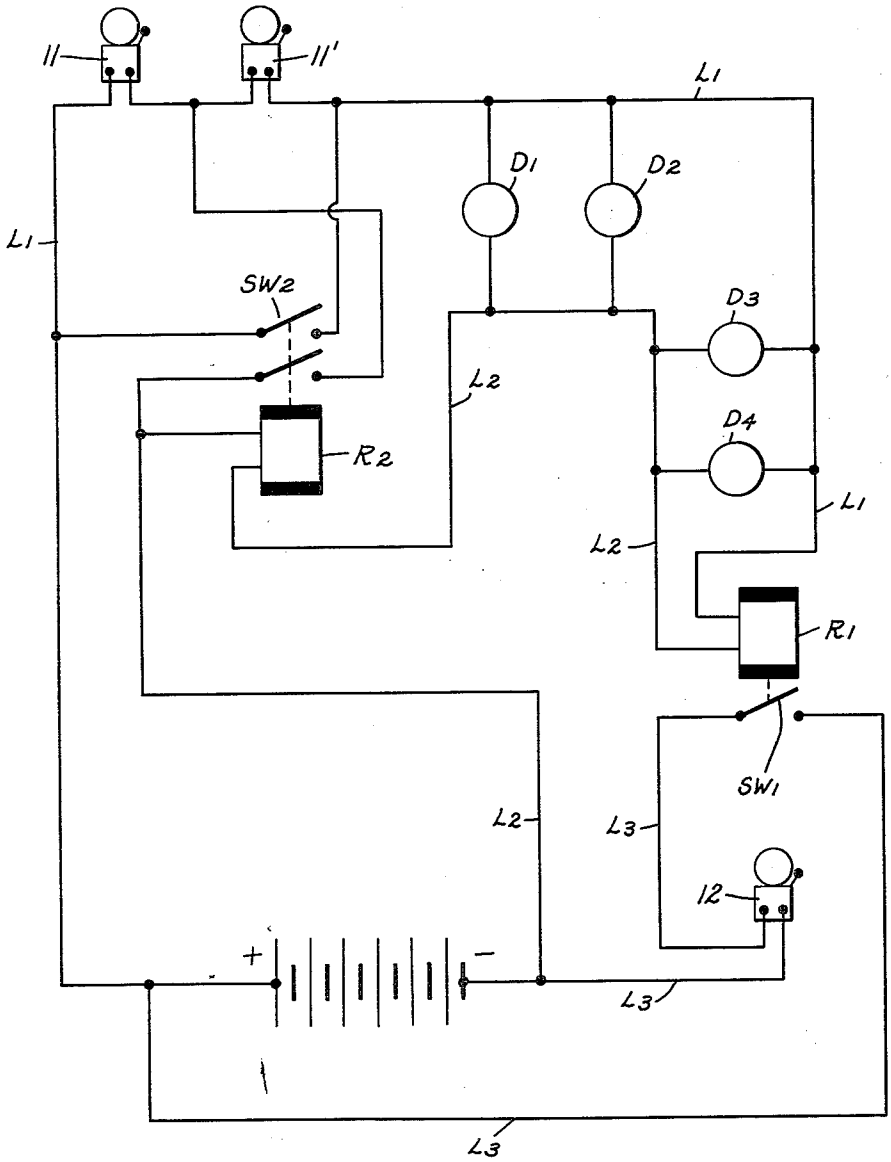
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CONTROL UNITS FOR FIRE PROTECTIVE SIGNALING SYSTEMS

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INVENTOR.
CY HARRIMAN

BY
Kleinberg & Lilling
ATTORNEYS

United States Patent Office

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CONTROL UNITS FOR FIRE PROTECTIVE SIGNALING SYSTEMS

Cy Harriman, Westport, Conn.

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The invention here presented relates generally to remote electrical indicators, and relates especially to a supervising circuit to determine the integrity of a fire or other alarm system.

Audible alarm systems to warn against fire, buglars or the like are well known. The systems usually incorporate a plurality of detectors which are normally electrically open but will close and complete an electrical circuit upon sensing an alarm.

It is imperative that such systems always be operative. It is well known that a fire or burglar alarm system that will not function is worse than no alarm system at all.

In view of the above, it is generally mandatory to provide a supervisory circuit to constantly insure the integrity and operativeness of the system by warning of any faults.

Generally the alarm circuit of systems as above described contain one or more vibrating bells or horns. Since such bells or horns are activated by the rapid opening and closing of contacts, thereby making and breaking the circuit, they must be connected in parallel across the power supply, rather than in series. Parallel circuits, however, cannot easily be supervised by the usual practice of maintaining a minute or trickle flow of current in the lines. Thus, the problem is apparent. To provide a minute flow of current through the alarm system at all times for supervision purposes, the bells or horns should be connected in series. When the bells or horns are to be activated, however, they must be connected in a parallel circuit to the power supply.

It is a cardinal object of this invention, therefore, to provide a detecting circuit with a plurality of bell or horn alarms which may be conveniently supervised by a minute flow of current.

Another primary object of this device is to provide a self supervisory circuit that will automatically indicate the mal-function or inoperativeness of any of its component parts, by a separate trouble signal device.

Another object of the instant invention is to set forth a self supervisory alarm system that is relatively economical and that has relatively few working components.

With these objects in view, the invention consists of the novel features of construction and arrangement of parts which will appear in the following specification and recited in the appended claims, reference being had to the accompanying drawing.

It will be realized that the illustration has been simplified to the greatest possible extent for the purpose of clarity of understanding of the essence of this invention. The drawing is diagrammatic, and conventional symbols have been utilized wherever possible.

Referring particularly to the drawing there is shown a plurality of alarm detectors D1, D2, etc., to sense the desired emergency condition.

It should be noted that although the detectors should be of the normally open type, closing only upon the sensing of the emergency, they are not otherwise described,

since their specific form plays no part of the present invention. Sufficient to say, however, they may be of the bimetallic type for use with a fire alarm system.

It will be seen that the detectors D1, D2 are uniformly connected in parallel across lines L1 and L2 to the opposite terminals of a direct current power supply 10. It should of course be realized that the power supply 10 may be a rectifier, a battery, or a combination of each. Furthermore, although only one power supply is herein shown, it should be understood that this is merely for the purpose of simplicity. Generally the circuit will have more than one direct current power supply, together with the usual voltage relays and control relays to insure a constant input of the proper voltage direct current.

One of the lines, L1 will have a plurality of alarm indicators or annunciators 11, 11′ electrically connected along its length. As illustrated, the alarm indicators or annunciators 11, 11′, will be in series with respect to L1.

The furthermost end of line L1 and L2 are electrically joined through a high resistance coil R1 forming part of a relay switch SW1 which is of the type that will remain electrically "closed" so long as no electric current is supplied thereto. The resistance of R1 is sufficient to severely limit the flow of electrical energy to a trickle therethrough. This low value of current, however, will be sufficient to maintain relay switch SW1 in the open position preventing any flow of electrical energy through line L3 and trouble indicator 12. Furthermore, the low value of electrical energy will flow through coil R2 which forms a part of relay switch SW2. Relay switch SW2 will normally be "open," and the relatively low trickle flow of current through coil R2 will allow the relay switch SW2 to remain open. When the system incorporates two alarm indicators or annunciators 11 and 11′, relay switch SW2 will be of the "double-pole single throw" type as illustrated.

The operation of this embodiment of this device then is as follows:

With the normal positions of relays SW1 and SW2, as shown in the drawing, and so long as the detectors D1 and D2, etc. are open the flow of current will be through 11, 11′, R1 and R2. Since the coil R1 has an extremely high resistance, as hereinbefore explained, there will be only a relatively low flow of current through lines L1 and L2. This low flow of current will maintain SW1 in the "open" position and will be of insufficient value to effect SW2 which will therefor, also remain in the "open" position.

However, should there be a failure of the continuity in the system, the flow of current in coil R1 will either cease or be diminished. This will permit relay switch SW1 to close and thereby complete an electrical circuit across trouble indicator 12 through line L3. Trouble indicator 12 will then call immediate attention to the fault in the circuit and the inoperativeness of the primary alarm system.

When there is reason for an alarm, such as a fire, assuming D1, D2, etc. are temperature type detectors, one of the detectors will close, thereby completing another circuit across lines L1 and L2. Since detectors D1, D2, etc. are relatively low resistance devices, a high current will flow from line L1 to line L2. This current will be sufficient to activate alarm indicators or annunciators 11 and 11′. It will be remembered, however, that the alarm

indicators or annunciators are still connected in series, and horns and bells will not generally operate when connected in series with respect to the power supply. At the moment they are to be activated, therefore, it will be necessary to disconnect the series circuit and connect the plurality of alarm indicators so that they are in parallel with respect to the power supply. This is accomplished automatically by means of relay SW2.

It will be observed that the relatively high flow of current present at the time of the alarm will pass through coil R2 forming a portion of relay SW2. The increased current will cause SW2 to close thereby completing separate parallel circuits for each of the alarm indicators or annunciators 11 and 11'.

Thus, the objects of this invention are realized by providing a system whereby a plurality of alarm indicators or annunciators are connected in series for supervision when not indicating an alarm, but are automatically disconnected from said series circuit arrangement and connected in parallel at the moment an alarm is sensed.

It is to be realized that although only two alarm indicators or annunciators 11 and 11' are illustrated, the principals of this invention may be utilized with even greater numbers of indicators.

Furthermore, as hereinbefore observed, the diagram is simplified for the purpose of clarity of invention. Commercial circuits will without doubt be additionally complicated by conventional manual alarm switches, plural alternative power supply means, manual switches for deactivating and resetting the supervisory circuit after a fault is discovered, etc.

It will be seen that the signal system provided accomplishes the objects of the invention previously set forth. The circuit and operations will be practicable, reliable and durable in all respects. As many detector stations as desired may be provided for, and the constant supervision of lines by a trickle flow of current allows the detectors to be separated from the alarm indicator by any distance with safety. Furthermore, widely separated, but constantly supervised alarm horns or bells are for the first time economically feasible.

While there are above disclosed but a limited number of embodiments of the structure and product of the invention herein presented, it is possible to produce still other embodiments without departing from the inventive concept herein disclosed, and it is desired, therefore, that only such limitations be imposed on the appended claims as are stated therein, or required by the prior art.

Having thus described my invention and illustrated its use, what I claim as new and desire to secure by Letters Patent is:

1. An electrically actuated alarm circuit comprising, a plurality of alarm indicating means, said alarm indicating means being normally connected in a series circuit for ease of electrical supervision, and trouble signal means to warn of a fault in said series circuit, detecting means for sensing an alarm, and means responsive to said detecting means for disconnecting said series circuit and connecting said alarm indicating means in parallel when an alarm is sensed.

2. An electric detection system circuit comprising, an electric power supply, a plurality of alarm indicating means normally connected in series with respect one line from said power supply, and means for sending a supervisory current through said alarm indicating means when connected in series, and alarm detection means connected from said one line to the other line from said power supply, and switch means responsive to said detection means for disconnecting said alarm indicating means from in series with respect to said power supply and connecting the same to in parallel with respect said power when an alarm is sensed.

3. An electric detection system circuit comprising, an electric power supply, two alarm indicating means normally connected in series with respect one line from said power supply, and means for sending a supervisory current through said alarm indicating means when connected in series, and alarm detection means connected from said one line to the other line from said power supply, and switch means responsive to said detection means for disconnecting said alarm indicating means from in series with respect to said power supply and connecting the same to in parallel with respect said power when an alarm is sensed, said switch means including a relay energizable by the closing of said alarm detection means.

4. An electric detection system circuit comprising, an electric power supply, two alarm indicating means normally connected in series with respect one line from said power supply, and means for sending a supervisory current through said alarm indicating means when connected in series, and alarm detection means connected from said one line to the other line from said power supply, and switch means responsive to said detection means for disconnecting said alarm indicating means from in series with respect to said power supply and connecting the same to in parallel with respect said power when an alarm is sensed, said switch means including a relay energizable by the closing of said alarm detection means, and a high resistance coil joining the end of said lines to permit a normal flow of supervisory current through said power supply and said lines and said relay and said alarm indicating means.

5. An electric detection system circuit comprising, an electric power supply, two alarm indicating means normally connected in series with respect one line from said power supply, and means for sending a supervisory current through said alarm indicating means when connected in series, and alarm detection means connected from said one line to the other line from said power supply, and switch means responsive to said detection means for disconnecting said alarm indicating means from in series with respect to said power supply and connecting the same to in parallel with respect said power supply when an alarm is sensed, said switch means including a relay energizable by the closing of said alarm detection means, and a high resistance coil joining the ends of said lines to permit a normal flow of supervisory current through said power supply and said lines and said relay and said alarm indicating means, said high resistance coil forming a part of a second relay having second switch means, said second switch means being held open by the supervisory current flow in said high resistance coil, whereby said second switch means will close when said supervisory current ceases.

6. An electric detection system circuit comprising, an electric power supply, a plurality of alarm indicating means normally connected in series with respect one line from said power supply, and means for sending a supervisory current through said alarm indicating means when connected in series, and alarm detection means connected from said one line to the other line from said power supply, and switch means responsive to said detection means for disconnecting said alarm indicating means from in series with respect to said power supply and connecting the same to in parallel with respect said power supply when an alarm is sensed, said switch means including a relay energizable by the closing of said alarm detection means, and a high resistance coil joining the ends of said lines to permit a normal flow of supervisory current through said power supply and said lines and said relay and said alarm indicating means, said high resistance coil forming a part of a second relay having second switch means, said second switch means being held open by the supervisory current flow in said high resistance coil, where said second switch means will close when said supervisory current ceases, and second trouble alarm means actuable by the closing of said second switch means.

7. In an electrical warning system for alarm conditions, the combination of, a power supply to induce a voltage across two electrically conducting lines, and a plurality of

alarm detection means individually adapted to electrically close only upon the sensing of an alarm condition and each connected from one of said conducting lines to the other of said conducting lines, and at least two alarm annunciator devices to announce the closing of any of said alarm detection means, each of said alarm annunciator devices being connected in a series circuit along said one line, and switch means responsive to any of said alarm detection means to disconnect said series circuit and connect said alarm annunciator devices from in series to in parallel with respect said power supply when said alarm is sensed, and a high resistance coil joining the ends of said lines to permit a normal flow of supervisory current through said power supply and said lines and said alarm annunciator devices.

8. An electrical warning system for alarm conditions as set forth in claim 7, wherein said alarm annunciator devices are each of the vibratory type wherein the electrical current passing therethrough when connected in parallel with respect said power supply will be caused to be intermittent.

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