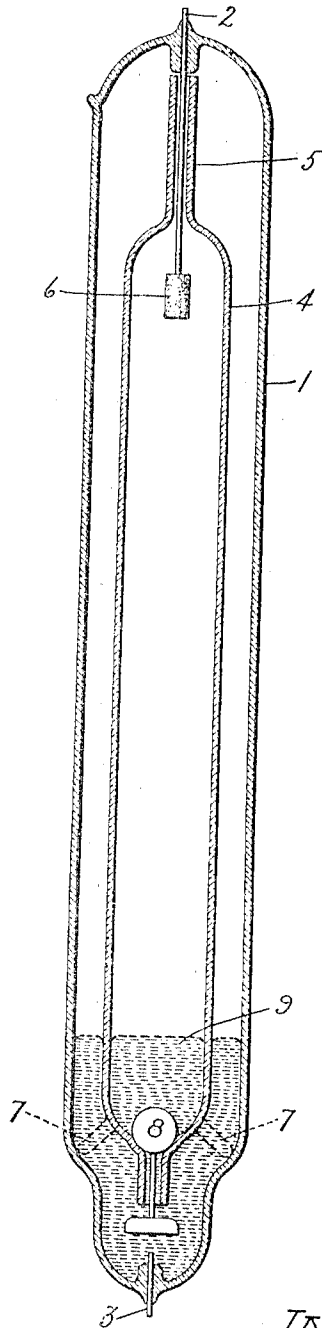


E. WEINTRAUB.
VAPOR ELECTRIC DEVICE.
APPLICATION FILED AUG. 12, 1911.

1,064,116.

Patented June 10, 1913.



WITNESSES:
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VAPOR ELECTRIC DEVICE.

1,064,116.

Specification of Letters Patent.

Patented June 10, 1913.

Application filed August 12, 1911. Serial No. 643,670.

To all whom it may concern:

Be it known that I, EZECHIEL WEINTRAUB, a citizen of the United States, residing at Lynn, county of Essex, State of Massachusetts, have invented certain new and useful Improvements in Vapor Electric Devices, of which the following is a specification.

My invention relates to vapor electric devices and most particularly to a form of lamp of high efficiency having a considerable voltage drop per unit length.

In my previous Patent Number 917,212, I have described a mercury vapor device in which the arc plays in a quartz tube which is surrounded by an outer glass tube. In the construction described in this patent, the quartz tube is open to the space surrounding it, and therefore the pressure in the quartz tube when the lamp is operating is the same as in the space outside of it. When a lamp of this character is operated under conditions which allow considerable pressure to accumulate within the quartz tube, a luminant can be secured which has a high efficiency and consumes a greater voltage than when the inner envelop is allowed to remain in free communication with the space surrounding it. In accordance with my present invention, I have secured this effect without the necessity of separately evacuating and sealing off the inner envelop. This result is accomplished by providing only a constricted passage from the inner envelop to the space surrounding it which sufficiently closes the inner tube during the operation of the lamp to permit pressure to accumulate therein. The other end of the inner tube is provided with a valve to permit vaporized mercury which may escape into the outer space to flow back into the inner tube.

The accompanying drawing is a sectional view of my improved form of lamp.

The outer tube 1 consists of glass, or other transparent material, in which are sealed leading-in wires 2 and 3 in the usual manner. Inside of this container 1 is situated an envelop or tube 4 consisting of fused quartz or silica, or, in fact, of any material more refractory than glass. The upper end of this envelop is drawn out into the form of a long narrow tube 5 through which the continuation of the leading-in wire or stem of the electrode 6 loosely passes, leaving enough space to permit the tube 4 to be

exhausted at the same time that the space surrounding it is exhausted. This construction also makes it unnecessary to seal a conductor into silica. The other end of this tube is provided with suitable supports 7 which hold it in a central position. This end of the envelop 4 is provided with a cylindrical valve 8 which prevents the mercury 9 inside of the tube from being forced into the space surrounding the tube by a pressure in the inner envelop when the lamp is operating and, at the same time, allows the mercury to return from the surrounding space into the inner tube when the level of the mercury outside the tube has become high enough to lift the valve.

The lamp is started by tilting in the usual manner, the starting of the arc within the inner tube being assured as the stem of electrode 6 is exposed only at a very narrow space between the glass surrounding the same and the tube 5. The spreading of the arc, after it has once started from the inside of the envelop 4 of the outside space, is prevented by a long opening of practically capillary dimensions which surrounds the stem of the electrode 6; also by the difficulty of creating a new cathode spot on the surface of the mercury outside the inner tube.

During the operation of the lamp, some of the mercury vaporized by the heating of the arc within the inner envelop finds its way into the outer space and thus raises the level of the mercury in this space. This evaporation is ordinarily not great enough to remove any substantial part of the mercury during an ordinary running period of the lamp. At the end of such period, after the lamp has cooled off and the pressure within the inner envelop has been reduced, the level of the two mercury surfaces is restored by the lifting of the valve 8 as already described.

I have thus provided a construction which permits a mercury arc to be run inside a quartz envelop under appreciable pressure without the necessity of providing seals.

What I claim as new and desire to secure by Letters Patent of the United States, is:

1. In a vapor electric device, an outer envelop and inner envelop communicating with each other through a contracted passage, electrodes in the inner envelop one of which is a vaporizable liquid, and means operable by pressure in the space outside the

inner envelop to permit the return of vaporizable material to the inner envelop.

2. In a vapor electric device, cooperating electrodes at least one of which is mercury, a double walled envelop, the space within the inner wall being in communication with the space outside said wall through a passage of capillary dimensions and a valve permitting the accumulation of pressure within said space but permitting a return of vaporized mercury to said space when the pressure is lowest.

3. In a vapor electric device, cooperating electrodes at least one of which consists of mercury, an outer inclosing envelop, an inner envelop containing said electrodes, the space within said inner envelop communicating with the space intervening between said envelops by a constricted passage, and a valve in said inner envelop for equalizing the mercury level within and without the inner envelop.

4. In a vapor electric device, cooperating electrodes at least one of which consists of mercury, an outer inclosing glass envelop, an inner quartz envelop containing said

electrodes, said quartz envelop being contracted into the form of a constricted tube at one end through which the stem of one of said electrodes passes, and a valve at the other end of said quartz tube to enable the level of mercury inside and outside the tube to equalize.

5. In a mercury vapor lamp, the combination of a transparent envelop, an envelop of fused silica therein communicating with the outer envelop through a tube of capillary dimensions, a mercury cathode and a cooperating solid anode for said silica envelop, a leading-in conductor for said anode passing loosely through the communicating tube, and means permitting the return of vaporized mercury to the quartz envelop when its pressure in the space external thereto is in excess of the pressure within.

In witness whereof, I have hereunto set my hand this tenth day of August, 1911.

EZECHIEL WEINTRAUB.

Witnesses:

JOHN A. McMANUS, Jr.,
ROBERT SHAND.