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Bowling

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[45] **Oct. 7, 1975**

[54] **ALARM DETECTOR SWITCH**

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[52] **U.S. Cl.** ..... **340/274;** 339/17 T; 340/256

[51] **Int. Cl.²** **G08B 13/04**

[58] **Field of Search** ..... 340/274 R; 339/17 T; 200/61.93, 51.12, 61.71

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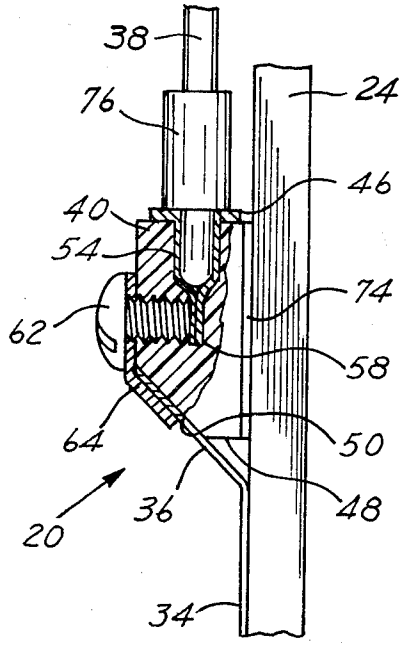
Primary Examiner—Glen R. Swann, III

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[57] **ABSTRACT**

A detector switch assembly for use in an alarm circuit includes a switch block adapted to be directly mounted on a window pane and has means for anchoring the end of a strip of conductive foil which is bonded to the window pane to detect breakage thereof. A jack opens through one surface of the block to releasably receive a male plug connected to an alarm circuit so as to selectively establish electrical contact between the alarm circuit and the detector switch whereby removal of the male plug from the jack or breakage of the conductive foil will energize the alarm circuit to signal unauthorized movement or breakage of the window.

4 Claims, 10 Drawing Figures



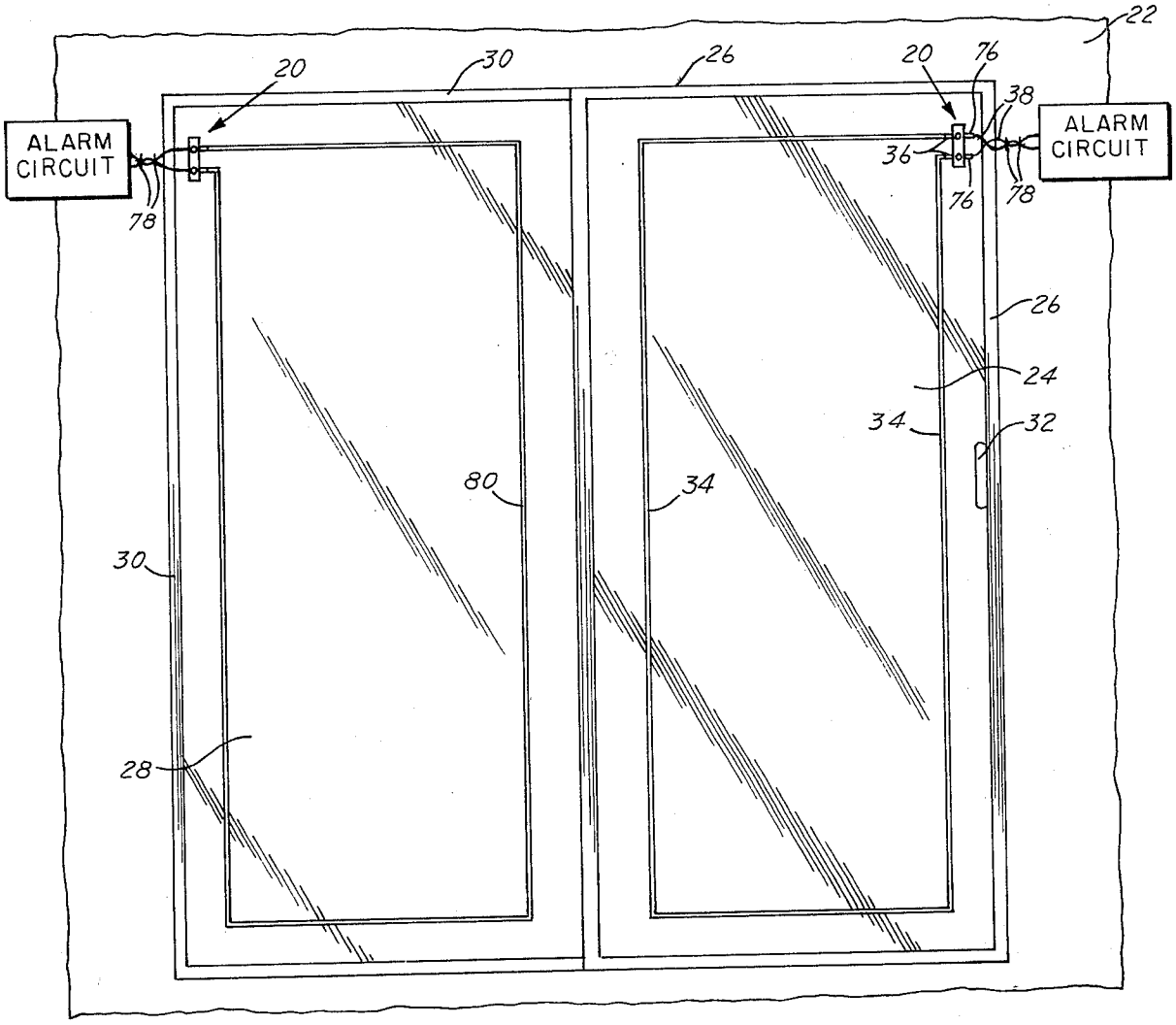


FIG. 1

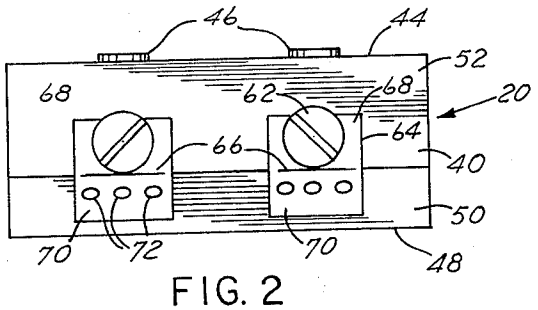


FIG. 2

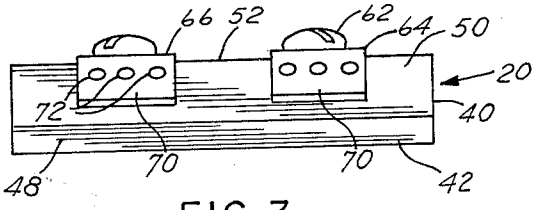


FIG. 3

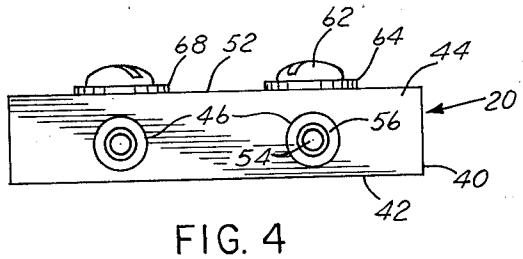


FIG. 4

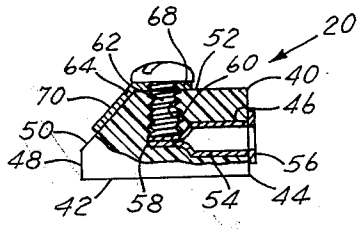


FIG. 5

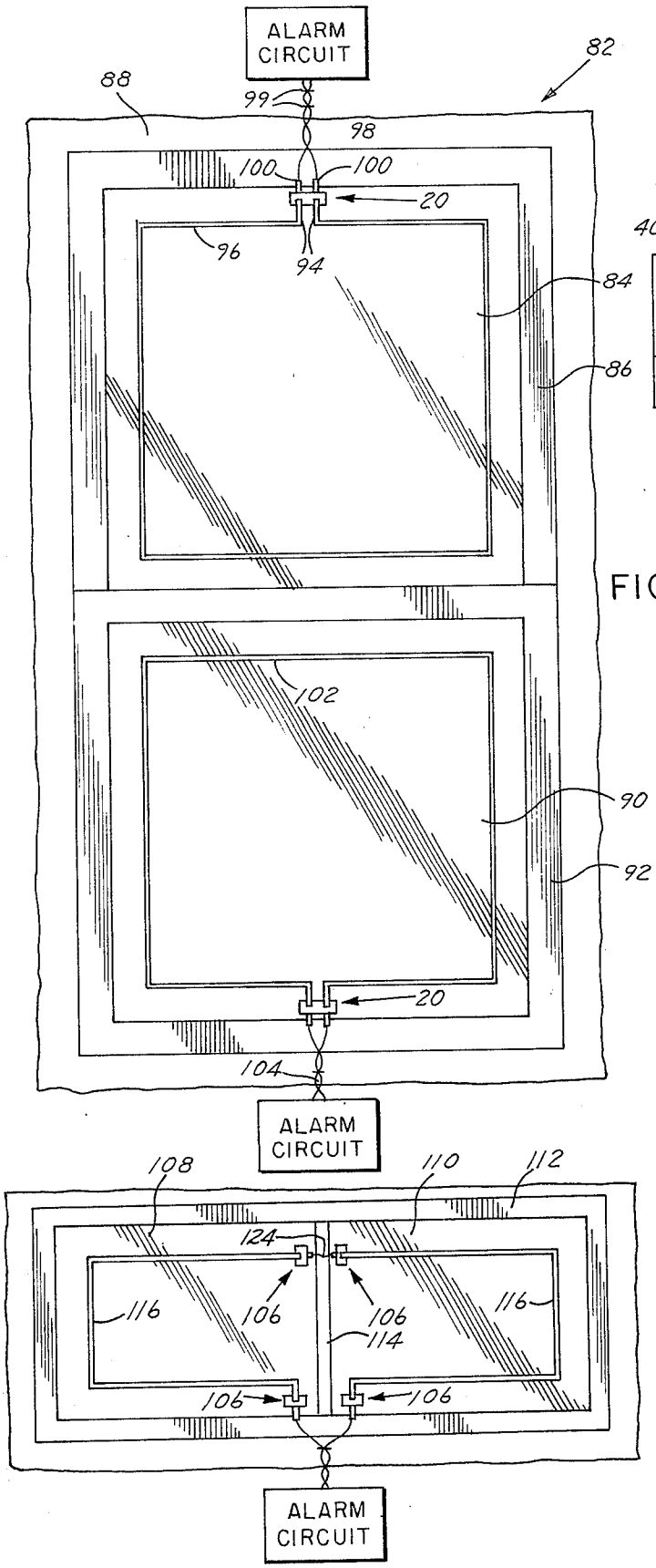


FIG. 8

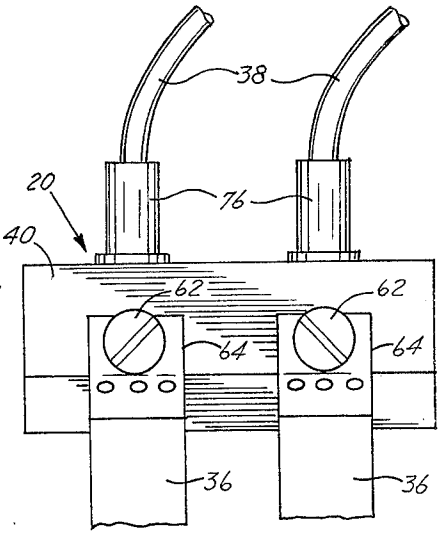


FIG. 7

FIG. 6

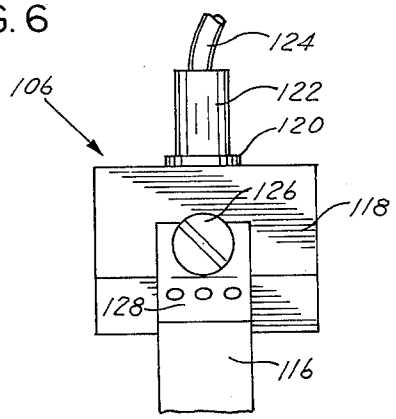


FIG. 9

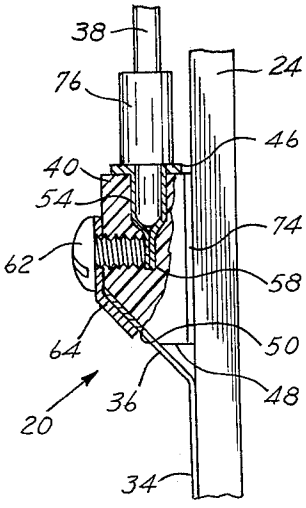


FIG. 10

ALARM DETECTOR SWITCH

BACKGROUND OF THE INVENTION

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

One anti-theft system presently in use for detecting the presence of persons on premises is to detect the movement of structures such as doors, windows and the like. This has been done by the use of an electrical switch or electrical contacts connected into 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.

Anti-theft alarm systems employed to detect the movement or breakage of windows per se are typified by a strip of conductive foil passed in some preselected pattern across portions of the window pane and connected into an alarm circuit so that breakage of the conductive foil will close the alarm circuit thereby energizing a warning bell or the like to indicate unauthorized breakage of the window. The ends of the conductive foil are typically connected by a conductive wire or the like to a switch apparatus mounted on the window frame adjacent to the window pane. It is, of course, desirable that when an anti-theft alarm system is installed, damage to the premises is kept at a minimum and for this reason, systems mounting the switch apparatus on the window frame are not entirely satisfactory. For example, in conventional systems the switches are normally mounted on the window frame by drilling a pre-selected array of holes in the frame so that the switch can be screwed into the frame. This is not only damaging to the premises but is time consuming and, therefore, involves an unnecessarily expensive installation charge.

SUMMARY OF THE INVENTION

Accordingly, it is an object of the present invention to provide a novel and improved alarm detector switch which can be quickly and easily mounted directly on a window pane to selectively interconnect a strip of conductive foil with a conventional alarm circuit.

It is another object of the present invention to provide a detector switch adapted to be mounted directly on a window pane and having means for positively securing the end of a strip of conductive foil and means for releasably retaining the connecting end of a wire passing to an alarm circuit whereby the conductive foil and wire are interconnected in a common switch assembly.

It is still another object of the present invention to provide a detector switch for use in anti-theft alarm systems and adapted to be mounted directly on a window pane having a switch block with a metal clip adapted to positively secure a strip of conductive foil to the block and a female fitting in the form of an electrical jack adapted to releasably retain a male plug portion of an alarm circuit such that the male plug is releasably electrically connected to the strip of metal foil.

It is still another object of the present invention to provide an alarm detector switch adapted to be adhesively bonded to a window pane and having means for anchoring the ends of a strip of conductive foil and for releasably receiving a male plug portion of an alarm circuit whereby breakage of the strip of conductive foil or movement of the window pane relative to the male plug will cause the alarm circuit to be energized.

These and other objects of the present invention are attained with an insulated switch block adapted to be adhesively secured to a window pane so as to electrically interconnect a strip of metal foil passing across portions of the window pane and an alarm circuit whereby the alarm circuit will be energized when the conductive foil is broken or when the window pane is moved relative to a conductive wire connecting the switch block to the alarm circuit. More specifically, the insulated block is adhesively bonded to the window pane in direct alignment with a strip of conductive foil conventionally used on window panes in anti-theft alarm systems so that the strip extends over a portion of the insulated block. A conductive clip overlies the strip of conductive foil to hold the strip against the insulated block and the clip is fastened to the block by a threaded conductive fastener which serves to electrically interconnect the conductive foil with a conductive female fitting provided in the block and adapted to releasably receive a male plug attached to the end of a conductive wire connected to an alarm circuit. The conductive wire to which the male plug is attached, is anchored to the building structure in any conventional manner adjacent the window frame so that the window is movable relative to the wire. Relative movement between the window pane and the adjacent structure will thereby release the male plug from the female fitting in the block and break the connection to cause the alarm circuit to signal unauthorized movement of the window. As will be more fully appreciated with the detailed description hereinafter, the detector switch assembly of the present invention is ideally adapted for use on most any type of opening window in detecting movement of the window relative to the support structure.

BRIEF DESCRIPTION OF THE DRAWING

Other objects, advantages and capabilities of the present invention will become more apparent as the description proceeds taken in conjunction with the accompanying drawings, in which:

FIG. **1** is a front elevation of the inside surface of a sliding window assembly incorporating the detector switch of the present invention;

FIG. **2** is a top plan view of the detector switch of the present invention;

FIG. **3** is a front elevation of the detector switch of the present invention;

FIG. **4** is a rear elevation of the detector switch of the present invention;

FIG. **5** is a partially sectioned end elevation of the detector switch of the present invention;

FIG. **6** is a front elevation of a double-hung window assembly utilizing the detector switch of the present invention;

FIG. **7** is a top plan view similar to FIG. **2** with electrical wires and conductive foil attached to the detector switch of the present invention;

FIG. **8** is another window assembly utilizing a single switch embodiment of the detector switch of the present invention;

FIG. **9** is a top plan view of the single switch embodiment of the detector switch of the present invention; and

FIG. 10 is a partially sectioned side elevation of the detector switch shown in FIG. 9 as it is mounted on a window pane.

DESCRIPTION OF PREFERRED EMBODIMENTS

Referring first to FIG. 1, the alarm detector switch 20 of the present invention is shown in use with a typical window assembly incorporated into a supporting structure 22 and having a sliding window pane 24 mounted in a sliding window frame 26 and a stationary window pane 28 mounted in a fixed window frame 30. The sliding window frame 26 is mounted for sliding movement in a horizontal direction from the position in which it is shown in FIG. 1 to a position wherein the sliding window frame is disposed in overlying relationship with the fixed window frame 30. To facilitate sliding movement of the sliding window, a handle 32 is positioned along the outer edge of the window frame 26 on the indoor side of the window so that an individual positioned within the structure could easily slide the window to any selected position.

As in conventional anti-theft alarm systems, a strip of conductive foil 34 is bonded to the indoor surface of the movable window pane 24 so as to pass in spaced relation around the perimeter of the window pane. The two terminal ends 36 of the conductive foil are secured to the alarm detector switch 20 which, as illustrated in FIG. 1, is mounted in the upper right hand corner of the interior surface of the window pane. A pair of electrical wires 38 are also connected to the switch 20 in a releasable manner as will be described hereinafter so that the conductive foil 34 forms part of an alarm system which could utilize any conventional alarm circuit to energize a bell, buzzer, or the like in the circuit when the circuit is open but which will not energize the bell when the circuit is closed.

The alarm detector switch 20 is best seen in FIGS. 2 through 5 to include a solid generally box shaped switch block 40 of an insulating material having a flat bottom surface 42 adapted to be adhesively bonded to a window pane or the like, a flat rear surface 44 in which a female fitting in the form of an electrical jack 46 or socket is inserted, a flat front surface 48 and a flat beveled surface 50 connecting the front surface 48 to a flat top surface 52. As best seen in FIG. 5, the jack 46 is of the conventional type having a hollow tubular portion 54 extending inwardly so as to be embedded in the switch block 40 and an annular flange 56 around the rear open end of the tubular portion abutting the rear surface 44 of the block. The jack 46 is thereby positively positioned relative to the block 40 so that the tubular portion 54 extends a predetermined distance into the block. The jack is made of a conductive material and has an axial extension contact 58 extending forwardly from the forward end of the tubular portion 54 of the jack so as to occupy the bottom portion of a threaded hole 60 in the block 40 opening through the top surface 52. The threaded hole 60 is adapted to receive a conductive screw member or fastener 62 threaded into the hole from the top surface of the block so as to secure a conductive clip 64 to the block in flush abutting relationship with the beveled surface 50 of the insulating block and a portion of the top surface 52. The clip 64 is probably best seen in FIGS. 2, 3 and 5 to comprise a flat strip of metal which has been bent at an intermediate location 66 to form a rear portion 68 having a hole therethrough, not seen, to receive the screw member 62 and adapted to engage the top surface 52 of the insulating block and a downwardly inclined front portion 70 forming an obtuse angle with the rear portion 68. The front portion 70 of the clip has three transversely aligned inwardly directed dimples or protrusions 72 adapted to be pressed into the beveled surface 50 of the insulating block when the screw member 62 is tightened against the rear portion 68 of the clip. As shown in FIG. 5, when the clip is tightened against the top and beveled surfaces of the block, the screw member is in conductive engagement with the extension contact 58 at the forward end of the jack 46 so as to establish an electrical connection between the clip 64 and the jack.

In FIG. 10, the detector switch 20 is shown mounted on the sliding window pane 24 of FIG. 1 by a strip of double-faced adhesive tape 74, even though other adhesive bonding mediums could be used to positively affix the switch to the window pane. It can be seen in FIG. 1 that the switch block is positioned on the window pane 24 so that the parallel ends 36 of the conductive foil 34 approach the front face 48 of the insulating block. The ends 36 of the conductive foil are passed over the front face of the block and along the beveled face 50 so as to lie beneath the front portion of the clip 64 whereby the clip can be tightened against the ends 36 of the foil 34 with the dimples 72 on the front portion of the clip pressing the foil tightly against the block. This, of course, establishes an electrical connection between the clip 64 and the conductive foil 34 so that the foil is electrically connected to the jack 46. Male plugs 76 attached to the ends of the electrical alarm circuit wires 38, when inserted into the jacks 46, electrically connect the alarm circuit to the conductive foil such that the alarm circuit will be energized only if the conductive foil is broken or if the plugs 76 are removed from the jacks to open the circuit and thereby cause an alarm to sound.

Referring again to FIG. 1, the alarm circuit wires 38 are anchored to the support structure by U-shaped fasteners 78 so that the plugs 76 can be inserted into the jacks 46 to establish an electrical connection between the conductive foil 34 and the alarm circuit. Sliding movement of the window pane 24 to the left as viewed in FIG. 1 will cause relative movement between the switch 20 and the plugs 76 so that the plugs are caused to be released from the associated jacks 46 thereby closing the circuit and causing the alarm to sound. In this manner, the system will detect unauthorized movement of the window so as to prevent theft or unauthorized entry into the structure in which the window assembly is mounted. Of course, if one were to attempt to enter the structure by breaking the window pane as opposed to slidably opening the window, the conductive foil would break thereby closing the circuit and causing the alarm to sound.

Since the fixed window pane 28 of FIG. 1 cannot be moved, the switch 20 shown in the upper left hand corner of the fixed window pane does not need to be connected to the alarm circuit wires 38 utilizing the plug-jack interconnection but rather the alarm circuit wires could be directly connected to the clip 64 beneath the screw members 62 to establish the electrical connection between the alarm circuit wires and the conductive foil. Of course, with this arrangement, breakage of the fixed window pane 28 would cause the conductive foil

80 on the fixed window pane to break thereby closing the circuit and causing the alarm to sound.

To further illustrate the use of the detector switch **20** of the present invention, reference is made to FIG. **6** wherein a double-hung window assembly **82** is shown having an upper window pane **84** mounted in an upper window frame **86** which is slidable vertically in a support structure **88**, and a lower window pane **90** mounted in a lower window frame **92** which is also slidable vertically within the support structure **88**. In this arrangement, the detector switch **20** is adhesively bonded to the indoor surface of the upper window pane **84** adjacent the upper edge thereof so that the beveled surface **50** of the switch block **40** is directed downwardly whereby the terminal ends **94** of a strip of conductive foil **96**, which passes around the perimeter of the window pane, can be affixed to the switch block by the clips **64** as previously described. The alarm circuit wires **98** would be anchored to the support structure **88** immediately above the window frame with fasteners **99** so that the plugs **100** on the end of the wires could be inserted into the jacks **46** in the switch whereby downward sliding movement of the upper window would cause the plugs to be released from the jacks thereby closing the circuit and causing the alarm to sound. Similarly, the detector switch assembly on the lower window pane **90** would be adhesively bonded to the indoor surface of the window pane adjacent the lower edge thereof with a strip of conductive foil **102** anchored to the switch as in the previously described manner and with the electrical alarm circuit wires **104** anchored to the support structure **88** immediately beneath the lower window frame so that upward sliding movement of the lower window would cause the plugs to be released from the switch so as to close the circuit and cause the alarm to sound.

A further window arrangement is shown in FIG. **8** utilizing a single switch embodiment **106** of the detector switch of the present invention. The window assembly shown in FIG. **8** is of the type typically used for basement windows wherein left and right window panes **108** and **110** respectively are mounted in a window frame **112** having a central frame member **114** to separate the window panes. In this arrangement, the single switch embodiment **106** of the present invention, as shown in FIG. **9**, is adhesively bonded to the indoor surface of the right window pane **110** adjacent the lower left hand corner of the window pane and another single switch embodiment is bonded to the indoor surface adjacent the upper left hand corner. Similarly, a single switch embodiment **106** is bonded to the indoor surface of the left window pane **108** in the lower right hand corner and another in the upper right hand corner. The single switch embodiment **106** is identical to the double switch embodiment **20** previously described except there is only provision for attachment of one end of conductive foil **116** to a switch block **118** and there is only a single jack **120** to receive one plug **122** so that a detailed description of the single switch embodiment is not necessary. Its use in the arrangement of FIG. **8**, however, is clearly evident with the upper single switches being connected by a conductive wire **124** attached beneath a fastening screw **126** on the respective switches in electrical contact with a metal clip **128** so as to electrically connect the conductive foils on the respective window panes. The single switches at the bottom of the window panes receive the opposite ends of the conductive foil **116** and the plugs **122** on the ends of the alarm circuit wires. Even though typically, the window assembly shown in FIG. **8** is not of the type which can be opened, the window assembly is normally removed for cleaning purposes and when the window is removed, the plugs can simply be released from the associated jacks **120** in the switches to disconnect the conductive foil from the alarm circuit wires. Of course, to prevent the alarm from sounding when the plugs are removed for cleaning purposes, the alarm circuit would need to be de-energized.

From the foregoing description, it will be readily apparent that the detector switch of the present invention is adapted for use in most any type of window assembly and particularly wherein the window is movable relative to the support structure. It will also be appreciated that since the switch is mounted directly on the window pane, the frame of the window need not be unduly damaged or marred and the alarm system can be quickly installed. 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. In an alarm system adapted to sense movement of a window pane and the like relative to the structure in which the window pane is mounted, said window pane having a strip of conductive foil across portions thereof with one free end of the strip adjacent but in spaced relation to an edge of the window pane, the improvement comprising a detector switch assembly bonded to a face of said window pane adjacent but in spaced relation to said edge of the window pane and in alignment with said one end of a conductive foil, said assembly including a mounting block having a front beveled surface forming an acute angle with the window pane, said one free end of the strip of conductive foil extending away from said window pane along said front beveled surface, conductive screw fastener means, a clip adjustably anchored to said block by said screw fastener means so that said clip extends along said beveled surface in overlying relationship with said one end of the conductive foil such that when said screw fastener means is screwed onto said block the clip will be drawn tightly against the conductive foil to secure the foil to the block, and a socket extending through the block in a direction parallel to the opening movement of the window having an axial extension contact at one end aligned with an opening in said block for said screw fastening means and the opposite end opening through a surface of the block other than said beveled surface; and a flexible alarm circuit wire including a male plug member on the end of said alarm circuit wire releasably inserted in said socket, said screw fastener means engageable with the axial extension contact of said screw fastener means being tightly screwed into said block, and said clip, socket and screw means all being composed of a conductive material so as to electrically connect the strip of conductive foil with the plug whereby when the window is moved relative to the structure, the male plug will be caused to be released from the socket and thereby energize the alarm circuit.

2. In the alarm system of claim **1**, wherein said block is composed of an insulating material.

3. In the alarm system of claim 2 wherein said screw means is threaded into an opening in a top surface of the block and wherein said clip comprises a bent element overlying a portion of said top surface as well as said beveled surface, said clip having an opening therethrough in which said screw means is disposed so that said clip can be drawn tightly against the block by the screw means.

4. In an alarm system adapted to sense movement of a window pane relative to the structure in which the window pane is mounted, said window pane having a strip of conductive foil across portions of the inner surface thereof with both ends of the strip disposed in parallel relationship adjacent one edge of the window pane, and an alarm circuit on said structure having the terminal ends of a pair of flexible conductive wires anchored to the structure adjacent said one edge of the window pane, each terminal end of said conductive wires having a conductive male plug thereon adapted to be aligned with the movement of the window pane, the improvement comprising,

a mounting block of an insulating material having top and bottom parallel surfaces, a rear surface normal to said top and bottom surfaces, and a beveled front surface forming an acute angle with the bottom surface, said top surface having a pair of spaced threaded holes therein,

adhesive bonding means securing the bottom surface of said mounting block to the inner surface of the window pane in alignment with the parallel ends of the conductive foil so that the parallel ends of said foil extend along the front beveled surface of the block,

a pair of generally V-shaped conductive clips mounted on said block, each clip having a forward portion overlying one of said ends of the conductive foil on the front beveled surface of the block and a rearward end overlying a portion of the top surface of the block, a plurality of protrusions on the forward portion of each clip in engagement with the associated end of the conductive foil, and an opening through the rearward portion of each clip axially aligned with one of said threaded holes in the top surface of the block,

a pair of conductive screw fasteners passing through the openings in the rear portion of the clips and threaded into said holes in the top surface of the block so that said clips can be tightened against said ends of the conductive foil to secure said ends to the block by tightening said screw fasteners into the threaded openings, and

a pair of conductive sockets embedded in said block so as to open through the rear surface of the block in a direction parallel to the direction of extension of the parallel ends of said foil, said sockets being positioned within said block and having axial extension portions in engagement with said screw fasteners when the screw fasteners are tightened in the associated holes whereby electrical connections are established between the ends of the conductive foil and an associated socket, each socket being dimensioned to frictionally receive one of said male plugs on the ends of the conductive wires so that the conductive foil is electrically connected to the alarm circuit and so that movement of the window pane relative to the structure in which the window pane is mounted will cause the male plugs to be released from the associated sockets.

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