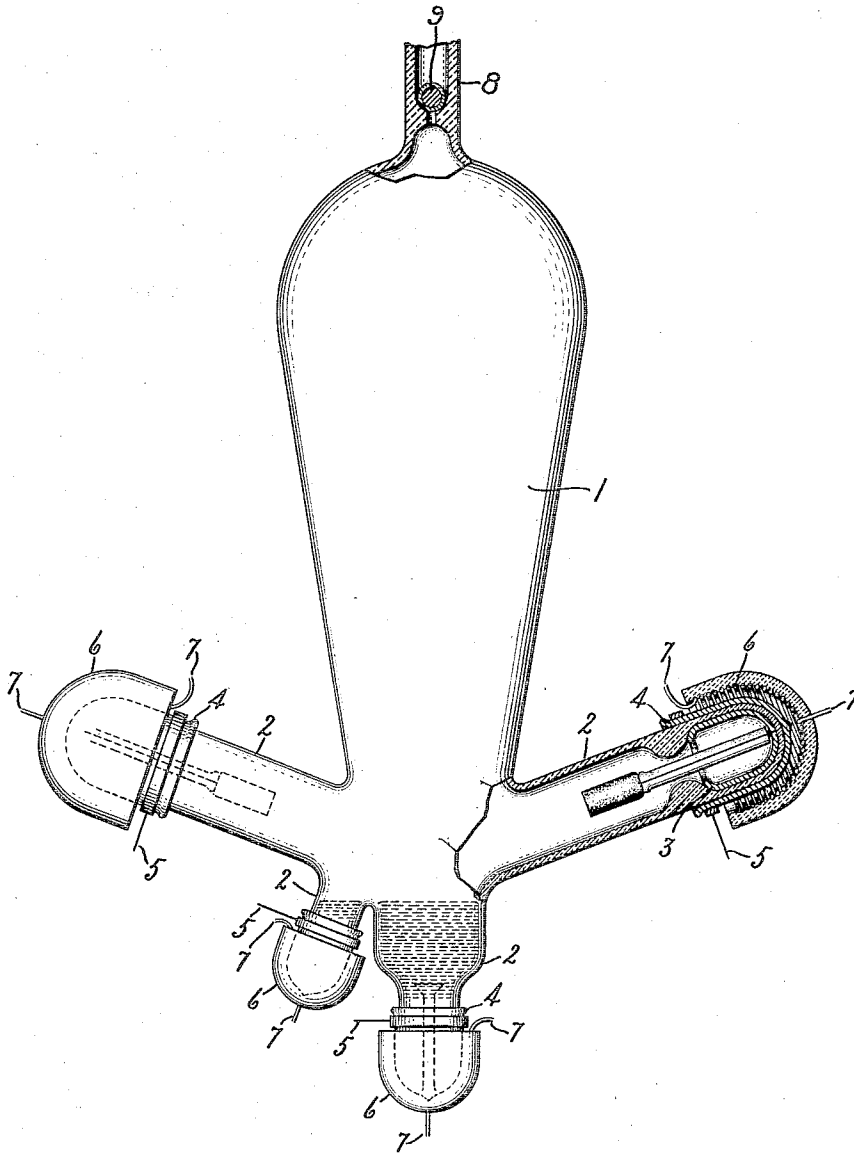


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VAPOR ELECTRIC APPARATUS.  
APPLICATION FILED JAN. 14, 1908.

953,598.

Patented Mar. 29, 1910.



Witnesses:

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Att'y.

# UNITED STATES PATENT OFFICE.

JOHN T. H. DEMPSTER, OF SCHENECTADY, NEW YORK, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

## VAPOR ELECTRIC APPARATUS.

953,598.

Specification of Letters Patent.

Patented Mar. 29, 1910.

Application filed January 14, 1908. Serial No. 410,768.

*To all whom it may concern:*

Be it known that I, JOHN T. H. DEMPSTER, a citizen of the United States, residing at Schenectady, county of Schenectady, State of New York, have invented certain new and useful Improvements in Vapor Electric Apparatus, of which the following is a specification.

The object of my invention is to avoid the difficulties caused by conductors extending through and sealed into the walls of vessels of porcelain, glass and similar materials; to eliminate the strains and leakage caused by the conductors, and to provide a simple and reliable means for hermetically sealing refractory vessels after they have been exhausted.

In carrying out my invention, the strains upon the walls of the vessel, due to the presence of metallic conductors, are eliminated by passing the current directly through the wall of the vessel, while if the vessel is made of refractory material it is sealed by fusing into the exhaust opening a plug or stopper composed of some material which makes a hermetical joint with the walls of the opening.

My invention will best be understood in connection with the accompanying drawing, which is merely an illustration of one of the many forms in which the invention may be embodied, and which shows a vessel or receptacle 1 made in the form of a mercury arc lamp or rectifier.

The vessel is provided on the sides with tubular projections 2, and on the bottom with similar projections containing the mercury. In accordance with my invention, the walls of the vessel are not weakened by being pierced for the conductors, but the current is conducted directly through the walls by making the walls at the desired points of some material which is a conductor of the second class and is non-conducting at ordinary temperatures but becomes more and more conductive as it is heated. The walls need be made of a conductor of the second class only at the points at which current is passed through them, although ordinarily the entire vessel will be made of the same material. The current may be passed through the selected portions of the walls, which in the device shown in the drawing would be the tips of the tubular projections, by making those portions of the walls of

porcelain or other conductor of the second class and by providing some suitable means for passing the current through them. Porcelain of the composition commonly used in electrical work for insulators is suitable for this purpose as is also the porcelain commonly used for crucibles and test tubes. The preferred means for passing the current through the wall comprises some suitable means for heating the wall at the desired point until it becomes sufficiently conductive to permit the desired amount of current to flow into the vessel and also for insuring that the current will flow through the heated portion. This result may be secured by any suitable means, such as co-operating conductors on opposite sides of the heated portion, as shown in the drawing, in which the internal conductor 3 is placed in the end of each tubular projection 2 in contact with the walls at the desired point, and a corresponding and co-operating external electrode 4 mounted on and surrounding the end of the tubular projection is connected to leads 5 by means of which current is supplied to the device. The electrodes may be made of any suitable material, such as iron. That portion of the tubular projection between these conductors is made of a conductor of the second class and is rendered conductive by heating it to the proper temperature by any suitable device, such as the electric heater 6 shown in the drawing, consisting of a shell of non-conducting material lined with a heating coil of platinum or similar material supplied with current through the conductors 7.

The form of vessel is, of course, immaterial, although that shown in the drawings is advantageous when the entire vessel is made of a conductor of the second class, since the tubular projections 2, which carry the co-operating electrodes, are easily heated at the point at which it is desired to pass the current into the vessel to such a temperature that the wall of the projection between the electrodes becomes conductive without causing the remainder of the vessel to become so hot that it loses its insulating properties.

In the operation of the device a small spot between the electrodes becomes red hot and then the current flowing through the wall at that spot keeps it hot enough to conduct the current. Where the electrodes

are made in the form shown in the drawing and are secured to the ends of the tubular projections 2, they strengthen the walls of the tube and confine the heat to a small spot at a considerable distance from the body of the rectifier.

If the entire vessel is made of a refractory conductor of the second class, such as porcelain, difficulty may be encountered in making the seal after the vessel is exhausted. In accordance with my invention, the vessel is provided with an exhaust outlet 8 by means of which it is connected to the exhaustion pump, and in this outlet is placed a sealing plug 9 made of any suitable material which will fuse at a lower temperature than the walls of the exhaust opening 8, and which when fused will make a hermetical joint with the walls of the exhaust opening. The plug or seal may be a metal ball, or if the vessel is made of porcelain, the seal is preferably made of glazed porcelain, with a covering of glaze so thick that when the outlet 8 is heated the glaze on the seal 9 unites with the walls of the outlet opening and forms a hermetical joint.

My invention may be embodied in many other forms than that shown and described and I, therefore, do not wish to be restricted to the exact form shown, but intend to cover by the appended claims all changes and modifications within the spirit and scope of my invention.

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

1. The combination with a vessel having a wall composed of a conductor of the second class, of cooperating electrodes in engagement with opposite sides of said wall for conducting current into the vessel through said wall when said wall is heated.

2. The combination with a vessel having a wall composed of a conductor of the sec-

ond class, of cooperating electrodes on opposite sides of said wall, and means for raising the temperature of said wall to render it conducting.

3. The combination with an evacuated vessel having a wall composed of a conductor of the second class, of cooperating interior and exterior electrodes in engagement with said wall, and means for heating the wall between said electrodes to render it conductive.

4. In a vapor electric device, the combination with an evacuated vessel having a wall composed of a conductor of the second class, of an interior electrode in engagement with the inner side of said wall and an exterior cooperating electrode in engagement with the outer side of said wall and in alignment with said interior electrode whereby current to operate the device is conducted into the vessel through said wall when said wall is heated.

5. In a vapor electric device, the combination with an evacuated vessel having a porcelain wall, of cooperating electrodes in engagement with opposite sides of said wall, and a heater for rendering the porcelain between the electrodes conductive.

6. In a vapor electric device, the combination with an evacuated vessel having tubular projections with the end walls thereof composed of a conductor of the second class, of interior electrodes in the ends of said projections, exterior electrodes encircling the ends of said projections, and heaters encircling the ends of said projections to render the end walls conductive.

In witness whereof, I have hereunto set my hand this 13th day of January, 1908.

JOHN T. H. DEMPSTER.

Witnesses:

BENJAMIN B. HULL,  
HELEN ORFORD.