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Cutler et al.

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[54] WIRELESS ALARM SYSTEM

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[63] Continuation-in-part of Ser. No. 848,258, Aug. 7, 1969.

[52] **U.S. Cl.** **340/224**, 200/61.74, 200/61.81, 325/64, 325/392, 340/274, 343/225

[51] **Int. Cl.** **G08b 1/08**

[58] **Field of Search** 340/224, 274, 276; 325/169, 325/185; 335/128, 172–174

[56] **References Cited**

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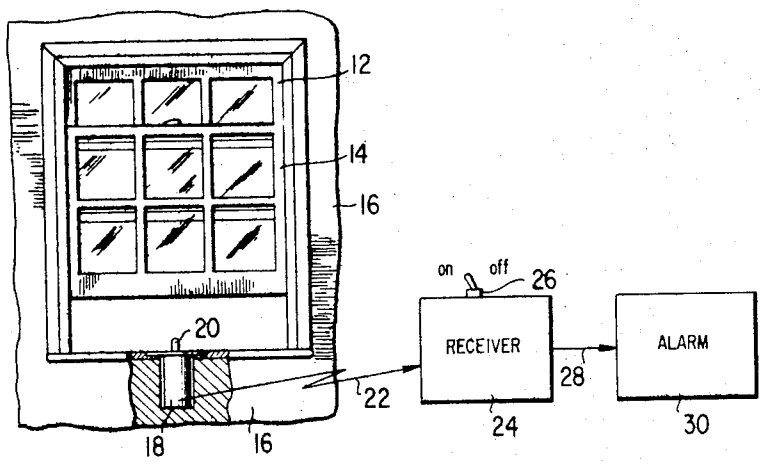
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Assistant Examiner—J. Michael Bobbitt
Attorney—Robert F. Conrad and Kurt Shaffert

[57] **ABSTRACT**

A double-hung window mounted alarm actuating unit comprises a transmitter for generating wireless signals, a relative constant voltage power source connected to the transmitter, and switch means mounted to the bottom and top windows operable upon the opening of either the bottom or top window for actuating the transmitter to generate a wireless signal for a relatively short period, whereby the transmitter draws power from the power source only during the relatively short period. Switch means closing for relatively short period via magnetic decoupling of spring biased armature.

6 Claims, 6 Drawing Figures



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SHEET 1 OF 2

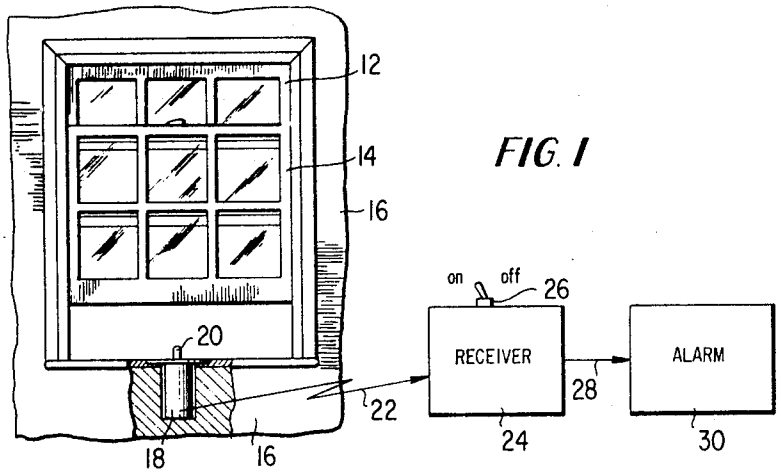


FIG. 1

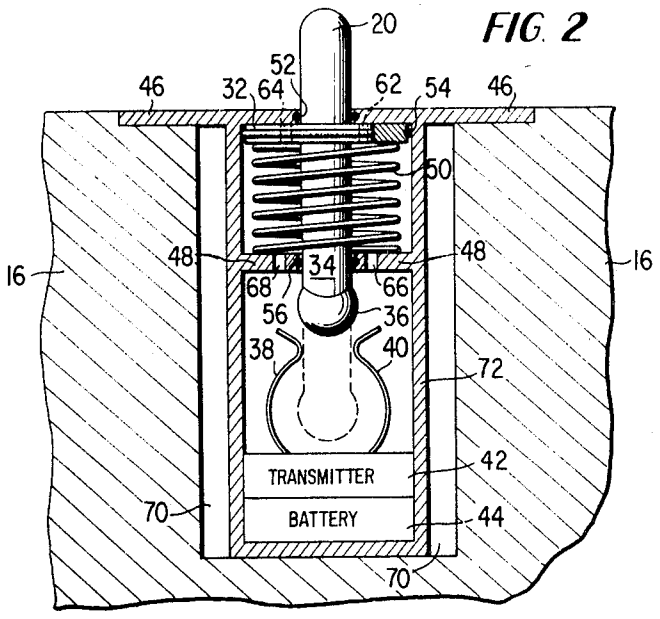


FIG. 2

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FIG. 3

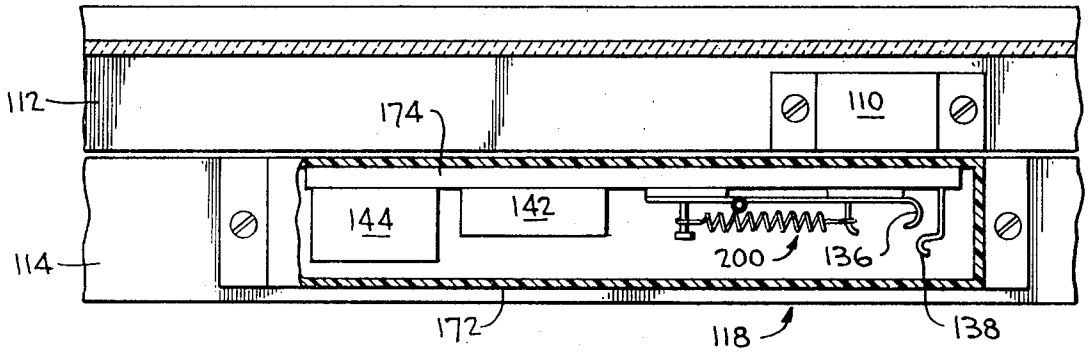


FIG. 4

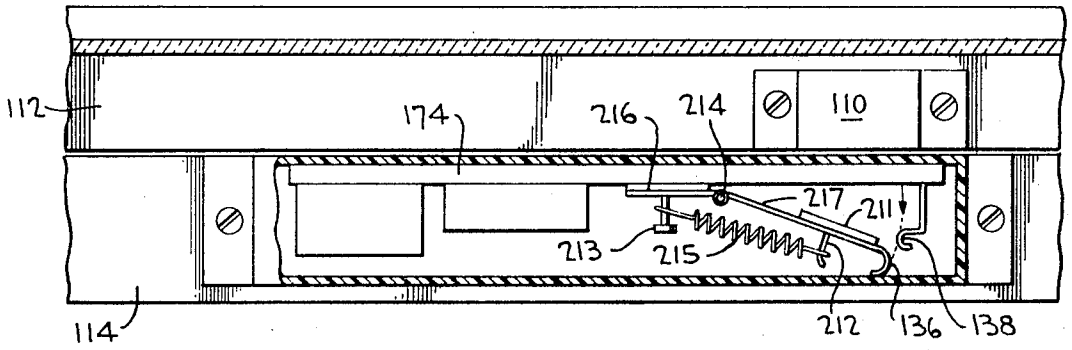


FIG. 3a

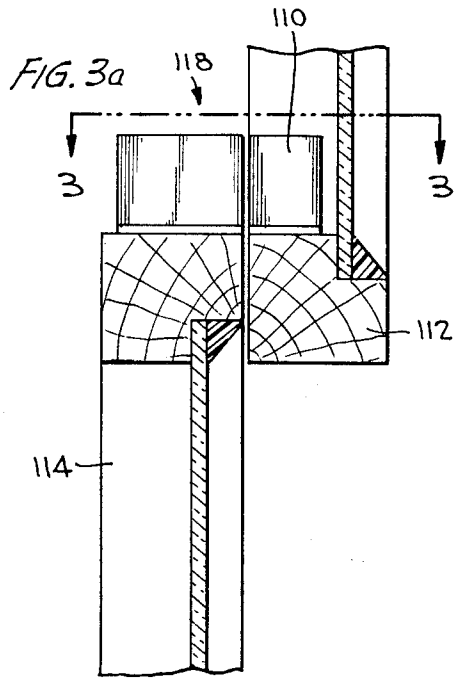
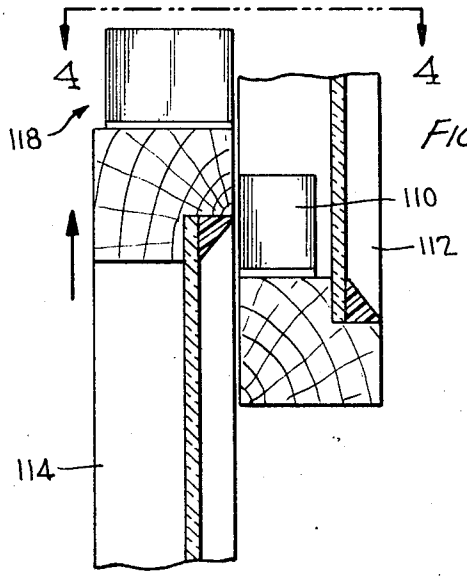


FIG. 4a



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WIRELESS ALARM SYSTEM

CROSS-REFERENCE TO RELATED APPLICATIONS

This application is a continuation-in-part of our U.S. Pat. application Ser. No. 848,258, filed Aug. 7, 1969.

This invention relates to alarm systems. More particularly, this invention relates to a window mounted alarm system.

Generally, a window mounted alarm system comprises a plurality of units so disposed as to detect the opening of the windows of a dwelling. Thus, the movement of the window away from the upper or lower window frame causes the displacement of a switch thereby detecting the opening of the window. In prior art window alarm systems, it has been the practice to provide conventional electrical wiring for transmitting the signal from the window mounted alarm unit to the apparatus for sounding the alarm. The use of this electrical wiring has presented certain problems.

Usually the window mounted alarm actuating unit is located a relatively far distance from the alarm. Thus, it is necessary that a large amount of wiring be done in order to connect the window mounted actuating unit to the alarm. Unfortunately, this results in a great deal of unsightly wiring which detracts from the general appearance of the surrounding. Furthermore, as efforts have been made to conceal this unattractive wiring, the cost of installation has risen appreciably. In fact, with many present day window mounted burglar alarm systems, a large portion of the cost of the entire system may be attributed to the cost of installation. This large cost of installation is made up in large part by the lengthy time period required to wire the system.

Therefore, it is an object of the present invention to provide a window mounted alarm system wherein there will be no unsightly wiring to detract from the general appearance of the surroundings.

It is another object of the present invention to provide a window mounted alarm system having a very low cost of installation.

Furthermore, it is another object of the present invention to provide a window mounted alarm system which will be completely hidden from view when in use or, in the alternative, occupy only a small amount of space.

It is still a further object of the present invention to provide a window mounted alarm actuating unit that will not be affected by exterior contaminants such as dust, dirt or moisture.

In addition, it is still another object of the present invention to provide a window mounted alarm actuating unit wherein the power source therefore need be replaced only at lengthy intervals.

Other objects will appear hereinafter.

The above-mentioned objects and many others are achieved by the present invention which includes a window mounted alarm actuating unit which is connected to a receiver by a wireless transmission path. The receiver is connected to an alarm. Thus, there are not unsightly wires to detract from the general appearance of the surroundings. Furthermore, costs of installation are greatly reduced as there is no necessity for expensive time-consuming wiring. Furthermore, when the windows are closed and the alarm is set, the alarm system of one embodiment of the present invention is completely out of sight.

In accordance with the present invention, it is desired that the transmitter generate a wireless signal to the receiver whenever the window is opened. Since it is not desired to actuate the alarm every time the window is opened, it is necessary to provide some means to disconnect the alarm. This may readily be done by providing the receiver with an on-off switch.

If the window mounted actuating unit continuously generates a wireless signal in response to the open condition of the window, a continuous signal will be generated whenever the window is open irrespective of whether the receiver is in its on or off position. Thus, although no alarm will be generated when the receiver is in its off position, there will be a continuous drain upon the power source.

In accordance with the present invention, means are provided for allowing the actuating switch of the window mounted alarm actuating unit of the present invention to generate a signal for only a short period of time during the actual opening of the window. Thus, the power source for the transmitter will not be appreciably drained after the window is positioned in an open position.

In many window mounted alarm actuating units in use today, it is possible for dust, dirt, moisture and other contaminants to collect within the actuating unit. If these contaminants collect upon the electrical contacts of the actuating unit, electrical flow therethrough may be prevented resulting in a failure of the unit. This is particularly undesirable because there will be no warning as to when the alarm will fail. Thus, the failure of the window alarm actuating unit will be detected only after an unauthorized entry into the dwelling through a window has been completed.

For the purpose of illustrating the invention, there are show in the drawings two preferred embodiments, it being understood, however, that the invention is not limited to the precise arrangements and instrumentalities shown.

FIG. 1 is a functional representation of the alarm system of the present invention, employing a first embodiment of the invention.

FIG. 2 is a cross-sectional view of a first embodiment of the window mounted alarm actuating unit of the present invention.

FIG. 3 is a top view of a second embodiment of the present invention taken on line 3—3 of FIG. 3A, with the cover member cut away for clarity.

FIG. 3A is a side view of a second embodiment of the present invention mounted on a window with the window in the closed position.

FIG. 4 is a view similar to FIG. 3, taken on line 4—4 of FIG. 4A.

FIG. 4A is a side view similar to FIG. 3A with the window in the open position.

Referring now to the drawings in particular, wherein like numerals designate like elements, there is shown in FIG. 1 a functional representation of a first embodiment of the alarm system of the present invention.

A window mounted alarm actuating unit designated as **18** in FIG. 1 is mounted in a window frame **16** containing upper window **12** and partially raised lower window **14**. The window mounted alarm actuating unit contains a transmitter therein which allows the unit to generate a wireless signal whenever lower window **14** is raised allowing plunger **20** to rise. This wireless signal is detected by receiver **24**. The wireless transmission path is designated as **22** in FIG. **1**. Receiver **24** is operatively connected to alarm **30** by connection **28**. Alarm **30** may be mounted within the dwelling to be protected by the alarm system or may be mounted upon one of the exterior walls of the dwelling as is commonly done. The connection from receiver **24** to alarm **30** designated as **28** in FIG. **1** may be by conventional electrical wiring or may be by wireless transmission.

As will be explained more fully hereinafter, plunger **20** of the window mounted alarm actuating unit is displaced downwardly by the closed lower window **14**. Upon the opening of lower window **14**, bias means causes the upward movement of plunger **20** thereby causing the window mounted alarm actuating unit to generate a wireless signal. This wireless signal is detected by receiver **24**. Since it is desirable that the alarm not be actuated every time lower window **14** is opened, on-off switch **26** is provided at receiver **24** for insuring that every signal generated by window mounted alarm actuating unit **18** will not actuate alarm **30**.

FIG. 2 shows in greater detail the interior mechanism of an embodiment of a window mounted alarm actuating unit **18** of the present invention. The alarm actuating unit is contained within casing **72**. Casing **72** has a diameter of less than 3 inches and a length of less than 18 inches. Thus, casing **72** may be entirely submerged within window frame **16**. Plunger **20** is

slidably mounted within casing 72. When completely installed, only top plate 46 of casing 72 and the top portion of plunger 20 will be visible when lower window 14 is in an opened position. When lower window 14 is in a closed position, the actuating unit 18 of this embodiment of the present invention will be completely out of sight.

Pressure plate 32 is rigidly connected to plunger 20 or alternatively may be formed integrally therewith. Electrically conductive sphere 36 is rigidly connected to central portion 34 of plunger 20 or alternatively may be formed integrally therewith. Spring 50 is operatively disposed within casing 72 so as to bias pressure plate 32 in an upwards direction. Transmitter 42 and battery 44 are disposed in the bottom portion of casing 72. Electrical contacts 38 and 40 are conductively connected to transmitter 42. Transmitter 42 is conductively connected to battery 44.

In order to install alarm actuating unit 18, it is necessary to drill an opening in window frame 16 to receive casing 72. This opening designated as 70 in FIG. 2 is of a 1*a* larger diameter than the main portion of casing 72 but is of a smaller diameter than top plate 46 of casing 72.

In order to insure efficient and reliable operation of alarm actuating unit 18, it is necessary to prevent contaminants such as dust, dirt and moisture from entering casing 72. Thus, O-ring 52 provides an effective seal between the top of plunger 20 and top plate 46 of casing 72 in order to prevent contaminants from entering the top of the alarm actuating unit. In a similar manner, O-ring 54 is mounted about the periphery of pressure plate 32 to further prevent the deposition of contaminants on contacts 38 and 40 and sphere 36. O-ring 56 is disposed about extension 48 of casing 72 in order to effectively control the path of plunger 20.

If pressure plate 32 were of solid construction, the depression of pressure plate 32 with O-ring 54 mounted thereabout would compress the air within the upper portion of casing 72. This is undesirable because the upward movement of plunger 20 must be slow enough to allow sphere 36 to make sufficient electrical contact with contacts 38 and 40 for a predetermined period. Thus, if compressed air under high pressure were contained within the upper portion of casing 72, sphere 36 would move past contacts 38 and 40 too rapidly to allow for proper electrical contact to be made. Therefore, vents 62 and 64 are provided to vent compressed air beneath pressure plate 32 to the region above pressure plate 32. In a similar manner, the lower portion of casing 72 is vented to the upper portion of casing 72 by vents 66 and 68 contained within extensions 48. Thus, actuating unit 18 is sealed off from external contaminants without creating any undesirable pressures within casing 72.

A second embodiment of a window mounted alarm actuating unit is designated as 118 in FIG. 3. This unit is mounted on the top surface of inside window 114 and, as visible in FIG. 3A, is horizontally aligned with magnet 110. Magnet 110 is mounted on the bottom portion of outside window 112. As is apparent from an inspection of FIG. 3A, when both outside window 112 and inside window 114 are closed, the alarm actuating unit and the magnet are juxtaposed to each other.

Alarm actuating unit 118 is comprised of a protective housing or cover 172 which fastens to window 114 by any convenient means such as the illustrated screws. Mounting plate 174 is positioned inside of cover 172 and both are made of a material that will not impede magnetic flux, such as plastic. Mounted on mounting plate 174 is battery 144 and transmitter 142, both serving the same function as battery 44 and transmitter 42 of the first described embodiment of the present invention. Switch assembly 200, to be described in greater detail below, is also mounted on mounting plate 174. Magnet 110 is aligned with that portion of cover 172 that surrounds switch 200.

With particular reference to FIG. 4, switch assembly 200 is described in greater detail. Switch member 216 is rigidly attached to mounting plate 174 and has pin 213 extending from its surface in a direction away from mounting plate 174. At one end of member 216 is a pivotal connection whereby second switch member 217 is pivotally attached thereto.

Mounted on one side of switch member 217 is magnetically attractive block 211, made from a material that is attracted by a magnet, and mounted on the other side, or integrally formed therewith, is spring anchor 212. The end of switch member 217 opposite that of pivot 214 is formed into a curved electrical contact 136.

Contact 136 is electrically connected to one terminal of battery 144. This may be accomplished, for example, by forming switch members 216 and 217 of an electrically conductive material and connecting member 216 to one terminal of battery 144.

Spring 215 is a coil spring with hook members on both ends, one hook being attached to pin 213 and the other hook being attached to spring anchor 212. When attached to both, the bias of the spring is such to tend to pivot switch member 217 in a clockwise direction as seen by the arrow in FIG. 4.

Electrical contact member 138 is attached to one end of mounting plate 174, is electrically insulated from contact 136, and is electrically connected to the other terminal of battery 144. Contact 128 is positioned relative to contact 136 such that contact 136 will briefly touch contact 138 as switch member 217 pivots on its pivot point.

With particular reference to FIGS. 3 and 3A, when both windows 114 and 112 are closed magnet 110 will be aligned with switch 200 and, more particularly, be aligned with block 211. As the mounting means on magnet 110, cover 172, and mounting plate 174 are all formed of material that will not impede magnetic flux, magnet 110 will attract block 211 and hold switch 200 in a position that opposes the bias of spring 215 (FIG. 3). Contacts 136 and 138 will be spaced one from the other.

Alarm actuating unit 118 is mounted on the top of inside window 114 and magnet 110 is mounted on the inside facing part of outside window 112 so that there is no exposure to outside contaminants such as dust, dirt and moisture. If desired, a sealing gasket may be positioned between the cover 172 and the frame of window 114.

Transmitter 174 is electrically connected in the circuit between one terminal of the battery and either contact 136 or 138. Thus, when contacts 136 and 138 touch each other, a closed circuit will be made between the battery, the transmitter, the switch and back to the battery.

The operation of the alarm system of the present invention is as follows. In the first described embodiment, alarm actuating unit 18 is inserted into opening 70 in window frame 16 so that only the top of plunger 20 protrudes therefrom. Plunger 20 is depressed by the closing of lower window 14. Receiver 24 is usually maintained in an off position through the use of on-off switch 26. Thus, any signals generated by alarm actuating unit 18 will not be effective to actuate alarm 30. Each time lower window 14 is raised or lowered, sphere 36 will bridge contact 38 and 40 causing alarm actuating unit 18 to generate a wireless signal. However, this bridging of contacts 38 and 40 will last for only a short period during normal opening of the window. Thus, each time plunger 20 is raised or lowered, only a small amount of power will be drawn from battery 44. Therefore, even if lower window 14 is left open all day, the only drain on battery 44 will occur during the short period as the window is opened.

The depressed position of plunger 20 is shown in dotted lines in FIG. 2. Although occasional contact is made between central portion 34 of plunger 20 and contacts 38 and 40, no signal will be generated by alarm actuating unit 18 since central portion 34 of plunger 20 is comprised of nonconductive material.

If it is desired to set the alarm system, lower window 14 will obviously be placed in its closed position and locked. Then switch 26 of receiver 24 is switched to its "on" position. If an unauthorized opening of lower window 14 is effected, plunger 20 will be forced upward by the action of spring 50 causing sphere 36 to bridge contacts 38 and 40 for a short period. This

causes alarm actuating unit **18** to generate a wireless signal to receiver **24**. Receiver **24** will actuate alarm **30**. Once actuated, alarm **30** will continue sounding until the alarm is manually disconnected.

Transmitter **42** is entirely conventional. Thus, transmitters utilized to open garage doors may be utilized. Battery **44** is also conventional. Although many different batteries may be utilized, it has been found that a "B" battery having a long shelf life gives satisfactory results. Casing **72** is comprised of a nonconducting material. Plastic has been found to be quite acceptable. Similarly, plunger **20** and pressure plate **32** are comprised of a nonconductive material. In this regard, plastic has been found to be a suitable material. The various O-rings utilized in the invention are also conventional. Contacts **38** and **40** are comprised of electrically conductive resilient material. The material must be such that contacts **38** and **40** will maintain a predetermined distance therebetween when sphere **36** is not disposed therebetween. Thus contacts **38** and **40** will spring back to their original position after sphere **36** has passed therethrough.

In the second embodiment of the present invention, actuating unit **118** replaces actuating unit **18** of the first embodiment but all other elements such as receiver **24** and alarm **30** remain the same.

When both window **114** and **112** are closed, magnet **110** is aligned with block **211** of switch **200** and holds contact **136** against the bias of spring **215**. If either the top or the bottom window is opened, magnet **110** will no longer be aligned with the switch. The force generated by the bias of the extended spring **215** will cause switch member **217** and its attached contact **136** to pivot around **214** and, during the course of this movement, contact **136** will make a brief, physical contact with contact **138**. The circuit will be closed, transmitter **142** will send a signal to receiver **24** and alarm **30** will sound.

It is of course apparent that the attractive strength of magnet **110** and the strength of spring **215** will be chosen so that the magnet may overcome the bias of the spring when aligned with block **211**. When the magnet is displaced, as seen in FIG. 4A, the strength of spring **215** must be sufficient to rotate contact **136** into and then out of contact with contact **138** to generate a signal but avoid undue current drain on battery **144**.

Receiver **24** may be a conventional receiver utilized to actuate garage door openers. For example, transmitters **42** and **142** may generate a wireless signal of a certain frequency having a characteristic modulation applied thereto. Thus, receiver **24** will be tuned to receive that particular frequency and will have means therein to demodulate the characteristic modulation and to actuate the alarm in response thereto.

In many instances, it is desirable to mount alarm **30** upon the exterior of the building to be protected by the alarm system of the present invention. Since receiver **24** may be placed anywhere in the building, it is a relatively easy matter to dispose receiver **24** at a position closely adjacent to the exterior wall upon which the alarm is mounted. Thus, no difficulties are encountered by connecting the receiver to the alarm by conventional electrical wiring. However, if it were not desired to connect the receiver to the alarm by wire, it is possible to utilize the receiver to generate a wireless signal to actuate the alarm.

A building protected by the alarm system of the first embodiment of the invention should include an alarm actuating unit for each upper and lower window. Furthermore, this alarm actuating unit of the present invention may be disposed in each door frame adjacent to the hinged side of each door in order to detect an unauthorized opening thereof.

The alarm system of the second embodiment of the invention may also be employed with doors or hinged windows by placing the alarm unit **118** on the door or window jamb away from the hinged side of the door and mounting the magnet **110** on the door or window itself. If desired the placement of elements **118** and **110** may be reversed on the door and jamb. It is only necessary to have the two elements juxtaposed to each other so that the magnetic attraction of the magnet may hold the switch against the bias of the spring. As an alternative to the magnet, mechanical lock means may be employed on both windows to releasably position the switch in its inactive position. Such a means would permit motion of either window to release the lock means, thereby releasing the switch.

It is to be understood that although mechanical means have been illustrated to permit the wireless signal to be generated for only a short period of time, the momentary contact of the electrical contacts of the instant invention could be employed to trigger a separate, self-contained circuit. Such a circuit may be designed to energize the transmitter for a short, predetermined period of time which would, in turn, actuate the alarm.

The present invention may be embodied in other specific forms without departing from the spirit or essential attributes thereof.

We claim:

1. An alarm system for detecting the movement of the top window or the bottom window of a double-hung window which in its closed position closes an opening comprising: a transmitter for generating a wireless signal; a relatively constant voltage power source; switch means; said switch means being disposed so as to detect movement of the top window or the bottom window; said switch means being actuated upon the movement of the top window or the bottom window a predetermined amount; said switch means being automatically deactuated during normal opening of the top or bottom window after a relatively short period of time after actuation; means electrically interconnecting said transmitter, said relatively constant voltage power source and said switch means so that actuation of said switch means during normal opening of the top or bottom window causes said transmitter to draw power from said relatively constant voltage power source for said relatively short period of time and to thereby transmit a wireless signal for said relatively short period of time; said transmitter, said relatively constant voltage power source and said switch means being electrically interconnected so that upon the expiration of said relatively short period of time said switch means prevents said transmitter from drawing power from said relatively constant voltage power source and further prevents said transmitter from generating a wireless signal; means for receiving said wireless signal; alarm means; means connecting said receiving means to said alarm means so that reception of said wireless signal by said receiving means causes actuation of said alarm means for a period of time longer than said relatively short period of time; means for disconnecting said alarm means so that generation of said wireless signal does not function to actuate said alarm means; said switch means comprising a first switch unit mounted to either the bottom or the top window; a second switch unit mounted to the other of the bottom or the top window; said first switch unit being comprised of such a material as to be displaced by a magnetic field; said second switch unit comprising magnetic field generating means whereby displacement of the top window or displacement of the bottom window said predetermined amount causes actuation of said transmitter.

2. An alarm system in accordance with claim **1** wherein said first switch unit is mounted to either the upper portion of the bottom window or the lower portion of the top window and said second switch unit is mounted to the other of the upper portion of the bottom window or the lower portion of the top window.

3. An alarm system in accordance with claim **2** wherein said first and said second switch units are mounted to the inside portions of the top and bottom windows.

4. An alarm system in accordance with claim **3** wherein said first switch unit comprises a first contact member and a second contact member, said first contact member being comprised of a magnetic material so as to be displaced in a first direction by said magnetic field generating means of said second switch unit when the top and bottom windows are in their closed positions, means biasing said first contact member in a second direction so that when either the top or bottom

window is displaced from its closed position, said first contact member is displaced in said second direction so as to make an electrical connection with said second contact member causing actuation of said switch means.

5. An alarm system in accordance with claim 4 wherein said biasing means comprises a spring and wherein said first contact member is displaceable about a pivot under the force of said biasing means.

6. An alarm system in accordance with claim 5 wherein when the top or bottom window is displaced said predetermined amount said biasing means causes said first contact member to be displaced in said second direction causing said first contact member to be successively out of contact with said second contact member, in contact with said second contact member, and out of contact with said second contact member after being in contact with said second contact member for said relatively short period of time.

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