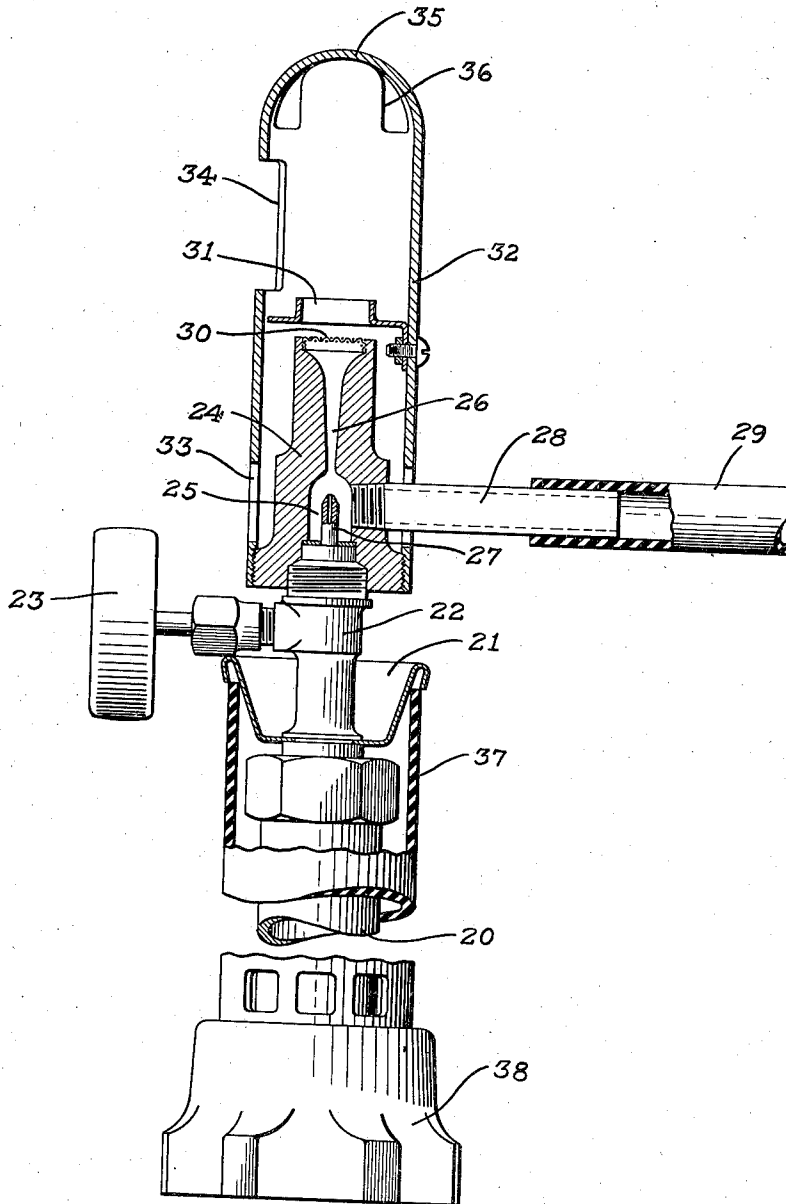


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REFRIGERATING APPARATUS
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REFRIGERATING APPARATUS

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2 Claims. (Cl. 23—254)

My invention relates to refrigerating apparatus and specifically to leak detecting apparatus for refrigerating systems. It is especially concerned with apparatus for testing leakage in refrigerating systems employing halogen derivatives and particularly fluoro derivatives of hydrocarbons as refrigerants.

Lamps or burners have been used for detecting the presence of halogens in the air and for detecting leakage in refrigerating systems employing halogen derivatives as refrigerants. I find, however, that these lamps or burners either are not sufficiently sensitive for detecting leaks in refrigerating systems or they use rather expensive gaseous fuels which are not always readily obtainable and require heavy cumbersome metal containers and thus are not readily portable and easy to handle.

It is an object of my invention to provide a simple, small, readily portable, highly sensitive leak detecting apparatus for detecting leakage in closed systems and containers containing halogen derivatives and which employs an inexpensive, readily portable and readily obtainable volatile liquid fuel.

It is a more specific object of my invention to provide a torch or burner for detecting the presence of a small proportion of halogen or halogen derivatives in air which employs a liquid fuel which is vaporized by the heat of the burner and the products of combustion to create a fuel vapor pressure for drawing in the entire primary air supply for the burner from the particular points of the refrigerating system to be tested for leakage at a relatively high rate of flow.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawing, wherein a preferred form of the present invention is clearly shown.

In the drawing the figure is a vertical sectional view of a halide detector embodying my invention.

In the halide detector shown in the figure, there is shown a cylindrical metal fuel container 20 having a small metal cup 21 at its upper end. Also, connected to the upper end of the fuel container 20 is a hand valve 22 provided with a handle 23 of insulating material for controlling the opening of the valve. The body of the hand valve 22 is preferably formed of some suitable heat conducting metal such as cast brass. Threaded onto the upper end of the hand valve is a Venturi tube and mixing member 24 having a mixing chamber 25 and a venturi 26. Sup-

ported within the mixing chamber 25 is a jet 27, which, together with the venturi 26, forms a jet pump which draws in the gases to be tested, which gases form the entire primary air supply of the burner, through the tube 28 which is threaded into the side of the mixing chamber 25. The tube 28 has a flexible exploring tube 29 connected thereto for conducting the gases to be tested to the burner. At the upper end of the venturi 26 there is provided a fine screen 30 which breaks up the large cone of unburned gases into a number of small cones of unburned gases so as to provide a flame which is capable of more readily indicating the presence of halogens.

Supported directly above the screen 30 and the burner is a ring shaped copper element 31 which will react with free halogens in the flame to emit the characteristic color to indicate the presence of halogens in the flame. This copper ring is supported within the flame and heated to such a temperature as will cause a reaction between any halogens and the copper to form a volatile copper halide which will color the flame. This copper element is supported by the chimney 32 which is threaded to the lower end of the burner 24 and is thus in excellent metallic heat conducting relationship with the burner and the hand valve 22. The chimney has a lower air opening 33 formed therein providing an inlet for the secondary air for combustion and the upper opening 34 which serves as a sort of window for viewing the flame. The upper portion of the chimney is slotted in order to provide integral projecting portions which are bent and rounded as shown at 35 so that they extend directly into the path of the products of combustion and are heated thereby to supply heat to the chimney. This upper portion is also provided with a plurality of openings 36 formed by the slots permitting the escape of the products of combustion. The fuel container is surrounded by an insulating housing 37 which may be used as a handle and which is provided with a removable base 38 which has a member formed therein which threads into and forms the removable closure member of the metal fuel container 20.

In operation, the fuel container 20 is provided with cotton wicking which serves as an absorbent, and the liquid fuel such as high test gasoline, benzine or naphtha is poured into the fuel container and the cap 38 is screwed on to close the fuel container. Thereafter, while the hand valve 22 is closed a small amount of fuel such as alcohol, benzine or naphtha is poured into the small cup 21 and lighted. The heat produced by

the burning of the fuel in this small cup 21 heats up the burner, as well as the small hand valve, and the chimney 32 and this heat is conducted to the metal fuel container 20 sufficient in
5 amount and temperature to vaporize the volatile liquid fuel in the fuel container 20 and to create a vapor pressure therein.

After this small amount in the fuel cup 21 has burned out, the hand valve 22 is opened and the
10 burner is lighted with a match or other flame. The pressure of the fuel discharged from the jet 27 within the mixing chamber 25, creates a suction in the mixing chamber which draws the gases to be tested at a rapid rate through the
15 exploring tube 29 and the tube 28 into the mixing chamber 25 and on into the Venturi tube 26. This mixture of highly vaporized fuel and gases to be tested then passes through the screen 30 and ignites immediately after passing through
20 the screen 30 and heats and comes into contact with the copper element 31.

Any halogens present in the combustible mixture will rapidly react with the hot copper ring
25 31 to cause the flame to almost instantly emit the characteristic bluish-green light indicating the presence of halogens or halogen derivatives. The products of combustion pass upwardly and heat the upper end 35 of the chimney 32. This heat is transmitted by the chimney to the burner 24
30 and the burner member also absorbs heat from the flame and all of this heat is conducted through the threaded connections to the valve body of the hand valve 22 which in turn conducts the heat to the metal fuel container 20. In
35 this way, the metal fuel container 20 is supplied with sufficient heat after the burner is lit so as to maintain the liquid fuel in a highly vaporized state and at a sufficient pressure to supply the
40 fuel under a relatively high pressure. By employing the gases to be detected as the entire primary air supply of the burner, and by providing the screen 30, the burner is made very sensitive to indicate the presence of small proportion of
45 halogens in the gas to be tested.

While the embodiment of the invention as herein disclosed, constitutes a preferred form, it is to be understood that other forms might be

adopted, all coming within the scope of the claims which follow.

What is claimed is as follows:

1. A halide detector for detecting the presence of halogens in gases, comprising a fuel chamber
5 adapted to contain a volatile liquid forming a vapor fuel, a vapor burner, a chimney for the burner capable of extracting heat from the products of combustion, means for conducting a large amount of heat from the chimney to the fuel
10 chamber for vaporizing the volatile liquid in the fuel chamber and create a vapor pressure therein, aspirating jet and Venturi means energized by the vapor pressure of the fuel for drawing in
15 gas to be tested and mixing them with the fuel to form a combustible mixture, an exploring tube connected to said last mentioned means for conducting gases to be tested to said means, a screen
20 at the outlet of the burner for broadening the flame and an element supported in the flame within the chimney and capable of reacting with
halides present in the flame to color the flame
to indicate the presence of halides in the gases tested.

2. A halide detector for detecting the presence
25 of halogens in gases comprising a fuel chamber adapted to contain a volatile liquid forming a vapor fuel, a vapor burner, a chimney for the burner capable of extracting heat from the products of combustion, means for conducting a large
30 amount of heat from the chimney to the fuel chamber for vaporizing the volatile liquid in the fuel chamber and create a vapor pressure therein, aspirating jet and Venturi means energized by the vapor pressure of the fuel for drawing in
35 gas to be tested and mixing them with the fuel to form a combustible mixture, an exploring tube connected to said last mentioned means for conducting gases to be tested to said means, and an element supported in the flame and capable of
40 reacting with halides present in the flame to color the flame to indicate the presence of halides in the gases tested, said element being in the form of a metal ring extending substantially entirely across the chimney, said ring having an aperture
45 therein substantially the same size as the burner outlet.

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