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ANNUNCIATOR SYSTEM

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FIG. 1

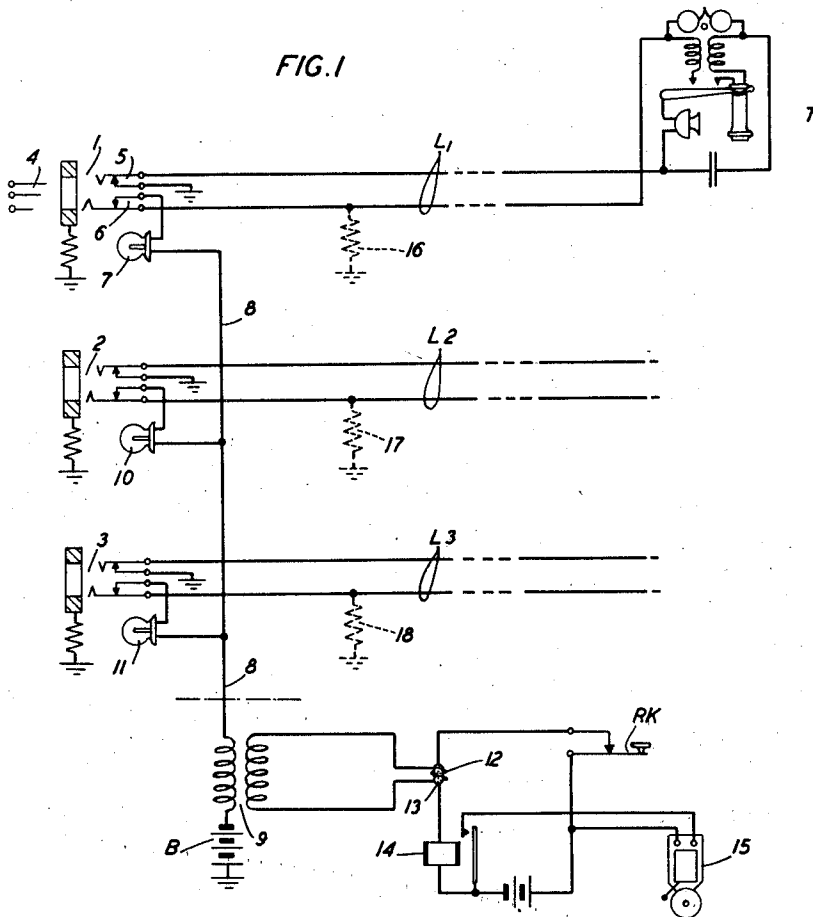
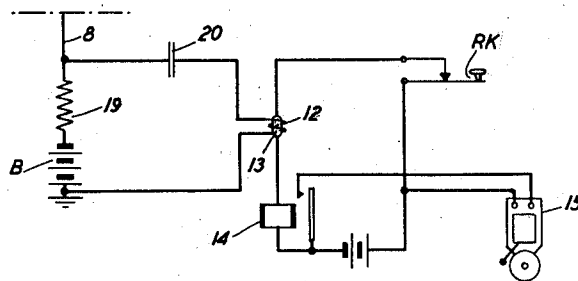


FIG. 2



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ANNUNCIATOR SYSTEM

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4 Claims. (Cl. 179—51)

This invention relates to telephone systems and more particularly to improvements in signaling arrangements at common battery telephone central offices at which subscribers' lines terminate. Specifically the invention relates to what are known as series line lamp lines, i. e., lines in which a line lamp is connected in series with the line and lighted without the aid of a so-called line relay, and in connection with which a night alarm relay common to a plurality of lines are caused to operate whenever any one of the lines calls.

Heretofore various arrangements have been suggested and used for giving a night alarm at the central office, as for example by inserting a relay in the common lead between the central office battery and the line lamps or line relays whereby whenever any one of the lines calls, the common or night alarm relay operates thereby closing a local circuit to light a pilot lamp or actuate some other signal device as an indication that a call has been received. Such an arrangement, however, is sometimes undesirable as the cumulative effect of leakage to ground on a number of lines may cause sufficient current to flow in the common relay to cause its operation, thus giving a false indication of a call.

An object of the invention is to insure reliable operation of a night alarm circuit in response to a call in spite of steady simultaneous leakage to ground from a number of the lines.

A further object is to prevent false operation of a night alarm circuit due to a steady and substantial leakage to ground on the lines.

A still further object is to insure reliable operation of a night alarm circuit when the line current suddenly increases in value a substantial amount.

A feature of the invention whereby the foregoing objects are attained resides in connecting the primary of a transformer in series with the line signal battery, connecting the usual night alarm relay in a local circuit, serially including a source of current and a heater type thermistor of the character disclosed in U. S. Patent 2,084,135 (resistance 19), and in connecting the heater coil thereof in series with the secondary of the transformer, whereby a sudden increase in current through the transformer primary winding induces an impulse in the secondary winding which in passing through the heater winding raises the temperature of the thermistor sufficiently to reduce its resistance to the point where the night alarm relay will operate.

An alternative feature of the invention resides in employing a non-inductive resistance element

in place of the transformer previously referred to which resistance is connected in series with the battery supply for the line signals and in connecting the heating coil of the thermistor across the resistance and battery in series with a condenser of substantial capacity whereby the condenser is normally charged to the potentials of battery and discharges through the heating coil of the thermistor when a sudden change in current, through the resistance, occurs due to a call on one of the lines, the capacity of the condenser being so chosen that the discharge current through the heating coil is sufficient to reduce the thermistor resistance and permit operation of the night alarm.

The invention will be understood from the following description and accompanying drawing, Fig. 1 of which represents a night alarm arrangement employing a transformer for heating the thermistor in accordance with the first feature, and Fig. 2 represents the arrangement of the alternative feature which employs a resistance element in place of a transformer.

In Fig. 1 a subscriber's telephone line L_1 is shown terminating at one end in a switchboard jack 1 and at the other end in a subscriber's telephone station T. Other telephone lines L_2 and L_3 extend from other switchboard jacks 2 and 3 to other subscribers' stations, not shown.

The plug 4 of an operator's cord is adapted to be connected with any of the lines.

The tip side of line L_1 (for example) is connected to ground through contacts 5 of jack 1 and the ring side of the line is connected through contacts 6, line lamp 7, and over conductor 8 to the central office battery B in series with the primary winding of a transformer 9. The lines L_2 and L_3 are connected in a similar manner through their respective line lamps 10 and 11 to the common conductor 8 and thence to battery through the transformer 9.

It will be understood that other line lamps can be connected to the conductor 8 in a similar manner.

Connected to the secondary of transformer 9 is a circuit including a heating winding 12 in close proximity to a so-called "thermistor" or negative temperature resistance element 13 which is serially connected in the energizing circuit of the night alarm relay 14 whose armature and contacts control a signal device such as a bell 15.

It will be understood that the thermistor 13 is of such a character and so chosen that its normal or cold resistance is such that it will not pass sufficient current to permit operation of relay 14

but when its temperature is raised to a predetermined value its resistance will decrease to a point where the relay 14 will receive the required operating current.

As previously indicated one or more of the lines may have high resistance ground (or crosses) due to faulty insulation or other causes and if such grounds are present on the ring conductor of the line, as indicated at 16, 17 and 18, there will be a multiple leakage path for current from the battery B through the line lamps of the grounded lines and while the leakage current through a single line lamp may be insufficient to cause it to glow with visible brilliancy the combined leakage current of several grounded lines may be as great or greater than the current required to light one of the lamps to full brilliancy but as the night alarm relay 14, instead of being connected in series with the battery and line lamp, as in previous systems, is inductively coupled to the battery supply conductor 8 by means of the transformer 9 and the leakage current seldom is subject to rapid fluctuation, this relay remains inert with its contacts in their open or normal condition due to the cold (high) resistance of the thermistor 13.

In case station T, for example, calls by lifting the receiver from the hook, a sudden increase occurs in the current flowing in the primary winding of the transformer thereby inducing a current in the secondary winding which flows in the heater winding 12 thus raising the temperature of the thermistor thereby lowering its resistance whereupon relay 14 operates to actuate the alarm bell 15.

When the temperature of thermistor 13 has been raised to the point where sufficient current flows to operate relay 14, this current will, due to the resistance of the thermistor, maintain it at its conducting temperature thus holding the relay operated until released by operation of release key RK.

Fig. 2 shows an auxiliary arrangement for accomplishing the same result as in Fig. 1 and is adapted to be connected to conductor 8 thereof in an obvious manner and consists of a non-inductive resistance 19 connected in series with the battery B, and a circuit for the heater winding 12 serially including a condenser 20 which circuit is connected across the resistance and battery in the manner shown so that condenser 20 will be normally charged to the full potential of the battery or to that potential less the drop in resistance 19 due to leakage current on the lines and hence no current flows in the heater winding 12. When, however, a line calls a sudden drop in potential occurs across resistance 19, due to the line lamp current which causes a change in the potential of condenser 20 and a consequent momentary flow of current in the heating coil 12 which, as before, permits relay 14 to operate.

What is claimed is:

1. In a telephone system, a central office, a plurality of lines terminating thereat, a signal device in series with each line at said central office, a common source of current at said central office for energizing said signals, a night alarm relay at the central office, a circuit for said relay serially including a source of current and a resistance element having a negative temperature coefficient, an electrical heater for raising the temperature of said negative temperature element and a transformer having a primary and a secondary winding and connected with its primary winding in series with said central office current source and its secondary winding connected to said electrical heater.

2. In a signaling system, a signal, an energizing circuit therefor, a transformer having a primary winding in said energizing circuit, a relay, an energizing circuit therefor including a source of current and a resistance having a negative temperature coefficient, an electrical heater for raising the temperature of said resistance and a circuit for said heater serially including a secondary winding of said transformer whereby a sudden change in current in said signal energizing circuit will cause a current impulse to flow in said heater to raise its temperature and that of its associated resistance to reduce the resistance of said relay circuit and cause its operation.

3. In a telephone system, a central office, a plurality of lines terminating thereat, a signal device in series with each line at said central office, a common source of current at said central office for energizing said signals, a night alarm relay at the central office, a circuit for said relay, serially including a source of current and a resistance element having a negative temperature coefficient, an electrical heater for raising the temperature of said resistance element, impedance means in series with said common source of current, and circuit means interconnecting said impedance means and said heater whereby a sudden increase in potential across said impedance will cause a flow of current in said heater.

4. In a telephone system, a central office, a plurality of lines terminating thereat, a signal device in series with each line at said central office, a common source of current at said central office for energizing said signals, a night alarm relay at the central office, a circuit for said relay serially including a source of current and a resistance element having a negative temperature coefficient, an electrical heater for raising the temperature of said resistance element, impedance means in series with said common source of current and circuit means including a condenser interconnecting said impedance means and said heater whereby a sudden increase in potential across said impedance will cause a flow of current in said heater.

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