Dec. 19, 1950 H. T. RINGROSE 2,534,796

APPARATUS FOR INDICATING THE PRESENCE OF INFLAMMABLE VAPORS OR GAS

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Fig. 1

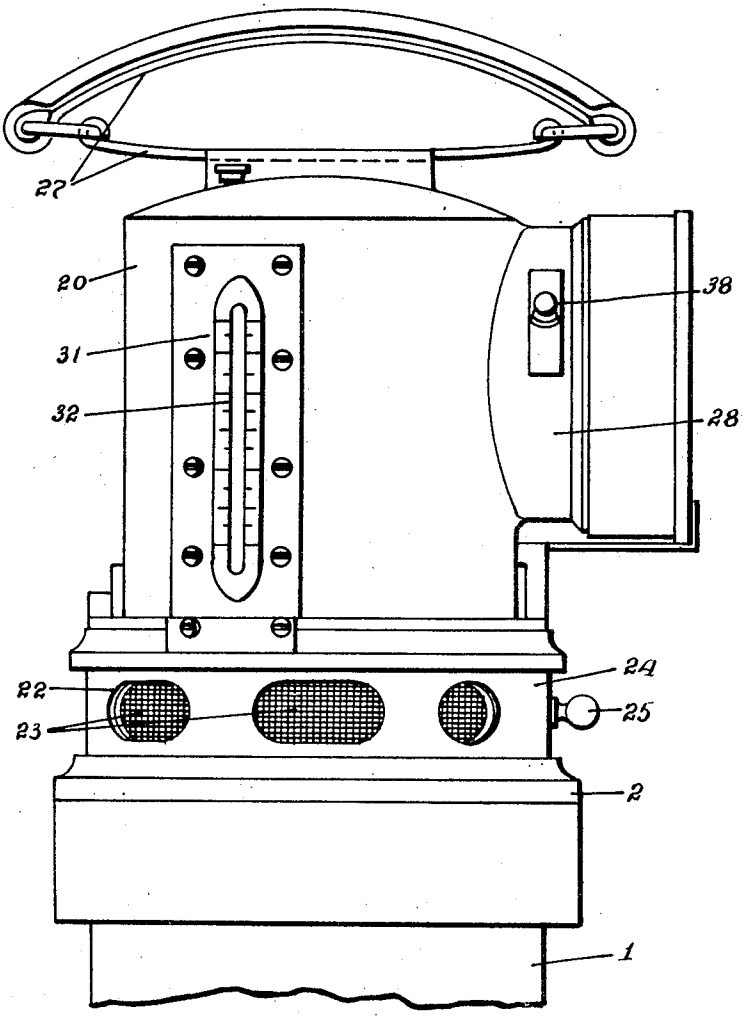

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Fig. 3.

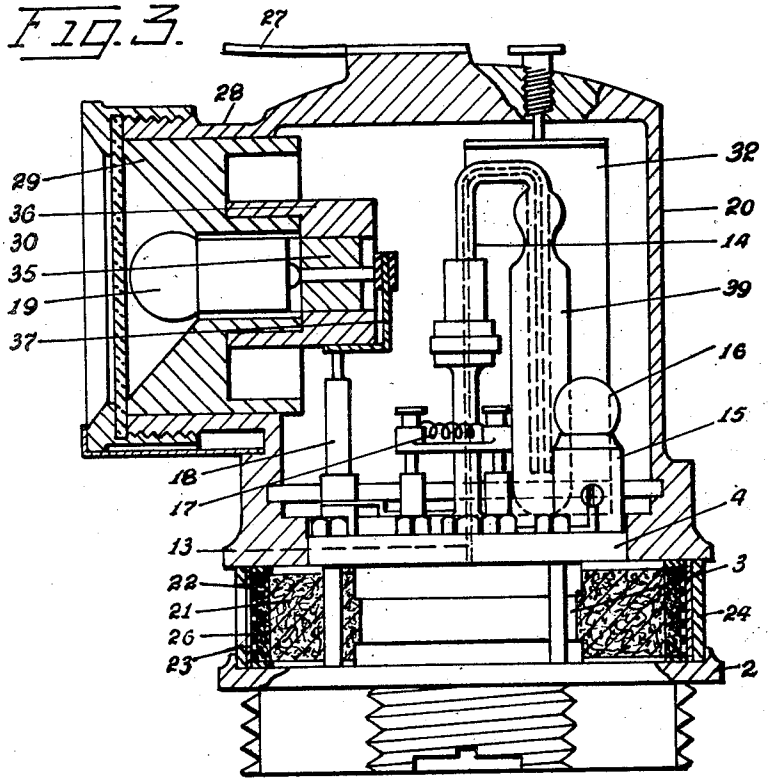

Fig. 2.

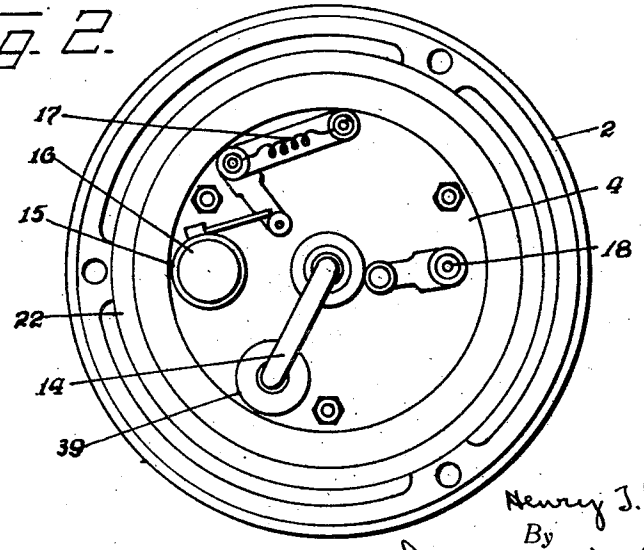

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Fig. 4.

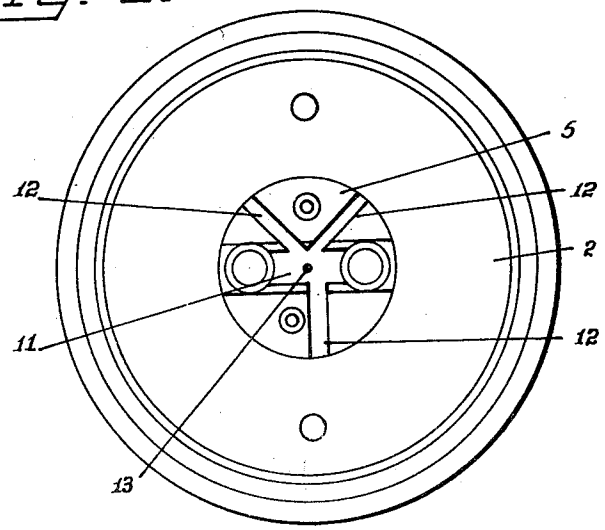

Fig. 8.

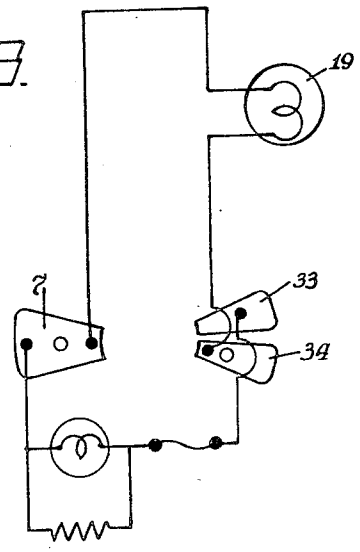

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Fig. 5

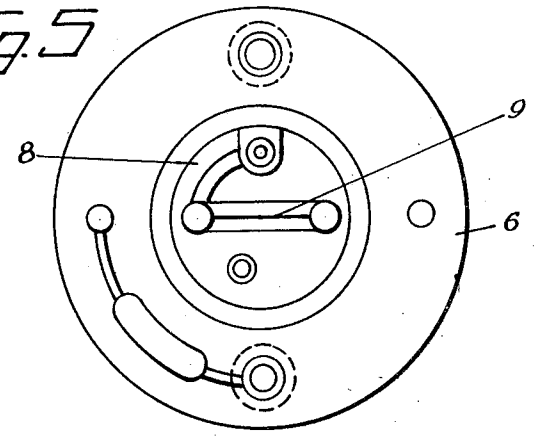


Fig. 6.

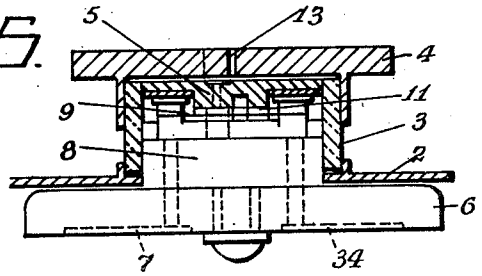
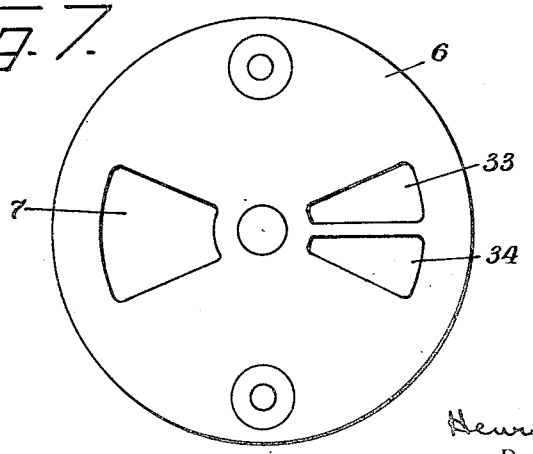


Fig. 7.



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Patented Dec. 19, 1950 2,534,796

UNITED STATES PATENT OFFICE

2,534,796

APPARATUS FOR INDICATING THE PRESENCE OF INFLAMMABLE VAPORS OR GAS

Henry Thomas Ringrose, Leeds, England

Application April 23, 1947, Serial No. 743,260
In Great Britain May 31, 1941

Section 1, Public Law 690, August 8, 1946
Patent expires May 31, 1961

1 Claim. (Cl. 23—255)

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This invention relates to apparatus, more particularly for use in mines, for indicating the presence of inflammable vapours or gases, and of the type wherein a vacuum proportional to the amount of inflammable vapour or gas in the atmosphere surrounding a porous vessel, which is capable of maintaining a gas pressure or vacuum for a substantial time, is created therein by the combustion of the inflammable vapours or gases, which diffuse or are aspirated into said vessel.

Such apparatus as has hitherto been designed has been intended primarily for use by the miner, and has usually been incorporated in a miner's electric lamp, the vacuum produced by combustion of vapours or gases in the porous vessel, which contains an incandescent filament, being utilised, generally through the medium of contacts controlled by a collapsible diaphragm connected to the porous vessel, to make, break or modify the circuit of an electric lamp, when the amount of inflammable vapours or gases in the atmosphere attains a predetermined percentage, thereby providing a visible warning or danger signal.

The object of the present invention is the provision of a new or improved apparatus for use as an accurate measuring instrument, say by inspectors or other mine officials, when making gas tests in the workings.

According to the invention, the vacuum created by the combustion of vapours or gases in the porous vessel is utilised to operate a manometer having associated therewith a graduated scale or mechanical vacuum gauge, and the apparatus is characterised in that the porous vessel containing the filament has a combustion space of the smallest capacity necessary for containing the filament holder and air circulating ducts in a depending boss of the closure for the porous vessel, and in that the porous vessel is surrounded or enclosed by a sealable chamber having controlled inlets through which atmospheric air must pass prior to diffusing to the interior of the porous vessel. In this way the "bulb" effect of the porous vessel is reduced to a minimum or negligible factor and the apparatus rendered immune from the effect of external pressure and temperature variations, so that accurate readings of the vacuum or proportion or percentage of inflammable vapours or gases in the atmosphere can be obtained.

Preferably means are provided for sealing the chamber around the porous vessel comprising a damper ring which encircles the inlets to the chamber so as to retain any moisture or water

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vapour present in the chamber, said means being adjustable to open said chamber and admit an atmospheric charge when it is desired to make a test. The chamber may be provided with a wick, activated carbon or absorbent packing saturated in water to produce and maintain a constant humidity or moisture laden atmosphere in said chamber. This is desirable to produce an indicating instrument of precision of the type described.

The scale associated with the manometer is preferably adjustable so that its zero can be set to register with the liquid column upon making a test in fresh air, say before going into the mine, so that direct accurate readings will be obtained when making subsequent tests in atmospheres containing methane or other inflammable gases or vapours, and said scale is preferably illuminated say by means of an electric lamp bulb connected in series with the filament in the porous vessel. In this latter connection and in order to avoid fusing of the filament in the porous vessel when the current is switched on ready for making a test, the series connected lamp bulb is of low capacity and is shunted by a resistance having a negligible temperature co-efficient to take the initial current surge or loading.

The gas testing apparatus may be incorporated in an inspection hand lamp, a switching device being provided for alternatively connecting the inspection lamp bulb, and the combustion filament with its associated scale illuminating bulb may be adapted to serve in lieu of the inspection lamp bulb in the event of the latter being broken or fusing. Further, should the filament in the porous vessel be broken or fuse, this will be indicated by failure of the scale illuminating bulb to light when switching over to make a gas test.

In order that the invention may be clearly understood and readily carried into effect the same will now be more fully described with reference to and by the aid of the accompanying drawings, wherein:

Figure 1 is an elevation of a combined gas testing apparatus and inspection lamp with the battery casing partly broken away.

Figure 2 is a plan of Figure 1 with the top cover or cap removed.

Figure 3 is a part sectional elevation of Figure 1.

Figure 4 is an inverted plan view of Figure 3, but with the contact plate removed.

Figure 5 is a plan of the contact plate.

Figure 6 is a part sectional elevation showing

the contact plate in position in the porous pot.

Figure 7 is an inverted plan of Figure 5.

Figure 8 is a diagrammatic representation showing the electrical circuit of the combined gas testing apparatus and inspection lamp.

Referring to the drawings, the battery container 1 is closed by a lamp ring 2 carrying the porous vessel 3 between its upper face and a clamping plate 4 which constitutes a top closure for the porous vessel 3 and is provided centrally with a depending boss 5 which almost completely fills the interior space of the cylindrical porous vessel 3. Within the lamp ring 2 is mounted an insulating contact plate 6 having appropriate battery terminal contacts 7, 33 and 34 on its underside and a central filament mounting boss 8 on its upper side, said mounting boss 8 with its filament 9 projecting into the lower part of the porous vessel 3 and being encircled by a sealing washer 10 to afford a tight joint.

The underside of the boss 5 on the top clamping plate 4 is formed with a diametrical recess or cavity 11 to accommodate the filament 9 and radial ducts or channels 12 giving access to said cavity 11 for gas which diffuses into the porous vessel, and said boss 5 is bored through centrally at 13 from said cavity or recess to communicate with one limb of the manometer 14 or other vacuum gauge which is mounted on the upper side of said top clamping plate 4, which also carries the holder 15 for the scale illuminating bulb 16, the shunting resistance 17 and a contact 18 for the inspection lamp bulb 19 which is mounted in a top cover or cap 20 adapted to completely enclose the parts on the top clamping plate 4.

An annular space 21 afforded between the porous vessel 3 and the lamp ring 2 affords an admission chamber which is closed by a removable cover 22 and provided with gauze-protected air admission openings 23 through its outer wall, whilst a hit and miss apertured damper or valve ring 24 encircles said outer wall and can be rotated by means of the knob 25 to seal said chamber or admit air at will. This chamber 21 contains a wick, activated carbon or other absorbent material 26 to maintain a constant humidity within said chamber 21.

The top cover or cap 20 is fitted with a carrying handle 27 and has a laterally disposed housing 28 for the inspection lamp bulb 19, associated reflector 29 and lamp glass 30, whilst opposite a window 31 in the wall of said cover or cap 20 and within the latter is mounted a scale 32 which is adjustable and lies alongside the registering limb 39 of the manometer 14 and is illuminated by the lamp 16 on the top clamping plate when the testing filament is switched on.

The switching over from inspection lamp to test filament and scale lamp is effected by rotation of the battery container 1 relatively to the contact plate 6 to connect either of contacts 33, 34 with the battery. The inspection lamp 19 may be of the double filament variety and in order

to change the filaments, the bulb 19 and holder 35 are mounted in a rotatable member 36 which has two contacts 37 adapted to be connected one at a time with the contact 18, and a knob 38 is provided on the outside of the lamp housing 28 for the purpose of rotating the member 36.

In operation, the device is taken into a suspected poisonous gas area and the gases diffuse into the porous vessel, the filament is heated and any combustible gases in the porous vessel are ignited. The vacuum is created in the porous vessel proportional to the amount of inflammable vapour or gas ignited within the porous vessel. The vacuum operates the manometer which gives a reading in accordance with the degree of vacuum.

I claim:

In an apparatus for indicating the presence of inflammable vapors or gases including a battery container provided with an open upper end, a lamp ring closing said end, a porous vessel on said ring, a rotatable damper ring encircling said vessel and spaced therefrom to form an admission chamber, said ring having circumferentially spaced openings, a wick of absorbent material within said chamber, an annular member between said wick and said damper ring and provided with spaced openings arranged to register with the openings in said damper ring for controlling the supply of atmospheric air to said chamber, a clamping plate on the top of said vessel, said clamping plate having a depending boss extending into the vessel, a contact plate having spaced contacts on its underside for contacting battery terminals and a central mounting boss on its upper side projecting into said porous vessel, said central boss having a transverse recess and radial channels, for giving access to said recess for gas which diffuses into the porous vessel, a filament in said recess having electrical connections with said contacts, a manometer on said clamping plate, a cover mounted on said vessel and enclosing said manometer, means communicating the recess in the central boss with said manometer, and a scale on said cover associated with the manometer.

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