No. 770,109. PATENTED SEPT. 13, 1904.

M. VON RECKLINGHAUSEN.

VAPOR ELECTRIC APPARATUS.

APPLICATION FILED OCT. 17, 1903.

NO MODEL.

Fig. 1

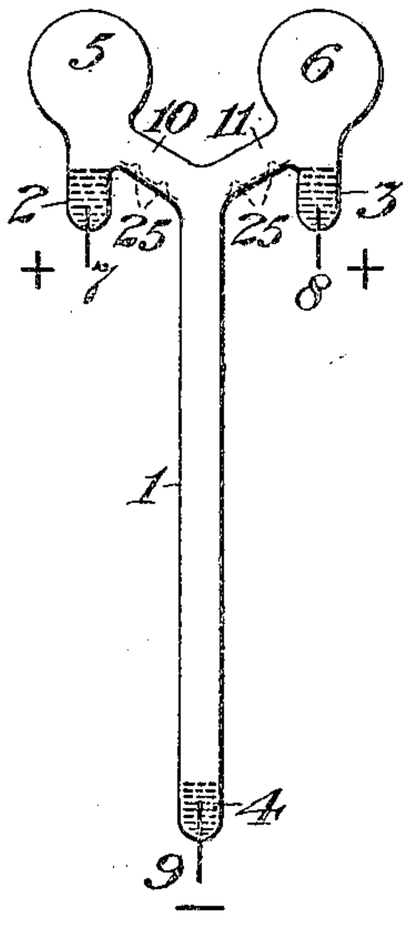


Fig. 2

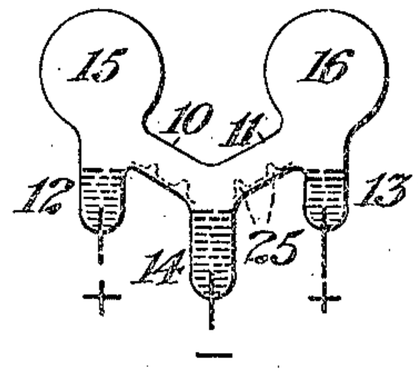


Fig. 3

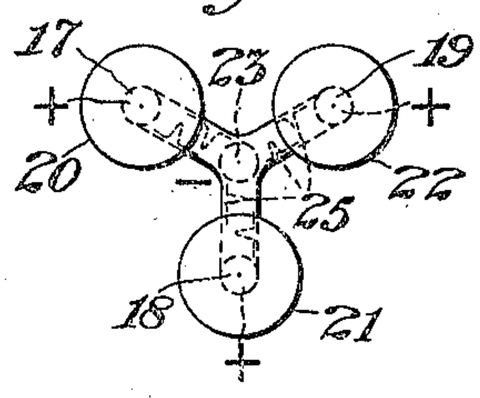
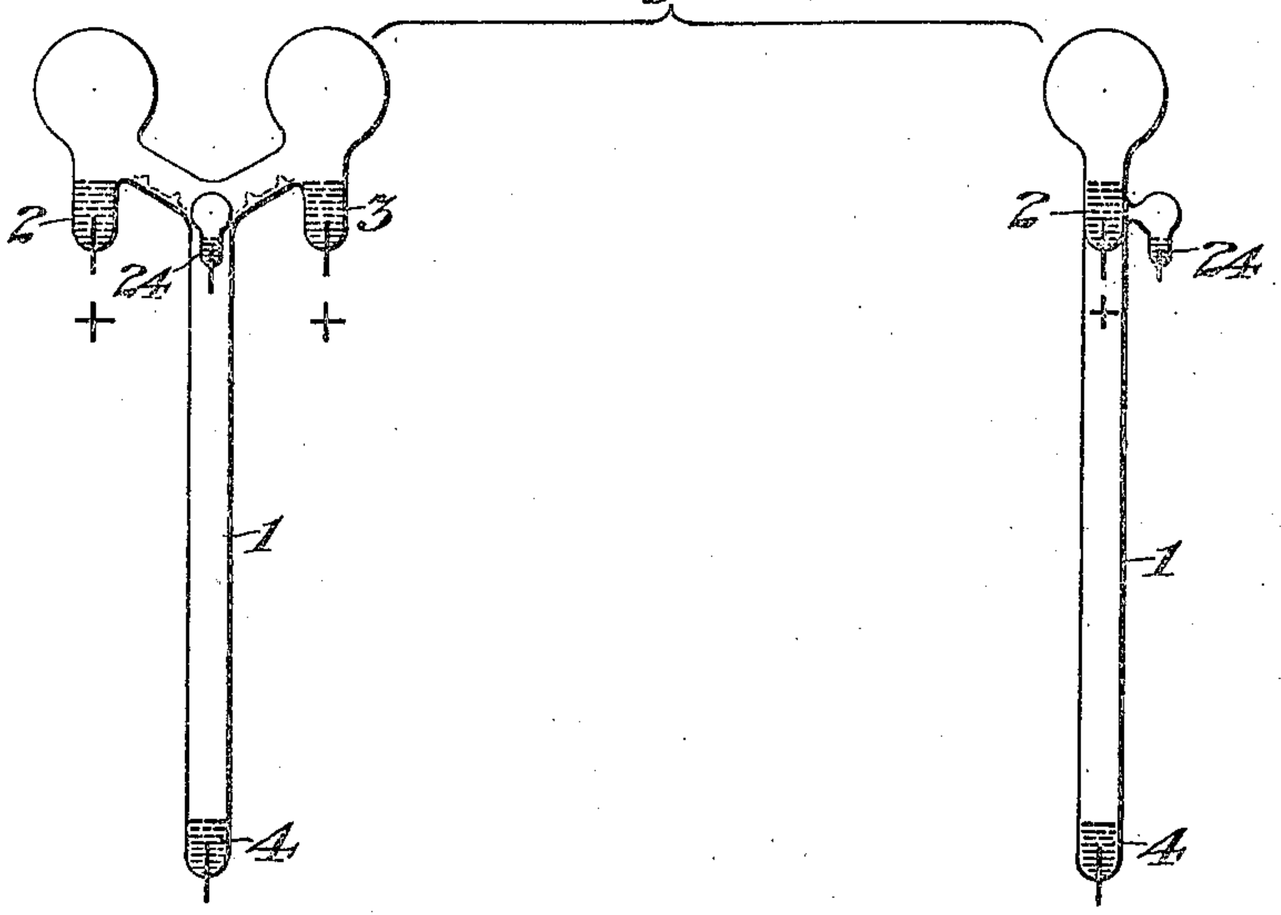


Fig. 4



Witnesses
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No. 770,109. Patented September 13, 1904.

UNITED STATES PATENT OFFICE.

MAX VON RECKLINGHAUSEN, OF NEW YORK, N. Y., ASSIGNOR TO COOPER HEWITT ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

VAPOR ELECTRIC APPARATUS.

SPECIFICATION forming part of Letters Patent No. 770,109, dated September 13, 1904.

Application filed October 17, 1903. Serial No. 177,398. (No model.)

To all whom it may concern:

Be it known that I, MAX VON RECKLINGHAUSEN, a subject of the Emperor of Germany, and a resident of New York, county of New York, State of New York, have invented certain new and useful Improvements in Vapor Electric Apparatus, of which the following is a specification.

The present invention is applicable to gas or vapor electric apparatus, of which the mercury-vapor lamp and the mercury-vapor converter are well-known types.

The particular form of apparatus for which the invention is especially designed is one in which two or more positive electrodes of mercury are employed.

The object of the invention is to provide means whereby the vapors of condensation shall be evenly distributed to the several electrodes, so as to secure a constant and uniform operation of the apparatus by very simple devices.

Broadly, the invention consists in constructing the apparatus in such a way that the major portion of the condensation flows directly back to the generating positive electrode, while the excess from the negative electrode is condensed in such a way as to flow back into all of the positive-electrode receptacles and finally overflow into the negative-electrode receptacle. These results are accomplished by providing each of the positive electrodes with a separate condensing-chamber having such relation to the electrode as to receive the vapor emanating from the said electrode and to return the condensed vapor to the said electrode. The negative electrode is located somewhat lower than the several positive electrodes, (in the case of a vapor-lamp it is located considerably lower,) so that when the positive-electrode receptacles are filled an overflow will take place from the positive electrodes to the negative, thereby restoring normal conditions. In general also the negative electrode will be so placed as to be at an intermediate point between the positive electrodes, whereby the excess of vapor which passes from the negative electrode will be practically evenly distributed to the several condensing-chambers. To prevent short circuits during the passage of mercury from a positive electrode to the negative electrode, the path between these electrodes may be provided with ridges so arranged as to cause the mercury to pass along a zigzag or similar course, and thereby be broken up into drops or balls of mercury instead of retaining a linear form.

My invention is illustrated in the accompanying drawings, in which—

Figure 1 is an elevation of a mercury-vapor lamp embodying my invention. Fig. 2 is a similar illustration of a mercury-vapor converter. Fig. 3 is a plan of a modified form of apparatus, and Fig. 4 shows both in front and side elevation a modified form of lamp.

In Fig. 1 of the drawings, 1 is a tube of glass or other transparent material constituting the main body of a mercury-vapor lamp. The lamp contains two positive electrodes (shown at 2 and 3) and a single negative electrode, (shown at 4,) all these electrodes being of mercury. Above the electrode 2 is a condensing-chamber 5, and above the electrode 3 is a similar condensing-chamber 6. Suitable leading-in wires 7, 8, and 9 pass through the inclosing walls of the apparatus into contact with the respective electrodes 2, 3, and 4. The main body of the lamp is connected by tubes 10 and 11 with the condensing-chambers 5 and 6, respectively, and also with the receptacles which contain the electrodes 2 and 3. It will be noted that the tubes 10 and 11 are so inclined that any overflow of mercury from the electrodes 2 and 3 will pass downward and will ultimately find a place at the bottom of the tube 1, where it will mingle with the mercury of the electrode 4.

The converter illustrated in Fig. 2 is provided with two positive electrodes 12 and 13 and a single negative electrode 14. The condensing-chambers 15 and 16 are arranged, as before, above the respective positive electrodes. Here, again, the overflow from either positive electrode will find its way downward into the negative-electrode receptacle.

It will be observed that in both the types of apparatus already described any vapors passing from the negative electrode in an upward

direction is likely to be distributed with practical evenness to both the condensing-chambers. When condensation takes place, the vapors which have been carried up from the negative electrode and from the several positive electrodes will fall first after condensation into the several positive electrodes, and any excess of condensation will flow over into the negative electrode. In this connection it is clear that the vapors arising from the positive electrode 2, for example, in Fig. 1 will pass into the condensing-chamber 5, while the vapors rising from the positive electrode 3 will enter the condensing-chamber 6. In other words, the vaporization from each positive electrode passes into a single condensing-chamber directly above the electrode without any tendency to pass over into the condensing-chamber above the other electrode or electrodes. Accordingly there is a practically even and uniform amount of condensation on each side of the apparatus which tends to prevent any distortion of the normal conditions of supply for the several electrodes. The only disturbing feature would be a lack of uniformity in the distribution of the vapor from the negative electrode; but this is provided against by the location of the said electrode with relation to the positive electrodes, as already described. Moreover, as each positive electrode is sure to receive back the condensation arising from its own vaporization even this disturbance would correct itself, the overflow simply passing back to the negative electrode.

Fig. 3 represents a converter having three positive electrodes (shown in dotted lines at 17, 18, and 19) and three condensing-chambers, (appearing in full lines at 20, 21, and 22.) The negative electrode appears in dotted lines at 23. The action is obvious.

In Fig. 4 the same construction is illustrated as that appearing in Fig. 1, with the addition of an auxiliary positive electrode, appearing at 24. This type of lamp is now well known, and the illustration is here given to show how my invention may be applied to lamps or converters having auxiliary electrodes. The auxiliary electrode 24 is here provided with a small condensing-chamber, the capacity thereof being proportioned to the amount of vaporization which is likely to take place at the said auxiliary electrode. Owing to the comparatively small currents which pass through such auxiliary electrodes in practice, the condensing-chamber connected therewith need not have a very great capacity. It is evident that more than one auxiliary electrode may be used, and in such case it is preferable to provide each such electrode with a separate condensing-chamber of suitable capacity.

By referring to the various figures of the drawings, and particularly to the plan view appearing in Fig. 3, it will be seen that I provide ridges or obstructions 25 25 in the bottom of the tubes corresponding to 10 and 11 in Fig. 1 and that these ridges are so arranged as to cause the mercury to flow in zigzag lines between either of the positive electrodes and the negative electrode. This precaution is less necessary in connection with a lamp structure than with a converter, inasmuch as the length of the tube 1 in the lamp is generally such that there would be little or no danger of a continuous flow of mercury throughout the whole length of the tube.

I claim as my invention—

1. In a gas or vapor electric apparatus having a volatilizable negative electrode and two or more volatilizable positive electrodes, a separate condensing-chamber for each positive electrode, in combination with inclined ducts leading from the several positive-electrode receptacles to the negative-electrode receptacle, and means for interrupting the continuity of the condensed fluid in passing from a positive electrode to the negative electrode.

2. In a gas or vapor electric apparatus having a volatilizable negative electrode and two or more volatilizable positive electrodes, a separate condensing-chamber for each positive electrode, in combination with inclined ducts leading from the several positive-electrode receptacles to the negative-electrode receptacle, and means for interrupting the continuity of the condensed fluid in passing from a positive electrode to the negative electrode, such means consisting of ridges or obstructions so arranged as to give the fluid a zigzag course.

3. In a gas or vapor electric apparatus having a volatilizable negative electrode and two or more volatilizable positive electrodes, an auxiliary positive electrode, and separate condensing-chambers for the several positive electrodes, such chambers having capacities proportionate to the vaporization at the several electrodes.

Signed at New York, in the county of New York and State of New York, this 8th day of October, A. D. 1903.

MAX VON RECKLINGHAUSEN.

Witnesses:
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