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M. T. SLIMAN

3,440,636

SENSING RESISTANCE DEVICE

Filed Jan. 11, 1966

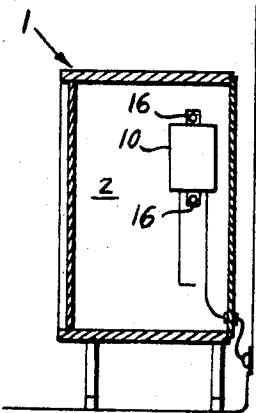


FIG. 2

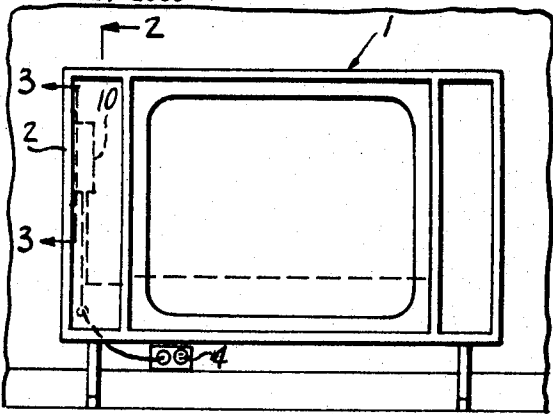


FIG. 1

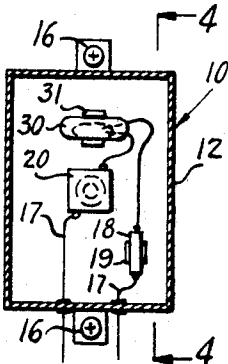


FIG. 3

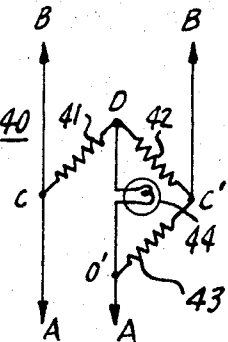


FIG. 8

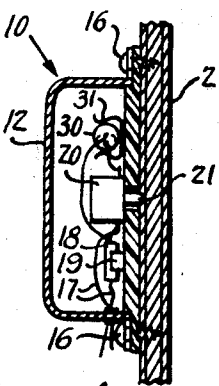


FIG. 4

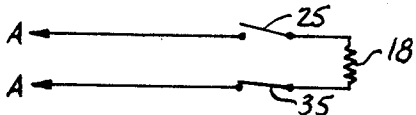


FIG. 5

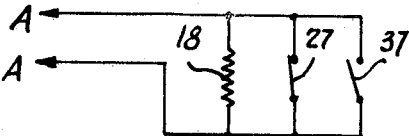


FIG. 7

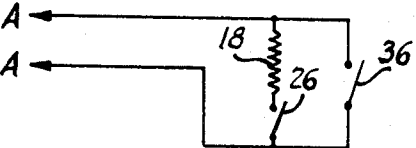


FIG. 6

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3,440,636

SENSING RESISTANCE DEVICE

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9 Claims

This invention relates to an alarm system and has as its principal object the provision of a means for detecting an attempt to move or to tamper with a valuable article such as an electrical appliance, for example, a television receiver, radio receiver, lamp or other appliance or article of furniture which may normally be contained in a furnished room, and is intended for use with an alarm system which will give a warning at a remote point upon the movement of or tampering with such article or appliance. Specifically, an object is to provide a resistance sensing device which will normally be attached to the article to be protected and which will be used in conjunction with an alarm system, preferably with the alarm system described in my co-pending application, Ser. No. 519,880, filed coincident with the instant application.

A serious problem exists with respect to valuable articles which are normally left in an unattended location which is accessible to the public. The problem is particularly acute in such establishments as hotels and motels where valuable articles of furniture are supplied in rooms used by the public at large. It is not infrequent that such valuable articles of furniture as television receivers, radio receivers, lamps and other furnishings are removed from the rooms by guests or others. In a normal situation it is impossible to provide for the presence of the manager or an employee at all times to prevent the removal of these valuable furnishings. It is therefore desirable to provide means to give an alarm signal when such valuable articles are removed or when an attempt is made to remove the article or to tamper with the article. The most serious problem usually exists with regard to television receivers which have a high value and can be removed with relative ease.

The most serious problems usually exist in such businesses as motels and hotels; however, a similar problem exists in relation to coin operated vending machines in many commercial and public locations and with valuable articles of merchandise or equipment in many industrial and commercial situations.

It is known in the prior art to provide means of giving a warning signal if such valuable articles are removed; however, such warning devices generally are only effective if the person attempting to remove the article is not aware that such warning devices are in operation. With most such warning devices, if the person attempting to remove the article is aware that such device is attached to the article and will respond to the article being unplugged, as described in my patent No. 3,192,518, he need only cut the wire attaching the device to the alarm system thereby rendering the alarm system useless.

It is an object of this invention to provide a sensing resistance device which may be attached to the article and which will give a warning signal if disconnected from the alarm circuit.

It is a further object of this invention to provide a sensing resistance device which will give a warning signal to the alarm system if an attempt is made to remove the sensing resistance device from the article protected.

An additional object of this invention is to provide a sensing resistance device which will give an alarm if an attempt is made to move or tilt the object to be protected. Other objects will be apparent in the drawings and description hereinafter.

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FIGURE 1 is a front view of a television receiver to which the sensing resistance device of this invention is attached.

FIGURE 2 is a side view of the television set including a sensing resistance device of this invention.

FIGURE 3 is a front view of the sensing resistance device of this invention including the internal structure of the device.

FIGURE 4 is a side view of the sensing resistance device of this invention showing the internal structure.

FIGURE 5 shows a series circuit in which the resistance device of this invention may be used.

FIGURE 6 shows a series parallel circuit in which the resistance device of this invention may be used.

FIGURE 7 shows a parallel circuit in which the sensing resistance device of this invention may be used.

FIGURE 8 is a Wheatstone bridge alarm circuit with which the sensing resistance device of this invention may be used.

With reference particularly to FIGURE 1, the television receiver 1 is shown having a wall 2 and including a sensing resistance device 10 of this invention attached to wall 2 and connected to the circuit at 4. FIGURE 2 is a side view of television receiver 1 showing the connection of sensing device 10 connected to the alarm circuit at 4 and attached to wall 2 by screws 16.

The sensing resistance device 10 of this invention is shown in greater detail in FIGURES 3 and 4. Sensing device 10 includes cover 12 and back-plate 14, as best shown in FIGURE 4. The sensing device 10 may be attached to the wall 2, as shown in FIGURE 4, by screws 16. Other means of attaching, such as rivets or a strong adhesive may also be used. Sensing device 10 includes a resistance element 18 attached by a clip 19, a switch 20, including an automatically returning compressible operating member 21, as best shown in FIGURE 4, and a switch 30 attached by a clip 31. Switch 30 is a motion sensing switch preferably a tiltable mercury switch.

As shown in FIGURE 3, resistance element 18, switch 20 and switch 30 are connected in a series circuit by a conductor 17.

Switch 20 may be either normally closed or normally open as desired. In the preferred embodiments, switch 20 has operating member 21 extending through base plate 14, member 21 being maintained in the compressed position by mounting sensing device 10 in confronting relation to wall 2 in a manner shown in FIGURE 4. If an attempt is made to remove sensing device 10 from wall 2, operating member 21 automatically returns to its normal position thereby giving a signal as hereinafter described. Thus it will be seen that it is impossible to remove sensing device 10 without supplying a signal to an alarm circuit, for example, the circuit of FIGURE 8 which will be described hereinafter.

Switch is sensitive to tilt or to movement. In the preferred embodiments, switch 30 is a mercury switch which may be either normally closed or normally open. If an attempt is made to move the television set, or any other article to which sensing device 10 is attached, switch 30 is actuated by the movement of the mercury, thereby giving a signal to the alarm circuit, as will be described hereinafter.

It is apparent that it is impossible for a person either to move the television set to any substantial degree or to remove the sensing resistance device without giving a signal to the warning circuit.

Switches 20 and 30 are selected to be normally opened or normally closed depending on the desired circuit.

FIGURE 5 shows a series circuit including switches of the type described before. Switch 25 is mechanically the same as switch 20 described before. In the circuit of FIGURE 5, switch 25 is normally open and in series

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with resistance element 18 and a normally closed movement sensitive switch 35. This circuit is connected at points A to the warning circuit of FIGURE 8 which operates in the manner described hereinafter.

FIGURE 6 is a series parallel circuit including normally open switch 26, mechanically analogous to switch 20, in series with resistance element 18. Normally open switch 26 and resistance element 18 are in parallel with normally open movement sensitive switch 36. This circuit is attached at points A to the circuit of FIGURE 8.

FIGURE 7 is a parallel circuit including resistance element 18 and normally closed switch 27, analogous to switch 20 of FIGURE 3, and normally open switch 37 which is of the movement or sensitive type described heretofore. The circuit of FIGURE 7 is attached to the alarm circuit of FIGURE 8 at points A.

The alarm circuit of FIGURE 8 is a Wheatstone bridge 40 comprising a plurality of resistance elements 41, 42, and 43. Resistance element 41 is connected between points C and D, resistance element 42 is attached between points D and D', and resistance element 43 is attached between points C' and D'. The warning signal indicator, for example, a lamp 44 is connected between points D and E'. Wheatstone bridge 40 receives its power from a voltage source which may be A.C. or D.C. connected at points B. The sensing device of this invention is attached at points A to electrically balance Wheatstone bridge 40 which normally is in the electrically unbalanced condition when sensing device 10 of this invention is not properly attached at points A. When sensing device 10 is properly attached to points A, the Wheatstone bridge 40 is in an electrically balanced condition; however, if the sensing device 10 is disconnected from points A, an electrically unbalanced condition occurs in Wheatstone bridge 40 and voltage is applied from points D and D' to lamp 44, causing lamp 44 to flash, thereby giving a warning to the manager or an employee of the establishment. In a similar manner, a voltage will be applied at points D and D' to lamp 44, giving a warning if resistance element 18 of sensing device 10 is shorted out of the circuit. An increase in resistance of the sensing resistance device will also cause Wheatstone bridge 40 to produce an electrical imbalance signal across points D and D' to lamp 44. It will, of course, be understood that indicator lamp 44 is used merely as illustrative of the type of warning device which may be used. In the preferred embodiment alarm circuit, including a Wheatstone bridge, a sensitive electronic switching circuit is used. Such a warning circuit is described in my previously referred to co-pending application.

With reference now to FIGURE 5, when the circuit of FIGURE 5 is attached at points A to Wheatstone bridge 40, of FIGURE 8, the Wheatstone bridge 40 will be in an electrically balanced condition if both switches 25, corresponding to switch 20 in FIGURES 3 and 4, and switch 35, corresponding to switch 30 of FIGURES 3 and 4, are closed. In this embodiment, FIGURE 25 is a normally open switch which will be held in the closed position when the sensing device 10 is mounted against a wall 2, thereby compressing operating member 21. If an attempt is made to remove sensing resistance device 16 from wall 2, operating member 21 will return to its normal position, opening switch 25, thereby causing an electrical imbalance signal to be applied to indicator lamp 44 or other alarm circuit as may be provided. Similarly, switch 35, which is of a motion sensitive type, is normally closed and any attempt to move or tilt television set 1 to which sensing device 10 is attached will open switch 35, thereby causing an electrical imbalance signal to be applied to indicator lamp 44 or other alarm circuit.

The circuit of FIGURE 6 operates in a similar manner with regard to switch 26 which is of the normally open type, but which is held in a compressed closed condition when sensing device 10 is mounted on wall 2 as shown

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in FIGURE 4. Thus an attempt to remove sensing device 10 from wall 2 will cause switch 26 to be opened, thereby producing an electrical imbalance signal at lamp 44 or such other alarm system as may be provided. In the circuit of FIGURE 6, motion sensitive switch 36 is normally open. An attempt to move or to tilt television receiver 1 to which sensing resistance device 10 is attached will cause switch 36 to be closed, thereby applying an electrical imbalance signal to indicator lamp 44 or other alarm circuit.

The circuit of FIGURE 7 operates in the manner described in FIGURE 6 with respect to switch 37 which is of the motion sensitive type and which is normally open. A signal will be developed when an attempt is made to move or to tilt television set 1 in the manner described with reference to FIGURE 6. In the circuit of FIGURE 7, switch 27, which is of the compression type, is a normally closed switch which, upon being compressed, is held in the open position. An attempt to remove sensing resistance device 10 from wall 2 will cause switch 27 to return to its normally closed position, thereby shorting out resistance element 18 thus causing an electrical imbalance signal to be applied to indicator lamp 44 or other alarm circuit at points D and D'.

The preferred embodiment of this invention has been described but it will be apparent that many alterations and variations may be incorporated in or added to this invention without departing from the spirit thereof. In particular, it should be noted that the sensing resistance device of this invention will be most effective when used in co-operation with an alarm circuit of the type described in my above mentioned co-pending application.

Having described my invention and the manner of making and using it, I claim:

1. In 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 having disposed therein a sensing resistance device and remotely located means for detecting changes with respect to said sensing resistance device and giving an alarm in response to such changes with respect to said sensing resistance device due to movement of or tampering with said television receiver the improvement wherein said television receiver has disposed therein

a sensing resistance device comprising

a resistance element and at least one switch for effecting a change in the over-all electrical resistance of said sensing resistance device in response to movement of or tampering with said television receiver;

said sensing resistance device including a switch having an automatically returning compressible operating member, said resistance device being attached to said television receiver thereby causing said switch operating member to be held in the compressed position only while said resistance device is properly attached to said television receiver,

and wherein said sensing resistance comprises a Wheatstone bridge normally balanced with said resistance element connected therein as an arm thereof.

2. The system of claim 1 wherein said switch is a normally open switch electrically connected in series with said resistance element.

3. The system of claim 1 wherein said switch is a normally closed switch electrically connected in parallel with said resistance element.

4. The system of claim 1 including a movement sensitive switch.

5. The system of claim 4 wherein said movement sensitive switch is a normally open switch electrically con-

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nected in parallel with said resistance element thereby electrically to short out said resistance element in response to movement of said television receiver.

6. The system of claim 5 wherein said movement sensitive switch is a normally closed switch electrically connected in series with said resistance element thereby electrically to open the path to said resistance element in response to movement of said television receiver.

7. The system of claim 1 wherein said sensing resistance device includes a movement responsive switch.

8. The system of claim 7 wherein said switch is a normally open mercury switch connected electrically in parallel with said resistance element thereby to short out said resistance element in response to movement of said television receiver.

9. The system of claim 7 wherein said switch is a normally closed mercury switch electrically connected in series with said resistance element thereby to open the

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electrical circuit to said resistance element in response to movement of said television receiver.

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