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H. A. MEARS  
BURGLAR ALARM SYSTEM

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3 Sheets-Sheet 1

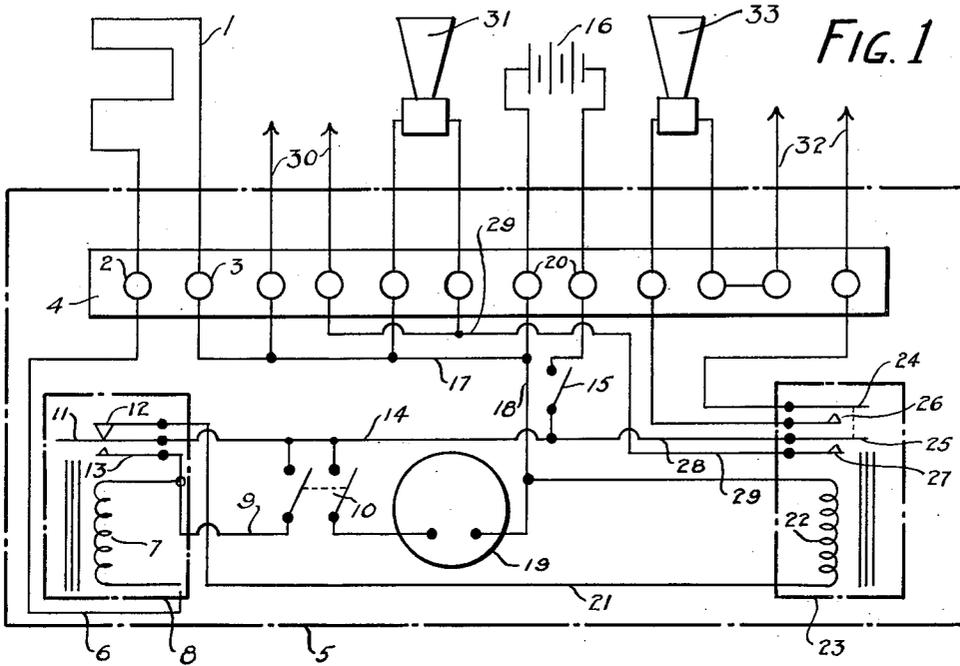


FIG. 1

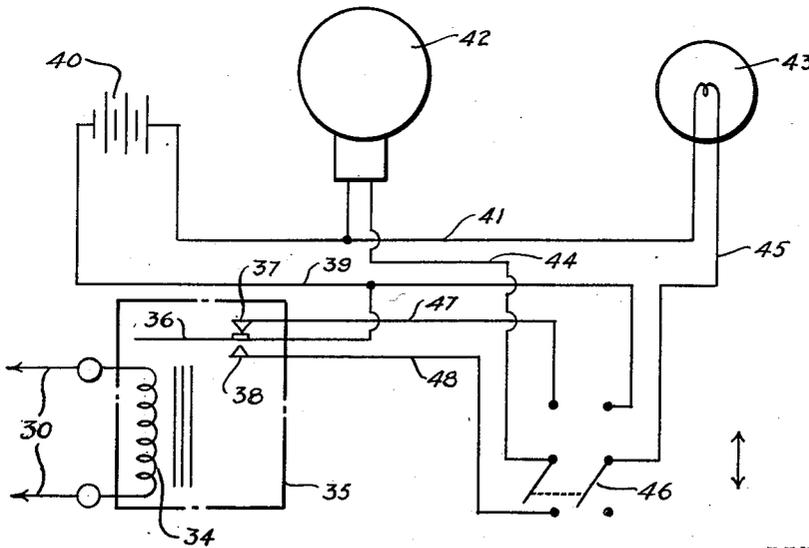


FIG. 2

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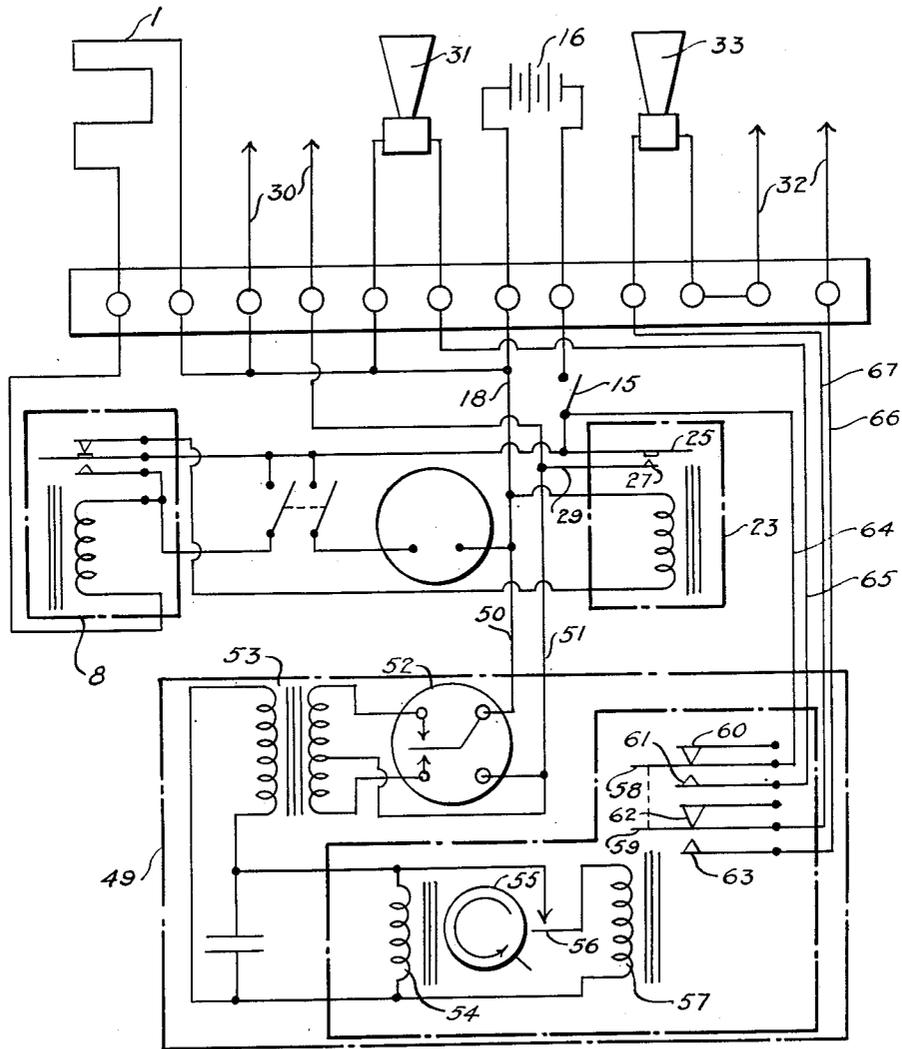


FIG. 3

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3 Sheets-Sheet 3

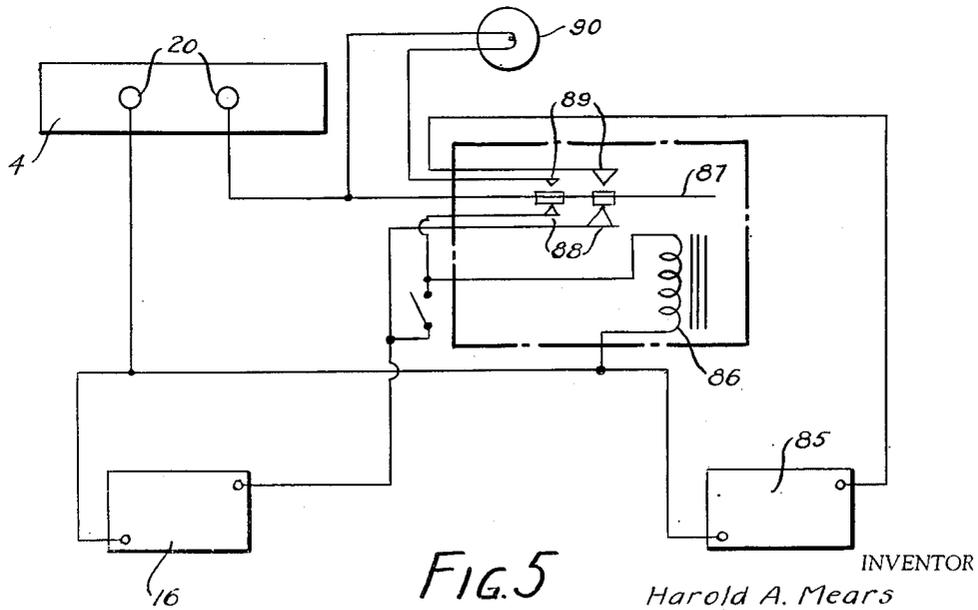
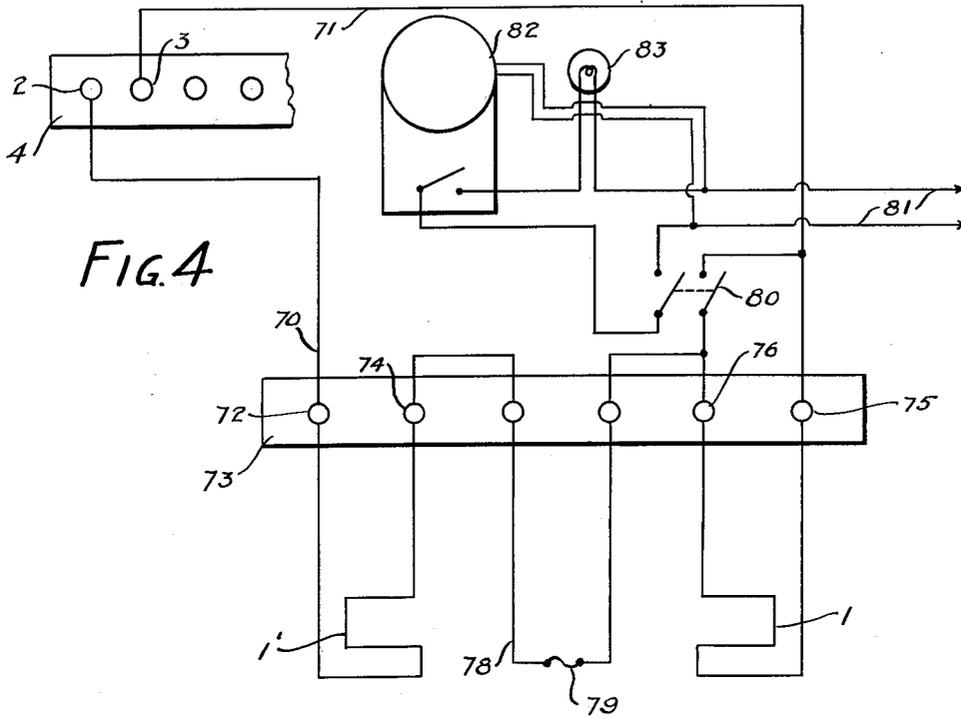


FIG. 5

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1

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## BURGLAR ALARM SYSTEM

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5 Claims. (Cl. 340—276)

This invention relates to improvements in Burglar Alarm Systems, such as are adapted for protecting mercantile premises and for other purposes.

Most burglar alarm systems as proposed heretofore have utilized a source of electric current which is not always dependable. Where a storage battery is used as the source of current, it stands without use for a considerable period of time and when called into use there is no assurance that it is active and will function as desired. On the other hand, if a power line is used as the source of electric current, it also is subject to being disconnected either by cutting the power line or detaching it in some way, so that it also is not effective and reliable when needed.

One object of this invention is to improve the construction of burglar alarm systems to provide for a source of electric current therefor which is constantly available as readily detected or observable without liability to failure and without dependence upon a power source which may be disconnected.

Another object of the invention is to improve the characteristics of a burglar alarm system by providing for detection at a remote point, such as the transmission of a signal over a line to a suitable indicator, such as a lamp or audible signal, where the operation of the alarm will be evident and responsive action can be set into motion.

Still another object of the invention is to provide for an element of surprise in a burglar alarm system by time delay in the operation of the alarm after the initiating of the action by the opening or closing of a signal circuit. Thus, the signal elements, such as electric lamps or audible signals, can be set into motion a predetermined time after the alarm circuit has been opened or closed, as for instance five minutes or ten minutes, so that the burglar will not know of the detection of his activities, particularly if he should try to disconnect the source of electric current.

Still another object of the invention is to improve the characteristics of the alarm circuit both as to the control thereof and as to the source of electric current therefor, to insure of proper and desired function and detection under controlled conditions.

In carrying out these objects, I have provided a system which utilizes an electric storage battery as at least one source of current, with provision to show that the battery is constantly charged with an available source of current to insure of proper operation of the system when required. Provision is made also for the utilization of a power line as an additional source of current for the operation of an additional signal device when desired, but this is utilized merely as an auxiliary source and the system will function, nevertheless, even if the auxiliary source should be disconnected or otherwise rendered non-available.

The invention also contemplates the provision of various alarm characteristics, any or all of which may be used in the system to improve the detection thereby and proper operation of the system at all times. These features may involve a time delay in the operation of the signal device, an indicator at a remote point, such as a central station, police station, etc., which is actuated by the opening or closing of the alarm circuit, and a control so as to adapt the alarm circuit to actuation under different conditions or times, as for day and night operation.

2

Certain embodiments of the invention are illustrated in the accompanying drawings, in which:

Fig. 1 is a diagrammatic view of a burglar alarm system showing one form of this invention;

Fig. 2 is a similar view showing a remote controlled central office indicator;

Fig. 3 is a view similar to Fig. 1 but with a time delayed control for the signal device;

Fig. 4 is a diagrammatic view showing a day and night control circuit; and

Fig. 5 is a diagrammatic view illustrating an auxiliary source of current.

This invention will be described first in connection with the protective alarm system illustrated in Fig. 1, which shows a general arrangement of such a system suitable for mercantile establishments and similar premises. In such a protective system the guarded premises usually are provided with a protective wiring arrangement extending over windows, doors and other points where a burglar may seek to enter. It would also be possible, however, to adapt the system to the protection of desks, showcases and other objects, the tampering with which may be indicated by such a system.

As shown in Fig. 1, I have illustrated diagrammatically a closed wire circuit, generally indicated at 1, which may be applied in the form of foil or in other suitable way over the object, window, door, etc. that is to be protected, in the customary manner of providing such a wiring circuit for burglar alarm systems in general. While I have illustrated and described a closed circuit for this purpose, it will be appreciated that with some modification the system may be made operative, either by a closed or open circuit, and will detect the opening or closing thereof as the case may be.

The protective circuit 1 or wiring arrangement is connected at opposite sides to leads 2 and 3 on a control panel 4. This control panel, preferably, is a part of a control unit, generally as indicated at 5 in Fig. 1. These parts enclosed thereby may be contained within an effective closure, such as a locked box or case, where tampering therewith is not possible.

One side of the circuit wiring 1 from the contact 2 is connected through a wire 6 with one side of the coil 7 of a relay, generally indicated at 8. The opposite side of the coil 7 is connected through a wire 9 with a bipole switch, generally indicated at 10.

The relay 8 includes a movable contact 11 and fixed contacts 12 and 13, the latter of which is connected with the wire 9 while the movable contact 11 is connected with a wire 14 that extends therefrom through a switch 15 to one side of a storage battery 16 as a source of 6-volt electric current.

The opposite side of the storage battery 16 is connected to wires 17 and 18, the former extending to the terminal 3 of the circuit wiring 1, while the wire 18 extends to a suitable indicating meter, such as shown at 19, to indicate the condition of the storage battery 16, preferably a voltmeter. The opposite side of the meter 19 is connected through one pole of the switch 10 to the wire 14.

The connections to the battery 16 are made through terminals 20 on the terminal panel 4, which terminal and panel may be used if desired, but is preferably a part of the control unit 5 as a convenient means of connection of the respective circuits with the operating parts of the control unit.

It will be apparent that the parts are shown in Fig. 1 in the de-energized condition of the circuit with the switches 10 and 15 open as shown. This is the condition when the alarm system is not in operation.

Upon closing of the switches 10 and 15, a circuit will be completed from one side of the storage battery 16 through the wire 18 to one side of the meter 19, thence through the right hand contact of the switch 10 and the connected portion of the wire 14 to the switch 15, thence back to the opposite side of the storage battery 16. This circuit will indicate immediately on the meter 19 whether or not the battery 16 is sufficiently charged so as to be effective in operation. This indication will be given to the attendant immediately upon setting of the circuit

into condition for use and thus he will know that the source of current is available for effective operation.

At the same time, the closing of the switches 10 and 15 will have completed a circuit from the switch 15, wire 14, left hand contact of the switch 10 and wire 9 to one side of the coil 7, thence through the coil 7 and the wire 6 to the circuit wiring 1. From the opposite side of the circuit wiring 1 the wire 17 leads to the opposite side of the battery 16. This will be a closed circuit in the embodiment described and illustrated when the circuit wiring 1 is unbroken or not tampered with. The closing of this circuit will energize the relay 8 to attract the movable contact 11 thereof into engagement with the contact 13. Such action will close a circuit from the wire 14 through the contacts 11 and 13, thence through the coil 7 of the relay 8 and act as a holding coil for the relay, maintaining it in its energized position even though the switch 10 then be opened. It will be apparent that the switch 10 need only be closed momentarily long enough to indicate on the meter 19 the condition of the battery 16 and at the same time to energize the relay 8, after which this switch 10 then may be opened. A double pole push button switch may be sufficient for this purpose.

This is the normal condition of the system when in operation so long as the circuit through the wiring 1 is maintained closed. If the circuit at 1 is broken by the tampering therewith in any manner, it is evident that the relay 8 will be de-energized immediately and thereupon the movable contact 11 being released by the electro-magnetic coil 7, will return automatically into engagement with the contact 12. Such engagement will close a circuit from the wire 14 through the contacts 11 and 12, thence through a wire 21 leading to one side of an electro-magnetic coil 22 of a relay 23. The relay 23 has movable contacts 24 and 25 in position to be attracted upon the energizing of the electro-magnetic coil 22 into engagement respectively with relatively fixed contacts 26 and 27, thereby closing circuits at the respective contacts. These, like the other relay contacts described herein, may be spring contacts of the character usually employed in such electro-magnetic relays.

The contact 25 is connected through a wire 28 with the switch 15, which thereby connects this contact with one side of the source of electric current provided by the battery 16. The cooperating contact 27 is connected through a wire 29 leading to one side of a signal circuit, generally indicated at 30, as hereinafter described, which preferably extends to a remote point, such as over a telephone line, the return side of which is shown in Fig. 1 as connected with the wire 17, thence to the opposite side of the battery 16. It will be appreciated that upon energizing of the relay 23, a circuit is closed through 25—27 to the remote signal circuit 30 to give an appropriate indication at such remote point of the breaking of the wiring circuit 1, thereby indicating a tampering with the building or other protected part, or a burglary.

Also connected across the lines 17 and 29 in parallel with the remote signal circuit 30 is an annunciator 31, shown as an electrically operated audible signal or horn, which will be energized upon the closing of the contacts 25—27. Either or both of the annunciators 30—31 may be used and in either event the tampering with the protected device will be indicated thereby upon the breaking of the circuit 1.

Provision is made also for an additional indication by means of a power circuit, generally indicated at 32, one side of which is connected with the contact 24. The opposite side of the power circuit 32 is connected through the connecting panel 4 with a suitable signal, either visual or audible, indicated generally at 33, an electrically operated siren being shown for purpose of illustration. The opposite side of the signal device 33 is connected with the contact 26. The power circuit 32 may be of any suitable character desired, such as a source of 110 volts or 220 volts, as customarily available in houses or buildings.

Thus, it will be apparent that upon breaking of the circuit wiring 1 by the tampering with or entering of the protected device, portion of a building, etc., the relay 8 will be de-energized, which thereby will cause energizing of the relay 23. This in turn will cause operation of the signal devices 31 and 33 immediately, and at the same time, if the remote indicating circuit 30 is utilized, it will cause the transmission to the remote point of an indication thereof. Thus, in the event that the power available

by the battery 16 should not be sufficient to operate the more strongly effective signal device 33, the latter, nevertheless, may be operated because of the available source of high voltage current through the power line 32. If the power line 32 should not be operative because of its being cut, disconnected or for any other reason, nevertheless sufficient power would be available by the battery 16 to operate the signal device 31 and to transmit a signal to the remote point, if the latter be used, through the line 30, thus insuring of immediate detection of the burglary or the like.

One form of remote signal device that may be used, if desired, is shown diagrammatically in Fig. 2. As thus indicated, the circuit 30 is shown as connected with an electro-magnetic coil 34 of a relay 35. The relay 35 includes a movable contact 36 normally in engagement with a fixed contact 37 when the relay is de-energized, as shown in Fig. 2, but capable of being moved into engagement with a fixed contact 38 upon energizing of the relay 35.

The movable contact 36 is connected to a line 39 which leads to one side of a source of electric current, such as a battery 40. The opposite side of the battery 40 is shown as connected through a line 41 having one or more annunciators connected therewith, two of which are illustrated as an audible signal or bell 42 and an electric lamp 43 forming a visible signal. These signal devices 42 and 43 are shown as connected at one side with the line 41 and at the opposite side through lines 44 and 45, respectively, with a switch, generally indicated at 46. One side of the switch 46 at the right in Fig. 2 is shown as connected with the lines 39 and 45. The opposite side of the switch 46 is connected with the line 44 and with lines 47 and 48 extending therefrom, respectively to the contacts 37 and 38 of the relay 35.

When the relay coil 34 is energized by the transmission of a current through the line 30, as described above, the contact 36 will be attracted and moved into engagement with the contact 38. If the arms of the switch 46 are in their lower position, which is the normal operating position of the parts, the closing of a circuit at 36—38 will complete a circuit therefrom through the line 39, battery 40, line 41, audible signal 42, line 44, left hand arm of the switch 46, and line 48, to energize the audible signal 42.

On the other hand, if the switch 46 is turned to its upper position, the energizing of the relay 35 would break a circuit at 36—37 from one side of the battery 40, through the line 39, contacts 36—37, line 47, left hand arm of switch 46, line 44, signal 42, back to the battery 40. With the switch 46 in its upper position, the visible signal 43 will be energized constantly until the switch 46 is opened. The latter, however, is an emergency connection and normally the position of the switch 46 will be as described above.

In the circuit shown in Fig. 3, the operating parts of the system are utilized substantially as described above, but in addition there is provided a time delay relay, generally as indicated at 49, for delaying the action of the annunciators 31 and 33 a suitable period of time, although transmitting a signal immediately through the line 30, to throw the burglar off guard and give sufficient time for detection of his activities. The same parts used in the system shown in Fig. 3 are correspondingly numbered, and repetition of the description thereof is not necessary. The relay 49 is diagrammatically shown and adapted to be of standard or any well-known or suitable construction, and may be varied as desired.

In this form, the relay 23 has only the contacts 25 and 27, the contacts 24 and 26 being made a part of the relay 49. These contacts 25 and 27 will be closed upon the breaking of the circuit 1 and the de-energizing of the relay 8, as described above. This in turn will close the circuit through the remote signal line 30 to an annunciator connected therewith at a remote point, such as that described above and illustrated in Fig. 2.

Also connected with the wires 18 and 29 are lines 50 and 51, respectively leading to opposite sides of a time controlled switch 52 which, upon energizing of the relay 23, will close a circuit to a time controlled switch member 52 forming a part of the relay 49 to the primary of a transformer 53 thereof, alternately energizing opposite phases of the transformer. This in turn energizes an electro-magnetic coil 54 that controls the turning motion of a manually set timing device 55, such as by a

5

ratchet action, to close a circuit at 56 to an electro-magnetic relay coil 57 which is in series therewith.

The coil 57 controls a series of contacts, such as spring contacts as described above, including movable contacts 58 and 59 and fixed contacts 60, 61, 62 and 63. Normally, when the relay coil 57 is de-energized, the movable contacts 58 and 59 are in engagement respectively with the contacts 60 and 62. Upon energizing of the coil 57, the contacts 58 and 59 are attracted and moved into engagement with the contacts 61 and 63 respectively.

The contact 58 is connected through a wire or line 64 with the switch 15, thence with one side of the battery 16. The contact 61 is connected through a line 65 leading to one side of the audible signal 31, the opposite side of which signal is in turn connected with the opposite side of the battery 16. Thus, upon closing of the contacts 58—61, the signal 31 will be energized, which, however, will not occur until after the time delay switch 55 has been operated to the required extent according to the setting thereof to close the switch 56. This switch may be set for operation after any desired interval of time, such as five minutes following the breaking of the circuit wiring 1.

One side of the power line circuit 32 is connected through a line 66 with the contact 63. Upon energizing of the relay coil 57, this circuit will be closed through 59—63 with a line 67 leading to the opposite side of the audible signal 33, which latter also will be energized upon the actuation of the relay following the desired setting of the time delay thereof.

It will be apparent that according to this form of the invention, the audible signals 31 and 33 will be energized only following a lapse of time after the breaking of the circuit, but this will not occur until some time after the energizing of the remote signal through the line 30, so as to give sufficient lapse of time for watchmen or police to arrive at the scene of the burglary before actuation of the annunciators there, as at 31 and 33. This will serve to throw the burglar off guard until such time as help has arrived.

Provision may be made, if desired, for the operation of the protective system either as a night circuit used to avoid burglary, the breaking into buildings through doors or windows, etc., or as a day time protective system suitably wired to cages, desks and other portions of the buildings or objects, one form of which is shown in Fig. 4. As there illustrated, in place of the circuit wiring 1 connected with the binding posts 2 and 3, are attached lines 70 and 71 that lead to an auxiliary protective circuit adapted for alternate use either during the day time or at night.

The line 70 extends to a binding post 72 on a panel 73. A second binding post 74 on the panel cooperates with the post 72 to form terminals for the day time wiring circuit, generally indicated at 1', which may be in the form of wires, tape, etc., connected with desks, cages and other articles to be protected during the day time.

The line 71 extends to a terminal 75 which cooperates with a terminal 76 to connect the circuit wiring 1 with the panel 73, the wiring 1 being of the character described above for protecting doors, windows, etc., especially during night time use.

Connected in series with the respective circuit wirings 1 and 1' is shown a fire alarm circuit, generally designated at 78, which may include fusible links 79 or other means operated upon excessive temperatures to break the circuit. This circuit 78, as will be noted, is in series with the night time circuit and with the day time circuit, so that it will operate to control either of these and cause the sounding of an alarm in the event that the circuit 78, or either of the others, should be broken.

These circuits may be controlled by a master switch 80, one pole of which switch 80, when closed, serves also to connect one side of the fire circuit 78 with the return line 71, thereby short-circuiting the wiring and completing a circuit through the line 70, wiring 1', circuit 78 and switch 80 to the line 71. This provides protection for day time use both against burglary or tampering, as well as against fire. Then when the switch 80 is opened, the wiring 1 is connected in series with the circuits 1' and 78 and complete protection is provided thereby for night use, both of the cages, etc. as in day time operation, and also of the windows, etc., in addition to the fire protection by the circuit 78.

6

The switch 80 serves also to connect a source of electrical supply, such as a power line for a housing circuit, indicated at 81, with a time controlled circuit breaker 82 which is connected in a circuit with an indicator 83, such as an electric lamp. Thus, it is possible to set the clock 82 so as to close the circuit to the lamp 83 at a predetermined time, to call attention to the necessity for changing the system from day to night operation. This will not be required, however, if an automatic clock control is connected with, or used in place of, the switch 80, and these parts then may be omitted.

A further modification is shown in Fig. 5, in which the circuit for the battery 16 is shown as provided with a second battery 85 as an auxiliary source of power, connected in parallel with the battery 16. A relay 86 is shown as normally energized to hold a switch arm 87 in engagement with contacts 88, between which a connection is made through the switch arm 87, the coil of the relay 86 being connected in parallel with the battery circuit of the battery 16. Upon de-energizing of the relay 86 by the reduction in current of the battery 16, the movable contact 87 springs upward, due to its inherent resiliency, into engagement with contacts 89, which thereby close a circuit connecting the auxiliary battery 85 with opposite sides of the battery circuit connected to the terminals 20 of the terminal panel 4. An indicator 90 may be connected in this auxiliary circuit, if desired, to show that the main battery 16 needs recharging or replacement. Thus, provision is made for the continued operation of the system without interruption in the event that the current of the main battery is discontinued for any reason.

It will be appreciated that the present system will operate under varying conditions to provide effective control of the annunciator system with full assurance of operation, and the provision of current for such operation under varying conditions.

While the invention has been illustrated and described in certain embodiments, it is recognized that variations and changes may be made therein without departing from the invention, except as specified in the claims.

I claim:

1. An electric burglar alarm system comprising a protective loop adapted for connection with a source of electric energy, a first manually operated switch, a second manually operated switch, a relay having an actuating winding and a normally open and a normally closed switch, a primary circuit for said relay winding including in series the protective loop, the source of energy and the two manual switches, a secondary circuit for said relay including in series the protective loop, one of the manual switches, the winding of the relay and the normally open switch of the relay, whereby the relay is first energized in the primary circuit upon closure of the two manually operated switches if the loop is intact, and is held energized by the secondary circuit independent of one of the manually operated switches as long as the loop is intact, control means for a pair of alarm circuits comprising a second relay having an actuating winding and a pair of normally open switches, a third circuit including in series the winding of said second relay, said normally closed contacts of said first relay, said source of energy, and the other manually operated switch, and a pair of alarm circuits, one of said alarm circuits including in series said source of energy, said other manually operated switch, one of said normally open switches of said second relay, and electrically operated alarm means, and the other of said alarm circuits including in series the other of the normally open switches of said second relay, an electrically operated alarm means, and a source of energy.

2. An electric burglar alarm system comprising a protective loop adapted for connection with a source of electric energy, a first manually operated switch, a second manually operated switch, a relay having an actuating winding and a normally open and a normally closed switch, a primary circuit for said relay winding including in series the protective loop, the source of energy and the two manual switches, a secondary circuit for said relay including in series the protective loop, one of the manual switches, the winding of the relay and the normally open switch of the relay, whereby the relay is first energized in the primary circuit upon closure of the two manually operated switches if the loop is intact, and is held energized by the secondary circuit independent of one of the manually operated switches as long as the loop is intact, control means for a plurality of alarm circuits comprising

7

a second relay having an actuating winding and a pair of normally open switches, a third circuit including in series the winding of said second relay, said normally closed contacts of said first relay, said source of energy, and the other manually operated switch, one of said alarm circuits including in series said source of energy, said other manually operated switch, one of said normally open switches of said second relay and electrically operated alarm means, a second alarm circuit including in series the other of the normally open switches of said second relay, an electrically operated alarm means, and a source of energy, and control means for a third alarm circuit comprising a third relay having an actuating winding and a normally open and a normally closed switch, a circuit including in series the source of energy, one of said normally open switches of said second relay, the other of said manually operated switches, and the winding of said third relay, and a third alarm circuit including in series said normally open switch of said third relay, a source of energy and electrically operated alarm means.

3. An electric burglar alarm system comprising a protective loop adapted for connection with a source of electric energy, a first manually operated switch, a second manually operated switch, a relay having an actuating winding and a normally open and a normally closed switch, a primary circuit for said relay winding including in series the protective loop, the source of energy, and the two manual switches, a secondary circuit for the relay including in series the winding of the relay, and the normally open switch of the relay, whereby the relay is first energized in the primary circuit upon closure of the two manually operated switches if the loop is intact, and is held energized by the secondary circuit independent of one of the manually operated switches if said loop is intact, time controlled means for an alarm circuit comprising an electric time-controlled normally opened switch and a second relay having an actuating winding and a normally open switch, a circuit including in series said source of energy, said normally open switch of said first relay, the winding of said second relay, and the other of said manually operated switches, and an alarm circuit including in series said source of energy, said normally closed contacts of said first relay, the normally open contacts of said second relay, said other of said manually operated switches, and electrically operated signal means.

8

4. An electric burglar alarm system comprising a protective loop adapted for connection with a source of electric energy, a relay having an actuating winding and a normally open and a normally closed switch, a primary circuit for said relay winding including in series the protective loop and the source of energy, a manually operated switch connected in said primary circuit for controlling said circuit, a secondary circuit for said relay including in series the protective loop, the winding of the relay and the normally open switch of the relay, whereby the relay is first energized in the primary circuit if the loop is intact, and is held energized by the secondary circuit as long as the loop is intact, control means for a pair of alarm circuits comprising a second relay having an actuating winding and a pair of normally open switches, a third circuit including in series the winding of said second relay, said normally closed contacts of said first relay and said source of energy, and a pair of alarm circuits, one of said alarm circuits including in series said source of energy, one of said normally open switches of said second relay, and electrically operated alarm means, and the other of said alarm circuits including in series the other of the normally open switches of said second relay, an electrically operated alarm means, and a source of energy.

5. An electric burglar alarm system as defined in claim 4, including a second protective loop, a circuit breaker formed of fusible material connecting said protective loops together in series, a source of electrical energy, and a time controlled circuit breaker connecting the source of electrical energy with the second protective loop.

## References Cited in the file of this patent

## UNITED STATES PATENTS

1,158,146	Olney -----	Oct. 26, 1915
1,223,789	Hess -----	Apr. 24, 1917
1,492,345	Barton -----	Apr. 29, 1924
1,709,097	Roe -----	Apr. 16, 1929
1,840,637	Reid -----	Jan. 12, 1932
1,881,832	Miranda -----	Oct. 11, 1932
1,920,742	Chapman et al. -----	Aug. 1, 1933
2,187,507	Walker -----	Jan. 16, 1940
2,243,804	Howton -----	May 27, 1941
2,346,171	Laford -----	Apr. 11, 1944