United States Patent [19]

Gloeckler

[11] **3,715,700**

[45] **Feb. 6, 1973**

[54] AUTOMATIC HEAT DETECTOR

[75] Inventor: **Fred A. Gloeckler,** Huntington Valley, Pa.

[73] Assignee: **Star Sprinkler Corporation of Florida,** Philadelphia, Pa.

[22] Filed: **June 17, 1971**

[21] Appl. No.: **153,956**

[52] **U.S. Cl.** **337/407,** 337/409, 337/414

[51] **Int. Cl.**.....**H01h 37/76**

[58] **Field of Search**.....337/320, 407, 409, 414, 416

[56] **References Cited**

UNITED STATES PATENTS

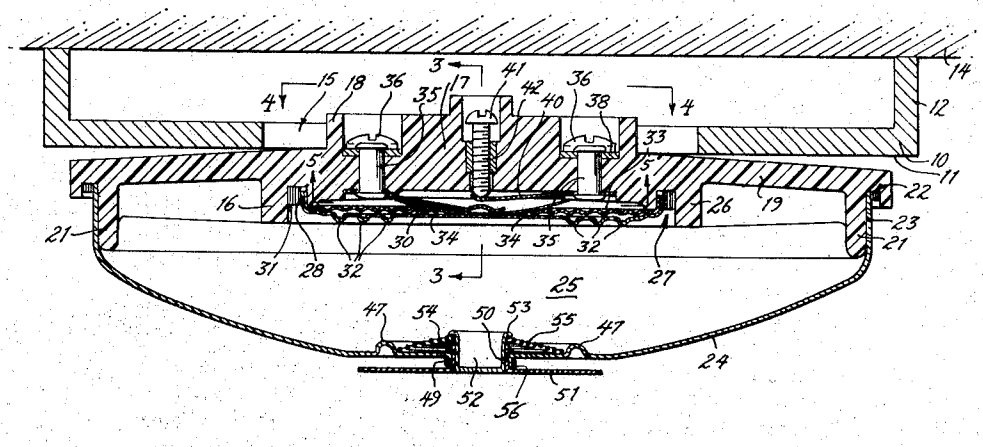
3,188,434	6/1965	Numayama	337/320 X
3,271,547	9/1966	Seely	337/409
3,569,892	3/1971	Ripamonti	337/320

Primary Examiner—Bernard A. Gilheany
Assistant Examiner—F. E. Bell
Attorney—Zachary T. Wobensmith, II

[57] **ABSTRACT**

An automatic heat detector is provided which has one or more electric circuits with spring metal contacts and a diaphragm is a closed controlled vented chamber, the contacts being controlled by the expansion of the diaphragm in accordance with rapid temperature rise or by the release of a spring at a predetermined temperature, which spring engages the diaphragm and causes the contacts to move and control the circuits.

7 Claims, 6 Drawing Figures



PATENTED FEB 6 1973

3,715,700

SHEET 1 OF 2

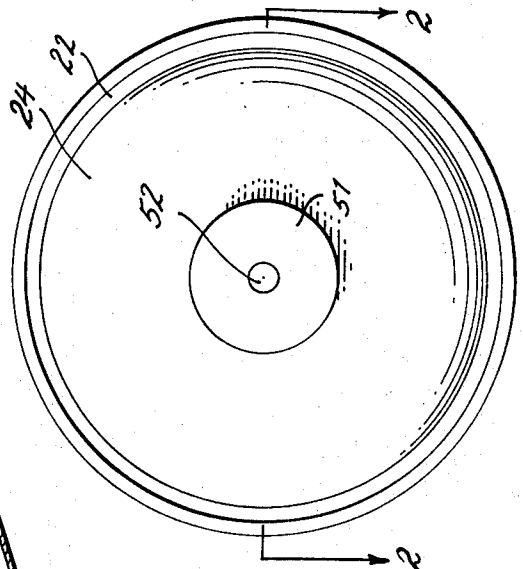


Fig. 1.

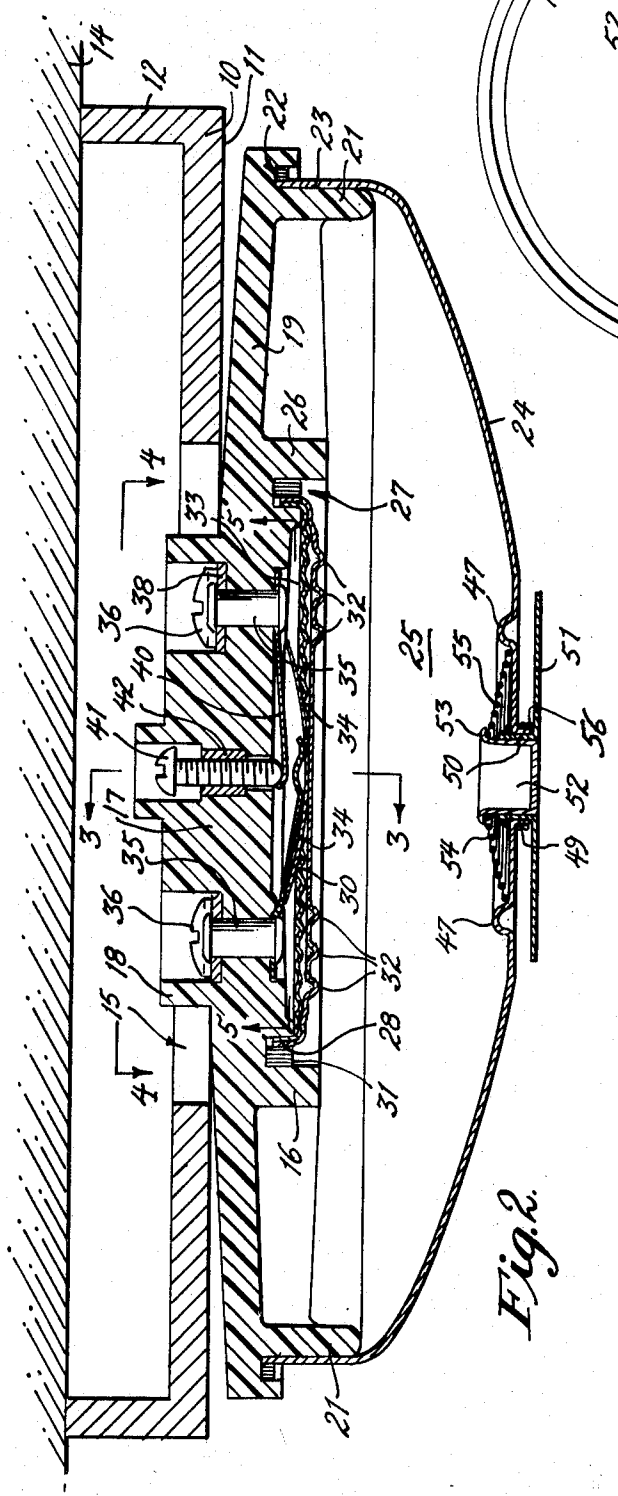


Fig. 2.

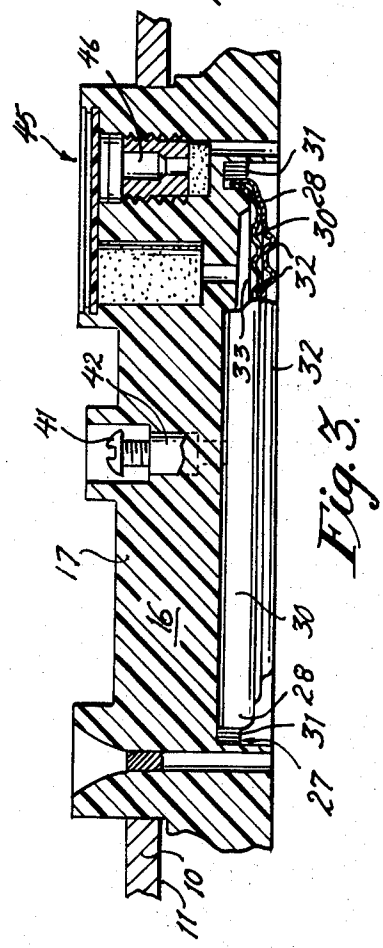


Fig. 3.

INVENTOR.
FRED A. GLOECKLER
BY B. T. Wolverton 2nd
ATTORNEY.

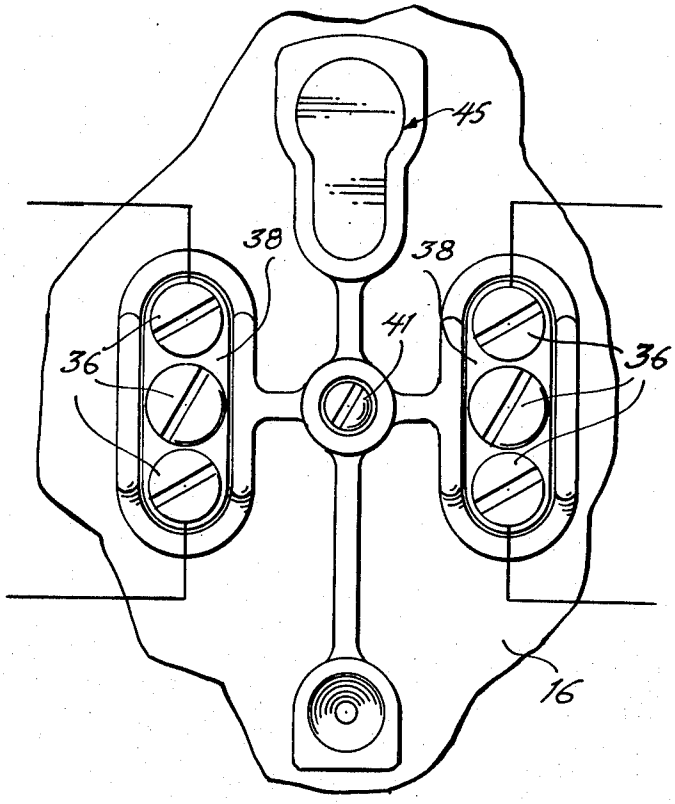


Fig. 4.

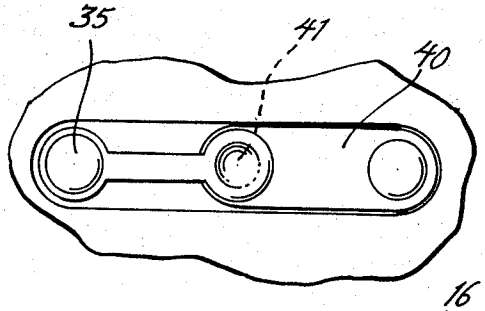


Fig. 5.

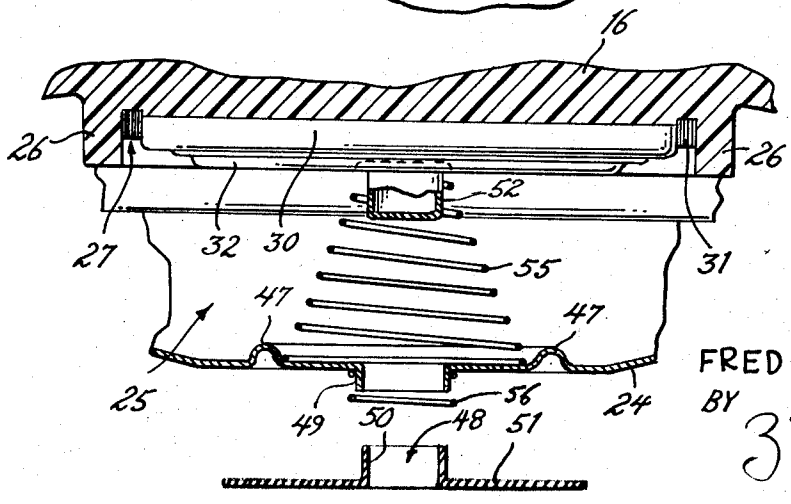


Fig. 6.

INVENTOR.
FRED A. GLOECKLER
BY
ATTORNEY.

AUTOMATIC HEAT DETECTOR

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to an automatic heat detector of the type which uses a closed vented chamber with a diaphragm therein for closing metal contacts to control one or more circuits in response to rapid temperature rise or by diaphragm spring engagement at a predetermined temperature.

2. Description of the Prior Art

Automatic heat detectors that respond to a sudden temperature rise or to a predetermined temperature are old in the art. One such detector is shown in U.S. Pat. No. 2,413,140 to Griffith and which includes a controlled vented chamber containing a diaphragm which expands with a sudden temperature rise and which chamber also contains a leaf spring which has one end held in an eutectic alloy mass ready for diaphragm engagement, when the alloy melts at its predetermined temperature and releases the spring to impinge on the diaphragm. This heat detector has proven satisfactory in use but is slow in operation at the leaf spring because the bronze casing or cover member commonly employed serves as an effective heat sink. The heat detector of the invention is very reliable and does not suffer from the shortcomings of previous designs.

SUMMARY OF THE INVENTION

An automatic heat detector is provided wherein a controlled vented chamber contains a diaphragm susceptible to movement by pressure variations due to rapid temperature rise or by release and diaphragm impingement of a coil spring which diaphragm movement moves metallic contacts and controls one or more circuits.

The principal object of the invention is to provide an automatic heat detector which is fast, positive and reliable in operation.

A further object of the invention is to provide an automatic heat detector that has a plurality of control circuits, if desired.

A further object of the invention is to provide an automatic heat detector which is simple to construct with little maintenance required and which has a long service life.

Other objects and advantageous features of the invention will be apparent from the description and claims.

DESCRIPTION OF THE DRAWINGS

The nature and characteristic features of the invention will be more readily understood from the following description taken in connection with the accompanying drawings forming part thereof, in which:

FIG. 1 is a bottom plan view of the heat detector in accordance with the invention and in condition for use;

FIG. 2 is a vertical sectional view, enlarged, taken approximately on the line 2—2 of FIG. 1;

FIG. 3 is a vertical sectional view taken approximately on the line 3—3 of FIG. 2;

FIG. 4 is a fragmentary horizontal sectional view, still further enlarged, taken approximately on the line 4—4 of FIG. 2;

FIG. 5 is a partial elevational view of a portion of the heat detector illustrated in FIG. 4, and

FIG. 6 is a fragmentary vertical sectional view of the heat detector shown in FIG. 2 with the apparatus in diaphragm engaging position.

It should, of course, be understood that the description and drawings herein are illustrative merely and that various modifications and changes can be made in the structure disclosed without departing from the spirit of the invention.

Like numerals refer to like parts throughout the several views.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now more particularly to the drawings the automatic heat detector includes a mounting plate 10 of circular cup shaped configuration with a face 11 and outside rim 12 which plate 10 may be secured to a ceiling or wall 14 in any preferred manner such as by screws (not shown). The face 11 has an opening 15 therein in which a detector body 16 is engaged. The detector body 16 includes a central portion 17 which has its upstanding rim 18 engaged in the face 11, and an outer dish portion 19. The dish portion 19 has an outer wall 21 set back from the peripheral edge with a groove 22 separating it therefrom and which groove 22 has the rim 23 of a cover member 24 secured therein, such as by epoxy cement, and forming a chamber 25 with the detector body 16. Cover members have heretofore usually been made of bronze or aluminum, but it is preferred that stainless steel be employed for the cover member 24 to avoid any heat sink action on the part of the cover member 24. An inner rim 26 is provided spaced inwardly from the outer wall 21 with a circumferential groove 27 adjacent thereto and inward from the rim 25. A rim 28 of a metallic diaphragm 30 is engaged in the groove 27 and retained therein by an adhesive filler and seal strip 31 of well known type. The diaphragm 30 as illustrated is of double wall construction with circular ribs 32.

The diaphragm 30 on its inner face 33 has an interposed insulating disc 36 of mylar or the like in contact with one or more opposed spring contacts 34 which are respectively secured to terminal posts 35, and extend transversely of the body 16. The posts 35 are threaded internally and have screws 36 for attachment of terminals (not shown) extending to alarm circuits (not shown).

As seen particularly in FIGS. 4 and 5 the posts 35 are engaged in plates 38 each of which has a lower metal arm 40 extending centrally to and engaging a center terminal screw 41. The screw 41 is in threaded engagement in a bushing 42 which is held in body 16 and rotational movement of the screw 41 adjusts the position of the arm 40 with respect to the spring contacts 34.

As shown in FIG. 3 the body 16 is provided with a passageway 45 which contains a valve 46 which valve permits air flow into and out of chamber 25 at a specified rate and which for a specific embodiment is below the rate for an 18° F. per minute temperature rise.

The cover 24 at its center is provided with a circular spring positioning rib 47 and inwardly thereof an opening 48 extends through the cover 24 with an outer lip

49 on the cover 24 and a sleeve 50 in the opening 48 and secured in lip 49 extending radially outwardly from the cover 24, and terminating in a flat disc member 51. Within the sleeve 50 a cup 52 is provided, preferably of brass or bronze for effective heat absorption and transmission to the eutectuc alloy ring 54 with an outer lip or abutment 53 secured to the sleeve 50 by the ring of eutectic alloy 54 which is of well known type with a melting temperature of the order of 135° F. The use of brass or bronze for the cup 52 and of stainless steel for the cover member 24 provides effective heat transfer to the ring 54 with a minimum of dissipation into the cover member 24. A coil spring 55 is provided and normally held in compression between the cup 52 and the cover 24 but effective to move cup 52 inwardly if released. A coil spring 56 is provided between the over member 24 and the disc member 51 for release of the disc member 51 upon release of the cup 52.

The mode of operation will now be pointed out.

Assuming that a flash fire occurs in the vicinity of the heat detector and that the temperature rises at a predetermined rate, at say 15° F. per minute or more, then valve 46 will restrain exhausting of air from chamber 24 and diaphragm 30 will more inwardly due to pressure build up until the spring contacts 34 are in engagement and the circuits therethrough are completed.

If the fire is extinguished without release of the cup 52 then valve 46 will permit air to flow back into chamber 24 and diaphragm 32 will contract so that contacts 34 are no longer engaged and the circuits will become open and the detector is again ready for use.

Should a smoldering fire occur in the vicinity of the heat detector and the temperature rise to 135 degrees F. or more, the eutectic alloy 54 will melt, releasing cup 52 from sleeve 50 and spring 55 will expand toward diaphragm 30 and cup 52 bear against diaphragm 30 until the diaphragm 30 closes contacts 34 and completes the circuits.

It will thus be seen that apparatus has been provided with which the objects of the invention are attained.

I claim:

1. An automatic heat detector that comprises

a mounting plate,

a detector body secured to said mounting plate,

a cover member employed with said body and forming a closed chamber therewith,

said cover member having a central flange with a central opening therein,

a diaphragm carried by said body inside said chamber,

circuit control means in said body and controlled by the position of said diaphragm,

a sleeve detachably held in said central opening by an eutectic alloy and having connected thereto a heat transmitting disc portion exteriorly disposed with respect to said cover member,

a cup shaped member detachably mounted in said sleeve and connected thereto by said eutectic alloy,

said cup shaped member having an abutment portion normally disposed contiguous to said cover member, and

resilient means in engagement with said abutment portion urging said cup shaped member toward said diaphragm for operating engagement with said diaphragm upon melting of the eutectic alloy.

2. An automatic heat detector as defined in claim 1 in which

said cup shaped member provides a closure for said cover member.

3. An automatic heat detector as defined in claim 1 in which

said circuit control means includes at least two circuits.

4. An automatic heat detector as defined in claim 1 in which

said resilient means comprises a spring carried on said sleeve between said cover and said cup.

5. An automatic heat detector as defined in claim 1 in which

said resilient means is a spiral spring in engagement with said cover and said cup.

6. An automatic heat detector as defined in claim 1 in which

said cover member and said cup member are of materials of different heat transmission characteristics.

7. An automatic heat detector as defined in claim 6 in which

said cover member is of a material of lesser heat transmission characteristics.

* * * * *