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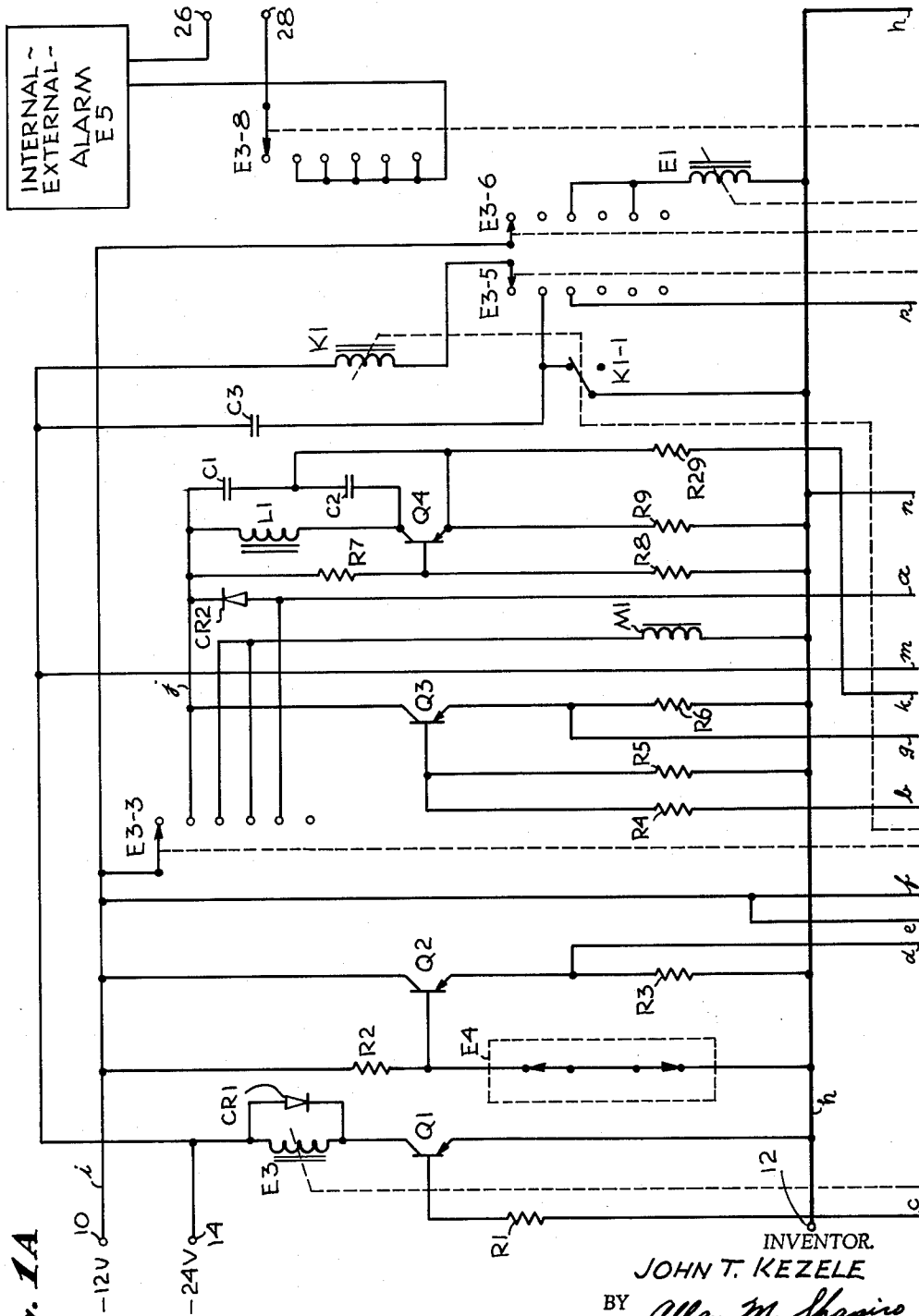
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3,140,349

AUTOMATIC ALARM SIGNALLING SYSTEM

Filed Aug. 23, 1962

2 Sheets-Sheet 1



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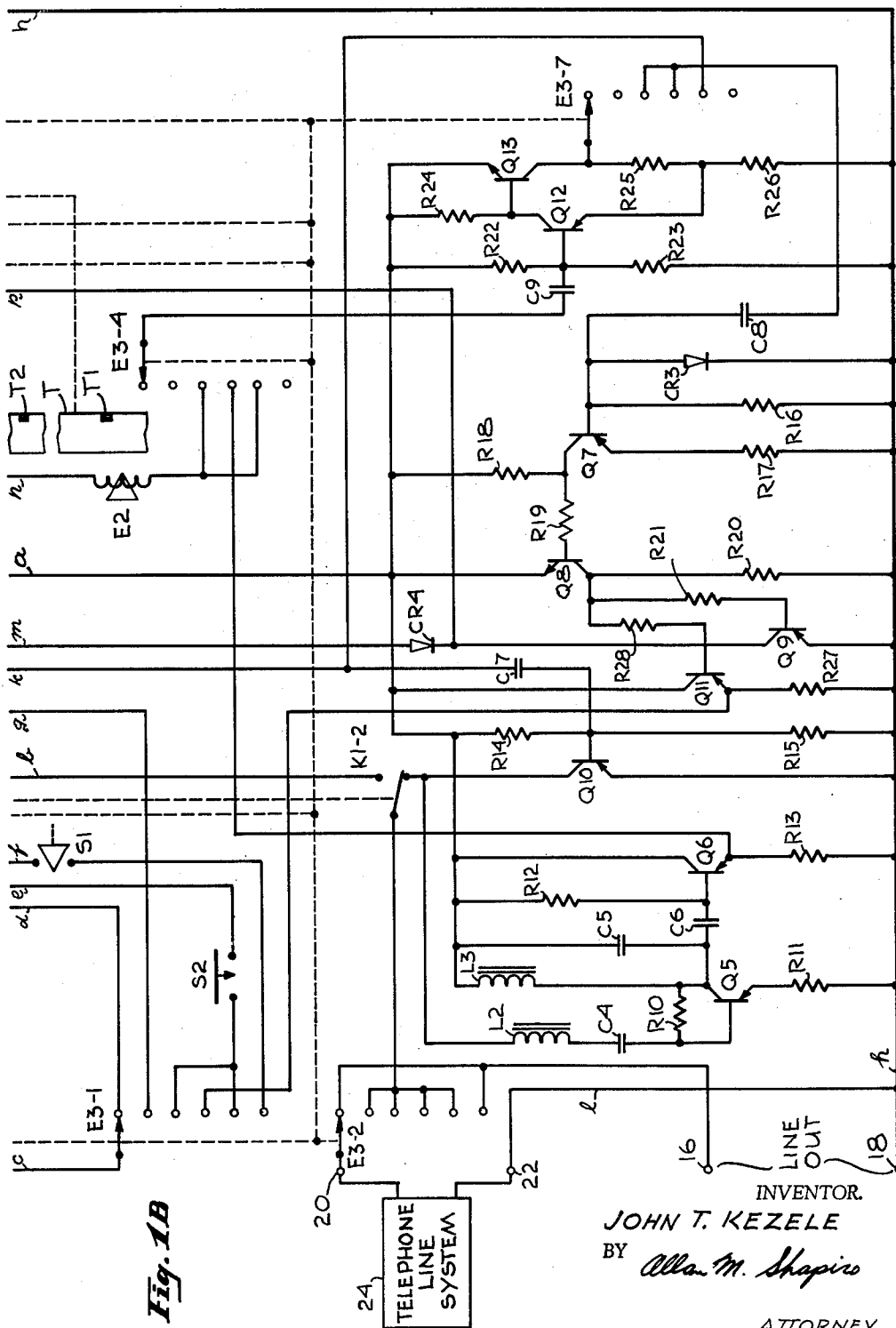


Fig. 1B

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1

3,140,349

AUTOMATIC ALARM SIGNALLING SYSTEM

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19 Claims. (Cl. 179-5)

This invention relates generally to automatic alarm signalling systems, and more particularly to an automatic alarm system which utilizes the telephone system for contacting and relaying information concerning a disturbance to a remote station.

Automatic alarm systems are used in many applications where it is desired to eliminate the need for continuous human surveillance of a protected house or property. Common examples of such systems are the fire and burglar alarm systems. As is well known, an alarm is normally sounded whenever a closed circuit, which may include detectors such as bimetallic thermostats, is broken. The more elaborate systems may additionally cause the signalling of a remotely located central station over the telephone system. An indicator lamp mounted on an identifying board at the central station is usually caused to light up to notify an attendant at the station. The attendant, upon noticing the lit lamp, will thereupon contact the local fire station or patrol car which is nearest to the scene of the disturbance.

Time plays an important factor in the satisfactory operation of any fire or burglar alarm system. In a system where a central station must be first alerted before the local station can be in turn notified, there may be a loss of several minutes which are required to contact and give all the necessary information to the local station. Where a fire is involved, for example, the loss of even one or two minutes may be critical in saving the house or property. Consequently, it is highly desirable that any automatic alarm system can, upon detection of a fire or burglary, contact directly a local station and give to the station all of the necessary information required for the station to respond to the call. Equally as important, the alarm system should be such that it cannot be easily or readily harmed by a fire or burglar.

Bearing in mind the foregoing, it is a major object of this invention to provide an automatic alarm signalling system which is capable, upon detecting a fire or the like, of automatically contacting a local station and giving all necessary and pertinent information required by the station to respond to the call.

Another object of the invention is to provide an automatic alarm signalling system which is self-contained and can therefore be located so that it is not easily or readily damaged by the disturbance to be detected by the system.

A further object of this invention is to provide an automatic alarm signalling system which includes the telephone system in such manner that destruction of the telephone or lines within a protected house or property will not affect the operation of the system.

A still further object of the invention is to provide a compact and reliable automatic alarm signalling system which can automatically function with a telephone system providing the dial type of telephone service.

Briefly, and in general terms, the foregoing and other objects are preferably accomplished by providing a sequentially operated system which automatically performs a number of functional steps upon initiation of a disturbance. The system includes a Ledex motor driven multiple contact, multiple wafer stepping switch, an oscillator circuit, a tape playback device, dialing control circuitry, a beep signal filter and control circuit, suitable amplifiers, an independently supplied alarm, and associated

2

auxiliary components, all of which elements are selectively connected in a variable combination to operate according to the different sequential functional steps of the system. Telephone lines are tied into the system and are utilized for providing and receiving signals to and from the lines in a sequential manner involving the different elements of the system.

Other objects and advantages of the invention will become apparent, and the invention will be more fully understood, from the following detailed description of an illustrative embodiment of the invention taken in conjunction with the attached drawings, in which FIGURES 1A and 1B together show an illustrative embodiment of an automatic alarm signalling system according to this invention.

A preferred embodiment of the invention is shown in FIGURES 1A and 1B. These figures, taken together, show an illustrative example of an automatic alarm signalling system. The system can be viewed in its entirety by placing FIGURE 1A directly above FIGURE 1B, and matching the ends of correspondingly labeled leads which interconnect these two figures. Thus, by matching the ends of the leads of FIGURE 1A with correspondingly labeled leads shown in FIGURE 1B, the complete illustrative system can be fully displayed. The following description is made with joint reference to FIGURES 1A and 1B which are preferably positioned with interconnecting leads matched as described above.

The system shown in FIGURES 1A and 1B will be described as being an automatic fire alarm system. However, it is to be understood that the system can be obviously used for any other similar type of alarm and signalling system. For example, the system shown in the figures can be readily adapted to be used as a burglar alarm and signalling system. Other uses and advantages of the invention will become apparent from the ensuing description.

Referring to the figures, terminals 10 and 12 are connected to a source of power as indicated. A 12-volt source, for example, can be connected between terminals 10 and 12 so that the terminal 10 is negative and terminal 12 is positive. Lead *i* is connected to terminal 10, and ground lead *h* is connected to terminal 12. A Ledex stepper motor E3 driving a six contact, multiple wafer rotary wiper switch is connected in series with transistor Q1 such that one end of the Ledex motor E3 is connected to -24 volts, for example, on terminal 14, and the other end is connected to the collector of the transistor Q1. The emitter of transistor Q1 is connected to lead *h*, and a diode CR1 is connected in parallel across the Ledex motor E3 as shown. While the Ledex motor E3 is shown as being connected to a -24 volt source, the Ledex motor can, of course, be connected to lead *i* if a 12-volt stepper motor is used.

The Ledex motor E3 driving the stepping switch simultaneously actuates the wipers of each of the eight wafers E3-1 through E3-8 of the stepping switch. The base of the transistor Q1 is connected to the wiper of wafer E3-1 through a resistor R1. The wiper of the wafer E3-1 is shown in contact with its first position contact, which contact is connected to the emitter of a transistor Q2. As is well known, whenever the Ledex motor E3 is energized by a pulse, for example, the wipers of each of the eight wafers are moved to their next position contact. This proceeds from contact to contact until they leave the last contact to return to the first contact, to repeat the cycle. Each of the wafers has six separate contacts as illustrated. The contacts of these wafers will be referred to as contacts 1 through 6, successively from contact 1 which is shown in the figures in contact with the wiper of the respective wafers.

The transistor Q2 is connected as an emitter follower

and is supplied by leads *i* and *h*. The base of the transistor Q2 is connected to lead *i* through a large resistor R2, and also connected to ground lead *h* through a fire detector E4. The fire detector E4 is a series string of bimetallic thermostats which are all in a normally closed position. Only two thermostats are shown, and it should be apparent that the fire detector E4 can also represent an electrical path which may be broken on burglar entry, for example.

The second contact of wafer E3-1 is connected to the emitter of a transistor Q3. The collector of the transistor Q3 is connected to the second contact of wafer E3-3, and also to lead *j*. The base of the transistor Q3 is connected to lead *b* through resistor R4. A transistor Q4, connected in an oscillator circuit, is connected to be energized on lead *j*. Lead *j* is, of course, energized when the wiper of wafer E3-3 engages its second position contact. The oscillator circuit produces a 1000 c.p.s. signal when energized, which signal is connected to the base of a line driver transistor Q10 through resistor R29 and a series capacitor C7.

A double pole, double throw relay has one end of its control coil K1 connected to terminal 14, and the other end connected to the wiper of the wafer E3-5. A capacitor C3 is connected between terminal 14 and the second position contact of wafer E3-5 as shown. The pole K1-1 of the relay is connected to lead *h* and normally engages its upper contact which is connected to the second contact of wafer E3-5. The pole K1-2 is connected to the second through fifth contacts of wafer E3-2, the upper contact of pole K1-2 being connected to lead *b*, and the lower contact connected to the collector of transistor Q10.

The lower contact associated with relay pole K1-2 is also connected to a 1000 c.p.s. filter circuit including transistors Q5 and Q6, the output of which is provided to the fourth position contact of the wafer E3-4. The filter circuit is tuned to 1000 c.p.s., corresponding to the frequency of a beep signal which is produced when a recorder is being used over the telephone system or line.

The third and fifth contacts of wafer E3-1 are connected to lead *i* through a normally open switch S2. The fourth contact of wafer E3-1 is connected to the emitter of transistor Q11, and the sixth contact of wafer E3-1 is also connected to the lead *i* through a normally open reset button switch S1.

The automatic alarm and signalling system operates into the telephone lines before they reach the house so that in the event of a fire destroying the telephone wiring in the house, the signalling system will still operate. Terminals 16 and 18 lead into the house and connect with a telephone (not shown). Terminals 20 and 22 are connected to the telephone lines or system 24. The terminal 18 is connected directly to terminal 22 by lead *l*, and the terminal 16 is connected to terminal 20 through either the first or sixth contacts of wafer E3-2. When the wiper of wafer E3-2 is contacting either the first or sixth contacts, the telephone connected to terminals 16 and 18 is connected directly to the telephone system 24.

The wiper of wafer E3-3 is connected to lead *i*, and the first and sixth contacts of the wafer E3-3 are left unconnected. The second contact of wafer E3-3 is connected to the lead *a* through a negatively oriented diode CR2, as shown. The third, fourth and fifth contacts of wafer E3-3 are connected to lead *a* and to one side of a tape deck motor M1 which drives the tape capstan of a tape recorder having a tape head coil E2. One end of coil E2 is connected to the third and fifth contacts of wafer E3-4, and the other end is connected to lead *h*, together with the other side of the tape motor M1.

In this system, dialing signals are recorded on tape T which also records a voice message. The voice message signals are recorded on the tape sequentially following the recorded dialing signals. The voice message is pref-

erably repeated a number of times during each cycle of operation of the system to assure positive understanding of the message by the receiving station.

The tape is preferably an endless tape on which the dialing signals and voice signals are recorded. At the end of the dialing signals, a short metallic strip T1 is contacted by a pair of fingers riding along the edge of tape T. Similarly, at the end of the voice signals, a short metallic strip T2 is contacted by the same pair of fingers. The metallic strips T1 and/or T2 and the pair of fingers comprise the normally open switch S2. Thus, at the end of the dialing signals and again at the end of the voice signals, the switch S2 is closed momentarily.

The wiper of wafer E3-6 is connected to -12 volts through lead *i*. The third and fifth contacts of wafer E3-6 are connected to lead *h* and ground through clutch coil E1. When coil E1 is energized, the clutch pulls an idler wheel down against the tape T, forcing it against the tape drive capstan to move the tape T. Thus, the tape T is driven only on the third and fifth position contacts of the stepping switch.

The wiper of the wafer E3-4 is coupled through capacitor C9 to an audio amplifier including transistors Q12 and Q13. The output of the audio amplifier is obtained on the wiper of wafer E3-7. The third and fourth position contacts of wafer E3-7 are coupled to a negatively amplifying circuit including transistors Q7 and Q8. The output of transistor Q9 is applied to the bases of transistors Q9 and Q11. The collector of transistor Q9 is connected to the third contact of wafer E3-5 to control the energization of the relay coil K1 during the dialing sequence. The coil K1 is connected back to -24 volts (terminal 14) through diode CR4 which is used to dissipate the inductive kickback energy of the coil. The emitter of transistor Q11 is connected to the fourth contact of wafer E3-1 and is to be usefully energized only when the relatively continuous 1000 c.p.s. beep signal is sensed and produced from the filter circuit including transistors Q5 and Q6.

When the wiper of wafer E3-5 is engaging its third position contact, energization of transistor Q9 for each dialing pulse amplified from the tape T causes energization of relay coil K1. This moves the pole K1-2 to its upper contact momentarily breaking the circuit through transistor Q10 to produce a dial pulse in the telephone line then connected to the third contact of wafer E3-2. The lead *a* provides -12 volts to supply the transistors Q5 through Q9 and Q11 through Q13, and to bias transistor Q10 so that it will operatively match the characteristics of the telephone microphone.

The first contact of wafer E3-8 of the stepping switch is left unconnected but the second through sixth contacts are all connected to one side of an alarm E5. The other side of the alarm E5 is connected to terminal 26 and the wiper of the wafer E3-8 is connected to another terminal 28. The terminals 26 and 28 are connected to a separate power supply so that the large amount of noise and hash that is generated by bells and buzzers, would not appear in the system as would be the case if the same power supply on terminals 10 and 12 were used to energize the alarm E5. The alarm unit E5 can be an interior alarm, or it can be an exterior alarm located external to the house or property to be protected so that the danger to the alarm by fire is eliminated.

Operation of the automatic fire alarm system shown in FIGURES 1A and 1B is described by first assuming that one of the thermostats of the fire detector E4 is opened by a fire in the house which is being protected. When one of the thermostats is opened, the base of the transistor Q2 becomes negative such that the transistor conducts. When the transistor Q2 conducts, the emitter thereof also becomes negative such that a negative voltage is applied to the base of the transistor Q1 through resistor R1 and the wiper of wafer E3-1 contacting its first position contact. The transistor Q1 therefore conducts

5

and energizes the Ledex motor E3 driving the stepping switch to move the wipers of wafers E3-1 through E3-8 to their respective second position contacts. One result is that the alarm E5 is immediately energized by its own power supply through the terminals 26 and 28. This alarm remains on until the wiper of wafer E3-8 is returned to its first position contact.

At the same time, the telephone system 24 or telephone line is broken from the telephone within the house and is connected to relay pole K1-2 through the wiper of the wafer E3-2 engaging its second contact. The tape motor M1 is energized through diode CR2 and brought up to speed. Lead *a* is also energized to supply and bias transistors Q5 through Q13, but these transistors are not directly used at this time. Relay coil K1 is intermittently energized through the wiper of wafer E3-5 engaging its second position contact and the pole K1-1 to ground lead *h*. As the voltage builds up sufficiently across capacitor C3, poles K1-1 and K1-2 are then actuated momentarily until the voltage across the coil K1 drops below the holding value. The pole K1-2 therefore intermittently connects with the lead *b* and the base of the transistor Q3. The collector of the transistor Q3 is now connected to the base of the transistor Q1 through resistor R1 and the wiper of the wafer E3-1 contacting its second contact.

If, now, someone has called the house prior to the occurrence of the fire and has not yet hung up, the voltage on the telephone line is at a low, nominal -5 volts, for example, which is intermittently applied on the lead *b* by relay pole K1-2. Thus, when the telephone line is not clear, a relatively low voltage is applied to the base of the transistor Q3, and which is insufficient to cause the transistor to conduct. However, when the telephone line is clear, the voltage on the line will rise to approximately -50 volts, for example, which is sufficient to cause the transistor Q3 to conduct.

When the wiper of wafer E3-3 is contacting its second contact, the lead *j* is energized. The oscillator circuit, including transistor Q4, will be energized. The output of the oscillator circuit is applied to the base of line driver transistor Q10 through resistor R29 and series capacitor C7 to energize the transistor Q10. The base of the transistor Q10 is suitably biased by the negative voltage on lead *j* applied through the negatively oriented diode CR2 and resistor R14. Since relay pole K1-2 is intermittently moved between its contacts, the 1000 c.p.s. signal from the oscillator circuit will be applied interruptedly to the telephone line through the transistor Q10 as a warning to anyone who may have called the house, prior to the occurrence to the fire, to hang up.

As soon as the telephone line is clear, the voltage on the line will rise from the nominal -5 volts that is on the line, when someone is using it, to approximately -50 volts. This voltage is applied to the base of the line monitor transistor Q3 through divider resistor R4 when relay pole K1-2 engages its upper contact and causes the transistor Q3 to conduct. A negative signal will then be applied to the base of the transistor Q1 through resistor R1, and the wiper of wafer E3-1 contacting its second contact. The transistor Q1 again conducts and energizes the Ledex motor E3 driving the stepping switch, and causes the wipers of the different wafers to move to their respective third contacts. When this occurs, transistor Q3 and the oscillator circuit including transistor Q4 are de-energized.

The wiper of wafer E3-3 in its third contact position continues to energize the tape motor M1 and the transistors Q5 through Q13. The relay coil K1 is connected to the collector of transistor Q9 by the wiper of wafer E3-5 engaging its third position contact, and clutch E1 is similarly energized by the wiper of wafer E3-6 in its third contact position. The tape T is then forced against the capstan driven by tape motor M1 and caused to move.

As the tape T is driven by the capstan, dialing signals

6

are produced in the tape head coil E2 and appear on the third contact of wafer E3-4. These signals are connected through the wiper of wafer E3-4 in its third contact position to the audio amplifier circuit including transistors Q12 and Q13. The amplified output is provided through the wiper of wafer E3-7 contacting its third contact to be applied to the base of transistor Q7 through the capacitor C8. Only a suitable dialing signal or negative pulse is amplified by transistors Q7 and Q8 and applied to the bases of the transistors Q9 and Q11, the diode CR3 having shunted out any positive signals. The transistor Q11 is ineffective at this time since the wiper of wafer E3-1 is then engaging its third contact. However, conduction of transistor Q9 causes the energization of relay coil K1. The relay pole K1-2 is moved to its upper contact, and the telephone line on the third contact of wafer E3-2 will thus have a pulse produced on it for each dialing pulse recorded on the tape T.

At the end of the dialing sequence, the tape T has been driven to a condition whereby the metallic strip T1 is engaged by its pair of fingers such that switch S2 is effectively closed. The closed switch S2 applies a negative voltage from lead *i* to the base of the transistor Q1 to cause it to conduct and again energize Ledex motor E3. Thus, at the end of the dialing sequence, the wipers of the wafers E3-1 through E3-8 are respectively stepped to their fourth contact positions.

In the fourth stepping switch position, the base of transistor Q1 is connected to the emitter of transistor Q11 through resistor R1 and wafer E3-1, the telephone line is connected to the input of the filter circuit including transistors Q5 and Q6 through wafer E3-2 and the relay pole K1-2 engaging its lower contact, tape motor M1 and lead *a* are still energized through wafer E3-3, the output of the filter circuit is connected to the input of the audio amplifier including transistors Q12 and Q13, relay coil K1 and clutch E1 are de-energized by the wafers E3-5 and E3-6, and the output of the audio amplifier is connected through wafer E3-7 to transistors Q7, Q8, Q9 and Q11.

If the correct number has been dialed by the dialing signals on the tape T, the nearest local fire station, for example, is reached and in answering will record any incoming messages to the station. Thus, the local fire station puts out a beep signal as required by law, and this beep signal would appear on the telephone line if the correct number has been reached. The beep signal is a 1000 c.p.s. frequency signal and is applied to the filter circuit including transistors Q5 and Q6. Since the filter is tuned to the beep signal frequency and rejects all other frequencies (including the 55 to 60 c.p.s. telephone ringing frequency), an output signal will be obtained only if the correct telephone number has been dialed.

An output signal from the filter is amplified by transistors Q12, Q13, Q7 and Q8 to cause the transistors Q9 and Q11 to conduct. As before, voice frequencies on the telephone line do not include a sufficient duration of the beep signal frequency to properly energize the transistors Q9 and Q11. Energization of transistor Q9 is ineffective at this time, but when the transistor Q11 conducts, a negative signal appears on its emitter and this signal is applied back to the base of the transistor Q1 to cause it to conduct and energize the Ledex motor E3 driving the stepping switch. Thus, the wipers of the different wafers will be moved to their respective fifth contacts if the correct telephone number has been dialed, as established by detection of a signal of suitable characteristics.

When the wiper of wafer E3-6 is moved to its fifth contact, the clutch E1 is again energized to drive the tape T. Tape motor M1 and lead *a* remain energized through the wiper of wafer E3-3 in its fifth contact position. The output of the tape head coil E3 is applied to the audio amplifier including transistors Q12 and Q13 through the wiper of wafer E3-4 in its fifth contact position, and the

7

output of the audio amplifier is applied to the input of the line driver transistor Q10 through the wiper of wafer E3-7 in its fifth contact position. The voice signals on the tape T will be amplified and applied to the telephone line which is connected to the transistor Q10 through the wiper of wafer E3-2 engaging its fifth contact.

This message will be repeated a number of times as recorded on the tape T until the end of the recorded voice signals is reached, at which time the metallic strip T2 has been driven to a condition which effectively closes the switch S2. When the switch S2 is closed, a negative signal is applied to the base of transistor Q1 to cause the transistor to conduct and energize the Ledex motor E3 which steps the wipers of the wafers of the stepping switch to their last contact position. In the last contact position, the telephone in the house is again connected back to the telephone system 24 through wafer E3-2. The alarm E5 continues ringing, however, and will stop only when the reset button switch S1 is depressed to apply a negative voltage to the base of transistor Q1, energizing the same and the Ledex motor E3 to move the wipers of the different wafers back to the first contact position. Thus, the full operation cycle is ready to be repeated again, if the bimetallic thermostats of detector E4 have not been damaged or destroyed by, for example, the fire.

In one modification of the foregoing system in accordance with the present invention, the dialing signals can be low level pulses which are recorded on the tape superimposed over the voice signals rather than sequentially following the latter. The dialing signals are recorded at such a low level as not to interfere with the recorded voice message while the latter is being used, and the message signals do not affect the dialing circuit. In such case, the first metallic strip T1 is eliminated and only the final metallic strip T2 at the end of both the dialing and voice signals is utilized. Thus, at the end of both the voice and dialing signals, the switch S2 is closed momentarily before the start of the signals again on the endless tape. During the dialing function, the diode CR3 shunts out positive signals, and any negative cycles of voice or message signals are of insufficient duration to energize the transistors Q9 and Q11 properly. These two transistors will conduct suitably only for each dialing pulse, the transistors Q7 and Q8 causing amplification of the negative dialing signals to energize the switching transistor Q9. During the period of voice message transmission, the low level dialing signals are not amplified sufficiently to interfere with the clear reception of the voice message. Advantageous results are obtained by this means in that the endless tape T need not be as long as otherwise necessary for performing the sequential type of dialing and voice signals transmission, and the repetitive cycling of all of the foregoing functions of the system can be obtained rapidly.

It can be seen that an automatic alarm signalling system is provided which, when adapted to function as an automatic fire alarm system, eliminates a large portion of the human element from the detection and reporting of a fire. Notification of the fire and all pertinent information concerning it can be given directly to a central station or local station as may be desired. The selection and change of station can be easily accomplished by simply recording a new dialing sequence of signals on the tape. The system contains its own power supply, and operates largely on open circuit techniques. Thus, the life of the power supply is conserved since the system uses negligible power when not operatively activated. Further, the system is a passive system which does not include elements that are reactively coupled in any way with elements outside of the system.

In this invention, an immediate local alarm is sounded simultaneously with the automatic notification and transmission of all pertinent information concerning the fire, for example, to a desired station. The system is self-contained with its own power and can, therefore, be

8

located external to the house or property to be protected, and only lead-in wires are required to connect with the fire detector unit, for example. The system also operates directly into the telephone lines before the lines reach the house or property so that the alarm will still operate even though the fire may have destroyed the telephone wiring within the house. The system has been found to be extremely reliable and trouble-free in operation.

While particular embodiments of the present invention have been shown and described, it will be obvious to those skilled in the art that changes and modifications may be made without departing from this invention in its broader aspects, and, therefore, the aim in the appended claims is to cover all such changes and modifications as fall within the true spirit and scope of this invention.

What is claimed is:

1. In an alarm system, in combination:

recorder means for producing a sequence of dialing signals and message signals;

a telephone line connected to a telephone system;

means responsive to said dialing signals for producing corresponding dialing signals in said telephone line; means for sensing a response to said dialing signals in said telephone line;

means for applying said message signals to said telephone line;

means for detecting an alarm disturbance and generating an initiating signal in response thereto; and

means responsive to said initiating signal for sequentially causing the production of dialing signals in said telephone line, sensing a response, and applying said message signals to said telephone line.

2. Apparatus as defined in claim 1 wherein in said means for producing dialing signals in said telephone line includes:

a switching circuit responsively energized once by each of said dialing signals of said recorder means; and relay means connected to be momentarily actuated each time said switching circuit is energized to disrupt said telephone line circuit whereby a corresponding dialing signal is produced in said telephone line for each of said dialing signals of said recorder means.

3. Apparatus as defined in claim 1 wherein

said means for sensing a response to said dialing signals in said telephone line includes filter means adapted to be connected to said telephone line for sensing a characteristic frequency signal in said telephone line when a response is obtained, and producing an output signal to indicate the same.

4. Apparatus as defined in claim 1 wherein said recorder means includes record means having said dialing signals superimposed over said message signals.

5. Apparatus as defined in claim 4 including means for detecting the end of said dialing and message signals.

6. Apparatus as defined in claim 1 wherein said means responsive to said initiating signal includes:

a stepping switch having a plurality of wafers each including a stepping wiper for engaging a plurality of contacts individually in sequence, said wipers and contacts selectively connecting said telephone line, recorder means, means for producing dialing signals in said telephone line, means for sensing a response and means for applying said message signals to said telephone line in a variable combination of elements for each step position of said wipers; and

means for generating a stepping signal on completion of each operational phase of producing dialing signals in said telephone line, sensing a response and applying said message signals to said telephone line, whereby said wipers of said stepping switch are sequentially stepped from an initial position in response to said initiating signal and subsequently to successive positions in response to said stepping signals.

9

7. Apparatus as defined in claim 6 including a separately supplied alarm device, said alarm device being energized by connections of wiper and contacts of a wafer of said stepping switch to power when said wipers of said stepping switch are stepped from said initial position in response to said initiating signal and remaining energized until said wipers are returned to said initial position.

8. In an alarm system, in combination:
a telephone line connected to a telephone system;
means for sensing when said telephone line is in use;
oscillator means for generating a clearing signal;
means responsive to said means for sensing when said telephone line is in use, and applying said clearing signal to said telephone line to clear the same when it is sensed to be in use;
recorder means for producing a sequence of dialing signals and message signals;
means responsive to said dialing signals for producing corresponding dialing signals in said telephone line when said telephone line is clear;
means for sensing a correct response to said dialing signals in said telephone line;
means for applying said message signals to said telephone line;
means for detecting an alarm disturbance and generating an initiating signal in response thereof; and
means responsive to said initiating signal for sequentially causing application of said clearing signal to said telephone line to clear the same, production of dialing signals in said telephone line, sensing a correct response, and applying said message signals to said telephone line.

9. Apparatus as defined in claim 8 wherein said means for producing dialing signals in said telephone line includes:
a switching circuit responsively energized once by each of said dialing signals of said recorder means; and
relay means connected to be momentarily actuated each time said switching circuit is energized to disrupt said telephone line circuit whereby a corresponding dialing signal is produced in said telephone line for each of said dialing signals of said recorder means.

10. Apparatus as defined in claim 8 wherein said means for sensing a correct response to said dialing signals in said telephone line includes filter means adapted to be connected to said telephone line for sensing a characteristic frequency signal in said telephone line when a correct response is obtained, and producing an output signal to indicate the same.

11. Apparatus as defined in claim 8 wherein said recorder means includes an endless tape having said dialing signals superimposed at a relatively low level over said message signals.

12. Apparatus as defined in claim 11 including a metallic strip positioned on said tape at the end of said dialing and message signals, and means for sensing said metallic strip to produce a signal therefrom.

13. Apparatus as defined in claim 8 wherein said means responsive to said initiating signal includes:
a stepping switch having a plurality of wafers each including a stepping wiper for engaging a plurality of contacts individually in sequence, said wipers and contacts selectively connecting said telephone line, means for sensing when said telephone line is in use, oscillator means, means for applying said clearing signal to said telephone line, recorder means, means for producing dialing signals in said telephone line, means for sensing a correct response and means for applying said message signals to said telephone line in a variable combination of elements for each step position of said wipers; and
means for generating a stepping signal on completion

10

of each operational phase of applying said clearing signal to said telephone line to clear the same, producing dialing signals in said telephone line, sensing a correct response and applying said message signals to said telephone line, whereby said wipers of said stepping switch are sequentially stepped from an initial position in response to said initiating signal and subsequently to successive positions in response to said stepping signals.

14. Apparatus as defined in claim 13 including a separately supplied alarm device, said alarm device being energized by connections of wiper and contacts of a wafer of said stepping switch to power when said wipers of said stepping switch are stepped from said initial position in response to said initiating signal and remaining energized until said wipers are returned to said initial position.

15. In an alarm system, in combination:
a telephone line connected to a telephone system;
means for sensing when said telephone line is in use;
oscillator means for generating a clearing signal;
means responsive to said means for sensing when said telephone line is in use, and applying said clearing signal to said telephone line to clear the same when it is sensed to be in use;
recorder means for producing a sequence of dialing signals and message signals;
means responsive to said dialing signals for producing corresponding dialing signals in said telephone line when said telephone line is clear;
means for sensing a beep signal response to said dialing signals in said telephone line;
means for applying said message signals to said telephone line;
means for detecting an alarm disturbance and generating an initiating signal in response thereof; and
means responsive to said initiating signal for sequentially causing application of said clearing signal to said telephone line to clear the same, production of dialing signals in said telephone line, sensing a beep signal response, and applying said message signals to said telephone line.

16. Apparatus as defined in claim 15 wherein said recorder means includes an endless tape having said dialing signals superimposed at a relatively low level over said message signals.

17. Apparatus as defined in claim 16 including a metallic strip positioned on said tape at the end of said dialing and message signals, and means for sensing said metallic strip to produce a signal respectively therefrom.

18. Apparatus as defined in claim 15 wherein said means responsive to said initiating signal includes:
a stepping switch having a plurality of wafers each including a stepping wiper for engaging a plurality of contacts individually in sequence, said wipers and contacts selectively connecting said telephone line, means for sensing when said telephone line is in use, oscillator means, means for applying said clearing signal to said telephone line, recorder means, means for producing dialing signals in said telephone line, means for sensing a beep signal response and means for applying said message signals to said telephone line in a variable combination of elements for each step position of said wipers; and
means for generating a stepping signal on completion of each operational phase of applying said clearing signal to said telephone line to clear the same, producing dialing signals in said telephone line, sensing a beep signal response and applying said message signals to said telephone line, whereby said wipers of said stepping switch are sequentially stepped from an initial position in response to said initiating signal

11

and subsequently to successive positions in response to said stepping signals.

19. Apparatus as defined in claim 18 including a separately supplied alarm device, said alarm device being energized by connections of wiper and contacts of a wafer of said stepping switch to power when said wipers of said stepping switch are stepped from said initial position in response to said initiating

5**12**

signal and remaining energized until said wipers are returned to said initial position.

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