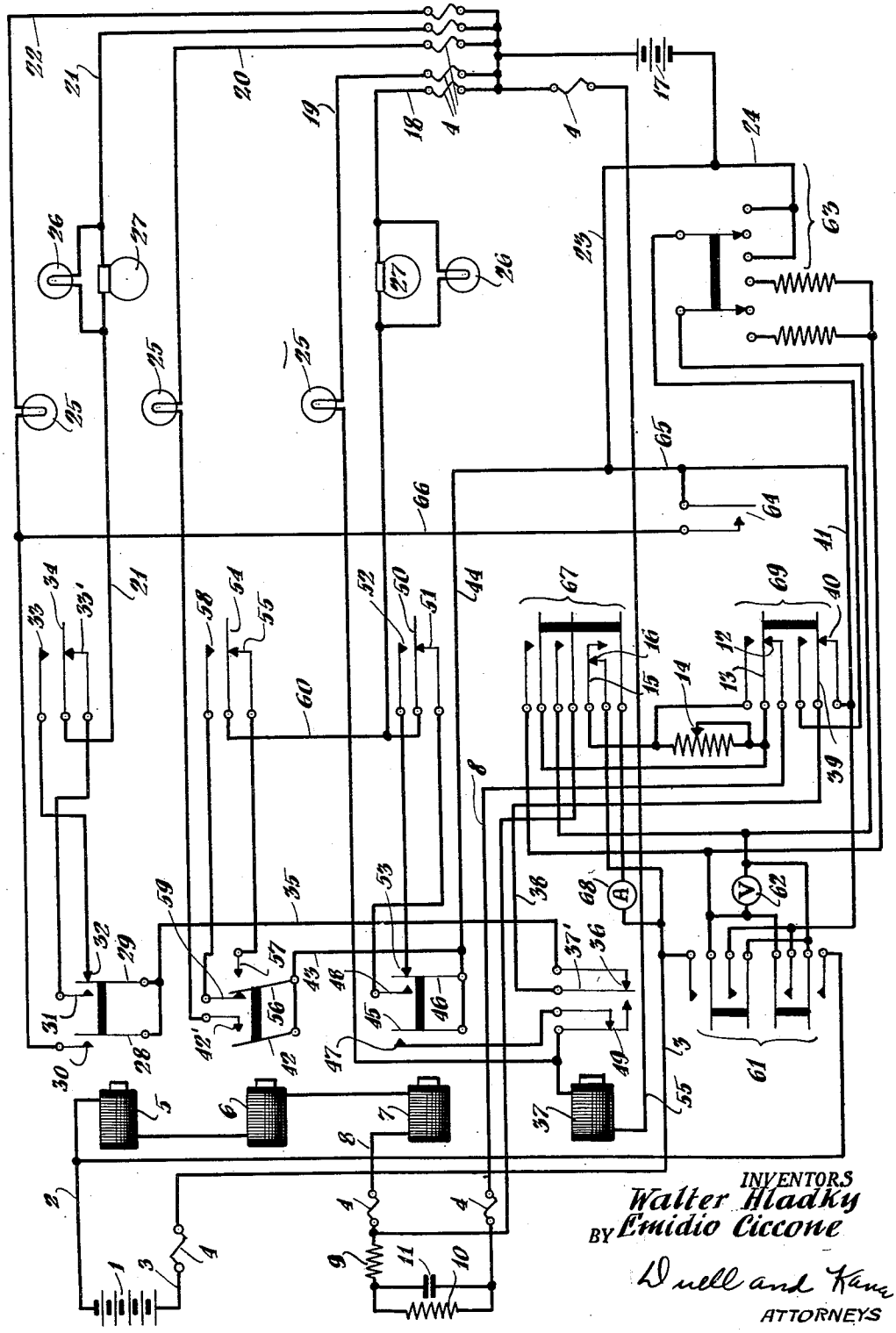
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SUPERVISED ALARM SYSTEM

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SUPERVISED ALARM SYSTEM

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This invention relates to an improved alarm system or apparatus and especially a mechanism by means of which fires or unusual temperature changes may be registered.

It is an object of the invention to furnish an improved system embodying a suitable number of detectors located at points which are to be supervised and which in the event of a fire or similar dangerous condition occurring at those points, will register an alarm at a central station or at a fire house. The present invention contemplates using the existing telephone lines between the points at which the detectors are located and that central station although, of course, other circuits may be included. Where telephone lines are employed the functioning of the present system will in no wise interfere with the normal operation of those lines and the conventional instruments connected therewith.

It is a further object to provide a system which will not alone register an alarm at a central station or a fire house, but also to furnish a system which will put the attendant on notice in the event of open or short circuits occurring.

A further object is that of furnishing a system of this type which may be readily tested so that the operator can be assured that all parts are functioning in a proper manner and in which, moreover, undesired and unnecessary signal indications may be eliminated.

Still another object is that of providing a layout of apparatus of rugged and more or less standard unit construction such as might be purchased on the open market. Therefore, the units may be assembled to provide a low cost system which will function over long periods of time with freedom from all difficulties.

With these and other objects in mind reference is had to the attached sheet of drawings in which the figure diagrammatically represents a circuit and grouping of apparatus such as would be employed in the case of a single detector.

As will be understood this illustration has been resorted to with a view to avoiding unnecessary complicated drawings. In actual practice the system will embrace any desired or necessary number of detectors located at desired points in the property to be supervised. Each of these detectors may be included in one complete system or else a number of detectors might be connected in a single system, especially if those detectors are located in a generally single locality. In any event, the alarms and, if desired, the controls for the system may be situated at the central manually supervised station on a single panel or adjacent panels. These may encompass any desired number of complete systems including one or more detectors which are located where necessary. The distance between the detectors and the central panel may be a matter of a few feet or several miles. This distance is bridged preferably by the intervening standard telephone lines.

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With the foregoing in mind and referring to the drawing it will be seen that the numeral 1 indicates a source of current supply from which leads 2 and 3 extend. Interposed in these leads and in other leads throughout the entire system are fuses 4 of suitable values. Connected with lead 2 and arranged in series with each other are the electro-magnets 5, 6 and 7 of relays which have been diagrammatically shown. Extending from electro-magnet 7 is a lead 8 within which there is interposed a resistor 9 beyond which a detector unit 11 is disposed. A second resistor 10 is arranged in shunt with this detector.

The detecting unit may embody one of a number of different constructions. Likewise it might respond to one or more of several conditions. However, for the purposes of the present description, it will be considered to be a unit which responds to a relatively rapid rise in temperature such as would exist in the case of fire occurring. While this is a preferred embodiment of the present teachings it is not to be regarded in a limiting sense except where otherwise indicated in the claims.

Beyond the detector unit and the resistors, lead 8 is continued to a test-release switch assembly. Under the normal position of the parts current will flow through contact 12 of that assembly, through switch arm 13 and potentiometer 14 to a switch assembly by means of which electrical measurements tests may be conducted. In the normal position of the parts of the latter assembly the current flows through arm 15 to contact 16. The latter is connected to lead 3 which, as afore brought out, extends from supply 1. Therefore a complete circuit is furnished.

At this time it is to be understood that magnet 5 responds to the flow of a moderate or medium amount of current to "pull-in" or attract its operating armature. Electro-magnet 6 responds to a small or low current flow to maintain its armature in attracted position and electro-magnet 7 requires the flow of a high current value to operate its armature. Resistor 9 serves to limit the flow of current in the circuit to a level which will be below that necessary to cause an operative energization of magnet 7, although above that at

which magnet 5 will be operatively energized. Resistor 18 is furnished to permit of a current flow of small value to pass through the circuit even although the points of the detectors are not engaged. The value of such current flow will be adequate to maintain electro-magnet 6 operatively energized, but magnet 5 de-energized.

A second source of current supply has been indicated by the numeral 17. From one side of this source leads 18, 19, 20, 21 and 22 extend. From the opposite side of the source 17 leads 23 and 24 extend. Within the leads 18 to 22 inclusive alarm signals are interposed. These may be of any desired type. For example, they may include light bulbs 25 or combined units embracing bulbs 26 and gongs or bells 27. Again it will be understood that these units may include any structure although preferably they will embody a more or less standard design.

The assembly of the relay of which electro-magnet 5 forms a part includes movable arms 28 and 29 which engage respectively contacts 30 and 31. The latter define the ends of leads 21 and 22. As will be hereinafter brought out, a shifting of arms 28 and 29 from their illustrated normal positions will result in an alarm being registered. This alarm would normally continue until the condition causing that alarm will have been corrected. Continuance of the alarm operation beyond a period necessary for the operator or supervisor at the central station to take cognizance thereof is not alone unnecessary but usually undesirable.

Therefore to discontinue by manual manipulation of a switch, further operation of the alarm, a cut-off structure is furnished. This conveniently embraces a switch including a contact 33 connected with the contact 32 engaged in the normal position of the aforementioned relay by the switch arm 29. A second contact 33' is disposed in spaced relation with respect to contact 33. A switch 34 may move between these contacts. The normal position of this switch arm is in engagement with contact 33'.

It has heretofore been noted that leads 21 and 22 are connected with one side of an electrical source 17. When electro-magnet 5 is energized to shift arms 28 and 29 to engage contacts 30 and 31, current may therefore flow from leads 22 through the arm 28 and lead 35. From the latter it will flow through contact 36 and arm 37' forming a part of a further relay assembly. This assembly normally maintains such contact and arm in electrical engagement. Therefore, the current flow will continue through lead 38 to arm 39 of the test-release switch assembly and then through contact 40 to lead 41. The latter being connected to lead 23 it follows that the second side of the electrical source 17 is connected in circuit. Therefore, the alarm lamp and any auxiliary units provided for tripping time stamps, code wheels, and punch registers connected within lead 22 will be energized. Simultaneously lamp 26 and gong or bell 27 connected to lead 21 will be energized to operate because current will flow from this lead through arm 34, contact 33', contact 31 and switch arm 29 to lead 35. As is apparent if the arm 34 of the cut-off switch is shifted to discontinue the alarm provided by the assembly at 26—27, the lamp 25 in lead 22 will nevertheless continue to be energized. This would be true of any substitute or units auxiliary to that lamp which might be employed. Such latter energization will place the operator on notice first that the condition registered by the unit 26—27 is still continuing and also that if the condition no longer prevails, switch arm 34 must be reshifted to its initial position as shown in the drawings.

An operative energization of electro-magnet 5 of course occurs when the points of detector 11 close to register a dangerous or fire condition. With such points closed a current may flow from source 1 and will have a sufficiently high value to cause a pull-in or attraction of the armature of that relay assembly. With the points of detector 11 open, current will nevertheless flow from source 1 through the several electro-magnets of the relays because of the existence of resistor 18. However, in view of the fact that this resistor permits only a small current flow solely electro-magnet 6 will be operatively energized. Such energization will maintain the arm 42 or the associated relay mechanism normally out of engagement with the contact 42'. That contact defines the end of lead 20. Under these circumstances lead signal or alarm unit 25 included within lead 20 will not be energized.

In the event that a break occurs within the telephone or other lines extending between the detector and the central apparatus, it is, of course, apparent that a fire or similar alarm as registered by energization of electro-magnet 5 and its associated relay mechanism would be ineffective. Therefore, an operator at the central station should be immediately made aware of any open circuit condition which would thus affect the system. As will be apparent, if either of the branches of lead 8 should be severed, all flow of current through the electro-magnets 5, 6, and 7 would be interrupted. Under these circumstances the usual spring or else the expedient of gravity under which the several relays operate would cause arms 42 to engage the contact 42'. Accordingly, current can flow through lead 20 and to lead 43, whence it would flow through lead 44 and branch 23 to the opposite side of source 17. This would cause an energization of the signal 25 in lead 20 to thus put the operator or supervisor on notice that an open circuit condition existed in the system.

Assuming a short circuit condition to come into being then it is obvious that current would not flow through either the detector or through the resistors 9 and 10. Again, the supervisor should be made aware of such a condition under which, of course, the detector 11 would be inoperative to sound an alarm. With the full potential of current from source 1 flowing through the magnets 5, 6 and 7, a sufficiently high value exists to cause an operative energization of magnet 7. This will result in a shifting of the switch arms 45 and 46 forming a part of the relay assembly embracing that magnet into engagement with contacts 47 and 48. Under these circumstances, current is free to flow from source 17 through lead 19 and the alarm signal interposed therein through contact 49 forming a part of the relay assembly embracing electro-magnet 37 and thence through contact 47, arm 45 and lead 44 connected to branch 23 which is coupled to the opposite side of source 17. Therefore, the circuit will be complete and the lamp 25 or other signal coupled into lead 19 will be energized. This will make the operator aware that a short circuit condition exists. Simultaneously with the energization of that signal the alarm embracing units 26—27 interposed in lead 18 will be energized. This will occur because current will flow from one side of source 17 through lead 18 and thence

through switch arm 50 of a cut-off assembly and thence through contact 51 which is connected to contact 48. From the latter it will of course flow through arm 46 to leads 44 and 23.

Again, if an operator wishes to cause a cessation of functioning of the alarm unit 26—27, he may do so by simply manually shifting arm 50 out of engagement with contact 51 and into engagement with contact 52. The latter is connected to contact 53 normally engaged by arm 46. Under these circumstances current will not flow through lead 18 because arm 46 will be out of engagement with contact 53. A cut-out switch assembly is also furnished in connection with the relay operated by electro-magnet 6 and includes a manually shiftable arm 54 normally engaging contact 55 which is connected to contact 57 engageable by arm 56 of that relay assembly. A contact 58 may be engaged by arm 54. This contact is connected to contact 59 of the relay assembly of which electro-magnet 6 forms a part. Due to the fact that that electro-magnet is normally energized, it follows that arm 56 is ordinarily in engagement with contact 59. With the opening or shifting of switch 54 or contact 55, current will not flow through the signal devices 26—27 in lead 18 because current flow will be interrupted through lead 60 connecting lead 18 with arm 54. However if that arm is thus shifted the signal lamp 25 or its equivalent interposed in lead 20 will remain energized.

As afore brought out, under normal operating conditions, a low current flows through the relay circuit embracing magnet 6. This maintains the relay in "pulled in" position. In that position no open-circuit alarm will be operated. Under fire alarm conditions a medium or moderate current flows through the circuit which causes the relay of which electro-magnet 5 forms a part to be actuated thus causing a fire alarm to be registered. Therefore, although two relays are energized, only one type of alarm is sounded. Under short circuit conditions, a high current flows which causes all three relays to pull in. Since this is the normal condition of the relay of which magnet 6 forms a part, no open circuit alarm will be sounded. However, if no expedient has been resorted to to overcome this difficulty, a fire alarm will be sounded simultaneously with the registering of the short circuit alarm. To prevent this, the relay of which electro-magnet 37 forms a part is provided. This relay functions only under high-current flow conditions.

As afore brought out, under normal conditions, arm 37′ and contact 36 of this latter relay are in engagement so that current may flow and a fire alarm be registered. Under short circuit conditions involving an operative energization of electro-magnet 7 arm 45 engages contact 47. Therefore current may flow from one side of source 17 through lead 23 and thence through lead 44 to arm 45 and so from contact 47 to contact 49 to the windings of electro-magnet 37. Thence it will flow through lead 55 to the opposite of source 17. This will cause the arm 37′ of the relay of which electro-magnet 37 forms a part to shift. Consequently the circuit through lead 35 will be interrupted. Therefore, the signal devices associated with leads 21 and 22 will not be energized.

A ground test switch assembly generally indicated at 61 is provided for testing by means of a volt meter 62 any existence of a short circuit between each side of the telephone line to ground for an equivalent circuit. A relay test switch 63

is preferably furnished as part of the system for testing the calibration of the alarm relays. A switch 64 is furnished and connected to a lead 65 coupled to lead 23 as well as a lead 66 connected to lead 22. This switch 64 permits of a testing of the annunciator or registering signal lamps. The numeral 67 indicates the assembly of the electrical measurements test switch and of which contact 16 and arm 15 form a part. This assembly has connected to it a milliammeter 68 for measuring the alarm signal current.

Finally, a test-release switch assembly is indicated by the numeral 69. Arm 13 and contact 12, as well as arm 39 and contact 40 form part of this assembly. Such assembly, in conjunction with the electrical measurements test switch 67 and the relay test switch 63 permit the engineer or operator in charge to check all portions of the system and to correct conditions of fault which are noted.

Thus, among others, the several objects of the invention as specifically afore listed are achieved. Obviously numerous changes in construction and rearrangement of the parts might be resorted to without departing from the spirit of the invention as defined by the claims.

We claim:

1. An alarm system including in combination three magnetic relays, the magnets of said relays requiring current flows of different values to operate them, a circuit closing detector unit, resistors of different values arranged respectively in shunt and in series with said unit, said relays being arranged in series with each other and with said unit, the assembly being connectible to a source of current supply, the first of the magnets being operatively energizable by a current flow passing through the resistor of highest value, the second of said magnets being operatively energizable by a current flow through the resistor of lower value, the third magnet being energizable solely by a current flow by-passing said unit and resistors and signalling means operated by each of said relays.

2. An alarm system including in combination three magnetic relays, the magnets of said relays requiring current flows of different values to operate them, a circuit closing detector unit, resistors of different values arranged respectively in shunt and in series with said unit, said relays being arranged in series with each other and with said unit, the assembly being connectible to a source of current supply, the first of the magnets being operatively energizable by a current flow passing through the resistor of highest value, the second of said magnets being operatively energizable by a current flow through the resistor of lower value, the third magnet being energizable solely by a current flow by-passing said unit and resistors, audible and visual signalling means connectible to a separate source of current supply and means for connecting said signalling means with said relays.

3. An alarm system including in combination three magnetic relays, the magnets of said relays requiring current flows of different values to operate them, a circuit closing detector unit, resistors of different values arranged respectively in shunt and in series with said unit, said relays being arranged in series with each other and with said unit, the assembly being connectible to a source of current supply, the first of the magnets being operatively energizable by a current flow passing through the resistor of highest value, the second of said magnets being opera-

tively energizable by a current flow through the resistor of lower value, the third magnet being energizable solely by a current flow by-passing said unit and resistors, audible and visual signalling means connectible to a separate source of current supply, means for connecting said signalling means with said relays, manually operable switch means for disconnecting said signalling means from said separate source and further signalling means indicating the position to which any of said relays has been shifted.

4. An alarm system including in combination three magnetic relays, the magnets of said relays requiring current flows of different values to operate them, a circuit closing detector unit, resistors of different values arranged respectively in shunt and in series with said unit, said relays being arranged in series with each other and with said unit, the assembly being connectible to a source of current supply, the first of the magnets being operatively energizable by a current flow passing through the resistor of highest value, the second of said magnets being operatively energizable by a current flow through the resistor of lower value, the third magnet being energizable solely by a current flow by-passing said unit and resistors, signalling means connected to the relay of the first magnet to indicate when said magnet is de-energized, further signalling means connected to the relay of which the second magnet forms a part to indicate the closing of a circuit through said unit and additional signalling means connected to the relay of which the third magnet forms a part for indicating a short circuit of said system.

5. An alarm system including in combination three magnetic relays, the magnets of said relays requiring current flows of different values to operate them, a circuit closing detector unit, resistors of different values arranged respectively in shunt and in series with said unit, said relays being arranged in series with each other and with said unit, the assembly being connectible to a source of current supply, the first of the magnets being operatively energizable by a current flow passing through the resistor of highest value, the second of said magnets being operatively energizable by a current flow through the resistor of lower value, the third magnet being energizable solely by a current flow by-passing said unit and resistors, signalling means connected to the relay of the first magnet to indicate when said magnet is de-energized, further signalling means connected to the relay of which the second magnet forms a part to indicate the closing of a circuit through said unit, additional signalling means connected to the relay of which the third magnet forms a part for indicating a short circuit of said system and a further relay forming a part of said system and connectible to the relay of which the second magnet forms a part to prevent an energization of the signalling means connected to that relay when a short circuit occurs.

6. An alarm system including in combination three magnetic relays, the magnets of said relays requiring current flows of different values to operate them, a circuit closing detector unit, resistors of different values arranged respectively in shunt and in series with said unit, said relays being arranged in series with each other and with said unit, the assembly being connectible to a source of current supply, the first of the magnets being operatively energizable by a current flow passing through the resistor of highest value, the second of said magnets being operatively energizable by a current flow through the resistor of lower value, the third magnet being energizable solely by a current flow by-passing said unit and resistors, signalling means operated by each of said relays and testing switches connected in said system to test the operativeness of the several relays, circuits and signalling means.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
673,519	Foster, Jr.	May 7, 1901
1,229,939	Goldstein	June 12, 1917
1,909,212	Muehter	May 16, 1933
2,000,074	Grant, Jr.	May 7, 1935
2,075,822	Miller	Apr. 6, 1937
2,116,947	Ketay	May 10, 1938
2,362,021	Nazar	Nov. 7, 1944