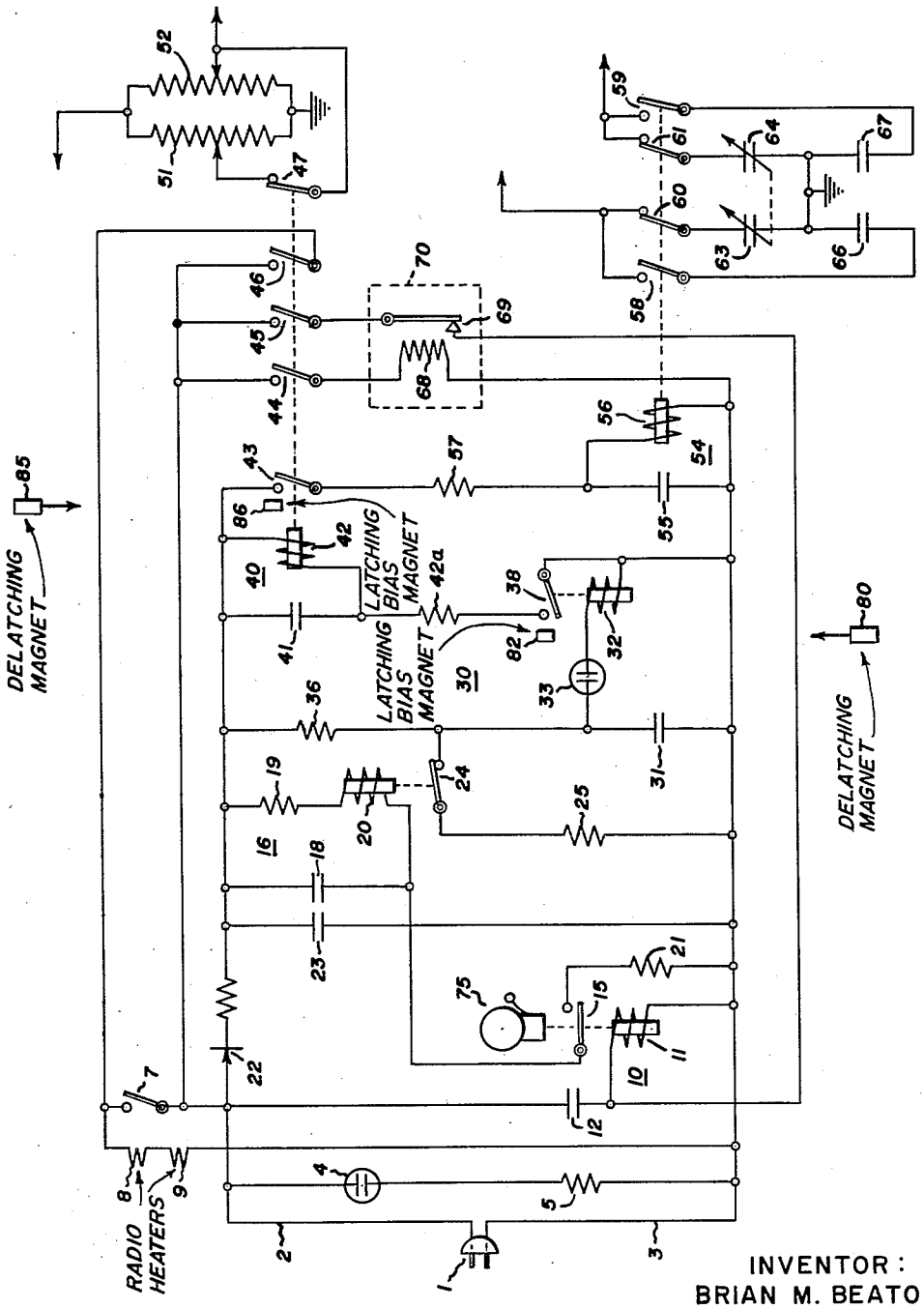
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RADIO CONTROLLED PUBLIC WARNING SYSTEM
UTILIZING CARRIER CURRENT
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RADIO CONTROLLED PUBLIC WARNING SYSTEM UTILIZING CARRIER CURRENT

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This invention relates generally to a remote control alarm system and more particularly to a carrier current controlled alarm or signalling system actuated by an alarm signal frequency impressed on the supply of a power line.

The importance of public warning systems, is widely recognized. In the event of impending disaster such as hurricanes, floods, conflagrations, as well as air raids, many lives may be saved by promptly alerting the public. The public can best be served in these situations by the inauguration of a public alarm system which can reach much of the entire population and whose alarm is reliable and readily observable. Present alarm systems such as air raid sirens do not readily penetrate closed spaces in many areas and may further be confused with sirens of emergency vehicles responding to routine mishaps. Furthermore, such alarm systems are incapable of advising the public as to the nature of the particular public danger.

Accordingly, it is a principal object of this invention to provide an alarm system by which in the event of an emergency of any varied scope, it is possible to establish instant communications with a large number of alarm signal utilizing devices such as radio receivers.

Another object is to provide a carrier current controlled alarm which can be actuated by an alarm signal frequency impressed on a power line.

A further object is to provide a carrier current controlled alarm which can be actuated by an alarm signal frequency impressed on a power line for a predetermined period or length of time.

Yet another object of this invention is to provide a small compact alarm system which can be inconspicuously positioned within a room of a private home, office, or any place which makes use of a central power supply.

A still further object of the invention is to provide an alarm system which is inexpensive, small, of simple construction, and inexpensively manufactured.

In order to attain the foregoing objects, there is provided in a preferred embodiment of the invention an electromagnetic alarm system, which turns on a utilization device such as a radio receiver and operates an alarm upon receiving a signal of a given alarm signal frequency and duration impressed on a power supply, such as a normal household electric power circuit. This electromagnetic alarm system comprises in part an alarm signal detector, a timing circuit, a radio control circuit and a circuit to indicate that household power is on. The presence of household power, e.g. 60 c.p.s. is indicated by a neon bulb placed across the household supply line. An alarm signal detector in the form of a tuned series LC circuit resonant at the predetermined alarm signal frequency is connected across the household power. A timing circuit control circuit is adapted to be instantaneously operated upon the closing of a frequency responsive switch or vibrating reed, which is operable in response to the tuned LC circuit resonating at the alarm signal frequency. The timing circuit control circuit causes a second switch means to operate, thereby placing the timing circuit across the household power lines. After a predetermined duration measured by the timing circuit during which the alarm signal continues to be present, the timing circuit operates a latching switch connecting a control circuit across the household power lines. Energization of this control circuit operates a plurality of switches, thereby connecting the radio to the household power line to operate at a preset volume and frequency corresponding to an alarm frequency such as Conelrad at 640 or 1240 kilocycles or any other desired frequency for alarm purposes. The control circuit simultaneously operates an alarm, sounding for a predetermined duration corresponding approximately to the time it takes the radio to become fully operable.

While the specification concludes with claims particularly pointing out and distinctly claiming the subject matter regarding the invention, it is believed the invention will be better understood from the following description taken in connection with the accompanying drawing, which is a circuit diagram of a preferred embodiment of the alarm system of the invention operating in conjunction with a radio receiver as the utilization device to be operated by the alarm system.

Referring to the drawing, the preferred circuit arrangement of the invention includes a power plug or terminal means 1 for connecting the power wires 2 and 3 of the alarm system of the subject invention to an A.C. voltage supply such as the electrical supply of a household electrical circuit in the order of 117 volts r.m.s. at 60 c.p.s. The presence of a supply voltage at a supply frequency of 60 c.p.s. on the power wires 2 and 3 is indicated by a circuit comprising a neon bulb 4 and resistor 5 placed across power lines 2 and 3.

In the absence of an alarm signal, radio "on-off" switch 7 may be closed connecting radio heaters 8 and 9, symbolically representing the power circuit of a radio, across power lines 2 and 3, causing the radio to become operable. If the radio is not operating, switch 7 being open, the presence of an alarm signal impressed on power lines 2 and 3 is detected by an alarm signal detector circuit 10 in the form of a tuned series LC circuit connected across lines 2 and 3 and including inductor 11 and capacitor 12 designed to be resonant at any predetermined alarm signal frequency.

A normally frequency responsive switch or vibrating reed 15, which is normally open, closes in response to the LC circuit 10 resonating at the alarm signal frequency of 240 c.p.s. The switch 15 upon closing connects an electrical control circuit 16 referred to as a timing circuit control circuit including a capacitor 18 in parallel with the series arrangement of resistor 19 and relay coil 20, across power lines 2 and 3 through a surge resistor 21. The power line alternating current supply is converted to a direct current supply by a rectifier 22. Accordingly, capacitor 23 is charged to capacity. The voltage on capacitor 23 approaches that of the peak line voltage. Therefore, upon switch 15 connecting control circuit 16 across the power lines 2 and 3, the full voltage of capacitor 23 will be placed directly across resistor 19 and relay 20 causing a magnetic field to build up almost instantaneously in relay 20, e.g. in a matter of milliseconds. The field of relay 20 will cause normally closed switch 24 to open. Prior to its operation while in the closed condition, normally closed switch 24 in series with resistor 25 shunts the capacitor portion of electrical timing circuit 30, which comprises capacitor 31 in series with resistor 36. Neon lamp 33 in series with relay coil 32 across capacitor 31 presents an open circuit until neon 33 is caused to fire.

When switch 24 is caused to open in response to the field on relay 20, the timing circuit including capacitor 31 and resistor 36 is connected across the power lines 2 and 3. Capacitor 31 will begin to charge by current passed through resistor 36 upon switch 24 opening and after a predetermined voltage has been developed across capacitor 31, the neon bulb 33 fires, thereby causing capacitor 31 to discharge almost instantaneously through

inductor 32. This causes an increase in the magnetic field on inductor 32 to a point sufficient to close latching switch 38. This operation of the timing circuit, including capacitor 31 and resistor 36 in the preferred embodiment, will take approximately 11–15 seconds.

Upon latching, switch 38 closing in response to the field on relay 32, an alarm and radio control circuit 40 comprising capacitor 41 in parallel with a latching relay 42 is connected across power lines 2 and 3 through surge resistor 42*a*. When the alarm and radio control circuit 40 is connected across power lines 2 and 3, capacitor 41 begins to charge. As the charge on capacitor 41 increases, so does the current flow through relay 42 thereby increasing the magnetic field of the relay 42. After the field on relay 42 reaches a predetermined value, almost instantaneously, it simultaneously closes latching switch 43, normally open switches 44, 45, and 46 and opens normally closed switch 47.

Normally open switch 46, shunting the radio "on-off" switch 7, which as described above is open, closes to connect the radio tube heaters 8 and 9 across power lines 2 and 3, thereby applying household power to the A.C. power input of the radio receiver.

The opening of switch 47 disconnects variable volume control potentiometer 51, which is the normal volume control potentiometer for a radio, and connects a preset volume control potentiometer 52 to the grid of the power tube of the radio. Thus, the radio is caused to operate at a preset volume when energized in response to an alarm signal. This volume will be such as to adequately insure all parties in the area of the radio to be able to hear the broadcast of the emergency warning.

When latching switch 43 closes it connects a station control means 54 comprising a parallel connection of capacitor 55 and latching relay 56 across power lines 2 and 3 through a surge limiting resistor 57. When station control means 54 is connected across power lines 2 and 3, capacitor 55 begins to charge and accordingly the field on latching relay 56 increases until as described with respect to inductor 42, the field strength is sufficient to operate normally open switches 58, 59 and normally closed switches 60, 61. Switches 60, 61, when opened, disconnect the variable gang operated condensers 63, 64, thereby removing the variable radio frequency control by which the radio is tuned. Switches 58 and 59 upon closing connect condensers 66 and 67 into the radio frequency and oscillator circuits, respectively, of the radio, thereby tuning the radio to a preset frequency such as the Conelrad frequency of 640 and 1240 kilocycles or any other desired preset frequency.

When switch 44 closes in response to the field on relay 42, heater 68 of thermal time delay relay 70 is placed across power lines 2 and 3. When switch 45 closes in response to the field on relay 42 the normally closed circuit 69 of the thermal time delay relay 70 shunts capacitor 12, thereby placing relay coil 11 directly across power lines 2 and 3. Accordingly, relay coil 11 is subjected to the full value of the A.C. line voltage and the increased magnetic field thereon will cause an alarm, e.g. a clapper, bell, or buzzer represented symbolically at 75, to sound. After a predetermined duration corresponding to the time it takes for the radio to reach a fully operable condition, heater 68 of the thermal time delay relay 70 will reach a sufficiently high temperature to cause the normally closed contacts 69 of relay 70 to become open. Accordingly, capacitor 12 is again placed in series with the relay coil 11. The ensuing change in the magnetic field on relay 11 causes alarm 75 to be disabled and ceases to sound.

In order to turn off the radio or utilization device of whatever type operated by the alarm signal, a de-latching means shown diagrammatically in the form of a magnet 80 may be attached to a push button (not shown) which when operated will overcome the latching bias magnet 82 on the latching switch 38. When latching switch 38 opens, the field on relay 42 is removed and switches 44, 45 and 46 open while normally closed switch 47 will once again be closed. Thus, the radio or other utilization device will be removed from across the power lines 2 and 3 and it will be necessary to turn on the radio "on-off" switch 7 to provide normal operation of the radio.

However, the opening of latching switch 38 and the deenergization of relay 42 will not operate to open latching switch 43 which connects station control means 54 across power lines 2 and 3. Thus, if the radio "on-off" switch 7 is turned on the radio will continue operation at only the preset alarm frequencies of a Conelrad nature, such as 640 kilocycles or 1240 kilocycles or any desired preset frequency. Therefore, a second delatching means 85 in the form of a magnet which may be attached to a push button as described above with respect to the latching means 80, will be operated to overcome the bias magnet 86 on the latching switch 43, thereby opening the latching switch and reconnecting the variable tuning circuit of the radio by opening switches 58 and 59 and closing switches 60 and 61.

It should be obvious to one skilled in the art that the subject invention will operate well as long as the timing is sufficiently long to avoid energization of the alarm and radio by transient signals having the frequency of the alarm signal but of shorter duration. The circuit will operate equally well with a plurality of electrical control means such as two timing circuits operated in cascade to supply the required time delay before the operation of the alarm and radio circuits.

Although a particular embodiment of the subject invention has been described, many modifications may be made and it is understood to be the intention of the appended claims to cover all such modifications that fall within the true spirit and scope of the invention.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. A carrier current controlled alarm responsive to an alarm signal of predetermined frequency impressed on an alternating current power line to operate a radio receiver comprising:

(*a*) terminal means for connection to a supply voltage carried by the power line,

(*b*) a tuned circuit including a first capacitor and an inductor serially connected across said terminal means resonant at the predetermined alarm signal frequency and having a first switch means operable at said predetermined frequency and connected to said terminal means,

(*c*) rectifier means connected to the terminal means to convert the A.C. supply voltage from the power line to a direct current control voltage,

(*d*) a second capacitor adapted to be connected to the rectifier means to be charged by said direct current control voltage,

(*e*) first electrical control means,

(*f*) said switch means operable to connect said second capacitor to said first electrical control means during application of the alarm signal to the power line,

(*g*) a third capacitor connected to the rectifier means to be charged by said direct current control voltage,

(*h*) said first electrical control means responsive to a predetermined charge on said first capacitor to connect said third capacitor to said rectifier,

(*i*) an electrical timing means,

(*j*) first means connecting said third capacitor to said electrical timing means,

(*k*) said electrical timing means responsive to a predetermined charge on said third capacitor to connect said radio receiver to said terminal means to be energized by the supply voltage carrying power line,

(*l*) a fourth capacitor adapted to be connected to the rectifier means to be charged by said direct current control voltage,

(*m*) a second electrical control means,

(*n*) second means connecting said fourth capacitor to said second electrical control means,

(*o*) a first latching switch operable to connect said fourth capacitor to said rectifier in response to the operation of said electrical timing means,

(*p*) second switch means responsive to the operation of said second electrical control means to connect said radio receiver to said terminal means to be energized by said supply voltage carrying power line,

(*q*) a fifth capacitor adapted to be connected to the rectifier means to be charged with said direct current control voltage,

(*r*) a third electrical control means,

(*s*) a second latching switch responsive to the operation of said second electrical control means to connect said fourth capacitor to said rectifier,

(*t*) third means connecting said fifth capacitor to said third electrical control means,

(*u*) a preset station frequency control means,

(*v*) a variable station frequency control means,

(*w*) a plurality of switches responsive to the operation of the fourth control means to connect the preset station frequency control means to the radio receiver,

(*x*) a first de-latching means operable to de-latch the first latching means to disconnect the radio receiver from the terminal means while permitting the preset station frequency to remain connected to the radio receiver, and

(*y*) second de-latching means operable to de-latch the second latching means thereby disconnecting the preset frequency control and connecting the variable frequency control means to the radio receiver.

2. The invention of claim 1 including a fourth means responsive to the operation of said second electrical control means to shunt said first capacitor and connect the inductor directly across the power lines thereby substantially increasing the magnetic field of the inductor, and

(*a*) an alarm device responsive to the changed field of the tuned inductor to sound an audible alarm.

3. The invention of claim 1 including a fourth means responsive to the operation of said second electrical control means to shunt said first capacitor and connect the inductor directly across the power lines thereby substantially increasing the magnetic field of the inductor,

(*a*) an alarm device responsive to the changed field of the inductor to sound an audible alarm, and

(*b*) a fifth means responsive to the operation of said second electrical control means to disable the alarm device after a predetermined duration.

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