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ALARM SYSTEM FOR PREVENTING THE THEFT OF VALUABLE ARTICLES

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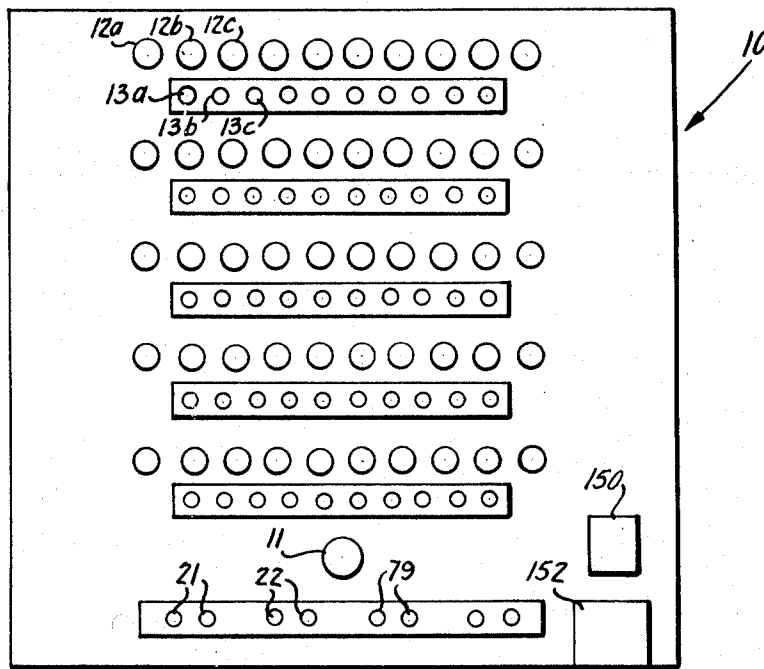


FIG. 1

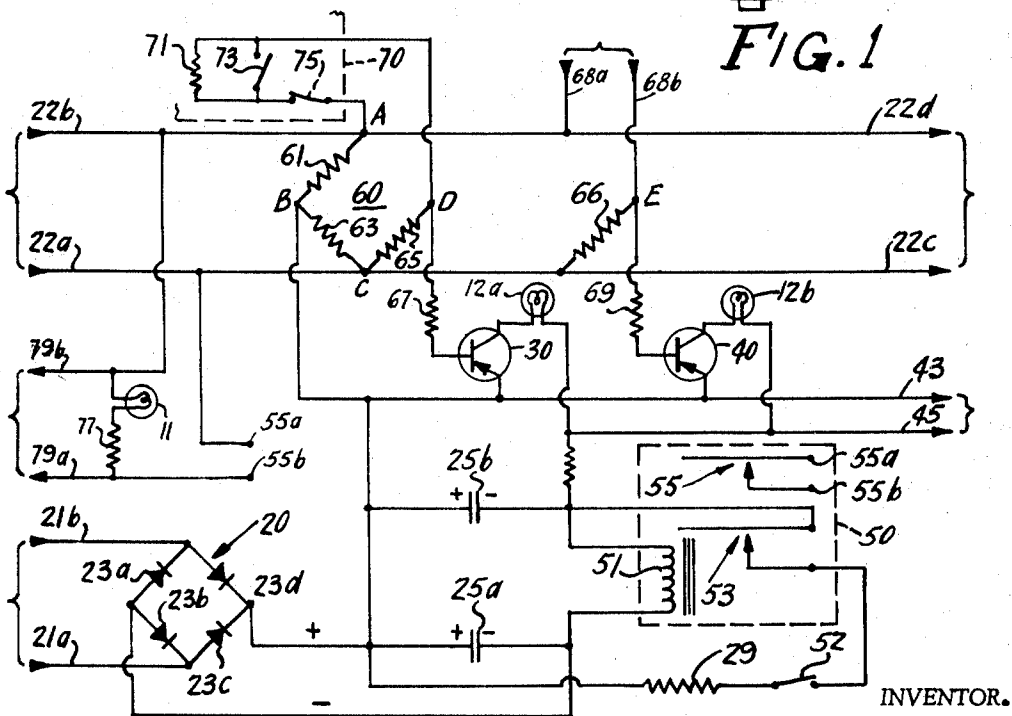


FIG. 2

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ATTORNEYS.

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ALARM SYSTEM FOR PREVENTING THE THEFT OF VALUABLE ARTICLES

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5 Claims

This invention relates to an alarm system and has as its primary object the provision of means, in association with an electrical appliance, such as a television receiver, radio set, lamp, or other such valuable article as may normally be contained and furnished in a room whereby when an attempt is made to remove or to tamper with said article an audible, visual or other suitable alarm is actuated.

It is well known that operators of certain types of businesses frequented by the public are faced with a serious problem of theft of such valuable articles as television sets, radios, lamps, and with the tampering with of these and other valuable articles, for example, such articles as coin-operated vending machines. It is not infrequent that such valuable articles are stolen and removed completely from the premises. It is even more frequent that such valuable articles are tampered with such as by movement or tipping to obtain valuables within such articles, especially coin operated vending machines.

It is an object of this invention to provide a system and means for preventing the removal of such valuable articles and the excessive movement and tampering with of such valuable articles by providing in association with such valuable articles an alarm system responsive to movement of or tampering with such articles.

It is a further object of this invention to provide fool-proof resistance circuit means whereby any attempt to remove the article protected will give an alarm and signal to the operator of the establishment.

Specifically, it is an object of this invention to provide means including a Wheatstone bridge circuit for giving an alarm in response to movement of or tampering with such articles.

It is expected that the most common use of a system of this invention will be in the protection of television receivers in such public establishments as motels and hotels where the owner or operator of the establishment cannot be present at all times; however, it is within the spirit of this invention to protect articles in such establishments as factories, stores, public buildings, and other places where it is necessary or desirable to leave valuable articles unattended for long periods of time.

This invention constitutes an improvement over the devices which I have previously invented and which are described in co-pending applications No. 472,888 filed July 19, 1965, and No. 484,860, filed Sept. 3, 1965, and over the system described in Patent No. 3,192,518.

Other objects of this invention will become obvious from the description given hereinafter. Reference is now made to the drawings.

FIGURE 1 shows a master control and alarm panel which is preferably located in a central office where it may be observed or attended to at all times.

FIGURE 2 shows a novel alarm circuit which is normally located in the master control and alarm panel shown in FIGURE 1.

FIGURE 1 shows a master control and alarm panel 10 including a master indicator light 11, a plurality of individual indicator lights 12a, 12b, 12c, etc., and terminals 13a, 13b, 13c, etc., corresponding to lights 12. Master control and alarm panel 10 also includes a relay 50 and a switch 52, the functions of which will be described here-

inafter. The functions of master terminals 21, 22 and 79 will also be described hereinafter.

Referring now to FIGURE 2, the detection system of this invention includes a power supply 20 which is connected to a source of A.C. power at 21a and 21b on terminal 21, as shown in FIGURE 1. Power supply 20 includes diode rectifiers 23a, 23b, 23c and 23d, as well as capacitors 25a and 25b.

Power supply 20 furnishes power to a transistor amplifier electronic switching circuit including transistor 30, indicator lamp 12a, a current limiting resistor 31 and an energizing coil 51 of relay 50. Power supply 20 also furnishes power to a second transistor 40, indicator lamp 12b, current limiting resistor 31 and relay energizing coil 51, on relay 50, which forms a second switching circuit. Power supply 20 may also furnish power to a plurality of switching circuits through 43 and 45.

Relay 50 is selectively energized as will be described hereinafter. Once relay 50 is energized power is supplied from power supply 20 through a current limiting resistor 29 and switch 52 to a pair of contacts 53 to energizing relay coil 51 thereby maintaining relay 50 in an energized condition until normally closed switch 52 is temporarily opened.

The switching circuit including transistor 30 responds to an imbalance in a Wheatstone bridge 60. Wheatstone bridge 60 includes a resistance element 61 connected between points A and B, a resistance element 63 connected between points B and C, and a resistance element 65 connected between points C and D. A voltage is supplied from 22a and 22b, of terminal 22, shown in FIGURE 1, to points A and C of Wheatstone bridge 60. The output signal of Wheatstone bridge 60 is fed from point B to the emitter of transistor 30 and from point D through a dropping resistor 67 to the base of transistor 30. The Wheatstone bridge, contained within the master control and alarm panel 10, shown in FIGURE 1, is normally in an electrically unbalanced condition thereby feeding an electrical imbalance signal to the transistor amplifier electronic switching circuit including transistor 30. When a sensing resistance element 71, located in a television set 70, is properly connected between points A and D of Wheatstone bridge 60, the Wheatstone bridge is electrically balanced, consequently no signal is applied between the base and emitter of transistor 30. The transistor amplifier including transistor 30 acts as an electronic switch and prevents the flow of current from power supply 20 through energizing relay 51 except when a signal is applied from the Wheatstone bridge 60.

When sensing resistor 71 is properly connected between points A and D, no signal is applied to the transistor amplifier electronic switch; however, if resistor 71 should be removed from the circuit either by disconnecting television set 70 including resistor 71 from the circuit of the Wheatstone bridge or by shorting resistor 71 out of the circuit as by a switch 73 or by opening the circuit to resistor 71 as by opening a normally closed switch 75, Wheatstone bridge 60 is in an electrically unbalanced condition and the electrical imbalance signal is fed to transistor 30 as heretofore indicated thereby causing current to flow through the circuit including the emitter and collector of transistor 30. This causes indicator light 12a, also shown in FIGURE 1, to flash and relay 50 to be closed by energizing coil 51C. Relay 50 will remain in an energized condition due to the closing of contacts 53 until normally closed switch 52 is manually opened.

Resistors 61 and 63 of Wheatstone bridge 60 are connected to the emitter of both transistor 30 and transistor 40. Thus it will be seen that resistors 61 and 63 of Wheatstone bridge 60 may apply an input signal voltage to a

plurality of transistor amplifier switches. This voltage may be further applied through point 43. Wheatstone bridge 60 also includes resistance element 66, which corresponds to resistor 65, and to an additional sensing resistance element, analogous to sensing resistance element 71, which may be connected at 68a and 68b. Wheatstone bridge 60 including resistor 66 operates in the manner described previously. When the Wheatstone bridge is balanced, that is when it includes a resistance element of the proper value connected between points A and E, no signal is applied to the transistor amplifier electronic switch including transistor 40; however, if the resistance between points A and E is removed, added to, or changed in any way, an electrically imbalanced Wheatstone bridge results causing an electrical imbalance signal to be applied from point B to the emitter of transistor 40 and from point E through resistor 69 to the base of transistor 40. The transistor amplifier circuit including transistor 40 operates in the same manner as the transistor amplifier circuit including transistor 30, i.e. no current flows through transistor 40 until a signal is applied from the Wheatstone bridge 60. When a signal is applied from Wheatstone bridge 60, between the emitter and base of transistor 40 current flows for transistor 40 causing indicator light 12b to flash and causing relay 50 to be energized as current flows through relay energizing coil 51. Relay 50 remains energized until normally closed switch 52 is manually opened.

Thus it will be seen that means is provided for indicating the removal of or tampering with the article to be protected, for example television set 70, and since indicator lights 12a, 12b, 12c, etc., correspond to known locations of such articles, it is immediately apparent which of the articles is being removed or tampered with.

It will also be apparent that a plurality of such Wheatstone bridge circuits may be provided as shown at 22c and 22d.

In addition to giving an indication showing the location of the article being removed or tampered with by individual indicator lamps 12a and 12b, the master indicator lamp 11 also flashes as now described. When current flows through energizing coil 51 closing the contacts 53 of relay 50, contacts 55 of relay 50 are also closed connecting points 55a and 55b shown on relay 50 and also shown at the left of the drawing for clarity. The closing of contacts 55 completes the circuit from 22a through resistor 77 to master indicator lamp 11. In addition, it is possible to provide an alarm signal of any desired nature by connecting the input to the alarm device at point 79a and 79b in parallel with resistor 77 and indicator lamp 11. In particular, it may be desirable to have an alarm bell located in or adjacent the master control and alarm panel or at a remote place, for example, in the office of the manager of the establishment. Any desired audible or visual or other alarm device may be connected at points 79a and 79b. It is possible to connect the master alarm system at 79a and 79b through telephone lines to the police switchboard or other remote place to give warning that a protected article is being removed or otherwise tampered with.

Thus it will be seen that a virtually foolproof system is provided because any change of the value of the resistance of resistance element 71, for example shorting or opening the circuit to resistor 71 or the addition of series of parallel resistances to resistor 71 will give an alarm.

I have set forth the best mode contemplated for the construction and operation of the invention; however, it will be realized that there are many variations possible to the system without departing from the spirit thereof. In particular, it would be possible to add one or more resistance elements in the Wheatstone bridge to adjust the sensitivity of the Wheatstone bridge to avoid false alarms in cases of temperature changes in the location of the article to be protected. Such resistances might be added, for example, between points A and D and between points A and E of Wheatstone bridge 60. In addition, it will be

realized that many other switching circuits might be employed to accomplish the desired result.

The particular nature of the resistance element including resistor 71 and switches 73 and 75 is not an essential part of this invention and may include the sensing resistance device described in my co-pending application No. 519,990 filed coincident with the instant application.

I claim:

1. A system for protecting normally unobserved articles such as television receivers and the like in locations accessible to the public such as hotel or motel rooms from theft or tampering wherein a remote signal is produced by removal or excessive movement of the article by an unauthorized person comprising

at least one television receiver;

a sensing resistance element disposed in at least one of said television receivers;

a master control and alarm panel remotely located from said television receivers, said master control and alarm panel including

a Wheatstone bridge circuit comprising a plurality of resistance elements which is normally in an electrically unbalanced condition unless properly electrically connected to one or more of said sensing electrical resistance elements disposed in said television receivers;

means for electrically connecting said at least one sensing resistance element to said Wheatstone bridge circuit to thereby electrically balance said Wheatstone bridge circuit, and

means responsive to an electrical imbalance signal in said Wheatstone bridge circuit for giving an alarm upon removal or excessive movement of one of said television receivers, said means responsive to an electrical imbalance in said Wheatstone bridge comprises a transistor amplifier electronic switching circuit and means responsive to said transistor switching circuit for giving an alarm.

2. The system of claim 1 wherein said transistor amplifier switching circuit comprises

a transistor having an emitter-base electrical imbalance signal input circuit,

an emitter-collector signal output circuit and

means within said emitter-collector output circuit for giving an alarm in response to an electrical imbalance in said Wheatstone bridge circuit.

3. The system of claim 2 wherein said means within said emitter-collector output circuit for giving an alarm includes

a relay selectively energized in response to an electrical imbalance in said Wheatstone bridge circuit and circuit means for maintaining said relay in an energized condition after said relay is energized in response to an electrical imbalance in said Wheatstone bridge circuit.

4. The system of claim 1 including

a plurality of television receivers in a plurality of locations remote from each other and

a plurality of sensing resistor elements individually fixedly secured in said television receivers;

wherein said master control and alarm panel includes

a plurality of means responsive to an electrical imbalance signal in said Wheatstone bridge circuit comprising a plurality of transistor amplifier electronic switching circuits each having a signal input circuit including a first and a second input point and an output circuit including means for giving an alarm;

and wherein said Wheatstone bridge circuit comprises a first series resistance circuit,

means connecting an intermediate point in said first series resistance circuit to each of said first signal input points in said signal input circuits to said transistor amplifier electronic switching circuit,

a plurality of additional series resistance circuits each of which additional resistance circuits including by

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proper electrical connection one of said sensing resistance elements individually connected in each of said additional series resistance circuits when said Wheatstone bridge is in an electrically balanced condition, and

means individually connecting an intermediate point in each of said additional series resistance circuits to one of said second signal input points in said signal input circuits to said transistor amplifier electronic switching circuits.

5. The system of claim 4 wherein said transistor amplifier switching circuit includes a transistor having an input circuit including the emitter and the base of the transistor and the output circuit includes the emitter and the collector of the transistor and

wherein means for giving an alarm includes a relay in the emitter-collector circuit of said transistor which relay is energized in response to an electrical imbalance signal in said Wheatstone bridge circuit and

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circuit means for maintaining said relay in an energized condition after said relay is energized in response to an electrical imbalance signal in said Wheatstone bridge circuit.

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