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[54] SECURITY SYSTEM
6 Claims, 4 Drawing Figs.

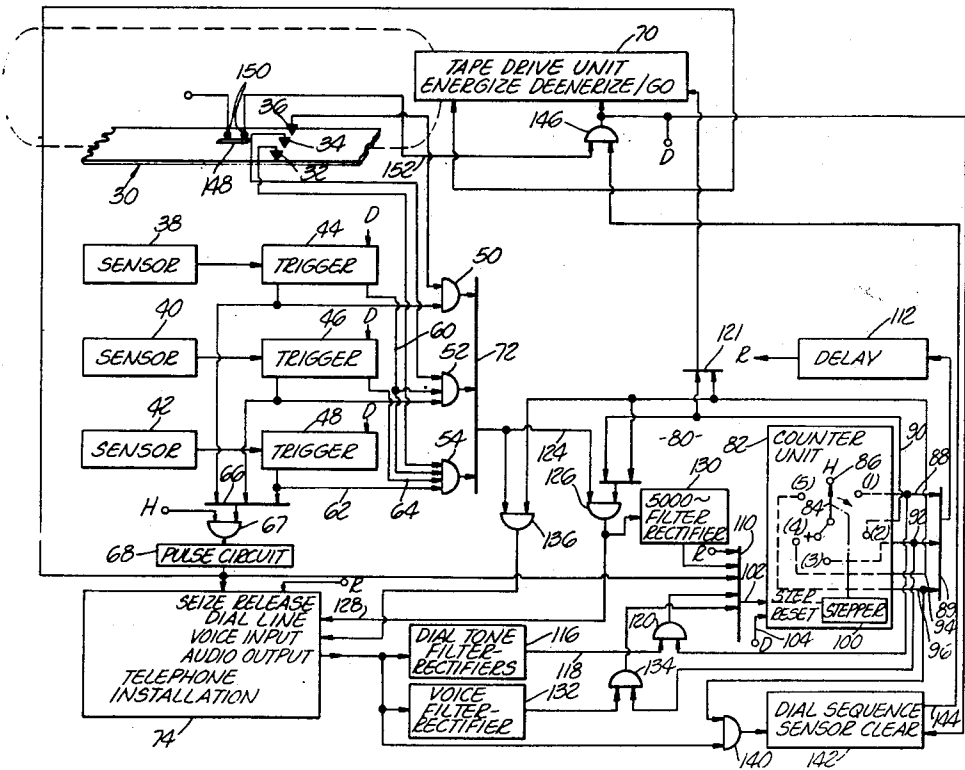
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340/412
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5(P), 1(VC), 90(BB); 340/412, 414

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ABSTRACT: The disclosed system is for summoning assistance and operates in conjunction with a conventional telephone station. The system includes a loop of magnetic recording medium divided into a plurality of parallel channels and a plurality of sequential sections. One of several sensor units initiates operation of the system and additionally controls the system to selectively sense a particular recording channel to summon a particular type of assistance.

In this regard, one channel may be employed for signals to summon the fire department while signals recorded in another channel serve to summon the police and so on. The system also incorporates means for verifying the fact that the message has been communicated. Specifically, means are provided for: verifying the occurrence of a dial tone before supplying dialing signals; verifying communication with the desired station before providing the message to summon help; and verifying receipt of the message requesting assistance. Still further, this system incorporates structure for dialing secondary sources of help if communication is not established with the primary.



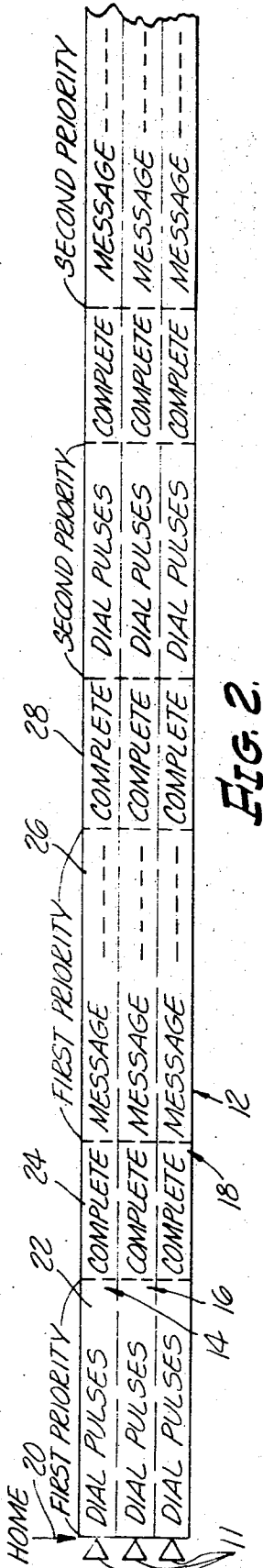
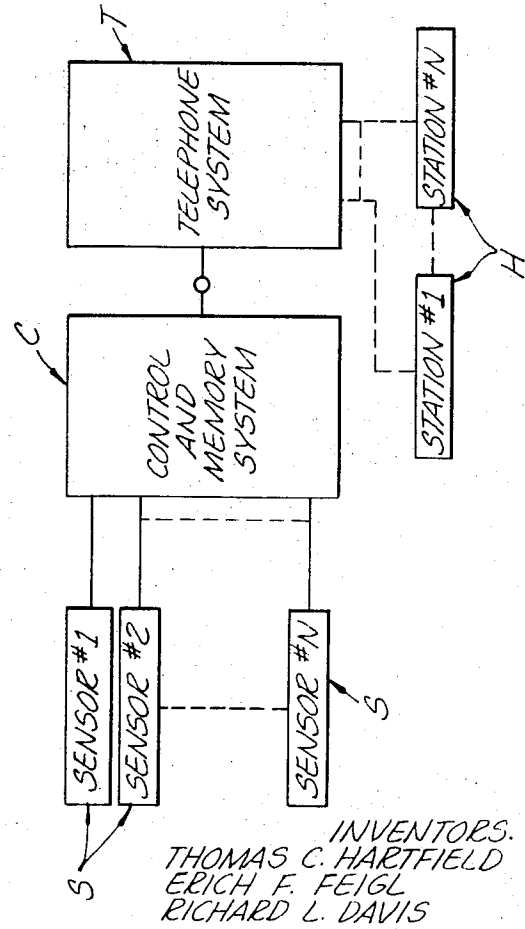
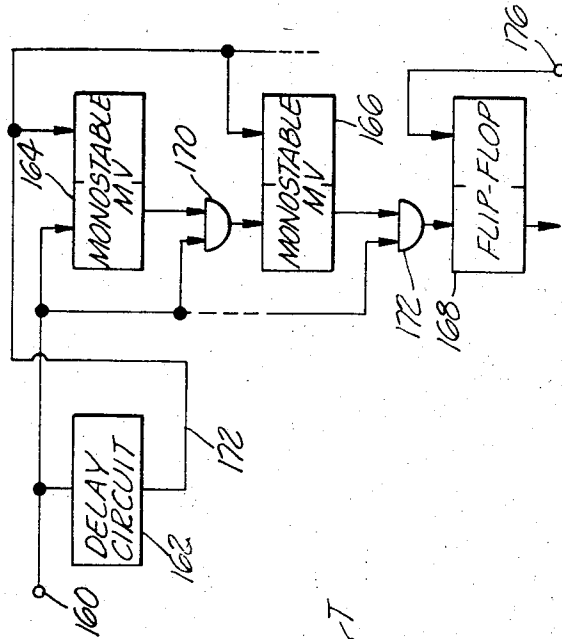


Fig. 1.



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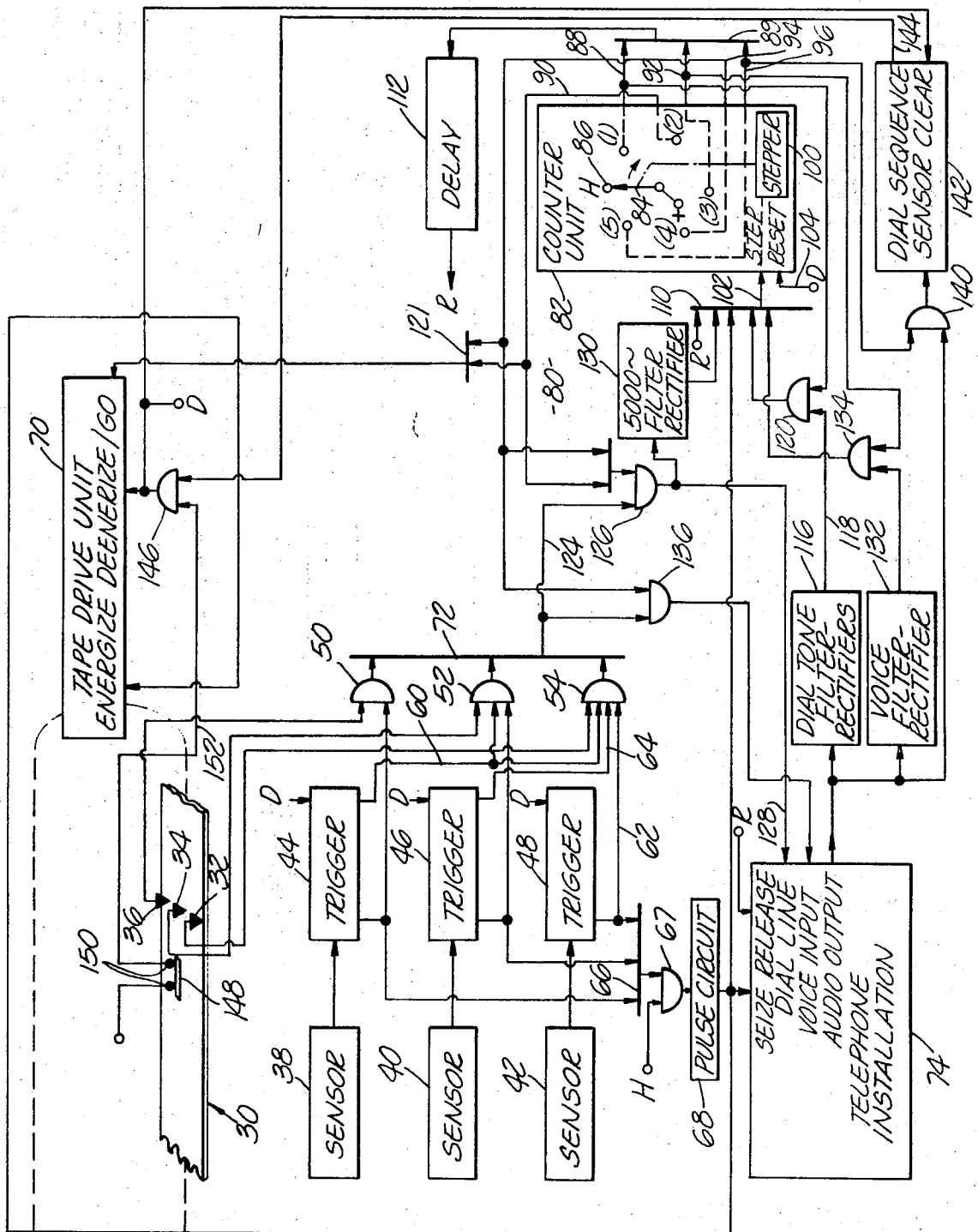


FIG. 3.

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SECURITY SYSTEM

BACKGROUND AND SUMMARY OF THE INVENTION

Over the course of recent years, tremendous and continual advancement has occurred in the communication arts. As a result, in most areas persons in need of help are generally able to summon assistance in a matter of minutes while such a communication may have required hours in the relatively recent past. However, in general, the initiation of a channel of communication and placing a request for help have generally remained primarily manual operations. In this regard, certain reporting difficulties occur as no one may be aware of the emergency situation; or the person aware of an emergency may find communication physically or mentally difficult or impossible. Therefore, substantial need exists for an automatic system capable of reliably acting to summon assistance in response to various emergencies.

In general, various agencies or authorities serve to assist in various emergencies. For example, in the event of a fire, one may merely summon the fire department and expect assistance. Similarly, police departments are responsive to certain types of emergency conditions. However, in various other emergency situations, the person or organization capable of providing assistance may not be accustomed to receiving emergency calls. For example, a disabled refrigeration system in a supermarket may present a rather grave emergency; however, standby assistance may or may not be readily available. Therefore, a need exists for a system to summon certain specific assistance, in response to any of a variety of conditions manifesting an emergency, which system is capable of operating effectively with persons and organizations that do not routinely receive emergency calls.

Recent years have evidenced a continuing trend toward increased crime. Statistically, burglary is one of the most prevalent forms of criminal activity. Of course, the burglar seeks to accomplish a theft without detection and ironically, the best interests of the victim are frequently parallel in this regard. That is, a burglar who is caught in the act of his crime may become violent, injuring or killing anyone interfering with his escape. Therefore, in many situations it may be desirable to summon police assistance to a building that has been illegally entered, with no perceivable indications at the building. In other situations, it may be desirable to provide an audible alarm or signal at the building site with the objective of informing the burglar of his detection in the hope that he will then depart from the premises. Therefore, it is desirable to provide an alarm or security system which may be reliably operated with or without manifestations at the location to which assistance is being summoned.

In the past, various alarms, security systems, and the like have been proposed. However, one of the difficulties involved with many such systems has been their unreliability. In this regard, the use of an unreliable system may be worse than using no system at all. Therefore, considerable need exists for a system that is truly reliable to respond to the various stages of establishing a communication channel, and that on failing, repeatedly attempts to establish communication and summon assistance until a request for assistance has been acknowledged.

In general, the present invention is directed to an apparatus for monitoring or "guarding" a particular location as a home, business establishment and so on. Specifically, the system functions in cooperation with a conventional telephone installation located on the guarded premises. The system utilizes the telephone to selectively summon any of a variety of required assistance. For example, in the event of a burglary, the police department is notified, in the event a coronary patient suffers an attack, his doctor is notified, and so on. That is, the system is adaptable to the particular needs of the installation, to selectively summon any of a plurality of persons capable of rendering assistance dependent upon the nature of the emergency.

In operating with a telephone station, the system hereof is responsive in a command-control manner. That is, for exam-

ple, initially the system awaits a dial tone prior to providing dial pulses to the telephone installation. Similarly, the system awaits a human voice prior to providing a vocal request for assistance. Furthermore, the system awaits an acknowledgement from the party with whom communication is established, prior to halting its operation. That is, the system repeatedly attempts to summon assistance, as from many persons or agencies, until an acknowledgement is provided indicating that assistance will be given.

BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings, which constitute a part of this specification, an exemplary embodiment demonstrating various objectives and features hereof is set forth; specifically:

FIG. 1 is a block diagram illustrative of the basic operation of a system incorporating the present invention;

FIG. 2 is a chart illustrating the format employed in the magnetic tape memory utilized in the system hereof;

FIG. 3 is a schematic and perspective diagram illustrating the detailed structure of an embodiment hereof; and

FIG. 4 is a diagrammatic representation of one component of the system of FIG. 3.

DESCRIPTION OF THE ILLUSTRATIVE EMBODIMENT

Referring initially to FIG. 1, there is shown an exemplary system hereof utilizing a plurality of sensors S which function through a control and memory system C and a conventional telephone system T to establish communication with a selective one of a group of remote stations H. In a specific installation, the sensors S comprise a wide variety of different transducers, sensors, switches, and so on. For example, first sensor may comprise a thermostat which provides an electrical signal when ambient temperature reaches a level indicative of fire. The second sensor may then comprise a series of switches physically mounted at windows, doors, or other places of entry, which switches provide a signal to indicate that an unauthorized person has violated the premises. Thus, the sensors S may comprise any devices for providing electrical signals indicative that help should be summoned. Also the sensors S may each indicate the need for a different type of help. As indicated, many sensors to and including the Nth sensor may be provided, each for detecting a particular type of emergency. Other examples, include: a thermostat placed in a cold storage facility to indicate failure of the refrigeration system, a small radio transmitter carried by a heart patient operable to indicate the occurrence of an attack, and so on.

The signals from each of the sensors S are connected to provide an electrical signal pulse to a control and memory system C which functions to summon the desired assistance through the telephone system T by contacting a person who may provide assistance, at one of the remote stations H (including stations 1 through N).

Considering a specific example, assume that the first sensor provides an electrical signal pulse to the system C, indicating that a fire has broken out on the premises of the installation. Thereupon, the system C seizes the local telephone station (incorporated in the telephone system T) and awaits a dial tone. If a dial tone is not received, the system C releases the telephone station briefly, then again seizes the station or line. This operation is repeated until tone is received, after which the system C delivers dialing signals to the telephone system T to establish communication with a selected one of the stations H, e.g. the first remote station which is the fire department.

After dialing operations are complete, the system C awaits the audible sound of a human voice answering the telephone at the first remote station. If no voice is forthcoming, the system proceeds to a secondary operation as described below. However, if the voice is forthcoming, the system provides the emergency message from recorded memory and requests that an acknowledgement be made. If the acknowledgement is received, the system returns to a quiescent state. However, again if an acknowledgement is not received the system proceeds to the secondary operation.

As indicated above, any failure by the system C to accomplish communication with a remote station results in a secondary pattern of operation. For example, communication may be temporarily suspended with certain remote stations (doctor's office, refrigeration expert, and so on). In such a case, the system proceeds during another cycle of operation to establish communication with a secondary remote station e.g. the Nth station. Again, the communication is conditioned upon positive responses and the failure thereof will cause the system to proceed to a third operating cycle or return to the first operating cycle. In this regard, each installation will be operated to accommodate particular needs.

Recapitulating, the system as generally presented in FIG. 1 functions to sense any of a variety of emergencies and attempt to summon the appropriate assistance via telephone. Failing communication the system proceeds to summon other assistance from secondary remote stations, repeating the cycle until an acknowledgement of the request for help is positively received. Thus, the system is reliable, direct, and as described below may be embodied in a relatively economical and compact physical unit.

Preliminary to considering the detailed structure of the exemplary embodiment, the chart of FIG. 2 will be considered which illustrates the format of the memory in the system C. In this regard, the memory may comprise a loop of magnetic tape (illustratively employed herein) or various other equivalent memory structures.

Electromagnetic transducer heads 11 (extreme left, FIG. 2) sense a representative strip 12 of magnetic recording medium by horizontally scanning three distinct tracks or channels 14, 16 and 18 considered defined thereon. In accordance with the operation of this system (as described below) one of the channels is selectively sensed depending upon which of the sensors provides a signal indicating a need for assistance. For example, channel 14 may serve to summon fire fighting equipment, channel 16 to summon the police and channel 18 to summon a medical doctor.

The formats in which information is recorded in each of the channels 14, 16, and 18 are generally similar. Specifically, the information or data for requesting assistance is arranged in priority sections. Each section includes telephone dialing signals, timing signals, and a recorded message requesting assistance. The first section is provided to summon the first-priority assistance, i.e. the most desired source of assistance. The second section contains the recorded data for requesting assistance from a source of second priority. Of course, various numbers of sections may be recorded in accordance with the requirements of a particular installation and finally the channels all close.

Considering the memory format in greater detail, assume a controlled movement of the strip 12 in relation to the heads 11, and further assume that the heads are selectively energized to sense only the channel 14 (or alternatively only the output from channel 14 is accepted). When the system receives a dial tone, the tape strip 12 moves from home position, designated by an arrow 20 and dialing pulses are sensed from a segment 22. Thereafter, a signal indicating the completion of the dialing pulses is provided from a segment 24. The next segment 26 of channel 14 provides audio signals carrying the message requesting assistance, which is also terminated by a completion signal contained in segment 28.

The sequence of the segments 22, 24, 26 and 28 is then repeated in the channel 11 of a section directed to the second priority source of assistance. Of course, the number of cycles to summon alternate source of assistance will vary widely, depending upon individual installation requirements, as will be readily apparent on understanding the total system hereof as illustrated in FIG. 3.

The format of the channels 16 and 18 is similar however, of course using different data.

As explained above, the exemplary system herein employs a tape loop (FIG. 3 upper left) of magnetic recording tape recorded with the format considered above. Thus, the tape is divided (in a parallel fashion) into three channels each of

which functions in cooperative relationship with one of the magnetic sensing heads 32, 34 or 36. As explained above, the head selected for operation depends upon the nature of the assistance required. Furthermore the tape loop 30 is also divided into sequential sections each of which carry the information to request assistance from a particular source, the sources being arranged in their order of priority.

The selection of a particular one of the heads 32, 34 or 36, depends upon which of a plurality of sensors 38, 40 or 42 indicates the occurrence of an emergency. As described above, the sensors may take a wide variety of forms as well known and widely used in the prior art; however, functionally, the sensors operate to provide an electrical pulse on occurrence of an emergency situation. The pulses from the sensors 38, 40 and 42 are electrically coupled to triggers 44, 46 and 48 respectively. These triggers may comprise any of a variety of well known bistable devices, e.g. multivibrators, which provide two binary signals, (in opposite states) depending upon the state of the device. Upon receiving a pulse from an associated sensor, the triggers 44, 46 and 48 are set, to provide a high signal to an associated "and" gate 50, 52 and 54.

The "and" gates 50, 52 and 54 may comprise any of a variety of well known multiple-input logic devices, which provide a high binary output upon receiving unanimous high binary inputs. Functionally, the "and" gates 50, 52 and 54 select one of the three channels on the loop 30 in accordance with the conditioned outputs from the sensors 38, 40 and 42. Also these gates establish the priority existing between the sensors. That is, for example, if the sensor 38 functions to sense a fire while the sensor 42 functions to sense an inoperative refrigeration system the structure gives the sensor 38 priority over the sensor 42.

The priority among the individual sensors 38, 40 and 42 is afforded by qualifying the "and" gates 50, 52 and 54 by the output signals from the triggers 44, 46 and 48. Specifically, the sensor 38 is given the highest priority and an output pulse therefrom sets the trigger 44, fully qualifying the "and" gate 50 for the passage of signals from the head 36. The sensor 40 is afforded secondary priority and an output pulse therefrom sets the trigger 46 to qualify the "and" gate 52, which also requires qualification by a high signal in a conductor 60 indicating that the trigger 44 is in a reset state or inactive. Somewhat similarly, the "and" gate 54 requires qualification by the trigger 48 being set (as applied to the gate through a conductor 62) as well as the occurrence of the trigger circuits 44 and 46 being reset (manifest by signals in conductors 60 and 64).

Recapitulating if any of the sensors 38, 40 or 42 detect an emergency condition, a signal is applied to qualify one of the "and" gates 50, 52 or 54 permitting the passage of signals from a selected one of the heads 32, 34 or 36 depending upon the nature of assistance required. Simultaneously with this operation, when one of the triggers 44, 46 or 48 is set, a signal (high-state binary) is applied through a junction 66, an "and" gate 67 (qualified by a "home signal" H explained below and a pulse circuit 68 to the "energize" input of a tape drive unit 70. The pulse circuit 68 may take a wide variety of different forms, comprising simply a structure to provide a pulse in response to a binary level change. The tape drive unit 70 may also take a wide variety of different forms including means for frictional engagement with the tape loop 30 and a motivation device for displacing the tape loop 30 relative to the heads 32, 34 and 36 to provide electrical signals as well known in the tape recording art. The tape drive unit is placed in on standby upon receiving the pulse on its "energize" input, drives the tape on receiving a signal at its "go" input and is turned off receiving a pulse at its "stop" input.

The tape loop 30 is driven in alignment with the heads 32, 34 and 36 with the result that signals (amplified and processed as well known in the tape recording art) are selectively passed by one of the "and" gates 50, 52 or 54 to a junction 72. It is to be noted, that the various junctions employed herein may comprise well known elements termed "or" gates which func-

tion to avoid the cross coupling of electrical signals; however, some forms of structural design may avoid the need for these elements.

Recapitulating, upon detection of an emergency situation, signals are supplied to the junction 72 which initially manifest dialing signals for a selected remote telephone station and then subsequently present signals representative of an oral request for assistance. Concurrently with these initial operations a signal is also applied from one of the triggers 44, 46 or 48 through the junction 66, the gate 67 and the pulse circuit 68 to a "seize" input of the telephone installation 74. This unit comprises a conventional telephone installation as in wide spread use to transmit data signals. The installation 74 has a "seize" input which upon receiving a signal, e.g. a pulse, seizes the outgoing telephone communication line thereby requesting a dial tone. The installation also includes a "release" input, which upon receipt of a pulse releases the telephone line. Additionally, the installation 74 includes a "dial line" input for receiving dial pulses, a "voice" input for receiving audio signals for voice transmission, and an "audio" output for delivering audio signals receives from a remote station through the telephone system.

In general, the operation of the system hereof to supply controlled and conditioned signals to the telephone installation 74 from the tape loop 30 is accomplished by a control system generally indicated at 80 (lower right, FIG. 3). The system 80 includes a ring counter 82 having five active states and a single "home" position. Of course, the counter 82 may take various electronic and other forms; however, for illustrative purposes the counter 82 is represented by an electromechanical analogy. That is, a positively energized rotary contact 84 is indicated to be progressively stepped from a "home" contact 86 to five sequentially arranged position contacts connected respectively to conductors 88, 90, 92, 94 and 96. When the movable contact 84 is in the "home" position, signal H is high, otherwise one of the output conductors receives a high or positive signal level.

Continuing with the electromechanical analogy, the counter 82 includes an electromechanical stepper 100 connected to receive pulses from a "step" input 102 and a "reset" input 104. Each time a pulse is received on the "step" input 102, the stepper 100 sequentially advances the contact 84 to the next stationary contact thereby providing a positive signal to the next output conductor. Upon application of the signal to the reset input 104, the stepper 100 clears the counter by returning the contact 84 to the "home" position 86.

In view of the above, preliminary explanation of FIG. 3, the accomplishment of a complete and detailed understanding thereof may now best be obtained by assuming certain initial conditions and explaining the following operating sequence concurrently with the introduction of further component parts of this system. Therefore, assume that the sensor 42 is actuated by detecting an emergency condition to provide an electrical pulse which sets the trigger 48. Assume further, that both the triggers 44 and 46 are reset, so that all inputs to the "and" gate 54 are high (in each of the conductors 62 64 and 60) thereby enabling the gate 54 to pass signals from the third channel via the head 32 to the junction 72.

Somewhat simultaneously to the above-described operations, the setting of the trigger 48 results in the application of a pulse from the pulse circuit 68 to the "seize" input of the telephone installation 74 thereby seizing the telephone line. The pulse from the circuit 68 is also applied to the "energize" input of the tape drive unit initiating the operation thereof. Furthermore, the start pulse from the circuit 68, also is applied through a conductor 108 and a junction 110 to the "step" input of the counter 82, thereby advancing the contact 84 from the "home" position 86 to provide a positive signal to the output conductor 88.

The conductor 88 (along with several other conductors) is connected through a junction 89 to a delay apparatus 112 which may comprise a delay relay that develops a signal R, at a predetermined interval after receiving a positive input signal.

The reset signal R recycles the sequence of operation as will be explained in detail below. That is, in the event a dial tone is not received after a predetermined delay interval of waiting, if the remote telephone is not answered within a period of waiting, or if a stated message is not acknowledged, the system provides a high level for the binary signal R, causing another sequence of operation pursuing an attempt to obtain assistance from the next source in the priority list.

Assuming that in the routine operation of the telephone installation 74 and the equipment associated therewith, seizing the telephone line results in a dial tone at the audio output that tone passes through a dial tone filter and rectifier circuit 116 providing a positive signal through a conductor 118 to an "and" gate 120. The "and" gate 120 (during this interval) is also qualified by a signal applied through the conductor 88 (energized while the counter 82 is in the first stage). Therefore, the "and" gate 120 applies a signal through the junction 110 and the input 102 to advance the counter 82 to the second stage of operation.

During the second stage of operation, the output conductor 90 from the counter 82 receives a positive signal which is applied through a junction 121 to drive the tape drive unit 70. That is, prior to this time, the tape drive unit has been energized in a standby state; however, it is now commanded to "GO" and produces relative motion between the tape loop 30 and the currently active head 32. Thereupon, the signals representative of dialing pulses are provided from the head 32 through the "and" gate 54, the conductor 124 the "and" gate 126 and a conductor 128 to the dial line input of the telephone installation 74. It is to be noted that during this interval the "and" gate 126 is qualified by the signal in the conductor 90, which signal is high during the interval of the second stage of operation. Thus, dialing signals are supplied from the tape loop 30 to the dial line input of the telephone installation 74 causing a predetermined station designation to be automatically dialed.

On completion of the dialing signals from the tape loop 30, the head 32 senses a command signal indicating the completion of the dialing sequence. The command signal in the present exemplary system is a 5,000-cycle signal, which on passage through the "and" gate 126 is applied through a 5,000 - cycle band-pass filter and rectifier 130 which develops a signal level that is applied through the junction 110 to the step input 102 and thereby advances the counter 82 to the third stage of operation by stepping the movable contact 84 to provide a high output on the conductor 92.

The third stage of operation is another waiting interval during which the system stands by for an indication that communication has been established. This manifestation is the occurrence of a human voice from the audio output of the telephone installation 74. That is, the system now stands by for a predetermined interval waiting for the remote telephone to be answered. During the waiting interval, only the conductor 92 from the counter unit 82 carries a high signal therefore the delay circuit 112 is again energized; however, the tape drive unit 70 is not in a "GO" state. As previously explained, unless the telephone at the remote state is answered within a predetermined period, the delay circuit 112 provides the abortive signal R in a high state causing the system to reset and make another complete attempt at establishing communication.

If the telephone is answered, voice range frequency signals are received from the audio output of the telephone installation 74. Such signals pass through a selective voice range band-pass filter and rectifier circuit 132 which provides a high output to an "and" gate 134 indicating a human voice is carried on the audio output from the telephone installation 74. The "gate" gate 134 is qualified during this interval by a signal carried by the conductor 92 which is connected to receive the output from the counter 82. Therefore, the "and" gate 134 applies a stepping signal through the junction 110 to the step input 102 advancing the counter 82 to the fourth stage of operation.

During the fourth stage of operation, the system functions to deliver a vocal message to the voice input of the telephone installation 74 which actually constitutes a request for assistance, that has been previously recorded on the tape loop 30. Specifically, during the fourth stage of operation, the output from the counter 82 to the conductor 92 is high thereby driving the tape unit 70 to "GO" through the junction 121. Therefore, the tape 30 is moved in relation to the sensing head 32 with the result that prerecorded signals representative of the voice message are sensed by the head 32 and applied through the "and" gate 54 and a gate 136 to the voice input of the telephone installation 74. The "and" gate 136 is connected directly to the conductor 94 which, as indicated above, provides a high signal during the fourth stage of operation.

At the conclusion of the vocal message, another control signal is sensed from the tape loop 30 in the form of a 5,000-cycle signal which is again applied to the filter and rectifier circuit 130 for the development of a positive signal which is applied through the junction 110 to the step input 102 of the counter 82 thereby advancing the counter to the fifth stage of operation. During this stage of operation, the system awaits the acknowledgement of the request for help.

The output from the counter is again applied to the delay circuit 112 (through conductor 96) to command a recycle operation if no acknowledgement is received. Specifically, for example, the prerecorded vocal request for help either requests an acknowledgement or the station from which help has been summoned routinely provides an acknowledgement in response to calls originating from the structural system hereof. The exemplary form of acknowledgement comprises the remote station dialing a prearranged single digit on the telephone instrument at that station. The system hereof then functions to detect such an occurrence to provide a clear signal D which returns the system to a standby status awaiting another possible emergency.

When a preselected number is dialed at the remote station, a coinciding number of dialing signals appear at the audio output from the telephone installation 74. Those pulses are applied through an "and" gate 140 (lower right, FIG. 3) which is qualified by a signal occurring in the conductor 96 during the fifth stage of operation. The dial sequence sensor may take a variety of different forms including a binary counter which counts the dialing pulses for verification of a prearranged number. One form of such a circuit is disclosed in FIG. 4 and will be considered hereinafter however, at the present stage of explanation, it is to be understood that functionally, the dial sequence sensor 142 provides a high output to a conductor 144 upon receiving a series of pulses coinciding to a predetermined numerical value. Thereupon, the request for help is known to have been acknowledged and the system may halt operations attempting to summon assistance.

The output from the sensor 142 to the conductor 144 is applied to an "and" gate 146 which is qualified only when the tape loop 30 returns its quiescent position. In this regard, the tape loop 30 carries a metallic contact 148 which cooperates with a pair of contacts 150 to provide an electrical signal through a conductor 152 to the gate 146 when the tape loop 30 is in a home "home" position. Thereupon, the gate 146 is qualified to provide a deenergized signal D. The signal D is applied to the tape drive unit 70 (deenergizing that unit) to each of the triggers 44, 46 and 48 (resetting the trigger 48) to the "reset" input of the counter 82 (resetting that unit) and to a "clear" input of the sensor 142 (clearing that unit). Thus, the system is returned to a quiescent state during which it again awaits the occurrence of the manifestation of an emergency from one of the sensors 38, 40 or 42.

Throughout the above explanation, it was assumed that the operation of the system caused a responsive dial tone from the telephone installation, that the remote station telephone was answered by a human voice, and that the request for assistance was acknowledged. As indicated, at various junctures throughout the above explanation, failure of such responsive sequences results in the production of a reset signal

R provided from the delay circuit 112. The reset signal is applied directly to the "release" input of the telephone installation 74 to release the telephone line. That is, the application of the reset signal R to the telephone installation 74 releases the line which was previously seized.

Additionally, the reset signal R is applied through the junction 110 to the step input 102 of the counter 82. As a result, the counter 82 is advanced to the next stage of operation, e.g. stage two, four or "home". If the stage of operation is stage two or four, the system proceeds in synchronism with the revolution of the tape loop 30 until the first priority source information on the tape 30 has passed the heads. Coincidental to such abortive action, the counter 82 is returned to the "home" position at which the signal H is provided high to again qualify the "and" gate 67. It is to be recalled that the gate 67 also receives an input from the trigger circuit 48 registering the fact that an unreported emergency still exists. Upon qualification of the gate 67, a pulse is supplied from the circuit 68 to seize a line in the telephone system 74 and advance the counter unit 82 to the first stage of operation of the system. Subsequently, the cycle of events is precisely as described above; however, in this instance the system is attempting communication with a source of assistance designated as "second priority", as recorded on the tape loop 30 substantially as indicated on the chart of FIG. 2.

In various applications, the second priority source of assistance may include a more remote fire station, a more remote police precinct, a property owner or virtually any other second priority source of help. Of course, as indicated above, third-priority sources of assistance may also be summoned in accordance with the present system as will be readily apparent to those skilled in the art from this explanation.

As indicated, the dial sequence sensor unit 142 (FIG. 3) may take a wide variety of different forms, one rather simple form of which is shown in FIG. 4. Specifically, input is provided to a terminal 160 which is connected to a delay circuit 162 and to one input of a monostable multivibrator 164 and to a similar input of each of a remaining number of monostable multivibrators 166 and so on, through "and" gates 170 and so on. The chain is terminated by a flip-flop 168 which is connected to the input terminal 160 through a gate 172, and similarly to the unstable side of the multivibrator 166. Thus, the multivibrators and the flip-flops comprise a binary counter as well known in the prior art interconnected by "and" gates which must be qualified to accomplish the sequential setting of the multivibrators. In this regard, multivibrators are very well known which possess only one stable state. Upon being pulsed to their unstable state, they impose a brief delay then return to the stable state. These periods of delay are applied to verify the periods between dialing pulses in the acknowledgement signal. That is, each dialing pulse must be followed by another in time, or the multivibrator that was set by the former pulse resets and the chain sequence is broken. Of course, the last pulse in the chain sets the bistable flip-flop 168 prior to the delay period imposed by the delay period imposed by the delay circuit 162 and an acknowledgement is indicated.

In the sequential operation of this apparatus the application of a series of pulses manifesting the dialing operation at the remote telephone instrument actuates the delay circuit 162 and similarly initiates stepping operations by the multivibrators 164, 166 and so on. The delay circuit 162 affords a sufficient period for all of the multivibrators and the flip-flops in the chain to be set before providing a reset output to a conductor 172. Of course, each of the multivibrators and the flip-flop are provided to operate on the leading edge of the pulses so that one may be set during each pulse, as very well known in the computer and data-processing art. Therefore, if a sequence of dialing pulses is truly provided at the input 160, the flip-flop 168 is set prior to the time when the signal emerges from the delay circuit 162 driving the conductor 172 high and resetting the entire chain except the flip-flop 168. However, conversely, if the multivibrators should be perchance randomly set by noise or other signals their auto-

matic reset and the delay circuit 162 will clear them before the last flip-flop 168 in the chain is set.

Upon setting the flip-flop 168, an output signal is provided from the sequence sensor, which signal endures until a reset input is provided at the terminal 176 to clear the flip-flop 168.

From the above explanation and description, it is apparent that the system hereof provides an effective security apparatus that generally overcomes the certain difficulties of the prior art as set forth in the above preliminary material. Furthermore, the system hereof is economical in operation clearly reliable and effective. Of course, as will be readily apparent to those skilled in the art, various modifications to the system may be accomplished; therefore, the system hereof shall not be limited in scope to the illustrative embodiment, but rather shall be determined in accordance with interpretations of the claims set forth below.

We claim:

1. A security system for operation with a telephone station to summon assistance or manifest emergency messages at a remote location through a telephone system, comprising:

- a plurality of electrical sensor units, each to provide a sensor signal in response to conditions indicating a need for assistance at the location of said telephone station;
- means for providing dialing signals for a plurality of telephone designations;
- means for registering a plurality of different message signals representative of a plurality of different emergency messages, said different message signals having a predetermined order of priority; and
- control means coupled to: said telephone system, said sen-

sor units, said means for providing dialing signals and said means for registering said control means for receiving said sensor signals to thereupon actuate said means for providing dialing signals and message signals to said telephone system in accordance with said predetermined order of priority.

2. A system according to claim 1 further including means for sensing the occurrence of voice tones from said telephone station to provide an electrical voice signal and wherein said control means includes means to control said means for providing said message signals under control of said voice signal.

3. A system according to claim 2 wherein said control means includes means for repeating operations of said means for providing dialing signals and said means for registering a plurality of different message signals under control of said voice signal.

4. A security system according to claim 3 wherein said means for controlling a repeating operation further includes means to select different designations from said means for registering, failure to establish communication as manifest by the absence of said voice signal.

5. A security system according to claim 2 wherein said control means further includes means for sensing a dial tone from said telephone station prior to providing said dialing signals.

6. A security system according to claim 1 further including means for sensing an audio sequence of clicks manifesting an acknowledgement of summoned assistance, whereby to halt an operating cycle of said system.

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