United States Patent [19]

Altenberger

[11] **3,767,867**

[45] **Oct. 23, 1973**

[54] **BURGLAR ALARM ACTUATED BY CUT TELEPHONE WIRE**

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[22] Filed: **July 27, 1972**

[21] Appl. No.: **275,566**

[52] **U.S. Cl.** ..... **179/175.25**, 179/5 R
[51] **Int. Cl.** **H04m 3/22**
[58] **Field of Search** ..... 179/5 R, 81 E, 175.25

[56] **References Cited**

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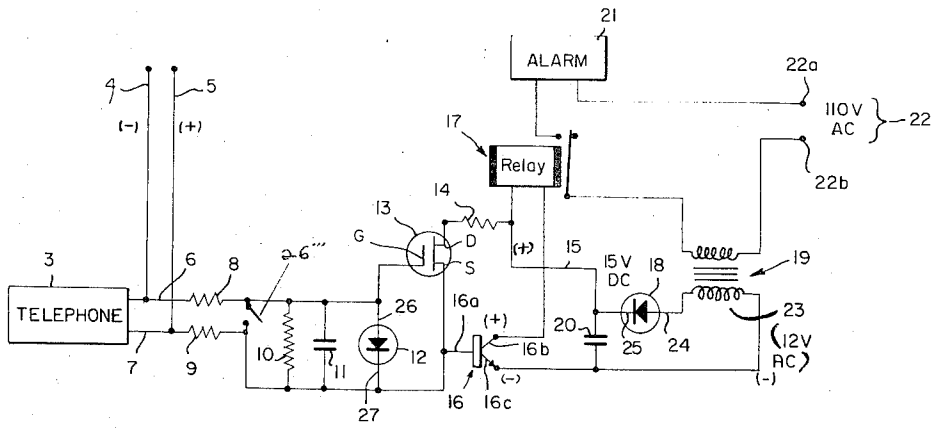
3,098,901 7/1963 Norling 179/175.25

Primary Examiner—Ralph D. Blakeslee
Attorney—William T. Hough

[57] **ABSTRACT**

A burglar alarm which is actuateable by the cutting of a telephone set wire such as located outside of a residence home, the alarm relay switch-actuating circuit being connected to either battery or DC-rectified AC-power source, the detector and actuating circuitry of a preferred embodiment including positive and negative leads connectable to telephone wire contacts of corresponding polarity, each lead including adjacent to the respective contacts, in series, a resistor, the respective resistors being connected to different terminals of each of a third resistor, a capacitor, a zener diode, and a field effect transistor (FET), the negative lead being connected to the FET gate terminal and to the diode such that electrons are flowable solely from said negative lead to said positive lead, and said postive lead being connected to each of the FET source and to a base of typically an NPN transistor, the FET drain being connected in series through a fourth resistor and a relay switch coil to the NPN collector, the relay switch being actuateably closeable of an alarm power circuit, the NPN emitter being connected to one terminal of a second capacitor and to a DC power source terminal of the relay alarm switch-actuating circuit, and the remaining relay switch being connected to each of the remaining terminal of the second capacitor and the remaining coil lead to the relay switch, the relay alarm switch-actuating circuit preferably including, in series, the relay actuating coil, the NPN transistor, a step-down transformer coil, and a rectifier diode permitting DC current to flow toward each of said collector and said drain.

10 Claims, 7 Drawing Figures



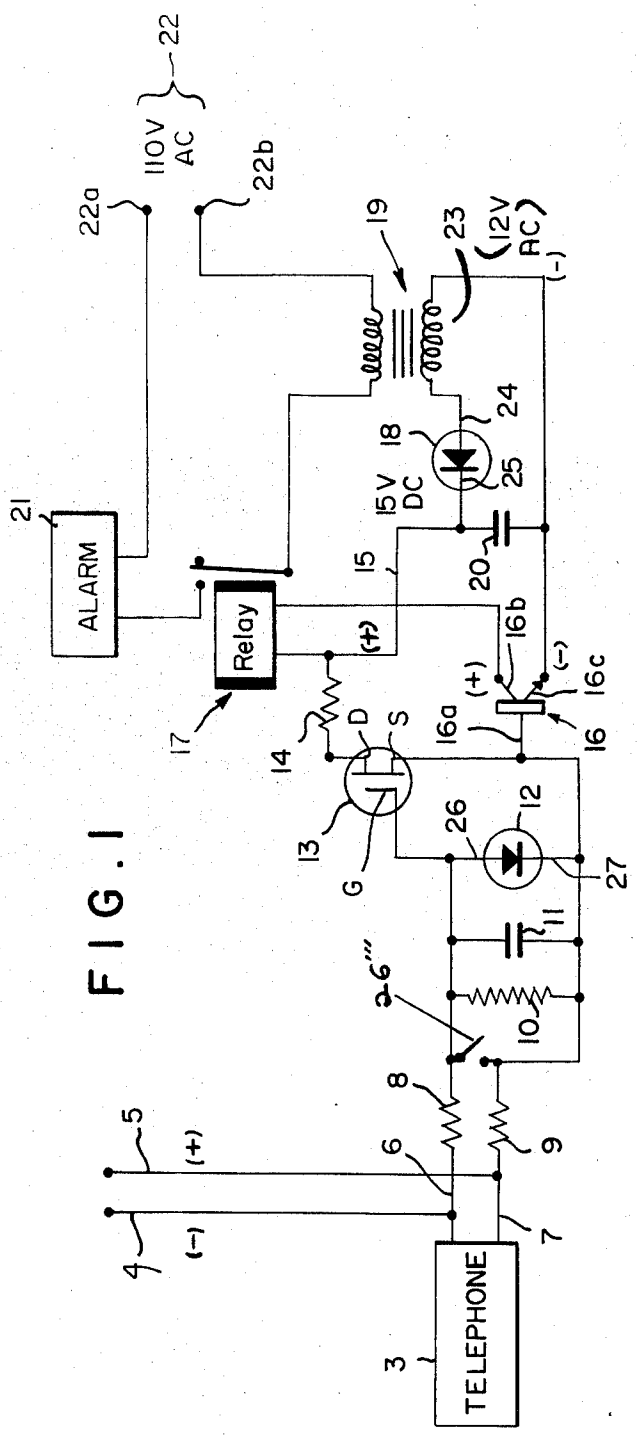


FIG. 1

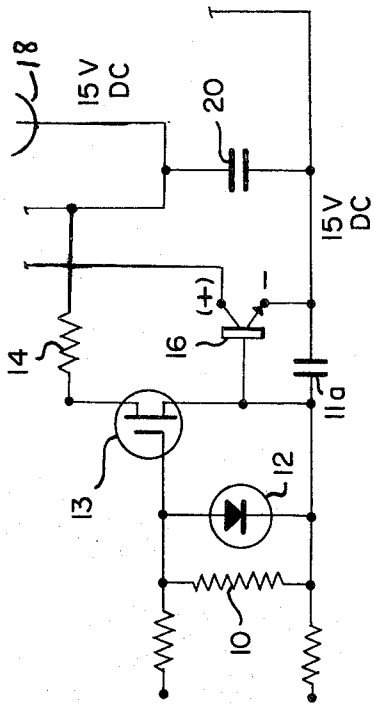


FIG. 1B

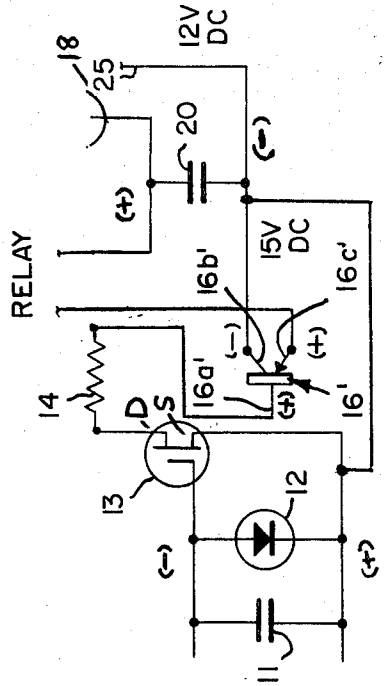


FIG. 1A

FIG. IC

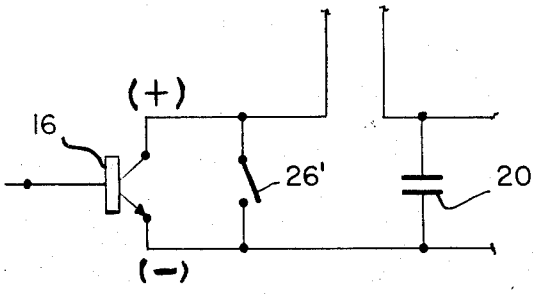
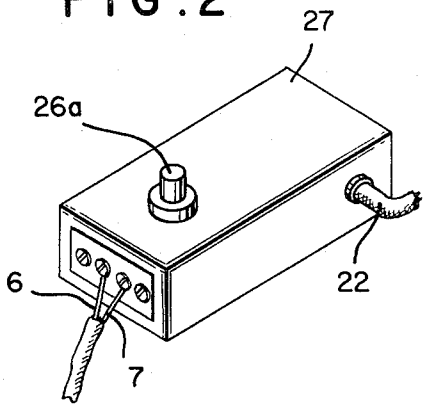


FIG. 2



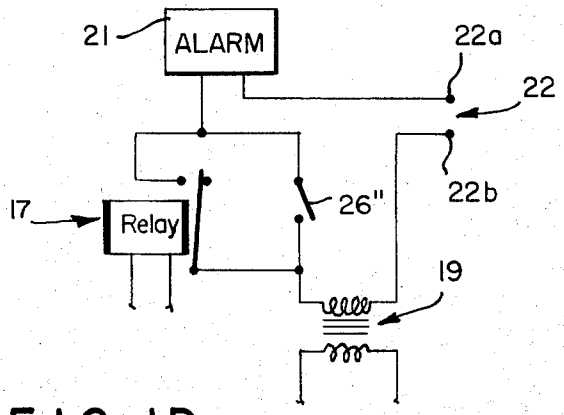


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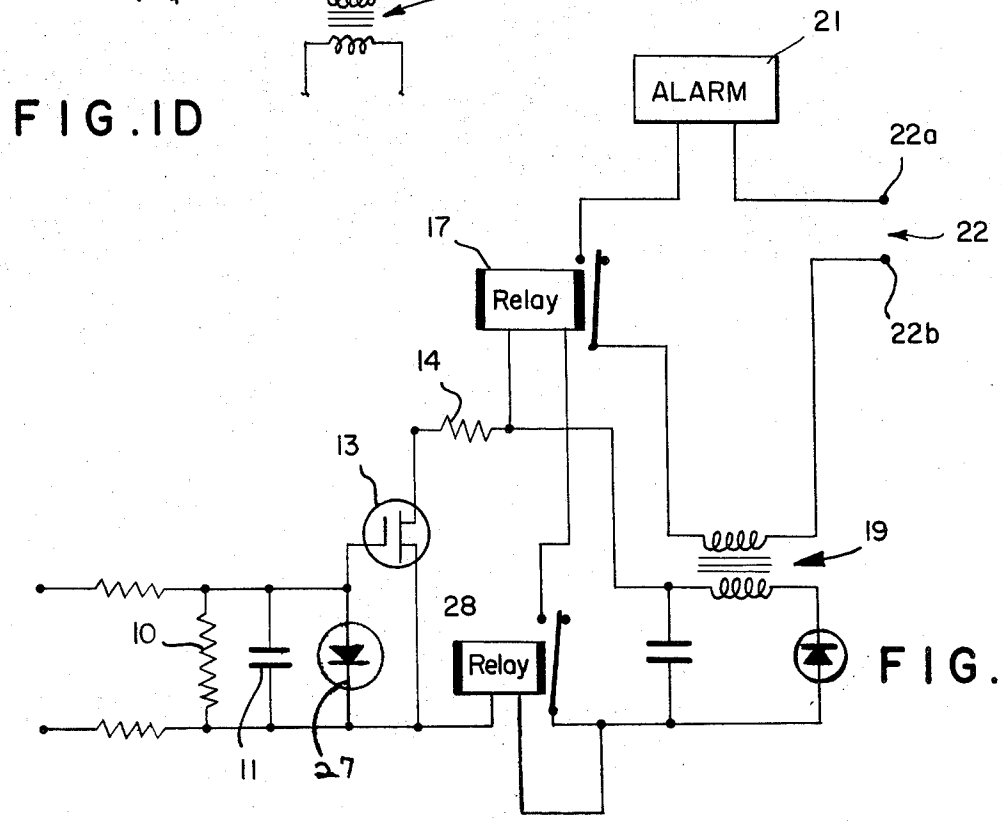


FIG. IE

BURGLAR ALARM ACTUATED BY CUT TELEPHONE WIRE

The present invention relates to a burglar alarm device associated with a telephone.

BACKGROUND

Prior to the present invention, there have existed varios devices for summoning the police upon actuation thereof, by either a straight signal, or a pretaped message which automatically dials the police and upon the police answering give the recorded message. These devices have, however, a common defect — that being that if the burglar or rapist or other intruder or would-be intruder is sufficiently seasoned in the ways of crime commition, he will inevitably cut the telephone line (wire) on the outside of the home or building such that telephone together with all the aforementioned types of burglar alarms become totally inoperative. This has proven to be factually the course of procedure followed in numbers of recent rape crimes, for example, where the woman known to be alone in the house is left virtually defenseless in so far as having any means of summoning help.

SUMMARY OF THE INVENTION

Accordingly, an object of the present invention is to overcome one or more of the type problems and difficulties discussed above.

Another object is to obtain a burglar device which detects tampering with or the severing of telephone set wires.

Another object is to obtain a burglar device circuitry which registers the presence of a normal telephone line voltage.

Another object is to obtain a burglar alarm circuitry which to register the presence of a typically normal telephone voltage utilizes a substantially inconsequential amount of current from the telephone line(s).

Another object is to obtain a burglar alarm circuitry which utilizes power other than that from telephone lines for the power source powering an alarm and actuating circuitry thereof.

Another object is to obtain a telephone burglar device substantially of the type discussed above in the preceeding objects, which includes safety features against malfunction thereof being a potential hazard, in possibly interfering with or overloading a telephone wire or telephone set to which it is connected.

Another object, in particular, is to obtain a telephone wire-cut burglar alarm device having a high impedance to the telephone line.

Another object is a telephone wire-cut burglar alarm device equally suitably adaptable to one or more of different alarm circuits and devices such as outside and/or inside lights being actuateable thereby, siren(s) and/or horn(s) and/or buzzer(s), or the like.

Other objects become apparent from the preceeding and following disclosure.

One or more objects of the present invention are obtained by the invention as defined herein.

Broadly the invention includes a circuitry detectable of reduced or terminated telephone voltage, which upon detection thereof actuates a power circuit includeable of alarm device(s), the power circuit being possibly battery powered but typically and preferably both the actuating circuit and the alarm power circuit

being powered by typically normal house power source(s). Where high voltage power sources are utilized, relative to the low powered telephone lines, it is necessary to include appropriate step-down transformer(s); also, whatever the power source(s), it is necessary to employ highly sensitive detector(s) for the detection of and response to the lack of voltage on the telehpone wire(s).

In greater particularity, the device of the present invention has negative and postive leads connectable to negative and positive polarity telephone wires respectively, matching the polarities thereof. Moving in a direction from the connecting ends of the device negative and positive leads respectively, each connecting lead includes a resistor of relatively high impedance, and next in series, for each connector lead, the leads are connected to opposite ends of elements mounted between the circuits of the leads, the elements including a high impedance resistor, a zener diode limiting field effect transistor (FET) gate-to-source voltage, an FET having the gate lead thereof connected to the negative lead (which is thereby connected to the zener diode anode lead or terminal) and having the source lead (of the FET) connected to the positive connector circuitry (which FET source is thereby connected to the zener diode cathode lead or terminal), and a capacitor of which at least one lead thereof is connected to the zener diode cathode circuitry operatively, preferably the other lead of the capacitor being connected to the zener diode anode circuitry and thereby also the FET negative gate lead. When potential across the zener diode becomes sufficiently reduced or terminated to a predetermined level — typically substantially zero —, thereby the low or terminated gate potential permits current flow in a separate actuating circuit from the drain to the source whereby in the closed actuating circuit current actuates a typically relay switch which upon the closing of the contacts of the power circuit of the relay switch causes the current to flow through the alarm power circuit thereby actuating the one or more alarm devices in the alarm power circuit. In an actuating circuit, the FET source is connected to an appropriate element such as an NPN transistor or PNP transistor or highly sensitive relay. FET source is connected to an NPN or PNP transistor base, preferably NPN, or connected to one coil lead to the sensitive relay, with the remaining leads of the NPN or PNP transistor or sensitive relay being appropriately connected to the actuation circuit connected to power actuation of the alarm relay. Where an NPN transitor is empolyed, the postive lead of the relay actuation circuit is connected to the collector lead of the NPN transistor, whereas for the PNP the positive relay activation lead is connected to the emitter of the PNP transistor. Accordingly, the negative lead of the relay actuation power circuit is connected to the emitter of an NPN transistor, or to the collector of a PNP transistor; and the negative actuation power circuit is connected to the remaining coil lead of the sensitive relay if such relay is used in substitution for either an NPN or a PNP transistor. The postive lead of the relay-coil actuation circuit (which is as stated above is connected through an NPN ot PNP transistor, or through switch contacts of the sensitive relay) is connected through a resistor to the FET drain lead. Although as noted above the one lead of the capacitor is connected to the detector circuit of the zener diode postive terminal and the FET gate lead, with the

other capacitor lead connected to the parallel connector lead connected to the zener diode negative terminal and the FET source lead, alternatively the remaining other lead (preferably — as stated above — connected to the zener diode negative lead and the FET gate) is instead connected to the negative circuitry of the actuation circuit already discussed above. Between the negative and positve circuitry of the actuation circuit (powerable of the relay coils of the alarm relay) is connected a second capacitor. Where a step-down transformer is employed, there also is employed a rectifying means, preferably the rectifying means being a rectifying diode operatively mounted such that current DC flow is toward said FET drain-lead resistor and toward the postive one of the NPN or PNP transistor emitter or collector, as the case may be.

The invention may be better understood by reference to the figures, as follow.

THE FIGURES

FIG. 1 illustrates a prefered embodiment circuitry connected to telephone wire leads to a telephone set, with the actuation circuit of the relay coils being powered through a step-down transformer and the alarm being powered from regular 110 AC house current.

FIG. 1A illustrates an in-part view of the circuit of FIG. 1, differing only in that the FIG. 1A employs a PNP transistor as opposed to an NPN employed in the FIG. 1 circuit.

FIG. 1B illustrates an in-part view of the circuit of FIG. 1, differing only in that the FIG. 1B circuit employs the capacitor across the base and emitter of the NPN transistor circuitry.

FIG. 1C illustrates an in-part view of the circuit of FIG. 1, additionally including a by-pass switch and circuit therefor, bypassable of the NPN transistor manually such that the alarm may be manually actuateable by closing this switch existing normally in an open state.

FIG. 1D illustrates an in-part view of the circuit of FIG. 1, as an alternate to that circuit of FIG. 1C in that a bypass switch is located in the alarm power circuit and bypasses — when closed— the normally open contacts of the relay switch normally actuateable by detection of a severed telephone wire, the alarm being actuateable by closing the bypass switch manually.

FIG. 1E illustrates an alternate alarm device circuit of the present invention, in which the sole basic difference from the FIG. 1 embodiment is the substitution of a sensitive relay for the NPN transistor of FIG. 1.

FIG. 2 is a typical possible appearance of an encased unit of the present invention, as illustrated in perspective side view.

DETAILED DESCRIPTION OF THE INVENTION

In most instances house-breakers and/or burglars, although they usually cut the telephone wire(s) if there is thought to be anyone at home or if there is feared to be present some sort of telephone-connected police alarm, house-breakers and/or burlgars rarely cut power lines for normal electrical power since typically there is a fear of self-electrocution thereby unless the house-breaker or burglar is especially prepared in advance for cutting power wire — this not being a typical situation, especially since the cutting of a telephone wire usually does the trick prior to the present invention. Therefore, it is a preferred embodiment of the present invention to employ a transformer containing or transformer connected (if a step-down transformer already is present) burglar alarm circuitry of the present invention — as opposed to a battery powered system which is plagued with the hazardous possibility that batteries over a prolonged period of time could become discharged sufficiently as to not power the alarm when the circuit of the alarm is actuated. However, it is within the scope of the present invention to additionally include an alternate circuitry which, for example, by a conventional relay holds the battery circuitry open until such time as current from (and thereby potential from) a regular house current line is cut-off — as by the cutting of the power line by the burglar. Thereby, automatically, if a burglar does cut the power line, automatically the battery power circuit would be cut-in to be available in the event that a telephone line is cut by the burglar. Also, at somewhat greater expense, it is possible to include a simple battery charger operable on house power which charger is automatically activatable to recharge battery(ies) whenever a potentiometer closes a circuit thereof upon the battery(ies) becomeing discharged to a predetermined extent, the charger operating thereafter until the battery(ies) is(are) fully recharged, this system being a substantially total fool-proof system. Under such a system, the actuation alarm circuit could at all times be closed for the battery circuit, the house current merely being utilized as a recharging power source. It is understood, of course, that where battery power is to be utilizable, that also the power in the alarm element circuit as well as in the relay-coil actuation circuit is derived preferably from the battery power, such that a cutting of the house power line(s) cannot possibly prevent activation of alarms.

With regard to FIG. 1, a telephone is connected conventionally to telephone wire leads such as postive lead 5 and negative lead 4. Connected to the negative telephone wire lead 4 is the connector negative lead 6 of the present invention, and correspondingly connected to the postive telephone wire lead 5 is the connector postive lead 7. In series within the connector lead 6 is a typically 5 MEG ohm resistor 8, and in series within the connector lead 7 is a typically 5 MEG ohm resistor 9. Thereafter in further series, connected across (between) the respective leads 6 and 7 are several element in parallel, namely the typically 10 MEG ohm resistor 10, a typically 0.1 Microfarad capacitor 11, and a one-way flow diode typically a zener diode. The zener diode is connected for flow of current from negative to postive, and the negative connector is thereafter connected to a gate G terminal of an FET transistor 13, with the source S being connected to the zener diode postive lead 27 and to a base lead 16*a* of NPN transistor 16. The drain D of the FET transistor is connected to and through a typically 4 K ohm resistor 14 to a postive lead of the relay-coil actuation circuit 15. A postive lead of the circuit 15 is connected to the collector 16*b* of NPN transistor 16; emitter 16*c* is connected to the negative lead of circuit 15. Across postive and negative leads of circuit 15 is typically 100 microfarad capacitor 20. In series in the circuit 15 is the rectifier diode 18 having input and output leads 24 and 25 respectfully. Circuit 15 includes in series therein step-down coil 23 typically 12 volts. Also within the circuit 15 in series therewithin is the relay coil(s) of relay 17 controllable of normally open contacts of the alarm power circuit and connected between power source 11

volt 22 terminals 22*a* and 22*b*, with the primary coil of transformer 19 being in the 110volt power circuit. The circuit 15 is typically 15 volt DC. The rectifier diode 18 is typically a silicon diode rectifier element. "Panic switch 26'" is optional and may be also used to test the entire circuit.

In the embodiment of FIG. 1A, the sole changes are that the circuit 15 postive lead is connected to the PNP emitter, and the circuit 15 negative lead is connected to the PNP collector 16*b'*, with the negative 15 v DC lead connected to the source S and the drain D connected through resistor 14 to the PNP base 16*a'*.

In the embodiment of FIG. 1B, the sole difference from the FIG. 1 capacitor 11 is in FIG. 1B connected across from the connector lead 7 to the circuit 15 negative circuitry (which is connected to the NPN emitter).

In the FIG. 1C embodiment, by-pass normally open panic switch (manually operable) 26' is connected across postive and negative circuitries of circuit 15 on either side of the NPN transistor 16 of the FIG. 1 embodiment.

In the FIG. 1D embodiment, by-pass normally open panic switch (manually operable) 26'' is connected across relay 17 contact leads of the alarm power circuit, on either side of the relay 17 switch contacts.

In the FIG. 1E embodiment, the NPN transistor of FIG. 1 is replaced by a highly sensitive relay 28 connected as shown, with the coil being connected across the connector lead 7 of FIG. 1, and the negative circuitry of circuit 15.

In the perspective view of FIG. 2, case 27 has thereon lead contact terminals for leads 6 and 7 of typically FIG. 1, and the power cord source 22. Also there is illustrated a panic button which may be actuated for turning-on manually the alarm(s), the button being illustrated as panic button 26*a*.

It is to be understood that the preceeding discussion and the illustrative figures are not comprehensive of all other possible embodiments within the scope of the present invention, but are merely for better understanding of the mechanism and heart of the invention. Accordingly, it is within the spirit and scope of the present invention to make such modification(s) and/or variation(s) and/or substitution of equivalent(s) as would be apparent to and/or within the scope of an artisan skilled in this particular field of endeavor.

I claim:

1. A telephone set cut-line alarm device, comprising in combination: separate postive and negative connector leads; connected across said leads at least each of a first resistor means and a zener diode, at a corresponding end of each of said connector leads, second and third resistor means connected one per lead in series, and at an opposite end of each respective resistor means each resistor means being connectable to a telephone-set line of identical polarity; said zener diode being connected for unidirectional electron flow from said negagive lead to said postive lead; a field effect transistor having separate gate, drain, and source leads, said gate lead being connected to said zener diode at a negative lead thereof; first switch means having second circuit input and output switch contacts for turning on and off respectively a first current flow controllable of a first relay-activation circuit-second current flow, said first switch means being operatively connected to one of said source lead and to said drain lead of said field effect transistor; a first capacitor means having first and second leads, and operatively connected to said zener diode at at-least a postive terminal thereof such that discharge of potential at said gate takes place whenever telephone line voltage on either of said connector leads is terminated or significantly decreased, such that the gate potential is prior to discharge, of a predetermined magnitude large enough to prevent current flow through said drain to said source; a second current-flow circuit including in series within said second current-flow circuit a direct current means providable of direct current, first relay means having first-circuit input and output actuation leads connected for activating said first relay means, and said switch of said first switch means, and operatively connected to said source lead; a second capacitor means connected between said first relay means actuating input lead and output lead; said first relay input lead being connected in series with one of said first switch means second circuit contacts; fourth resistor means connected between said drain lead and one of said first relay means input and output leads; and said first relay means including alarm-circuit switch contacts.

2. An alarm device of claim 1, in chich said first switch means comprises a base/emitter/collector transistor having base, emitter and collector leads, one of said first switch means second-circuit input and output switch contacts being connected to said emitter lead and the other of said first switch means second circuit input and output switch contacts being connected to said collector lead.

3. An alarm device of claim 2, in which the first lead of said first capacitor means is connected to said zener diode at a postive terminal thereof, and the second lead of said first capacitor means is connected to said zener diode at a negative terminal thereof.

4. An alarm device of claim 3, in which said base/emitter/collector transistor is an NPN transistor, said collector being connected to one of said first relay means input and output leads.

5. An alarm device of claim 4, in which said direct current means comprises step-down transformer means including primary and secondary coils, and rectifier means for imparting direct current to said second circuit in a flow-direction toward said collector lead, toward said drain lead, from said emitter lead and from said source lead.

6. An alarm device of claim 5, and an alarm circuit including in series with one-another an electrically responsive alarm, said alarm-circuit switch contacts, and said primary coils.

7. An alarm device of claim 6, in which said alarm circuit is about 110 volts AC, in which said transformer secondary coil is about 12 volts AC, and in which said second current-flow circuit is about 15 volts DC.

8. An alarm device of claim 3, in which said base/emitter/collector transistor is a PNP transistor and in which said emitter lead is connected, in series in said second current-flow circuit.

9. An alarm device of claim 8, and an alarm circuit including in series with one-another an electrically responsive alarm, said alarm-circuit switch contacts, and said primary coils, and in which said direct current means comprises step-down transformer means including primary and secondary coils, and rectifier means for operatively imparting direct current from said secondary coil to said second circuit in a flow-direction of electrons toward said emitter lead, and toward said source lead.

10. An alarm device of claim 9, in which said alarm circuit is about 110 volts AC, in which said transformer secondary coil is about 12 volts AC, and in which said second current flow circuit is about 15 volts DC.

* * * * *

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,767,867 Dated October 23, 1973

Inventor(s) Edmund C. Altenberger

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Delete the illustrative figure on the cover sheet under the Abstract and sheets 1 and 2 of the drawings as printed, and substitute the attached illustrative drawing and sheets 1 and 2, as shown on the attached sheets. Column 6, line 21, "chich" should read -- which --.

Signed and sealed this 26th day of November 1974.

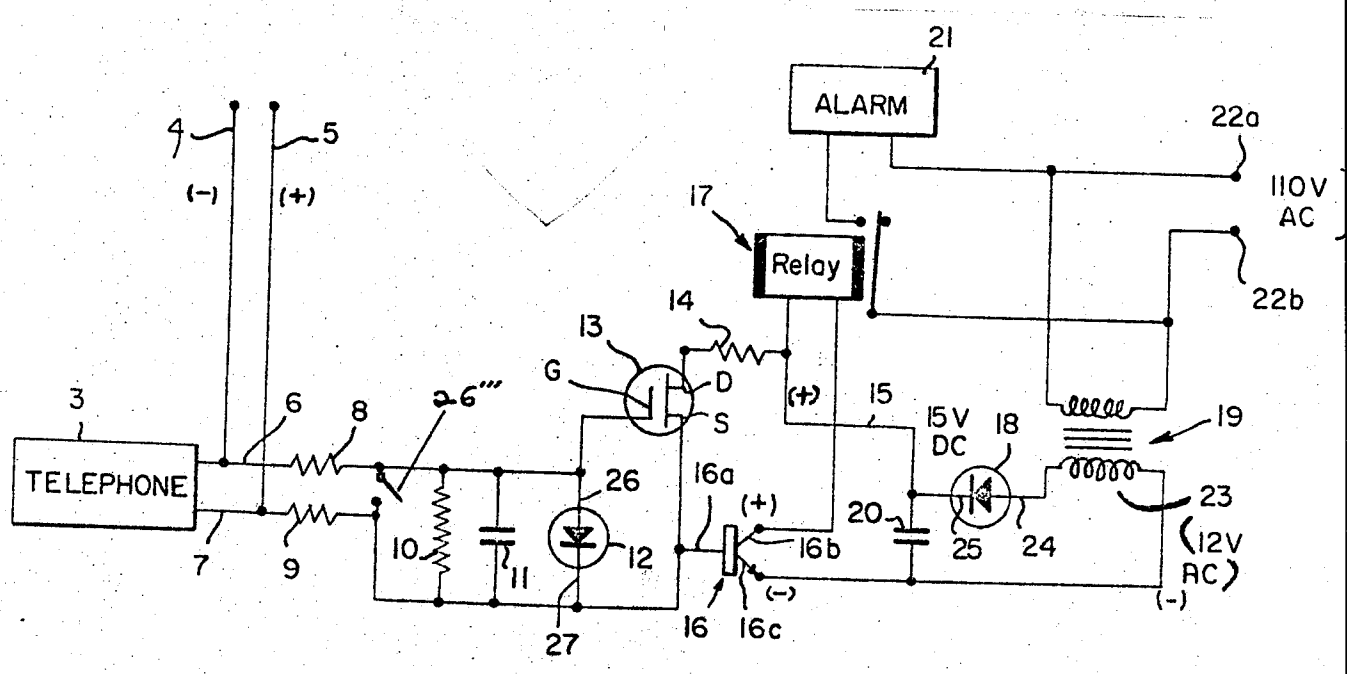
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McCOY M. GIBSON JR.
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents

FORM PO-1050 (10-69)

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22a
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PATENTED OCT 23 1973

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SHEET 1 OF 2

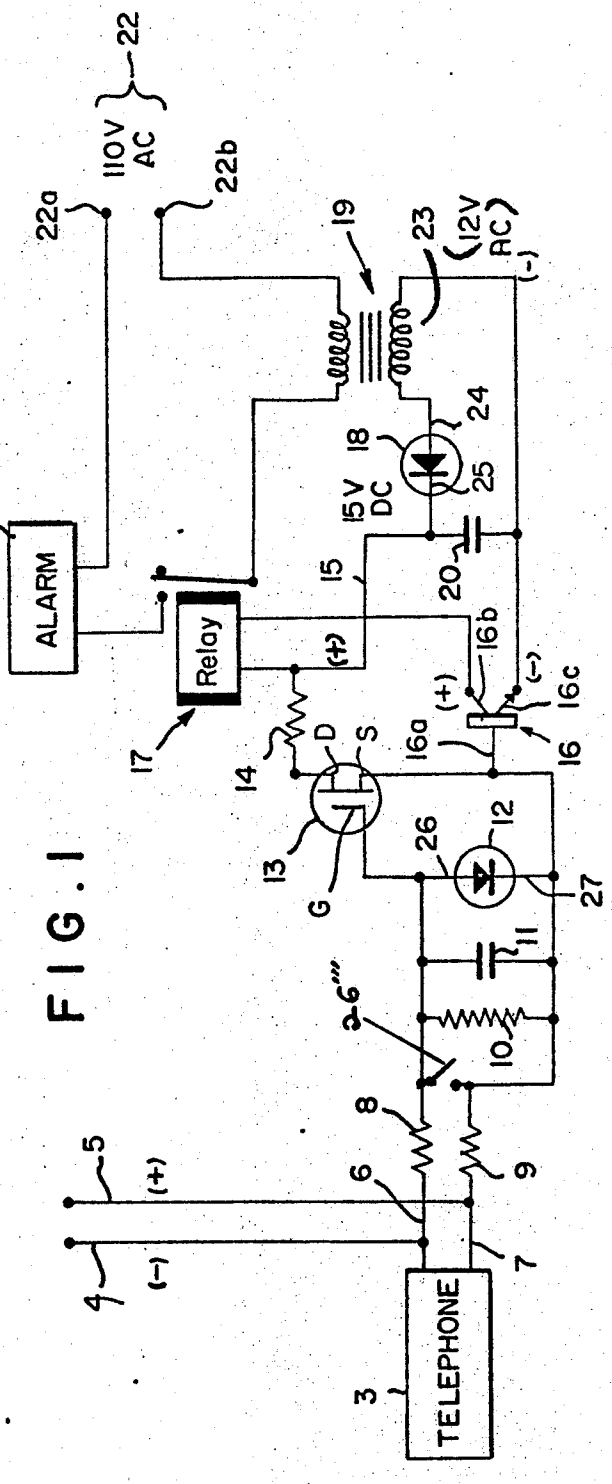


FIG. 1

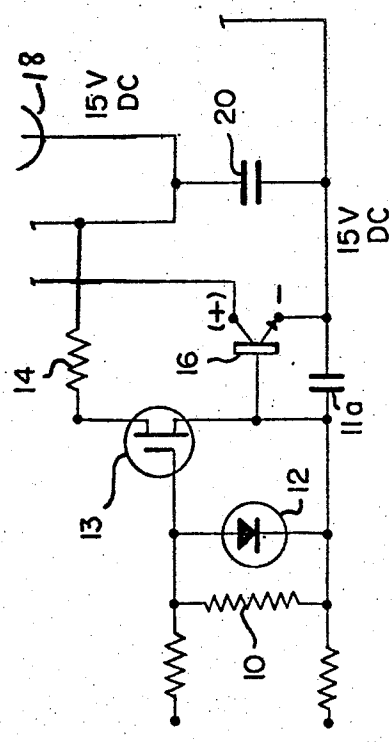


FIG. 1B

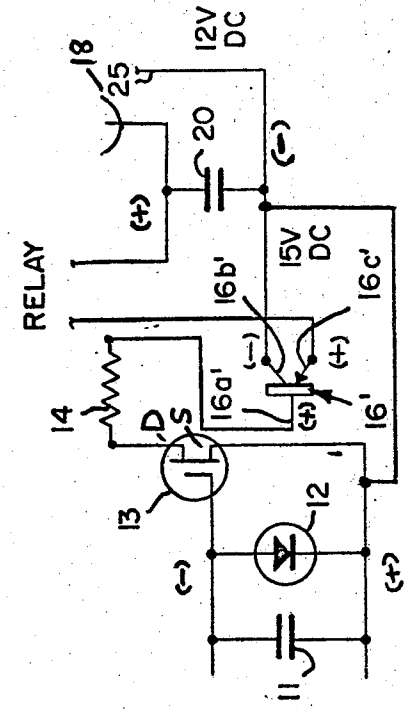


FIG. 1A

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SHEET 2 OF 2

FIG. IC

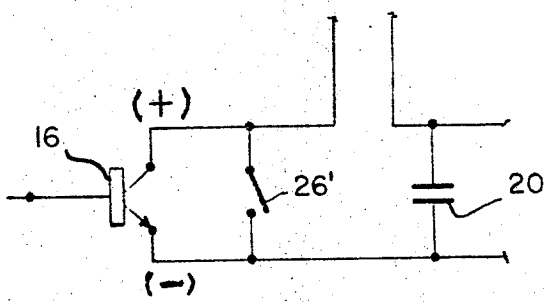
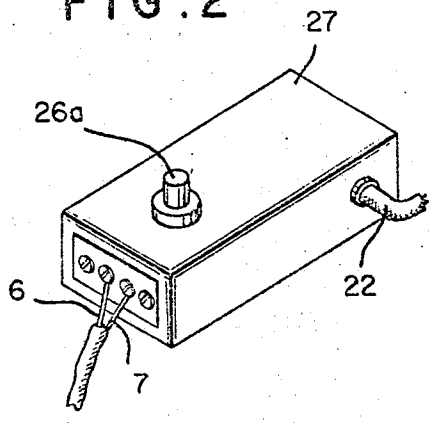


FIG. 2



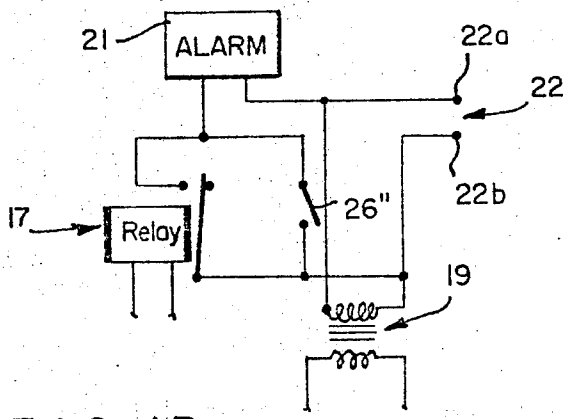


FIG. ID

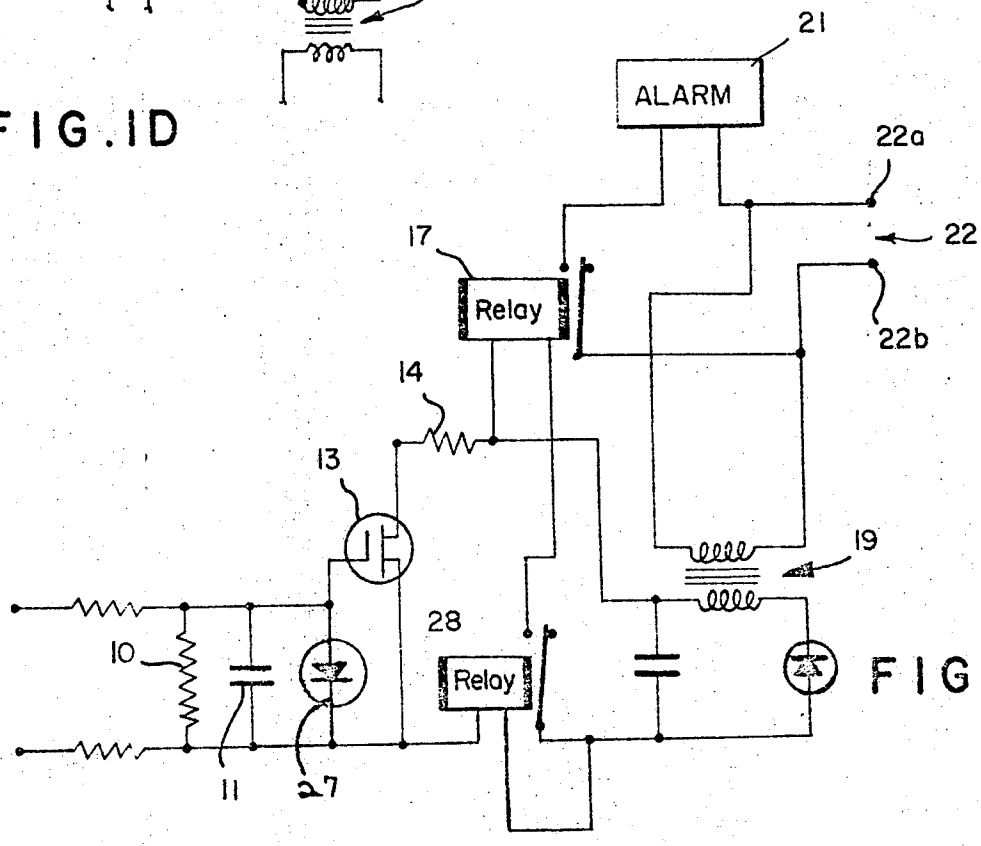


FIG. IE