United States Patent

McDaniels, deceased

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[54] **ALARM DETECTOR SWITCH ASSEMBLY**

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[52] **U.S. Cl.** .....**200/61.93,** 339/19, 340/276, 339/31 R

[51] **Int. Cl.**.....**H01h 3/02**

[58] **Field of Search** ...200/61.93, 163; 340/276, 274; 339/19, 22 R, 31 R, 252 P, 154 R

[56] **References Cited**

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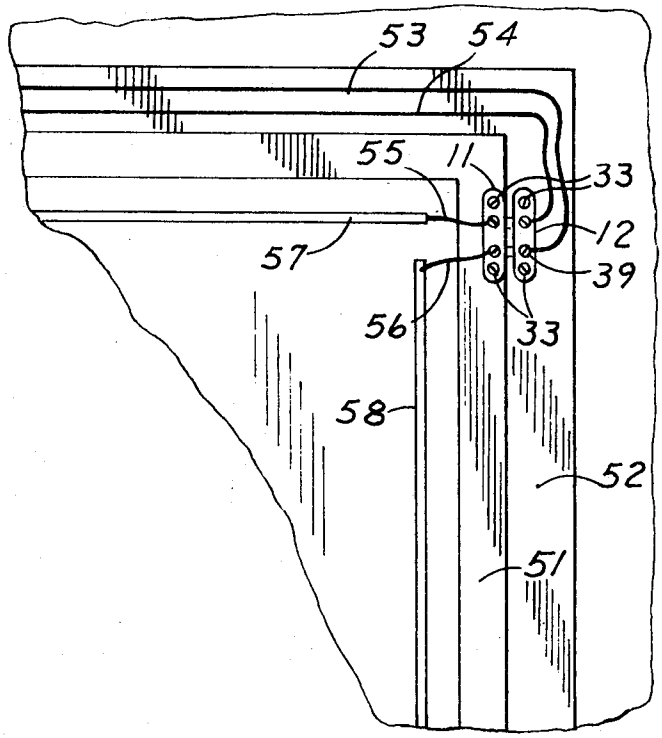
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Assistant Examiner—M. Ginsburg
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[57] **ABSTRACT**

A detector switch assembly for use in an alarm circuit includes a set of cooperating connecting members specifically adapted to mount on a door or window structure or the like to sense unauthorized movement thereof. Each connecting member includes a similar outer support housing with interchangeable male and female conductive connector blocks releasably inserted into separate compartments in the housings with each block being reorientable in each housing relative to the disposition of that housing. A male plug projects from a face of the block in one of the housings and is adapted to releasably insert into an aligned inwardly extending jack hole in the block in the other housing to establish an electrical connection between the connecting members which connection is broken when one of the connecting members is moved away from the other. A dummy connecting member is releasably received by one of the set of connecting members to permit use of the door or window without actuation of the alarm circuit.

11 Claims, 10 Drawing Figures



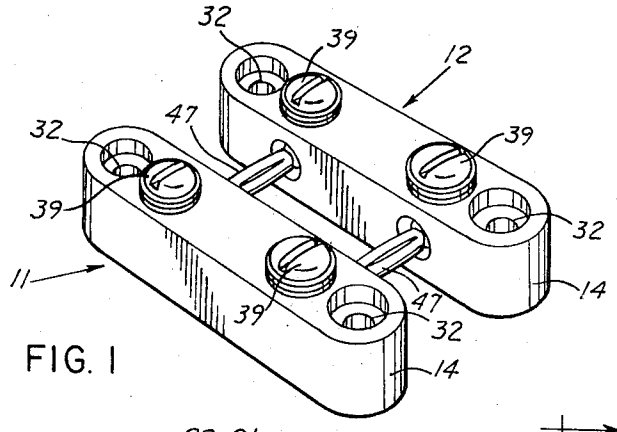


FIG. 1

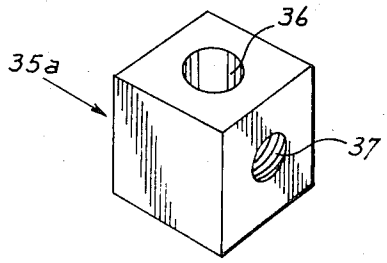


FIG. 4

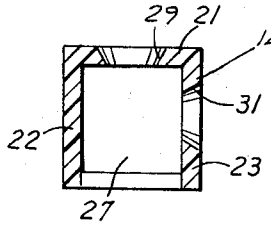


FIG. 3

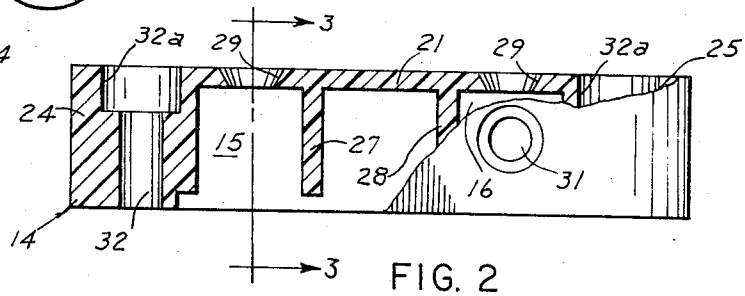


FIG. 2

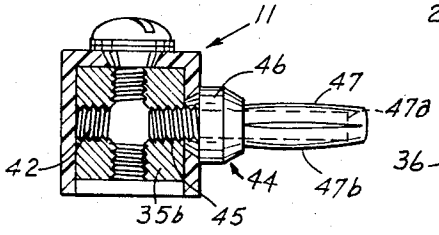


FIG. 5

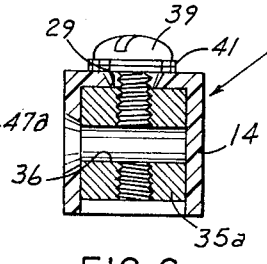


FIG. 6

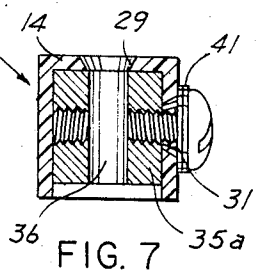


FIG. 7

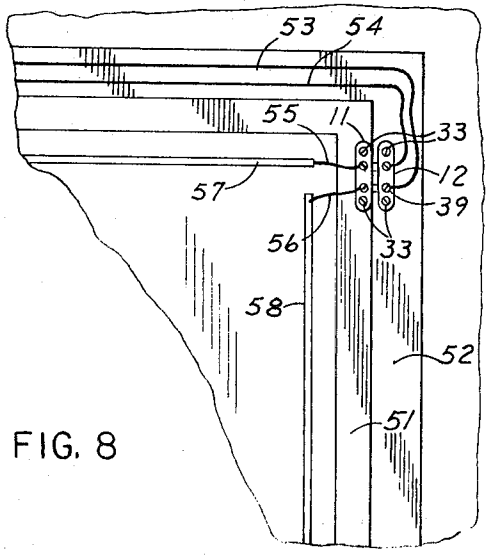


FIG. 8

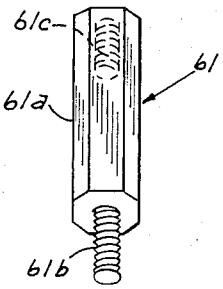


FIG. 9

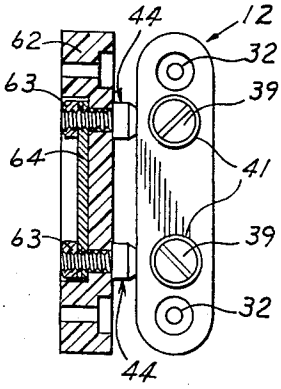


FIG. 10

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ALARM DETECTOR SWITCH ASSEMBLY

This invention relates to novel and improved alarm detector switch apparatus for anti-theft alarm systems and the like which is particularly suitable for detecting the unauthorized movement of windows, doors and the like.

One approach presently in use in detecting the presence of persons on premises is to detect the movement of structures such as doors and windows and the like. This has been done by the use of an electrical switch or electrical contacts connected in an alarm circuit and mounted on the structure in such a way that when the structure is moved the circuit is interrupted and an alarm signal is sounded. Electric switches for this purpose are required to be durable, flexible and provide a positive contact to avoid premature alarm signals. Switches heretofore provided for detector purposes have utilized integral structure for both the male and female connectors and have required different parts for different mounting requirements. Previous switches have not had an effective way of disabling the circuit when their use is not required.

Accordingly, it is an object of this invention to provide a novel and improved alarm detector switch assembly for use in an alarm circuit having interchangeable parts which provides a reliable positive connection between the operating contact surfaces of the connectors.

Another object of this invention is to provide a novel detector switch assembly adapted for mounting on doors, windows and the like and having interchangeable male and female conductive connector blocks which permit the use of the same housing for both types and with each block being capable of being reoriented in the housing for versatility in disposing the connectors in different positions relative to the support structure using the same parts.

Yet another object of this invention is to provide an improved detector switch assembly for alarm circuits which is simple and relatively inexpensive to manufacture and to mount and is adapted to be disabled by the use of a dummy connector.

In accordance with the present invention, in a preferred embodiment shown there is provided cooperating connecting members adapted to mount on independent, normally adjacent support structures with each connecting member including an outer housing of an electrical insulating material and formed with a pair of compartments opening through the bottom side and the compartments being sized to releasably receive a pair of conductive connector blocks. The blocks are of a corresponding size and shape, preferably cube-shaped, and the compartments have the same shape so that the blocks are both interchangeable and reorientable in the housing compartments. A male plug projects outwardly through one side of one housing and is removably secured to the block in that housing. The plugs are arranged in pairs in each housing for a two-wire circuit and extend generally parallel to one another and align with jack openings in the blocks in the other housing. Each block has an internally threaded opening in a face of the block adjacent the plug or jack connector to receive a terminal screw which serves to secure the block to the housing and electrically connect a circuit wire line to each block. The female of the connecting members receives short-circuited plugs on a dummy connecting member to disable the effectiveness of a selected connecting member in the alarm circuit.

The foregoing objects, features and capabilities of the present invention will be apparent from the following more particular description of preferred embodiments of the invention, as illustrated in the accompanying drawings, in which:

FIG. **1** is a perspective view of a set of cooperating male and female connecting members disposed side by side embodying features of the present invention;

FIG. **2** is a side elevation view of a mountable housing with a portion of one side wall broken away to show the interior construction;

FIG. **3** is a sectional view taken along line **3—3** of FIG. **2**;

FIG. **4** is a perspective view of a lines connector block removed from the housing;

FIG. **5** is a vertical sectional view of a conductive block disposed in the housing supporting a removable banana-type plug-connector;

FIG. **6** is a vertical sectional view of a connector block with a jack opening in place in the housing oriented with the jack opening in alignment with a side opening in the housing;

FIG. **7** is a sectional view of the connector block shown in FIG. **6** but reoriented to dispose its jack opening so as to align with the opening in the top of the housing;

FIG. **8** is a fragmentary elevation view showing the switch assembly of FIG. **1** mounted on a window structure;

FIG. **9** is a perspective view of an extension member for use with the male and female connecting members; and

FIG. **10** is a plan view of the female connecting member having a dummy connecting member inserted thereinto to disable its effectiveness in the alarm circuit.

Referring now to the drawings, the detector switch assembly as shown in FIG. **1** includes a set of cooperating male and female connecting members generally designated **11** and **12**, respectively. The connecting members shown and described herein are arranged in with pairs of aligned male and female connector portions described fully hereinafter for connection in a two-wire circuit, but it is understood that the features of the present invention described herein are applicable to one or more connectors arranged for connection into a circuit having one or more wires or lines.

Each connecting member shown comprises a similar outer housing **14** preferably composed of an electrical insulating material and constructed as a unitary molded structure from plastic or the like. The housing **14** is formed with a pair of longitudinally spaced, inner receptacles or compartments **15** and **16** of corresponding size and shape which open through the bottom of the housing. The housing **14** is formed to provide a top wall **21** together with spaced side walls **22** and **23** and spaced end walls **24** and **25** which extend perpendicularly away from the outer edge of the top wall **21**. A pair of longitudinally spaced divider or partition walls **27** and **28** are disposed between the end walls and extend away perpendicular from the top wall to divide the housing into the two compartments **15** and **16** which

are of a corresponding size and shape. Walls **27** and **28** terminate inwardly of the bottom of the housing. The housing also has an inwardly diverging top opening **29** centered in and leading into each compartment and an inwardly diverging side opening **31** is provided on one side wall and centered in and leading into each compartment. The housing is also provided with vertical mounting hole **32** in each end wall with an upper counterbore portion **32***a* to receive a fastener screw **33** shown in FIG. **8** for securing the housings to selected support structure with the bottom surface of the housing bearing against the support structure.

Interchangeable connector blocks generally designated **35***a* for the female type connecting member and **35***b* for the male type connecting member are of a corresponding size and of a shape corresponding to the housing compartments so that they releasably insert into any of the housing compartments and in such a way that the selected face of the block may be disposed relative to a selected wall of the housing. Each conductive connector block preferably is cube-shaped with the sides or faces thereof being of an equal dimension. The compartments **15** and **16**, then, are also cube-shaped and sized with sufficient clearance so that the blocks will readily releasably insert into the compartments. The cube-shaped arrangement of blocks and housing compartments permits each block to be inserted into the compartments at several positions relative to the walls of the compartments.

The connector block **35***a* for use in the female connecting member **12** has a smooth-sided jack hole **36** centered in and directed inwardly from one side and an internally threaded terminal hole **37** centered in and directed inwardly from an adjacent side. Block **35***a* inserted into the housing compartment has its holes in alignment with the openings in the housing. A terminal screw **39** is shown in FIGS. **1** and **6** as extending through the top opening **29** into the threaded terminal hole **37** of the block and in this way the block is held in the housing. A pair of washers **41** are shown disposed between the head of the terminal screw and housing surface. The positions of the terminal hole and jack opening for the female connecting member **11** may be reversed or interchanged relative to the walls of the housing by removal of the terminal screws **39**, the removal of the block **35***a* from the housing compartment, reorienting it relative to the housing walls by turning it 90° and then reinserting it into the housing compartment as shown in FIG. **7** so that the jack opening **36** is up and in alignment with opening **29** and the threaded terminal hole **37** is aligned with the opening **31** in the side wall and this time the terminal screw **39** is threaded through the side opening **31** of the housing and into the block **35**a to hold the terminal block in place.

The block **35**b for the male connecting member **11** is modified from that for the female connecting member **12** in that it has an inwardly directed, internally threaded holes **42** like that of terminal hole **37** above described which receives the terminal screw **39**.

The male plug member **44** which mounts on block **35***b* is a conventional banana-type construction and includes the externally threaded end portion **45** which threads into the threaded opening **42** in block **35***b*, an enlarged intermediate portion **46** which bears against the outer surface of the housing and an outwardly projecting flexible plug portion **47**. The plug portion **47** has an inner pin section **47***a* which forms a narrowed continuation of the internal portion on which there is supported four axially bowed and radially flexible side sections **47***b* preferably made of a spring steel to provide a friction fit with a positive spreading action in the hole of the cooperating block in the female member. It is understood that the terminal and connector holes in the block may extend only halfway through the block or may extend all the way through the block. In the latter case more than one jack hole and/or plug may be provided in more than one face of the same housing.

The connecting members **11** and **12** are shown installed on a movable window structure in FIG. **8**. Connecting member **11** is mounted on the movable window **51** and connecting member **12** on the adjacent window frame **52**. The connecting members are aligned and positioned in closely spaced adjacent relationship so that the plugs are in a mating engagement inside the jack openings. The connecting members **11** and **12** are on the forward surfaces of these support structures and are secured thereto by a pair of screws **33** which fasten each of the housings to one of the two structures and jack and plug portions in alignment with one another. A pair of wires **53** and **54** which in the alarm circuit are shown connected by the terminal screws **39** on the female connecting member **12**. A pair of wires **55** and **56** which are also connected in the alarm circuit are shown connected by the terminal screws **39** to the male connector member **11**. Strips of conductive foil **57** and **58** are secured to the window frame **51** and connect to lines **55** and **56**, respectively, to facilitate the connection of member **11** to the alarm circuit. The alarm circuit may be of the conventional foil or vibrator type in which the alarm will sound when the circuit is opened and in which the alarm will not sound when the circuit is short-circuited. When the window **51** is opened by sliding it away from the frame **52** the connectors separate to interrupt the circuit. When the window is closed, the electric circuit is again established.

In those installations where the connecting members are not in a closely spaced relation as shown in FIG. **8**, an extension member generally designated **61** shown in FIG. **9** may be used with the connecting members. This extension member **61** includes a hex-shaped body portion **61***a* with a narrowed threaded portion **61***b* at one end which threads into a threaded hole in the connector block of the connecting member and an internally threaded hole **61***c* in the other end will then receive the threaded end portion of the plug.

Referring now to FIG. **10**, the female connecting member **12** is shown in combination with a dummy connector including a body or housing **62** composed of an electrical insulating material and constructed as a unitary molded structure from plastic or the like having a pair of male plug members **44** projecting outwardly from the body with the threaded end portions extending into apertures in the body and secured in place by nuts **63** threaded on the threaded end portions. A conductive shorting bar **64** is held in place in a recess in the body by the nuts which serves to short-circuit the male plugs **44**. In any alarm circuit there will be more than one connector assembly and the dummy connector is used to disable a selected connector switch assembly by

providing a short-circuit which in effect will allow the occupant to open a door or window without activating the alarm. As an alternative to the arrangement of FIG. 10, the male connecting member may serve the same purpose if a shorting bar with slotted end portions is inserted between the pair of terminal screws 39 and held in place by threading the screws tightly thereagainst.

Although the present invention has been described with a certain degree of particularity, it is understood that the present disclosure has been made by way of example and that changes in details of structure may be made without departing from the spirit thereof.

What is claimed is:

1. A detector switch assembly for alarm devices and the like comprising cooperating female and male connecting members, each said connecting member including an outer housing with each housing having at least one interchangeable, conductive connector block releasably inserted thereinto and an opening in each housing, each said block being reorientable in the associated housing, a male plug projecting outwardly from a side of the block and through the opening in one of said housings, an inwardly directed jack opening in one side of the block in the other of said housings and aligned with the opening in said other housing, said male plug being releasably received in aligned openings in said other housing and associated block and connected in a friction fit therewith to establish an electrical connection between said connecting members and separable therefrom to break the connection when one of the connecting members is moved away from the other.

2. A detector switch assembly as set forth in claim 1 including a pair of connector blocks in each housing with the plugs for the male member arranged parallel to one another and the jack openings in the female member arranged parallel to one another to slidably receive said pair of plugs.

3. A detector switch assembly as set forth in claim 1 wherein said outer housing is composed of an electrical insulating material and constructed as a unitary molded structure.

4. A detector switch assembly as set forth in claim 3 wherein said housing includes a pair of vertically directed mounting holes adjacent each end for the mounting thereof on a support structure.

5. A detector switch assembly as set forth in claim 1 wherein each of said blocks is cube-shaped with its sides being of an equal dimension and each said housing has a cube-shaped receptacle open along one side for receiving the block.

6. A detector switch assembly as set forth in claim 1 wherein said male plug is a banana-type structure having a plurality of axially bowed and radially flexible side sections.

7. A detector switch assembly as set forth in claim 6 wherein said male plug has a threaded end portion passing through a wall of the housing and threading into one face of the connector block.

8. A detector switch assembly as set forth in claim 1 wherein each said block has an inwardly directed, internally threaded terminal hole in another side adapted to receive a terminal screw extending through an aperture in the housing and into the block to connect an electric wire to the connector block.

9. A detector switch assembly as set forth in claim 1 further including an extension member releasably connected between the block and the male plug to compensate for additional space between said connecting members.

10. A detector switch assembly for alarm devices and the like comprising cooperating female and male connecting members adapted to mount on independent normally adjacent support structures, each said connecting member including an outer housing of an electrical insulating material and formed with a pair of spaced multi-sided compartments opening through one side thereof and having a side opening in each housing for each compartment, a pair of conductive connector blocks releasably inserted into the compartments of each of said housings, said blocks being of a corresponding size and shape and of a shape corresponding to that of the housing compartment to be interchangeable in each housing compartment and reorientable therein, a male plug projecting outwardly through the side opening of one of the housings from one side of each block therein, said plugs extending generally parallel to one another, an inwardly directed jack opening in one side of each block in the other of said housings, said jack openings being aligned with an associated side opening in the associated housing and disposed parallel to one another and spaced apart one from another, said pair of plugs being received in said jack openings and connected in a friction fit therewith to establish an electrical connection between said connecting members and separable therefrom to break the connection when one of the support structures is moved away from the other.

11. In an alarm circuit, a detector switch assembly comprising cooperating female and male connecting members (11, 12) mounted on independent normally adjacent support structures with one of the structures movable toward and away from the other, each said connecting member including an outer housing (14), each said housing being composed of an electrical insulating material and constructed as a unitary molded structure, each said housing including a top wall (21), side walls (22,23) and end walls (24,25) and inner spaced transverse divider walls (27,28) forming a pair of spaced inner cube-shaped compartments (15,16) opening through the bottom, each said housing having a pair of vertical holes (32) adjacent each end for the mounting thereof on a support structure, and each said housing having a pair of apertures (29) and side openings (31), a pair of cube-shaped connector blocks (35*a*, 35*b*) releasably inserted into the compartments of each housing and reorientable therein, a banana-type plug (47) projecting outwardly from a side of each of the blocks through each side opening in one of the housings, said plugs being disposed in a parallel relation to one another, an inwardly directed smooth jack hole (36) in one side of the blocks in the other of said housings, said jack holes being aligned with an associated side opening and disposed in a parallel relation to one another, said plugs being received in the aligned openings in said other housing and associated blocks and connected in a friction fit therewith to establish an electrical connection between said connecting members and being separable to break the connection when one of the support structures is moved away from the

other, each said block having an inwardly directed, internally threaded hole (37) in another side adjacent the side with the male plug for the male connecting members and adjacent the side with the jack hole for the female connecting member, a terminal screw (39) extending through each aperture in each housing into each said internally threaded hole to connect an electric line to each of said connector blocks.

* * * * *