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⑤④ **Monitoring the presence of human activity in an environment.**

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Description

This invention relates to automatically de-energizing power utilizing equipment after a lack of animal activity or sound for a predetermined time period.

As a result of fossil fuel shortage, strong opposition to nuclear generated electrical power, and economic unavailability of other forms of power, e.g. geothermal power and the like, there has been a strong need for energy saving devices. There have been several prior art detection systems designed to detect human activity in a specified environment as for example, a room or other enclosure. One such prior art device utilized a source of microwave radiation. Human activity within the specified environment with the microwave radiation would cause a triggering of a signal to energize or de-energize electrically operable equipment.

There have been other systems to detect human activity, as for example, passing through a doorway or across some barrier or threshold. One such detection system used a light beam and light sensor such that breaking of the beam would cause initiation of an electrical signal to operate some electrically operable equipment, e.g. trigger an alarm or cause a door to open.

Exemplary of burglar alarm circuits are the Stettner et al Patent No. 3,761,912 in which a timing circuit is used in connection with a silicon controlled rectifier for generating an alarm or energizing lights for a selected period of time in response to the occurrence of a sound and immediately after the sound. After a substantial period of time, the circuit is de-energized and turns off the lights and/or sound.

U.S. Patent No. 4,102,732 also discloses a circuit to sense an inanimate object as well as an animate object and relies upon a clocking system to actuate an alarm after a predetermined period of inactivity. U.S. Patent No. 3,445,836 also discloses an alarm system which operates by means of audio frequency signals and includes a plurality of sound actuated sensors. U.S. Patent No. 4,099,168 discloses an intrusion alarm system which operates on the basis of an audio frequency signal.

There has been at least one proposed system using ultrasonic radiation for generating a standing wave in a specified environment for sensing the presence of or a lack of human activity. If the wave was not disturbed, then equipment could be automatically de-energized. Any disturbance in the standing wave would cause a re-energization of the equipment. A similar system has been proposed using a standing wave of microwave radiation. These systems were not passive in sensing and were not specifically sensitive to human activity.

It is, therefore, an object of the present invention to provide an apparatus which is capable of sensing energy within a certain wavelength range generated as a result of animal activity and in a particular environment for a predetermined time interval.

Brief Summary of the Disclosure

An apparatus for detecting the presence of animal activity or the lack of animal activity in a specified environment and during a predetermined time interval. The apparatus is designed to control energization and de-energization of equipment, preferably electrically operable equipment. If animal activity is not detected in the specified environment within the predetermined time interval, then the apparatus is effective to de-energize the electrically operable equipment in order to provide at least energy savings. On the other hand, if the animal activity is detected in the specified environment, the apparatus is designed to permit energization, or otherwise, to maintain energization of the electrically operable equipment. In this way, the apparatus of the present invention functions as a so-called "intelligent switch". The apparatus is not limited to use only with electrically operable equipment and can be used with other forms of powered equipment.

The apparatus of the invention includes an analog circuit portion and a digital circuit portion. The analog circuit portion is designed to provide for the detection of energy within a specified wavelength range which results from animal activity. In a preferred embodiment, the energy is in the sonic wavelength range which is deemed for the purposes of this invention to include the subsonic wavelength as well as super-sonic wavelength. The analog circuit portion includes a sensor mechanism, such as a microphone, in order to detect sound within a specified environment, such as a room or the like, which constitutes a defined volume. The analog circuit portion may also include band pass filters, gain amplifiers and the like in order to process the signal for further use in the digital portion of the circuit, as herein-after described.

The animal activity in accordance with the present invention, is preferably human activity. Moreover, the specific area or environment is preferably an enclosed environment or limited environment. The human or other animal activity is detected by the registration of a noise level (spectral signature) above a user-adjustable threshold level and within a predefined spectral bandwidth. The user-adjustable threshold level is preferably manually operable or adjustable in connection with the present invention.

A pulse shaper, e.g. a Schmitt trigger inverter is used as an interface between the analog portion and the digital portion of the circuit. This Schmitt trigger acts as a discretizer to provide output pulses in a form which are compatible with and capable of being effectively used by the digital portion of the circuit.

More specifically, the system of the present invention senses the presence or absence of human activity within a defined volume by registering the special signatures above the user-adjustable threshold level and within the spectral bandwidth. Upon detection of signal above this threshold level within a predetermined time period, the noise is used to activate a built-in-user

selectable time delay mechanism. The output of the system is an electrical impulse and may be used to activate or de-active electrical devices or systems connected to the system of the present invention.

As a specific example, if the user of the invention selects the noise threshold level appropriate to the environment and sets the time delay, i.e. a predetermined time interval or period, for e.g., ten minutes the system will monitor for noise characteristics of human activity within the specified environment. If no noise is registered there will be no inputs over this ten minute time period. Consequently, the system will shut off all lights, air-conditioning, stereo or other electrically operable devices that may be connected to the system. On the other hand, if the system of the invention does register a noise input during the ten minute or other time interval and above the threshold level, it will automatically reset its timing circuit to zero and thereby energize all of the electrically operable equipment connected thereto and thereby restart the process and the predetermined time period.

The apparatus is passive in that it does not generate any form of standing wave or other signal form. It is thus passive in the sense that it does not generate any signal which must be detected or interrupted in order for the apparatus to be operative.

The "predetermined" time interval is a time interval or time period which may be manually set in the apparatus itself by a manually operable control, such as a potentiometer, as hereinafter described. The term "predetermined" time interval will, of course, also include fixed time intervals which could be the same or vary from apparatus to apparatus, and which could also be factory-set.

The predetermined time interval in the apparatus of the present invention will be an appreciable time interval or time period, at least compared to a standard burglar alarm system. In the conventional burglar alarm, the alarm is initiated as soon as an intrusion is detected. In the present invention, there will be an appreciable delay which is usually one minute or longer, and typically, will be considerably longer, e.g., in the range of ten to fifteen minutes or longer.

The apparatus of the invention is essentially a so-called "intelligent" apparatus or "intelligent switch" as aforesaid. The apparatus is intelligent at least in the sense that it is capable of making a decision, even though it may be a somewhat elementary decision making process. In essence, the apparatus effectively searches for human or other animal activity at all times and thereby effectively monitors a lack of animal activity, at least within the predetermined time period and thereby makes a decision to effectively energize or de-energize the electrical operable equipment.

In this respect, it should be understood that other forms of decision making apparatus or the so-called "intelligent components" could be used with or to modify the apparatus of the invention.

For example, the apparatus is capable of being operated with programmed logic utilizing a form of microprocessor as opposed to the random logic circuit as described herein. In this way, the circuitry could be software programmed to make the necessary decisions which are not being made by the random logic in the apparatus of the invention. Decision making software program logic of this type could be designed to average out background noise in an accurate manner and account for the existence of such background noise.

The Drawings

FIGURE 1 is a schematic block diagram showing the overall electronic portion of the apparatus of the present invention;

FIGURE 2 is a schematic circuit view of one form of analog circuit portion;

FIGURE 3 is a schematic circuit view of a modified form of analog circuit portion;

FIGURE 4 is a schematic circuit view of a digital circuit portion; and

FIGURE 5 is a schematic circuit view of a modified form of digital circuit portion.

Detailed Description

"A" designates a circuit forming part of the apparatus of the present invention which automatically permits de-energization and energization of equipment operable by the circuit. The circuit is illustrated in a block diagram form in Figure 1. The apparatus A comprises a transducer 10, such as microphone, or the like, designed to detect energy within the sonic or so-called acoustic wavelength range.

The analog circuit portion, designated by reference numeral 12, may or may not be deemed to include the transducer 10. The analog circuit portion 12 includes a gain amplifier 14 and a high impedance input preamplifier 16, although the latter is not absolutely necessary. The analog circuit portion 12 preferably includes a low pass filter 18 and a high pass filter 20. It is important that the analog circuit portion includes at least a gain amplifier.

The apparatus of the present invention also includes the digital circuit portion 22 comprising a pulse shaper, such as a Schmitt trigger inverter 24. This pulse shaper functions as a discretizer and enables the analog circuit portion to be directly coupled to the digital circuit portion 22. In this respect, the discretizer 24 may be considered to be part of the analog circuit portion, or the digital circuit portion, or considered a separate element.

The digital circuit portion 22 comprises a clock generator which is often referred to as a timer, such as an oscillator 26. The output of the oscillator 26 is introduced into a NOR gate 28 which serves to provide an input to and also receives a feedback from an interval timer 30 over a feedback circuit 31.

The output of the interval timer 30 is introduced through a switching circuit including an inverter

34 and an electrical switch, such as a relay 36. A load 38 is illustrated as being connected to a source of electrical power 40 through the electronic switch 36.

Each of the aforesaid components could be operated by a suitable power supply, as for example, a power supply 42 illustrated in Figure 1 of the drawings. This power supply could be an AC power source taken directly from the environment from which the apparatus is used, as for example, a 120 volt AC power source. A battery power source or the like, could be provided in order to enable portability of the apparatus.

Each of the aforesaid components forming part of the apparatus A of the present invention and which are shown somewhat schematically in Figure 1, are more fully illustrated in more detail in Figures 2 to 5 of the drawings.

The transducer 10 may be a microphone or other sound pick-up-device which is connected through a capacitor 44 to the adjustable gain amplifier 14. The capacitor 44 is designed to isolate the amplifier 14 from the microphone 10, and the latter of which has one terminal thereof grounded.

A feedback circuit 48 is connected to the output and one of the inputs of the amplifier 14 and includes a resistor 50 for biasing the amplifier and establishing a full open loop gain. An externally adjustable gain control potentiometer 52 is connected to the feedback circuit 48 to thereby enable external adjustment of the gain of the amplifier. A capacitor 54 of 6,000 microfarads is connected to the last mentioned input of the amplifier 14 for detecting a low frequency cutoff point of the amplifier as for example, a one thousand hertz cutoff point.

Connected to the output of the amplifier 14 is a voltage dividing circuit 56 comprised of a pair of resistors 58 and 60 and each of which have essentially the same value. Finally, connected between the resistors 58 and 60 of the voltage dividing circuit 56 is an amplifier output line 62. The voltage dividing circuit 56 is also designed to prevent overloading of the input. In the output line 62 is a filter 65 which may be a combination of a low pass filter and a high pass filter as heretofore described.

The amplifier 14 provides an open loop gain of approximately 320,000 and is designed to have a low frequency cutoff as aforesaid at approximately 3 dB frequency of approximately 500 Hz. which may be adjusted over a limited range by means of the potentiometer 52. The amplifier may be operated by a 15 volt power supply.

Figure 3 illustrates a modified form of analog circuit portion 12' and is comprised of a transducer such as a crystal microphone 10', similar to the microphone 10. A capacitor 44' couples the microphone 10' into an input amplifier stage 64 comprised of a preamplifier 66 having a resistive-feedback circuit 68. A potentiometer 70 is connected to the feedback circuit 68 and is also grounded through a capacitor 72. This potentiometer 70 is designed to provide adjust-

able gain from about 10 to about 100. The feedback circuit 68 contains a resistor 74, which in combination with a similar resistor 76, forms a voltage dividing network. The resistor 74 and the setting of the potentiometer 70 effectively determine the gain of the amplifier. The capacitor 72 is designed to provide an AC gain with a low frequency cut off at about 100 Hz.

The output of the preamplifier 66 is connected through a coupling capacitor 78 to a low pass filter 80 with linear phase characteristics and with a three decibel (break) frequency of 5 KHz. In one preferred aspect the cut-off slope would have a -20 decibel per decade starting at 10 KHz, thus providing attenuation above 8.5 KHz.

The output of the low pass filter 80 is introduced into a high pass filter 82, preferably configured as a high pass elliptic filter with a three decibel cut off (break) frequency of one thousand KHz. The cut off slope is again about -20 dB per decade at a frequency of about one KHz and in this way, is capable of providing effective low frequency attenuation. The combination of the low pass filter 80 and the high pass filter 82 effectively forms a band pass filter combination with a spectral bandwidth or response of about 6.5 KHz.

The output of the high pass filter is introduced into the gain amplifier 14 which is linear with a fixed gain of about 10.94.

The gain amplifier has an output connected to discretizer 24, which may be a schmitt trigger inverter. The discretizer 24 operates as the interface between the analog and digital portions of the circuit and is designed to provide an output of rectangularly shaped pulses between about 0 V and 10 V from the analog output of the analog portion of the circuit, and also eliminates low level background noise within the spectral band of the circuit. The discretizer 24 is also provided with an output line 32 which is capable of being introduced into the digital circuit portion.

The potentiometer 70 is preferably externally located to enable a user to compensate for background noise and provide a desired degree of sensitivity. A light emitting diode 84 located at the discretizer would be turned off and on with respect to the sensitivity when the potentiometer 70 is adjusted so that, an optimum condition is achieved. The low pass filter is designed for a cut off at about 300 Hz although it could have a low cut off point as low as a 100 Hz. The high pass filter is designed with a cut off frequency of about 7.5 KHz although it could have a high cut off frequency as much as 20 KHz or greater.

The digital circuit portion 22 in one embodiment, is more fully illustrated in Figure 4. This circuit portion 22 in Figure 4 can also be referred to as a time delay and output circuit section and receives the output line 32 from the amplifier circuit portion or otherwise the output line 32' from the discretizer 24.

The time delay and output circuit 22 also comprises a first counter 90 having an output connected through an inverting NOR gate 92 to a

second counter 94. The counters 90 and 94 are preferably solid state counters. However, one solid state counter could be substituted for the two counters 90 and 94.

The first of the counters 90 receives an input through a NOR gate 96 from a solid state timer 98. The NOR gate 96 can be considered to form part of the timer to constitute a timer circuit 100. The gate 96 serves as a disable gate in order to disable the counters.

The output of the second counter 94 is connected to a decoder NAND gate 102 which serves as a decoder and allows the timer 94 to function as a divide by six counter. The output of the decoder gate 102 is connected through another NOR gate 104 to a third solid state counter functioning as a timer 106, and connected to the timer 106 is a manually operable solid state, programmable timing switch 108 to permit external control over a predetermined time period which may be manually adjusted.

An output of the counter 106 is connected to a flip-flop 110 and also to part of a feedback circuit 112, including a NAND gate 114 which serves as an inverter or inverting gate. This gate 114 is connected to another NAND gate 116 and an inverting gate 118. The gate 116 receives an input from the output of the discretizer 24. The output of the gate 118 is introduced back into the third counter 106 in order to complete the feedback path. The flip-flop 110 has also one input to the NOR gate 96.

The output of the flip-flop 110 is connected through an inverting buffer amplifier 120 to a relay e.g., the electrical solid state switching relay 36. The relay is operable by means of an optically isolated triac 126 and is provided with output terminals 128 for connection to a suitable load 38.

The load 38 as indicated above, may adopt any electrically operable device or equipment, e.g. lights, air-conditioning equipment, etc. When the circuit detects sound over a certain level within a specified environment during or after a predetermined time period, it generates a signal which is an enable signal to operate the equipment and when no sound is detected in the environment during the time period, the relay cuts power to the equipment.

The discretizer 24 clears the first and second counters 90 and 94, respectively, and resets the third counter 104 and the flip-flop 110 as well as energizes the solid state relay 36. This decoder is capable of detecting for example, six counts and then shifts to a zero level. When the counter 106 reaches a maximum count, its output will shift to a zero level and thereby turns off the flip-flop 110 which, energizes the relay 36 effectively creating a disable signal since the third counter 106 generates a signal which enables the clock through NOR gate 96. The disable signal turns off the relay to discontinue power to the load.

The flip-flop 110 can turn on the solid state relay 36 and thereby functions as a latch. It is reset as soon as the noise is detected as being above the threshold level. Thus, the flip-flop 110 remains

reset until the predetermined time period, set through the manually operable solid state time delay mechanism 58, has expired.

The first and second counters 90 and 94, the decoder gate 102, and the third counter 106 form an adjustable time delay circuit. The basic time-base is supplied by the timer 98. The count of the third counter 106 is set by the programmable switch 108 which allows for the programmable time delay. The output of the JK flip-flop 110 is set by the timing circuit which receives the output from the third counter 106. The setting of the flip-flop 110 disables the output from the timer 98, thus preventing the timer circuit from counting any further. The output of the JK flip-flop 110, when set, enables the output of the solid state relay 36 through the inverting buffer.

The entire system may be reset from the output of the discretizer 24. Whenever a signal which is above the Schmitt trigger threshold is received from the amplifier, all of the counters and the flip-flop 110 are reset to zero, thereby restarting the time delay. This action will also energize the solid state relay 36. The solid state relay 36 will only be in the "on" condition as long as noise levels from the amplifier are above the Schmitt trigger thresholds. During period of inactivity, and depending upon which time period has been selected, the time circuitry will time-out, thereby setting the output of the flip-flop 110 and turning off the solid state relay 36.

Figure 5 illustrates a modified form of digital circuit portion 22' which receives an input over the output line from the discretizer 24 and which is introduced into a NOR gate 134, the latter of which also receives an input from a counter 136. The counter 136 is designed to replace the two counters 90 and 94 in Figure 4. The output of the inverted NOR gate 134 is directed to a second counter 138 and the latter, of which, functions in a manner similar to the counter 96. The counter 138 also functions as a timer and is provided with a timing switch 140 connected thereto.

The circuit 22' also employs a timer circuit 142 similar to the timer circuit 100. The timer circuit 142 includes a solid state timing chip 144 provided with a resistive-capacitive network as illustrated. The output of the timing circuit 142 is directed to a NOR gate 146 which receives an input from a switching circuit 148. The output of the NOR gate is introduced, as an input, into the first counter 136. Thus, the construction of the timing circuit 142 and the NOR gate 146 is similar to that of the counter 90 and the NOR gate 92.

The timer 142 is configured as an astable multivibrator with a rectangular output wave form, preferably between 0 and 10 volts and with a time period of about 6 seconds. The frequency of the timer is determined by a pair of resistors 149 and 150 in a voltage dividing network along with a capacitor 151. The output of the timer 142 through the NOR gate 146 is a complement of the actual output of the timer 142 if the other input into the NOR gate were a low or logic zero level.

The output of the timer circuit 142 is introduced

into the counter 136, preferably a divide by ten up-counter. Thus, the counter 136 will produce an output after 10 counts (approximately 60 seconds) thereby causing the counter 138 to increment by one. The counter 138 is preferably a divide-by-sixteen up-counter. Certain inputs to the counter 138 are programmable inputs from the timing switch 140, which can be adjusted to provide a time interval of about 1 to 15 minutes in units of one minute increments. The counter 138 actually begins a count with a number programmed by the switches 140 and always ends with the count of 15 or whatever is elected and preprogrammed as the highest number of a count.

The switching circuit 148 effectively operates as an output switching circuit and receives an output from the main timer 138 through an inverting NOR gate 130 and is comprised of a pair of JK flip-flops 152 and 154. These flip-flops 152 and 154 each provide electrical signals to one or more amplifiers 156 and 158 and which are connected to relays (not shown). When the flip-flops 152 and 154 are shifted to the set state, they will provide an electrical output signal which is amplified by the amplifiers 156 and 158 and this signal causes the electrically operable equipment to be de-energized.

A capacitor 160 is connected across the output of the NOR gate 134 and the input to the flip-flop 154 and is grounded. The capacitor 160 operates as a pulse stretcher and functions as a low pass filter. This prevents a narrow pulse from inadvertently triggering the apparatus and thus makes the apparatus more reliable.

When the counter 138 begins a count and ends with the highest number of count, a signal is transmitted to the JK flip-flop 154 in the output circuit 148 through a NOR gate inverter 130 which causes the JK flip-flop 154 to immediately set. A low level signal from the analog circuit portion immediately resets the counter 136 as well as each of the flip-flops 152 and 154. This same signal also presets the counter 138 in accordance with the code introduced by the manually operable switches 140.

The flip-flop 154 sets the flip-flop 152 and also acts as a 1-count delay during the timing period, that is the period before the counter 138 is reset and the flip-flop 152 is set. As the flip-flop 154 is set, its positive going output pulse goes high and the lower or negative going output pulse goes low. The positive going pulse causes the output of the NOR gate 134 to go low which preloads the counter 138 and also clears the flip-flop 154. The flip-flop 152, which may have already previously cleared, remains unaffected by this operation. Upon clearing the flip-flop 154, the lower or inverted pulse goes high which thereby sets the flip-flop 152. When the flip-flop 152 is set, its Q or positive output, that is the upper output, goes high which disenables the clock input from the counter 142 to the counter 136. Accordingly, any further counting is inhibited.

In accordance with the above outlined construc-

tion, a steady state condition then results with the count of both of the counters 136 and 138 being inhibited. The flip-flop 154 is set and the output of the flip-flop 152 is connected to the relay. This condition remains until a high level signal is received from the amplifier which will clear the counter 136, thereby preloading the counter 138. This will also clear both of the flip-flops and enable the clocking pulses from the timer 142 to further energize each of the relays.

Claims

1. Apparatus for controlling the energization of a load in accordance with the presence or absence of human activity in an environment comprising a detector (10) responsive to such activity, a counter (30) supplied by a clock generator (26) and arranged to count a pre-determined time interval, the detector being connected to the counter to re-start the said interval whenever activity is detected, and an output circuit (36) responsive to the condition of the counter to control the supply of energy to a load (38) characterized in that the output circuit (36) is arranged to de-energize the load (38) when the counter has counted the said time interval without the detector (10) sensing any activity and the detector is a passive sensor.

2. Apparatus as claimed in claim 1 wherein time delay control means is operatively connected to said counter to adjust the predetermined time interval.

3. Apparatus as claimed in claim 2 wherein the time delay control means is manually adjustable.

4. Apparatus as claimed in any of claims 1 to 3 comprising signal generating means operatively associated with said sensing device for generating a signal upon the detection of sound in the specified environment.

5. Apparatus as claimed in claim 4 including sensitivity control means operatively connected to said signal generating means to adjust and control the sensitivity of the apparatus to account for background noise.

6. Apparatus as claimed in claim 4 comprising logic circuit means operatively connected to said counter and output circuit to determine if there was no sound for at least the predetermined time interval, and causing said output circuit to provide a responsive action.

7. Apparatus as claimed in claims 4, 5 or 6 comprising low pass filter means for filtering out low frequency components of the signal and using a portion of the signal more representative of human activity.

8. Apparatus as claimed in any of the preceding claims wherein said passive sensing means senses for sound of the type associated with physical activity normally associated with the presence of a human being in a specified environment and thereby also recognizing a lack of such activity during a predetermined time interval without generating or relying upon a standing wave for such sensing, and which also does not rely upon

generation of any signal by said apparatus to be introduced into said specified environment and which signal must be detected or interrupted in the specified environment for operation.

9. Apparatus as claimed in claim 8 wherein the output circuit comprises a relay means coupled to the electrically operable device and controls the electrical power delivered to the electrically operable device in response to the occurrence of the presence of a human being.

10. Apparatus as claimed in any of the preceding claims wherein said counter comprises:

(a) a first counter operatively connected to said clocking circuit means to initiate a counting operation upon detection of sound in said predetermined time interval in said specified environment, and

(b) a second counter operatively connected to said first counter to reset a counting operation in response to a lack of sound in said predetermined time interval.

11. Apparatus as claimed in claim 10 wherein the first counter provides a rectangular wave determining a count period, for example one second, and the second counter is configured to count to a certain modulo number, for example six.

Revendications

1. Appareil pour commander l'alimentation d'une charge en fonction de la présence ou de l'absence d'activité humaine dans un environnement, comprenant un détecteur (10) sensible à une telle activité, un compteur (30) alimenté par un générateur d'horloge (26) et agencé pour compter un intervalle de temps prédéterminé, le détecteur étant connecté au compteur pour faire redémarrer ledit intervalle chaque fois qu'une activité est détectée et un circuit de sortie (36) qui répond à l'état du compteur pour commander l'alimentation en énergie d'une charge (38), caractérisé en ce que le circuit de sortie (36) est agencé pour couper l'alimentation de la charge (38) lorsque le compteur a compté ledit intervalle de temps sans que le détecteur (10) ne détecte une activité et en ce que le détecteur est un capteur passif.

2. Appareil selon la revendication 1, dans lequel des moyens de commande temporisés sont connectés fonctionnellement audit compteur pour régler l'intervalle de temps prédéterminé.

3. Appareil selon la revendication 2, dans lequel les moyens de commande temporisés sont réglables manuellement.

4. Appareil selon l'une quelconque des revendications 1 à 3, comprenant des moyens générateurs de signaux associés fonctionnellement audit dispositif capteur pour engendrer un signal en réponse à la détection d'un son dans l'environnement spécifique.

5. Appareil selon la revendication 4, comprenant des moyens de réglage de la sensibilité connectés fonctionnellement auxdits moyens générateurs de signaux pour régler et commander

la sensibilité de l'appareil, pour tenir compte du bruit de fond.

6. Appareil selon la revendication 4, comprenant des moyens de circuit logique connectés fonctionnellement audit compteur et audit circuit de sortie pour déterminer s'il n'y a pas eu de son pendant au moins l'intervalle de temps prédéterminé, ces moyens amenant ledit circuit de sortie à fournir une action en réponse.

7. Appareil selon l'une des revendications 4, 5 ou 6, comprenant des moyens formant filtre passebas pour éliminer les composants basse fréquence du signal et utilisant une partie du signal qui est plus représentative d'une activité humaine.

8. Appareil selon l'une quelconque des revendications précédentes, dans lequel lesdits moyens capteurs passifs captent un son du type associé à une activité physique normalement liée à la présence d'un être humain dans un environnement spécifique et reconnaissant également une absence de telle activité pendant un intervalle de temps prédéterminé sans engendrer d'onde stationnaire ni fonder cette détection sur une onde stationnaire, et qui n'est pas non plus fondé sur la production par ledit appareil d'un signal qui doit être introduit dans ledit environnement spécifique, lequel signal doit être détecté ou interrompu dans l'environnement spécifique pour provoquer le fonctionnement.

9. Appareil selon la revendication 8, dans lequel le circuit de sortie comprend des moyens formant relais couplés au dispositif électrique et commande l'énergie électrique fournie au dispositif électrique en réponse à l'occurrence de la présence d'un être humain.

10. Appareil selon l'une quelconque des revendications précédentes, dans lequel ledit compteur comprend:

a) un premier compteur connecté fonctionnellement auxdits moyens de circuit d'horloge pour déclencher une opération de comptage en réponse à la détection d'un son dans ledit intervalle de temps prédéterminé dans ledit environnement spécifique, et

b) un deuxième compteur connecté fonctionnellement audit premier compteur pour remettre une opération de comptage à zéro en réponse à l'absence d'un son dans ledit intervalle de temps prédéterminé.

11. Appareil selon la revendication 10, dans lequel le premier compteur forme une onde rectangulaire déterminant une période de compte, par exemple une seconde et le deuxième compteur est configuré pour compter jusqu'à un certain nombre modulo, par exemple six.

Patentansprüche

1. Gerät zur Steuerung der Energiezufuhr zu einer Last in Übereinstimmung mit dem Vorhandensein oder dem Nichtvorhandensein von menschlicher Aktivität in einer Umgebung, wobei das Gerät einen auf eine derartige Aktivität ansprechenden Detektor (10), einen Zähler (30), der

von einem Taktgenerator (26) gespeist wird und dazu ausgelegt ist, ein vorbestimmtes Zeitintervall zu zählen, wobei der Detektor mit dem Zähler verbunden ist, um dieses Intervall erneut beginnen zu lassen, wenn immer Aktivität festgestellt wird, und eine Ausgabeschaltung (36) aufweist, die auf den Zustand des Zählers anspricht, um die Energiesufuhr zu einer Last (38) zu steuern, dadurch gekennzeichnet, daß die Ausgabeschaltung (36) dazu ausgelegt ist, die Energieversorgung der Last (38) abzubrechen, wenn der Zähler dieses Zeitintervall, ohne daß der Detektor (10) irgendeine Aktivität festgestellt hat, gezählt hat, und daß der Detektor ein passiver Meßfühler ist.

2. Gerät nach Anspruch 1, in welchem eine Laufzeitsteuervorrichtung wirksam mit dem Zähler verbunden ist, um dieses vorbestimmte Zeitintervall einzustellen.

3. Gerät nach Anspruch 2, in welchem die Laufzeitsteuervorrichtung manuell einstellbar ist.

4. Gerät nach einem der Ansprüche 1 bis 3, das eine Signalerzeugungsvorrichtung aufweist, die dieser Meßfühlereinrichtung funktionsmäßig zugeordnet ist, um ein Signal bei Feststellung von Schall in der spezifizierten Umgebung zu erzeugen.

5. Gerät nach Anspruch 4, das eine Empfindlichkeitssteuervorrichtung aufweist, die wirksam mit dieser Signalerzeugungsvorrichtung verbunden ist, um die Empfindlichkeit des Geräts bei Inbetrachtziehung von Untergrundgeräuschen einzustellen und zu steuern.

6. Gerät nach Anspruch 4, das logische Schaltungsvorrichtungen aufweist, die mit diesem Zähler und dieser Ausgabeschaltung wirksam verbunden sind, um festzustellen, ob für zumindest dieses vorbestimmte Zeitintervall kein Schall auftrat, und um diese Ausgabeschaltung zu veranlassen, für eine entsprechende Wirkung zu sorgen.

7. Gerät nach Anspruch 4, 5 oder 6, das eine Tiefpaßfiltervorrichtung aufweist, um tiefe Frequenzkomponenten des Signals herauszufiltern und einen Bereich des Signals auszunut-

zen, der repräsentativer für die menschliche Aktivität ist.

8. Gerät nach einem der vorhergehenden Ansprüche, in welchem die passive Meßfühlereinrichtung Schall der Art aufnimmt, die physischer Aktivität zugeordnet ist, die normalerweise von der Anwesenheit eines sich in einer spezifizierten Umgebung aufhaltenden Menschen herührt, und dabei auch ein Fehlen derartiger Aktivität während eines vorbestimmten Zeitintervalls erkennt, ohne für ein derartiges Aufnehmen eine stehende Welle zu erzeugen oder auf einer stehenden Welle zu beruhen, und wobei die passive Meßfühlereinrichtung ebenfalls nicht auf der Erzeugung irgendeines Signals durch dieses Gerät beruht, welches Signal in diese spezifizierte Umgebung einzubringen ist und für ein Funktionieren in dieser spezifizierten Umgebung festgestellt oder unterbrochen werden muß.

9. Gerät nach Anspruch 8, in welchem die Ausgabeschaltung eine Relaisvorrichtung aufweist, die mit einer elektrisch betreibbaren Vorrichtung gekoppelt ist und die an diese elektrisch betreibbare Vorrichtung abgegebene elektrische Leistung in Abhängigkeit vom Auftreten der Anwesenheit eines menschlichen Wesens steuert.

10. Gerät nach einem der vorhergehenden Ansprüche, in welchem der Zähler aufweist:

(a) einen ersten Zähler, der funktionsfähig mit dieser taktgebenden Schaltungsvorrichtung verbunden ist, um eine Zählfunktion bei Feststellung von Schall in diesem vorbestimmten Zeitintervall innerhalb dieser spezifizierten Umgebung zu initiieren, und

(b) einen zweiten Zähler, der funktionsfähig mit diesem ersten Zähler verbunden ist, um eine Zählfunktion ansprechend auf ein Fehlen des Schalls in diesem vorbestimmten Zeitintervall zurückzusetzen.

11. Gerät nach Anspruch 10, in welchem der erste Zähler eine Zählperiode, beispielsweise eine Sekunde, festsetzende Rechteckschwingung erzeugt, und der zweite Zähler dazu ausgelegt ist, bis zu einer bestimmten Modulo Zahl, beispielsweise 6, zu zählen.

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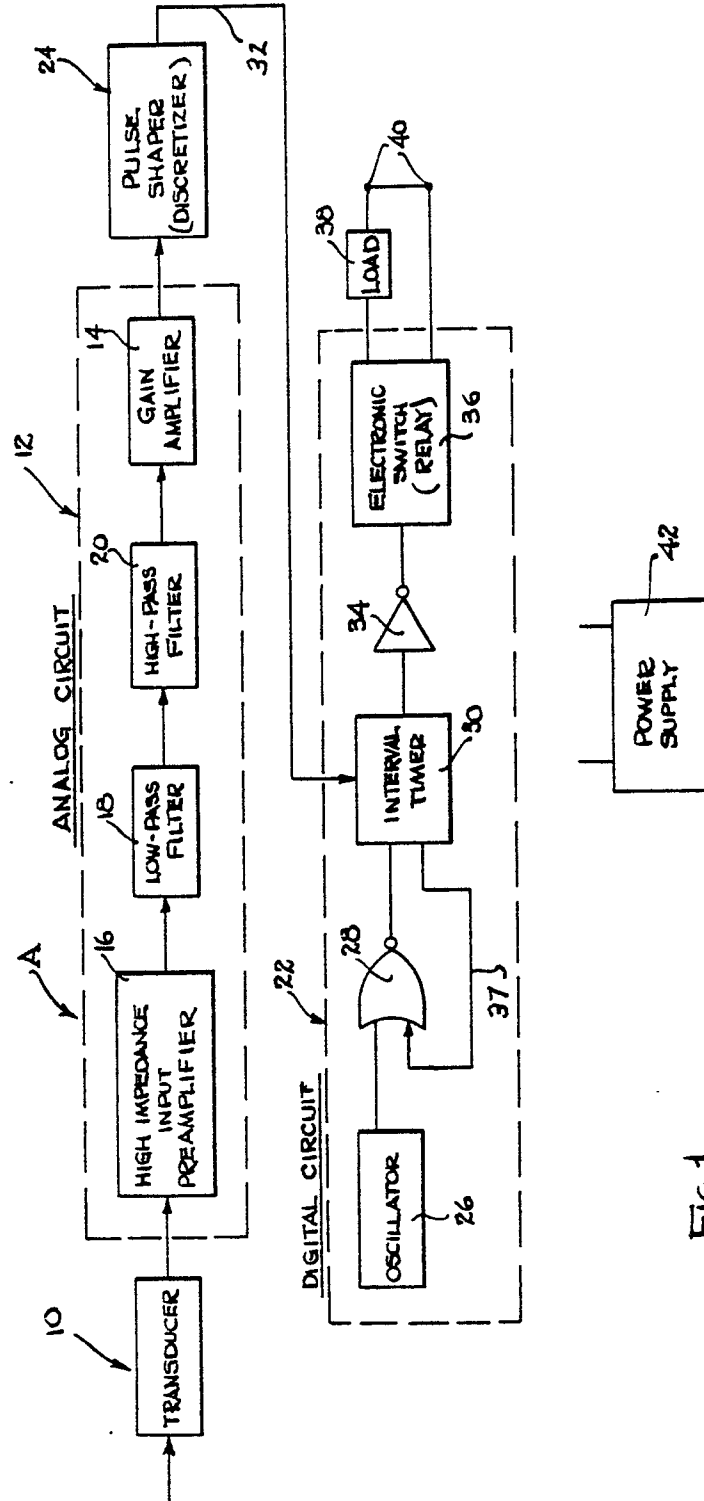
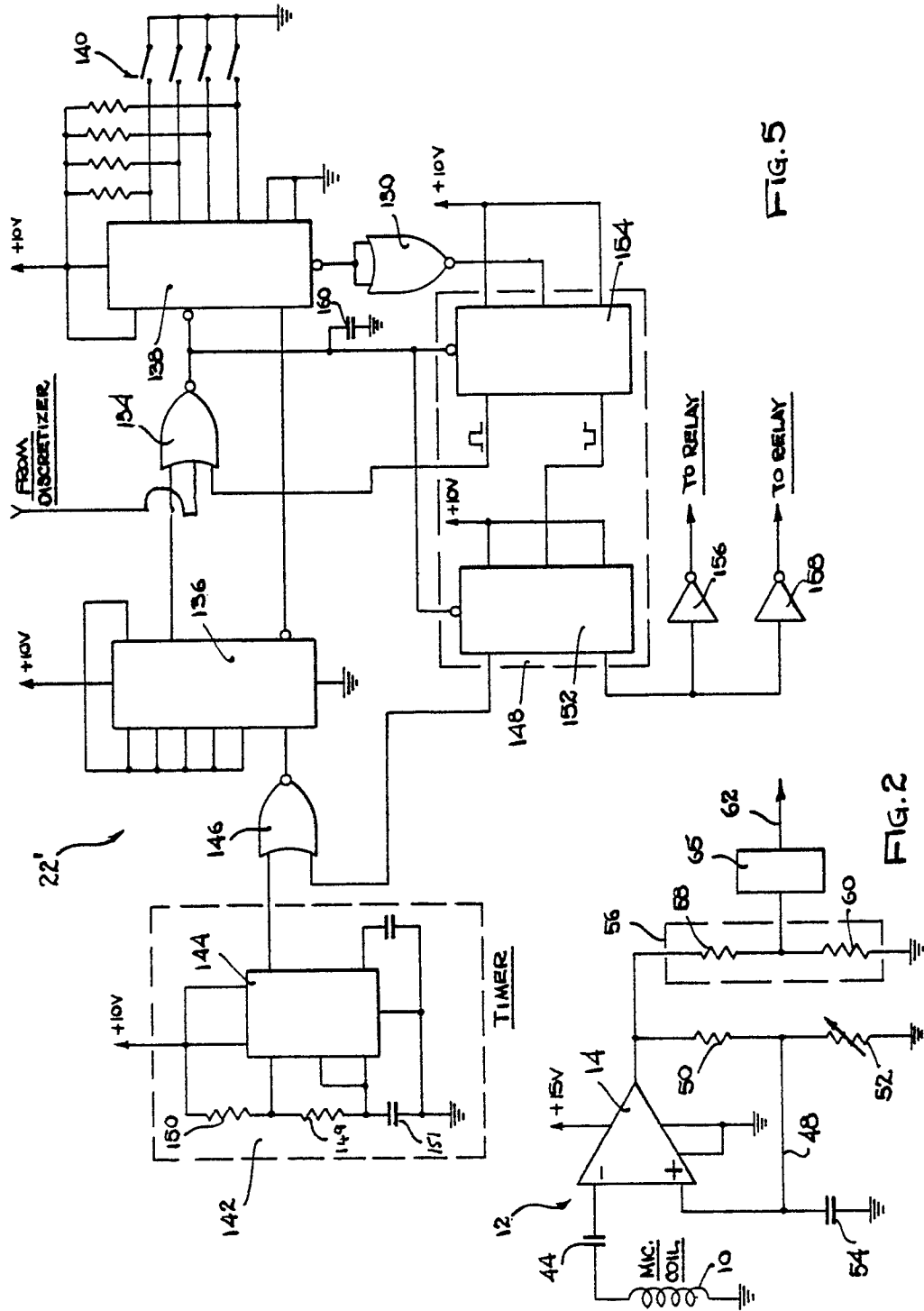


Fig. 1



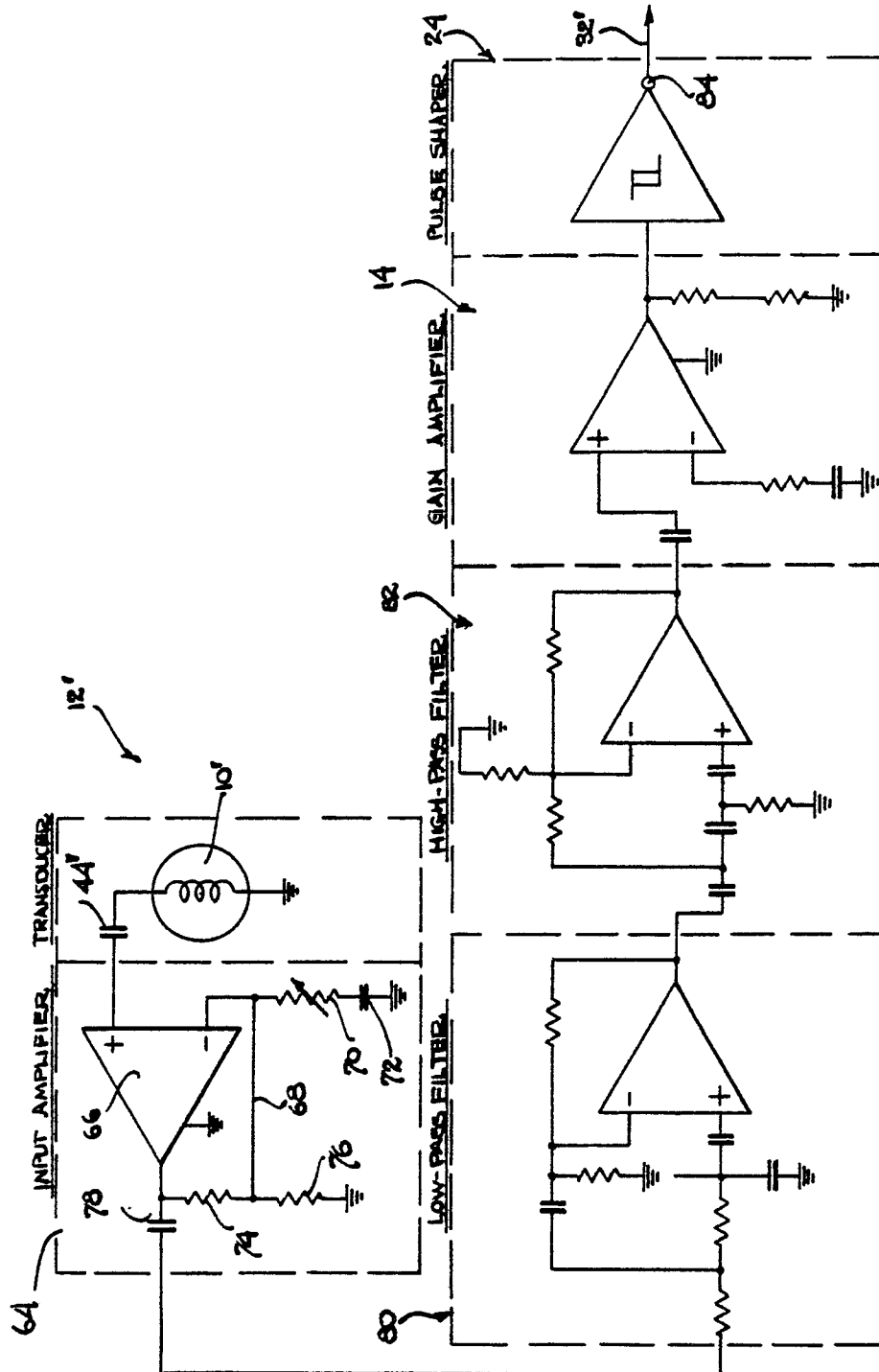


FIG. 3

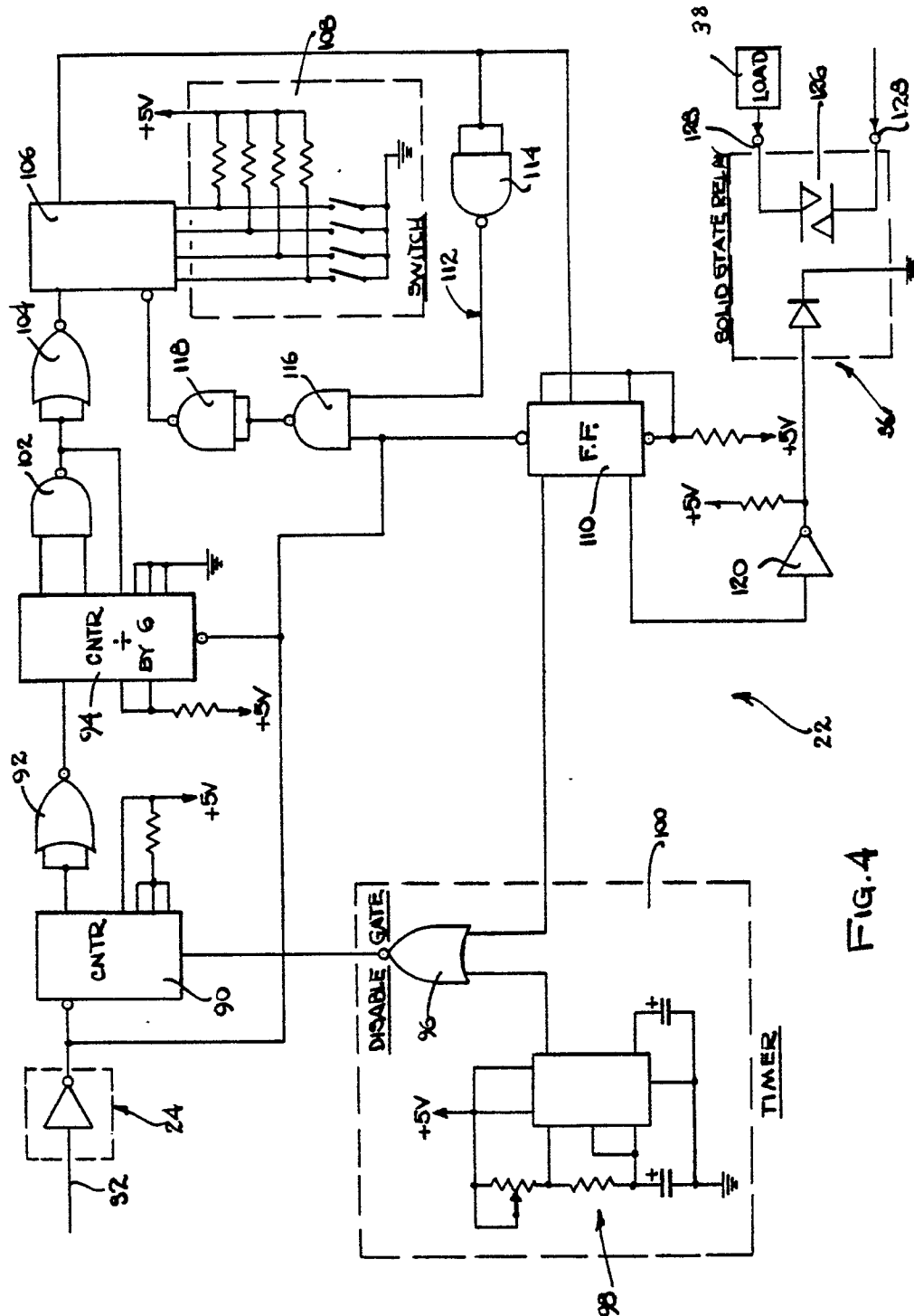


Fig. 4