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POWER SYSTEM TRANSMITTED ALARM

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FIG. 1

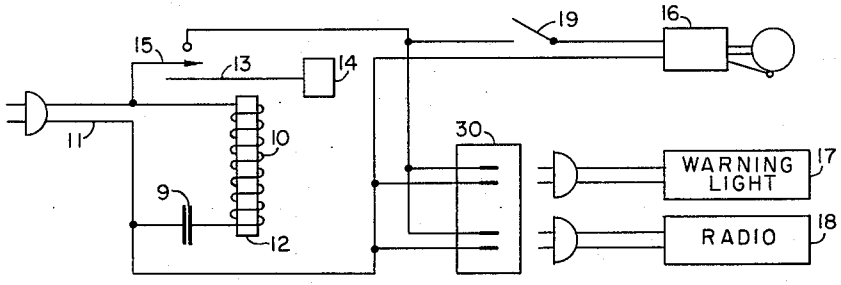
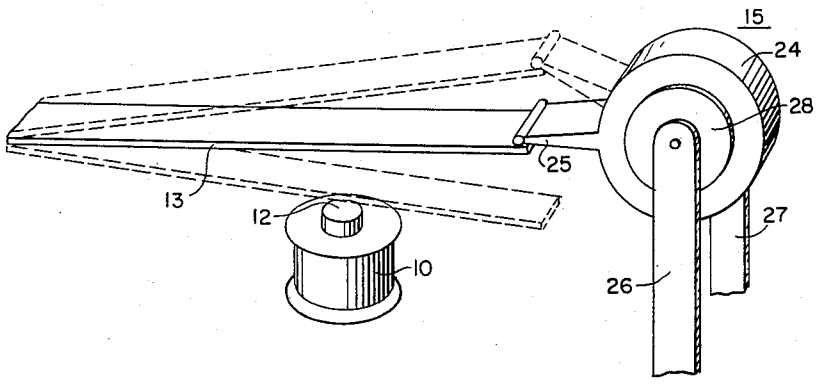


FIG. 2



INVENTORS
ERNEST W. LONGTON
AMEDEE J. BEAUDOIN
PETER W. JOHNSON

BY W R Maltby

ATTORNEYS

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POWER SYSTEM TRANSMITTED ALARM

Ernest W. Longton, Amedee J. Beaudoin, and Peter W. Johnson, United States Navy

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The invention described herein may be manufactured and used by or for the Government of the United States of America for governmental purposes without the payment of any royalties thereon or therefor.

This invention relates generally to remote control systems and more particularly to an alarm or signaling system actuated by the frequency of the power supply system.

The importance of public warning systems is widely recognized. In the event of impending disasters such as hurricanes, floods, conflagrations, as well as air raids many lives may be saved by promptly alerting the public. It is likewise important to avoid mass hysteria upon the occurrence of events likely to terrorize an uneasy public such as unscheduled testing of air raid sirens, sonic booms from aircraft, or fire sirens which do not denote cause for mass alarm. The public can best be served in these situations by the inauguration of a public alarm system which can reach the entire population and whose alarm is so reliable and readily observable that the public will not be aroused by the occurrence of events not accompanied or preceded by a signal on the alarm system. Present alarm systems such as air raid sirens do not readily penetrate enclosed spaces in many areas and may be confused with the sirens of emergency vehicles responding to routine mishaps. Furthermore, such alarm systems are incapable of advising the public as to the nature of the public danger.

Accordingly it is an object of this invention to provide an alarm system capable of meeting the above requirements.

It is another object of this invention to provide an alarm system capable of reaching even the smallest or remote space served by electrical power.

It is another object of this invention 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 electric power system.

Another object of this invention is to provide a portable alarm system which is light, small, of simple construction and inexpensively manufactured.

It is another object of this invention to provide a remote control system which can signal an alarm in diverse manners.

It is another object of this invention to provide a remote control system actuated by the frequency of a power supply system.

Other and more specific objects of this invention will become apparent upon careful consideration of the following detailed description taken together with the accompanying drawings in which:

Fig. 1 is a schematic diagram of a preferred embodiment of this invention; and

Fig. 2 is an elevational view of a switch actuation mechanism according to this invention.

Briefly, this invention utilizes a vibrating reed actuated by an electromagnet connected to any utility outlet

serviced by an electric power plant. In the usual case the electromagnet is energized by about 115 volts at 60 cycles. The reed is made resonant at a frequency near the supply frequency, for example 58 cycles, and does not vibrate in response to the normal 60 cycle power. If the supply frequency is changed to 58 cycles the reed begins to vibrate heavily. The motion of the reed when in vibration is used to mechanically close a switch which connects the same or any other supply source to any desired alarm device. The switch remains closed so that the supply frequency may be returned to 60 cycles without stopping the alarm signal or the other connected equipment.

Referring now to Fig. 1 in detail, the coil **10** of an electromagnet is connected to a line cord **11** which may be plugged into any 115 volt 60 cycle outlet. Coil **10** is wound around a magnetic core **12** which is disposed near the free end of a reed **13**. The other end of reed **13** is securely held in mount **14**. A switch **15** is positioned closely adjacent the free end of reed **13** so as to be closed by the motion of reed **13** when in vibration. Switch **15** when closed connects the line cord **11** to an alarm bell **16** through switch **19** and to a pair of outlets **30** to which may be connected additional alarm or indicating devices such as a warning light **17**, or a radio **18**. The ability of this device to turn on radio **18** has many apparent advantages. For example this radio may be preset to one of the Civil Defense emergency frequencies so that Civil Defense information becomes automatically available at the alarm location following the actuation of the alarm. Alternatively the radio **18** could be replaced by a prerecorded message and a public address system.

Many switching elements are suitable for switch **15**, however it is preferred to use a switch which will remain closed after once being actuated by the movement of reed **13** so that the alarm devices continue to operate until switch **15** is manually opened. With such a switch the power supply need be changed from 60 cycles for only an interval long enough to close switch **15** and then may be returned to its normal 60 cycle frequency without interrupting the operation of the alarm devices. Also the switch could be of a type requiring a minimum of mechanical force for operation. Mercury switches and micro switches are examples of switches meeting the requirements of switch **15**.

Switch **19** may be used to turn off bell **16** such as after an alarm without interrupting power to radio **18**. If bell **16** were turned off by opening switch **15**, the receiving of instructions over radio **18** would be interrupted until radio **18** could be connected to a live outlet.

Referring now to Figure 2 in detail, there is here shown an embodiment of a switch actuation mechanism according to this invention. The mounting base, although preferably of insulating material, can take any form considered convenient and none is here shown. Only the free end of reed **13** is shown in Figure 2. Its other end may be supported by any form of rigid mount. Reed **13** is shown in its normal or quiescent position, typical excursions of the reed in vibration are illustrated by dashed lines. Electromagnet **10** is disposed so that its core **12** is directly under reed **13** but spaced a sufficient distance therefrom to avoid direct contact between the core and the reed when in vibration.

Switch **15** is shown as a mercury switch capsule having an insulating case **24** and terminal pieces on opposite sides thereof such as the metal disc **28** on the visible side. The terminal pieces permit making a sliding or rotary contact between a stationary circuit and the movable capsule. An arm **25** is fastened to switch case **24** by any suitable means and may be used to rotate switch **15** about an axis defined by the switch terminal pieces illustrated by disc **28**. Arm **25** extends above the free end

of reed 13 and in the quiescent condition of the reed and open position of the switch, arm 25 is either in contact with the upper surface of reed 13 or positioned closely adjacent thereto. When reed 13 begins to vibrate its first upward excursion drives arm 25 upward to a position such as illustrated by the dashed lines in Figure 2. The arm is mounted on switch case 24 so that its movement to the raised position as illustrated is ample to cause the mercury switch to close.

Switch 15 may be pivotably mounted as shown between a pair of conducting spring metal arms 26 and 27 which engage the switch terminals such as disc 28. Therefore springs 26 and 27 provide the electrical connection to the switch as well as the pivotable mount therefor. In the embodiment illustrated in Figure 2 the tension of springs 26 and 27 against the switch is preferably made sufficient to maintain switch 15 in any rotary position to which it is moved. At the same time the spring contact must be light enough to permit the force of reed 13 to easily drive or rotate switch 15 by its engagement with arm 25. After once actuated by the vibration of reed 13, switch 15 will remain indefinitely in its closed position with arm 25 raised. It is returned to its normal open circuit position by manually moving arm 25 downward to a position adjacent the free end of reed 13. Reed 13 is, of course, made of paramagnetic material such as spring steel in order that it may be influenced by the field of coil 10.

It will be apparent that this device may be plugged into an outlet in any place served by electric power. The entire service area of any electric power system may be simultaneously and instantaneously alerted simply by briefly altering the frequency of the power at the power plant. The alarm device should of course be designed to match the voltage and alternation frequency of the power system with which it is used so that its reed will be resonant at a frequency very near that of the power system.

While the foregoing discussion suggests that this device is operable only with alternating power systems, actually it may be readily operated with D. C. systems. Since many metropolitan areas are still served by D. C. power, the circuit of Figure 1 has been provided with a series condenser 9 which will block D. C. from coil 10 of the electromagnet. The presence of condenser 9 not only prevents burning out of coil 10 if cord 11 should be plugged into a D. C. outlet but also permits the device to respond to pulses of alternating current superimposed upon the D. C. power mains. By selecting for superposition an alternating signal having the resonant frequency of reed 13, and having a generator of such a signal available at the D. C. power plant, this device may be used with D. C. as well as A. C. power systems.

It will be apparent that the control function of this device may be utilized in unlimited ways. However, the three illustrated in Fig. 1 seem most likely, the audible signal from bell 16, a silent signal from warning light 17, or a radio 18 to provide Civil Defense information. As an example of the many variations possible, radio 18 which in Fig. 1 should have its frequency and volume control preadjusted, may be replaced by a radio and an electrical device triggered by switch 15 to turn the radio on and also select a desired frequency.

It is also pointed out that this device, as a system, can be used to alert very large areas, comprising a complete network of several power companies joined together and also, by relatively small areas for local disturbances by one power company's momentarily leaving the network.

It is additionally pointed out that the variation of frequency by the power companies for a system of warning utilizing this device requires only slight, if any, modifications to present power generating equipment and associated transmission equipment.

Many modifications may of course be made in the light of the above teaching. It is therefore to be understood that within the scope of the appended claims, the invention may be practiced otherwise than as specifically described.

What is claimed is:

1. A remote control system comprising a reed of magnetic material rigidly mounted at one end and free to vibrate at the other end at its resonant frequency, a pair of power input terminals, means for connecting said input terminals to a source of alternating electric power, an electromagnet disposed adjacent said reed and connected across said power terminals, a control circuit, a normally open switch having an arm member disposed to be engaged by the free end of said reed, said reed adapted to mechanically close said open switch when set in vibration, said switch in its closed condition connecting said control circuit to said power terminals, the resonant frequency of said reed being selected near that of the power source whereby the reed may be set in vibration by a small change in the frequency of said source.

2. A remote control system comprising a reed of magnetic material rigidly mounted at one end and free to vibrate at the other end at its resonant frequency, a pair of power input terminals, means for connecting said input terminals to a source of alternating electric power, an electromagnet disposed adjacent said reed and connected across said power terminals, a control circuit, a normally open pivotally mounted mercury switch having an arm member disposed to be engaged by the free end of said reed, said reed adapted to mechanically close said mercury switch when set in vibration, means for permitting said switch to remain in its closed position after the vibration of said reed against said arm has advanced the switch to its closed position, said switch in its closed condition connecting said control circuit to said power terminals, the resonant frequency of said reed being selected near that of the power source whereby the reed may be set in vibration by a small change in the frequency of said source.

3. A remote control system comprising, a reed of magnetic material mounted to be free to vibrate at its resonant frequency, a pair of power input terminals, means for connecting said input terminals to a source of electric power, a condenser, an electromagnet disposed adjacent said reed and serially connected with said condenser across said power terminals, a control circuit, a normally open pivotally mounted mercury switch connected to said control circuit and having an arm disposed to be engaged by said reed, said reed adapted to mechanically close said mercury switch when set in vibration, means permitting said switch to remain in its closed position after vibrations of said reed against said arm have advanced the switch to its closed position, whereby said switch will be closed when electrical energy at the resonant frequency of said reed appears across said input terminals.

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