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J. C. PETERS, JR

1,751,715

THERMAL CONDUCTIVITY GAS ANALYSIS APPARATUS

Original Filed Feb. 27, 1926

Fig. 1.

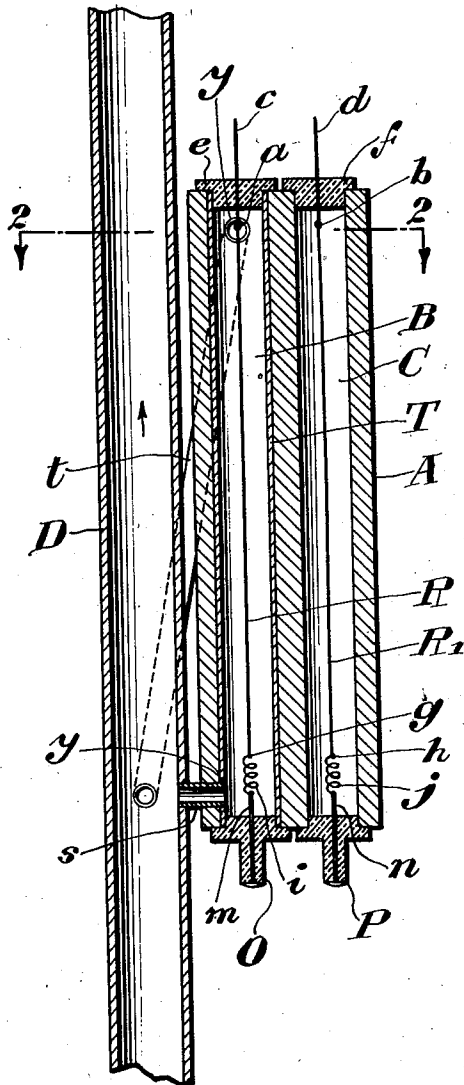


Fig. 2.

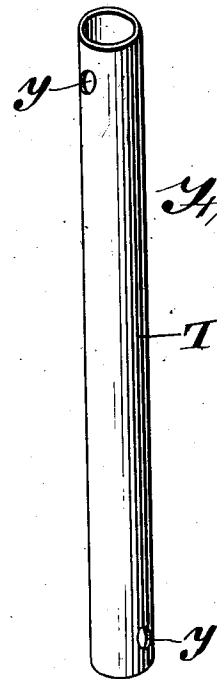
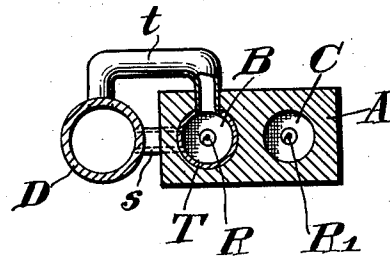


Fig. 3.

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THERMAL-CONDUCTIVITY GAS-ANALYSIS APPARATUS

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My invention relates to the art of gas testing or analysis and comprehends a gas analysis unit or structure comprising a chamber, cell or passage whose gas-contacting surface is inactive with respect to gases corrosive with respect to the usual material forming the unit.

In accordance with my invention, the surface of a chamber, as aforesaid, enclosing a body of gas and formed of a material subject to gaseous corrosion is prevented from contacting with the gaseous contents of the chamber by an interposed shield inactive and not subject to corrosion by said gaseous contents.

Further in accordance with my invention, a chamber or passage enclosing or through which circulate gaseous vapors is lined with a material, either metallic or non-metallic, inactive with respect to the gases within the chamber, and more particularly, a chamber as aforesaid elongated, and preferably cylindrical, is lined with a supplementary member likewise elongated and preferably cylindrical of suitable material inactive and not subject to corrosion by the gaseous contents of the chamber.

Further in accordance with my invention, a liner member, as aforesaid, of suitable material as nickel, gold, platinum or glass, preferably the former, is suitably maintained in contacting relation with the interior surface of a chamber, and more particularly the thermal conductivity between the members is maintained at a high value by the interposition of solder, varnish or the like.

My invention relates to apparatus or structure of the character hereinafter described and claimed.

My present invention is an improvement from a structural viewpoint of the structure illustrated in my prior Letters Patent No. 1,504,707.

For an illustration of one of the various forms my invention may take, reference is to be had to the accompanying drawing, in which:

Fig. 1 is a vertical sectional view of a gas analysis unit constructed in accordance with my invention.

Fig. 2 is a horizontal sectional view taken on the line 2—2 of Fig. 1 looking in the direction of the arrows.

Fig. 3 is a perspective view of a liner tube for a gas chamber.

Referring to the drawing, A is a block of metal or other suitable material, usually of a character that is corroded when brought into contacting engagement with some gases, said block having therein the cells or chambers B and C. Or the cells B and C may be in separate blocks or members. Extending longitudinally of the cells B and C are the resistance conductors R and R¹, respectively, of any suitable material having substantial temperature co-efficient. Preferably the conductors R and R¹ are fine platinum wires, which may have diameters of the order of two mils. At their upper ends they are soldered at a and b, respectively, to the wires c and d, respectively, of gold or other suitable material extending through the insulating members e and f, forming gas-tight end closures for the cells B and C, respectively. At their lower ends the conductors R and R¹ are soldered at g and h, respectively, to the metallic springs i and j, respectively, which are preferably of gold or other material chemically neutral with respect to the gases involved. The springs i and j keep the conductors R and R¹ taut, and are connected to the conductors m and n, of gold or other suitable material, sealed in the end closure members O and P, respectively, for the cells B and C. The closure members o and p may be of glass or other suitable insulating material, or the lower ends of the springs i and j may be connected to metal end closures of the cells B and C when the block is of metal, as indicated. It will be understood that either arrangement may be utilized, as may be suitable or convenient.

Structure of the character aforesaid finds application in the art of gas analysis and, when so utilized, the resistance conductors R and R¹ are connected in a Wheatstone bridge or other suitable circuit arrangement, for example, as disclosed in my aforesaid Letters Patent No. 1,504,707. At times, the analysis or testing unit is used with gases

- which corrode the materials usually employed in its construction. Even slight corrosion of the wall of the chamber B causes a change in the temperature, and therefore, in the resistance of wire R, since the amount of heat supplied to the wire is substantially constant. As a result, the calibration of the instrument employed in the external circuit is disturbed, this, of course, affecting the accuracy of the observations.
- Heretofore, in an attempt to eliminate corrosion, the interior surface of a gas analysis chamber or cell subject to corrosion by a gas has been electroplated. Structures of this character yield unsatisfactory results, particularly due to the fact that it is impossible or at least extremely difficult to obtain an impervious surface.
- In accordance with my invention, in order to eliminate corrosion of the wall or walls of a gas analysis unit, as chamber B, I utilize a shield of suitable inactive material for preventing contact of the corrosive gases with said wall or walls, such shield being placed in position by any suitable manner other than by electroplating. By preference, I utilize a liner tube T whose outside diameter should substantially conform with the inside diameter of chamber B. Preferably, tube T, adjacent each end, is provided with a hole or perforation *y* receiving respectively tubes *t* and *s*, in which case the latter function to hold the liner tube in place. Moreover, it is desirable that tube T be of substantially the same length as that of block A whereby the inner ends of closure members *e* and *o* may pass interiorly thereof for effecting closure of chamber R.
- Tube T may be constructed of suitable material, either metallic or non-metallic, as nickel, gold, platinum, or glass and its equivalents. Preferably, however, said tube is constructed of nickel.
- It is also desirable that there be a good and definite thermal contact between liner tube T and the walls of chamber B. To this end, I may utilize solder, varnish or the like between the exterior surface of said tube and the wall or walls of chamber B.
- For the sake of brevity in the appended claim, it shall be understood that the terms "lining", "lining member" and "liner tube" do not comprehend a construction wherein the interior surface of a gas analysis unit, chamber, cell or the like of a material corroded by a gas is shielded from contact with the gaseous contents thereof by a coating deposited directly on said surface by an electroplating process.
- What I claim is:
- Apparatus for testing or analyzing gases comprising an elongated tubular chamber, a resistance conductor disposed therein, a liner tube of material inactive with respect to the gaseous contents of said chamber forming the interior surface thereof, and material interposed between said chamber and liner tube to maintain high, definite, thermal conductivity between them.
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