

Feb. 9, 1937.

R. M. HOPKINS

2,069,953

ENCLOSURE PROTECTING ALARM

Filed Nov. 29, 1930

2 Sheets-Sheet 1

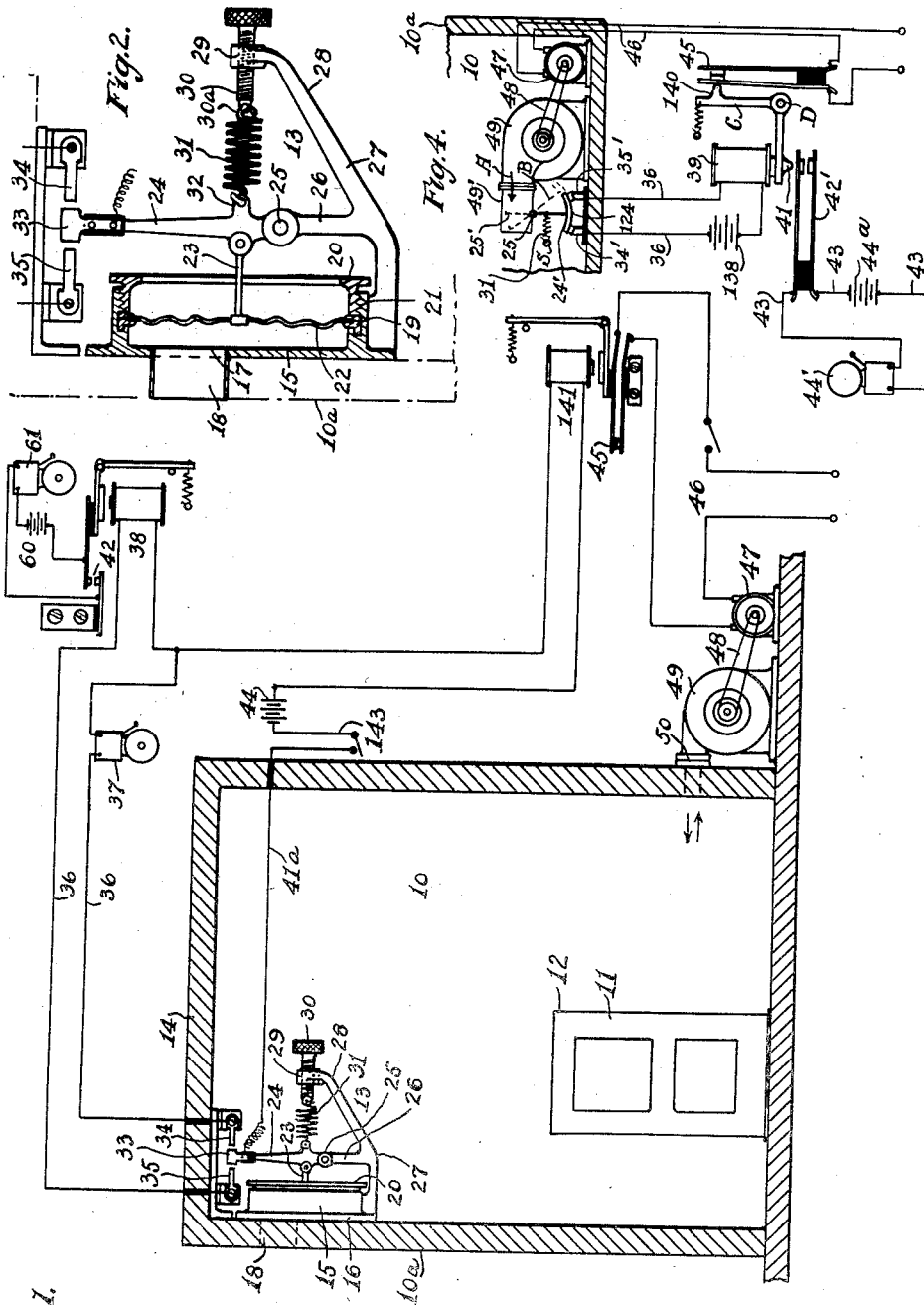


Fig. 1.

INVENTOR
Richard M. Hopkins

BY

Harold W. Penney

ATTORNEY

Feb. 9, 1937.

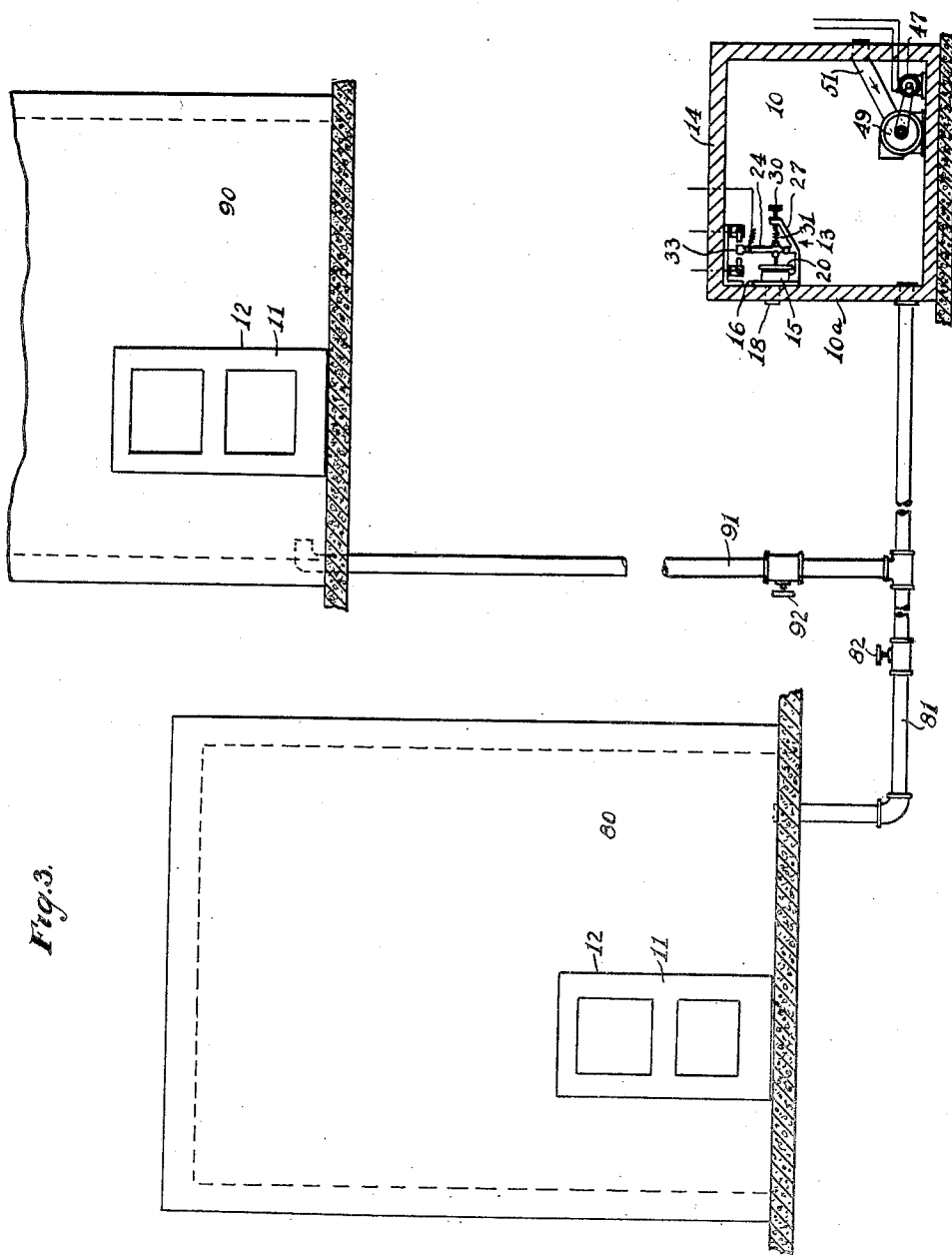
R. M. HOPKINS

2,069,953

ENCLOSURE PROTECTING ALARM

Filed Nov. 29, 1930

2 Sheets-Sheet 2



INVENTOR
Richard M. Hopkins

BY
Harold E. Penney
ATTORNEY

UNITED STATES PATENT OFFICE

2,069,953

ENCLOSURE PROTECTING ALARM

Richard M. Hopkins, Rutherford, N. J.

Application November 29, 1930, Serial No. 499,004

5 Claims. (Cl. 177—314)

This invention relates to improvements in signal or alarm installations for protecting the contents of sealed compartments such as bank vaults and other protected enclosures.

5 A principal object of the invention is to provide an alarm apparatus which is sensitive, yet positive in operation, adjustable to maintained abnormal pressures, and operable to sound an alarm by reason of the presence of excessive air pressure variations.

10 Another object of the invention is to create a dynamically maintained abnormal condition in the atmospheric content of a protected chamber and the provision of means for sounding an alarm should the condition of said atmospheric pressure be altered by entry into said chamber of extraneous air.

15 A still further object of the invention is to provide means and connections for forcing a constant air current into a sealed chamber or other protected enclosure, to form and maintain an abnormal pressure therein, or when the said propelling means is reversed in operation, for drawing air from said sealed chamber for maintaining a constant partial vacuum within said chamber, means being provided for operating an alarm or signal should the said abnormal pressures within the chamber be disturbed or altered by the entry of extraneous air through an opened door or window or through a break in the wall of said chamber, or protected enclosure.

20 A further object is to provide abnormal pressure controlled means, or apparatus for protecting individual chambers or enclosures or groups of chambers or enclosures against unlawful entry.

25 In the accompanying drawings, there is illustrated an embodiment of the invention which is thought practical for carrying out the above enumerated objects, but it will be understood that variations and refinements, may be resorted to within the scope of the invention claimed.

In the drawings,

30 Fig. 1 is a partial diagrammatic view, showing a sealed vault or chamber, to be protected, in sectional elevation, and the apparatus of my invention installed in connection therewith;

35 Fig. 2 is a detail elevation, partially in section, of an adjustable differential pressure alarm control device employed;

40 Fig. 3 is a slightly modified form of the apparatus as employed and connected for protecting a plurality of vaults or other protected enclosures; and

45 Fig. 4 is a modified fragmentary showing of the pressure actuated alarm means, in which a

closed circuit is utilized, with means directly connected to the air pressure device whereby change of speed of air flow will operate to cause the alarm and stop the pressure means operation, all being diagrammatically shown.

Referring in detail to the drawings, and more particularly to Figs. 1 and 2, the numeral 10 designates a vault, room or other protected area, provided with a door 11, sealed in its opening 12, as by stepped joints, common in vault doors.

10 In carrying out my invention, I may secure a sensitive differential pressure indicating device or apparatus 13, on a wall 10a of the vault 10, preferably near the top or ceiling 14. The device or apparatus 13, may include a cylindrical base member 15, provided with a circumferential flange 16, which may bear against, and be secured to the said wall; and this base member 15 is provided with an opening 17, into which a short pipe 18 is fitted to extend outwardly and through the vault wall 10a to the outside air.

Held between suitable retaining rings 19, by a clamping ring 20, which is threaded into the base member 15, as at 21, is a diaphragm 22, connected centrally through a link 23, with a switching bar 24, rockable on a cross pin 25, in an arm 26, of a frame 27, extending inwardly from the base member 15. The frame 27, is also formed with another arm 28, extending inwardly and upwardly beyond the arm 26, and is provided with a threaded bore 29, receiving a finger operated screw 30, which is connected as at 30a to one end of a normally open spring 31, which in turn is connected at its opposite end to the switching bar 24, as at 32, and preferably in longitudinal alignment with the connecting link 23, of the diaphragm.

35 The switching bar 24, carries on its free end an insulated switching contact piece 33, in swingable position to contact with either of two terminal contacts 34 and 35 arranged in an alarm and motor control circuit 36, said circuit including an alarm 37, a relay 38 another relay 141, a hand switch 143, a source of energy 44, connected by a conductor 41a with the contact piece 33 of the switching bar 24.

40 The relay 38, acts when the circuit 36 is closed, through the terminal piece 35 and switching piece 33, to close a switch 42, to energize a local circuit 60, and operate an alarm 61, and to simultaneously, through relay 141, open a switch 45, arranged in a circuit 46, controlling a motor 47; said motor being belt connected as at 48, with a blower or fan 49, which is in piped communication with the interior of the sealed vault or

5

10

15

20

25

30

35

40

45

50

55

chamber 10 as at 50. The opening of the switch 45, of course, stops the motor 47 and the fan 49.

When an opposite alarm release takes place, and the circuit 36 is closed through the switching piece 33, contacting with the terminal contact 34, the alarm 37 is operated, as well as the relay 141, to break the motor circuit as before, so that if the circuit 36 is closed in either closed position of the switching piece 33, an alarm will be operated and the motor circuit broken.

In the setting of the improved alarm apparatus when a maintained pressure is to be employed, the motor circuit 46, is closed and the fan 49 operated to fill the vault 10, to a determined pressure, and as this pressure is developing, the diaphragm 22 will be flexed outwardly thus drawing the switching bar 24 to the left, and when the determined pressure has been established within the vault and the motor set at the proper R. P. M. for the constant maintenance of said determined pressure, the finger screw 30, is manipulated to exert a yielding pull on the switching bar 24 against the flexing action of the diaphragm to center the switch piece 33 between the terminal contacts 34 and 35 and at the same time storing the flexing energy exerted by the diaphragm into said spring after which the device is ready for service.

Now, should an attempt be made to enter the vault 10, either by breaking through the wall of the vault or by opening the door 11, the pressure within the vault will at once be reduced, thus causing the diaphragm 22 to reflex to normal and thus permitting the tensioned spring to pull the switching arm over and cause the switch piece 33 and terminal piece 34 to contact and establish the alarm circuit 36 through alarm 37 and relay 141 to stop the motor and sound an alarm. However, the alarm 37 is not absolutely necessary, as the mere stopping of the motor would be a signal to a person nearby that the pressure in the vault had been changed.

In the event a constantly maintained pressure is to be maintained as the holding force, a determined pressure is first established within the vault 10 by operating the fan 49, which action will tend to flex the diaphragm 22, and through the link 23, force the switching arm 24, to the right, and when the determined pressure has been established, the finger screw 30, is manipulated to urge the switching bar 24, to the central neutral position by changing the spring 31, thus when the wall of the vault is penetrated or the door 11 opened in an attempt at unlawful entry the outrushing air will permit the diaphragm to reflex to normal and permit the compressed spring 31 to throw the switching arm 24 over and cause the switch piece 33 to engage the terminal contact 35 of the circuit 36, thus closing said circuit to operate the alarm 61 through the relay 38, and also to operate the relay 141 to break the motor circuit. While herein I show means for raising the pressure in the enclosures, rather than lowering the pressure therein, it is noted that the invention as defined in the claims is not thus limited.

In Fig. 3 of the drawings, the motor 47 and blower 49 are located within the vault 10, the fan having a centrally connected inlet conduit 51, entering through a wall of the vault as shown. In this figure other protected enclosures 80 and 90 are shown with their interiors connected by air tubes 81 and 91, provided with valves 82 and 92. In this arrangement the air in all of the intercommunicating enclosures is maintained at

an abnormal pressure and any disturbance of pressure, will cause the diaphragm in the vault 10 to operate to sound an alarm as described.

In Fig. 4 there is disclosed another form of pressure change actuated means in which the vault or chamber 10 is formed by walls 10a, and closed as described in prior figures. The walls 10a are broken away and sectioned for convenience in showing.

A blower 49 is driven by a motor 47 by any convenient drive connection such as a belt 48. The motor is connected to a source of current not shown by means of a switch and circuit comprising wires, the switch 45 being similar to switches 42 and 45 previously described in Fig. 1. The blower 49 has an extended exhaust duct 49', through which air passes in the direction of the arrow A, Fig. 4.

In the exhaust duct 49' is pivotally mounted an air actuated damper valve switch 124, pivoted at 25 to the duct wall, the upper end being the damper portion 25' and located in the path of air passing through duct 49' and affected thereby to move by said air action. The lower end of the valve switch 124 is in the form of a short arc 24', and in the position shown, bridges two terminals 34' and 35', at the ends of the relay circuit wires.

Further, the valve switch 124, is constrained against movement by the air stream and in its closed circuit position as shown, by a balancing spring 31 affixed to said switch 124 and a suitable fixed point. This spring may be tensioned, as at S, to suit the pressure force exerted by the passing air upon the damper portion 25' so as to hold it in the closed circuit position shown. In this state of balance, any change of air pressure caused by opening the sealed chamber 10 will cause the valve 124 to move to position B, shown dotted, thus breaking circuit 36—36, causing an alarm to operate, and the motor to cease operating the blower. When the motor stops, the air ceases to flow from the fan and switch 124 returns to closed position starting the motor again. The air from the fan would then again open the switch and the cycle would be repeated so long as the door 11 was open.

To this end, the wires 36—36 are connected to a source of current supply 138 and a relay coil 39 in series, so that when switch 124 covers terminals 34'—35' the relay is operative to attract and hold pivoted switch actuating lever C to press a cam end 140 against switch 45 to close motor circuit 46 to cause motor 47 to operate the blower. The lever C is pivoted at its elbow D and its lower cam arm 41 controls to leave switch 42' open when switch 45 is closed, and conversely, when pressure change in chamber 10 is altered, switch 45 is opened and switch 42' is closed thereby cutting off blower drive, and operating the alarm circuit 43—43 through the series connected current source 44a and alarm 44'.

Thus my improved alarm apparatus may be employed for quick operation with a determined abnormal pressure as the holding or maintaining force.

What I claim is:

1. In an alarm apparatus for housings including a structure having a door, the combination of an electric circuit having a switch in the housing, gas-pressure operative switch control means, means including a blower for maintaining a predetermined pressure in the housing to hold the switch open, a signal means, means controlled by said circuit for controlling the signal means, a

second circuit including a motor for operating said blower, and means disposed in said first circuit for opening the circuit of said motor whereby to discontinue operation of said blower, said control means being effective to close said switch responsive to a change of the air pressure on opening said door.

2. A system for use in combination with a compartment having a door for the ingress and egress of valuables, said system comprising a means for giving to the air in the interior of the compartment a continuous constant pressure, within predetermined limits, different from the exterior pressure; a signal means; and means operated by the pressure of said air in the compartment when it departs from said constant pressure for operating the signal means and discontinuing the operation of the pressure changing means.

3. A system for use in combination with a compartment having a door for the ingress and egress of valuables, said system comprising a pressure changing means for giving to the air in the interior of the compartment a constant pressure different from the exterior pressure; and means operated by the pressure of said air when it departs from said constant pressure, either above or below, for discontinuing the operation of the pressure changing means.

4. A system for use in combination with a compartment having a door for the ingress and egress of valuables and a pair of openings therein, said system comprising a constant pressure

changing means, including a motor therefor, for normally giving to the air in the interior of the compartment a continuous constant pressure, within predetermined limits, different from the exterior pressure; a signal means; and means operated by the pressure of said air in the compartment as long as it departs from said constant pressure beyond said predetermined limits, as when the door is opened, for operating the signal means, cutting off the motor of the pressure changing means, and preventing the pressure changing means from restoring said normal pressure, restarting the motor and silencing the signal means should the door be closed again, thereby maintaining the signal means operating and the motor at rest.

5. In an alarm apparatus for housings including a structure having a door, the combination of an electric circuit having a switch within the housing, a gas-pressure operative switch control means, means for biasing the switch to circuit closing position, a blower for maintaining a predetermined pressure in the housing to constantly restrain said switch and hold the circuit open while said door is closed, an electric motor for operating said blower an energizing circuit for said motor and means operated by the closure of the gas-pressure switch controlled circuit for opening the motor energizing circuit to discontinue the operation of the blower on opening the door.

RICHARD M. HOPKINS.