April 24, 1956 J. J. VALENTI 2,743,334

FIRE DETECTOR

Filed May 11, 1954

2 Sheets-Sheet 1

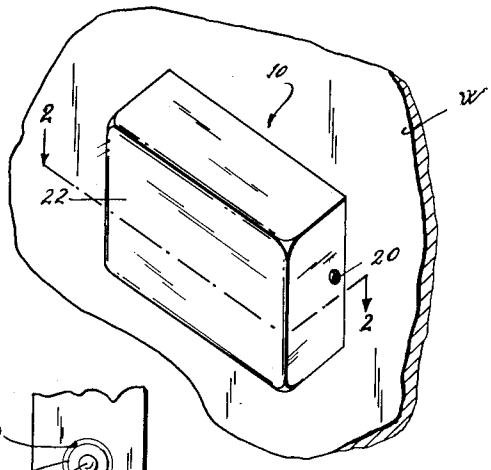


Fig. 1.

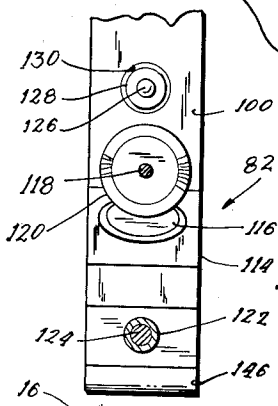


Fig. 5.

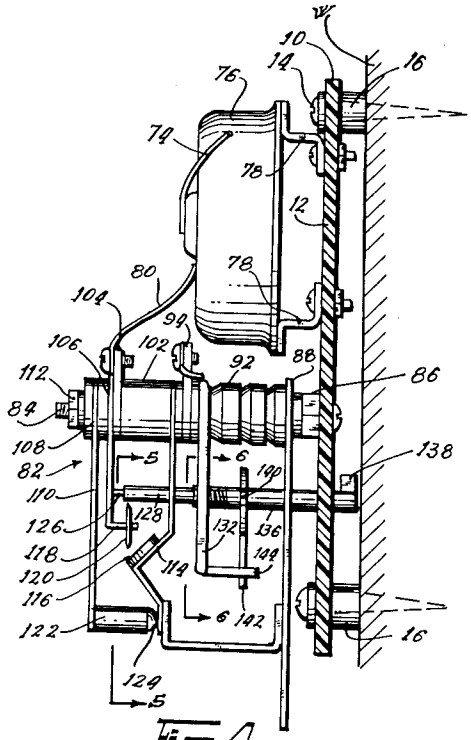


Fig. 4.

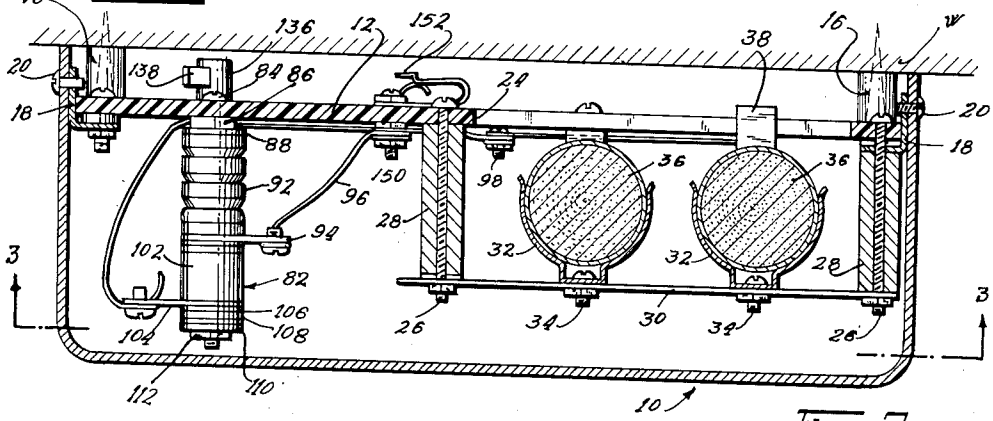


Fig. 2.

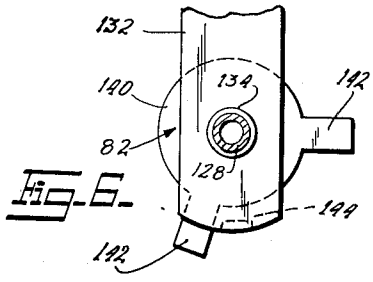


Fig. 6.

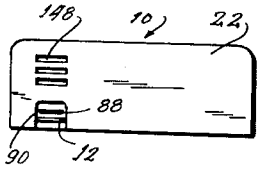


Fig. 10.

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FIRE DETECTOR

Filed May 11, 1954 2 Sheets-Sheet 2

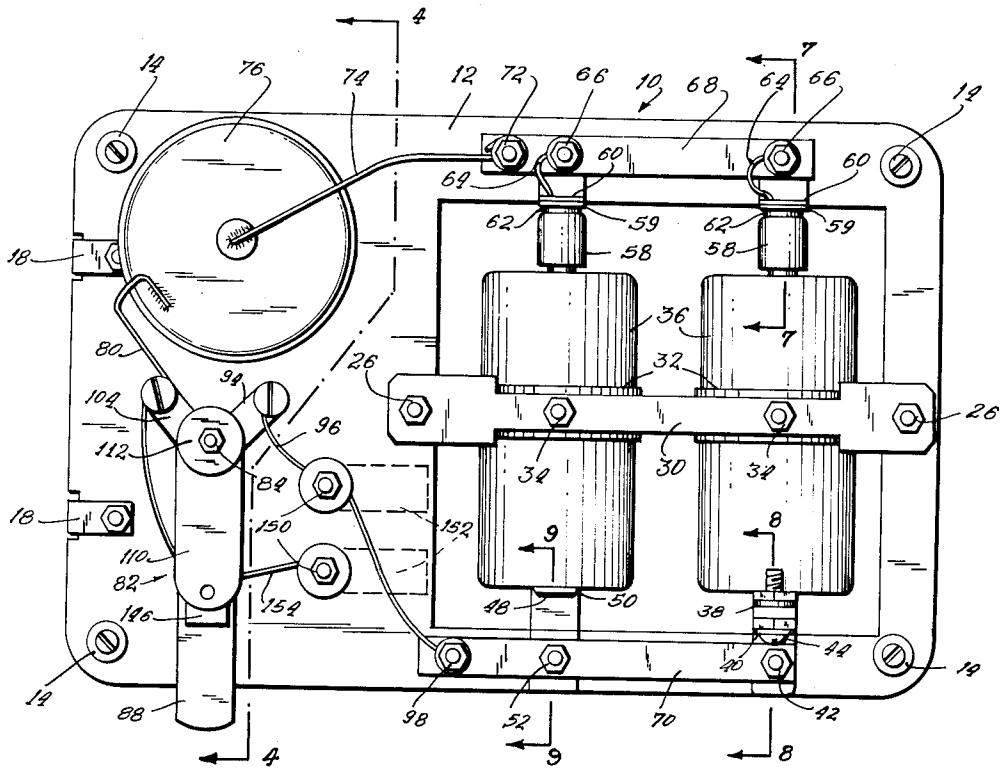


Fig. 3.

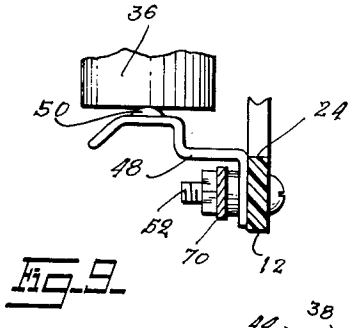


Fig. 9.

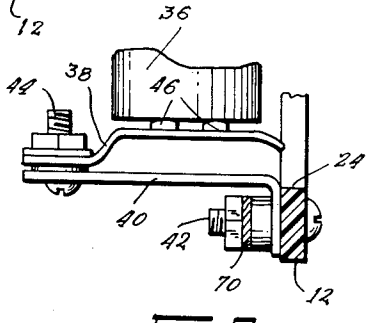


Fig. 8.

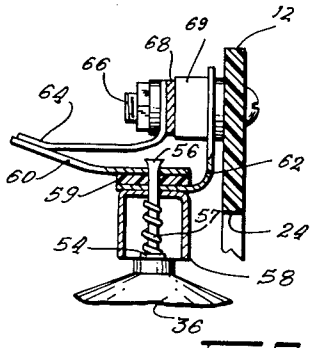


Fig. 7.

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2,743,334

FIRE DETECTOR

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Application May 11, 1954, Serial No. 428,385

2 Claims. (Cl. 200—138)

This invention relates to fire detector alarm units. More particularly, the invention has reference to a unit of the nature referred to which can be mounted at any desired location, and is of the bimetallic thermostatic type.

Among important objects of the invention are the following:

To provide a generally improved fire detection unit which will react efficiently to a predetermined abnormal temperature rise within the area of the unit to close a circuit to a selected type of electrical signal device responsive to reaction of the bimetal;

To enclose the entire unit within one case, thereby to make it a self-contained device which can be free of any connection to and/or reliability upon any other fire detection unit elsewhere located;

To design the unit in such a way as to permit it to be connected in parallel with other similar units in any desired number, despite the adaptability of the unit for operation, in the manner referred to above, independently of said other units;

To design the system for operation on any voltage ranging, for example, from one-and-one-half to 110 volts;

To permit the unit to be mounted within walls, on or above ceilings, in concealed or exposed locations, or at any other desired point;

To effect operation of the fire detection unit without reliability upon any external wiring for the source of supply needed to provide a working current, thus causing each unit to house its own power plant and thereby eliminate completely any need for wiring, so as to facilitate the fast installation of the device without the need of special technicians;

To so design the unit as to locate a test button in such relationship relative to the remaining parts of the device as to cause all parts to be tested by the single operation of pressing the test button;

To employ only bolted and spot welded connections, thus to make it possible for the unit to operate in the midst of a fire under extreme heat conditions; and

To provide an improved contact assembly that will include specially designed contact points effective to close a circuit at all times, even with oxidization film which tends to collect upon any set of contacts which have been in open position for any length of time, it being thus proposed to insure the closing of a circuit under a condition which has been responsible for failure of a great number of safety devices of this general type.

For further comprehension of the invention, and of the objects and advantages thereof, reference will be had to the following description and accompanying drawings, and to the appended claims in which the various novel features of the invention are more particularly set forth.

In the accompanying drawings forming a material part of this disclosure:

Figure 1 is a perspective view of a fire detection unit formed in accordance with the present invention, as it

appears when mounted upon a wall, said wall being illustrated fragmentarily.

Fig. 2 is an enlarged longitudinal sectional view substantially on line 2—2 of Fig. 1.

Fig. 3 is an elevational view of the device with the cover removed, the device being seen from the line 3—3 of Fig. 2.

Fig. 4 is a transverse sectional view on line 4—4 of Fig. 3.

Fig. 5 is an enlarged detail sectional view substantially on line 5—5 of Fig. 4.

Fig. 6 is an enlarged, detail sectional view substantially on line 6—6 of Fig. 4.

Fig. 7 is an enlarged, detail sectional view substantially on line 7—7 of Fig. 3.

Fig. 8 is an enlarged, detail sectional view substantially on line 8—8 of Fig. 3.

Fig. 9 is an enlarged, detail sectional view substantially on line 9—9 of Fig. 3.

Fig. 10 is an elevational view looking upwardly at the device when mounted upon a vertical wall surface.

The reference numeral 10 has been applied generally in the drawings to the fire detection unit constituting the present invention, said unit being illustrated as it appears when mounted upon a vertical wall surface W. The device can, of course, be mounted at any other desired location at which abnormal temperatures might be expected in the event of a fire, such as interiorly of a wall, upon or above a ceiling, etc. Further, it should be noted at this point that the unit illustrated could be mounted in multiple, upon a structure, not shown, covering a large area, which structure may be mounted upright upon a floor surface with a plurality of elongated adjustable arms radiating outwardly therefrom, with each arm containing one of the units at its outer end. A ceiling unit could be formed in the same manner as the upright floor structure, except for being supported dependingly from the ceiling.

In any event, whether the device is used alone or in multiple, it would appear as shown in the several figures of the drawing, and as illustrated in Fig. 3, includes a generally rectangular, flat base plate 12 of electrically insulative material having corner openings receiving screws 14 which extend through spacer sleeves 16 into the wall surface W to secure the base plate fixedly to said wall surface in closely spaced relation thereto. At its opposite ends, base plate 12 has L-shaped brackets 18 (Fig. 2) secured thereto. At one end of the base plate, a single bracket 18 is provided medially between the longitudinal edges of the base plate. At the other end, two brackets 18 are provided, spaced transversely of the base plate. Screws 20 are threadedly engaged with the brackets, and pass through openings formed in the opposite end walls of a rectangular, open-backed cover 22.

For substantially half its length (Fig. 3) base plate 12 is formed with a large rectangular opening 24. At opposite ends of opening 24 (Fig. 2) elongated screws 26 extend through base plate 12, projecting outwardly from the base plate for a substantial distance. Circumposed about the screws 26 are spacer sleeves 28, which serve to space outwardly from base plate 12 a battery support bar 30 extending longitudinally and centrally of opening 24. The outer ends of screws 26 extend through smooth-walled openings in the ends of bar 30, and threaded on the screws are nuts that hold the battery support bar in place.

Spaced longitudinally of bar 30 are spreadable spring clips 32 the bights of which have smooth-walled openings registering with similar openings of bar 30, for extension of attaching screws 34 through the clips and bar. Flashlight batteries 36 are engaged by the clips and are remov-

able through opening 24 when base plate 12 is detached from its associated wall surface.

The negative ends of the batteries are engaged by contact springs, respectively shown in Figs. 8 and 9. While both contact springs can be identical, two different types are illustrated to show springs that could be used. That shown in Fig. 8 is preferred, and includes a spring element 38 one end of which is secured to the outer end of an L-shaped bracket 40 attached to base plate 12 by screw 42, a screw 44 being used to effect the fixed connection of the bracket and spring. The free end of spring element 38 is formed with longitudinally spaced contact lugs 46 both of which are in engagement with the negative side of the battery. If desired, the Fig. 9 construction could be used, this including a spring 48 having a single contact lug 50 engaging the negative side of battery 36, and formed with an L-shaped extension at its other end attached to base plate 12 by screw 52.

The positive ends of the battery are supported as shown in Figs. 3 and 7. A flat contact disc 54 is held in engagement with the positive battery post, and is rigid with one end of a shank the other end of which has an enlargement 56. A compression spring 57 is circumposed about the shank, within a cup-like holder 58, and continuously urges the disc 54 into engagement with the battery post. The shank is slidable in registering openings formed in the holder 58, an insulating washer 59, an electrically conductive connecting member 60, and an L-shaped bracket 62.

By reason of this arrangement, a double spring pressure is exerted upon each battery, opposing pressures being exerted toward one another from the opposite ends of the battery to insure good electrical contacts at all times at both ends.

Fixed to the members 60 are connecting wires 64 the other ends of which are looped about screws 66 that mount the brackets 62 upon the base plate. Screws 66 pass through longitudinally spaced openings of a conductive bar element 68 spaced outwardly from the base plate by spacer sleeves 69 of electrically insulative material, circumposed about screws 66.

At the negative ends of the batteries, a second conductor bar element 70 is supported in spaced relation to base plate 12 by screws 42, 52, and is electrically connected through said screws to the contact springs 38, 48.

To one end of bar element 68 there is attached a terminal screw 72, about which is looped one end of a lead 74 the other end of which is spot welded to one side of an electrical signal device 76. Preferably, this is of the vibrator-disc-oscillating type having a high acoustical value. While the sound emitted from such a unit would not be too harsh at close range, its vibration and sound will carry further than any other type of signal device of a comparable size. The signal device is mounted fixedly upon support brackets 78 bolted to base plate 12 (Fig. 4.)

Spot welded at one end to the other side of signal device 76 is a lead 80. This extends to a contact assembly 82. Assembly 82 is illustrated in Figs. 2, 3, 4, 5 and 6. It is mounted upon an elongated bolt 84 projecting outwardly from base plate 12 and secured to the base plate by nut 86.

Immediately adjacent nut 86, bolt 84 passes through an opening in one end of a flat test handle 88 which (Figs. 3 and 10) projects outwardly beyond one longitudinal edge of base plate 12, through a large rectangular opening 90 formed in the sidewall of cover 22, to provide access to the free end of the test handle when the operation of the detection unit is being checked.

An insulation sleeve 92 through which the screw 84 passes bears against the test handle, and beyond the outer end of sleeve 92, the screw passes through a center opening of a circular terminal element of electrical conductive material having a radial arm 94 carrying a terminal screw at its outer end, about which is looped one end of a lead 96 (Fig. 3), the other end of which is looped about a terminal screw 98 of conductive bar element 70.

In contact with the terminal disc is the inner end of an elongated, electrically conductive, spring contact arm 100. Spacing sleeve 102 of insulation material bears against arm 100, and spaces the arm 100 away from a second terminal disc 104 having a radial arm spaced from the radial arm 94 (see Fig. 3).

Mounting bolt 84 extends through a movable spring contact arm 106 bearing against terminal disc 104. An insulating washer 108 spaces arm 106 from a restraining arm 110 adapted, in a manner to be made apparent, to hold arm 100 from moving, under normal conditions, toward arm 106.

A nut 112 threaded upon the outer end of bolt 84 holds the several parts through which the bolt extends against movement off the bolt.

The particular formation of spring contact arms 100, 106 is of importance. Arm 100, adjacent its outer end, has a V-shaped crimp 114 formed therein on one leg of which is fixedly secured a contact 116. Contact 116 is thus inclined obliquely to the direction in which the free end of arm 100 normally tends to move by reason of the spring tension thereof.

At the outer end of arm 106 there is formed a lateral extension 118 projecting toward arm 100. Fixed to said extension is a circular, thin contact 120 having a sharply beveled periphery spaced a short distance away from the face of the obliquely inclined contact 116. Arm 106 is tensioned to normally shift at its free end in the direction of arm 100 to bring the contacts 116, 120 into engagement with one another for the purpose of closing a circuit.

Means is associated with each contact arm, however, to hold the same against movement toward the other contact arm. In the case of arm 100, said means includes a cylindrical holder 122 rigid at one end with the free end of restraining arm 110. At its other end, holder 122 has an electrically insulative spacer element 124 engaged therein. Element 124 is in engagement with the free end of arm 100, said free end being engaged by the element 124 against movement toward contact arm 106.

An insulative element 126 engages the arm 106 against movement toward arm 100, and is supported in a cylindrical holder 128 loosely positioned through an opening 130 of arm 100 (Fig. 5). An elongated bracket member 132 is mounted at its inner end upon bolt 84, and adjacent its outer end, has a threaded opening in which is engaged the correspondingly threaded base portion 134 of holder 128, said base portion being integral with an operating rod 136.

Arm 136 extends through openings formed in test handle 88 and base plate 12, and below the base plate, has a radially extending handle portion 138 to facilitate rotation of the operating rod. When the operating rod is rotated, it is threadedly advanced toward contact arm 106, or is moved away from the contact arm as desired, thus to adjust the spacing between the contacts 116, 120.

To limit rotatable movement of the adjusting rod in opposite directions, said rod has rigidly secured thereto a disc-like collar 140 having (Fig. 6) circumferentially spaced, radially extending lugs 142 either of which is engageable by a depending stop finger 144 formed upon the outer end of member 132.

The arms 100, 106 are highly sensitive bimetallic strips, each having a wide range of variation despite its sensitivity. Under the influence of abnormal temperatures of a predetermined value, said strips will deflect to bring the contacts 116, 120 into engagement and as a result, a circuit will be closed to the signal device 76.

Spot welded at one end to the free end portion of test handle 88, interiorly of the cover, is a C-shaped bracket 146 (Fig. 4) the other end of which engages the free end of contact arm 100 to cooperate with element 124 in holding said arm 100 in a stationary position. If it is desired to test the device, the user merely grasps the free

end of test handle **88**, and shifts it to the left in Fig. 4. This shifts contact **116** against the beveled periphery of contact **120**.

In the cover side wall, adjacent opening **90** (Fig. 10), slot-like vent openings **148** are provided, adjacent contact strips **100**, **106**. Thus, an abnormal rise in temperature is communicated immediately to the area of said strips, to cause deflection thereof.

A pair of screws **150** (Fig. 3) are extended through base plate **12** adjacent contact assembly **82**, and hold against the underside of the base plate a pair of spring clips **152** (Fig. 2). Lead **96** is looped about one of the screws **150**, and a lead **154** extends to the other screw **150** from the terminal arm **104**.

The purpose of screws **150** and clips **152** is to permit the device to be connected in parallel with other similar devices located elsewhere. Conductors, not shown, need merely be attached at one end to the clips **152**, and extended from the unit to a similar unit, for attachment at their other ends to the clips **152** of said similar unit.

In this way, the device is adapted not only for use as a self-contained unit having its own source of power, but also as one of a multiplicity of such devices.

The particular formation and relative arrangement of contacts **116**, **120** is also of great importance. Ordinarily, open contacts tend, after a period of time, to be coated with a film due to oxidization. This prevents closing of a circuit when the contacts engage. The use of a sharply beveled contact the periphery of which engages a cooperating contact, insures the closing of the circuit under these conditions.

The adjustable variation in the contact spacing is intended to permit adjustments for winter, spring, fall and summer, and the handle portion **138** can, of course, be extended so as to be accessible from without the cover. Further, a suitable scale may be associated with said handle portion to facilitate movement to the proper location.

The mounting of the batteries is also of importance, since the location and arrangement of the holding clips make it impossible for the batteries to fall out or come loose.

It is to be understood that a bellows-type reactor may be used instead of bimetal restraining arm **110**, where conditions are more critical.

While I have illustrated and described the preferred embodiment of my invention, it is to be understood that

I do not limit myself to the precise construction herein disclosed and the right is reserved to all changes and modifications coming within the scope of the invention as defined in the appended claims.

Having thus described my invention, what I claim as new, and desire to secure by United States Letters Patent is:

1. In a fire detection unit, a contact assembly including a set of normally open contacts and thermo-responsive means for biasing the contacts into engagement with one another, said thermo-responsive means including a pair of strips on which the respective contacts are mounted, one at least of said strips being of a bimetallic nature and being arranged to deflect responsive to a temperature rise of predetermined value, to bring the contacts into engagement with each other, one of the strips having its associated contact inclined obliquely in respect to the direction of deflection of the bimetallic strip, the other contact having a peripheral edge engageable with the obliquely inclined contact, the strip supporting the obliquely inclined contact having a V-shaped crimp on one leg on which the obliquely inclined contact is mounted, said peripheral edge being sharply beveled.

2. In a fire detection unit, thermostatically controlled switching mechanism including a pair of closely spaced conducting strips, one of said strips being of bimetal adapted to be deflected toward the other strip upon a temperature rise of predetermined value, said bimetal strip having an angular portion extending toward the other conducting strip, a disc-shaped contact on said angular portion, the other strip having a right-angular portion extending toward the bimetal strip and carrying a contact with a beveled periphery disposed at an angle to the face of the disc-shaped contact, an extension on the bimetal strip, and a yieldable restraining arm in engagement with said extension for normally restraining movement of the bimetal strip.

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