

[54] SECURITY SYSTEM

[76] Inventors: **Joseph L. Stendig**, 2500 Riverside Dr.; **Claude A. Davis**, 568 Piney Forest Rd., both of Danville, Va. 24541

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Primary Examiner—David L. Trafton

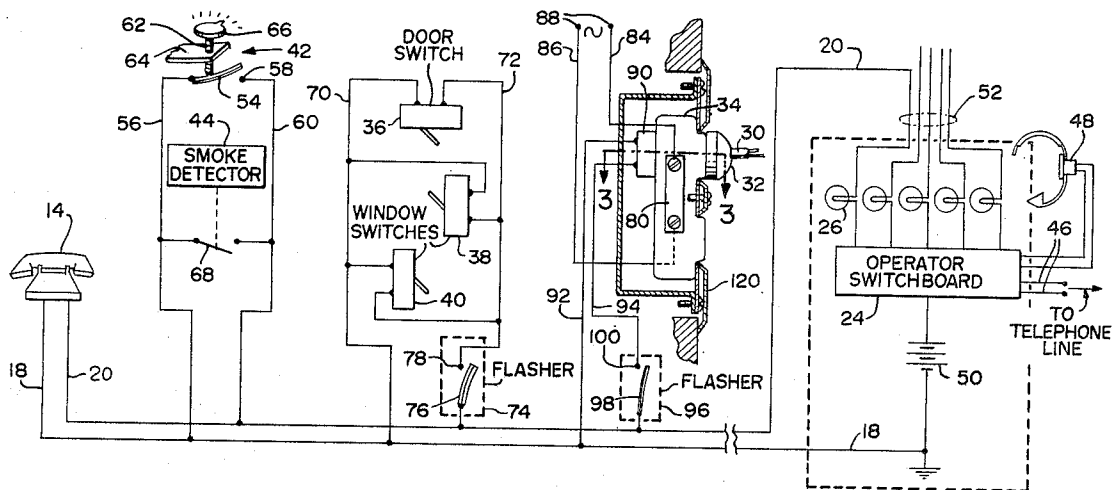
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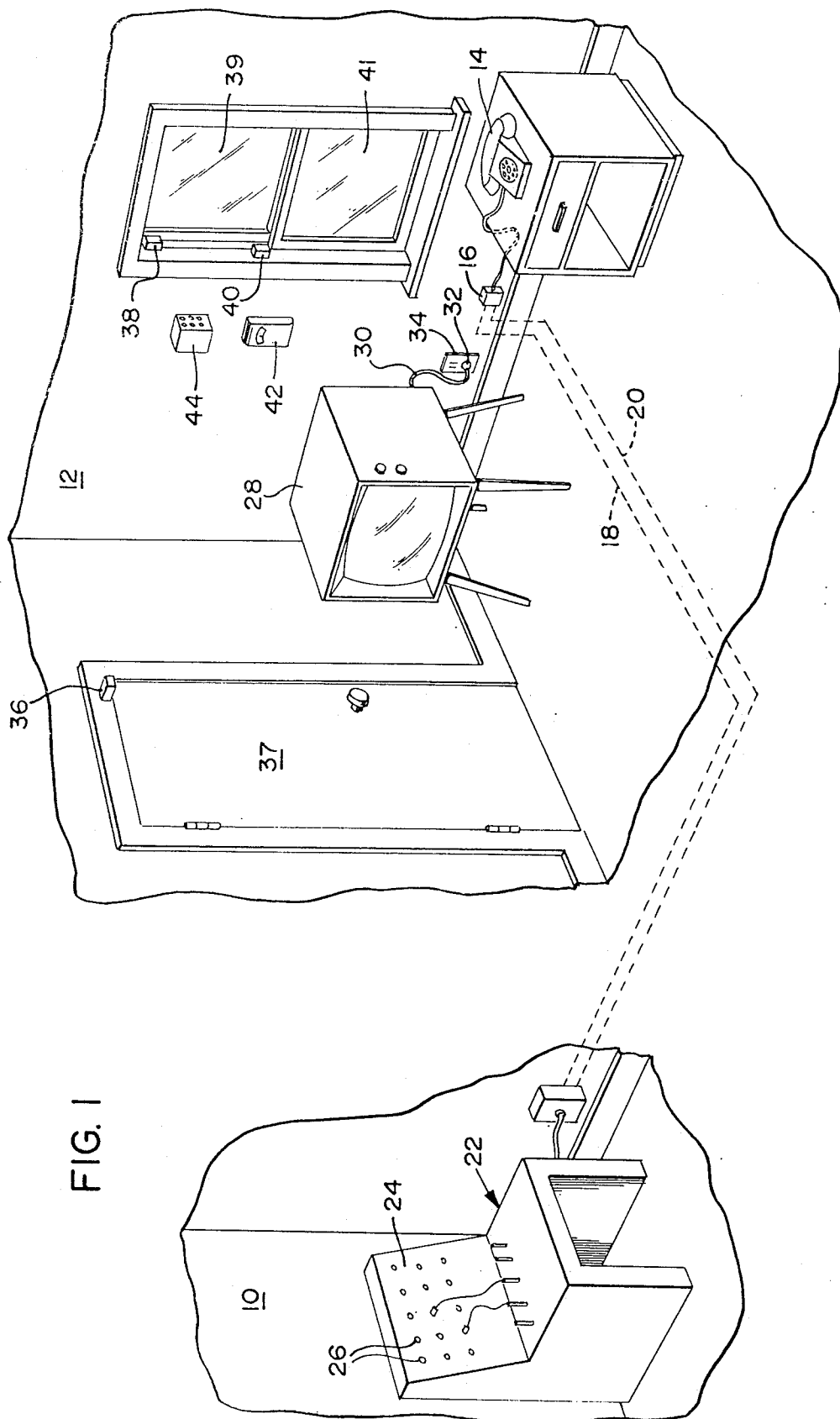
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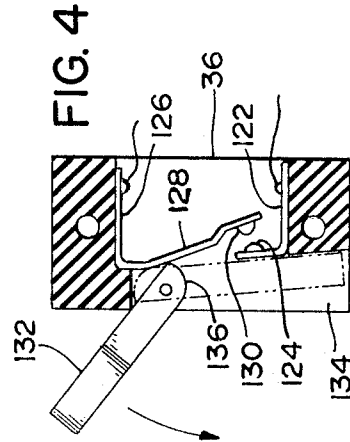
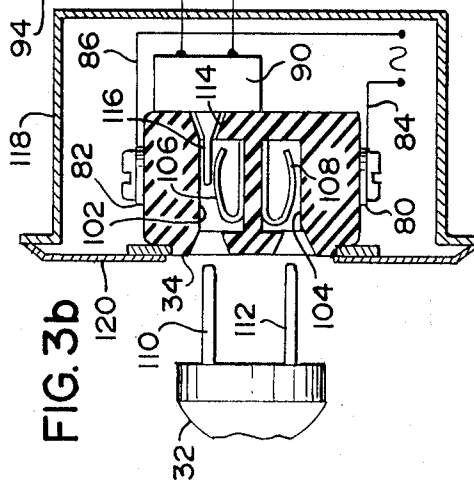
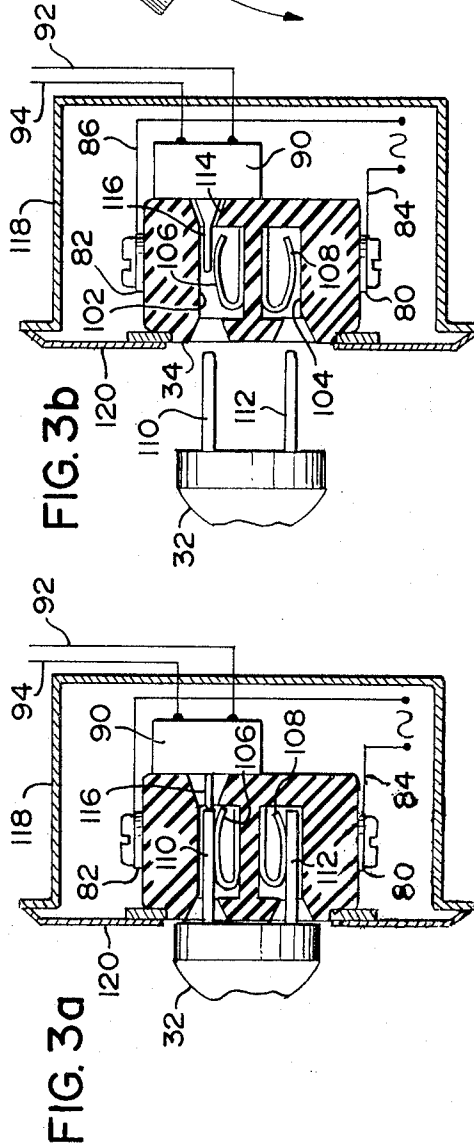
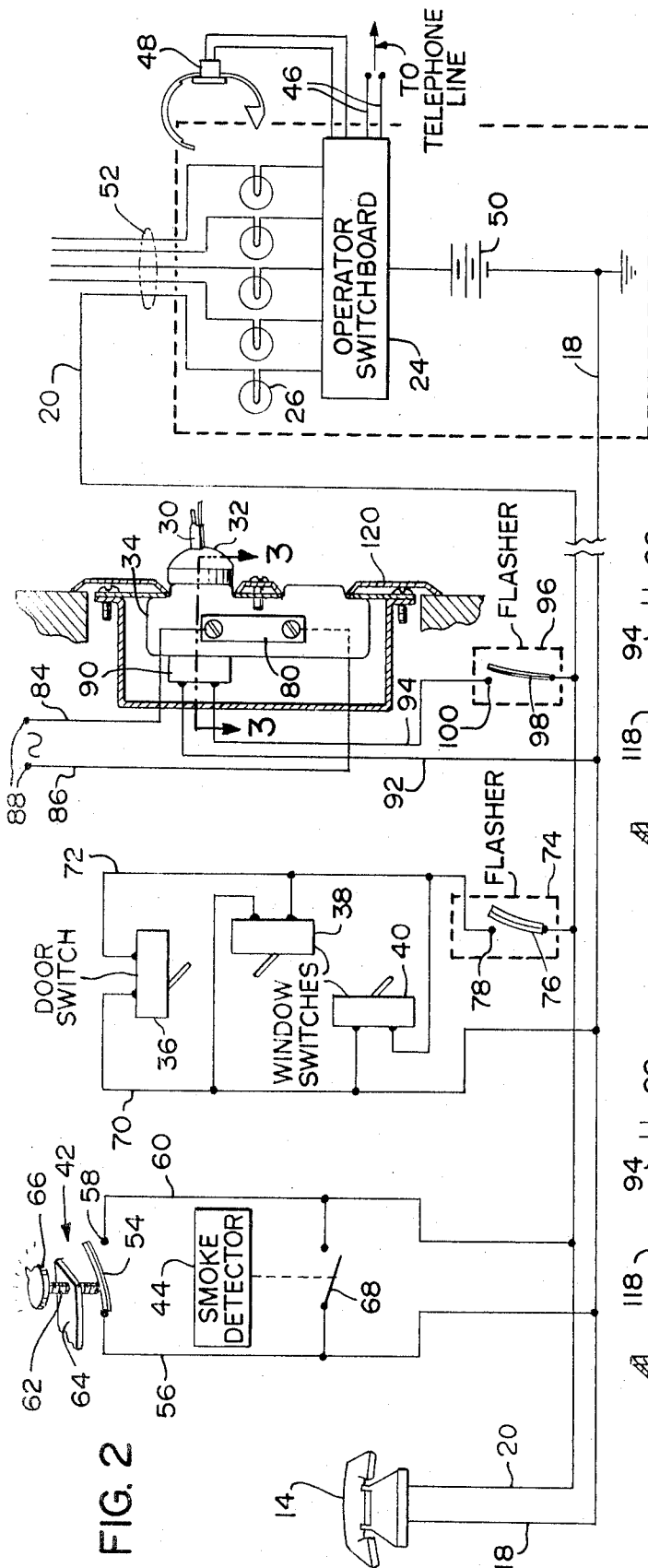
ABSTRACT

An integrated security system including a microswitch monitored, alternating current receptacle adapted to be mounted in a standard wall-box and further adapted to receive a standard two-prong plug and which is connected with a local telephone system to provide a distinct alarm signal upon removal of the plug; additional switching devices are connected with the telephone system to appraise the operator by distinct signals of the occurrence of unauthorized entry, fire and/or smoke at any of a plurality of remote locations.

16 Claims, 5 Drawing Figures







1

SECURITY SYSTEM

BACKGROUND OF THE INVENTION

1. Field of the Invention:

The present invention pertains to security systems and more particularly to a security system especially suited for use with a telephone system having a local operator switchboard to provide distinct alarm indications of unauthorized entry, burglary, fire and/or smoke from a number of spaced points or locations within an area serviced by the local telephone system.

2. Description of the Prior Art:

People in this and other countries are becoming increasingly concerned about personal safety and the security of their homes and businesses. This concern can be appreciated from the number of presently available electronic security systems which range in sophistication from simple door-tripped alarm devices to complex computer-monitored networks and which are all, in some degree, enjoying widespread commercial acceptance. More than the individual, the businessman realizes that it is becoming economically necessary to purchase and/or lease security systems of this type in order to prevent or at least deter the high incidence of burglary and unlawful entry which he now faces. Motel owners, for example, face an unusually difficult challenge in this regard since a potential thief can easily check in, drive away from the motel office to the door of his room, disconnect and remove the television set in privacy, and abscond undetected within a matter of minutes.

Past activity in this field has outlined certain minimal criteria which must be met in the design of an effective security system. For instance, the system must be capable of promptly detecting an unauthorized entry, and more importantly, the theft of expensive appliances such as televisions, radios and the like. The system must also be capable of concealment both to prevent evasion and, in the case of motels, hospitals, etc., to avoid calling attention to the existence of a crime threat. It is also critical that the system design be simple and foolproof to minimize the occurrence of false alarms, to reduce initial cost and maintenance outlays, and to reduce the wiring necessary to install the system in existing facilities.

The prior art, as exemplified by U. S. Pats. Nos. 3,114,904, No. 3,411,150, and No. 3,484,775, is generally cognizant of security systems utilizing alarm indications upon the theft of an electrical appliance. However, systems of this general type have not proven fully satisfactory since they are complex and expensive, tend to require frequent maintenance, utilize recognizable, non-conventional components and thus may be easily detected and avoided by a thief, and do not provide integrated protection for unauthorized entry, burglary, fire and/or smoke.

SUMMARY OF THE PRESENT INVENTION

Accordingly, it is an object of the present invention to construct an inexpensive, concealed security system capable of providing alarm indications of burglary, unauthorized entry, fire and/or smoke.

The present invention is summarized in an integrated alarm system including a power receptacle having at

2

least one slot thereof extending completely there-through, a switch mounted on the receptacle and structurally independent therefrom and having an electrically insulated, linearly movable actuating arm extending into the slot from the rear of the receptacle, the actuating arm being adapted to be moved by the insertion and removal of a plug from the receptacle to change the state of the switch, and a network connected with the switch to produce an alarm signal upon removal of the plug from the receptacle.

Another object of this invention is to construct a security system in which the removal of a standard two-prong a.c. plug from a conventional a.c. wall receptacle may be monitored in concealment over local telephone lines.

This invention has a further object in that a concealed security system is used with a local telephone system to alert the telephone operator of the occurrence of a crime (e.g., burglary) and a disaster (e.g., fire) by distinct alarm signals.

Further objects and advantages of the present invention will be apparent from the following description of the preferred embodiment when taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a diagrammatic view in partial perspective of a motel illustrating the use of a security system according to the present invention;

FIG. 2 is a schematic diagram partially in block form of a preferred embodiment of the security system of FIG. 1;

FIG. 3a is a sectional view of a monitored receptacle of the security system of FIG. 2 with a conventional plug inserted therein;

FIG. 3b is a view similar to FIG. 3a with the plug removed from the receptacle; and

FIG. 4 is a sectional view of a trip-switch of the security system of FIG. 2.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The present invention has general utility for protecting any number of buildings or facilities such as motels, factories, offices, hospitals and private residences and is shown and described herein in connection with a motel for exemplary purposes only. Referring to FIG. 1, there is shown diagrammatically a central office 10 of a motel or hotel having a plurality of individual rooms 12 each including a conventional telephone 14 which is connected through a wall-box 16 and a pair of leads 18 and 20 to an operator's console 22 located in the office 10. The operator's console may be of any suitable design and includes a control panel or switchboard 24 which may be provided with appropriate telephone switches or plug cords to enable the operator to interconnect the line pair for each room to outside telephone lines or to other inside line pairs as required. The particular structural configuration of the various switching networks of console 22 is well known and thus need not be described in detail for the sake of brevity.

Control panel 24 is also provided with a bank of lamps 26 each corresponding to a room or individual telephone extension to provide a visual indication each time the handset of one of the telephones 14 is lifted from the cradle.

In each of the rooms 12, any number of electrical appliances may be provided such as a television set 28. Television set 28 receives operating potential via power line 30 which is terminated in a standard two-prong a.c. plug 32 adapted to cooperate with an a.c. outlet 34. Also located in each room 12 is a door trip-switch 36 mounted to the frame of door 37 such that the switch will be tripped to an electrically closed position whenever door 37 is opened. Likewise, a window trip-switch 38 is disposed on the frame of upper window section 39 and a second window trip-switch 40 is similarly located relative to lower window section 41. A thermostat 42, which may be adjustably preset to respond to a predetermined excessive temperature, may be mounted in any desired location on the wall of room 12 and is preferably attached above telephone wall-box 16 as illustrated. Similarly, a smoke detector 44 is located on the wall of room 12 above wall-box 16. It is noted that smoke detector 44 may be of any suitable type, such as an electrostatic particle detector, adapted to detect the presence of smoke within room 12 and close a set of electrical contacts in response thereto. Since smoke detectors of this general type are well known, the structural details of detector 44 will not be described herein for the sake of brevity.

Referring to FIG. 2, which is a schematic diagram of the security system of FIG. 1, the switchboard 24 of the operator's console 22 is connected to at least one leased public telephone line 46 and includes a suitable headset 48 to enable the operator to monitor the telephone 14 in each room 12. Each of the lamps 26 is connected through switchboard 24 to a source of operating potential such as battery 50 which is returned to ground as shown. Lamps 26 are all normally connected with battery 50 with the connection therebetween controlled by switchboard 24 such that the operator, for example, may disconnect or by-pass each lamp to connect any of the telephones 14 directly with an outside line 46 or another inside line pair 18-20 as desired.

Each of the lamps 26 is also connected with line 20 of a respective one of the line pairs for telephones 14 via a cable 52, with line 18 from all of the telephones connected in common. In this manner, the lifting of the handset of any one telephone 14 completes a current path between lines 18 and 20, as is well known, to enable energization of the lamp 26 corresponding to the room where that telephone is located. The operator thereafter responds to the call by connecting headset 48 across lines 18-20 for the indicated room telephone and acknowledging the caller's request.

Thermostat 42 includes a bimetal 54 connected to a lead 56 and having one end fixed in place and the other end movable relative thereto with heat. A fixed contact 58 connected to a lead 60 is adapted to cooperate with bimetal 54 to provide a heat-responsive switch. Bimetal 54 is disposed such that it is normally remote from contact 58 to form an open circuit and responds to an increase in heat to engage contact 58. The temperature at which bimetal 54 engages contact 58 is preselectable by a screw 62 which is threadably mounted in a support member 64 and is adapted to engage an intermediate point on the surface of bimetal 54 for repositioning the same relative to contact 58. A knob 66 is affixed to the upper end of screw 62 for cooperation with a calibrated scale.

Smoke detector 44 is operatively connected with a set of contacts 68, with the contacts normally open, as

shown, and adapted to be closed by the smoke detector 44 whenever smoke is present in room 12. Contacts 68 are connected between leads 56 and 60 in parallel with thermostat 42, and leads 56 and 60 are in turn connected with telephone lines 18 and 20, respectively, in parallel with the telephone 14.

The door trip-switch 36 is connected between a pair of leads 70 and 72, with window switches 38 and 40 connected in parallel thereacross. Lead 70 is directly connected with telephone line 18 and lead 72 is connected with telephone line 16 through a flasher device schematically shown at 74. Flasher 74 may be of any suitable type which has a preselected frequency of operation and, for example, may include a bimetal 76 which is normally in engagement with a fixed contact 78 and is adapted to move away from contact 78 upon self-heating.

Power receptacle 34 of the security system of the present invention includes a pair of contact terminals 80 and 82 which are connected by lines 84 and 86, respectively, to a source of alternating current represented schematically by terminals 88. Affixed to a rear surface of receptacle 34 is a single-pole, single-throw microswitch 90 which is responsive to insertion and removal of plug 32 as will be described more fully below. Microswitch 90 is connected in parallel with telephone 14 by leads 92 and 94 which are respectively connected with lines 18 and 20, the latter connection being through a flasher 96. Flasher 96 is similar to flasher 74 and includes a selfheating bimetal 98 which cooperates with a fixed contact 100; however, flasher 96 operates at a frequency which is different from that of flasher 74.

Referring to FIGS. 3a and 3b, receptacle 34 includes a pair of spaced, parallel plug-prong receiving slots 102 and 104 and a pair of contact blades 106 and 108 which are partially folded over upon themselves to extend partially into slots 102 and 104, respectively. Contact blades 106 and 108 are electrically interconnected internally of the receptacle 34 with terminals 82 and 84 to feed operating potential from source 88 to plug 32 via prongs 110 and 112.

Slot 102 of receptacle 34 extends completely there-through by means of an aperture 114 in a rear wall of the receptacle. As shown in FIGS. 3a and 3b, microswitch 90 has an actuating arm 116 extending therefrom and is mounted on receptacle 34 such that arm 116 extends through aperture 114 into slot 102. Arm 116 is biased outwardly of switch 90 and is adapted to be engaged by prong 110 of plug 32 and moved linearly thereby along the elongate axis of slot 102. Also, microswitch 90 is constructed such that it assumes an open state whenever plug 32 has been inserted into the receptacle 34 as is shown in FIG. 3a and is actuated to a closed state upon removal of the plug 32 as is shown in FIG. 3b.

Receptacle 34 and switch 90 are mounted in a conventional wall-box 118, and a cover plate 120 is suitably secured to the receptacle to close box 118 in the conventional manner. It can be appreciated that the existence of microswitch 90 cannot be detected without removing plug 32 and wall plate 120 since plug 32 is of conventional design and the outward appearance of receptacle 34 is identical to that of any ordinary, unprotected or unmonitored outlet.

As illustrated in FIG. 4, door trip-switch 36 includes a hollow rectangular body in which is mounted a first

L-shaped contact member 122 having a contact 124 disposed on the end of the shorter arm thereof and a second L-shaped contact member 126 having a resilient contact arm 128 which carries a contact 130 on an offset distal end for cooperation with contact 124. A lever 132 is pivotally mounted onto the body of the switch for movement between a standby position as illustrated and a tripped or released position (shown in dashed lines) within a rectangular channel 134. As can be seen in FIG. 4, lever 132 has a camming surface 136 formed at its proximal end to coact with contact arm 128 such that contacts 124 and 130 are separated from each other when lever 132 is in its standby position and move into engagement when lever 132 is rotated into the channel 134. Due to the construction of camming surface 136 and channel 134, once lever 132 is moved slightly in the direction of the arrow in FIG. 4, it snaps into the channel to close contacts 124 and 130 and cannot be readily reset due to its recessed position when tripped in channel 134. It should be understood that the details of switch 36 shown in FIG. 4 are merely exemplary of the general type of switch which may be utilized in the security system of the present invention and that switches 38 and 40 may be of similar construction.

In operation, normally all of the switches in the system are open and telephone 14 is not in use. Thus, lines 18 and 20 are open and lamp 26 is deenergized. Should one desire to place a call, the removal of the telephone handset connects lines 18 and 20 of the caller's room to complete a current path from ground through battery 50, switchboard 24, lamp 26 corresponding to that room, and telephone 14 back to ground. The operator at console 22 is therefore notified of the removal of the handset by the energized lamp 26 and thereafter connects headset 48 with lines 18 and 20 to receive instructions from the calling party.

A similar sequence follows in the event of a fire or unusually high temperature in the room since the thermostat 42 or smoke detector 44 detects such condition and again shorts out lines 18 and 20. However, following the ignition of lamp 26 in response to actuation of thermostat 42 or smoke detector 44, the operator upon responding to the signal from lamp 26 hears no sound whatsoever because of the short circuit across the telephone line. Thus, the operator would immediately recognize that a fire or smoke exists in the particular identified room.

In the case of an unauthorized entry, one or more of switches 36, 38 and 40 would be tripped thereby connecting flasher 74 across the telephone lines 18 and 20. The current from battery 50 would thus flow through the flasher which causes a periodic interruption of the short across lines 18 and 20 such that lamp 26 blinks on and off at recognizable frequency. The operator is in this way immediately signalled of the occurrence of an unauthorized entry. Likewise, removal of the plug 32 of television 28 from the receptacle 32, from the position shown in FIG. 3a to that shown in FIG. 3b, releases actuating arm 116 which moves into slot 102 causing switch 90 to become closed. This results in the connection of flasher 96 across the telephone line producing periodic energization of lamp 26 at a rate recognizably different from the rate of flasher 74. The operator is thus readily apprised of the unauthorized removal of the television set 28 from the room.

Thus, it can be appreciated that the security system according to the present invention is simple and yet is

capable of readily and accurately notifying an operator of the occurrence of various alarm conditions at any number of spaced locations.

The present invention has a number of distinct advantages in that receptacle 34 presents the outward appearance of a conventional, unmonitored a.c. outlet, does not require the use of other than a standard two-prong a.c. plug and does not rely upon the lateral flexure of one or both of the contact blades for actuation of an alarm switch; that microswitch 90 is a structurally independent unit from receptacle 34 and thus may be replaced separately therefrom in the event of a failure; that alarm signals for fire and smoke and for burglary or unauthorized entry are distinct and readily identifiable; and that a complete or integrated security system is simple, reliable and compatible for use with local telephone systems to reduce or minimize wiring.

Inasmuch as the present invention is subject to many variations, modifications and changes in detail, it is intended that all matter contained in the foregoing description or shown in the accompanying shall be interpreted as illustrative and not in a limiting sense.

What is claimed is:

1. An alarm system comprising:

a central console including alarm indication means; a pair of leads in series with said indication means and extending to an area to be protected;

condition responsive means at said area to be protected connected across said pair of leads for shorting same in response to a given condition;

another condition responsive means at said area to be protected connected across said pair of leads for shorting same in response to another given condition;

potential source means in series with said pair of leads and said indication means for generating an indication means energizing signal therein in response to shorting of said pair of leads;

flasher means in series with said another condition responsive means across said pair of leads and responsive to said signal therein for interrupting same at a given frequency to thereby provide an intermittent alarm indication at said operator console; and

said another condition responsive means including a power receptacle having at least one slot extending completely therethrough and switch means including a pair of contacts connected across said pair of leads and having a linearly movable actuating arm protruding into said slot of said receptacle and responsive to removal of a plug from said receptacle for closing said contacts.

2. The invention as recited in claim 1 including a telephone in said area to be protected connected across said pair of leads and being shorted out by either of said condition responsive means upon the occurrence of an alarm condition and including means for energizing said alarm indication means during telephone usage.

3. An alarm system comprising:

a central console including alarm indication means; a pair of leads in series with said indication means and extending to an area to be protected;

condition responsive means at said area to be protected connected across said pair of leads for shorting same in response to a given condition;

another condition responsive means at said area to be protected connected across said pair of leads for

shorting same in response to another given condition;

potential source means in series with said pair of leads and said indication means for generating an indication means energizing signal therein in response to shorting of said pair of leads;

thermally responsive flasher means in series with said another condition responsive means across said pair of leads including a pair of contacts, one of which is responsive to heat generated by current flow therethrough to intermittently open, and being responsive to said signal therein for interrupting same at a given frequency to thereby provide an intermittent alarm indication at said operator console; and

said another condition responsive means comprising a power receptacle having at least one slot extending completely therethrough, and switch means including a pair of contacts connected across said pair of leads and having a linearly movable actuating arm protruding into said slot of said receptacle and responsive to removal of a plug from said receptacle for closing said contacts.

4. The invention as recited in claim 3 wherein said condition responsive means comprises a heat responsive means including a pair of switch contacts connected across said pair of leads which close in response in an excessive heat condition.

5. The invention of claim 4 including trip switch means connected across said pair of leads and actuable in response to movement of a window in said area to be protected for shorting said pair of leads, and thermally responsive flasher means in series with said trip switch means, said thermally responsive flasher means intermittently open circuiting at a frequency different from said given frequency to thereby provide an intermittent alarm indication at said operator console.

6. The invention as recited in claim 5 including smoke detecting means in said area to be protected including switch contacts connected across said pair of leads which close in response to the presence of smoke.

7. A security system for a building having a local telephone system which includes a remote telephone in an area to be protected having telephone lines to an operator console which has a telephone use status indicator comprising in combination:

a heat-responsive means in said area including a pair of switch contacts connected across said telephone lines for shorting said telephone lines and the telephone connected thereto in response to an excessive heat condition causing the generation of a remote telephone use simulating signal at the operator console;

power receptacle means in said area having at least one slot extending completely therethrough; and switch means including a pair of contacts connected across said telephone lines in parallel with the switch contacts of said heat responsive means and having a linearly movable actuating arm protruding into said slot of said receptacle and responsive to removal of a plug from said receptacle for shorting

said telephone lines and the telephone connected thereto causing the generation of a remote telephone use simulating signal at the operator console.

8. The invention as recited in claim 7 including a flasher means in series with said switch means and responsive to the remote telephone use simulating signal generated thereby to interrupt same at a first frequency to thereby provide an intermittent indication at said operator console.

9. The invention of claim 8 wherein said flasher means comprises thermally responsive contacts which open in response to heat caused by current flow therethrough and which close upon cooling.

10. The invention as recited in claim 8 including trip-switch means connected to said telephone system in parallel with the switch contacts of said heat-responsive means and actuable in response to movement of a window in said area to generate a remote telephone use simulating signal at the operator console.

11. The invention as recited in claim 10 including another flasher means in series with said trip-switch means and responsive to the telephone use simulating signal due to a window being opened to interrupt same at a second frequency different from said first frequency to thereby provide a second intermittent indication at said operator console.

12. The invention as recited in claim 11 wherein said another flasher means comprises thermally responsive contacts which open in response to heat caused by current flow therethrough and which close upon cooling.

13. The invention as recited in claim 11 including a smoke detecting means in said area connected to said telephone system and responsive to the presence of smoke to cause the generation of a remote telephone use simulating signal at said operator console.

14. The invention as recited in claim 7 wherein said telephone system includes a power supply and telephone use indicator at the operator console and the use of said remote telephone completes a current path from the power supply through the indicator to energize same, and wherein the closure of the switch contacts of the heat-responsive means completes the current path from said power supply through said indicator to energize same as a simulation of telephone use, and wherein the closure of the contacts of the switch means completes the current path from said power supply through said indicator to energize same as a simulation of telephone use.

15. The invention as recited in claim 14 including flasher means in series with said switch means to interrupt the telephone use simulating signal at a given frequency to thereby provide an intermittent indication at said operator console.

16. The invention as recited in claim 15 wherein said flasher means comprises thermally responsive contacts which open in response to heat caused by said simulating signal current flow therethrough and which close upon cooling.

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