

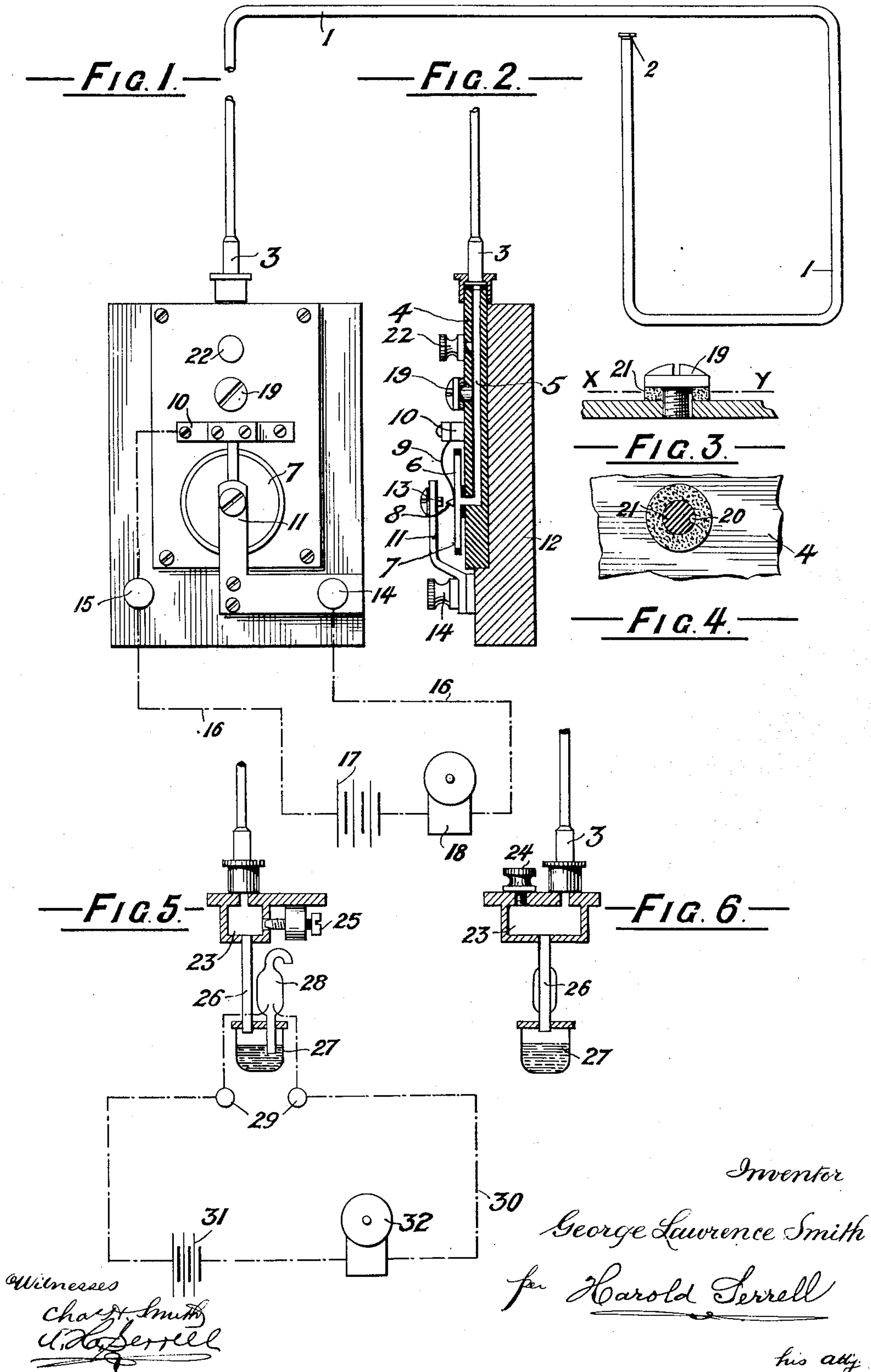
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G. L. SMITH.

FIRE AND TEMPERATURE ALARM OR INDICATOR.

APPLICATION FILED JULY 23, 1906.



UNITED STATES PATENT OFFICE.

GEORGE LAWRENCE SMITH, OF ABERDEEN, SCOTLAND.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, GEORGE LAWRENCE SMITH, a subject of the King of Great Britain, residing at Aberdeen, Scotland, North
5 Britain, have invented certain new and useful Improvements in Fire and Temperature Alarms or Indicators, and of which the following is a specification.

The object of this invention is to provide a
10 pneumatic fire and temperature alarm or indicator which shall fulfil certain conditions—that is, it must not be merely a local fire-alarm, but an apparatus which must extend over a considerable area—so as to indicate a
15 rise in temperature at any part of the room or rooms through which it passes, and at the same time it must not indicate upon a gradual rise, but only upon a sudden rise, in temperature. Further, it must be of such a construction that the electrical contacts which
20 are to be operated must be capable of being placed even outside the area within which the sudden rise of temperature takes place or is likely to take place.

Now it has been heretofore proposed to
25 construct a pneumatic local fire-alarm apparatus composed of a closed expansible-metal box containing air provided with a porous plug calculated to permit of a slow entrance
30 or exit of air to or from the box, so that the box only was expanded upon a sudden rise in temperature, while upon gradual rises the air escaped by the porous plug. The expansion of the box closed or opened an electric circuit. In practice such an apparatus pos-
35 sessed serious disadvantages in that it was not capable of indicating over a large area, and therefore to indicate a fire throughout a number of rooms or a building it was neces-
40 sary to affix a number of these expansible boxes, and beyond this the electrical contacts and conductors were extended actually into the room or places in which a fire was to be indicated.

In operating dampers or ventilators by
45 action brought about by changes of temperature it has been proposed to employ a tube containing water under pressure or compressed air, the tube communicating with a
50 cylinder having a piston under spring-pressure, and then the tube could be extended around a room, for instance, so that upon any rise of temperature, however gradual or however sudden, an expansion of the liquids
55 in the tube would take place, the piston would be operated, and the damper or venti-

lator would be adjusted. Such an apparatus would not attain the objects sought by this invention, because even supposing the tube to contain air the air would be ex-
60 panded upon a gradual rise of temperature as well as upon a sudden rise, and therefore if the temperature of the room or place in which the apparatus was fitted rose slowly through any ordinary heating in a normal
65 manner the ventilator would be operated, or, substituting for the ventilator a fire-alarm circuit, the fire-alarm would be sounded at any gradual or ordinary rise of temperature.

Now according to this invention a metal
70 tube of small diameter is provided of any required length and having a correspondingly small bore. The tube is closed at one end and at the other is connected with a pneumatic pressure-indicator, which when the
75 air expands in the tube acts to close an electric circuit and to operate an alarm. The air within the tube and within the pneumatic pressure-indicator is to be normally maintained at atmospheric pressure, and to
80 this end I provide the tube with an air-vent or small opening for the passage of the air, so that upon the air in the tube expanding by a normal and slow rise of temperature the air will escape by the vent sufficiently to insure
85 the maintenance of atmospheric pressure within the tube, but upon a sudden rise, owing, for instance, to a fire, the capacity of the air-vent will not be sufficient to keep pace with the expansion, and consequently
90 the pneumatic pressure-indicator will act, the electric circuit will be closed, and the alarm sounded. At the same time with such an apparatus it is essential that the pneumatic pressure-indicator should be of the
95 smallest practicable capacity, so that it may be affected with certainty by the expansion of the air in the small-bore tube.

Examples of construction of the invention are illustrated in the accompanying draw-
100 ings, whereon—

Figure 1 is an elevation showing the air-containing tube, which is extended through or around the place or places in which any
105 unusual or sudden rise of temperature is to be notified, and illustrates the tube connected with a pressure-indicator, and an electric circuit is indicated in diagram by dotted lines, Fig. 2 being a vertical cross-section taken through the pressure indicator, while
110 Fig. 3 is a cross-section, on a larger scale than the previous figures, showing the adjustable

vent; and Fig. 4 is a section on the line X Y of Fig. 3. Fig. 5 is a sectional elevation, and Fig. 6 a transverse vertical section, showing a modified construction of the pressure-indicator.

Referring to Figs. 1 to 4, the thermostatic alarm-tube 1 is made of copper, although other metal may be used, and it is of comparatively small bore—say about one-tenth of an inch diameter—with the bore of, say, one-twentieth of an inch, although these dimensions may be increased or decreased both as regards the diameter and the bore to suit special conditions. The tube is fitted around or through the room or rooms to be protected, say as near the ceiling or roof as convenient, and in dwelling-houses it may be dropped into the picture-molding commonly fitted, and in such positions the tube would be invisible. In fitting a number of rooms a comparatively large tube may be employed—say one-eighth of an inch in diameter—but the connections between room and room and between the rooms and the pressure-indicator—which may be far removed—can be constructed with a tube of small diameter, as instanced above. On the other hand, a very large hall or place might be fitted with a larger tube in order that the metal (copper) might be less in proportion to the contained air, thus producing a more sensitive alarm, while increase of metal of the tube in proportion to the air contained gives an extra compensation and causes the alarm to operate slower, although with equal certainty, so that the mechanical conditions to be met with in different situations thus have an influence on the size, strength, and thickness of the tubing it is preferable to employ. The tube 1 is closed at one end—say at 2, as shown in the drawings—and at the other and open end 3 it is connected with the pressure-indicator.

The indicator (shown at Figs. 1 to 4) is connected to a plate 4, so that the tube communicates with a passage 5 in the said plate, the passage 5 communicating with the interior of an expansible chamber 6, which may have a flexible or elastic diaphragm 7, upon which there rests a platinum or other contact 8, carried by a light spring 9 from a stud 10, fixed upon the plate 4. Above the contact-point 8 is a bridge-piece 11, fixed to the base 12 of the indicator and carrying an adjustable contact-screw 13, so that when the pressure of air is increased in the tube 1 and passes by the passage 5 the expansion of the case 6 causes the platinum contact 8 to touch the contact-screw 13 and complete the circuit. The bridge-piece 11 has a terminal 14 mounted on the base 12, while the stud 10 is electrically connected with a terminal 15, and the terminals 14 15 are respectively connected with the ends of the wires 16 forming the electric circuit, 17 indicating an electric

battery and 18 any suitable or well-known alarm apparatus operated by the current passing through the circuit 16.

As aforesaid, I provide a vent, generally controllable or adjustable, through which the air from the tube may slowly escape from or press into the tube at any gradual or usual variation of temperature, and in the drawings, Figs. 1 and 4, such vent is composed by a hole formed in the wall of the passage 5 and communicating therewith. In the construction illustrated a screw 19, entering the hole, as shown in detail at Figs. 3 and 4, is formed with a groove 20, and beneath the head of the screw is a washer 21 of porous material, such as porous paper, cloth, or the like.

22, Figs. 1 and 2, is a screw-plug closing a hole in the plate 4, communicating with the passage 5, which screw 22 can be removed and replaced by a suitable testing-machine, so that by forcing a certain quantity of air into the passage 5 in the tube 1 the effect of a fire or sudden rise of temperature can be produced to set off the alarm for the purpose of testing the apparatus.

Obviously the construction of the devices for controlling the vent communicating with the bore of the tube 1 can be infinitely varied; but I would have it understood that in some cases means for controlling this vent may be dispensed with, a simple perforation being sufficient to allow the air to pass from or into the tube upon any usual or ordinary variation of temperature. It will now be understood that upon an unusual or sudden rise of temperature, due to a fire or other causes, the air in the tube 1 will become expanded and the pressure will be communicated to the indicator, and in the construction shown at Figs. 1 to 4 it will act within the expansible case 6 and cause the electrical contacts to close, so completing the circuit 16 and sounding the alarm.

At Figs. 5 and 6 is shown a modified form of what I have termed the "pressure-indicator," consisting of a box 23 equivalent to the passage 5 and fitted with a test-screw 24 and formed with a hole communicating with the outer atmosphere, which can be adjustably controlled by a screw 25. The box 23 communicates by a tube 26 with a closed case 27, containing mercury.

28 is a tube (which may be of glass) which enters the closed case 27, dipping beneath the surface of the mercury, and in this tube there are two platinum contacts, as indicated, the upper end of the tube being open and turned down to exclude dust. The platinum contacts are connected by terminal screws 29 to a wire 30, forming an electric circuit, 31 indicating a battery and 32 any suitable electrically-operated alarm apparatus.

When the air in the tube 1 is unusually or suddenly heated by fire or otherwise, the

mercury is pressed up into the enlarged part of the tube 28 and completes the circuit; but before the enlarged part of the tube 28 is full of mercury the level of the mercury in the case 27 will have sunk below the lower end of the said tube, and any further pressure of air will simply pass through the contained mercury in the enlarged part of the tube 28.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In fire and temperature alarms; the combination of a metal tube of small diameter having a correspondingly small bore containing air and closed at one end a closed chamber with the interior of which the open end of the tube communicates, said tube having a vent for permitting air to pass slowly to and from the bore of the tube upon a gradual and ordinary variation of temperature, and means for regulating said vent, two electrical contacts, means operated by a sudden and unusual increase of pneumatic pressure in the tube and chamber for mechanically closing said contacts, an electrical conductor having its ends respectively electrically connected to said contacts, and an electric battery and an alarm device located in the electric circuit composed by the conductor aforesaid substantially as set forth.

2. In fire and temperature alarms; the combination of a metal tube of small diame-

ter having a correspondingly small bore containing air, means for closing one end of said tube a plate having a passage formed therein and having an air-vent communicating with said passage, means for adjustably regulating the passage of air through said vent, said plate having a test-aperture communicating with said passage for testing the action of the alarm by air-pressure admitted through said test-aperture, and a screw-plug for closing the test-aperture, means for connecting the open end of said metal tube to one end of said passage in said plate, a chamber capable of expansion by interior air-pressure and having a bore communicating with the passage in the plate aforesaid, a movable electric contact carried upon said expansible chamber, a stationary electric contact, means for supporting the latter contact above the movable contact, an electric conductor having its ends respectively electrically connected to said contacts, and an electric battery and an alarm device located in the electric circuit composed by said conductor, substantially as set forth.

In witness whereof I have hereunto set my hand in the presence of two witnesses.

GEORGE LAWRENCE SMITH.

Witnesses:

JAMES WALKER,

HENRY ALEXANDER BOTHWELL.