June 12, 1951 R. POOLE 2,557,008

APPARATUS FOR DETECTING EXPLOSIVE GASES

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Fig. 1.

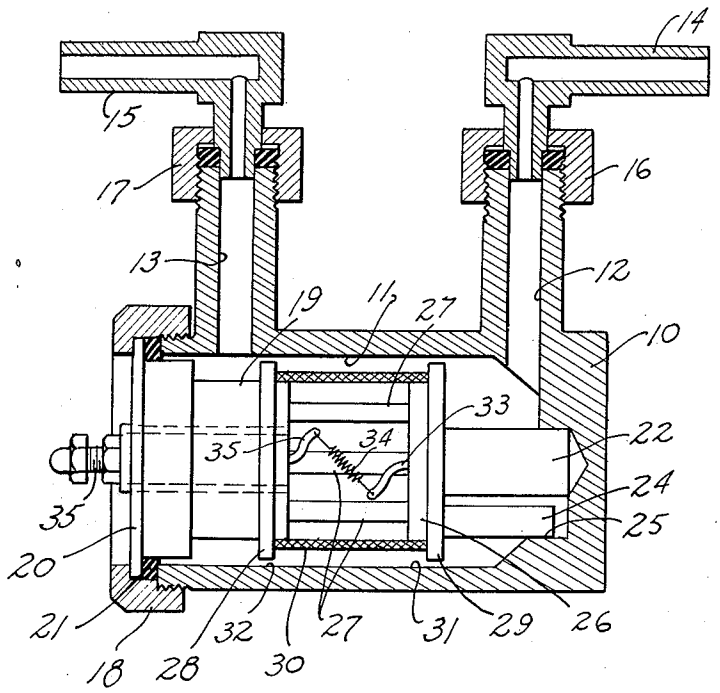
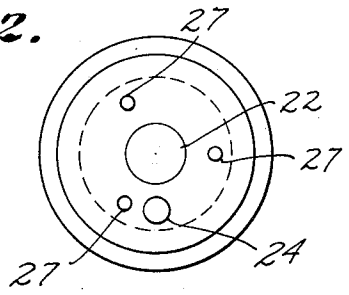


Fig. 2.



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APPARATUS FOR DETECTING EXPLOSIVE GASES

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9 Claims. (Cl. 73—27)

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My invention relates in general to apparatus for detecting the presence of explosive, toxic, or other dangerous gases and, more particularly, to an apparatus of the type in which the gases to be tested are caused to pass through a chamber containing an electrically heated filament which forms part of a bridge circuit.

This application is a continuation in part of my application Serial No. 523,380, filed February 21, 1944, now Patent No. 2,546,273.

In an apparatus of this type, the temperature of the heated filament varies with variations in the proportion of an explosive gas present in the air or other gas mixture being tested because of the fact that the heated filament causes local combustion of the explosive gas. In some instances, however, such variations in the temperature of the heated filament may be due to other causes, such as, for example, variations in the thermal conductivity of the gases being tested resulting from variations in the proportion of the dangerous gas present therein. In either event, variations in the temperature of the filament may be indicated by a suitable electrical measuring instrument which forms another part of the bridge circuit.

One of the difficulties encountered with apparatus of this type is that if the gases being tested are permitted to impinge directly upon the filament, or if they flow too rapidly through the space in which the filament is mounted, the filament may be damaged, or at least may fail to operate in a reliable manner. Accordingly, it has been found necessary to provide means for shielding the filament, and the provision of an improved shielding means represents a primary object of my invention.

More specifically, an object of the invention is to provide an apparatus of the foregoing general character having means for distributing the flow of the gases being tested in such a manner that they do not impinge directly upon the filament and in such a manner that they flow past the filament relatively slowly.

Another object of the invention is to provide an apparatus having means for causing the gases being tested to flow into a space surrounding the filament in a relatively thin, annular stream and to leave such space in a similar stream so that the gases do not impinge directly upon the filament and so that the local velocity of the gases adjacent the filament is relatively low.

A further object is to provide an apparatus of the character indicated wherein the filament is mounted in the chamber on a removable support

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having baffles or flanges thereon which extend into close proximity with a wall of the chamber and cooperate therewith to cause the gases being tested to enter and leave the space surrounding the filament in relatively thin streams.

The flanges and the chamber are preferably circular so as to form narrow circumferential slots through which the gases being tested must enter and leave the space in which the filament is disposed. Thus, the flanges cooperate with the wall of the chamber to form a compartment which communicates with the remainder of the chamber only through such circumferential slots so that the gases being tested cannot impinge directly upon the filament.

The foregoing objects of my invention and the advantages suggested thereby, together with various other objects and advantages which will be evident hereinafter, may be attained through the employment of the exemplary embodiment which is illustrated in the accompanying drawing and which is described in detail hereinafter. Referring to the drawing:

Fig. 1 is a longitudinal sectional view of an apparatus embodying the invention; and

Fig. 2 is an end view of a filament support forming part of the apparatus.

In the particular construction illustrated, the apparatus includes a casing or housing 10 having a cylindrical chamber 11 therein and having inlet and outlet passages 12 and 13 therein, which communicate with the chamber, inlet and outlet lines 14 and 15, which communicate with the inlet and outlet passages 12 and 13, respectively, being connected to the housing by fittings 16 and 17, respectively. The inlet line may be connected to a source of the gases to be tested, and the outlet line may lead to a suitable point of discharge.

The chamber 11 may be closed by a cap 18 which is threadedly or otherwise connected to the housing 10 and which carries a filament support 19, the latter being provided with a flange 20 at one end which is clamped between the cap 18 and the housing. Preferably, an annular sealing element 21 is disposed between the flange 20 and the casing 10 to provide a fluid-tight seal. Projecting from the filament support 19 is a peg 22 which extends into a suitable opening in the casing 10 and which retains the support with respect to the casing. Also projecting from the filament support 19 is another peg 24 which is inserted into a notch 25 in the casing to prevent rotation of the support.

The filament support comprises a plug-like end portion on which the flange 20 is formed, and

comprises a disc-like end portion 26 which carries the pegs 22 and 24, these portions being connected by circumferentially spaced pins 27. Longitudinally spaced circular flanges 28 and 29 are formed on or secured to the two end portions, respectively, of the filament support 19, and a screen 30 extends between the flanges 28 and 29, as best shown in Fig. 1, the screen preferably being of circular cross section. It will be noted that the flanges 28 and 29 extend into close proximity to the circumferential wall of the chamber 11 so as to provide relatively narrow circumferential slots 31 and 32 through which the gases being tested are required to flow, as will be discussed in more detail hereinafter.

Supported on suitable conductors 33 within the screen 30 is an electrically heated detecting filament 34 connected in any appropriate manner to suitable terminals, one of which is indicated by the numeral 35, so that it can be connected in a bridge circuit. Since the means by which the filament 34 is heated and the manner in which it may be connected in a bridge circuit to obtain indications of variations in its temperature are well known in the art, and since such components per se form no part of the present invention, they are not shown on the drawing.

Considering the operation of my detecting apparatus, the inlet line 14 may be connected to a source of gases to be tested so that such gases will enter an inlet compartment at the right end of the chamber 11, as viewed in Fig. 1, by way of the inlet line 14 and the inlet passage 12. From this inlet compartment, the gases must flow through the narrow circumferential slot 31 between the flange 29 and the circumferential wall of the chamber 11 into the space surrounding the screen 30 in the form of a relatively thin, annular stream. The gases will then percolate through the screen 30 so as to come in contact with the detecting filament 34 and, subsequently, will leave the space surrounding the filament by again percolating through the screen and flowing through the circumferential slot 32 provided by the flange 28 and the wall of the chamber 11. It will be apparent that with this construction, the gases being tested cannot impinge directly upon the detecting filament 34 and, moreover, must flow past the filament at a low velocity so that there is no tendency to damage the filament and so that a reliable indication will always be obtained.

It will be noted that with the particular construction illustrated, the entire filament support 19 may be removed readily for repair or replacement when necessary by the simple expedient of unscrewing the cap 18 and withdrawing the filament support from the chamber 11 as a unit, which is a feature of the invention.

Although I have disclosed an exemplary embodiment of my invention herein for purposes of illustration, it will be understood that various changes, modifications and substitutions may be incorporated therein without necessarily departing from the spirit of the invention, and I hereby reserve the right to all such changes, modifications and substitutions as properly come within the scope of the invention as set forth in the appended claims.

I claim as my invention:

1. In a gas testing apparatus, the combination of: casing means having an elongated cavity therein and having inlet and outlet passages therein respectively communicating with opposite ends of said cavity; an imperforate inlet baffle in said cavity intermediate said inlet and outlet passages and spaced from one end of said cavity to provide an inlet chamber communicating with said inlet passage, said inlet baffle extending into close proximity to but being spaced from the peripheral wall of said cavity so as to provide a narrow, peripheral inlet port through which a gas in said inlet chamber is required to flow to pass said inlet baffle; an imperforate outlet baffle in said cavity intermediate said inlet baffle and said outlet passage, said outlet baffle being spaced from said inlet baffle to provide a compartment therebetween and being spaced from the other end of said cavity to provide an outlet chamber communicating with said outlet passage, said outlet baffle extending into close proximity to but being spaced from the peripheral wall of said cavity so as to provide a narrow, peripheral outlet port through which a gas in said compartment is required to flow to pass said outlet baffle and enter said outlet chamber; means for supporting said baffles in said cavity; and a filament carried by said supporting means and disposed in said compartment intermediate said baffles.

2. A gas testing apparatus as set forth in claim 1 wherein said baffles comprise annular flanges on said supporting means.

3. A gas testing apparatus as set forth in claim 1 including a foraminous wall extending between said baffles and encompassing said filament.

4. A gas testing apparatus as set forth in claim 1 wherein said cavity is of circular cross section and wherein said baffles are circular so that said ports are of annular configuration.

5. In a gas testing apparatus, the combination of: casing means having an elongated cavity therein and having inlet and outlet passages therein respectively communicating with opposite ends of said cavity; an imperforate inlet baffle in said cavity intermediate said inlet and outlet passages and spaced from one end of said cavity to provide an inlet chamber communicating with said inlet passage, said inlet baffle extending into close proximity to but being spaced from the peripheral wall of said cavity around the entire periphery of said inlet baffle so as to provide a narrow, continuous, peripheral inlet port through which a gas in said inlet chamber is required to flow to pass said inlet baffle; removable means for supporting said inlet baffle in said cavity; and a filament carried by said removable supporting means and disposed on the lee side of said inlet baffle so as to be shielded from a gas stream flowing through said continous peripheral inlet port.

6. A gas testing apparatus as set forth in claim 5 wherein said cavity is open at one end and wherein said removable supporting means includes means for closing said open end of said cavity.

7. A filament supporting unit adapted for use with a gas testing apparatus having a cylindrical chamber and inlet and outlet ports in communication with the chamber adjacent the ends thereof, said chamber having an open end, comprising: a plug-like member adapted for insertion in the chamber and having an end flange adapated to close the open end of the chamber, said member having connected, axially spaced, circular flanges defining at least one compartment intermediate the ends of the member, said flanges being of smaller diameter than said end flange and defining with the wall of the cylin-

drical chamber restricted annular slots when said filament supporting unit is inserted in the chamber; and at least one detecting element carried by said member and disposed in said compartment.

8. A filament supporting unit as defined in claim 7 and including a cylindrical screen extending between said flanges and surrounding said detecting element.

9. In a gas testing apparatus of the character described, the combination of: a cylindrical chamber having inlet and outlet ports respectively adjacent its ends, said chamber being open at one end; a filament supporting unit removably mounted in said chamber and removable through said open end of said chamber, said unit including an end portion which closes said open end of said chamber when said unit is mounted in said chamber; at least one filament carried by said unit at a point intermediate its ends; and a pair of baffles respectively carried by said unit on opposite sides of said filament

and between said inlet and outlet ports, said baffles co-operating with the peripheral wall of said chamber to form inlet and outlet passages for the flow of gas into and out of the space between said baffles, said inlet and outlet passages being of small cross sectional area as compared to the cross sectional area of said chamber.

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