D. McF. MOORE.

AUTOMATIC GAS FEED FOR VACUUM TUBES.

APPLICATION FILED MAY 8, 1906.

1,010,670.

Patented Dec. 5, 1911.

Fig. 1.

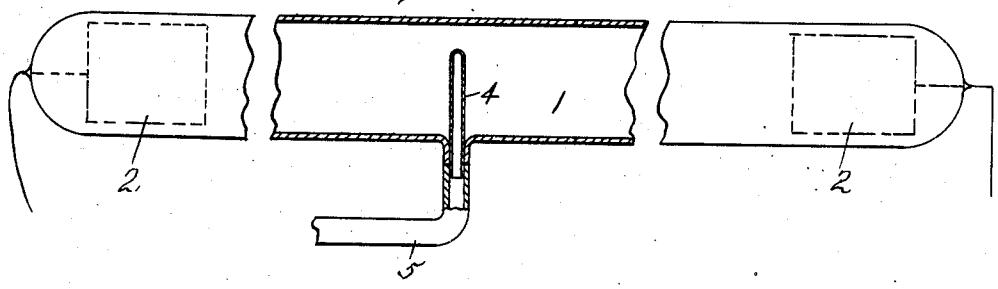


Fig. 2.

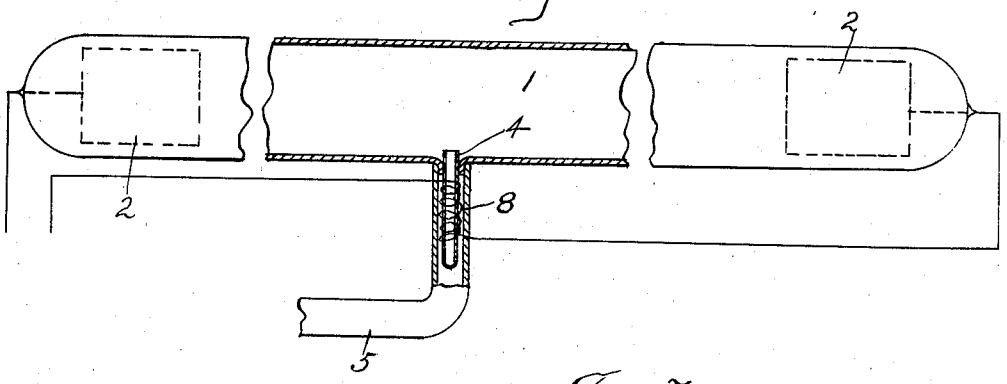
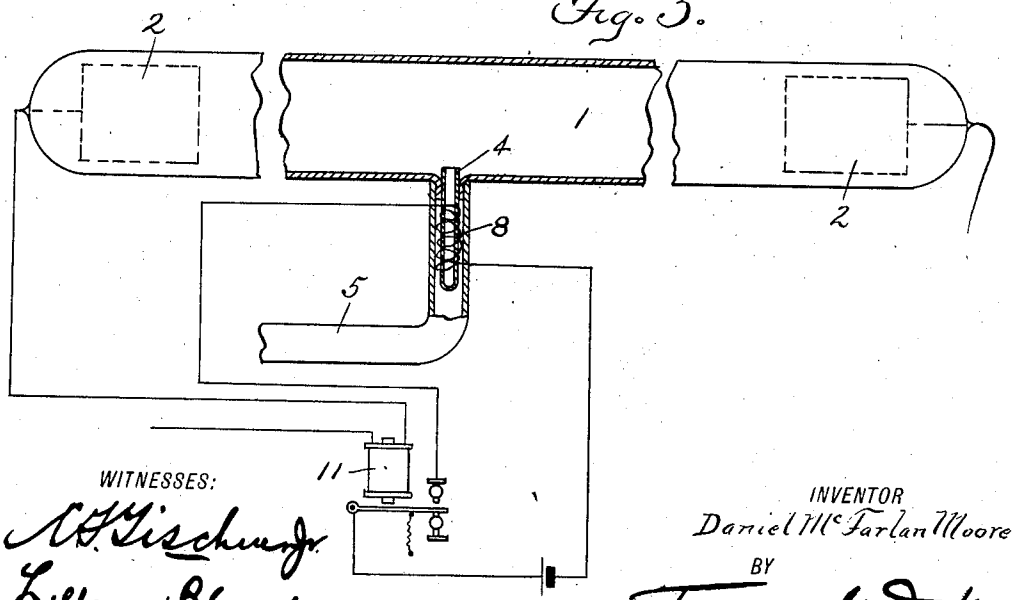


Fig. 3.



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AUTOMATIC GAS-FEED FOR VACUUM-TUBES.

1,010,670. Specification of Letters Patent. Patented Dec. 5, 1911.

Application filed May 8, 1906. Serial No. 315,732.

To all whom it may concern:

Be it known that I, DANIEL McFARLAN MOORE, a citizen of the United States, and a resident of Newark, in the county of Essex and State of New Jersey, with post-office address 52 Lawrence street, have invented certain new and useful Improvements in Automatic Gas-Feeds for Vacuum-Tubes, of which the following is a specification.

My present invention relates to that class of vacuum tube lamps which are supplied with electrodes or terminals for causing electric energy to pass through the contained gas or vapor and render the same luminous.

The object of my invention is to prevent changes in the luminosity consequent upon changes of vacuum due to the passage of the electric energy and consists in an improved manner of automatically supplying the gas or vapor to the vacuous spaces so as to maintain the gas or vapor tension at the degree necessary for standard luminosity.

In carrying out my invention I make use of some material whose porosity increases with an increase of temperature and automatically increases the temperature of said material when the resistance of the gas in the tube decreases due to changes of tension. Said material may be for example platinum, palladium, platiniridium, nickel or iron.

In the preferred manner of carrying out my invention, the material is arranged to be heated by the discharge through the gas in the tube so as to automatically permit gas to feed thereto in amount to restore the vacuum to the normal or desired degree of tension when its resistance decreases.

In the accompanying drawings, Figure 1 is a general side elevation and partial section of an apparatus embodying my invention. Figs. 2 and 3 illustrate modifications of the invention.

1 indicates a vacuum tube furnished with electrodes 2 of any kind, by means of which electric energy may be applied to the gaseous contents for rendering the same luminous.

Located in proper position to feel directly the increase in the temperature of said gas, due to increase in the flow of the electric energy, consequent upon any decrease of gaseous tension and vice versa, is a septum or wall of the desired material forming an obstacle to the free flow of gas into said tube from a body of gas maintained at higher tension than the tension of the gas within said tube.

In Fig. 1 the material forms a hollow plug or tube 4 which is sealed in the wall of the tube and projects more or less into the heated gas or vapor. The walls of said tube form a septum between the vacuous spaces and spaces containing the gas which is to be fed to the tube to keep the gaseous tension normal. Such gas may be supplied to the interior of the plug or tube 4 through a pipe 5 connected either to the atmosphere with a gas tank, gas generator, gas converter or any source of gas as described in prior applications for patent filed by me April 2, 1906, Nos. 309,283, 309,285, 309,286, and filed February 7, 1906, S. No. 299,884.

In the operation of the device, the septum 4 is of limited porosity and allows gas to flow in limited amount insufficient to increase the tension of the gas in the tube, so long as the operation of the tube and flow of current therein remain normal. When the vacuum increases more current flows and the septum 4, becoming more highly heated, expands and allows an influx of gas which will restore the tension to normal. Less current will now flow and the tube 1 be thereby permitted to decrease in temperature and cut down the flow. While I have shown the employment of such a septum heated directly by the gas through which the current of the lamp flows, it might be arranged to be heated indirectly by the flow of current, as for instance, in the manner illustrated in Fig. 2, wherein the circuit of the tube or lamp is shown as including a heating coil 8 which surrounds the hollow septum 4, the latter being then located outside of the tube, but responding in obvious manner to the increased flow of current due to decrease of gaseous tension so as to admit more gas and restore the tension to normal.

As will be seen, the lamp is normally operated at or with a vacuum just below that at which the current flow and luminosity are greatest so that an increase of vacuum lowers the resistance and causes more current to flow through the tube with an attendant increase of temperature and porosity in the material.

A further modification of my invention is

illustrated in Fig. 3. In this case the increased flow of current in the lamp is used by the intervention of an electromagnet 11 to close an independent circuit containing a heating coil which heats the septum or other form of porous substance which allows gas to leak. So long as the gas tension in the tube remains at normal, the armature of the magnet being properly adjusted, will be in position to keep the circuit of the heating coil open. On decrease of tension in the tube and consequent increase of flow of current, the magnet will close the heating circuit and keep it closed until sufficient gas has been permitted to leak through the septum to restore the tension to normal. When this occurs, the armature will drop back and open the heating circuit, thus cutting down the feed of gas.

What I claim as my invention is:

1. The combination with a vacuum tube lamp, of a porous material interposed in the gas feed passage through which gas is fed to said lamp and means for increasing the temperature and porosity of said material automatically upon a decrease of resistance of the gas due to an increase of vacuum attended by an increase of the flow of electric current through the gas.

2. The combination with a vacuum tube lamp, and its gas feed passage, of a porous material interposed in said passage, an electric heater acting on said material and means for automatically throwing the heater into action upon decrease in the resistance of the gas within the tube due to decrease of gaseous tension and throwing it out of action when the gaseous tension increases sufficiently to increase the electric resistance to normal.

3. The method of maintaining a constant luminosity in a vacuum tube lamp by automatically increasing the temperature and porosity of a material interposed in the gas feed upon a decrease of the internal resistance due to decrease of the gaseous tension and vice versa.

Signed at New York in the county of New York and State of New York, this 5th day of May A. D. 1906.

DANIEL McFARLAN MOORE.

Witnesses:

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LILLIAN BLOND.