G. M. S. TAIT.

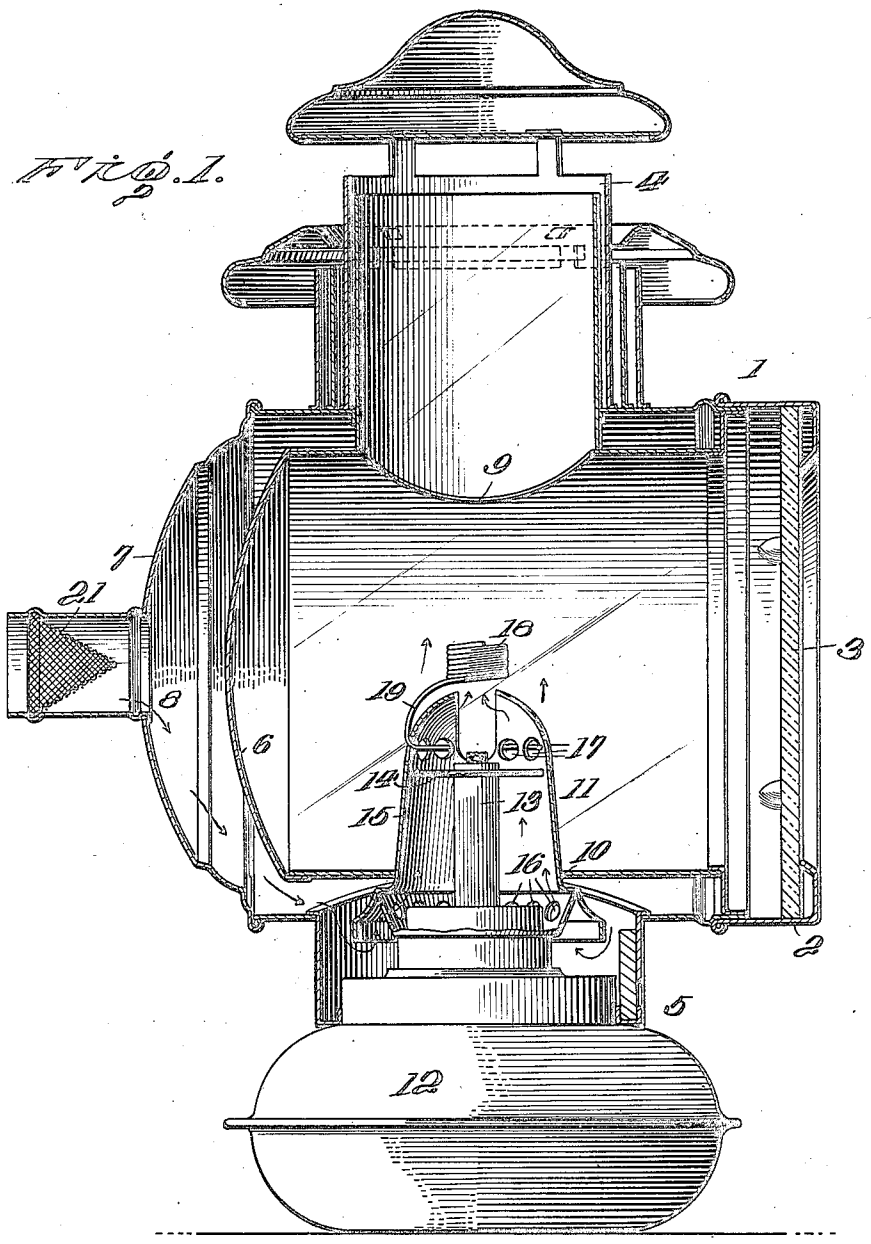
METHOD OF AND MEANS FOR DETECTING GASES.

APPLICATION FILED OCT. 4, 1918.

1,305,025. Patented May 27, 1919.

2 SHEETS—SHEET 1.

Fig. 1.



Inventor

George Tait

G. M. S. TAIT.

METHOD OF AND MEANS FOR DETECTING GASES.

APPLICATION FILED OCT. 4, 1918.

1,305,025.

Patented May 27, 1919.

2 SHEETS—SHEET 2.

FIG. 3.

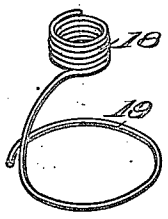
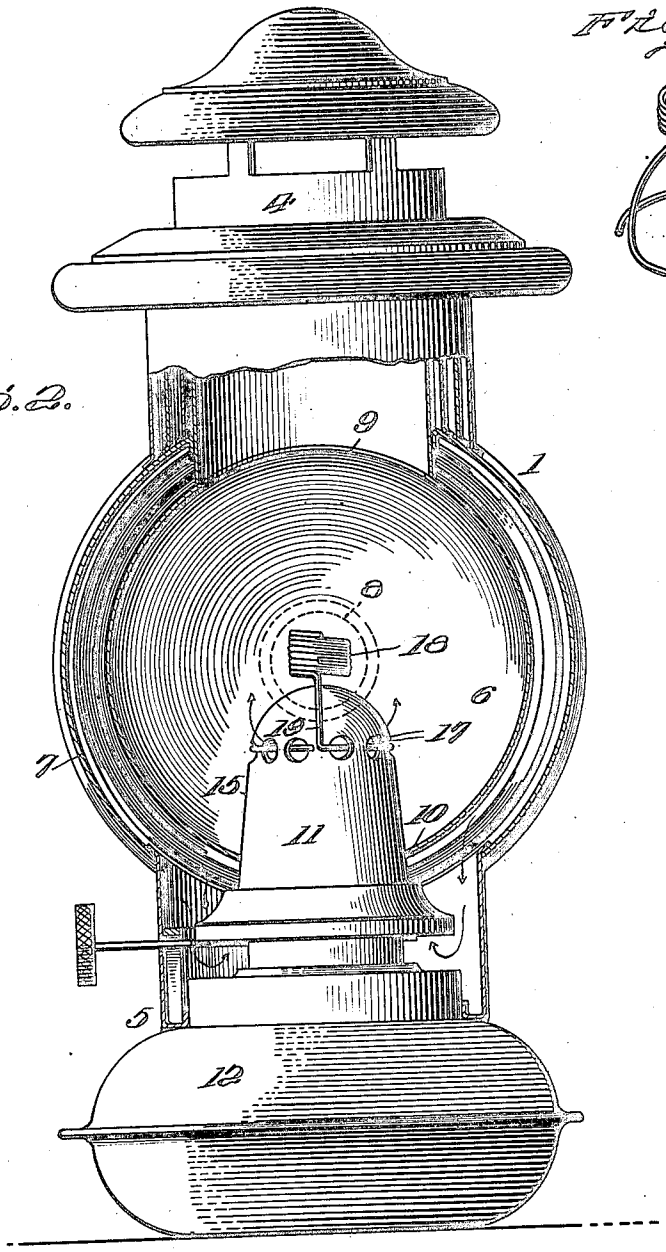


FIG. 2.



Inventor

Graham Tait

UNITED STATES PATENT OFFICE.

GODFREY M. S. TAIT, OF THE UNITED STATES ARMY.

METHOD OF AND MEANS FOR DETECTING GASES.

1,305,025. Specification of Letters Patent. Patented May 27, 1919.

Application filed October 4, 1918. Serial No. 256,933.

(FILED UNDER THE ACT OF MARCH 3, 1883, 22 STAT. L., 625.)

To all whom it may concern:

Be it known that I, GODFREY M. S. TAIT, captain, Chemical Warfare Service, United States Army, a citizen of the United States, and stationed at Washington, D. C., in the office of the Director of the Chemical Warfare Service, have invented a Method of and Means for Detecting Gases, of which the following is a specification.

This application is made under the act of March 3, 1883, chapter 143, (22 Stat. 625), and the invention herein described and claimed may be used by the Government of the United States or any of its officers or employees in the prosecution of the work for the Government, or any person in the United States, without payment to me of any royalty thereon.

This invention relates to the detection of gases, more especially it is concerned with the detection of poisonous gases mixed with air, and the object of my invention is to produce a novel method of detecting gases and an apparatus suitable for carrying out my method.

Such a device is especially adapted for use aboard ships or on submarines where poisonous fumes of chlorin are accidentally evolved. My invention is also of great value in detecting the gases evolved on the battlefield in gas shell or gas cloud attacks by the enemy or gas or vapor liberated by the accidental leaking of gas containing cylinders or shells, in ammunition depots or in gas factories, since most of the poisonous gases used to-day are chlorinated or brominated products.

I detect the presence of the gases by means of the character of the light emitted by suitable material in the presence of the gas to be detected.

More specifically my invention consists in heating a mass of suitable material and leading the gas to be detected into contact with the material whereby the material forms a substance with the gas to be detected whose vapor emits a characteristic colored light when heated.

Still more specifically my invention consists in heating a member which may consist of copper, strontium, calcium, calcium oxid, or other suitable material, in any convenient form, as in the form of a spiral, wire, ball, block, coil, gauze, cylinder or other shape, by means of a flame, electric current, or in any other suitable manner to cause the material to emit its characteristic color when brought into contact with the gas.

The preferred form of my invention is as follows:

A spiral of copper is placed in the heating zone of a steadily burning flame, (such as for example, alcohol). The spiral will glow without emitting any light. The color of the flame will be dependent on the material producing it. Should vapors of a compound containing a halogen become mixed with the air being fed to the burner, the spiral emits a green flame which serves to show the presence of the halogen containing gas. The gas entering the heated zone containing the copper spiral is decomposed and the halogen combines with the copper forming copper halid which is volatilized by the heat. The vapor produced imparts the greenish color of volatilized copper to the surroundings.

These and other objects of my invention set forth, I accomplish by an apparatus which I have devised, of which Figure 1 of the accompanying drawings is a side sectional view; Fig. 2 is a front elevation with some parts shown in section; and Fig. 3 is a perspective view of the copper spiral.

In the drawings 1 represents the lamp which is of a well known type having a front opening closed by a hinged door 2 in which is set a transparent pane 3. 4 is the chimney of ordinary construction and 5 is the lamp proper. The casing of the lamp consists of two concentric casings 6 and 7, the inner one of which is closed to access of air, while the outer casing 7 is provided with a special inlet 8 adapted for coupling to a pressure source of air supply when used on shipboard. Casing 6 has an opening 9 in the top communicating with chimney 4, and an opening 10 at the bottom into which is inserted the burner 11 of the lamp 5.

The lamp consists of a well, 12, which holds the inflammable liquid, (alcohol), the ordinary wick burner 13, a perforated deflecting plate 14 near the top, and a hood 15 which has perforations 16 at its bottom for the ingress of air and perforations 17

near the top for the egress of air. 18 is a copper spiral placed in the path of the flame of the lamp. It is attached by the extension 19 threaded through the perforations 17. 21 is a gauze cone to prevent the flame from flashing back accidentally.

In operation, the lamp 5, which usually contains alcohol as combustible, is lighted. Air is drawn in through the opening 8 and follows the path shown by the arrows, flowing around the casing 6 and becoming thus preheated, then entering the hood 15 through the perforations 16 and passing upward. It is deflected by perforated plate 14, part passing directly into the flame at 20 and part passing out through perforations 17 forming a cylinder of preheated air surrounding the flame. This method of indirectly leading in air for combustion results in a steadily burning flame which is necessary in order to be able to detect small quantities of gas. The spiral 18 becomes red and glows without giving off any appreciable light. Should, however, any gas, as for instance phosgene, become mixed with the air entering the lamp, the copper spiral will emit light of a greenish hue due to the halogen in the gas. This affords a ready means of detection of the gas mixed even in small quantities with air.

My invention may be carried out by other apparatus than that described above. A metallic wire is heated to redness by the passage of an electric current through it. The air containing the gas is led into contact with the glowing member which will now be surrounded by a colored zone of light. Where copper is the metal used and chlorin containing gas is to be detected, the action is as follows: The copper becomes red hot. The chlorin compound mixed with air is led into contact with the hot metal. The compound is broken down liberating chlorin which combines with copper forming volatile copper chlorid which, when vaporized by the heated metallic member, emits the greenish color characteristic of volatilized copper.

Another modification of my invention consists in causing the burner to light only at the time an observation is to be made. A covered receptacle contains alcohol. Directly above it is suspended, in the zone of combustion of the burner, a small amount of a catalyzer, as finely divided nickel. This is surrounded by a copper gauze, or the nickel may be otherwise held in proximity to the copper. When the cover of the alcohol receptacle is removed, the catalyzer causes the alcohol vapors given off to ignite, thus heating the copper to glowing. If the air contains a halogen derivative the flame is colored greenish. When the test is over, the receptacle cover is replaced and the flame thus extinguished.

By gases I mean substances which are either permanent gases, vapors, or solid or liquid particles diffused in a gaseous medium. It is to be understood that I do not intend to limit myself to the detection of halogen containing substances by means of glowing copper. It is obvious that other materials such as strontium, or calcium or calcium oxid may be used in place of the copper and that other gases or vapors such as cyanogen or sulfur containing compounds, may be detected by my method. I claim broadly the detection of gases except as limited by the following claims:

1. In a method of detecting gases, producing a characteristic colored light by heating said gases in the presence of a material which under these conditions will cause emission of such light.

2. In a method of detecting gases, producing a characteristic colored light by heating said gases in the presence of a metal, which under these conditions will cause emission of such light.

3. In a method of detecting gases, bringing the gases in contact with material capable of forming a substance with the gas to be detected whose vapor emits a characteristic light when heated.

4. In a method of detecting gases, bringing the gases in contact with material capable of forming a volatile substance with the gas to be detected whose vapor emits a characteristic colored light when heated.

5. In a method of detecting gases, bringing the gases in contact with heated metal capable of forming a substance with the gas to be detected whose vapor emits a characteristic light when heated.

6. In a method of detecting gases, bringing the gases in contact with a heated copper member.

7. In a method of detecting gases, bringing together into a flame the gases and material capable of forming a substance with the gas to be detected whose vapor imparts a characteristic light to the flame.

8. In a method of detecting gases, bringing together into a flame the gases and a metal capable of forming a substance with the gas to be detected whose vapor imparts a characteristic colored light to the flame.

9. In a method of detecting gases, bringing together into a flame the gases and a copper member.

10. In a method of detecting gases, placing a copper spiral in a steadily burning flame, and bringing the gases into said flame.

11. A method of detecting gases which consists in heating a mass of suitable material, and volatilizing at least a part thereof by contact with the gas to be detected.

12. A method of detecting gases which consists in heating a metallic member, and

forming a luminous volatile compound of the same by bringing the gas to be detected into contact therewith.

13. Means for detecting gases, comprising a member made of material capable of forming a substance with the gas to be detected whose vapor emits a characteristic light when heated, means for heating said member and means for bringing the gas into proximity with the same.

14. Means for detecting gases, comprising a member made of a metal capable of forming a substance with the gas to be detected whose vapor emits a characteristic light when heated, means for heating said member, and means for bringing the gas into proximity with the same.

15. Means for detecting gases, comprising a member made of copper, means for heating said member and means for bringing the gas into proximity with the same.

16. Means for detecting gases which consists of a metallic member so placed in the combustion zone of a burner as to enable it to be heated to glowing.

17. Means for detecting gases which consists of a copper member so placed in the combustion zone of a burner as to enable it to be heated to glowing.

18. Means for detecting gases which consists of a burner, a metallic member placed in the zone of combustion of the burner, and air ducts for leading the gas to be detected mixed with air, into contact with the metallic member.

19. Means for detecting gases which consists of a member of suitable material having an extension adapted to secure said member to a burner in the zone of combustion thereof.

20. Means for detecting gases which consists of a metallic member having a portion adapted to be threaded through the air holes of a burner to secure said member in the zone of combustion of said burner.

GODFREY M. S. TAIT.