and the alarm circuit is shorted out.

If, upon opening door D, switch 49 is not closed within the prescribed time, cam surface 64 will engage arm 29 so that switch 28 in the alarm circuit will be opened and an alarm will immediately be broadcast. When cam surface 65 simultaneously or later engages arm 63 to open switch 62 the motor circuit will be interrupted and the cam will stop in a position wherein switch 29 is held open. Lamp 69 will continue to function and buzzer 70 will be silent. It may be stated that the holding open of switch 28 is not necessary in the systems described in the above mentioned applications since according to those systems the momentary opening of the burglar circuit affects a relay which throws the broadcasting apparatus into action. The relay must be manually reset and cannot be reset merely by again closing the alarm circuit.

The system shown in Figure 2 is like that of Figure 1 except that provisions are made so that when the door switch 51 is once opened, it is rendered, thenceforth, ineffective so that closing of the door will not effect reenergization of relay B' and consequent interruption of the current supply to the motor 58, lamp 69 and buzzer 70. To this end a third relay C is provided, this relay having a coil 100 and contactor arms 101 and 102 normally biased away from relay contacts 103 and 104, respectively. Wire 17 is continued to a switch 105 which includes a fixed contact 106 to which one end of coil 100 is connected, the other end of the coil being connected by a wire 107 with wire 18. The switch contact 106 is in electrical connection with relay contact 103.

A wire 108 extends from wire 17 to one point of a push button 109 whose other point is connected by a wire 110 with relay arm 101. Push button 109 is positioned adjacent push button 43 so as to be readily accessible at the outside of door D.

The contact 104 of relay C is connected by a wire 111 with wire 52 and arm 102 of relay C is connected by a wire 112 to the arm 55*a* of relay B'. The latter relay is provided with an additional contact 113 which is engaged by the arm 55*a* when the relay is energized whereby to complete a connection to door switch 51 through wire 50*a*.

With the system in the day position shown, coil 100 of relay C is energized through switch 105 and a circuit is completed to push button 109 through arm 101 and contact 103, but the push button is without effect because switch 105 is closed. When the premises are to be closed for the night, switches 49 and 105 are opened by the operator, but this has no effect other than to place the control of the coils of relays A and C in the push buttons 43 and 109, respectively. When the operator has gone out through door D and closed and locked the same, he presses push button 43 with the result that an energizing circuit is completed to the coil of relay B' through contacts 39 and 104 of relays A and C, respectively. Arm 55*a* of relay B' is thrown into engagement with contact 113. When push button 109 is now depressed, relay C is deenergized so that its contacts are broken, thus placing door switch 51 in control of the energization of relay B' through contact 113. When the door D is opened, thereby opening switch 51, the action of the system is the same as described in connection with Figure 1, except that in this instance the circuit to the switch is interrupted at 113. If the door were immediately

closed, it would have no effect on the operation of the system, since the closing of switch 51 will be without effect due to the breaks at point 113 of relay B' and at point 104 of relay C. An alarm will be broadcast unless switch 49 is closed during the period allowed by the time delay switch.

The purpose of those features of Figure 3, which are in addition to the basic system of Figure 1, is the same as in Figure 2, namely, to take all control function from door switch 51 once it has been opened with the system in night condition.

Referring to Figure 3, relay A' has added thereto a contactor arm 200 and a fixed contact 201, the latter being in connection with line 17 and the former being led to a terminal 202 and thence to one end of the coil of relay B'' whose other end is in connection with line 18 at a terminal 203. Arm 200 closes when relay A' is energized and opens when the relay is deenergized—in other words it acts in unison with the other arms of the relay.

Relay B'' is provided with the contactor arm 55b in connection with contact 39b of relay A'. Arm 55b is cooperable with contact 56 of the motor circuit as before, but when relay B'' is energized and A' is deenergized the arm engages a contact 204 so that a green light 69b between it and terminal 203 is lighted.

Relay B'' has a second contactor arm 205 in connection with line 17 through the wire 206. It moves in unison with arm 55b and when the relay is energized engages a contact 207 so that conductor 59b is closed up to the door switch 51. The other side of switch 51 is in connection with terminal 202 through a wire 52b.

With relay A' energized, the coil of relay B'' is connected across lines 17 and 18 so that the contactor arms 55b and 205 occupy the position illustrated and green light 69b shows. When switch 49 is opened, door D closed, thus closing switch 51, and push button 43 depressed, relay A' will be deenergized as before so that a break will occur at contact 201. However, an energizing circuit for the coil of relay B'' will now be established between wires 17 and 18 through the door switch 51 and contact 207 of relay B''. If the door D is now opened, switch 51 is also opened, so that relay B'' is deenergized and due to the break at contact 207 reclosing of switch 51 cannot again cause energization of relay B''. Consequently, the time delay mechanism will operate and an alarm will be broadcast unless switch 49 is closed in time.

In Figures 1, 2 and 3 the outlines *x*, *y* and *z*, in dash lines, are intended to designate cabinets or trays in or on which the inclosed apparatus may be mounted to form a convenient unit.

It will be understood that the invention is not limited to the illustrative disclosure herein, but extends to equivalent arrangements and devices falling within the scope of the following claims. In referring, in the claims, to "disturbance of" a burglar circuit is meant the affecting of the circuit, in a manner appropriate to the particular circuit, to disturb its normal current condition so that it is conditioned to cause operation of the alarm signal means.

I claim:

1. In an alarm system for enclosed premises, said system including a burglar circuit and alarm signalling means actuated upon disturbance of said circuit, a control system including a circuit for shorting the burglar circuit whereby to render the latter ineffective, a switch in said shorting circuit for controlling the same, electromagnetic means for controlling said switch, energizing circuits for said electromagnetic means having a common point of connection with the latter, a switch inside the premises for controlling one of said energizing circuits, and a switch for controlling the other of said energizing circuits accessible outside the premises and operable to cause said electromagnetic means to break the shorting circuit only subsequent to a prescribed manipulation of the inside switch.

2. In an alarm system for enclosed premises, said system including a burglar circuit and alarm signalling means actuated upon disturbance of said circuit, a control system including a circuit for shorting the burglar circuit whereby to render the latter ineffective, a switch in said shorting circuit for controlling the same, electromagnetic means for controlling said switch, energizing circuits for said electromagnetic means having a common point of connection with the latter, a switch inside the premises for controlling one of said energizing circuits, a switch for controlling the other of said energizing circuits accessible outside the premises and operable to cause said electromagnetic means to break the shorting circuit only subsequent to a prescribed manipulation of the inside switch, and a switch in said other of said energizing circuits and controlled by said electromagnetic means to render the last named circuit ineffective after operation of said outside switch has caused operation of said electromagnetic means to break the shorting circuit.

3. In an alarm system for enclosed premises, said system including a burglar circuit and alarm signalling means actuated upon disturbance of said circuit, a control system including a circuit for shorting the burglar circuit whereby to render the latter ineffective, a switch in said shorting circuit for controlling the same, electromagnetic means for controlling said switch, energizing circuits for said electromagnetic means having a common point of connection with the latter, a switch inside the premises for controlling one of said energizing circuits, a switch for controlling the other of said energizing circuits accessible outside the premises and operable to cause said electromagnetic means to break the shorting circuit only subsequent to a prescribed manipulation of the inside switch, a switch in said other of said energizing circuits and controlled by said electromagnetic means to render the last named circuit ineffective after operation of said outside switch has caused operation of said electromagnetic means to break the shorting circuit, a local signalling device distinguishable exteriorly of the premises, and a circuit for said device controllable by said circuit breaker subsequent to the prescribed manipulation of said inside switch, said device being operative while said shorting circuit is operative.

4. In an alarm system for enclosed premises, said system including a burglar circuit and alarm signaling means actuated upon disturbance of said circuit, the premises including an entrance door, a control system including delayed action means adapted to disturb said burglar circuit, a circuit for controlling said delayed action means, electromagnetic means for controlling said control circuit, a door switch, a circuit including said electromagnetic means and door switch, said door switch affecting the last-named circuit in such manner when said door is opened that through the consequent action of said electromagnetic means said control circuit is conditioned to acti-

vate said delayed action means, a switch inside the premises operable to recondition said control circuit whereby said delayed action means is rendered inactive before it has been effective to disturb said burglar circuit, and means operated upon actuation of said door switch to render the latter incapable of affecting said electromagnetic means if the door is reclosed.

5. In an alarm system for enclosed premises, said system including a burglar circuit and alarm signaling means actuated upon disturbance of said circuit, the premises including an entrance door, a control system including a door switch controlled by said door, a time delay switch in said burglar circuit, a circuit for controlling the activation of said time delay switch, a switch in said control circuit, the last named switch being normally open in the night-time condition of the control system, electromagnetic means for controlling said normally open switch, a circuit including said electromagnetic means and said door switch, said door switch affecting the last-named circuit in such manner when said door is opened that through the consequent action of said electromagnetic means said normally open switch is closed and completes said control circuit so that the time delay switch is activated, and a switch inside the building operable to break said control circuit so as to interrupt the activation of said time delay switch before the latter has been effective to disturb said burglar circuit.

6. In an alarm system for enclosed premises, said system including a burglar circuit and alarm signaling means actuated upon disturbance of said circuit, the premises including an entrance door, a control system including a door switch controlled by said door, a time delay switch in said burglar circuit, a circuit for controlling the activation of said time delay switch, a switch in said control circuit, the last named switch being normally open in the night-time condition of the control system, electromagnetic means for controlling said normally open switch, a circuit including said electromagnetic means and said door switch, said door switch affecting the last named circuit in such manner when said door is opened that through the consequent action of said electromagnetic means said normally open switch is closed and completes said control circuit so that the time delay switch is activated, and a switch inside the building operable to break said control circuit so as to interrupt the activation of said time delay switch before the latter has been effective to disturb said burglar circuit, the circuit which includes the door switch and electromagnetic means including another switch controlled by said electromagnetic means when the door switch is operated by the opening of the door to render the door switch incapable of affecting said electromagnetic means as the door is reclosed.

7. A control system according to claim 6 wherein said normally open switch and the other switch controlled by said electromagnetic means have a movable switch element in common.

8. A control system according to claim 6 wherein an auxiliary circuit is provided for taking control of said electromagnetic means from said door switch, and wherein means are provided for controlling said auxiliary circuit.

9. A control system according to claim 6 wherein an auxiliary circuit is provided for taking control of said electromagnetic means from said door switch, wherein means are provided for controlling said auxiliary circuit, and wherein said auxiliary circuit is normally energized in daytime condition of the control system.

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