Sept. 25, 1934. J. M. LUPOLD ET AL 1,974,779

BURGLAR ALARM

Filed Oct. 23, 1931

Fig. 1.

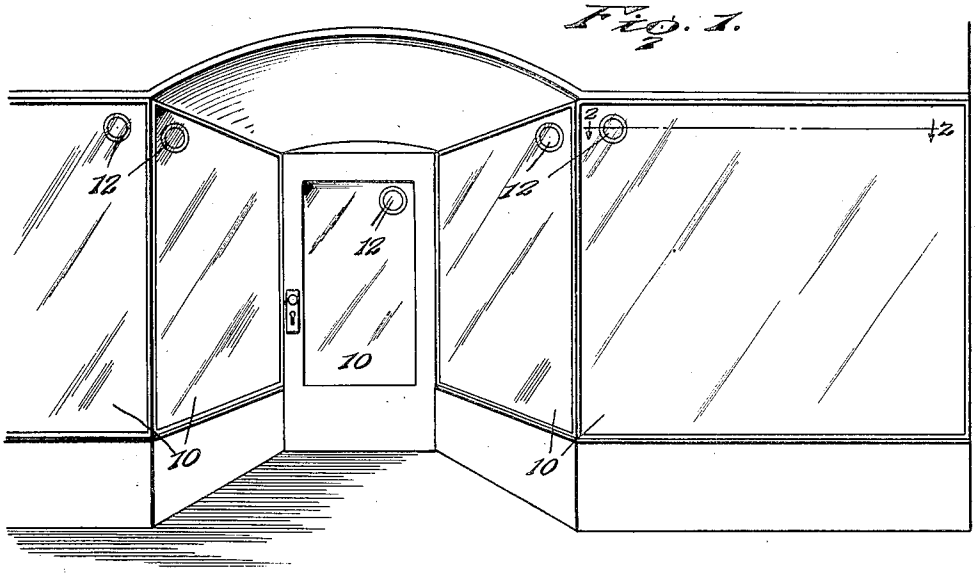


Fig. 2.

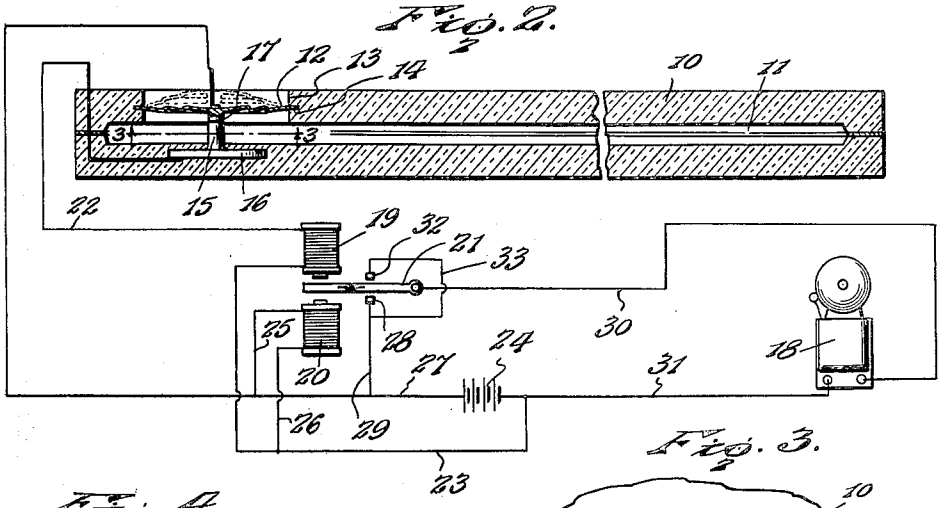


Fig. 3.

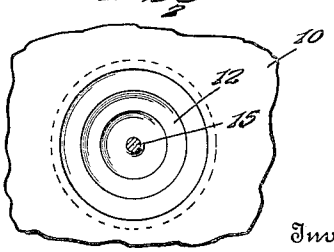
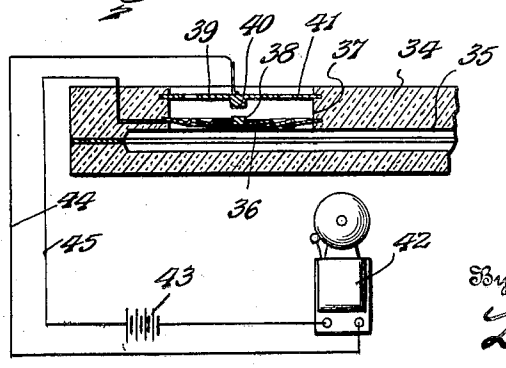


Fig. 4.



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BURGLAR ALARM

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Application October 23, 1931, Serial No. 570,704

2 Claims. (Cl. 200—83)

This invention relates to burglar alarms particularly adapted for installation in banks, stores, residences, or other buildings and has for an object to provide a switch which may be built into a window and which will operate, upon the window being ruptured, to energize an alarm device.

A further object is to provide a switch and novel electrical connections therefor which latter will operate independently of the switch to sound the alarm should a broken wire or other defect in the system accidentally occur.

Another object is to provide a novel switch, one side of which is exposed to substantially a vacuum or minus pressure and the opposite side to atmospheric pressure so that the diaphragm is normally maintained deformed until the pressure on both sides thereof is equalized, for example, by a rupture in the window, whereupon the diaphragm coacts with a stationary switch contact to control an electric circuit for sounding the alarm.

A still further object is to provide a burglar alarm device which may be built into the window during manufacture thereof and which will be formed of a few, inexpensive parts, which will be strong and durable, and will not easily get out of order, and which is susceptible of being concealed or exposed without sacrificing the positive operation thereof.

With the above and other objects in view, the invention consists in certain novel details of construction and combinations of parts hereinafter fully described and claimed.

In the accompanying drawing forming a part of the specification:

Figure 1 is a perspective view of the burglar alarm device in applied position on glass windows.

Figure 2 is an enlarged cross sectional view taken on the line 2—2 of Figure 1, showing the switch in normal closed position and showing the electrical connections diagrammatically.

Figure 3 is a fragmentary sectional view taken on the line 3—3 of Figure 2, showing the inner face of the diaphragm switch member.

Figure 4 is a fragmentary longitudinal sectional view showing a modified form of the invention in which the switch is open in normal position.

Referring now to the drawing, wherein like reference characters designate similar parts in the various views, the numeral 10 designates the windows of a building, which may be a bank, store, residence, or other building, and, preferably, the windows are of glass, although it is conceivable that in the case of a bank teller's window, steel may be used, the material of which the window is formed being immaterial so long as the internal structure thereof is constructed as follows:

Formed in the window 10 is an internal space 11 which is of nearly the same longitudinal and cross dimensions as the window and is evacuated of air during or subsequent to manufacture to produce substantially a vacuum or at least minus pressure in the space 11.

The electric switch may be concealed or exposed to view on the window and by now referring to Figure 2 of the drawing, it will be seen that the switch comprises essentially a resilient diaphragm 12 which may be of the corrugated type and is preferably formed of suitable metal to withstand exposure to weather. The diaphragm is mounted in an opening 13 formed in the window and preferably the marginal edge of the diaphragm is inserted in a kerf 14 in the wall of the opening, which kerf is made air or gas tight in any preferred manner. The exterior face of the diaphragm is exposed to atmospheric pressure while the interior face of the diaphragm is exposed to the minus pressure in the space 11. As a result, the diaphragm is held normally deformed or tensioned to assume a convex contour toward the internal space 11. A stationary switch contact 15 is provided with a disc base 16 which is embedded in the material of the window, as shown, the contact 15 projecting axially toward the center of the diaphragm switch member 12, which latter is provided at the center thereof with a nub or boss 17 against which the contact 15 abuts when the diaphragm is flexed or tensioned, as shown in full lines in Figure 2. Obviously, should the window be ruptured, so that atmospheric pressure enters the space 11, the pressure on both sides of the diaphragm switch member 12 will be equalized so that the diaphragm switch member may instantly return to its natural condition as indicated by dotted lines in Figure 2, with consequent disengagement of the boss 17 from the contact 15. The diaphragm 12 may thus be said to constitute a movable switch member controlled by variations in pressure on the opposite faces thereof.

In the preferred form of the invention shown in Figure 2, the electrical connections are such that the alarm device 18, such as an electric bell or other suitable alarm device, will not be operated while the switch is maintained closed. The preferred electrical apparatus consists of a pair of op-

posed electromagnets 19 and 20 between the cores of which a pivoted armature 21 is normally balanced or maintained in a position midway between the electromagnets by both electromagnets being similarly energized. For this purpose, one end of the winding of the electromagnet 19 is connected by a wire 22 to the fixed switch contact 15. The other end of the winding is connected by a conductor wire 23 to one side of a storage battery 24 or other suitable source of electrical energy. Both ends of the winding of the magnet 20 are connected across the battery by means of wires 25 and 26, the latter being connected to the wire 23 and the former being connected to a wire 27, one end of which is soldered or otherwise suitably electrically connected to the center of the diaphragm switch member 12 while the opposite end is connected to the battery 24. It is now clear that when the switch is closed the electromagnet 19 is maintained energized through the circuit wires 22, 23 and 27, while, simultaneously, the magnet 20 is maintained energized through the circuit wires 25 and 26 which are connected across the battery by the wires 23 and 27.

In operation, should the vacuum or minus pressure in the space 11 be equalized by shattering or rupture of the window, the diaphragm switch contact 12 will immediately spring back to released position, opening the circuit at the diaphragm with resultant de-energization of the magnet 19. The pivoted armature 21 is thereupon immediately attracted to the core of the magnet 20. When in this position the armature makes contact with a switch contact 28 which is connected to one side of the battery through a wire 29. The armature 21 is connected to one pole of the bell 18 by means of a wire 30 while the other pole is connected to the other side of the battery by means of a wire 31. Consequently, in the operative position of the armature 21 against the magnet 20, the alarm circuit from the battery through the bell is closed at the contact 28 with resultant sounding of the alarm.

To facilitate sounding of the alarm as a warning, in the event any of the circuit wires become accidentally broken, it will be observed that a fixed switch contact 32 is disposed on the opposite side of the armature 21 from the contact 28 and the contact 32 is electrically connected to the contact 28 by means of a conductor wire 33. Assuming now that one of the conductor wires from the magnet 19 becomes accidentally broken, the armature 21 will be attracted by the magnet 20, as above described and sound the alarm, regardless of the closed position of the switch 17. Assuming that one of the conductor wires from the magnet 20 becomes accidentally broken, the armature 21 will be immediately attracted to the core of the magnet 19 and close the alarm circuit to the bell at the contact 32.

In Figure 4, there is shown a modified form of the device in which the window 34 is provided with an internal evacuated space 35, as above described. In this embodiment of the invention, a resilient metal diaphragm 36 is mounted at its edge in an opening 37 in the window and is held deformed or in convex shape toward the evacuated space 35 by atmospheric pressure against the outer face of the diaphragm. The contact boss 38 of the diaphragm is, however, in this modification, arranged at the center of the outer face of the diaphragm. A metal disc 39 is also secured at its edge in the opening 37 and is provided on its inner face with a contact boss 40 which is opposed to the boss 38 and is normally held spaced therefrom as shown. The disc is provided with vent openings 41 which expose the outer face of the diaphragm 36 to atmospheric pressure. It is now clear that should the vacuum or minus pressure in the space 35 be broken by rupture of the window, the pressure on both faces of the diaphragm will be equalized so that the diaphragm may return to initial condition and engage the boss 38 thereof with the boss 40 on the fixed disc 39 for the purpose of closing the alarm circuit. It will thus be observed that the main difference between the preferred form of the invention shown in Figure 2 and the modified form shown in Figure 4, is that the switch device in Figure 2 is normally closed while the switch device in Figure 4 is normally open, depending upon whether the fixed contact is arranged to engage with the outer or the inner face of the diaphragm switch member.

In the modified form shown in Figure 4, for the purpose of simplicity, the electric alarm bell 42 is shown connected in circuit with the battery 43 and the contacts 38 and 40 by means of suitable conductor wires 44 and 45.

It is thought that from the foregoing description the construction and operation of the invention will be fully understood without further explanation.

Having thus described the invention, what is claimed is:

1. In a device of the class described, a window pane or the like having an evacuated chamber therein approximately coextensive therewith and also having an opening communicating at one side with said chamber and at the opposite side with the atmosphere, a flexible diaphragm sealed in said opening and subjected to atmospheric pressure at the side remote from the chamber, an electric contact on the diaphragm, and a fixed electric contact mounted in the pane adjacent the diaphragm to coact with the contact on the diaphragm for forming an electric circuit.

2. In a device of the class described, a window pane or the like having an evacuated chamber therein approximately coextensive therewith and an opening communicating at one side with said chamber and at the opposite side with the atmosphere, a stationary electric contact mounted in the pane at one side of said chamber and in alinement with the opening, and a flexible diaphragm sealed in the opening and exposed to atmospheric pressure at its outer side and carrying an electric contact on its inner side to coact with the stationary contact for forming an electric circuit.

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