United States Patent

Horton

[15] **3,683,346**

[45] **Aug. 8, 1972**

[54] **VARIABLE-TONE ELECTRONIC ALARM SYSTEM**

[72] Inventor: **Charles A. Horton**, 3210 Bluebonnet, Houston, Tex. 77025

[22] Filed: **March 1, 1971**

[21] Appl. No.: **119,764**

[52] **U.S. Cl.**.....**340/213 R**, 340/276, 340/328, 340/384 E

[51] **Int. Cl.**.....**G08b 3/10**

[58] **Field of Search**..340/326, 328, 329, 384 E, 276, 340/213 R

[56] **References Cited**

UNITED STATES PATENTS

3,218,621	11/1965	Foster	340/384 E X
3,404,393	10/1968	Blivice et al.	340/276
3,544,987	12/1970	McMann et al.	340/328 X
3,355,706	11/1967	Pitches	340/384 E X
3,402,329	9/1968	Stewart	340/329 X

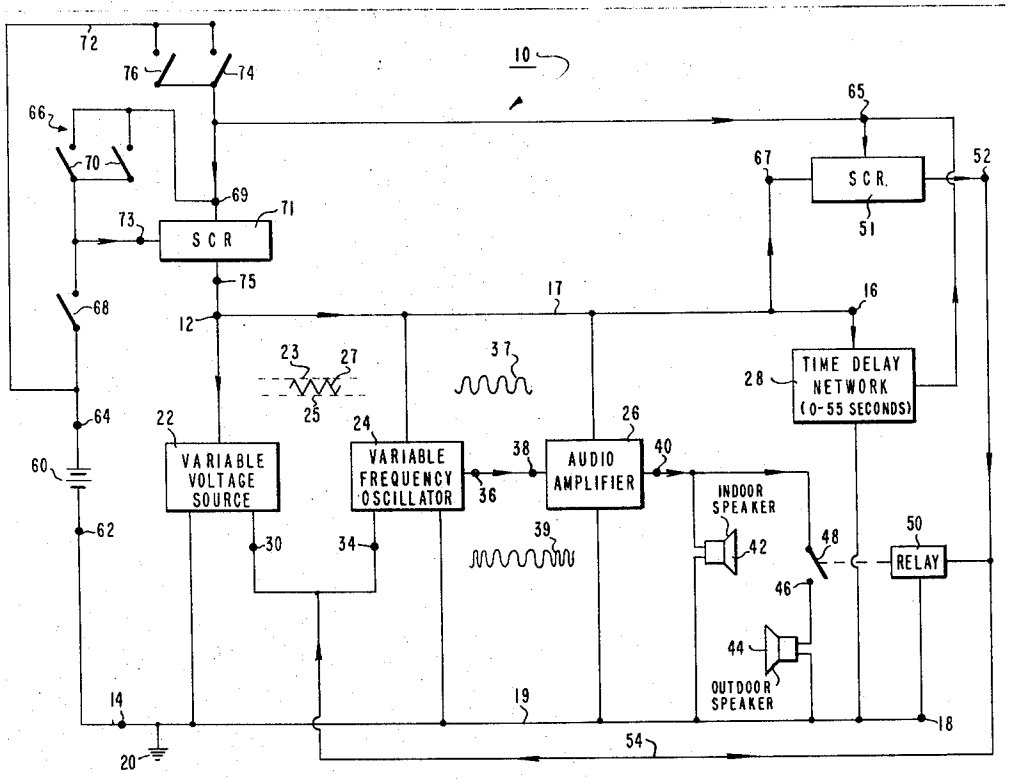
Primary Examiner—David L. Trafton

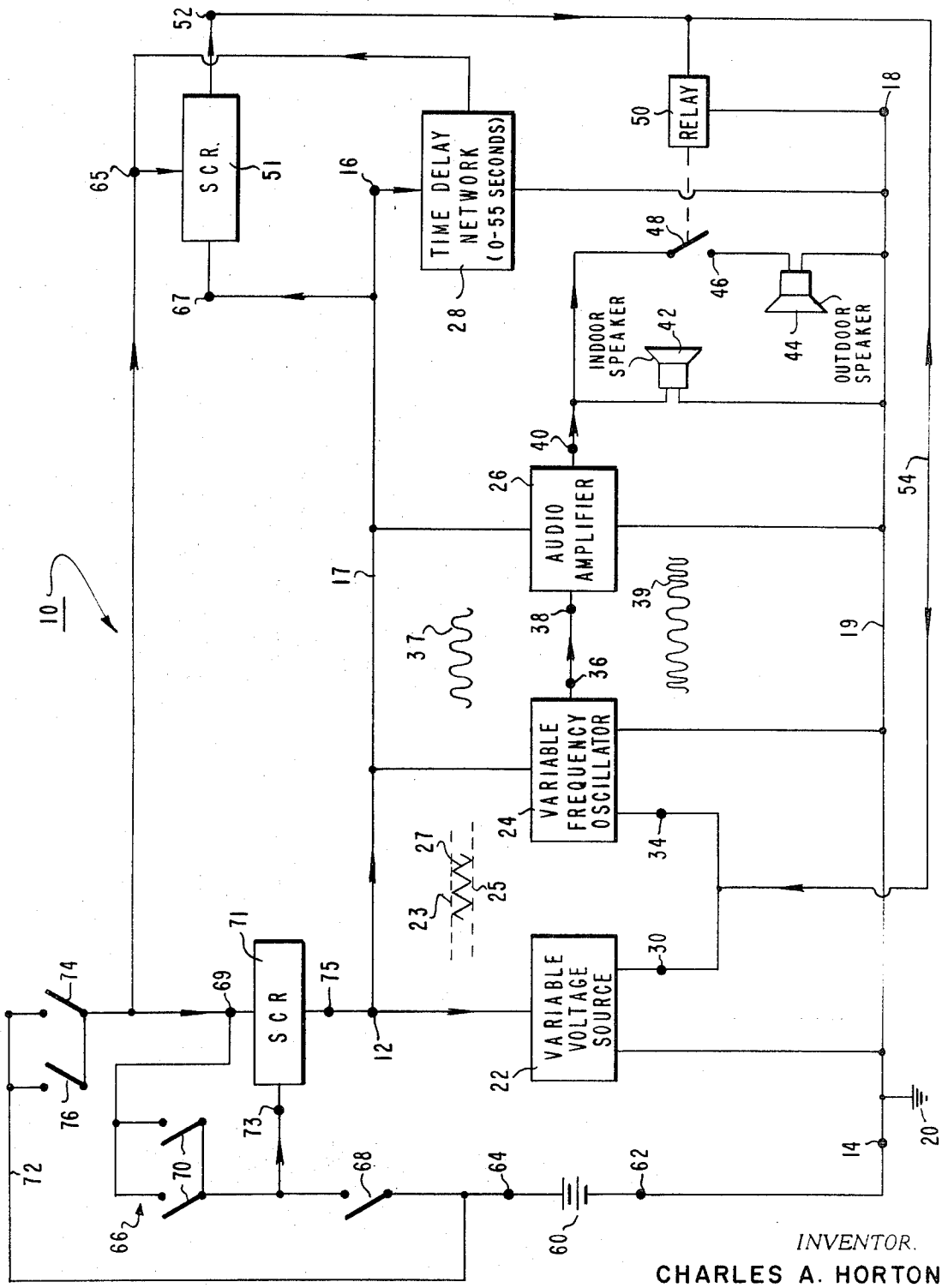
Attorney—Michael P. Breston and Alfred B. Levine

[57] **ABSTRACT**

An intrusion alarm having an audio oscillator capable of producing fixed or variable frequency tones wherein closing of an intrusion detection switch causes the oscillator to first deliver a fixed warning tone to a local loudspeaker, and after a time delay causes the oscillator to deliver a variable frequency alarm tone to the local and a remote loudspeaker in the event authorized deactivation of the alarm system does not take place before expiration of the time delay period. Fire and panic switches provide for immediate alarm tone signalling by bypassing the time delay circuit.

10 Claims, 1 Drawing Figure





INVENTOR.

CHARLES A. HORTON,

BY

MICHAEL P. BRESTON

ATTORNEY.

VARIABLE-TONE ELECTRONIC ALARM SYSTEM

This invention provides a variable-tone electronic alarm system capable of detecting the unauthorized entry into guarded premises as well as other undesired events such as fires, etc. The system includes a variable-frequency oscillator which generates a single-frequency warning tone inside the guarded premises upon the closure of a detector switch. If after a predetermined time-delay interval the alarm system is not turned off, then the oscillator will produce a variable-frequency alarm tone both inside and outside of the guarded premises.

BACKGROUND OF THE INVENTION

One difficulty with known intruder detection systems is that while many of them are able to sound an alarm when an unauthorized entry takes place upon guarded premises, they do not effectively discriminate between an unauthorized entry and an authorized entry. As a result it is common for such systems to sound false alarms which are highly objectionable to neighboring apartment dwellers and even to the residential neighbors of the guarded premises.

Another difficulty with conventional intruder detection systems lies in their relatively high cost and complexity.

SUMMARY OF THE INVENTION

This invention provides a variable-tone intruder detection system including a variable-frequency oscillator which, upon the closure of a detector switch, sounds a single-frequency or warning monotone having an intensity which makes it audible primarily inside the guarded premises. The owner upon hearing the warning signal can, during a predetermined time interval, turn the system off in the event of a false warning signal. If the system is not turned off, the variable-frequency oscillator then generates a variable-frequency alarm tone which is radiated both indoors and outdoors to alert passerbys and neighbors of the occurrence of an emergency.

It is an object of this invention to provide an electronic intruder system which is not offensive to neighbors upon the occurrence of false alarms.

It is another object of this invention to provide such an intruder system which is relatively inexpensive to manufacture, which is easy to install, and which requires a minimum of standby power.

BRIEF DESCRIPTION OF THE DRAWING

In the drawing the sole FIGURE shows in block diagram form a preferred embodiment of the present invention for first generating an indoor warning audio signal and then an alarm signal.

In the drawing the electronic intruder system is generally designated as **10** and includes a first pair of terminals **12** and **14** and a second pair of terminals **16** and **18**. Between terminals **12** and **16** is a conductor **17** and between terminals **14** and **18** is a conductor **19**. Terminal **14** is connected to ground **20**. Connected in parallel-circuit arrangement across lines **17** and **19** are: a variable-voltage source **22**, a variable-frequency oscillator **24**, an audio amplifier **26**, and a time-delay network **28**.

The variable-voltage source may be a saw-tooth oscillator having a voltage-control terminal **30**. When a suitable voltage is applied to terminal **30**, the voltage on terminal **30** will vary between an upper level **23** and a lower level **25** following a saw-tooth waveform **27**.

Terminal **30** is connected to a frequency-control terminal **34** in the variable-frequency oscillator **24**. Oscillator **24** provides to its output terminal **36** a single-frequency or monotone **37**, say on the order of 1,000 Hz. On the other hand, when the saw-tooth waveform **27** is applied to the frequency-control terminal **34**, oscillator **24** will generate an audio alarm signal having a frequency range, say between 300 to 3,000 Hz, herein called the "variable-tone" **39**.

The output terminal **36** from the variable-frequency oscillator **24** is coupled to the input terminal **38** of the audio amplifier **26** having an output terminal **40**. Hence, either the monotone or the variable tone will appear at the output terminal **40** depending on the nature of the signal applied to the input terminal **38** of the audio amplifier **26**.

Connected in parallel-circuit arrangement between terminal **40** and ground **20** are: a first sound producer such as an indoor speaker **42**, and a second sound producer such as an outdoor speaker **44**. In series with speaker **44** are a pair of relay terminals **46**, **48** which are controlled by a DC relay **50**. Relay **50** is connected between the cathode **52** of a silicon-controlled rectifier (SCR) **51** and grounded terminal **18**. A conductor line **54** also connects cathode **52** to the voltage-control terminal **30** for a purpose subsequently explained.

To energize the alarm system **10** there is provided a DC battery **60** having its negative terminal **62** connected to ground **20** and its positive terminal **64** connected to a transmission line **66** through an ON-OFF power switch **68**. Transmission line **66** includes a plurality (only two are shown) of normally OFF detector switches **70** which are placed in conventional manner around monitored objects such as doors, windows, safes, etc.

Also connected between the positive terminal **64** and the gate **65** of SCR **51** is an auxiliary transmission line **72** which may include a thermal switch **74**, a panic button **76**, etc., both normally OFF. The anode **67** of SCR **51** is connected to terminal **16**. Gate **65** is connected to the gate **69** of another SCR **71**, whose anode **73** is connected to terminal **64** via switch **68**, and whose cathode **75** is connected to terminal **12**.

In operation of the alarm system **10**, when the owner desires for the system **10** to survey the guarded premises he closes switch **68**. When an unauthorized entry occurs, one or more of switches **70** will close, thereby applying the battery voltage to gate **73**, firing SCR **71**, and energizing lines **17** and **19**. This energizes the variable-voltage source **22**, the variable-frequency oscillator **24**, the audio amplifier **26**, and the time-delay network **28**. Accordingly, oscillator **24** will produce its monotone or single-frequency warning signal **37**. The warning signal **37** after being amplified by the audio amplifier **26** is applied to speaker **42** for sounding an indoor warning signal throughout the guarded premises. Upon hearing the warning signal, the owner can, within a predetermined time-delay interval, turn off the power switch **68** thereby de-energizing the alarm system **10**. This is normally done when the warning signal **37** is known to be a false alarm.

If on the other hand the owner does not turn off power switch **68**, then after the predetermined time interval, which in a preferred embodiment could be adjusted in the time-delay network **28** between 0 and 55 seconds, the gate **65** will receive a voltage from and through the time-delay network **28**. This voltage will fire the SCR **51** thereby energizing relay **50** and closing contacts **46, 48**. Upon closing of relay contacts **46** and **48**, the outdoor speaker **44** becomes connected to the output terminal **40** of the audio amplifier **26**. At the same time as relay **50** becomes energized, the voltage which appears on cathode **52** is also applied via auxiliary line **54** to the voltage-control terminal **30** of the variable-voltage source **22**. The voltage on terminal **30**, and hence on terminal **34**, starts oscillating as shown by the saw-tooth signal **27**. The saw-tooth signal **27** which is applied to the frequency-control terminal **34** causes the variable-frequency oscillator **24** to produce the variable-frequency signal **39**. Signal **39** after being amplified by the audio amplifier **26** becomes applied to both speakers **42** and **44** for sounding an alarm both indoors and outdoors of the guarded premises.

The auxiliary line **72** also allows the use of the alarm system **10** for heat or fire detection, as well as for the detection of other monitored conditions. When, for example, a heat detector switch **74** closes, then the battery voltage is applied directly to gates **65** and **69** thereby causing, in a manner previously explained, the generation of the variable tone **39** by the variable-frequency oscillator **24**. After the battery voltage is applied to gates **65** and **69**, relay **50** becomes energized thereby closing relay contacts **46** and **48**. Accordingly, the amplified, variable-frequency alarm signal **39** becomes instantaneously (without delay) applied both to the indoor and outdoor speakers **42** and **44** for sounding an alarm in the event of a fire or other monitored condition.

While this invention has been described in connection with a specific embodiment and with a presently preferred arrangement of parts, it will be apparent to those skilled in the art that modifications may be made therein, and it is intended for all such modifications to fall within the scope of the claims attached hereto.

What I claim is:

1. A variable-tone electronic alarm system comprising:

a pair of terminals;

a variable-voltage source having a voltage control terminal;

a variable-frequency oscillator having a frequency-control terminal, said oscillator producing a warning signal in the absence of a signal applied to said frequency-control terminal, and producing a variable-frequency alarm signal when a signal is applied to said frequency-control terminal;

a time-delay network having an output terminal;

means connecting said variable-voltage source, said variable-frequency oscillator, and said time-delay network in parallel circuit arrangement across said pair of terminals;

means connecting the output of said variable-voltage source to said frequency-control terminal to control the frequency of said variable-frequency oscillator;

means connecting the output terminal of said time delay-network to said voltage-control terminal to allow the output of said variable-voltage source to vary between predetermined levels thereby causing said variable-frequency source to generate said variable-frequency alarm signal;

a first sound producer;

means connecting said first sound producer to the output circuit of said variable-frequency oscillator to sound said warning signal and said alarm signal;

a source of DC power;

a transmission line including at least a first normally open detector switch for coupling said DC power source to said pair of terminals; and

said warning signal being generated upon the closure of said detector switch, and said alarm signal being generated after a predetermined time interval from the time of closure of said detector switch as determined by said time-delay network.

2. The system of claim **1** and further including:

a second sound producer;

means including a pair of normally-open relay contacts for connecting said second sound producer in parallel-circuit relationship with said first sound producer; and

a relay connected in the output circuit of said time-delay network for closing said relay contacts after said predetermined time interval.

3. The system of claim **2** and further including a power amplifier connected to the output of said variable-frequency oscillator and to said first and second sound producers to amplify the signals generated by said variable-frequency oscillator.

4. The system of claim **3** wherein said warning signal has a single frequency.

5. The system of claim **4** wherein said alarm signal has a variable frequency.

6. The system of claim **5** wherein said first sound producer is positioned inside premises guarded by said alarm system.

7. The system of claim **6** wherein said second sound producer is positioned outside said guarded premises.

8. The system of claim **2** and further including:

a second transmission line comprising at least a second normally open detector switch; and

said second transmission line being connected between said DC power source and said voltage-control terminal thereby simultaneously energizing said relay and causing said variable-frequency oscillator to generate said variable-frequency alarm signal immediately after said second detector switch is closed in response to a monitored condition.

9. The system of claim **8** wherein,

said second transmission line includes a silicon-controlled rectifier.

10. The system of claim **1** wherein,

said transmission line includes a silicon-controlled rectifier.

* * * * *