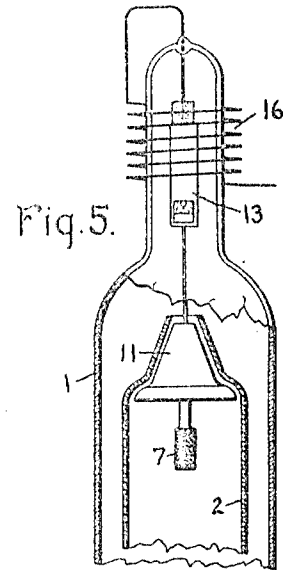
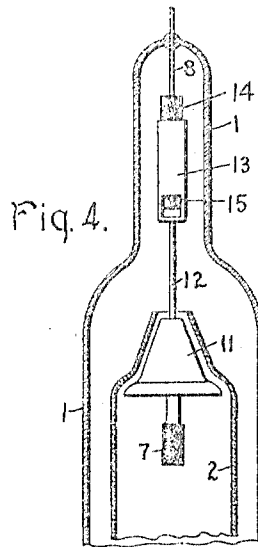
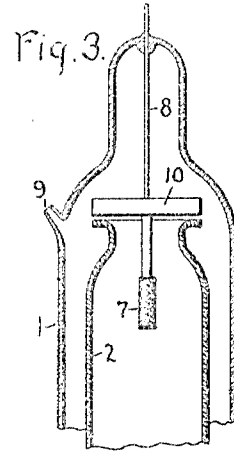
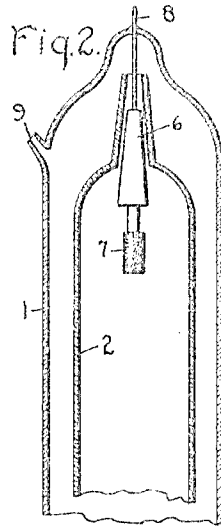
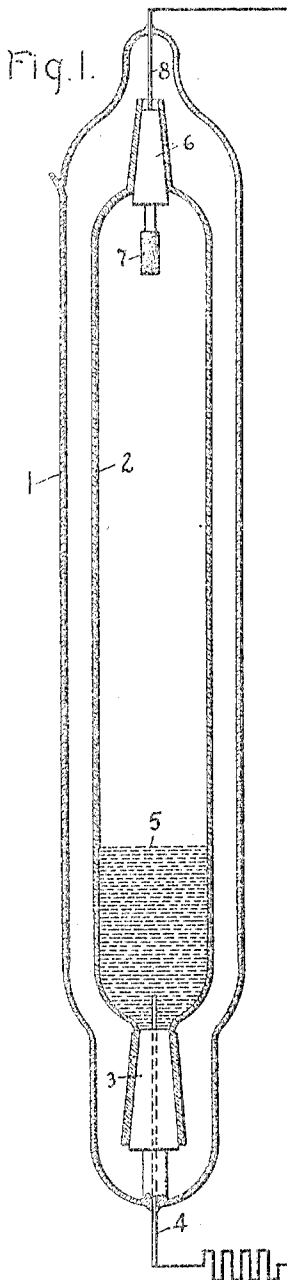


E. WEINTRAUB.
VAPOR ELECTRIC DEVICE.
APPLICATION FILED DEC. 13, 1910.

1,064,115.

Patented June 10, 1913.



Witnesses:

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UNITED STATES PATENT OFFICE.

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VAPOR ELECTRIC DEVICE.

1,064,115.

Specification of Letters Patent.

Patented June 10, 1913.

Application filed December 13, 1910. Serial No. 597,012.

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.

The present invention relates to the construction of vapor arc devices, such as mercury vapor lamps, rectifiers and the like, and comprises a device in which the arcing electrodes as well as the arc itself, are entirely inclosed in an exhausted space, which is not in communication with the arc space.

Letters Patent No. 917,212, issued to me April 6, 1909, describes a vapor electric device comprising an external glass envelop surrounding an inner tube of material, such as fused silica, which is more refractory than the outer envelop. In the device described in this patent, the space in the inner tube, and the space between it and the glass tube are connected. While this construction is entirely operative and satisfactory, I find that in some cases the inner tube can advantageously be entirely inclosed, or in other words, out of communication with the vacuum space between the two tubes. This construction permits the vapor arc to be run at a higher temperature and pressure, as the vaporized cathode material does not pass into the space surrounding the two tubes. Also by this construction the outer tube is heated only by radiation through the vacuum space, and thus is maintained at a lower temperature than when an open inner tube is employed. Another distinct advantage is gained through the heat insulation afforded by the vacuum space surrounding the mercury cathode thus permitting the attainment of higher temperatures and pressures within the inner tube. In accordance with my invention, the inner tube is sealed permanently, or it is automatically closed when the device is started.

In the accompanying drawings illustrating my invention, Figure 1 shows a mercury vapor lamp having an inner tube permanently closed or sealed; Fig. 2 is a fragmental view showing the upper part of the tube before the tube is evacuated; Fig. 3 is a fragmental view showing an alternative form of closure, or seal, at the anode end of the tube; Fig. 4 is a fragmental view showing another modification of closure for the anode end of the

tube, the tube in this case being closed automatically by the pressure of the mercury vapor within the same; and Fig. 5 illustrates a form of tube similar to that shown in Fig. 4, an electromagnet being used to assist in closing the tube.

Referring to Fig. 1, the outer receptacle 1 consists of glass and the inner envelop 2, supported therein, consists of some material more refractory than glass such as fused or sintered quartz, or silica. The sintered quartz as prepared in the resistance furnace is preferably heated in an arc or oxygen flame, thereby improving the transparency of the material. This form of quartz tube is not only considerably cheaper than the fused quartz tube, but the appearance of the light is better as the arc is not seen through the translucent envelop, and, therefore the effect of a solid incandescent source is obtained. The lower end of the inner tube 2 is closed by a plug 3 consisting either of glass, or nickel steel, or other suitable material. This plug as clearly shown makes a long tapered joint with the quartz envelop and is tightly fitted therein by grinding the surfaces which are in contact with each other. The leading-in wire 4 passes through the outer envelop 1 and enters the plug 3 and may if desired project into the body of mercury 5, which constitutes the cathode of the device. The anode end of the tube is closed by a tapered plug 6 consisting of nickel steel, or other metal, having substantially the same coefficient of expansion as quartz. At one end of this plug 6 is attached the anode 7 consisting of graphite, or other refractory conductive material, and at the other is attached a leading-in wire 8 passing through the outer envelop 1. As illustrated in Fig. 2, the plug 6 is held centered within the mouth of the tube 2 and not in contact with it before the lamp is completed. The initial clearance between the plug 6 and the tube 2 enables the inner tube to be evacuated simultaneously with the space between the tubes 1 and 2 when the lamp is attached to a suitable pump through the small tube 9. When the evacuation is complete the tube is sealed off in the usual manner, and the glass surrounding the lead wire 8 is softened, and the plug 6 is drawn upward, thereby snugly fitting it in position, as illustrated in Fig. 1.

In a modified form of anode closure

shown in Fig. 3, the heavy steel disk 10 is supported just above the ground flat lip of the inner tube 2 during the exhaustion of the lamp. When the lamp has been exhausted this disk 10 is lowered by softening the glass around the leading wire 8 as already described so as to make the disk rest upon the lip of the tube thereby sealing the inner tube.

10 In Fig. 4, a form of device is shown in which a conical closure 11 consisting of nickel steel, or other suitable material, is held suspended within the conical tip of the inner tube 2, by means of the lead wire 12 which is in turn attached to a metallic tube 15 which slides over a cylinder 14 and makes electric contact therewith. The cylinder 14 is attached to the lead wire 8 sealed into the outer glass tube 1. A stop 15 limits the movement of the sliding contact device. In this form of device, the inner tube 2 is sealed off from the space surrounding the same by the development of vapor pressure within the inner tube when the device is started. This pressure acts upon the lower surface of the cone 11 and lifts it upward, thereby closing the mouth of the tube. This operation may be assisted, as shown in Fig. 5, by a solenoid 16 external to the outer tube and connected in series with the device. In this case the outer cylinder 13 is made of magnetic material and when the lamp is started it is lifted upward by the magnetic action of the solenoid 16. The conical plug 11 is maintained in position by the pull of the solenoid as well as the vapor pressure within the inner tube.

All of these forms of lamps are started by simply tilting the same when appropriate circuit connections have been made, or by a high voltage line or in any other suitable way. Devices for starting mercury vapor lamps, either automatically or by hand, are well known in the art and need not be described in this connection.

I do not claim herein broadly the combination of a solid anode with a mercury vapor device of the high pressure type, this being claimed in another application; Serial No. 753,946, filed March 13, 1913, as a continuation hereof.

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

1. In a vapor electric device, the combination of an evacuated container, an envelop consisting of material more refractory than glass located within said container, rigid

sealing means for closing the inner container to permit the accumulation of pressure therein during the operation of said vapor device, electrodes in said inner envelop one of which consists of easily vaporizable material, and current-carrying conductors connected to said electrodes.

2. In a vapor electric device, the combination of an evacuated glass envelop, an evacuated envelop supported therein consisting of material more refractory than glass, electrodes in said envelop at least one of which consists of easily vaporizable metal, leading-in conductors therefor, and a solid plug operable by pressure in said inner envelop to render the envelop vapor-tight during the operation of the device.

3. In a vapor electric device, the combination of an outer receptacle, an inner envelop supported therein, electrodes, at least one of which consists of vaporizable material, in said inner envelop, current connections, and means operated by vapor pressure within said inner envelop for closing the same.

4. In a vapor electric device, the combination of an outer receptacle, an inner envelop supported therein, electrodes, at least one of which consists of vaporizable material, in said inner envelop, and a conical closure for one end of said inner envelop adapted to be lifted by vapor pressure in said inner envelop into engagement with the mouth of said envelop, thereby sealing the same.

5. In a vapor electric device, the combination of an outer exhausted receptacle, an inner exhausted silica envelop supported therein, electrodes within said silica envelop one of which consists of mercury, current connections for said electrode, an automatic means operable upon the starting of said lamp for sealing the silica envelop from the evacuated space surrounding the same.

6. In a vapor electric lamp, the combination of an evacuated glass envelop, an evacuated silica envelop supported therein, a mercury electrode and a cooperating solid electrode in said silica envelop, and mechanically fitted seals of nickel steel for rendering said inner envelop vapor-tight and acting also as leading-in conductors.

In witness whereof, I have hereunto set my hand this tenth day of December, 1910.

EZECHIEL WEINTRAUB.

Witnesses:

JOHN A. McMANUS, Jr.
CHARLES A. BARNARD.