April 11, 1939. C. W. JOHNSON 2,153,568

GAS DETECTION APPARATUS

Filed May 11, 1937

Fig. 1

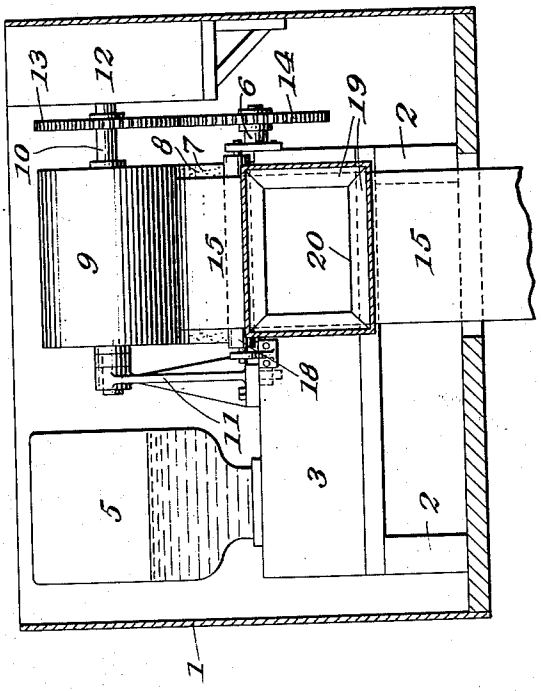
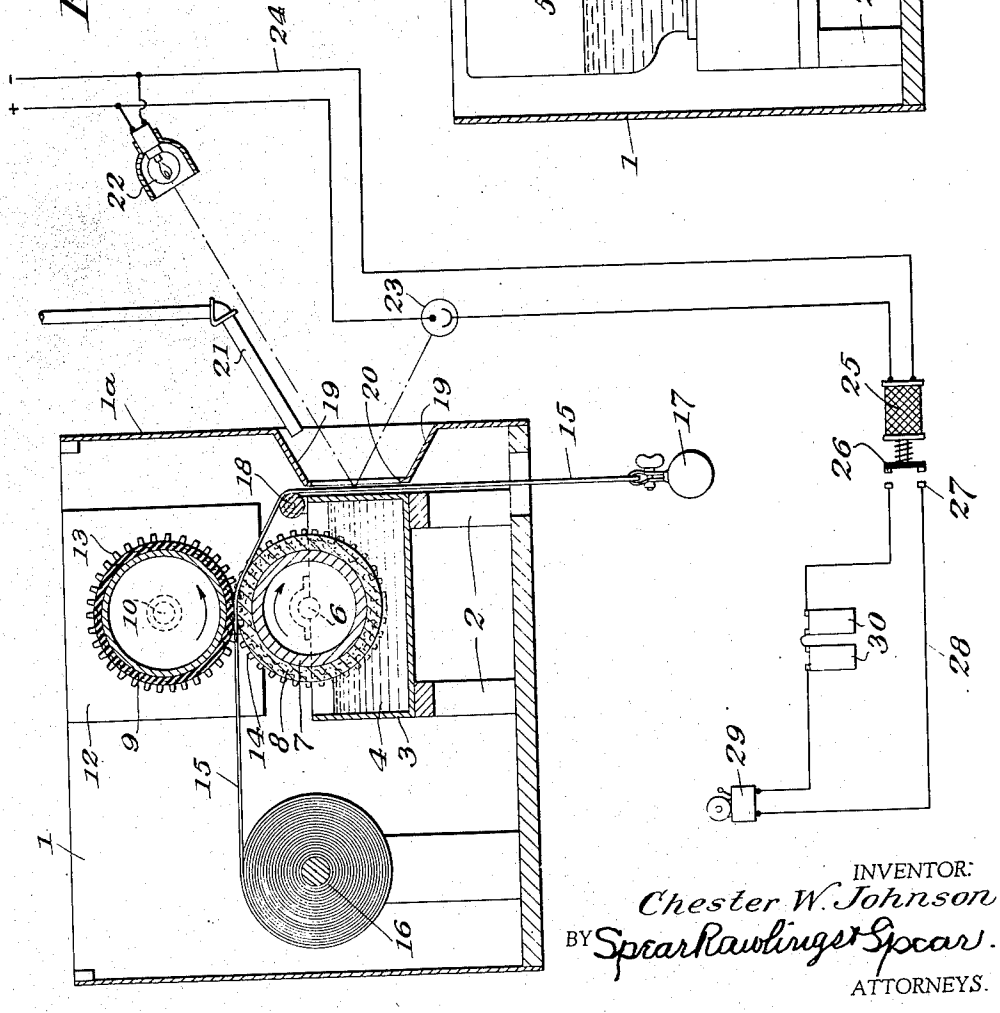


Fig. 2



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GAS DETECTION APPARATUS

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Application May 11, 1937, Serial No. 141,990

1 Claim. (Cl. 177—311)

This invention relates to alarm apparatus and more particularly to apparatus for the detection of dangerous or undesirable gases. Frequent disasters, including death and the destruction of property witness the need for and value of such apparatus.

The deadly gases which are of most common interest are carbon monoxide gas and illuminating gas. My invention therefore provides for single alarm units which may be installed in private or public garages, kitchens, or other parts of a residence, and which may be calibrated to function at a predetermined stage of gas concentration prior to the danger point to inhalers, or prior to any danger of combustion of the inflammable gases. Obviously the principles and construction of my apparatus and the various mechanisms included therein may be varied as necessary to adapt the same to use in coal or other mines, in the holds of ships, or elsewhere, where deadly or inflammable gases are likely to be present.

My gas detecting apparatus may be used alone or in combination with a fire alarm apparatus, as fire is frequently accompanied or even caused by the presence of explosive gases.

While my present alarm system is adapted primarily to be operated directly by these gases when they are present in dangerous concentration, it may also be used in combination with the means set forth in the patent to Hunter and Johnson 1,993,788, of March 12, 1935, for detecting the presence of minute quantities of smoke or gas by a system of concentrating the same until a sufficient density is built up to operate the alarm.

The most common deadly gases are colorless, and my invention includes means for causing such a reaction that such gases are either themselves rendered opaque or a film saturated with a solution is turned black by a reaction of the carbon monoxide or other gases with the chemicals of the solution so that its light reflective qualities are lost, the failure of light being the means of starting the system which warns of the presence of the deadly gases.

In the accompanying drawing I have shown and in the following specification disclosed a practical embodiment of my invention. In the drawing:

Fig. 1 is a longitudinal view partly in section of my apparatus, and

Fig. 2 is a similar transverse view.

My invention includes a casing 1, within which is mounted on supports 2 a tank 3 adapted to receive the solution 4 which is fed into the tank 3 from the bottle or other reservoir 5, as and for the purposes hereinafter set forth. A solution which I have used successfully is a mixture of palladium chloride, distilled water and alcohol, the last being added only where freezing of the solution is likely. A white film such as I use when saturated with such a mixture rapidly changes to black when the carbon monoxide concentration reaches .02½%.

A rubber covered roller 9 is fixed on a shaft 10 supported at one end by the bracket 11 and at its other end within the clock mechanism box 12, which standard mechanism (not shown) governs the rotation of the roller 9. On the shaft 10 is mounted a gear 13 in mesh with a second gear 14 which rotates the roller 7. This roller 7 is mounted on a shaft 6 disposed over the tank 3 and is covered by a wick 8, which wick covered roller 7 is immersed in the solution 4 in the tank 3.

Between the wick covered rollers 7 and rubber covered roller 9 is fed a cloth film 15 from the reel 16, and to which film 15 is attached a clamp weight 17, the movement of which is controlled by the rubber covered roller 9, which, as indicated above, is retarded by the clock gear mechanism through the shaft 10. The cloth film 15 therefore is constantly saturated with the solution 4 by means of the wick covered roll 7 between which and the rubber covered clock controlled roll 9 it constantly feeds.

As shown in Fig. 1, the film 15 passes over the small roller 18 from which it is pulled down straight by the weight 17 parallel to the front wall 1a of the casing 1.

Extending inwardly from the front wall 1a of the casing are the inclined walls 19 of a sight opening 20 past which the film 15 travels as it is drawn slowly downward by the weight 17.

The portion of the moist film 15 exposed through the opening 20 is directly in line with the delivery end of a conduit 21 from the air pump and filter, not shown herein but disclosed in said Hunter and Johnson Patent No. 1,993,788. Obviously, my present system is not dependent on the use of a filter although this might be of decided value in removing from the gas dust particles which might tend to clog the conduit or interfere with the delivery of the gas laden air adjacent the wet film 15.

A light 22 is suitably mounted to shine on the moist white film showing through the opening 20 which, so long as it remains white, deflects the light to the photoelectric cell 23 which is

mounted in the same electric circuit 24, this also including the solenoid 25. If the reflected light from the film 15 to the photoelectric cell 23 is interrupted as would happen if the chemical, with which the film 15 is saturated, turned the same black as a result of the reaction therewith of a dangerous gas delivered to the opening 20 by the conduit 21, the solenoid 25 would move the contacts 26 to contact the contacts 27 to complete a circuit 28 to a bell or other alarm signal 29. The usual battery 30 is provided to operate the signal 29.

Slow movement of the film 15 is necessary to prevent the gradual discoloration of the same by a constant low but not dangerous amount, for instance, of carbon monoxide gas. If however the gas concentration should increase to the poisoning stage, the film 15 would darken and the failure of the reflected light would operate the photoelectric cell. The inclined or beveled frame 19 of the sight opening 20 may be painted black, so that only the white film will reflect the light to the cell 23.

After an alarm has been given as a result of the discoloration of the film 15, the system may be restored to operating condition by lifting the rubber covered roller 9 and allowing the weight 17 to carry a fresh white section of film to be exposed at the opening 20.

The roller 9 may be tightly held down on the roller 7 by a suitable spring, not shown.

My apparatus may be calibrated to feed the film and solution as rapidly or as slowly as desired. In practical use, I have so adjusted the apparatus that about one inch of film 15 is moved past the opening 20 every twenty-four hours. I provide the film in foot lengths and one film length and one bottle capacity will operate the machine one week. In some cases and in certain climates or under different conditions of humidity, it may be necessary for the film to move faster. The one inch twenty-four hour movement noted above is merely illustrative.

What I therefore claim and desire to secure by Letters Patent is:

Apparatus for detecting the presence of dangerous gases comprising a light reflecting strip impregnated with a solution effective on reaction with such gases to substantially reduce the light reflecting property of the strip, a light source positioned in front of said strip to direct a beam of light diagonally against the front face thereof, a photo-electric cell also disposed in front of said strip and positioned in the path of the light beam reflected from said source by said strip, means to direct air which may contain a dangerous gas against the front of said strip substantially where the light beam strikes said strip, and indicating means controlled by said photo-electric cell.

CHESTER W. JOHNSON.