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SELF-CONTAINED CONTACT ALARM DEVICE

Filed June 23, 1966

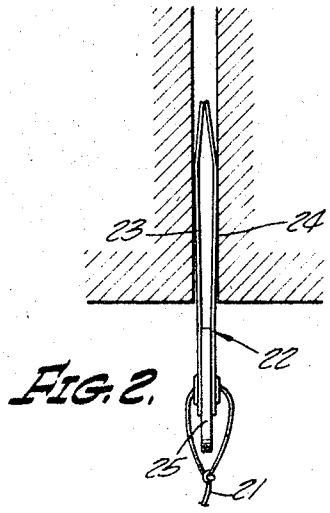
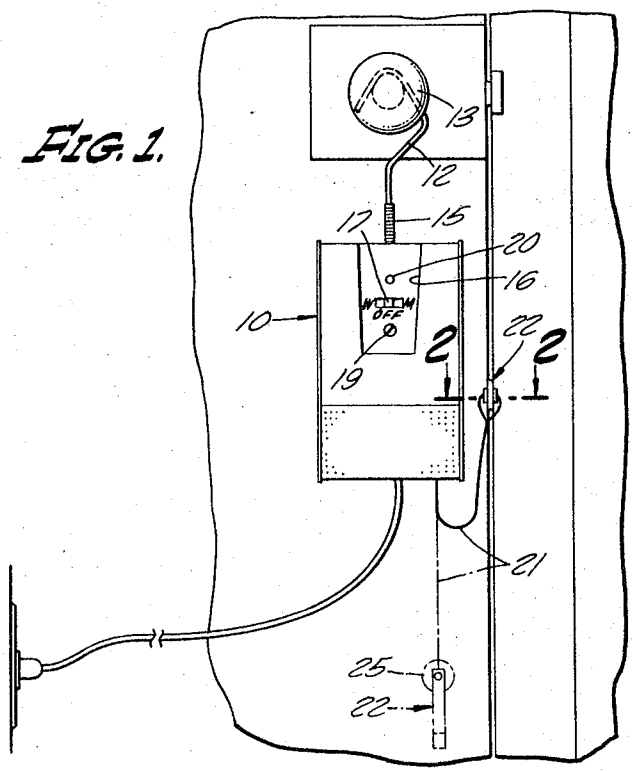


FIG. 2.

FIG. 1.



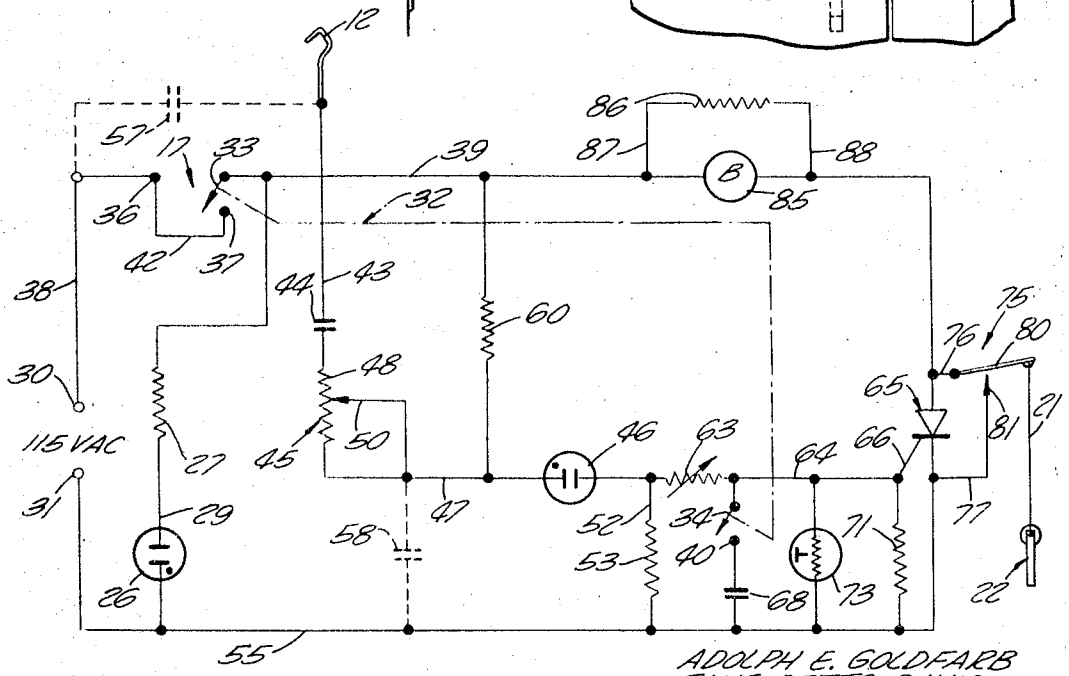


FIG. 3.

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SELF-CONTAINED CONTACT ALARM DEVICE

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ABSTRACT OF THE DISCLOSURE

The device is an alarm device. It is a small self-contained portable device provided with means for hanging it on a doorknob. The device embodies a capacity operated alarm circuit responsive to changes in capacity occasioned by contact with the device, the doorknob or the door itself.

This invention relates to a self-contained alarm device adapted to give an alarm or warning signal in response to contact or proximity of a person. In an exemplary form of the invention, it is used in connection with doors by merely suspending the unit or hanging it from a doorknob. The device or unit is entirely self-contained, portable and requires no installation, and therefore no high installation cost. It might be used in association with any type of entry or closure member.

The device of the invention is intended to meet particular and severe needs for a device of this type. A particular need has existed for an alarm device to provide protection from intruders of the type who try doorknobs or attempt to open doors and who often then disappear without having been detected. Such intruders include such characters as dope addicts, mentally disturbed people, etc. The device of the invention meets the need by having the characteristics that it is small and portable; can be hung on a doorknob, requiring no installation; and will give an alarm in response to contact with the doorknob, tampering with lock mechanism, or opening of the door. The device may be made sufficiently sensitive that it will give a signal in response to the mere proximity of the person, although for ordinary purposes it is not desired that it be this sensitive. The device may have other applications and utilities, of course, wherever it is desired that an alarm be given in response to contact or proximity.

In the preferred exemplary form of the invention as described herein, the device comprises a relatively small plastic housing containing therein an alarm buzzer and highly sensitive circuitry for triggering the alarm. The housing is provided with a hook by means of which it can be simply hung on a doorknob inside of the door. A further feature is provided which is a mechanical device normally held between the door and the jamb, so that if the door is opened, the device falls and by its weight operates a switch which then triggers the alarm.

The primary object of the invention is to make available an alarm device capable of fulfilling the need described above, that is a relatively simple, inexpensive, portable alarm device requiring no installation, adapted to provide security by providing for an alarm as a result of contact or proximity to a point of entry, such as a door.

In the preferred form of the invention, it is provided with improved solid state triggering circuitry using a silicon controlled rectifier switching device. The circuitry incorporates features making it extremely positive and reliable in operation for a wide range of applications. For example, the triggering circuitry is adapted for utilization with different types of closures, such as wooden doors and metal doors, and is adaptable for use with either. The circuitry furthermore embodies temperature compensation to insure positive and reliable operation under a wide range of temperature conditions.

A further object of the invention is to provide this improved triggering circuitry whereby positive and reliable operation is assured in different environments under varying temperature conditions.

A further object of the invention is to improve the security provided by the device by way of the inclusion of the mechanical means for triggering the circuitry in response to actual opening of a door or the like.

Further objects and additional advantages of the invention will become apparent from the following detailed description and annexed drawings wherein:

FIGURE 1 is a view of a preferred form of the invention illustrating its usage on a door; and

FIGURE 2 is a detail view of the mechanical triggering device.

FIGURE 3 is a circuit diagram of a preferred form of triggering circuitry.

Referring now to the drawings, FIGURE 1 shows an exemplary form of the invention hung on a doorknob. The device includes a relatively small housing, as indicated at **10**, having a supporting hook **12** whereby it may be suspended from a doorknob **13**, as shown. Preferably, there is a flexible spring connection **15** between the hook and the housing. In the actual construction, the unit preferably has a removable inside panel on which are mounted the buzzer and all of the components of the triggering circuitry. Printed type circuitry may be used on the panel board.

The front of the housing has a recess or indentation, as designated at **16**, in which is mounted a switch lever **17**. The switch has three positions, including "W," "Off" and "M." In the form of the invention shown, the "W" position is for use with wooden doors, and the "M" position is for use with metal doors, as will be described. Also in the recess there is an opening **19** providing access to a screw adjustment within the unit or instrument. This adjustment is used to set the threshold in connection with metal doors of different types which are compensated for by this screw adjustment, as will be described hereinafter. Also, there is an aperture **20** behind which is an indicator light or glow lamp to indicate when the device is on or operating as will be described.

Embodied in the housing **10** is a mechanically actuatable switch which can trigger the unit. The numeral **21** designates an operating cord extending from the switch and having on its end a spring holder in the form of the bent spring member **22** having separated resilient leg portions **23** and **24**. The ends of the spring member are attached by a rivet or eyelet to a weight in the form of a disc **25**, as shown. The spring device may be inserted between the door and the jamb, as shown in FIGURE 1, and held there. If the door is opened, the spring device is released and falls down and its weight operates the switch in the alarm unit to trigger it, as will be described more in detail hereinafter.

FIGURE 3 shows a preferred exemplary form of triggering circuitry. The hook **12** is hung on the doorknob as described and the circuit is triggered by contact with the doorknob or lock mechanism or it can be made sufficiently sensitive to be triggered merely by proximity. The triggering and alarm circuits are powered by a regular 115 volt AC source connected to terminals **30** and **31**. The alarm circuit is connected across these terminals. The switch **17**, as previously described, has three positions including an intermediate "Off" position. The switch includes contact blades **33** and **34** which are ganged together. In the "W" or wooden door position, blade **33** contacts terminal **36** and blade **34** does not engage any contact. In the "M" position for metal doors, blade **33**

contacts terminal 37 and blade 34 contacts terminal 40. Terminals 36 and 37 are connected by wire 42, as shown. Terminal 36 connects to wire 38 and blade 33 connects to wire 39.

Numeral 26 designates a neon indicator lamp connected in wire 25 across terminals 30 and 31 through the switch 17 and resistor 27 which reduces the voltage applied to it. It is visible through aperture 20.

Contact of a person with the doorknob or lock mechanism causes a small potential to be applied to the hook 12. This small potential is applied to a circuit already on the threshold of fiiring which causes it to fire, as will be described. It controls an alarm circuit across the terminals 30 and 31. The hook 12 is connected by wire 43 through condenser 44, variable resistor 45 and wire 47 to the trigger glow lamp 46. The variable resistor 45 includes resistor 48 and sliding contact 50. The glow lamp 46 is one that will fire at a particular voltage applied, as will be described herein. Wire 52 beyond the glow lamp 46 connects to resistor 53 to the other side of the line, i.e., the wire 55 connecting back to terminal 31. It will be observed that the glow lamp 46 is in a branch of the circuit forming a voltage divider.

Numeral 57 designates a capacitance which is a capacitance existing by virtue of the proximity of a person to the hook 12 or contact with the doorknob. This capacitance is between wire 43 and terminal 30. Numeral 58 designates a similar capacitance existing between the connection to glow lamp 46 and wire 55. This capacitance is the stray internal circuit capacitance of the unit.

Numeral 60 designates a resistor connected between wire 39, and the wire 47 connection to glow lamp 46. The glow lamp 46 is one that provides great stability and reliability. Its firing point, however, is at a high potential such as 110 volts that cannot be picked up from the doorknob of a wooden door. To overcome this, the resistor 60 causes a small AC voltage from the AC source to be applied therethrough to the input of glow lamp 46. This raises the threshold voltage and facilitates firing. Glow lamp 46 is placed adjacent indicator lamp 26 in housing 10 since it is photo-sensitive and the light from tube 26 improves its operation.

Numeral 63 designates a variable resistor in the wire 64 connecting to the switching device for the alarm which is a silicon controlled rectifier, as designated at 65, having a gate 66 to which the wire 64 connects. Variable resistor 63 is for adjusting the cntrol point of various glow lamps and/or capacitors in the circuit. The switching device 65 conducts at a particular gate voltage which might, for example, be .3 volt, but which voltage is subject to temperature changes of the junctions of the SCR as will be referred to hereinafter. The switch 34 is connected between wire 64 and 55 through capacitor 68. When the alarm device is operated in conjunction with a metal-clad door, as will be described, the pick-up voltage is far in excess of that obtained from the knob of a wooden door. This would cause the glow lamp 46 to fire constantly, sounding the alarm. Thus, to reduce the voltage to a comparative level, switch 34 is closed to terminal 40, thus adding the capacitor 68 to the circuit, changing the ratio of the voltage divider across the AC line and thereby reducing the threshold voltage at the glow lamp 46 in standby condition.

Numeral 71 designates a biasing resistor connected between wires 64 and 55 and normally controlling the bias at the gate 66 of the silicon controlled rectifier 65. As pointed out, the gate voltage must vary with temperature. The system provides compensation to vary the gate voltage of the switching device 65. This is provided by the thermistor 73 which is a resistor, the resistance of which varies with the temperature. It is connected between wires 64 and 55. Its resistance changes with temperature so as to compensate for any temperature changes that would occur at the SCR junctions. The thermistor 73 decreases in resistance as the temperature rises and increases when the temperature drops, thereby applying variable bias to the gate 66 to provide compensation so that the threshold at which device 65 triggers remains substantially constant.

The switch 75 is shunted across the silicon controlled rectifier 65 by wires 76 and 77. The alarm is sounded whenever this switch is closed as a result of opening of the door and dropping of the weight 25 on cord 21, which pulls down the blade 80 into engagement with terminal or contact 81.

Numeral 85 designates the buzzer connected in wire 39. Preferably, the buzzer is a standard commercial type comprising simply an AC vibrator that vibrates the diaphragm or soundmaker. Shunted across the buzzer 85 is a resistor 86 by way of wires 87 and 88. Resistor 86 provides a better impedance match between buzzer 85 and SCR 65.

From the foregoing, those skilled in the art will understand the operation of the device. When the device is turned on for operation with a wooden door, for example, blade 33 engages contact 36. The glow lamp 46 has a particular threshold operating voltage as determined by resistor 60 and the voltage divider circuit as described. Contact with the doorknob through hook 12 when touched adds a small potential to the circuit which is sufficient to bring the voltage on glow lamp 46 up to its firing point causing it to fire. Trigger voltage is therefore applied through control resistor 63 to the gate 66 of switching device 65 which immediately switches on, placing the buzzer 85 across the terminals 30 and 31 so that the alarm is sounded. A sharp sounding signal is provided to frighten would-be intruders or anyone in the vicinity is alerted and may attempt to apprehend the intruder or notify authorities. Alarm ceases when contact is removed from doorknob or lock mechanism.

When the unit is used with a metal door, the switch 17 is turned to the "M" position so that blade 33 contacts terminal 37 and blade 34 contacts terminal 40. This adds capacitor 68 to the voltage divider circuit which the trigger glow lamp 46 is in. Since the voltage picked up from a metal door is much higher than that obtained from a wooden door, the addition of this capacitor in the voltage divider circuit reduces the voltage to a comparative level, reducing voltage at the glow lamp 46 in standby condition to a desirable amplitude. Different amplitudes of voltage may, of course, be picked up from different doors and this is compensated for by adjustment of the variable resistor or rheostat 45, and variable resistor 63, which adjusts the ampltude of the trigger voltage applied to the gate 66. This adjustment may be made for a particular door and then left at that adjustment.

As previously described, the thermistor 73 compensates for temperature variation, producing stabilization in that the thermistor decreases in resistance as the temperature rises and increases when the temperature drops, thereby applying variable voltage to trigger 66 to provide compensation for temperature variations of the SCR junctions.

From the foregoing, those skilled in the art will observe that the invention achieves and realizes all of the objects and advantages as set forth in the foregoing, as well as having many additional advantages that are apparent from the detailed description. The device is self-contained and relatively inexpensive to produce and requires no installation. It fills the need for a device having these characteristics which will respond and give an alarm in response merely to contact, or proximity of an unauthorized person.

What is claimed is:

1. A self-contained contact type safety alarm device comprising a housing, alarm signal means contained, including a trigger circuit therefor responsive to contact, said device being portable and having conductive hook means for suspending it from a doorknob, said hook means being electrically connected to said trigger circuit

said trigger circuit having means rendering it sensitive to contact with the door or knob, said last means comprising circuit elements responsive to capacity changes occasioned by such contact.

2. A device as in claim 1 including a member adapted for being held between the edge of a closure member and the frame of an opening so as to fall out when the closure is opened, said housing having a switch therein for operating said alarm means and means connecting said member to said switch for causing the alarm means to operate when the closure is opened.

3. A device as in claim 1 wherein said trigger circuit includes a silicon controlled rectifier switching device and triggering means controlling the gate of said switching device, said triggering means including a circuit branch having a voltage responsive glow lamp therein, said circuit branch having connection to said hook means which responds to contact with said doorknob to vary the voltage applied to said glow lamp to cause it to fire, a control switch for the circuit and means including a circuit branch having contacts controlled by said switch therein, for adjusting the voltage at which said glow lamp fires.

4. A device as in claim 1 including a circuit for said signal device having therein a silicon controlled rectifier switching device having a gate, said trigger circuit including therein a voltage responsive glow lamp connected to said hook means and said gate to vary the voltage applied to said glow lamp, and means comprising a circuit branch having therein a temperature responsive resistor for controlling the voltage on the said gate to compensate for varying temperature.

5. A device as in claim 3 wherein said circuit means includes an indicator tube operable when the circuit is turned on and positioned to be seen through an aperture in said housing, said voltage responsive glow lamp being light sensitive and being positioned adjacent said indicator tube to be affected by the light therefrom.

6. A device as in claim 3 including a member adapted for being held between the edge of a closure member and the frame of an opening so as to fall out when the closure is opened, said housing having a switch therein for operating said alarm means, and means connecting said member to said switch for causing the alarm means to operate when the closure is opened.

7. A device as in claim 1 wherein said trigger circuit includes a silicon controlled rectifier switching device having a gate and triggering means controlling the gate of said switching device, said triggering means including a circuit branch having a voltage responsive glow lamp therein operated by said capacity changes.

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