

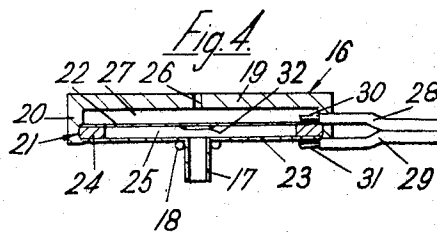
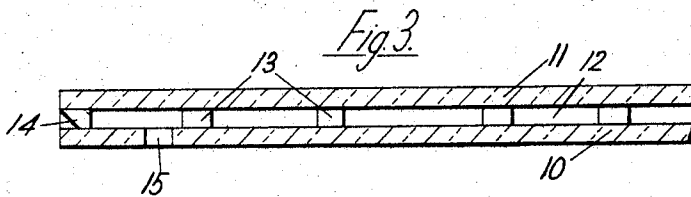
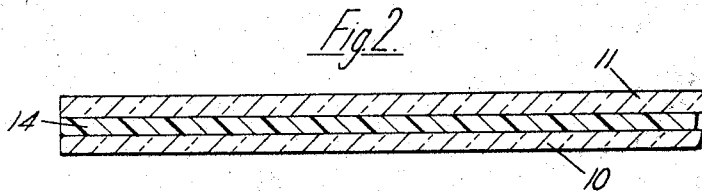
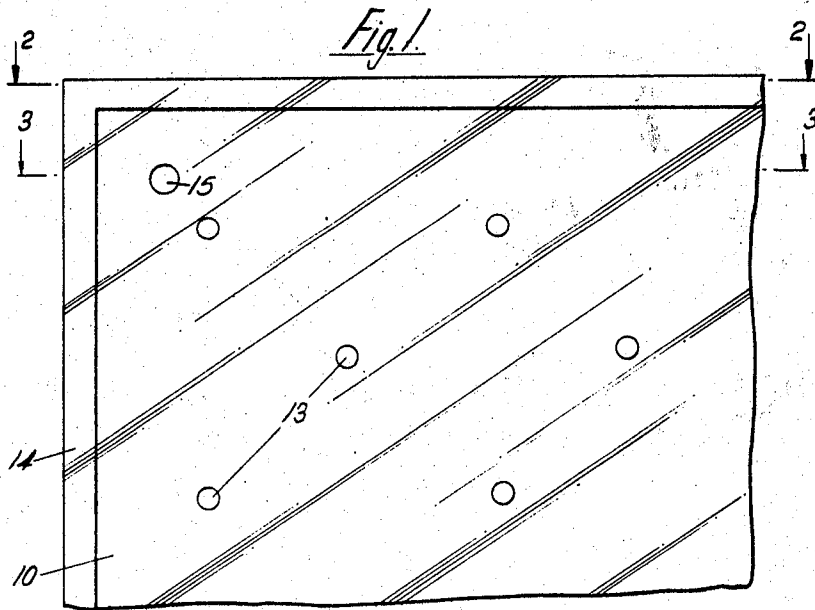
April 29, 1969

C. H. PEEK ET AL

3,441,924

WINDOW AND ALARM APPARATUS INCORPORATING SAME

Filed May 7, 1965



Inventors

Cecil H. Peek

Kenneth R. Peek

By Stevens, Davis, Miller & Mosher
Attorneys

1

3,441,924

**WINDOW AND ALARM APPARATUS
INCORPORATING SAME**

Cecil Herbert Peek and Kenneth Rodney Peek, both of
2 Russell Drive, Stanwell, Middlesex, England
Filed May 7, 1965, Ser. No. 454,116
Int. Cl. G08b 21/00, 13/08
U.S. Cl. 340—240

13 Claims

ABSTRACT OF THE DISCLOSURE

A window for actuating an alarm upon being broken comprising two substantially identical panes of glass mounted in spaced parallel relationship. The panes are held apart by a plurality of spacer means and are sealed about their peripheries by a sealing means. An orifice is provided to at least partially evacuate the space between the panes and pressure responsive means are mounted in this orifice to actuate a suitable alarm.

This invention relates to windows, and alarm apparatus incorporating same.

One object of the invention is a window comprising two panes of glass spaced apart in parallel relationship by spacer elements therebetween, sealed together at their edges, and with the contained gaseous volume at a pressure less than that external to the window.

Another object of the invention is a window comprising two panes of glass similar in their major dimensions, separated in parallel relationship by a series of spaced elements, sealed together at their edges, and containing a vacuum therebetween.

The spacer elements may be discs of transparent plastics material preferably bonded to at least one of the panes. Alternatively, the spacer elements, or some of them, could be non-transparent and together be representative of display matter of any desired kind.

A further object of the invention is alarm apparatus comprising a window closing an opening and comprising two panes of glass spaced apart in parallel relationship by spacer elements and sealed together at their edges to define therebetween a cavity or space wherein the pressure is less than the external pressure and holds inoperative a switch device interrupting an electrical circuit which includes alarm means, said switch device being adapted to react to operate the alarm means on equalization of the pressures.

Still another object of the invention is a method of closing an opening providing access to a room interior, said method comprising fitting said opening with a window comprising two panes of glass held apart by small discs or strips and sealed together at the edges to define a cavity or space to which access is afforded from the inner side of the window by an orifice, creating in said cavity or space a pressure less than that outside the window, and setting to be inoperative during continuance of the differential pressure a switch device interrupting an electrical circuit which includes alarm means.

The cavity or space may have the form of a number of parallel passages joined at one end by a single passage at right angles to the others. The cavity or space may be formed between two panes of glass either or both of which is fluted to provide the passages. The strips of discs could be of transparent material or could provide advertising matter, for instance.

In an embodiment of the invention, which will now be described by way of example, a window comprises two panes of thirty-two ounce glass measuring six feet by four feet which are disposed in parallel relationship and sep-

2

arated by discs of diameter one-eighth of an inch and thickness three or four hundredths of an inch

($\frac{1}{8}$ " x 0.03" or 0.04")

of a transparent plastics material. The discs are disposed three inches apart throughout the area of the panes and are bonded to one of the panes, this enabling transport of the window in this condition. The panes are sealed together at their edges by a suitable sealing compound such as an epoxy resin, and air is extracted from between the panes to form a partial vacuum. A vacuum of the order of about fifteen inches of mercury has been found to be suitable, and is maintained by a non-return valve.

The weight of the glass used and the size and relative dispositions of the discs may be varied in accordance with the area of the window. Moreover, the discs, or some of them, could be replaced by spacer elements of other shape in front elevation, and the discs or other elements could be non-transparent and display a name and/or an advertisement or the like. The discs or other spacer elements may have openings therein defining between the panes spaces in which air is trapped on evacuation of air from between the panes, thus affording further support to the panes.

In a further embodiment of the invention, a window is formed of two parallel panes of glass sealed together at their edges and held apart by a number of spaced small discs of transparent material. At one edge of the double window there is an aperture communicating between the cavity or space between the panes and an adapter is fitted into the aperture. Air is extracted from between the panes to form a vacuum of the order of six or seven inches of mercury.

An alarm device is incorporated into an electrical circuit which includes a switch device mounted on one of the panes and communicating through an opening in the pane with the space between the panes, the switch device being adapted to be set in an inoperative condition by the differential pressures on either side of a diaphragm. If the vacuum in the cavity or space between the panes is destroyed, the diaphragm moves to open the contacts and thus operates the alarm.

A double window as described could be set in a frame mounted in position by securing screws which pass through the frame and screw on to a switch keeping the contacts apart, the arrangement being such that if a securing screw is removed or if the head is cut therefrom, the contacts are forced together by a spring to set off the alarm.

Windows as described could be fitted, for example, to jeweler's shops, banks, private houses and show cases to set off the alarm should a window be broken, cut or removed.

Further objects and advantages of the invention will become apparent as this description proceeds with particular reference to the embodiment of the invention shown by way of example in the accompanying diagrammatic drawing, in which the views are not to scale and in which: FIG. 1 is a front elevation of a corner part of a window in accordance with the invention;

FIG. 2 is a section on the line 2—2 of FIG. 1;

FIG. 3 is a section on the line 3—3 of FIG. 1; and

FIG. 4 is a sectional view of a switch for attachment to a window according to the invention to provide alarm apparatus according to the invention.

Referring now to the drawing, and firstly to FIGS. 1 to 3, the window comprises two panes 10 and 11 of glass spaced apart in parallel relationship to provide a space 12 therebetween. Either or both of the panes may be of any toughened glass, rolled glass, plate glass or plain glass, or may be a two-layer laminated glass with possibly a coloured material between the layers to eliminate through passage of undesired sun rays.

The panes 10 and 11 are interspaced by a number of discs 13 of one-eighth of an inch ($\frac{1}{8}$ ") diameter and three-hundredths of an inch (.03") thick. Teflon, which is a trade name of polytetrafluoroethylene, has been found to be a suitable material for the discs 13. Makrolon, which is a trade name for a thermoplastic polycarbonate of 4,4'-dihydroxy-diphenyl-2,2'-propane (bisphenol A) is also a suitable material for the discs 13, as is PVB as hereinafter defined. The discs 13 are interspaced in a uniform pattern and are bonded to one or both of the panes 10 and 11.

The panes 10 and 11 are sealed together at their edges by a polyvinyl butyl resin containing, as a plasticizer, triethylene glycol di-2-ethyl butyrate, such sealing material being known as PVB. Alternatively an epoxy resin or a neoprene sealing compound could be used as the sealing material. The peripheral band of sealing material is denoted 14 in the drawing.

A small hole 15, of say about three-sixteenths of an inch ($\frac{3}{16}$ ") diameter, is provided in the pane 10, which in use will be the inside pane, the hole being adjacent one corner of the pane. This hole is used for evacuating air from the space or cavity between the panes 10 and 11 which space is laterally bounded by the peripheral band 14 of sealing material. The pump used in such evacuation is one which automatically pushes a plug into the hole 15 when the desired degree of vacuum has been obtained. This may be, say, of the order of about fifteen inches of mercury.

When the window is equipped for alarm purposes, the aforesaid plug is replaced by a switch device 16 such as shown in FIG. 4, this device incorporating a hollow stem or stud 17 which is a press fit into the hole 15. The device is sealed to the exterior of the pane 10, by a band 18 of a suitable sealing adhesive about the root of the stud 17.

The switch device 16 comprises a support member 19 which is circular in shape and of about one inch (1") diameter. The member 19 has a peripheral wall 20 of relatively small height or depth with a peripheral groove 21 in its inner wall surface close to its free edge whose function is to locate a switch comprising a circular diaphragm 22 and a circular plate 23 of like size interspaced at their peripheries by an annular insulator 24 which is bonded thereto and is externally shaped to fit snugly into the groove 21, the insulator being bonded to the wall 20 thereat. As can be seen the hollow stud 17 extends normally outwards from the plate 23 and communicates with the space 25 between the diaphragm and the plate, which space is otherwise sealed. A vent 26 is provided in the member 19 to provide communication between the space 27 and the atmosphere. Leads 28 and 29 from an electrical circuit which includes an alarm are soldered respectively to the diaphragm and the plate at 30 and 31, apertures being provided in the wall 20 for through passage of the leads 28 and 29. An annular contact 32 is provided centrally on the surface of the diaphragm 22 opposite the stud 17 and is of greater diameter than the latter.

When the switch device 16 is fitted to a window, such as that described with reference to FIGS. 1 to 3, after evacuating the cavity or space between the panes by a vacuum pump to form a vacuum of the order of about six or seven inches of mercury, the diaphragm 22 is drawn inwards to make contact with the plate 23 because of the differential pressures, and the associated alarm is then inoperative. If the vacuum is destroyed, however, the diaphragm 22 moves outwardly to open the contacts and the alarm is operated.

A plurality of switch devices could be used with one window according to the invention.

Manifestly, the discs 13 or other spacing element could be thicker if it is desired that the space 12 between the panes be of greater thickness.

A vacuum of about ten to about fifteen inches of mercury between the panes has been found to give good

sound insulation and also to improve heat insulation. Windows according to the invention can be moved to different altitudes with the vacuum sealed, or the vacuum can be adjusted as required at the site.

We claim:

1. A window comprising two panes of glass similar areal dimensions fixedly mounted in parallel spaced relationship, a plurality of disc-like plastic members mounted between said panes spaced from each other and from the peripheries of said panes to maintain the spacing of said panes, each of said members being bonded to at least one of said panes, and sealing means sealing said panes together along the peripheries thereof to define a gaseous volume therebetween, said gaseous volume being at a pressure less than ambient pressure.

2. A window according to claim 1 in which the gaseous volume is a partial vacuum of the order of about ten to fifteen inches of mercury.

3. A window according to claim 1 in which said members are formed of transparent plastic materials.

4. A window according to claim 1 in which said members have openings therein, which openings trap air when said window is assembled.

5. A window according to claim 1 in which at least some of said members are non-transparent, said elements forming a geometric configuration representative of display matter.

6. A window according to claim 1 in which at least some of said members are non-transparent and are arranged in a geometric configuration representative of display matter, means bonding said members to at least one of said panes, and said gaseous volume being at a vacuum of the order of about ten to fifteen inches of mercury.

7. A window according to claim 1 further comprising an orifice in at least one of said panes and means for selectively closing said orifice.

8. In combination with an electrical circuit which includes alarm means, a window comprising two panes of glass of similar areal dimensions fixedly mounted in a spaced-parallel relation, a plurality of disc-like plastic members mounted between said panes spaced from each other and from the peripheries of said panes to maintain the spacing of said panes, each of said members being bonded to at least one of said panes, sealing means sealing the peripheries of said panes together thereby defining a closed space, an orifice in one of said panes communicating with said space, switch means mounted in said orifice and responsive to the pressure in said space, said switch means being connected in said electrical circuit to prevent actuation of said alarm as long as the pressure within said space differs from ambient pressure.

9. The combination according to claim 8 in which said space is evacuated to form a partial vacuum on the order of seven inches of mercury.

10. The combination according to claim 8 in which said switch means comprises a housing with a chamber formed therein, a diaphragm mounted in said housing dividing said chamber into two compartments, orifice means connecting one of said compartments to ambient pressures, conduit means connecting the other said compartment to said space through the orifice in said plane, movable contact means carried by said diaphragm, stationary contact means carried by said housing, said switch means being connected in said electrical circuit so that said alarm will be actuated only upon equalization of pressures on said diaphragm.

11. The combination according to claim 8 in which said members are formed of transparent material with openings therein, said openings trapping air therein when said window is assembled.

12. The combination according to claim 8 in which at least some of said members are non-transparent and are arranged together representative of display matter.

13. The combination according to claim 8 in which

said window is mounted in the entrance to a confined space thereby assuring the security thereof.

References Cited

UNITED STATES PATENTS

1,150,204	8/1915	Julian	-----	340—240	
1,635,140	7/1927	O'Brien	-----	340—240	
1,974,779	9/1934	Lupold et al.	-----	340—240	X
2,419,149	4/1947	Lodwig	-----	52—404	X
2,976,583	3/1961	McCarthy	-----	52—402	10

FOREIGN PATENTS

648,857 9/1962 Canada.

JOHN W. CALDWELL, *Primary Examiner.*

5 D. L. TRAFTON, *Assistant Examiner.*

340—274

U.S. Cl. X.R.