

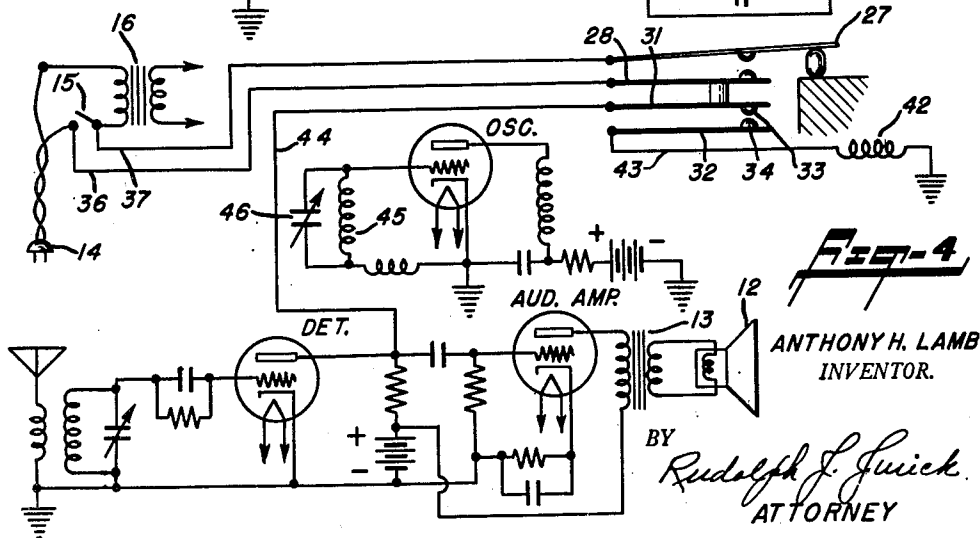
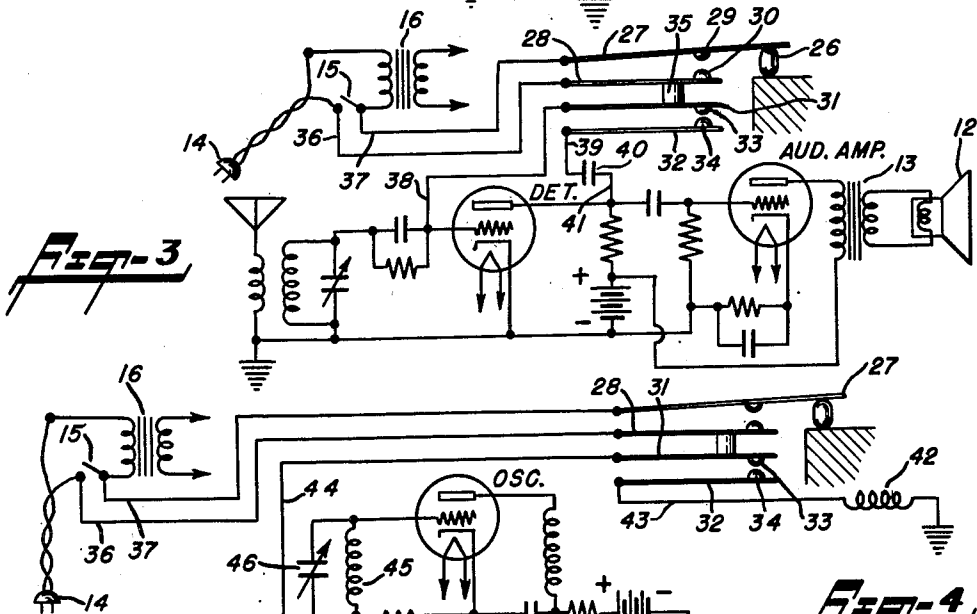
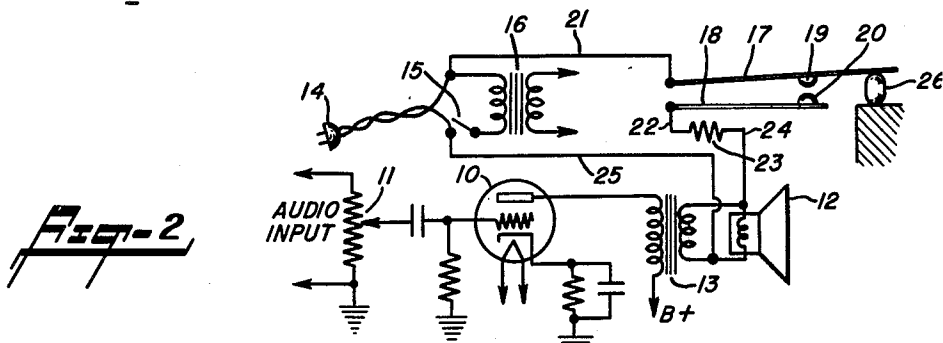
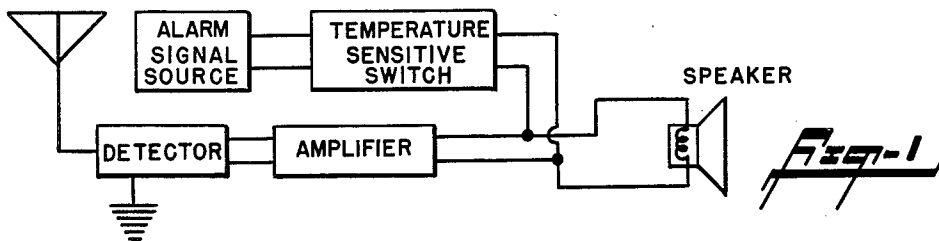
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COMBINATION RADIO AND FIRE ALARM

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COMBINATION RADIO AND FIRE ALARM

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3 Claims. (Cl. 340-220)

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This invention relates to fire alarm devices and more particularly to the novel combination of a radio receiving set and fire alarm.

In my copending application Serial No. 772,634 filed September 8, 1947, now Patent No. 2,552,331; issued May 8, 1951, I have illustrated and described the broad aspects of a novel fire alarm device adapted for home use, said device comprising an audible sound producing member serving a primary function and provided with temperature responsive control means for actuating the sound producing member when the temperature of the surrounding air reaches a predetermined value.

Under certain circumstances it is desirable that the nature of the audible signal serving as a fire alarm be of a distinct character different and distinguishable from the normal sounds produced by the sound producing member. With respect to a combination radio receiving set and fire alarm the normal sounds produced by the loud speaker consists of speech, music etc. By impressing an alternating current upon the coil of the loud speaker loud vibrations or high frequency squeals will emanate from the speaker to serve as a warning of fire under proper conditions.

An object of this invention is the provision of a combination radio receiving set and fire alarm.

An object of this invention is the provision of a radio receiving set provided with temperature actuated means for impressing an alternating current upon the loud speaker whereby the resulting vibrations of the loud speaker serve as a fire alarm.

An object of this invention is the provision of a radio receiving set comprising a loud speaker, a source of relatively high level, high frequency oscillations, and temperature sensitive control means effective to impress said high frequency oscillations upon the loud speaker when the temperature of the surrounding air reaches a predetermined value.

An object of this invention is the provision of a radio receiving set having a loud speaker, manual control means effective for operation of the receiver in the normal manner, a source of high frequency oscillations, circuit elements for connecting said source of high frequency oscillations to the loud speaker, and temperature actuated control means effective at a predetermined temperature to establish electrical connection between the source of high frequency oscillations and the loud speaker whereby the

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loud speaker produces a high level, high frequency warning when the temperature of the surrounding air reaches a predetermined value.

An object of this invention is the provision of a radio receiving set having an oscillator circuit, a loud speaker, a switch having an "on" and an "off" position, circuit elements connecting the oscillator circuit to the loud speaker when the switch is in the "on" position, and temperature sensitive means retaining the switch in the "off" position at normal room temperatures.

These and other objects and advantages will be apparent from the following description when taken with the accompanying drawings which illustrate several embodiments of the invention. The drawings are for purposes of illustration and are not to be construed as defining the scope or limits of the invention, reference being had for this latter purpose to the appended claims.

In the drawings wherein like characters denote like parts in the several views:

Figure 1 is a block diagram illustrating the functional aspects of this invention;

Figure 2 is a wiring diagram of a radio receiving set and including circuit connections for impressing a low frequency alternating current upon the loud speaker through a temperature actuated switch;

Figure 3 is a diagram of a simple radio receiving circuit showing the connections for impressing high level, high frequency oscillations upon the loud speaker when the temperature of the surrounding air reaches a predetermined value; and

Figure 4 is similar to Figure 3 but showing a separate oscillator permitting adjustment of the circuit to produce a loud speaker squeal of a selected frequency range.

Referring now to Figure 1 the block diagram of a radio receiving set illustrates a detector capable of detecting the radio energy received by the antenna, and an amplifier capable of amplifying the detected radio signal to a degree necessary to operate the loud speaker. This invention contemplates the addition of an alarm signal source electrically connected into the loud speaker circuit through a temperature sensitive switch. The alarm signal source may constitute a separate source of alternating current or high frequency oscillations or it may represent a function existing as a part of the radio receiving circuit proper

According to this invention the radio receiving

set may be operated by the user in the normal manner. However, should a fire break out in the room in which the set is located, the rise in room temperature causes a closure of the temperature sensitive switch thereby impressing a high level, alternating current upon the loud speaker coil. The resultant vibrations or squeals emanating from the loud speaker serve as a warning or fire alarm.

Figure 2 discloses a simple circuit for impressing a 60 cycle hum or vibration upon the loud speaker coil. In a conventional radio receiving set the audio input signal is applied to the grid of an amplifier tube 10 through a potentiometer or volume control 11. The signal current appearing on the plate of the tube is fed to the voice coil of the speaker 12 through an output transformer 13. The electrical power required to operate the tube elements of a conventional radio set is usually obtained from a 60 cycle source of household power, connection being made to the set by means of a standard outlet plug 14. An "on-off" power switch 15 controls the energization of a suitable power transformer 16, the secondary winding of which provides the various voltages for proper operation of the numerous components forming the radio circuit.

One form of the temperature sensitive switch comprises a set of resilient blades 17 and 18 having cooperating contacts 19 and 20, respectively, the contacts being made of a material having good electrical characteristics such as silver. The blades 17 and 18 are assembled together on a suitable mounting and electrically insulated from each other as is well known in the art. The blade 17 is connected to one side of the power line by the wire 21, and the other blade 18 is connected to one side of the speaker coil by wire 22, current limiting resistor 23 and wire 24. The other side of the speaker coil is connected to the other side of the power line by the wire 25.

The switch contacts 19, 20 normally are retained in open circuit position by the pellet 26 interposed between the blade 17 and a relatively fixed surface, as shown. Pellet 26 may be a composition that melts at a specific temperature say 110° F. Certain wax compounds and low melting point "fusible" alloys having closely controlled melting points are satisfactory for the purpose.

It is to be noted that with the pellet 26 in place the 60 cycle power circuit to the speaker coil is broken by the switch contacts 19, 20. Such is the case at normal room temperatures and the user may operate the radio set in the normal manner. However, should a fire break out in the room the temperature of the air increases rapidly. When the air temperature reaches the melting point of the pellet 26, as say 110° F., the pellet melts permitting closure of the switch contacts 19 and 20. Thereupon the 60 cycle power current flows through the speaker coil causing the loud speaker to vibrate or hum thereby serving as an unmistakable fire alarm. In general the fire alarm signal should be as loud as possible being limited by the mechanical characteristics of the particular loud speaker and permanent damage to the speaker coil is prevented by assigning a proper value to the current limiting resistor 23.

It should be noted that the fire alarm signal is independent of the operation of the radio set as the alarm circuit is connected directly to the power line. This is an important consideration as most fires break out at night during which period the radio set is "turned off," that is, power

switch 15 is open. It is customary practise to keep a radio plugged in by leaving the plug 14 connected to a well outlet. Thus, my invention provides 24 hour protection against fire without in any way interfering with or restricting the normal use of the radio set.

While I have described the Figure 2 embodiment of the invention with reference to a pellet type of temperature sensitive switch, it is apparent other types of temperature actuated devices may be employed to cause closure of the 60 cycle power circuit to the speaker coil. For example, the blade 17 may be made of a bimetal that flexes with change in temperature. In this case the blades 17 and 18 would be mounted such that the contacts 19, 20 are normally open. As the surrounding air temperature increases the blade 17 would flex toward the blade 18 and by proper design of the switch the contacts 19, 20 could be made to close the circuit at say 110° F. within very close limits. One advantage of the pellet type switch lies in the fact that such device is not self-resetting. Once the pellet 26 has been melted the contacts 19, 20 remain closed until the switch is reset by insertion of a new pellet.

The Figure 2 embodiment results in an alarm signal of relatively low frequency obtained with a minimum addition of components and wiring and is satisfactory for the intended purpose. However, a higher frequency signal, such as a "squeal," has a more extended range of travel and for this reason may be preferred in some instances, as for example, on radio sets located in hotel rooms, public buildings, rural locations, etc.

Figure 3 illustrates a simple method for impressing a high frequency current upon the voice coil of the loud speaker. The circuit illustrated is a conventional, though simplified, radio receiving circuit having a detector and amplifier tube as identified in the drawing. The operation of radio receiving circuits is well known in the art obviating the need for a detailed description. A temperature actuated switch comprises a first set of cooperating blades 27 and 28 provided with contacts 29 and 30, and a second set of cooperating blades 31 and 32 provided with contacts 33 and 34. The adjacent blades 28 and 31 are separated by an electrical insulating member 35. The blades 27, 28 are connected in parallel with the power switch 15 of the radio by wires 36 and 37. The blade 31 is connected to the grid of the detector tube by the wire 38 and the blade 32 is connected to the plate of the detector tube by the wire 39, condenser 40 and the wire 41. When the temperature sensitive pellet 26 is inserted between the blade 27 and a relatively fixed surfaces all contacts of the switch are in open circuit position, as shown, and the radio set may be operated in the normal manner.

When the surrounding air temperature reaches the predetermined value, the pellet 26 melts permitting closure of the contacts 29, 30 and simultaneously the blade 31 is depressed causing closure of the contacts 33, 34. Closure of the contacts 29, 30 energizes the power transformer 16 in the event the set has been "turned off," that is, should the power switch 15 be open. Should the radio be "turned on" at the time the pellet 26 melts the closure of contacts 29, 30 is of no significance. In either case the vacuum tubes are energized and placed in operating order. Closure of the contacts 33, 34 inserts the condenser 40 across the grid and plate of the detector tube causing the tube to oscillate thereby resulting in a high frequency squeal from the loud speaker 12, as is well known in the art.

The actual frequency of the audible signal produced by the speaker is dependent upon the value of the condenser 40 and the constants of the various components of the circuit.

It will now be apparent the Figure 3 embodiment of the invention provides a combination radio receiver and fire alarm wherein the fire alarm signal is a high frequency squeal.

Figure 4 is similar to Figure 3 except that a separate oscillator tube and associated circuit serves as the source of the high frequency signal current. The blades 27, 28 of the switch are connected in parallel with the power switch 15 and serve to "turn-on" the radio when the pellet 26 is melted by the rising temperature of the room air in the event of a fire. The blade 32 is connected to the oscillator coil 42 by the wire 43 and the cooperating blade 31 is connected to the plate of the detector tube by the wire 44. The frequency at which the oscillator tube and associated circuit will oscillate is determined by the constants of the inductance 45 and the variable capacitor 46 as is well known to those skilled in the art. These oscillations are impressed into the amplifier circuit upon closure of the contacts 25 33, 34, and result in a loud squeal from the loud speaker.

Having now described my invention various modifications in the circuit and arrangement of the parts will be apparent to those skilled in the art. While I have illustrated and described the functional character of the invention by reference to a 110 volt A. C. power operated radio it is apparent the invention is equally adapted to D. C. powered or so called portable radios in which instance the regenerative circuit of Figure 3 may be used.

With respect to a radio set installed in an automobile the temperature actuated switch may be provided with a set of contacts connected in parallel with the horn button. Thus, in the event the car catches on fire, or if a fire starts in the garage in which the car is parked, the horn will blow and/or the radio will squeal to call attention to the situation.

I claim:

1. A combination radio receiver and fire alarm comprising a radio receiving circuit including a detector tube, a loud speaker operated by the receiving circuit, a manually-operable on-off switch connecting the receiving circuit to a source of electrical energy, manual control means controlling the operation of the receiving circuit in the normal manner, a first set of contacts connected in parallel with the on-off switch, a second set of contacts connected across the grid and plate electrodes of the detector tube, a reactive element connected in the circuit comprising the second set of contacts and the grid and plate of the detector tube, and a temperature sensitive element effective automatically to close both said sets of contacts at a predetermined temperature.
2. The invention as recited in claim 1 wherein the reactive component is a condenser.
3. The invention as recited in claim 1 wherein the temperature sensitive element is a material that changes from a solid to a fluid state at a predetermined temperature.

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