

Oct. 27, 1942.

E. W. GENT

2,299,815

GAS DETECTOR

Filed Nov. 5, 1940

2 Sheets-Sheet 1

FIG. 1

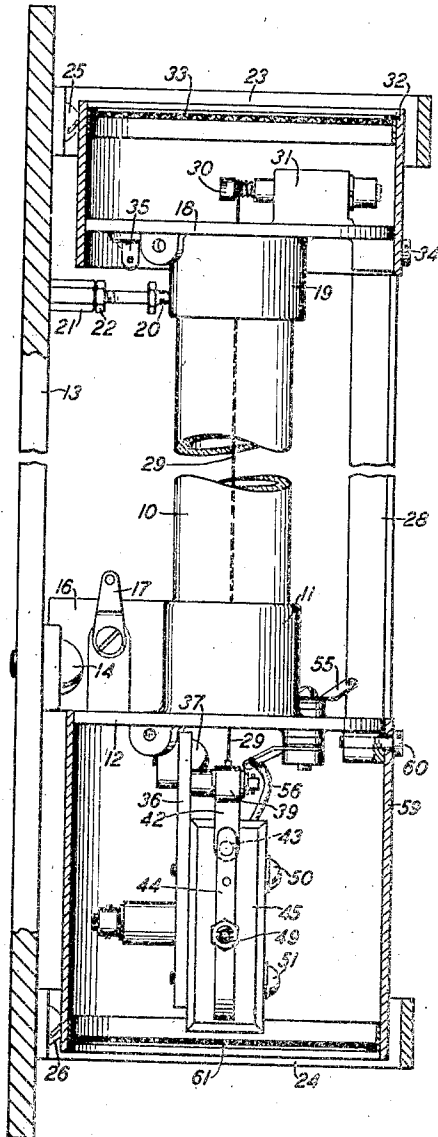
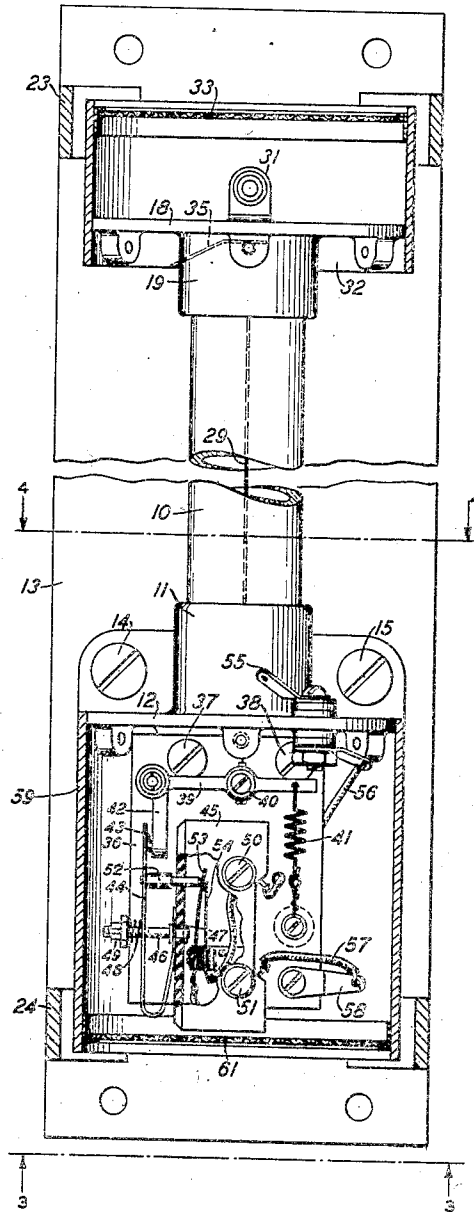


FIG. 2



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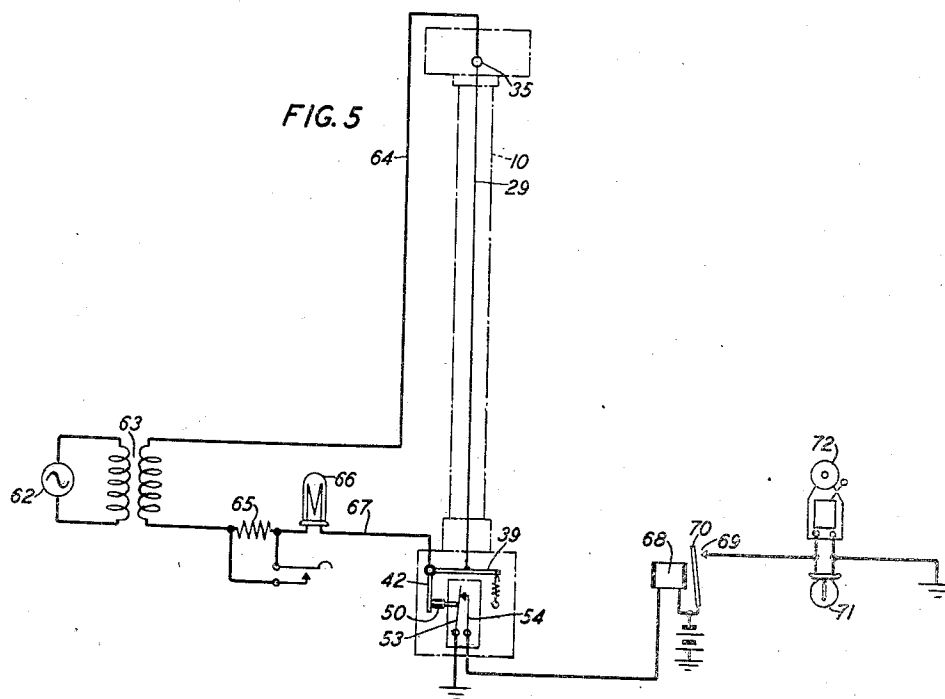
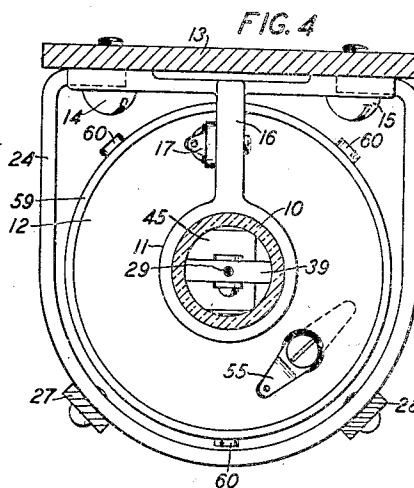
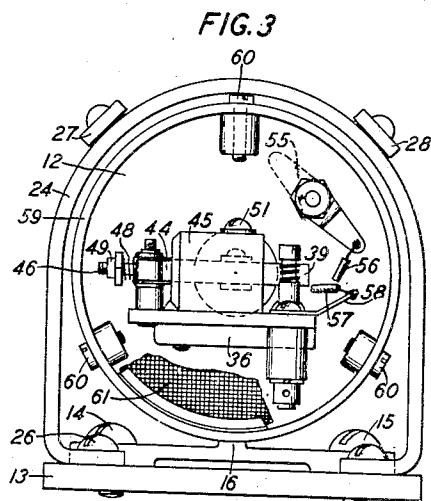
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UNITED STATES PATENT OFFICE

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GAS DETECTOR

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Application November 5, 1940, Serial No. 364,359

4 Claims. (Cl. 200—52)

This invention relates to gas detectors and more particularly to means for detecting and indicating the presence of combustible gases in confined areas.

One object of my invention is to provide a gas detector which is simple in construction and yet provides the utmost in reliability.

Another object of my invention is the provision of a gas detector which will be actuated by the presence of small amounts of combustible gases.

A further object of this invention is the provision of a means for detecting combustible gases which will give a positive alarm when such gas is present.

A still further object of my invention is the provision of a gas detector having means associated therewith for simulating the presence of a combustible gas for testing the alarm circuit.

The preferred form of my invention comprises a tubular chamber, preferably of glass, having a coefficient of lineal expansion practically that of the platinum wire, in order to eliminate any change in the adjustment due to ambient changes in temperature. This tube is suitably mounted to prevent displacement thereof and has a platinum or some other similar wire which acts as a catalyst, centrally positioned and suspended therein the entire length of the tube. The upper end of the wire is secured to an adjustable tensioning device and the lower end is secured to a supersensitive electrical switch mechanism, which in turn is connected into a suitable alarm circuit. Under normal operating conditions the platinum wire is heated to an elevated temperature by means of electrical current passing there-through.

When a combustible gas is present in the vicinity of the detector, it will be drawn up into the tube by the natural draft caused by said tube, and the gas entering the tube will come in contact with the heated platinum wire and combustion will result on the surface of the platinum wire, thereby raising the temperature of the platinum wire and causing the elongation thereof and due to this expansion will operate a normally closed switch which in turn will cause the operation of a suitable alarm circuit which may have associated therewith a local or a central office alarm system.

The features of my invention will be readily understood from the following detailed description made with reference to the accompanying drawings in which:

Fig. 1 is a side elevational view partly in section of applicant's improved gas detector;

Fig. 2 is a front elevational view, of Fig. 1, partly in section and disclosing the supersensitive switch and the mechanism for its operation;

Fig. 3 is a bottom view taken on line 3—3 of Fig. 2;

Fig. 4 is a cross-sectional view taken on line 4—4 of Fig. 2;

Fig. 5 is a schematic circuit diagram illustrating how the detector of this invention is connected into the electrical circuit.

As shown in Figs. 1 and 2 a glass tube or cylinder 10 is vertically positioned in a collar 11 which is integral with the top portion of the casting 12. The casting 12 is secured to the bottom portion of the back plate 13 by means of the screws 14 and 15 and is reenforced by means of the rearwardly extending rib or fin 16 to which is secured the soldering lug or electrical connection 17 which provides a ground connection for the casting member, the purpose of which will be explained later on in the description.

Rigidly secured to the top end of the tube 10 and supported thereby, is the metal casting 18, which like the lower casting 12, has a collar 19 cast integral therewith for the reception of the upper end of the tube 10, thus the casting 18 is wholly supported by the tube 10. In order to protect the glass tube against displacement from accidental pressure applied to the front portion thereof an adjustable insulating member 20 bears against the back of the tube 10 and is in threaded engagement with a boss 21 secured to the back plate 13. A lock nut 22 is provided for locking the insulating member 20 against movement.

Suitable U-shaped guard members 23 and 24 are secured to the top and bottom portions of the back plate 13 by means of the screws 25 and 26, these guard members together with the vertically extending bars 27 and 28 provide protection means for the tube 10 and its associated mechanism.

Positioned in the vertically extending tube 10 and extending the full length thereof, is a fine platinum wire 29. This wire is centrally located in the tube and has its upper end wound around and secured to the adjustable screw member 30. The screw 30 is in threaded engagement with a boss 31 which is integral with the top casting 18 and together with the screw 30 provides means for tensioning the wire 29. In order to protect the upper end of the tube 10 and the adjusting means a cylindrical cover 32 is secured to the top casting by means of the screws 34. An electrical terminal connection 35 is provided on the

casting 18 for making a suitable connection to the platinum wire 29.

In order to prevent the heated platinum wire 29, within the glass tube 10, from affecting the gas mixture outside of the glass tube, gas cooling screens 33 and 61 of fine mesh wire are secured to the exposed end of the covers 32 and 59 at the top and the bottom of the glass tube 10.

Located at the lower end of the tube 10 is a switch mechanism to which the lower end of the wire 29 is secured. This mechanism is mounted on the under-side of the casting 12 on a plate 36 which is secured to the casting by means of the screws 37 and 38. Pivotally secured to the plate 36 and centrally located with respect to the tube 10 is a lever arm 39. This lever arm is pivoted at one end to the plate 36 and has the lower end of the wire 29 secured to its mid-portion by means of the screw 40, the other end of the arm is provided with a spring 41 which maintains the wire 29 taut at all times and any elongation of this wire will be immediately taken up by the tension of the spring acting thereon.

Located on the pivoted end of the lever arm 39 is an extension 42 having an insulated protuberance 43 thereon. This protuberance is in engagement with the upper extending end of the U-shaped leaf spring member 44 which is secured to the insulated switch housing 45 by means of the bolt 45 and the nut 47. The tension on the free end of the spring 44 is adjusted by means of the coil spring 48 which is positioned over the bolt 46 and is confined between the adjusting nut 49 and the spring 44.

Secured to the inner surface of the spring member 44 near the top thereof and extending into the center of the switch housing 45, which is secured to the plate 36 by means of the screws 50 and 51, is the insulated plunger 52, which as shown in Fig. 2, bears against and holds over contact spring 53 in engagement with the contact spring 54, thus maintaining the switch in a normally closed position.

Connections to the springs 53 and 54 are brought out and connected to their respective terminals, viz., the back contact 54 is connected to the terminal connection 55 by means of the wire 56 and the front contact 53 is connected or grounded to the plate 36 by means of the wire 57 and the lug 58.

The switch mechanism and its component parts are enclosed by a cylindrical casing or housing 59 which is secured to the casting 12 by means of the screws 60 and is provided at its bottom portion, as heretofore referred to, with a fine mesh wire screen 61.

As shown in the schematic circuit diagram in Fig. 5, electrical current for heating the platinum wire 29 is supplied from an alternating current source 62 through a constant voltage transformer 63, one side of which is connected to the terminal 35 at the top of the tube by conductor 64 and the other side connected through a high resistance 65, the ballast lamp 66 and the conductor 67 to the ground or common terminal 17 which is secured to the fin 16 on the casting 12.

A switch 68 is shunted across the resistance 65 which when closed provides a means for testing the detector by increasing the current flow through the circuit thereby raising the temperature of the platinum wire to a degree comparable with that attained by the presence of a combustible gas, which will elongate the wire and permit the contact springs 53 and 54 to separate

thereby opening the normally closed circuit to cause the operation of a suitable alarm circuit.

In the operation of the gas detector of this invention the platinum wire 29, as heretofore described, is maintained at an elevated temperature which is sufficient to render the platinum wire sensitive for detection of gas and air mixtures below the explosive mixtures. The contact springs 53 and 54 are maintained closed due to the tension of the spring 44. However, as may readily be observed, any elongation of the wire 29, due to its expansion caused by its heating due to the ignition of the combustible gases will cause the lever arm 39 to travel downwardly under the influence of the spring 41, which tension is sufficient to overcome the tension of spring 44, thus causing the free end of the U-shaped spring 44 to be moved outwardly carrying with it the insulated plunger 52 which permits the contact springs 53 and 54 to separate and open the normally closed circuit.

As shown in Fig. 5, the opening of the contacts 53 and 54 will cause a break in the circuit which in turn will cause the deenergization of the relay 69 which through its contacts 70 and 71 will cause the operation of the lamp 71 and the bell 72.

While I use platinum wire in the present embodiment of my invention, other wires could be used which would act as catalysts, that is, bring about combustion of combustible gases when in contact with such gases.

I do not wish to limit my invention to the exact details of construction herein set forth, as various modifications thereof may be made without departing from the scope of the appended claims.

What is claimed is:

1. A gas detector comprising a switch mechanism housing open at the bottom, a vertical tube mounted in a collar on said housing and communicating with the interior thereof, a chamber open at the top positioned on and supported by the top of said tube and having an opening in alignment therewith, a wire suspended in said tube one end of which is secured to a switch mechanism in said housing and the other end to a tensioning means in said chamber, and wire mesh screens covering the openings in said housing and said chamber.

2. A gas detector comprising a switch mechanism housing open at the bottom, a vertical tube mounted in a collar on said housing and communicating with the interior thereof, a chamber open at the top positioned on and supported by the top of said tube and having an opening in alignment therewith, a wire suspended in said tube one end of which is secured to a switch mechanism in said housing and the other end to an adjustable tensioning means located in said chamber, and wire mesh screens covering the openings in said housing and said chamber for the passage of gas-laden air.

3. A gas detector comprising a switch mechanism housing open at the bottom, a vertical tube mounted in a collar on said housing and communicating with the interior thereof, a chamber open at the top positioned on and supported by the top of said tube and having an opening in alignment therewith, a platinum wire suspended in said tube one end of which is secured to a switch mechanism in said housing and the other end to a tensioning means in said chamber, means for heating said wire to a predetermined temperature, and wire mesh screens

covering the openings in said housing and said chamber for the passage of gas-laden air.

4. A gas detector comprising a switch mechanism housing open at the bottom, a vertical tube mounted in a collar on said housing and communicating with the interior thereof, a chamber 5 open at the top positioned on and supported by the top of said tube and having an opening in alignment therewith, a platinum wire suspended

in said tube one end of which is secured to a switch mechanism in said housing and the other end to an adjustable tensioning means in said chamber, means for heating said wire to a predetermined temperature, and wire mesh screens covering the openings in said housing and said chamber for the passage of gas-laden air.

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