Dec. 23, 1941. E. F. LOWRY ET AL 2,267,594

PRESSURE ADJUSTER FOR GASEOUS DISCHARGE LAMPS

Filed Nov. 22, 1940 2 Sheets-Sheet 1

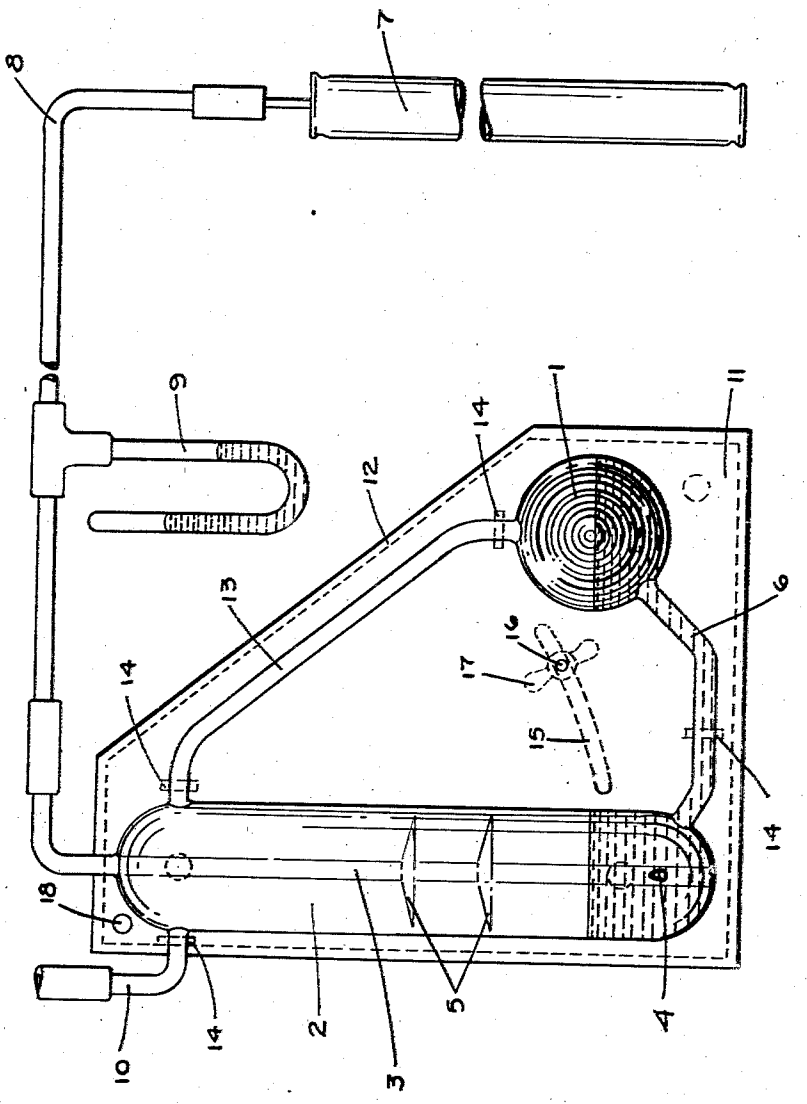

Fig. 1.

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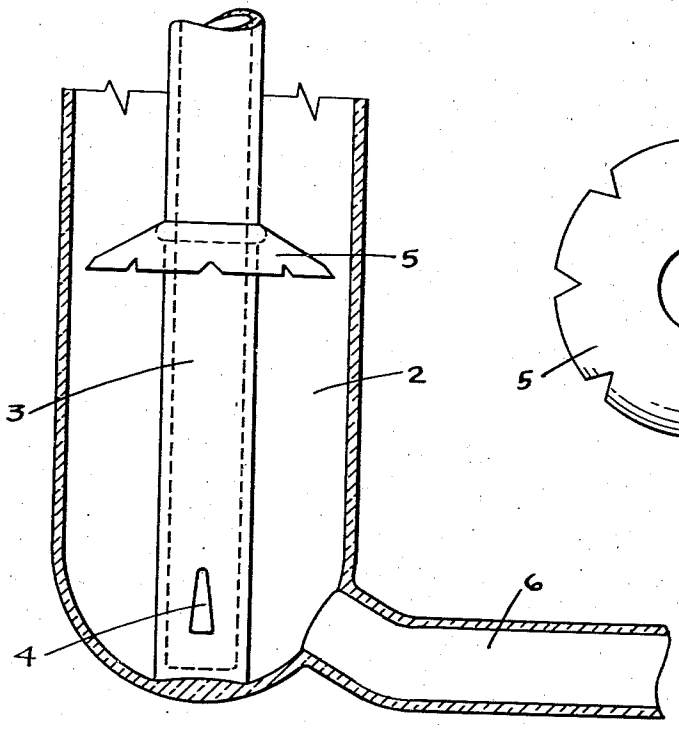

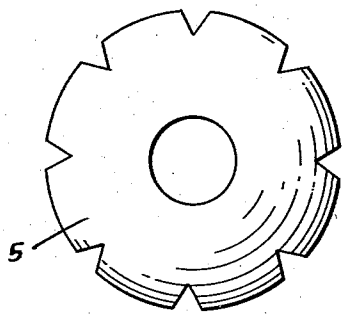

Fig. 3.

Fig. 2.

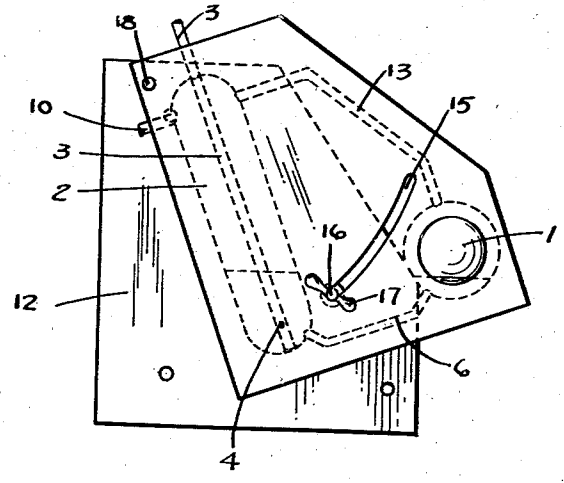

Fig. 4.

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Patented Dec. 23, 1941 2,267,594

UNITED STATES PATENT OFFICE

2,267,594

PRESSURE ADJUSTER FOR GASEOUS DISCHARGE LAMPS

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Application November 22, 1940, Serial No. 366,650

8 Claims. (Cl. 137—53)

This invention relates to a pressure regulating device and more particularly to a device for regulating the gas pressure in an electric gaseous discharge lamp.

An object of this invention is to provide a device for accurately controlling the gas pressure in an electric gaseous discharge lamp.

Other objects, advantages and features of this invention will be apparent from the specifications below taken in conjunction with the accompanying drawings in which:

Figure 1 is a front elevational view shown partly in phantom of the pressure regulating device assembly, in conjunction with a pressure measuring device and an electric lamp.

Figure 2 is a detail shown partly in section of the lower extremity of the cylindrical chamber;

Figure 3 is a top view of one of the baffles;

Figure 4 is a side elevational view shown partly in phantom, showing the device in a revolved position.

In the manufacture of electric gaseous discharge lamps with a coating of luminescent material on the inner walls thereof, the lamp, after it has been exhausted, is usually filled with an inert gas under pressure. Oftentimes it is desirable to vary this pressure for different lamps. Thus, an accurate pressure regulating means capable of being very easily adjusted to the various desired pressures is highly desirable.

Figure 1 shows the device of my invention which consists of the balancing spherical reservoir 1 connected to the cylindrical chamber 2 which encloses the exhaust line 3 with the exhaust window 4 therein. This exhaust line 3 is concentric with the cylindrical chamber 2 and has the baffles 5 thereon. The exhaust line 3 is sealed in the cylindrical chamber in a manner as to have the only opening between it and the cylindrical chamber 2 through the exhaust window 4. A quantity of n-butyl-phthalate, or similar liquid with an extremely low vapor pressure, is located in the reservoir 1, the lower connecting line 6 and the chamber 2.

In the exhausting of fluorescent lamps the lamp is usually evacuated to a fine degree of vacuum before it is ready for its final filling of inert gas. It is desirable to have the pressure of this gas accurately determined. Thus if, for example, 2 mm. of an inert gas such as argon were desired, the lamp 7 would be filled with a pressure of argon somewhat above 2 mm., for example, 10 mm. The lamp 7 would then move, as shown in copending application Serial No. 335,979, filed May 18, 1940, to a position where it would establish contact with the pressure regulating device in my invention through the exhaust line 8. This line is connected through the manometer 9 to the exhaust line 3 sealed in the cylindrical chamber 2.

The line 10 leads to an exhaust pump which evacuates the cylindrical chamber 2. The height of n-butyl-phthalate in the chamber 2 from the top of the window 4 to the surface of the liquid is of a weight equal to 2 mm. pressure. Thus the excess of gas over 2 mm. in the lamp 7 will be drawn off through the line 8, the manometer 9, and through the line 3 sealed in the chamber 2. The pressure over 2 mm. will exceed the pressure of the liquid at the vent 4 and will bubble out through the vent and be drawn from the chamber 2 through the line 10. When the pressure in the line 3 equals the pressure of the liquid at the vent 4, the equalization will result in the ceasing of the bubbling and an indication that the excess pressure in the lamp has been drawn off and the pressure in the lamp now is 2 mm.

In Figure 1, the spherical reservoir 1, the cylindrical chamber 2, the line 6 connecting the lower extremities thereof and the line 13 connecting the upper extremities thereof are all mounted on the adjustable plate 11 through the tabs 14. This plate 11 may be recessed to provide for a firm mounting of these parts thereon. The elongated slot 15 is located in the plate 11. The screw 16 through the stationary plate 12 extends up through the slot 15, and locks the adjustable plate through the wing nut 17 at the desired position as shown in Figure 4. As also shown in Figure 4, the plate 11 pivots about the stud 18 in the plate 12 when it is moved for adjusting purposes.

Figure 4 shows how the height of n-butyl-phthalate from the top of the vent 4 to the surface of the liquid has increased due to the flow of n-butyl-phthalate from the reservoir 1 into the cylindrical chamber 2, caused by the angular position which the plate 11 has now assumed. The calculation of the pressure being exerted at the vent 4, when the height of n-butyl-phthalate from the top of the vent to the surface of the liquid is changed, may be made on the manometer 9 shown in Figure 1.

Figure 3 is a detail of one of the baffles 5 concentric with the exhaust line 3. Figure 4 shows how the line 6 from the spherical reservoir 1 joins the cylindrical chamber 2. The exhaust line 3 is sealed in the chamber 2 so that the only opening from the line 3 into the chamber 2 is through the triangular vent 4. This vent is of a contour substantially as shown in Figure 2 to provide a more even and less turbulent displacement of the

liquid around the vent when the excess gas pressure from a lamp is being drawn off. The line 3 is swelled at certain points along its longitudinal axis for the positioning of the baffles 5 thereon. These baffles serve to prevent any of the liquid in the chamber 2 from working up into the exhaust line 10 when the liquid is in a somewhat turbulent state due to the excess pressure bubbling through the vent 4.

What we claim is:

1. A pressure adjusting means for electric gaseous discharge lamps comprising: a reservoir; a quantity of low vapor pressure liquid in said reservoir; a cylindrical chamber separate from said reservoir, said chamber being in communication at its bottom with said reservoir and the liquid therein, and at its top with an outlet for exhaust; and a tube extending through said cylindrical chamber and toward the bottom of said chamber and having a vent at its lower extremity, the only means of communication between said cylindrical chamber and said tube being through said vent.

2. A pressure adjusting means for electric gaseous discharge lamps comprising: a reservoir; a quantity of low vapor pressure liquid in said reservoir; a cylindrical chamber separate from said reservoir, said chamber being in communication at its bottom with said reservoir and the liquid therein, and at its top with an outlet for exhaust; an equalizing path between said chamber and said reservoir; and a tube extending through said cylindrical chamber and toward the bottom of said chamber and having a vent at its lower extremity, the only means of communication between said cylindrical chamber and said tube being through said vent.

3. A pressure adjusting means for electric gaseous discharge lamps comprising: a reservoir; a quantity of low vapor pressure liquid in said reservoir; a cylindrical chamber in communication at its bottom with said reservoir and the liquid therein, and at its top with an outlet for exhaust; an equalizing path between said chamber and said reservoir; a tube extending through said cylindrical chamber towards the bottom thereof and having a vent at its lower extremity, the apex of said vent extending upward, said vent being the only means of communication between said cylindrical chamber and said tube; and a baffle around and concentric with said tube, said baffle being located above said vent and below the outlet for exhaust at the top of said cylindrical chamber.

4. The combination of claim 3 and means for raising said reservoir.

5. The combination of claim 1 and means for raising and lowering the level of said low vapor pressure liquid in said reservoir.

6. The combination of claim 1 and a pivotally mounted support to which said apparatus is fixed.

7. The combination of claim 2 and means for raising and lowering the level of said low vapor pressure liquid in said reservoir.

8. The combination of claim 2 and a pivotally mounted support to which said apparatus is fixed.

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