July 14, 1959 C. R. WATTS 2,895,125

ELECTRICAL ALARM SYSTEM

Filed Dec. 9, 1954 3 Sheets-Sheet 1

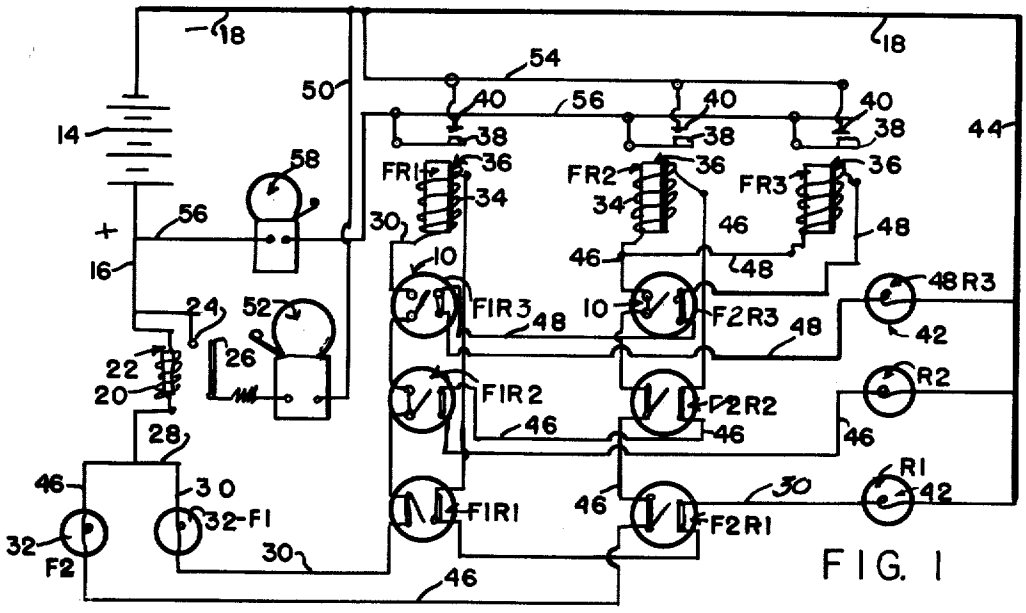


FIG. 1

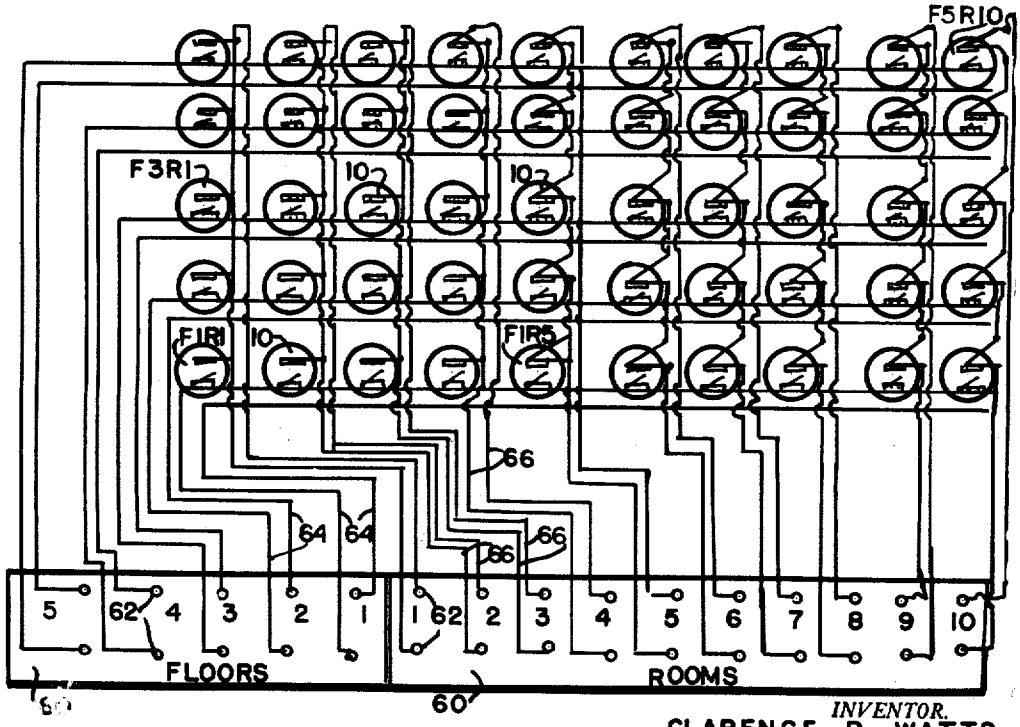


FIG. 2

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ELECTRICAL ALARM SYSTEM

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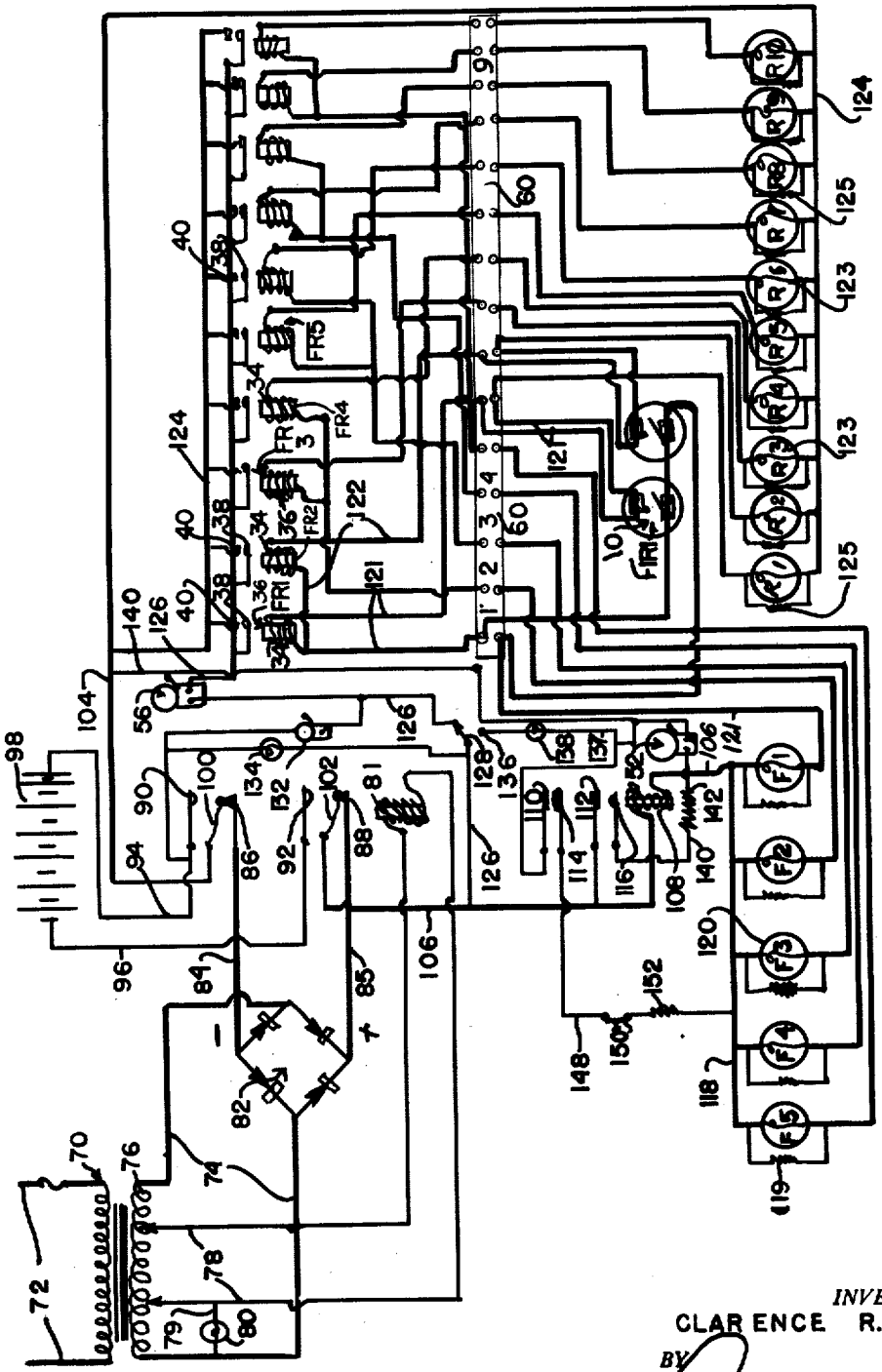


FIG. 3

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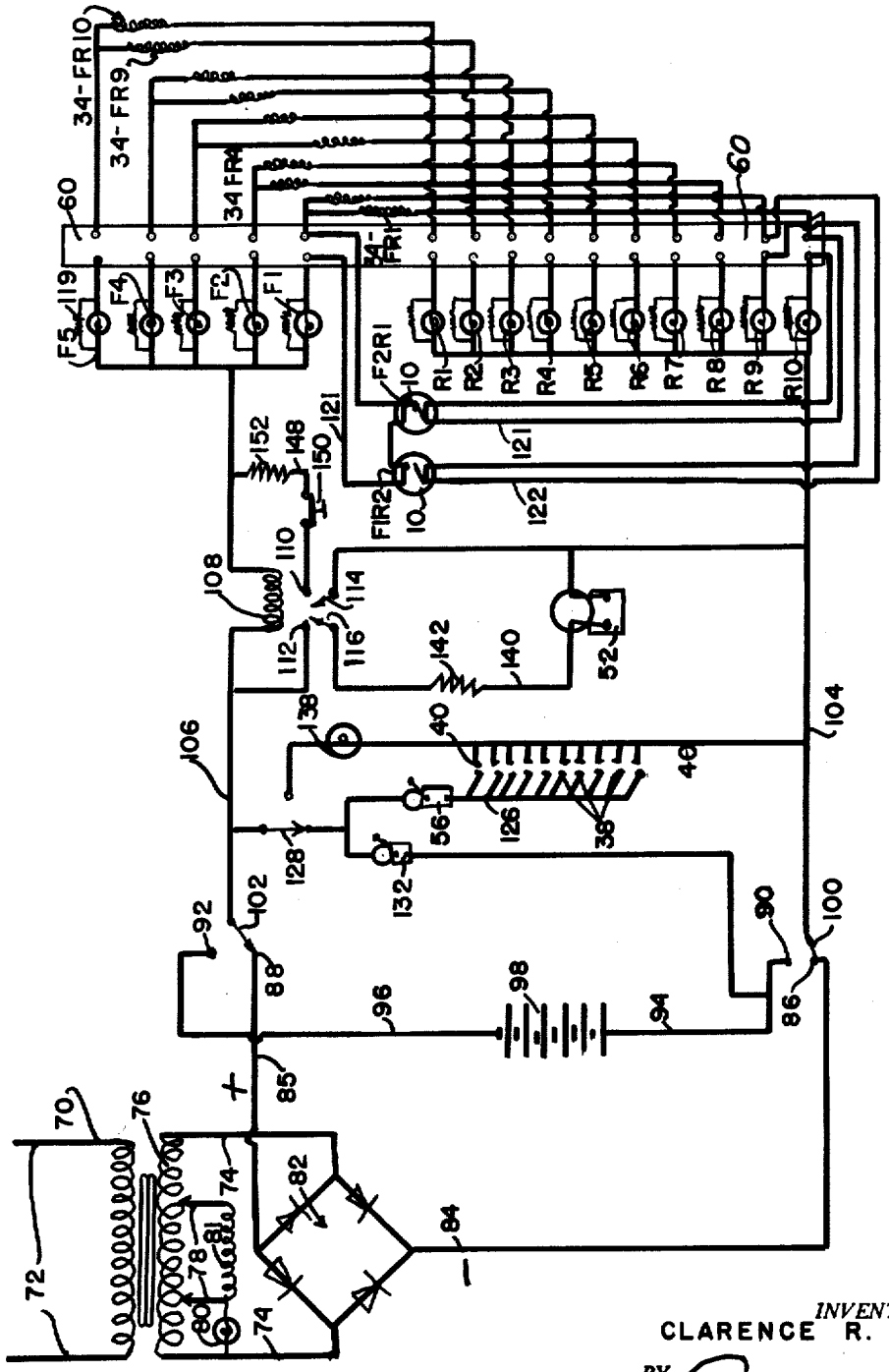


FIG. 4

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United States Patent Office 2,895,125 Patented July 14, 1959

2,895,125

ELECTRICAL ALARM SYSTEM

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Application December 9, 1954, Serial No. 474,118

8 Claims. (Cl. 340—227)

This invention relates to an electrical alarm system and particularly to a switch actuated system of this sort for automatically policing for abnormal condition in a building having a plurality of floors and a plurality of individual spaces considered separate on each floor.

Such a system as hereinafter disclosed is particularly useful as a fire alarm system in buildings which have several floors above the ground and many individual rooms on each floor. Obviously unless some constantly watching means is provided it is likely that sooner or later a fire will occur in one of the rooms on one of the floors and probably the fire will not be noticed until it has gained substantial headway. Such is particularly true in buildings where rooms are only intermittently occupied during day and night. Accordingly, gigantic loss of property can be avoided if the initial fire is brought immediately to the attention of the fire department as almost any fire can be readily controlled if caught in the beginning stages.

The present system is completely automatic with optional alarm indication and with, if desired, self-supervision of its own circuits in order to indicate also any breakdown of one of its elements or damage to any of the circuit wiring. As is customary in alarm systems the basic element is a switch located in each of the individual rooms and actuated solely upon the occurrence of some abnormal condition. For example, in the case of fire alarm system, the switch would be a thermostat circuit closer operable upon the sudden rise or ultimate peak of heat to close a circuit. Since there would be at least one thermostat in each room, the number of thermostats would be the multiple of the number of rooms times the number of floors and as shown hereinafter the wiring between thermostats is done in multiple, hence the expression "manifold."

Other systems are in existence using the manifold or multiple association of per se thermostats and therefore that specific portion of the system alone is not new. The present system is a new arrangement in a manifold and optionally as a combination with self-supervised alarm system. The term "self-supervised" refers to the system having means therein for automatically indicating trouble within the circuits or electrical elements.

An object of this invention is to provide an alarm system which is supervised in simple and expedient manner.

Another object of this invention is to present a system requiring a minimum of electrical elements such as wire and relays.

An additional object of this invention resides in the particular manner of locating supervisory control elements with respect to the circuits through the indicator means and through the circuit closer devices in the rooms.

The particular direction and location of the wiring with respect to a central indicator device and the various floors and rooms forms a feature of my invention.

One important object in this invention resides in the use of relays as supervisory control devices and in locating and wiring these relays so that only as many relays as the maximum number of floors or rooms whichever the greater is necessary.

It is important also to note the advantage herein presented of having an arrangement in the alarm and locating system which permits the construction of a pre-fabricated control unit which is easily and dependably applied to any building regardless of the number of rooms and floors or the ratio and with no more than the removal of excess connections.

The present system is extremely desirable because of its flexibility in allowing the use or omission of additional alarm signals and auxiliary equipment depending upon the cost allotted in the purchaser's budget and in view of local fire code requirements.

After the disclosure of the present invention has proceeded sufficiently, other and further objects and advantages of the system will become apparent to those skilled in the art and the following description in detail is in conjunction with the accompanying drawings wherein like parts are designated by the same reference characters in the several figures in which:

Fig. 1 is an electrical diagram of a complete system for a two floor and three room building but without certain auxiliary elements.

Fig. 2 is an electrical diagram of the portion of thermostat switches and terminal strip in a system for a five floor, ten room building.

Fig. 3 is an electrical diagram of all of the circuits for the five floor, ten room building in Fig. 2 and duplicating the terminal strip and two thermostats of Fig. 2.

Fig. 4 is a purely diagrammatic view of the electrical system of Figs. 2 and 3 for the purpose of presenting this system in a different manner.

Briefly described, the present system employs a source of current, a thermostatically operated circuit closer in each defined room of each floor in a building, a plurality of closed combined indicator and supervisory circuits connected across said source of current and each extending from one side of said source and connecting one side of all the thermostatically operated circuit closers on one floor through a current limiting means with the other side of one of the room circuit closers and all the room circuit closers on all the floors of like location, supervisory indicating means operable upon substantial loss of current in any one of said closed indicator circuits, a floor alarm indicator for each of said floor circuits on one side of said respective current limiting means, and a room alarm for each of said room circuits and on the other side of the respective current limiting means, the closing of any thermostatically operated circuit closer causing increased current which is sufficient to operate simultaneously a floor indicator and the room indicator corresponding to and on the other side of said circuit closer.

Proceeding to a more detailed description, the system in Fig. 1 represents a simple and inexpensive installation in accordance with the present invention. The building to which the system is applied is of two separate floors with three separate rooms or compartments defined on each floor, substantially one on top of the other in corresponding rooms. Since the system shown is a fire system, a circuit closing device is provided in each one of the separate rooms on each floor. It is permissible to use any suitable thermostatically controlled circuit closer, hereinafter referred to simply as thermostat, but preferable that the type be used which operates by virtue of a sudden rise of temperature in addition to the normal operation through the reaching of a pre-set minimum temperature. Many suitable thermostats are available on the commercial market and some are found described in both U.S. patents to Griffith, Patent Num-

ber 2,413,140, and to Van Houten, Patent Number 2,267,484.

For convenience and clarity, the thermostats **10** are shown in plan view as if they were on the same level rather than in both plan and elevation which is the true representation of a building. In Fig. 1, each of the thermostats are identified according to the exact location thereof, as for example, F1R1 refers to the thermostat in the number 1 room on the first floor, F2R1 is the number 1 room on floor 2, and so forth. The circuit for the system begins with a source of current which, as shown, may be a D.C. battery **14** or group of batteries with the plus side **16** and the minus side **18**. Plus side **16** leads from the battery **14** through the coil **20** of a relay **22** having armature point **24** and contact arm **26** in a circuit to be described. Side **16** continues on and connects to a bus bar **28** from which a number of closed indicator and supervisory circuits begin. One such circuit begins with line **30** passing through a signal light **32** which will represent a signal for floor 1 as identified by FR1. Circuit line **30** leads to the thermostats **10** and is connected with one side of all of the thermostats **10** located on floor 1, these being F1R1, F1R2, and F1R3. Circuit line **30** then leads to and connects with one side of one of the coils **34** of one of a group of relays **36** each having a contact arm **38** in association with a respective point **40**, the arms **38** and points **40** being in a supervisory circuit to be described. Line **30** then leads from the other side of the relay coil **34** to and through the other side of thermostat in F1R1 and also to one side of all the thermostats in compartments of like location and number, in this case the number 1 rooms. Circuit **30** then connects to and through another signal light **42** representing compartments of like number which in this case is the room light. Room 1 light **42** is one of a group of room lights **42** further identified by their particular designator R1, R2, and so forth and all leading to a common bus bar **44** connected to the other side of the line source **18**.

With this arrangement, the source **14** has a number of closed indicator and supervisory circuits, such as **30**, connected thereacross, each of which leads through a floor light to all floor thermostats thence through a relay coil, then through one group of all rooms of like number, and finally back through a room light to the other side of the line. Since in the present system there are two floors and three rooms on each floor, there is required two floor signal lights and three room signal lights. The circuits through these lights could be described as "loop" circuits or "bend" circuits since in actuality in a building they go up through thermostats and bend back to the source. The second such circuit in the present system is **46** beginning at bus bar **28**, through signal light **F2**, through one side of all thermostats **10** on floor 2, through another relay coil **36**, further identified as FR2, through one side of all thermostats **10** of another group of rooms of like number, in this instance all the room 2's, and finally through signal light **R2** back to bus bar **44** on side **18**.

Through the particular arrangement in the present invention, only a partial but complete circuit is needed to serve the third and final group of rooms R3. Ahead of the relays **6** and after thermostats **10** on line **46** is a branch circuit **48** leading to the relay coil of **36**, further identified as FR3, and from there to one side of all the thermostats in the remaining rooms of like number, namely R3's, thence through the R3 signal light to the bus bar **44**. All the lights **32** and **42** are in a particular circuit across the source **14**. The circuits **30, 46, 48** are closed circuits and therefore have some measure of current in them at all times. Since the lights **32, 42** are in series on these closed, energized circuits they would burn at all times were it not for the resistance of the relay coils **34** in the respective circuits limiting the current to less than required by the light **32, 42**. Accordingly, the coils **34** serve this purpose of limiting current as well as providing supervision as will be discussed hereinafter. In line with this, the characteristics of coils **34** are selected with regard to the initial source **14** and the rating of the lights **32, 42**, or vice versa.

In the operation of the system by fire, heat causes one of the thermostats **10** to close which will then connect the circuit at its terminals so as to short the respective relay **36** thereby permitting increased current to flow in the line which will be sufficient to light a room light in series with a floor light. For example, suppose a fire starts in room 22. Thermostat **10-F2R2** in room 22 will close and increased current will flow in line **46** around relay **36—R2** causing the **F2** light to light with the R2 light. For effective execution, the signal lights **32, 42** would be located in one frequented spot such as the main desk in a hotel. Since it is desirable to have audible notice of this as well as visual, a bell circuit is made by a line **50** from side **16** to relay point **24** at normally open relay arm **26** and line **50** continues through a bell **52** and then to the other side of the line **18**. When the increased current flows through one of the indicator circuits it also increases current in coil **20** selected as requiring an amount not in the normal circuit enough to pull contact arm **26** to an amount sufficient to so do. Therefore, at the same time as the lights light, the bell **52** rings.

The foregoing arrangement is readily supervised.

This term "supervision" refers to providing some manner of being informed if the system is out of order. The most effective method is to have a loud bell or the like sound whenever any trouble develops in the system to this end the relays **36** control the movement of their respective arms **38** which will be held away from its contact **40** by the attraction from coil **34** as long as it is sufficiently energized. Of course, if the current into any of the coils **34** is interrupted the attraction on the arm **38** for that coil will be lost and the arm **38** will be forced through conventional relay spring bias arrangement (not shown) into contact with its contact **40**. All the contacts **40** are carried by and connected to a wire **54** leading to one side of the source while the contact arms **38** are connected with another wire **56** connected through an alarm bell **58** to the other side of the line **16**. Thus when the current is terminated in any of the circuits, contacts **38, 40** close and alarm bell **58** will sound. Upon hearing the alarm bell, an attendant or service man can inspect the system in order to locate the fault. When the trouble is corrected the system is restored to normal.

The system is extremely desirable from economy standpoint in both fabrication and installation due in large manner to the novel way of locating and wiring in the relays **36**. The necessary number of relays **36** is always equal to the maximum number of floors or rooms whichever is the greater. In the Fig. 1 system the maximum number of rooms (3) is greater than the maximum number of floors (2) and therefore the number of indicator and supervisory relays **36** is three. In a six floor, three room per floor building the number of relays **36** will be six. In some prior systems is found the less desirable situation where the number of supervisory relays must be the sum of floors and rooms which necessitates the use of more than the present invention thereby requiring more time to install and a larger investment. Furthermore, the wiring of the relay coils **34** is flexible in that if there are more floors than rooms or vice versa the excess number of relays **36** (determined by subtracting the smaller number from the larger) have their coils **34** grouped with each other in sets of 2 or more, as in the case of FR2 and FR3 in Fig. 1. If desired, FR3 could have been grouped with FR1 by connecting wire **48** onto wire **30** some place ahead of relay FR1 and after the last of the thermostats **10** for floor 1.

The system disclosed in Figs. 2 and 3 is basically the

same as that of Fig. 1 but with certain additions and being expanded to handle a 5 floor, 10 room installation and having the characteristic of being capable of expansion to handle a 10 floor, 10 room situation without changing the number of relays. While the system is broken into two parts for study, it is necessary to combine Fig. 2 with Fig. 3 in order to see the complete system since Fig. 2 is actually a continuation of Fig. 3 with the exception that the connecting strip is shown in both figures and two thermostats **10** are shown in Fig. 3 and in actuality there is only one such strip so in order to follow the entire circuit it is necessary to visualize the strip in Fig. 2 and the strip in Fig. 3 as one strip with the proper connections made.

Fig. 2 is a plan view of the thermostats **10** for a 5 floor 10 room building which are arranged such that the lowermost line of thermostats on the sheet are floor 1 and successive floors reading on up the sheet while the left hand thermostats are in rooms 1 and successive rooms on across the sheet to room 10 at the right hand border. Therefore if one starts at the lowermost, left-hand thermostate **10** it is labeled as **F1R1**, while two above that is **F3R1**, and four to the right is **F1R5**. The thermostats **10** are grouped in a multiple or manifold system including an insulated terminal strip **60** having many jacks or pairs of terminals **62**, there being one for each floor and each room. The terminals **62** are further identified on the drawing by being marked as "Floors" 1, 2, 3 and so on, and as "Rooms" 1, 2, 3 and so on. Terminal strip **60** would preferably form one portion of a control and indicator box (not shown) located at one place in the building where it is likely to be noticed. The manifold wiring eliminates separate circuits to each thermostat and is attained by running wires **64** from each of the floor terminal strip floor terminals **62** to one side of all the thermostatic switches for that particular floor and wires **66** from each of the terminal strip room terminals **62** to one side of all the thermostatic switches for all those particular rooms of like number. For example, wire **64** begins at bottom terminal **62** for floor 5 extends up to one side of all the thermostats on floor 5 and thence back to the top terminal strip. Likewise, wire **66** begins at bottom room terminal for room 1, extends upwardly through one side of all the thermostatic switches **10** for all room 1 locations and thence back to the top terminal for room 1. As a result, only ten separate wires are handling 50 thermostats. In a building installation, this means that from a central station only 10 wires are run from the central station instead of the 100 found in a non-manifold system, and there are only ten sets of terminals **62** on the strip **60** which simplifies the construction.

The complete system in Fig. 3 is adapted by transformer **70** to receive incoming A.C. current **72** of the ordinary 110–115 volt supply and reduce same with outgoing line **74** from the seconary **76** and also with taps **78** on secondary **76** leading to the coil and armature **81** for emergency D.C. standby and through another line **79** for A.C. pilot light **80**. A rectifier **82** receives incoming line **74** and converts same to D.C. current on outgoing lines **84**, **85** leading to a pair of switch contacts **86**, **88** near the coil **81**. A second pair of switch contacts **90**, **92** are opposed to a respective contact **86**, **88** and are connected, respectively, to the opposite line sides **94**, **96** from a battery set **98** which will supply the emergency standby D.C. current in the event of failure of the A.C. current. A pair of relay switch arms **100**, **102** are positioned within contact distance of a respective opposed pair of opposed contacts **86**, **90** and **88**, **92**. Arms **100**, **102** are each connected to a respective opposite side of the line **104**, **106** and each is spring biased normally held against the spring in contact with **86**, **88** so that line **84** continues as line **104** and line **85** continues as line **106**. The **106** side of the line leads to a relay coil **108** near switch arms **110**, **112** and contact points **114**, **116** in circuits described hereinafter. Line **106** connects to a bus bar **118** having a plurality of the floor signal lights **120** connected thereto, each light being further identified as **F1**, **F2** and so forth. Each floor light **120** has safety shunt resistor **119** so that the circuit is complete even when the light burns out.

Each floor light **120** has an independent circuit **121** therefrom which begins at the bus bar **118** and continues in the manner of the circuits **30**, **46** of the embodiment of Fig. 1. Accordingly, the line **121** runs from bus bar **118** through light **F1** thence to one of the number 1 floor position on terminal strip **60**, thence through one side of all thermostats **10** on floor 1, thence back to the other number one floor terminal, thence to a relay coil **36**—**FR1**, then from the other side of relay coil **36**—**FR1** to one of the **R1** terminals on strip **60**, then through one side of all the thermostats in all room 1 locations, then to the other **R1** terminal, and finally through a room 1 signal light **123** to a common bus bar **124** for all room lights which bar **124** is connected to the other side of the line **104**. All room lights **123** have shunt resistors **125**. From one side of the line beginning at the floor lights **120** each circuit like **121** follows the same pattern as in the system of Fig. 1, passing through the current limiting coil **36** of a respective relay. Since there are more relays **36** with coils **34** than there are floor lights, each floor circuit leads to more than one relay as seen by line **121** having line **122** leading therefrom just ahead of relay **FR1** into relay **FR2**, thence to room 2 terminal, and so on to room 2 light. The present system is grouped in successive pairs but could be grouped in three's or more. This unique arrangement provides extreme flexibility in fabrication and installation.

The contacts **40** of relays **36** are connected to a common line **124** which leads to line side **104** while the switch arm side **38** of relays **36** are connected to a common line **126** through trouble indicator bell alarm **56** thence through a switch **128** to the other line side **106**. Leading from D.C. line **94** is circuit **130** through an A.C. trouble buzzer **132** and a D.C. pilot light **134**. Across from switch **128**, a contact **136** leads through circuit **137** and thru a fire buzzer off light **138** to switch arm **110**. A circuit **140** extends from line side **104** to line **137** and through fire buzzer **52**, through a resistor **142**, to the switch contact **116**. Switch arm **112** leads directly to line side **106** while switch contact **114** leads by wire **148** through a switch **150** and resistor **152** to the bus bar **118**.

In the operation of the system of Figs. 2 and 3, the D.C. emergency standby is automatically put into action by and upon the failure of current in the A.C. secondary **76** which deenergizes coil **81** and lets contact arms **100**, **102** close on contacts **90**, **92** which throws lines **104**, **106** with sides **94**, **96** of D.C. standby from the batteries **98**. To indicate this fact, A.C. trouble buzzer **132** can be silenced by opening switch **128**. Of course, light **134** will go out and contacts **100**, **102** will return the system to normal source from rectifier **82** once the A.C. trouble is corrected.

The operation of the indicator lights **120**, **123** is the same as in the system of Fig. 1 occurring upon the closing of a thermostat **10** which shorts out one of the current limiting coils **34** of relays **36** allowing full current to flow through the circuit from floor light **120** across thermostat **10** and through a room light **123** with sufficient rating to light these lights and also to actuate the relay **108** pulling in switch arms **110**, **112** causing bell **52** to sound and which may be locked in through circuit **148** having switch **150** and resistor **152**. Therefore, bell **52** will continue to ring until switch **150** is opened momentarily.

The supervisory operation of the system is the same as that of Fig. 1. If current is terminated through any one of the relays **36**, as by a broken wire, that relay will permit one of the arms **38** to close on a contact **40** thereby closing the alarm circuit through **126** on one side and **124** on the other causing bell **156** to ring. Bell **156** is silenced

through the movement of switch **128** which will light **138** to remind that the system is out of order until corrected and until all relays **36** are restored to normal open position.

The system diagrammed in Fig. 4 is identical with that of Figs. 2 and 3 and the purpose of this is merely to repeat the system in a different form of electrical diagram so as to point out in another way the relationship between certain elements such as relay contacts **38**, **40** and relay coils **34**. Terminal strip **60** is applied with Fig. 2 in the same manner as was Fig. 3. This is more of a functional diagram since, for example, the relay arms and contacts **38**, **40** are grouped a distance from the coils **34** whereas actually they are within magnetic attraction.

While above has been shown and described in detail and with specific circuits in drawings a system with and without extras, this is not to be construed as any sort of limitation on the scope of the invention involved herein as the same may be done in several different ways and various substitutions, eliminations, modifications, and alternations may be made within the purview of this invention. For thoughts and questions involving scope of coverage, equivalency, definition of invention, and so forth reference is hereby made to the appended claims with constructions relating thereto.

I claim:

1. In an alarm system for a building in which there are a plurality of floors and a plurality of rooms on each floor, a source of electrical current, a switch in each of the rooms closable upon the occurrence of a condition therein, floor signal means for each floor, a plurality of closed indicator circuits each beginning at one side of the source and passing through a floor signal means to one side of all switches for that floor and through a current limiting means, said current limiting means connected through the other side of one of the switches on that floor for a room of particular designation through a room signal means to the other side of the line, the other indicator circuits extending in like manner through other floor signalling means and other rooms like and different designation until all rooms are related across an open switch to their floor, the minimum required individual current limiting means being in number equal to the maximum number of floors or rooms whichever is the greater, each of said respective floor circuits and said room circuits being in circuit with at least one respective current limiting means, each of said current limiting means normally completing a portion of the circuit associated therewith, and a loss of normal current in any of said current limiting means being an indication of trouble in a circuit associated therewith, whereby an indication of trouble in any circuit may be determined from said current limiting means associated therewith.

2. In an alarm system for a building in which there are a plurality of floors and a plurality of rooms on each floor, a source of electrical current, a switch in each of the rooms closable upon the occurrence of a pre-determined condition not normally present therein, a plurality of floor indicator circuits each beginning at one side of said source and connecting one side of a plurality of switches on the same floor in series with one another, a plurality of relay coils, a plurality of room indicator circuits each beginning at the current source side opposite from the floor indicator circuits and connecting one side of a group of switches in like designated rooms on different floors in series with one another, each floor indicator circuit including a signal device, each room indicator circuit including a signal device, said number of relay coils being determined by subtracting the lesser of the floor or rooms from the greater thereof, the relay coils being arranged in circuit with both a floor circuit and a room circuit and where the total number of one of either floor circuits or room circuits exceeds the other the relays being grouped by incoming circuits on the lesser number side and with separate circuits from the greater side, said relay coils normally being energized with a normal amount, and a loss of normal amount in any relay coil results from trouble affecting the electrical energy in the circuit associated therewith, said loss of said energy from normal amount being an indication of trouble in that circuit portion, whereby improper function of the system itself may be detected.

3. The alarm system as claimed in claim 2, there being a normally open supervisory circuit closable through loss of current in a relay coil, and signalling means in said supervisory circuit.

4. In an alarm system for a building in which there are a plurality of floors and a plurality of rooms on each floor, a source of electrical current, a switch in each of the rooms closable upon the occurrence of a condition not normally present therein, a plurality of floor indicator circuits each beginning at one side of said source and connecting one side of a plurality of the switches on the same floor in series with one another, a plurality of room indicator circuits each connecting the other sides of a group of switches in like designated rooms on different floors in series with one another, each floor indicator circuit including an electrical signalling means, each room indicator circuit including an electrical signalling means, current limiting means in each of said floor circuits and said room circuits, the minimum number of current limiting means required being the maximum number of floors or rooms whichever is the greater, said current limiting means normally being part of a closed circuit portion in its respective circuit portion when said system is in normal working order, each of said current limiting means receiving an amount of electrical energy in normal condition and having a change therein in the amount of energy in response to a break in the circuit portion associated therewith, and the current condition resulting from said change, said change in energy amount in any of said current limiting means upon detection providing an indication of trouble associated with that circuit portion, whereby trouble may be discovered by electrical inspection of said current limiting means.

5. In an alarm system for a building in which there are a plurality of floors and a plurality of rooms on each floor, a source of electrical current, a switch in each of the rooms closable upon the occurrence of a condition not normally present therein, a plurality of floor indicator circuits each beginning at one side of said source and connecting one side of a plurality of the switches on the same floor in series with one another, a plurality of room indicator circuits each connecting the other sides of a group of switches in like designated rooms on different floors in series with one another, each floor indicator circuit including an electrical signalling means, each room indicator circuit including an electrical signalling means, current limiting means in each of said floor circuits and said room circuits, the minimum number of current limiting means required being the maximum number of floors or rooms whichever is the greater, said current limiting means in excess of the number of floors or rooms whichever is the lesser being grouped in incoming circuit from the number of lesser floors or rooms and being independent on the circuits of the other of said floors or rooms, said current limiting means normally being energized when said circuits are operating properly, there being a change in electrical energy in any of said current limiting means in response to a change of condition in the circuit portion associated respectively therewith which would occur when there is damage to the circuit portion, said current limiting means thereby providing an electrical detection of trouble whereby trouble may be detected from said current limiting means from any change in normal thereof.

6. In an alarm system for a building in which there are a plurality of floors and a plurality of rooms on each floor, a source of electrical current, a thermostat switch in each of the rooms closable upon the occurrence of a condition not normally present therein, a plurality of floor indicator circuits each beginning at one side of said source and con-

necting one side of a plurality of switches on the same floor in series with one another, a plurality of room indicator circuits each connecting the other sides of a group of switches in like designated rooms on different floors in series with one another, each floor indicator circuit including electrically operated signalling means, each room circuit including electrically operated signalling means, a plurality of relay coils, each floor circuit being connected through a relay coil to a room circuit, said relay coil normally limiting the current in said combined circuits to an amount insufficient to actuate either of said signalling means, there being at least as many relays as the maximum number of floors or rooms whichever is the greater, the excess number of relays determined by subtracting the lesser number of floors or rooms from the greater thereof being grouped and connected on one side and receiving therefrom more than one circuit from the same floor or room whichever is of the lesser number and connecting on the other side thereof to an individual circuit of one of the other of said floors or rooms, the closing of any one of said thermostats causing current to by-pass said relay coil and increased current to flow through one of said floor signalling means and one of said room signalling means, said relays being actuatable in response to a change of electrical energy condition therein providing a positive detection of trouble in the respective circuit associated therewith, whereby a detection of trouble may be determined from said relays.

7. The system in claim 6 having in addition a supervisory alarm means, in a normally open supervisory circuit across said source, said circuit being closable by and upon the loss of current in any one of said relays.

8. In an alarm system of the class described for a building in which there are a plurality of floors and a plurality of rooms on each floor, a source of electrical current, a thermostat in each of the rooms closable upon the occurrence of a condition not normally present therein, a plurality of floor indicator circuits each beginning at one side of said source and extending therefrom in independent

circuits and each connecting one side of a plurality of the thermostats on the same floor in series with one another, a plurality of room indicator circuits each extending from the other side of the source and connecting the other sides of a group of thermostats in like designated rooms on different floors in series with one another, each floor indicator circuit including electrically operated signalling means, each room circuit including electrically operated signalling means, a plurality of relay coils, each floor circuit being connected through a relay coil to one of the room circuits said relay coil normally limiting the current in said combined circuits to an amount insufficient to actuate either of said signalling means, there being at least as many relays as the maximum number of floors or rooms whichever is the greater, each relay being in its respective circuit after the last of all the group of thermostats of either a floor or room and before the first of the thermostats of the other thereof, the excess number of relays determined by subtracting the lesser number of floors or rooms from the greater thereof being grouped and connected on one side thereof and receiving therefrom more than one circuit from the same floor or room or whichever is the lesser number and connecting on the other side thereof to an individual circuit of one of the other of said floors or rooms, the closing of any one of said thermostats causing current to by-pass said relay coil and increased current to flow through one of said floor signalling means and one of said room signalling means, a normally open supervisory circuit across said source, a movable relay for each of said relay coils normally open at the open portion of said supervisory circuit, contact point at said open portion, and signalling means in said supervisory circuit, the loss of current in any of said relays causing said supervisory circuit to become closed thereby actuating said signalling means.

References Cited in the file of this patent

UNITED STATES PATENTS

2,605,342 Spurling ---------- July 29, 1952