

United States Patent

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[56]

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[54] ALARM DEVICE

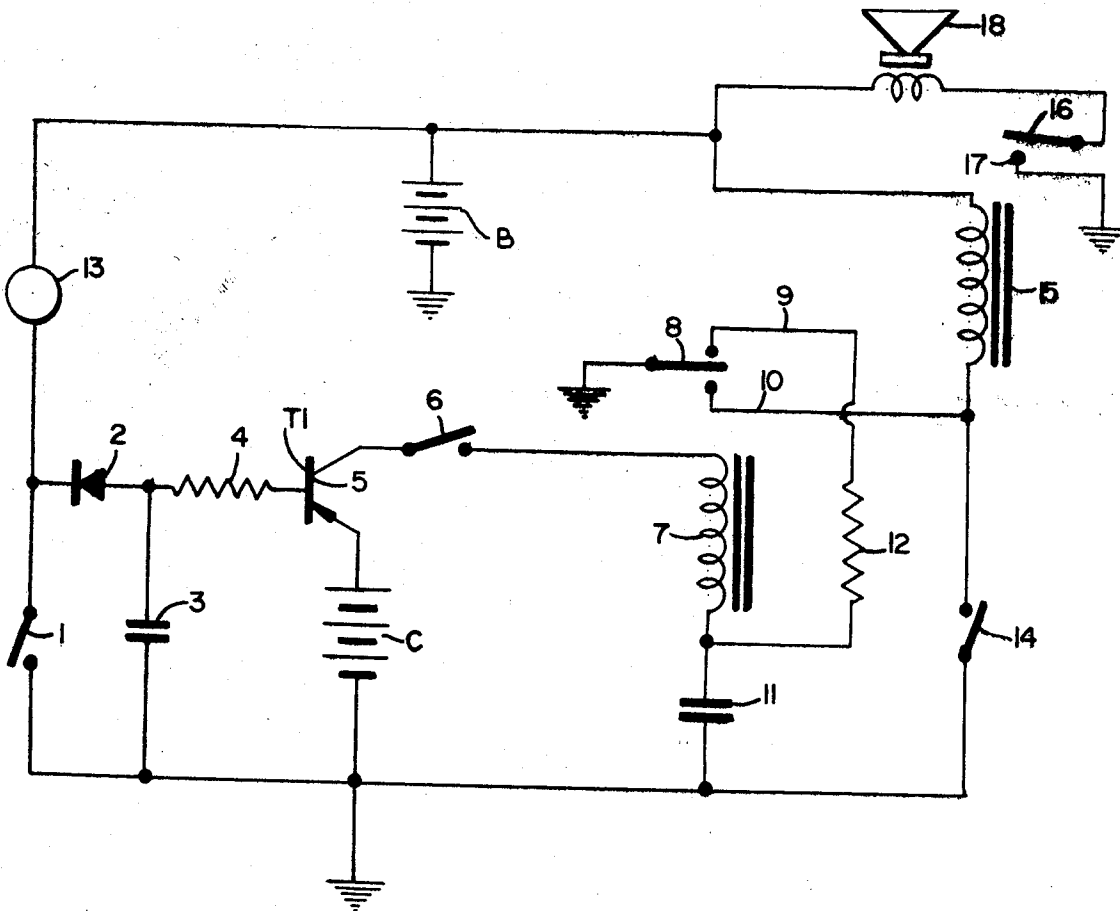
10 Claims, 1 Drawing Fig.

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B60r 25/00

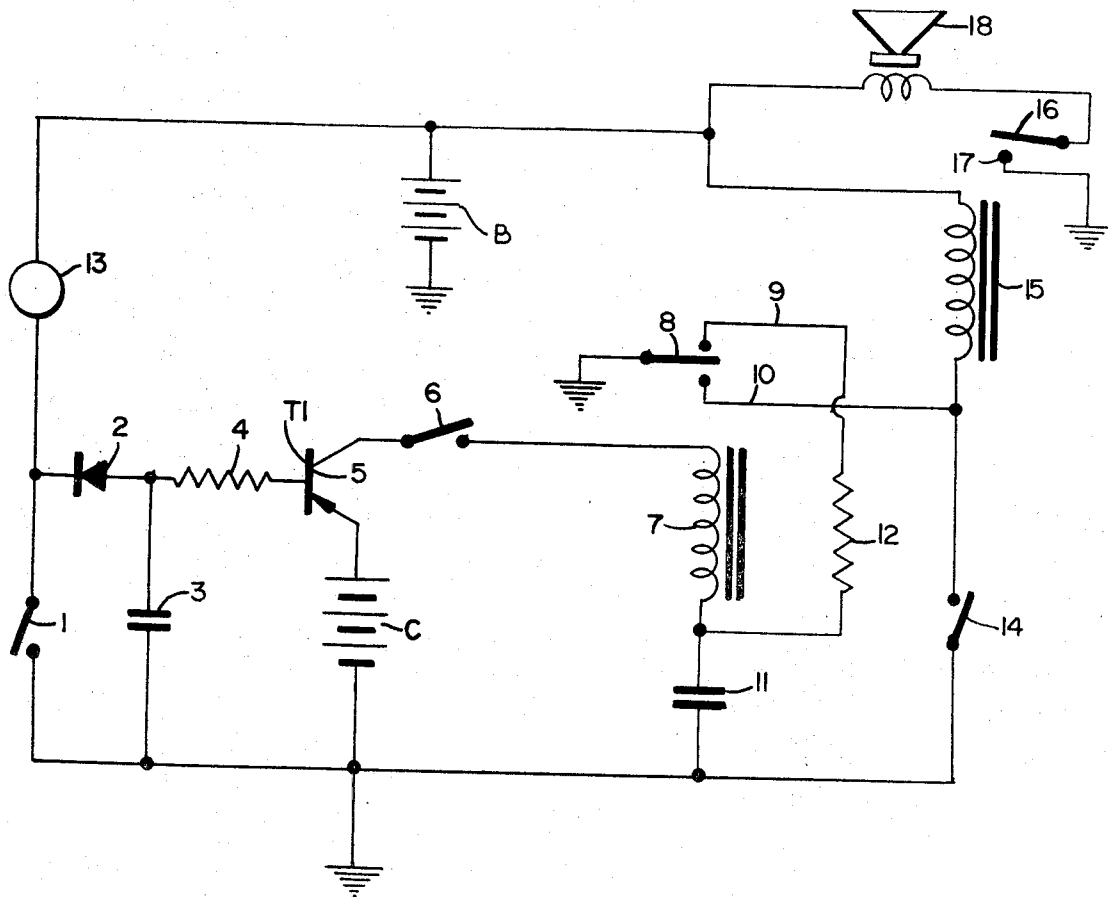
[50] **Field of Search**..... 340/52, 63,
64, 276, 279, 329, 331, 332; 307/10 AT; 315/77

ABSTRACT: An alarm device which is actuated by intrusion into the protected area to cause an intermittent signal to be produced indicating the intrusion. An electronic circuit is employed to selectively cause actuation of the alarm device.



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ALARM DEVICE

BACKGROUND OF THE INVENTION

1. Field of the Invention

The invention relates to an alarm device and has particular utility for use in conjunction with automobiles. Thus the alarm may be actuated by the opening of a car door, hood or trunk to cause intermittent alarm signals to be produced indicating the intrusion.

2. Description of the Prior Art

Automobile intrusion alarm devices are known in the prior art. However these normally have one or more disadvantages. For example, one type of device provides a circuit which is actuated to produce audible alarm signals in response to the intrusion, but the signals immediately cease upon closure of the door, hood or trunk, the opening of which caused actuation of the alarm. Therefore the intruder can make a quick entry, and remove himself from the area before the alarm is heard.

Another type of prior art device causes the automobile horn to be continuously actuated after the car is initially broken into, and therefore cannot be distinguished from a "37tuck" horn. Therefore, it may not be noticed as an alarm signal. Still another type of prior art device utilizes a transducer in the form of a siren to produce the audible alarm, rather than the car horn. However, in some states the use of sirens by private individuals is prohibited, and furthermore the use of an additional component needlessly increases the cost of the overall alarm device.

Still another type of prior art alarm device requires that a manual switch be actuated in order to turn the alarm off. Under certain conditions the alarm could be actuated for an extended period of time, and therefore the car battery may be needlessly drained. Further, this type of device may produce unnecessary and prolonged noise.

Still other alarm devices function in response to vibrations or physical contact. Thus, some prior art circuits have capacitive inputs whereby if a person approaches the car the capacitance thereof changes to cause actuation of the alarm. Other devices are responsive to vibration. However such devices are subject to false alarms in that a passing truck or person might accidentally cause actuation of the alarm where no intrusion or premeditated tampering is intended.

SUMMARY OF THE INVENTION

These and other defects of prior art alarm devices are solved by the present invention. An electronic circuit is employed which provides intermittent actuation of an audible alarm indicating that the protected area has been broken into.

The circuit is particularly adaptable for use in conjunction with a car and may be powered by the car battery. When armed, opening of a car door, hood or trunk will cause intermittent sounding of the car horn. If the car door, hood, or trunk which, when opened, initiated actuation of the alarm is then closed, the car horn will continue to be actuated for a predetermined period of time. The alarm device will then automatically be deactuated, and will return to the "alert" status.

The electronic circuit employs a transistor but other equivalent means may also be employed. An RC circuit is employed to bias the transistor to the nonconducting condition until the car is broken into. Then, the RC circuit functions to drive the transistor to conduction and an interrupter circuit is employed to cause intermittent actuation of the car horn. Therefore a distinctive audible alarm signal is produced to provide an indication that the car has been broken into. Further, the car battery is not unduly drained because, if the car door, hood, or trunk, the opening of which caused actuation of the alarm is closed, the RC circuit functions to maintain actuation of the car horn only for a predetermined period of time.

Since the circuit utilizes the car horn, it is not necessary to use additional transducer means to produce the audible signal. Thereby the cost of the alarm device is minimized.

BRIEF DESCRIPTION OF THE DRAWING

The drawing shows a schematic diagram of the circuit according to the invention.

DETAILED DESCRIPTION OF THE INVENTION

The drawing shows the circuit according to the invention. A PNP transistor T1 is illustrated, having its emitter connected to the positive supply terminal of battery C, and its base connected to one end of resistor 4. The other end of resistor 4 is connected to the common connection of the anode of diode 2 and one plate of capacitor 3. The cathode of diode 2 is connected to one end of courtesy lamp 13 and to the movable contact arm of single-pole, single throw switch 1. The corresponding stationary contact of switch 1 is connected to ground, along with the other plate of capacitor 3, the negative supply terminal of battery C, one plate of capacitor 11, and the movable contact arm of single-pole, single throw switch 14.

The collector of transistor T1 is selectively connectable to one end of relay winding 7 through switch 6, the other end of said relay winding being connected to the other plate of capacitor 11. The series connection of relay winding 7 and capacitor 11 is connected through resistor R12 to contact 9. The corresponding stationary contact of switch 14 is connected to one end of relay winding 15 and to stationary contact 10. Movable contact 8 is connected to ground and is associated with stationary contacts 9 and 10, and is selectively controlled by energization and deenergization of relay winding 7 to provide the desired connections. Thus when relay winding 7 is sufficiently energized, contacts 8 and 10 are connected and when it is deenergized or not sufficiently energized, contacts 8 and 9 are connected.

The other end of relay winding 15 is connected to the positive terminal of battery B, and to one terminal of horn 18. The other terminal of horn 18 is connected to contact 16, which in conjunction with complimentary contact 17 is controlled by relay winding 15 to provide the desired connections. Contact 17 is connected to ground. The positive end of battery B is connected to the other terminal of courtesy lamp 13.

The described circuit functions in the following manner. In the standby state, capacitor 3 charges towards the voltage of battery C through the circuit comprising resistor R4, and the base-emitter circuit of transistor T1. The base of transistor T1 is thereby maintained at a positive potential value that is sufficient relative to the potential at the emitter, to bias transistor T1 to the nonconducting state. The circuit is armed by closing switch 6, although actuating switch 6 to the closed position does not alter the above-described conditions.

Assume that switch 1 is now actuated to the closed position, corresponding to the opening of a door, hood, trunk, or the like of the car. A number of switches may be connected in parallel with switch 1, each corresponding to different portions of the car that may be broken into. Then if any of said portions is disturbed by an intruder, the alarm will be actuated.

When switch 1 is closed, capacitor 3 discharges to ground through diode 2. The base of transistor T1 is thereby driven sufficiently negative with respect to the emitter to forward bias transistor T1. This causes a current to flow in the collector circuit which energizes relay winding 7 such as to cause contacts 8 and 10 to be connected. This completes the electrical connection to horn relay winding 15 by connecting it to ground, thereby causing said horn relay winding 15 to be energized to connect contacts 16 and 17 together. The connection to horn 18 is therefore completed by connecting it to ground, thereby causing said horn to be actuated to produce an alarm signal. Switch 14 comprises the conventional horn switch associated with the car which, when depressed, completes the electrical connection to horn relay winding 15.

During this cycle of operation, capacitor 11 charges to a predetermined value and the current flowing in the collector circuit of transistor T1 decreases, until it reaches a level which is insufficient to cause relay winding 7 to maintain the connection of contacts 8 and 10. This connection thereby drops out,

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and contacts 8 and 9 are connected. Capacitor 11 thereby discharges to ground through resistor 12 and the connection between contacts 8 and 9. The rate of discharge is determined by the relative value of capacitor 11 and resistor 12. When capacitor 11 discharges sufficiently to thereby permit an increase in collector current, relay winding 7 is again sufficiently energized to cause connection of contacts 8 and 10. This results in energization of horn relay winding 15, and the consequent actuation of horn 18. The described cycle of operation is thereby repetitive, and the chopping action of relay winding 7 causes intermittent blowing of horn 15.

If it is assumed that an intruder, when confronted with the intermittent blowing of horn 15 according to the described operation, instinctively closes the car door, trunk, or hood which, when opened by the intruder actuated the alarm, switch 1 will again be actuated to its open position. This will cause capacitor 3 to be charge through the base-emitter circuit of transistor T1 and resistor 4 by battery C to thereby reverse bias transistor 5 and drive it to the nonconducting state. The charge time associated with capacitor 3 is determined by the relative values of resistor 4 and capacitor 3. Therefore, the alarm will not immediately be deactivated if the intruder closes the car door, trunk, or hood but will instead remain actuated for a predetermined time depending upon the time constant of capacitor 3 and resistor 4. Thereafter, when capacitor 3 is sufficiently charged to reverse bias transistor T1, the alarm will automatically be deactivated and will revert to the alert status.

Diode D2 is poled to prevent car battery voltage B from being applied to the alarm circuit through courtesy light 13, while still affording a discharge path for capacitor 3 when switch 1 is closed.

It will be appreciated that minor modifications or addition to the circuit shown in the figure could readily be made without departing from the scope of the invention. For instance, it will be appreciated that the polarity of the transistor could be changed with corresponding changes in the circuit and polarities of like voltages. Many other minor modifications could also be made. The invention therefore is to be measured by the scope of the appended claims, rather than limited to the preferred embodiments described herein.

What I claim is:

1. An electronic alarm circuit to indicate intrusion into a protected area comprising:

an alarm device,

control means comprising a transistor and a biasing circuit connected to the alarm device to control operation thereof,

actuating means connected to the control means actuated in response to an intrusion into the protected area to cause the control means to complete the electrical circuit of the alarm device and cause actuation thereof, and,

interrupter means comprising the series combination of a relay winding and a capacitor interposed between the transistor output circuit of the control means and the alarm device to periodically interrupt actuation of the alarm device to provide intermittent operation thereof in response to an intrusion into the protected area, the control means having timing means to cause the alarm device to remain actuated for a predetermined period of time after the actuating means are deactivated.

2. The electronic alarm circuit recited in claim 1 wherein the biasing circuit reverse biases the transistor when the actuating means are deactivated.

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3. The electronic alarm circuit recited in claim 2 wherein the biasing circuit forward biases the transistor when the actuating means are actuated.

4. The electronic alarm circuit recited in claim 3 wherein the interrupter circuit is connected to the output circuit of the transistor and comprises means to selectively vary the current in said output circuit to cause intermittent operation of the alarm device.

5. The electronic alarm circuit recited in claim 3 wherein the biasing circuit comprises the series connection of resistance means and capacitance means connected through the control electrodes of the transistor to a source of potential the capacitance means being charged to maintain the transistor in reverse bias condition when the actuating means are deactivated, and

the actuating means comprise means to discharge the capacitor when actuated to forward bias the transistor.

6. The electronic alarm circuit recited in claim 4 wherein the biasing circuit comprises the series connection of resistance means and capacitance means connected through the control electrodes of the transistor to a source of potential, the capacitance means being charged to maintain the transistor in reverse bias condition when the actuating means are deactivated, and

the actuating means comprises means to discharge the capacitor when actuated to forward bias the transistor.

7. The electronic alarm circuit recited in claim 6 wherein the alarm device comprises an automobile horn, the protected area being the associated automobile, and wherein the actuating means are actuated in response to the opening of an access to the automobile.

8. An electronic alarm circuit to indicate intrusion into a protected area comprising:

an alarm device,

control means comprising a transistor and a biasing circuit, said biasing circuit comprising a series connection of resistance means and capacitance means connected through the control electrodes of the transistor to a source of potential,

actuating means connected to said control means comprising means to discharge the capacitance means when actuated to forward bias the transistor in response to an intrusion into the protected area, thereby causing the control means to complete the electrical circuit of the alarm device and cause actuation thereof, and

interrupter means interposed between the control means and the alarm device to periodically interrupt actuation of the alarm device to provide intermittent operation thereof in response to an intrusion into the protected area comprising the series connection of a relay winding being responsive to the flow of current of predetermined amplitude therethrough to actuate the alarm device, the control means having timing means to cause the alarm device to remain actuated for a predetermined period of time after the actuating means are deactivated.

9. The electronic alarm circuit recited in claim 8 wherein the alarm device comprises an automobile horn, the protected area being the associated automobile, and wherein the actuating means are actuated in response to the opening of an access to the automobile.

10. The electronic alarm circuit recited in claim 8 wherein the actuating means comprises at least one switch connected in parallel with the capacitance means.

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