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THEFT-PREVENTING ALARM DEVICE

10 (CONVENTIONAL OUTLET)

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TO APPARATUS

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THEFT-PREVENTING ALARM DEVICE

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ABSTRACT OF THE DISCLOSURE

The invention pertains to an alarm device which has means to sense the plugged in condition of an electrical apparatus and which sounds an alarm upon the unauthorized removal of the apparatus from its plugged in condition.

With the ever increasing number of thefts of television receivers, television cameras, and other costly electrical devices and appliances, the need for providing alarm devices to prevent such thefts has become acute. Such need has been heretofore met by the provision of numerous different types of alarm devices which, while they do actuate an alarm upon removal of the electrical apparatus, have not proved to be entirely satisfactory.

One of the main reasons for the lack of entire satisfaction with the prior art alarm devices is that in most instances, such devices require substantial physical modification of the conventional electrical outlets, rendering such devices costly and cumbersome to install. Another reason for the dissatisfaction is that such prior art alarm devices are, in many instances, rendered inoperative in the event the power to the outlet is cut off, making it necessary to depend continuously upon battery power which thus requires frequent replacement.

The alarm device in accordance with the present invention overcomes the problems present in the aforementioned prior art devices. In accordance with the invention, a conventional three terminal outlet and plug is utilized, thus eliminating any need for modification of existing standard equipment or for the provision of new plug and socket combinations. More specifically, the internal electrical connection existing between the electrical ground and the cold side of a conventional three terminal outlet is used to form a closed loop when the apparatus is plugged in. When such closed loop is interrupted, as by removal of the plug from the outlet, the alarm device is automatically activated. The closed loop thus defines the detecting element of the alarm and, as such, must be monitored by an electrical current flowing there-through. In accordance with another feature of the invention the power for monitoring the closed loop is provided by the AC power supply normally available on the premises. In the event, however, that there is a failure in the normal AC supply, the closed loop is automatically energized from a battery supply. In this way, the alarm device will not become disarmed by the accidental or deliberate cut off of AC supply. On the other hand, the battery is not subjected to constant drain as it comes into play only in the event of power failure in the normal AC supply.

It is therefore an object of the invention to provide an improved alarm device which is activated upon the removal of an electrical apparatus from its normally plugged-in condition.

Another object of the invention is the provision of an alarm device which is compatible with standard and conventional electrical apparatus and wiring and which does not require physical modification thereof.

A further object is the provision of an alarm device

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which does not become disarmed in the event of failure in the normal AC supply in the premises.

A still further object is the provision of such alarm device in which the monitoring current is obtained from the normal AC supply in the premises so that there is no constant drain on the annunciator battery.

The above and other objects, features and advantages of the present invention will be more fully understood from the following description considered in connection with the accompanying drawing.

In the drawing:

The sole figure is a schematic circuit diagram of the alarm device in accordance with the invention.

Referring now to the drawing, reference numeral 10 identifies a conventional modern day electrical wall socket or outlet provided with three female terminals 12, 14 and 16, respectively. Terminal 12 is that normally referred to as the hot terminal, terminal 14 is the cold terminal, and terminal 16 is the grounded terminal. In accordance with standard practice and code regulations, cold terminal 14 is internally linked to ground terminal 16 as shown by dashed line 18.

Alarm device 20 is provided with conventional plug 22 which is complementary to outlet 10 and is provided with three prongs 24, 26 and 28 adapted to be inserted in outlet terminals 12, 14, and 16, respectively. These three terminals 24, 26 and 28 are, in turn, connected to electrical conductors L1, L2 and L3, respectively. Accordingly, when plug 22 is plugged into outlet 10, L1 will be the hot conductor, L2 the cold conductor, and L3 the grounded conductor. When outlet 10 is live, i.e., AC power is supplied thereto, the AC potential will exist between L1 and L2, L3, since the latter two are in fact at the same potential, by virtue of internal connection 18.

In the circuit diagram, numerals 30, 32, 34, 36, 38, and 40 represent conventional resistors; numerals 42 and 44 represent conventional condensers; numerals 46, 48 and 50 represent conventional CR transistors; numeral 52 represents a Zener diode; numeral 54 represents an SCR transistor which, as is well known, will pass current only from anode A to cathode C when it is gated, i.e., when current flows from gate G to cathode C; numeral 56 represents a conventional DC battery; numeral 58 represents a conventional switch; a numeral 60 represents the annunciator of the alarm, which, in this case, could be a bell.

The operation of the alarm device will now be described:

When the device is plugged into the wall outlet, that is, plug 22 is inserted into outlet 10, the line voltage will exist between L1, and L2, L3. CR transistor 46 serves as a half wave rectifier and converts the line voltage into half wave DC. Resistors 30 and 34 define a voltage divider so that a relatively low potential, in the range of 20 volts, is provided across condenser 42. So long as plug 22 remains in its plugged-in condition, L2, and L3 will be connected together by means of connection 18 and, under these circumstances, the charge on condenser 42 flows through resistor 34, CR transistor 48, L3, internal connection 18, L2 and back to condenser 42. Such flow of the charge of condenser 42 prevents the creation of a potential across condenser 44. In turn, the lack of charge across condenser 44 prevents any current flow from gate G to cathode C of SCR transistor 54, thus preventing the triggering thereof.

When plug 22 is withdrawn from wall outlet 10, as would be the case when the electrical apparatus to which the subject alarm device is attached is being stolen, the connection 18 between L2 and L3 will be interrupted. Under these circumstances, the charge from condenser 42 flows through resistor 34 and charges condenser 44.

As condenser 44 charges up, current will flow through Zener diode 52, through resistor 36, and on to gate G, and through cathode C of SCR transistor 54, firing the latter, provided, of course, that manual switch 58 is closed. More specifically, the firing of SCR 54 permits current flow from battery 56 through switch 58, through annunciator 60 and resistor 40, through SCR 54 and back to the negative side of battery 56. Such current flow will continue so long as switch 58 remains closed and will of course activate the alarm.

It will be noted that the closed loop formed only with the assistance of internal connection 18, when the apparatus is plugged in, forms essentially the detecting circuit for the alarm and, as such, must be monitored continuously. So long as there is line AC supplied to the outlet 10, it is this line supply which performs the monitoring function. If, however, there is a power failure, the detecting loop continues to be monitored by electric current available from the battery. More specifically, in the event of power failure, condenser 42 receives its charge through CR transistor 50. It will also be noted that the normal line voltage creates a voltage across condenser 42 which is higher than the voltage of battery 56, and accordingly, so long as line voltage is available, there will be no drain on the battery. In this connection, resistor 32 is of high value to make sure that the battery remains freshly charged so that its life may be extended.

The network comprising Zener diode 52, resistor 36, defines a time delay network to slow down the triggering of SCR transistor 54 in order to prevent the monitoring loop from being sensitive to transient spikes. More specifically the Zener diode 52 will prevent passage of current therethrough when the voltage there across is clearly below the voltage normally obtained upon the breaking of the monitoring loop.

It will be noted that the alarm device disclosed above fully accomplishes all of the stated objects of the invention. Specifically, it will be noted that the alarm device in accordance with the invention utilizes conventional three terminal plug-circuit combinations universally available. In fact, it is the internal connection between the ground and cold terminal of the socket which forms the basic element of the alarm monitoring loop. For this reason, the removal of the plug from its wall connection, which is a prerequisite to the unlawful removal of the electrical appliance, automatically activates the alarm. Furthermore, because the subject invention does not require modification of or additions to conventional plug-outlet combinations, there is no way in which the potential thief is alerted to the fact that the apparatus is provided with an alarm.

It will also be noted that the monitoring loop of the alarm does not create a drain on the battery so long as line AC is available, thus preserving the life of the battery. On the other hand, in the event of power failure, either accidental or deliberate, the alarm device is still operative as the monitoring loop is then automatically energized by the battery current.

It will be understood that the alarm itself can be provided in a neat and compact housing which can be located on the electrical appliance in a manner so as to clearly conceal the same from detection. Switch 58 serves the obvious purpose of disarming the alarm, either after it has been activated because of an unauthorized attempt to remove the apparatus, or when removal of the apparatus is authorized.

While we have herein shown and described the preferred embodiment of our invention, it will be under-

stood that the invention may be embodied otherwise than as herein specifically illustrated or described, and that in the illustrated embodiment certain changes in the details of construction and in the form and arrangement of parts may be made without departing from the underlying idea or principles of this invention.

Having thus described our invention, what we claim and desire to secure by Letters Patent is:

1. An alarm device for detecting the unauthorized removal of an electrical apparatus from its plugged-in condition in a three terminal outlet having a hot terminal and electrically interconnected cold and grounded terminals comprising,

plug means having three contact elements adapted to be inserted into said three outlet terminals, respectively;

first circuit means comprising a loop which is closed when said plug means is inserted in said outlet by the interconnection between said electrically interconnected cold and grounded outlet terminals;

second circuit means responsive to an interruption of said loop for providing an electrical control signal; and

third circuit means which is automatically activated in response to said control signal;

and alarm annunciator means controlled by said third circuit means;

whereby interruption of said loop results in the automatic activation of said annunciator.

2. An alarm device in accordance with claim 1 wherein said loop comprises a condenser which is charged from said power outlet upon insertion of said plug and which is discharged upon interruption of said loop to energize said second circuit means.

3. An alarm device in accordance with claim 1 further comprising a battery power supply means for operating said annunciator means.

4. An alarm device in accordance with claim 2 further comprising a battery means for energizing said condenser when the power outlet supply fails with said first circuit means uninterrupted.

5. An alarm device in accordance with claim 3 wherein said battery means energizes said annunciator means when said first circuit means is open.

6. An alarm device in accordance with claim 1 wherein said third circuit means includes an SCR responsive to said control signal for activating said annunciator.

7. An alarm device in accordance with claim 1 wherein said third circuit means includes an SCR, said SCR being connected in series with said annunciator, the gate of said SCR being energized to control its conduction in response to said control signal for completing an electrical circuit to the annunciator.

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