United States Patent

Harman

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[54] MAGNETIC DOOR ALARM

[72] Inventor: **Bennett B. Harman**, Bayside, N.Y.

[73] Assignee: **Door Alarm Device Corp.**, New Hyde Park, N.Y.

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[52] **U.S. Cl.** **335/207**

[51] **Int. Cl.** **H01h 51/28**, H01h 36/00

[58] **Field of Search** 335/205–207

[56] **References Cited**

UNITED STATES PATENTS

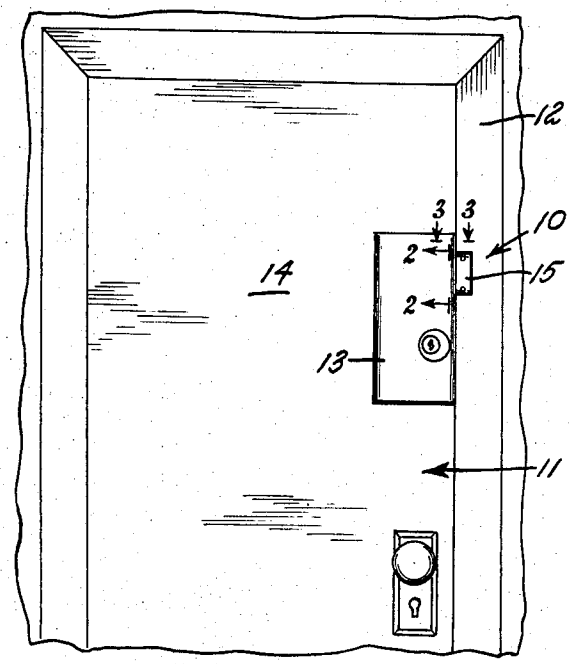
2,912,540	11/1959	Sawicki	335/207 X
3,161,742	12/1964	Bagno	335/207 X
3,187,129	6/1965	McBrian	335/205 X
3,544,934	12/1970	Poliakoff	335/206

Primary Examiner—Bernard A. Gilheany
Assistant Examiner—R. N. Envall, Jr.
Attorney—Charles E. Temko

[57] **ABSTRACT**

A magnetic door alarm for use in conjunction with normally unlocked emergency exit doors of a type in which an audible signal is produced when the door is opened by unauthorized persons. The device includes a housing normally mounted on an inner surface of the door which normally swings outwardly, the housing containing a first reed switch of normally open type responsive to a magnetic field to move to a closed position. A magnet is positioned within the housing adjacent the reed switch to effect this movement. Mounted on a door jamb or frame is a larger magnet, the polarity of which is opposite that of the first mentioned magnet, so that its magnetic field cancels that of the first magnet when the door is in closed position, whereby the reed switch remains open. Upon movement of the door, the field of the second mentioned magnet is removed, and the reed switch is operated by the magnetic field of the first magnet. If an attempt is made to place an additional magnet adjacent the magnet on the door jamb, the field of the door jamb magnet is either enhanced or cancelled, so that the equilibrium condition is destroyed, and the reed switch is operated by the first mentioned magnet. Additionally, a second reed switch is provided within the casing, electrically connected in parallel with the first switch, and shielded from the magnetic field of the first mentioned and second mentioned magnets, so that unauthorized use of a third magnet in the area of the second magnet will serve to close the second switch and operate the alarm irrespective of the condition of the first mentioned switch.

1 Claim, 6 Drawing Figures



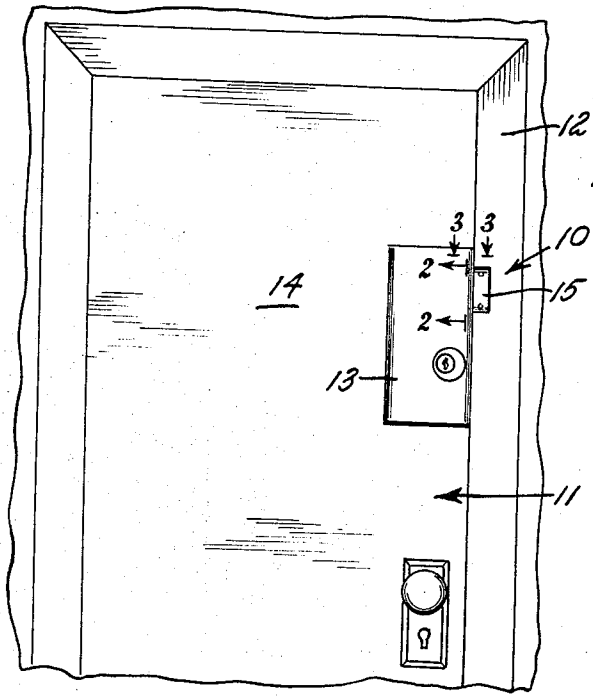


Fig. 1

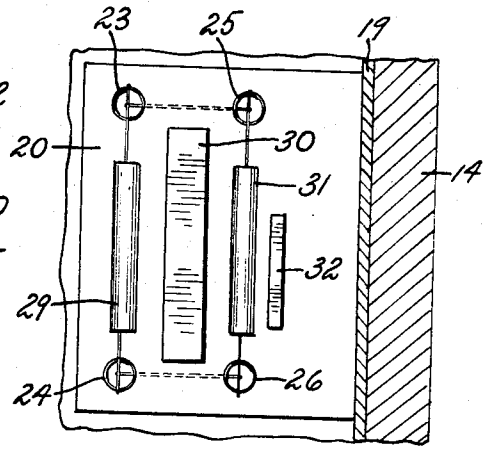


Fig. 2

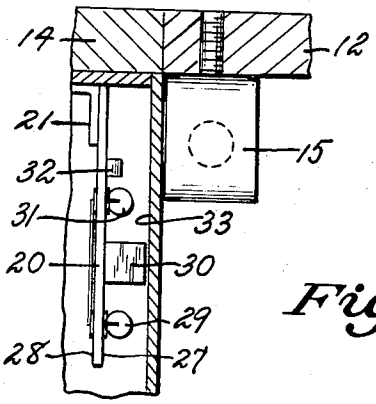


Fig. 3

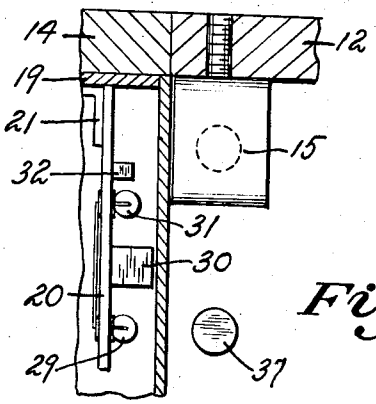


Fig. 5

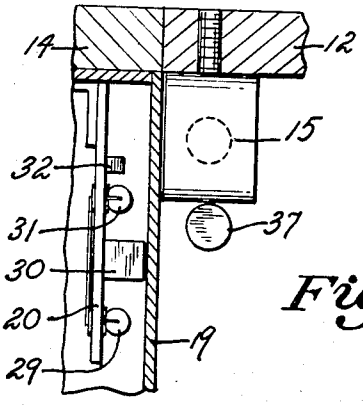
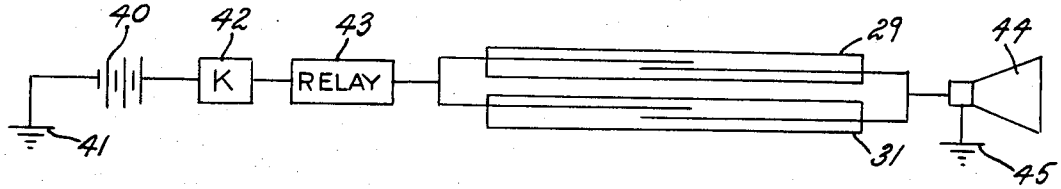


Fig. 4

Fig. 6



MAGNETIC DOOR ALARM

This invention relates generally to the field of magnet door alarms of a type commonly used in conjunction with unlocked emergency exit doors, and more particularly to an exit alarm which is virtually tamper-proof.

Devices of this type normally include a casing which is mounted on the inner surface of the exit door with one edge of the same adjacent a door jam. The casing includes a magnetically responsive switch which is held in opened position by the presence of a permanent magnet which is mounted upon the door jamb in the vicinity of the switch. While the door remains closed, the magnetic field of the magnet maintains the relay in open condition, and when the door is moved away from the magnet, resilient means associated with the relay closes the electrical contacts of the relay to sound an audible alarm. Normally, a switch associated relay is such that returning the door to closed position does not turn off the alarm, which remains operative until authorized personnel arrive to operate a key switch.

Alarms of this type can be de-activated by the careful manipulation of an additional magnet positioned adjacent the door jamb mounted magnet in such manner that it will move with the casing as the door is opened. This magnet will continue to supply the magnetic field necessary to maintain the relay in opened condition, whereby the alarm is not sounded, although the door is maintained open. Once the door has been opened, access to the casing is possible, and the alarm can be disassembled while maintaining the additional magnet in the proper location.

It is therefore among the principal objects of the present invention to provide an improved magnetic door alarm, in which the above mentioned possibility has been substantially eliminated.

Another object of the invention lies in the provision of an improved magnetic door alarm which will be activated by the presence of a magnet placed in position by unauthorized personnel, irrespective of the manner of its use, and the orientation of such magnet with respect to polarity.

Yet another object of the invention lies in the provision of an improved magnetic door alarm switching means which may be readily incorporated into existing prior art magnetic alarm devices with a minimum of modification.

A further object of the invention lies in the provision of an improved magnetic door alarm device in which the cost of fabrication may be of a relatively low order, with consequent wide sale, distribution and use.

These objects, as well as other incidental ends and advantages, will more fully appear in the progress of the following disclosure, and be pointed out in the appended claims.

Briefly stated, the invention contemplates the provision of first and second reed switches interconnected in parallel within the alarm circuit. Each of the switches is normally in an opened condition, in the absence of a magnetic field, each being closed by the presence of a magnetic field. A small magnet is positioned adjacent one of the reed switches to induce it to closed position. The second of the switches is provided with magnetic field insulating means so as not to be affected by said magnet. Both switches, the magnet and the magnetic shielding means are incorporated into the casing of the alarm positioned adjacent a door edge. An externally positioned magnet is mounted on the door jamb opposite the first mentioned magnet, the externally mounted magnet having a field strength substantially greater than the first mentioned magnet, and being positioned a greater distance from the unshielded switch tends to neutralize the field of the first magnet so that the switch remains in opened condition. Relative movement between the two magnets destroys the equilibrium condition, and an effective magnetic field closes the first switch. Should an additional magnet be placed in proximity with the external magnet, depending upon the relative polarities, the effective field will be either increased or decreased with respect to equilibrium, and the switch will thus be closed. Should the manipulation of the third magnet be such as to bring it into proximity with the second switch, this switch will be closed, irrespective of the condition of the first mentioned switch, again sounding the alarm.

In the drawing, to which reference will be made in the specification, similar reference characters have been employed to designate corresponding parts throughout the several views.

FIG. 1 is a view in elevation showing an embodiment of the invention in installed condition upon a door and adjacent door jamb.

FIG. 2 is an enlarged view in elevation showing a panel mounting magnetically operated switches comprising a part of the embodiment.

FIG. 3 is a top plan view showing the panel mounted upon a chassis, and enclosed by a casing to be positioned opposite an externally mounted magnet, as when the door upon which the device is mounted is in closed condition.

FIG. 4 is a similar top plan view illustrating the positioning of an unauthorized magnet adjacent the externally mounted magnet.

FIG. 5 is a similar plan view showing the positioning of an unauthorized magnet in spaced relation with respect to the external magnet.

FIG. 6 is an electrical schematic wiring diagram showing the interconnection of the panel of FIG. 2 within the alarm circuit.

In accordance with the invention, the device, generally indicated by reference character **10**, is illustrated in FIG. 1 of the drawing in installed condition with respect to an emergency door **11** mounted within a door jamb **12**. Although a reversal of parts is in some instances possible, normally the alarm system will be disposed within a casing **13** mounted on a surface **14** of the door **11**, to be maintained in inactive condition by a bar magnet **15** mounted externally of the casing on the jamb **12**.

As is conventional, the casing is mounted by means not shown on a chassis **19** which is thereby covered. Also mounted on the chassis at substantially right angles thereto is a planar switch panel element **20** supported by bracket means **21**. The panel is preferably formed of insulated material, such as sheet synthetic resin, and is penetrated by electrically conductive grommets **23**, **24**, **25** and **26** between an inner surface **27** and an outer surface **28** (see FIG. 3). Mounted by grommets **23** and **24** is a first reed switch **29** of conventional type. Disposed immediately adjacent is an elongated magnetic shield means **30**. A second reed switch **31** is supported by the grommets **25** and **26**, and immediately adjacent thereto is a small bar magnet **32** of relatively low field strength, sufficient to activate the second reed switch **31**.

Referring to FIGS. **3**, **4** and **5**, the panel element **20** is located immediately adjacent an inner surface **33** of the casing **13**, such that when the chassis **19** is mounted upon the door, the switch **31** will be positioned adjacent the external bar magnet **15** when the door is closed. The bar magnet **15** is substantially larger than the bar magnet **32**, and the polarity is such that the field is in opposite directions, such that the field of the magnet **32** is cancelled insofar as its effect upon the second switch **31** is concerned. Thus, when the door is closed, equilibrium is maintained. With the opening of the door the effective field of the external magnet **15** is reduced, and the switch **31** is then closed to activate the alarm.

As has been mentioned, the most common way of de-activating alarms of this type by unauthorized persons is by use of an additional bar magnet employed to supply the field supplied by the fixed external bar magnet when the door is moved to an opened condition. This is usually manually positioned, and maintained by the fingers of the user with or without the presence of an additional support to maintain proper field strength as the door is moved to prevent the relay from closing. FIG. **4** illustrates the effect of placing such a magnet, indicated by reference character **37** in position adjacent the external bar magnet **15**. Although the polarity of the external magnet is normally unknown to such persons, it can be determined by the use of a pocket compass, and the additional mag-

net 37 can be placed to coincide in polarity, whereby the field strength will be augmented until the door is moved to opened condition. When such a procedure is attempted in the instant device, the increase in field strength then destroys the equilibrium of magnetic field existing between the magnet 15 and the magnet 32, thus closing the switch 31. Should the magnet be positioned with reverse polarity, the field strength of the magnet 15 is neutralized, and the magnet 32 then has an effective field strength sufficient to close the switch 32.

FIG. 5 illustrates the positioning of the magnet 37 is somewhat spaced relation to the magnet 15 in an attempt to neutralize the effect of the magnet 32 without either increasing or decreasing the field of the magnet 15. To accomplish this, the magnet 37 must be placed in a position proximal to the first switch 29, which being shielded from the fields of the magnets 15 and 32, responds to the field of the magnet 37 and closes, thus again activating the alarm circuit. Normally, owing to the position of the casing 13 with respect to the door jamb 12, access to the magnet 15 is available only on one side thereof.

FIG. 6 illustrates a typical alarm circuit, variations of the same being possible within the scope of the invention. A battery 40, is grounded at 41, and connected to a key switch 42 whereby the circuit may be de-activated by authorized personnel. Connected in series with the switch 42 is a locking relay 43 which is locked by the closing of either switch 29 or switch 31, both switches being connected in series — parallel with an audible device 44 which is grounded at 45.

We wish it to be understood that we do not consider the invention limited to the precise details of structure shown and set forth in this specification, for obvious modifications will occur to those skilled in the art to which the invention pertains.

We claim:

1. Improved switching means for a magnetic emergency door alarm of a type including a casing mounted upon a surface of a door and a permanent magnet mounted upon an adjacent door jamb, comprising: a panel mounted within said casing having a planar surface substantially perpendicular to the plane of said door, a magnetically responsive normally open reed switch, magnet means disposed upon said panel adjacent said switch of field strength sufficient to maintain said switch in closed condition, said panel being so positioned within said casing as to lie in adjacent relation with respect to said permanent magnet when said door is in closed position, with said switch juxtaposed thereto; a second magnetically responsive normally open switch magnetically shielded from the field of said magnet means, and positioned parallel to said first mentioned switch, and connected in electrically parallel relation thereto; whereby said first mentioned magnet, the polarity of which is opposite to that of said magnet means serves to cancel the magnetic field of said magnet means when said door is in closed position, and upon movement of the door, the field of the magnet is removed, and the first reed switch is operated by the magnetic field of the magnet means, and said second magnetically responsive switch at all times remains sensitive to the unauthorized use of an external magnet to operate the alarm irrespective of the condition of the first mentioned switch.

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