

PATENT SPECIFICATION (11)

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(54) THEFT PREVENTION DEVICE

(71) I, MOTOHIRO GOTANDA, a Japanese Subject, residing at No. 6—29, 3-chome, Inokashira, Mitaka City, Tokyo, Japan, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to a theft prevention device.

Many electrical alarm devices have been proposed for avoiding thefts in rooms of a building. In such devices, a power source is switched on when a person leaves a room and the lock of a door is fastened from outside. When the person sets on the power source inside the room and leaves the room, he needs to open terminal switches which are usually provided on the door the opening or closing of which actuates terminal switches so that the alarm devices unexpectedly operate and issue an alarm signal. To avoid such undesirable operation, the switches for setting ON or OFF the power source of alarm devices are located conventionally on the outside of a room or building, preferably in a place which is inaccessible to other persons, or such switches are kept in a locked box. Thus, in a building having several rooms, the power source switches are usually all located in a caretaker's room.

However, the arrangement is useless if the caretaker should fail to set ON the power source of the alarm devices even if all doors of the building or room have been locked.

It frequently happens in conventional alarm devices that when the alarm device has been set ON in a room, the caretaker enters the room without setting OFF the power source switch located on the outside of the room. On opening the door of the room the alarm is actuated so that he or other persons will erroneously take it for an emergency alarm. At other times, an intruder may raid the caretaker's room while the caretaker is absent, disconnect the alarm

devices or destroy the power source switch so that the intruder may break into a room.

According to the present invention there is provided a theft prevention device for a building or room of a building said device including electrically operable alarm means, a power source for energising the alarm means via normally open switch means for connecting said power source to said alarm means, said switch means being arranged to be closed upon locking of a door of the room or building to connect said power source to said alarm means, said switch means being located in a recess in a door frame, which recess accommodates a locking member when said door is locked, the switch means being closed when said locking member is moved into said recess, further switch means actuatable in response to the opening or closing of a window or a door of said building or room such that when said switch means is closed to connect said power source to said alarm means, the alarm means is energised when any of said further switch means is opened, and a breakable conductor disposed adjacent said further switch means, the arrangement being such that when said further switch means is closed and the breakable conductor is broken, said alarm means is energised.

The invention will be described now by way of example only with particular reference to the accompanying drawings. In the drawings:

Fig. 1 is a view of a main door and other doors of a room provided with a device in accordance with the present invention;

Fig. 2 is a circuit diagram of the theft prevention device shown in Fig. 1;

Fig. 3 is a section of a locking switch means of a device according to this invention;

Fig. 4 is a view showing the operating member of the lock switch of Fig. 3;

Fig. 5 is a side view partly in section of the switch of Fig. 3;

Fig. 6 is a side view of a fixing board of the switch of Fig. 3;

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Fig. 7 shows an embodiment in which a door switch is arranged in the upper part of a door;

Fig. 8 is a view showing in more detail the door switch of Fig. 7;

Fig. 9 is a perspective view of another embodiment of a lock switch of a device in accordance with the present invention;

Fig. 10 shows a further embodiment of a lock switch in a device according to the present invention;

Fig. 11 is a further embodiment in which a reed switch and breaking conductor are provided in a fixing board of the switch of Fig. 9;

Fig. 12 is an enlarged perspective view of a cross section taken along the line XVII—XVII of Fig. 11;

Fig. 13 is a circuit diagram of another embodiment of a theft prevention device in accordance with the present invention, and

Fig. 14 shows an embodiment in which a number of alarm circuits for theft prevention means of this invention are provided.

Referring to Fig. 1 a compartment room of a building, comprises a main door 1a, a secondary door 1c, and a window 1b. The main door 1a has a lock operable switch SW₁ provided on the door frame 2. The secondary door 1c and window 1b are respectively provided with door switches SW₂ at selected positions on the walls of the room. The door switch SW₂ can be located in any appropriate position near the main door 1a, for example, at the upper part thereof. Fig. 1 shows all the doors being closed and the door switch SW₂ closed. The lock switch SW₁ of the main door 1a is open, that is, the main door is not locked. The main door 1a has a handle 4 for opening and closing the door and a keyhole K into which a key can be inserted to lock the door.

The electrical circuit used with the door shown in Fig. 1 is illustrated in Fig. 2. The circuit consists of an AC or DC source S, switch means SW, and an alarm A¹. The switch means SW comprises a lock switch SW₁ disposed on the main door and which is opened and closed to movement of the dead bolt of the lock of the door; a switch SW₂ disposed at a preferred place about the main door 1a or secondary door 1c, or window 1b and a breakable conductor BC adjacent to the switches SW₁ and SW₂. The alarm device A¹ comprises a coil Co, a relay Ry including a movable contact member C₁ and a fixed contact member C₂ and a buzzer Bz.

The circuit operates as follows.

The switch SW₂ is opened or closed in response to the closing or opening of the door 1a or window 1b as shown in Fig. 1. The lock switch SW₁ is not closed unless the door 1a is locked by operation of the dead

bolt, so that although the door switch SW₂ is closed, the buzzer Bz of the alarm device A¹ will not operate while door 1a is unlocked. As soon as the dead bolt is operated to lock the door 1a the lock switch SW₁ is closed. If second and other doors and windows are closed and their switches SW₂ are closed, a current flows in the coil Co of the relay Ry. The contact member C₁ is attracted to the coil side Co and released from contact with the fixed contact member C₂. In this way, when the door 1a is locked the power source of the alarm device A¹ is connected to the alarm but the buzzer will not operate. If anyone should unexpectedly open a door provided with a door switch SW₂ or forcibly open the door the door switch SW₂ is opened or the breaking conductor BC is broken. As a result the circuit is broken and the coil Co is de-energized. The movable contact member C₁ and the fixed contact member C₂ move into contact so that the buzzer Bz operates.

If one of the doors or windows is left open when the door 1a is locked, the buzzer Bz will operate and give a notice to a person that all the doors and windows are not completely closed.

Fig. 3 and Fig. 4 show in more detail a lock switch SW₁ used in the electrical circuit of Fig. 2. The lock switch SW₁ is attached to the back side of a fixing board 8. In this construction, a conventional micro-switch is usually employed. The lock switch SW₁ is provided with an operating member L₁ made of resilient material. As the dead bolt 6 enters the aperture 9 at the lower part of the fixing board 8, the operating member L₁ is pushed upwardly and this in turn pushes the operating rod LW₁ of the lock switch SW₁ so that the lock switch is closed.

Fig. 5, together with Fig. 3 illustrates the breakable conductor BC provided in the casing 10 attached to a side of the fixing board 8. Fig. 6, together with Fig. 3, illustrates the attachment of the lock switch SW₁ to the fixing board 8. The drawings illustrate that the breaking conductor BC is provided on the outside of the lock switch SW₁, i.e., outside the room.

The breaking conductor BC attached to the casing 10 as described above normally consists of a material such as glass, porcelain or plastic film, which may be coated with an electrically conductive film produced by surface electroplating or spattering, or otherwise an electro-conductive material which is readily breakable itself by external force or otherwise destroyable to break the circuit. The breaking conductor is arranged such that when the casing 10 is deformed by external force the circuit is broken.

The embodiments shown in Figs. 7 and 8 each have a door switch SW₂ located in a 130

preferred place on the second door 1b, in which an operating member L_2 is arranged so as to project from the door frame 2. When the door 1b is closed, the member L_2 is compressed to actuate the operating rod LW_2 of the door switch SW_2 so as to close the door switch SW_2 . In this embodiment, Fig. 7 is a view as seen from the inside of the room. In Fig. 8, the upper part of the figure shows the inside of the room. The switch may be a micro-switch, non-contact switch or any other type of switch as the case may require.

Fig. 9 shows a reed contact unit RS used in the lock switch SW_1 provided inside the room and near the lower aperture 9 of the fixing board 8 and the breaking conductor BC is on the outside of the room. On the dead bolt 6 is attached a permanent magnet M for actuating the reed contact unit RS. As the dead bolt 6 moves back and forth through the lower aperture 9 at the lower part of the fixing board 8 the reed contact unit RS is opened or closed.

Fig. 10 is an embodiment in which the lower aperture 9 of the fixing board 8 is covered with a case 11 and the reed contact unit RS is provided on the inside of the room while the breaking conductor BC is fixed on the outside of the room, with this arrangement even if the tip end of the dead bolt 6 is skillfully cut off from outside, the cut-off portion may be left in the case 11 so that the reed contact unit RS remains closed and the power source may not be cut off.

Fig. 11 illustrates an embodiment, in which the reed switch RS portion is fitted to a lateral slot H on the inside of the room about the lower aperture 9 provided on the fixing board 8 and the breaking conductor BC is fitted to another lateral slot H^1 . The contact unit RS and conductor BC are both secured by adhesive and are electrically connected.

Fig. 12 shows a cross section taken along the line XVII—XVII of Fig. 11, and particularly shows the method of attachment of the breaking conductor BC and reed contact unit RS.

As illustrated in the above drawing, the breaking conductor BC is insulatedly fixed to the fixing board 8 and the casing 10 in the rear part thereof and also the same conductor is provided on the outside of the lock switch SW_1 or on the outside of the room such that before the lock switch SW_1 is broken the breaking conductor BC has to be broken. As a consequence, when the breaking conductor BC is broken or destroyed by external force, the circuit is cut off and the buzzer is caused to operate.

Fig. 13 shows an example of the application of the above electrical circuit. In the circuit, all door switches are connected in series and the breaking conductor also con-

nected in series. The reed switch RS being the lock switch SW_1 is closed as the dead bolt 6 having a permanent magnet M contacts is in the locked position. The thyristor SCR actuates the buzzer Bz when it conducts. The circuit comprises a transistor Q to open or close the gate of the thyristor SCR, resistors $R_1 - R_n$, and a DC or AC source S. In this embodiment, if all doors are closed and the door switches SW_2 are closed, the transistor Q is non-conductive because a negative potential is applied to the base even though the reed switch RS is closed by virtue of the door being locked. Accordingly, the thyristor SCR is non-conductive and the buzzer is not actuated.

If the breaking conductor BC is cut off or one of the door switches SW_2 is opened, the transistor Q is actuated to apply a voltage to the gate of the thyristor SCR which in turn becomes conducting. Conduit flows from the power source S to buzzer Bz issuing an information that an emergency has occurred. Thus, the reed contact unit RS is opened and the buzzer Bz ceases to operate.

The circuit of Fig. 14 comprises a number of alarm means $A^1_1 - A^1_n$ operated by one lock switch SW_1 . All the alarm means are operated by setting one of the lock switches ON by the person working in the controller's room. In this arrangement, the control of rooms in the building can be much more facilitated.

This arrangement includes a check lamp board CL in the controller's room, neon lamps $N_1 - N_n$ and resistors $R_1 - R_n$ in parallel and respectively corresponding to the alarm $A^1_1 - A^1_n$ and in series with switches $SC_1 - SC_n$. If the switches $SC_1 - SC_n$ are closed and the neon lamps $N_1 - N_n$ corresponding to the switches $SC_1 - SC_n$ are lighted, this indicates that the circuit is operating normally. The check lamp board CL may be designed such that the neon lamps and resistors disposed in parallel are connected in series to the coil Co of the relay Ry (shown in Fig. 7).

A feature of the present device is that it can connect a power source to theft prevention means when a door is locked. A conventional door may be modified for use with the present device. It may have a great value for buildings which have become much higher and larger recently and have a large number of rooms as well as for the security of the rooms of those buildings.

The present device has a lock switch on a door of a room or building, the lock switch being used for switching ON or OFF the power source of an alarm device. When the door is locked so that the dead bolt in the door engages a hole in the door frame the lock switch is closed, whereby locking of the main door of each room will connect the

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power source to the alarm devices. The construction avoids the failure of issuance of an alarm upon emergency during the absence of the controller. Also, difficulties in providing a power source for the alarm device separately after locking of the door can be avoided.

When the main door is opened, the lock member is moved back to its initial position and the power source is cut off.

The alarm device does not operate so that the controller can confirm the power source is cut off. Thus, he will not fail to cut off the power source before he opens the door as he enters the room although he often forgets when he uses a conventional devices. Nor will a door being opened cause an alarm to be issued erroneously.

Therefore, there is provided a device for connecting power source to an alarm device which allows a person to lock a door from inside for the sake of safety when he stays at home. The person then can prevent the entry of a intruder from outside. It is possible for him to issue an emergency alarm by setting a terminal of the alarm device OFF when he is in the room and feels a danger from outside.

WHAT I CLAIM IS:—

1. A theft prevention device for a building or room of a building said device including electrically operable alarm means, a power source for energising the alarm means via normally open switch means for connecting said power source to said alarm means said switch means being arranged to be closed upon locking of a door of the room or building to connect said power source to said alarm means, said switch means being

located in a recess in a door frame, which recess accommodates a locking member when said door is locked, the switch means being closed when said locking member is moved into said recess, further switch means actuatable in response to the opening or closing of a window or a door of said building or room such that when said switch means is closed to connect said power source to said alarm means, the alarm means is energised when any of said further switch means is opened, and a breakable conductor disposed adjacent said further switch means, the arrangement being such that when said further switch means is closed and the breakable conductor is broken, said alarm means is energised.

2. A theft prevention device as claimed in claim 1 wherein said switch means includes an operating member which projects into said recess, said operating member being movable by a locking member of the door to close said switch means.

3. A theft prevention device as claimed in claims 1 wherein said switch means includes a reed contact unit actuatable by a magnetic member provided on the locking member of the door.

4. A theft prevention device substantially as herein described with reference to and as illustrated in Figures 1 to 6, 7, 8, 9, 10, 11 and 12, 13 and 14 of the accompanying drawings.

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