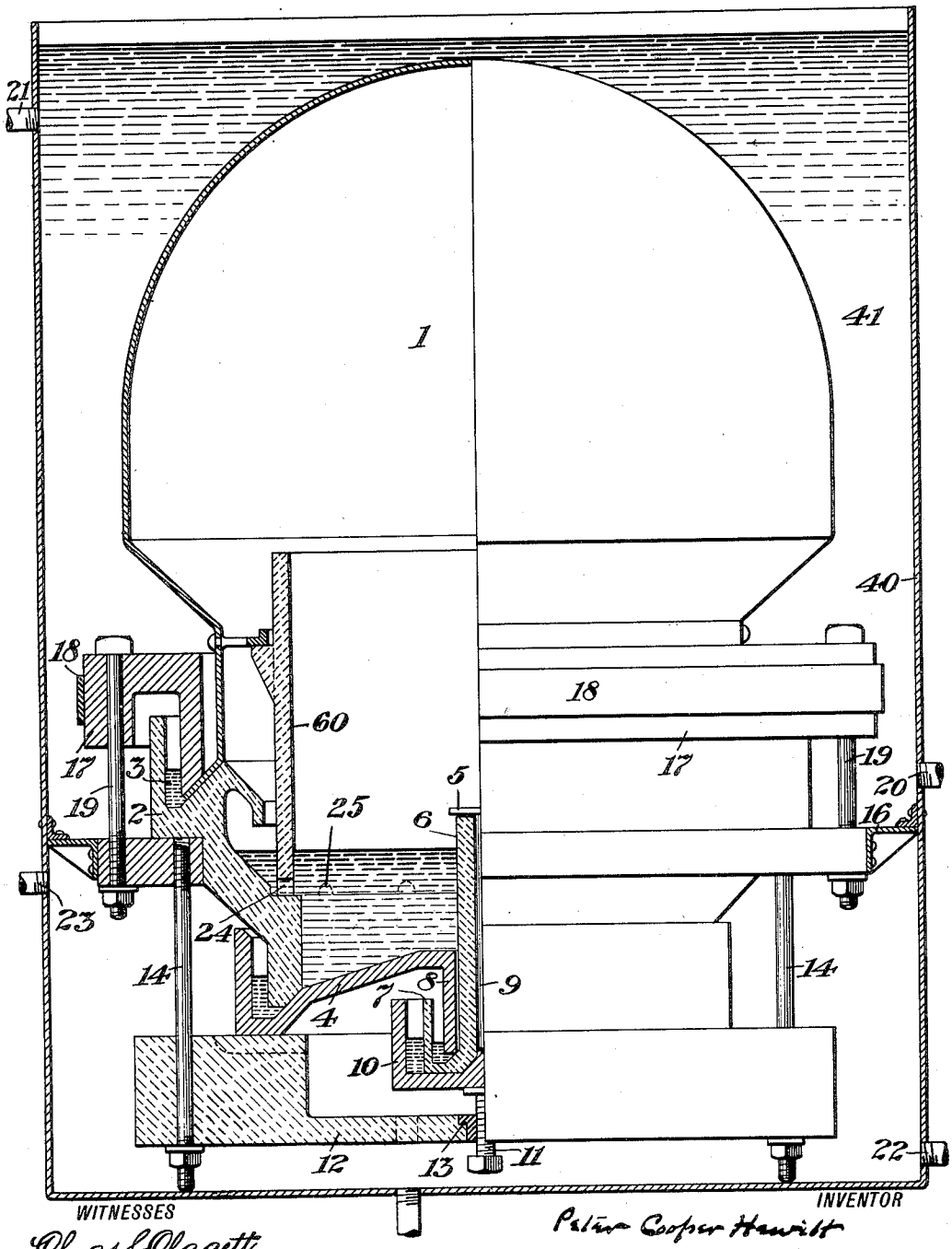
P. C. HEWITT.

VAPOR ELECTRIC APPARATUS.

APPLICATION FILED APR. 3, 1912.

1,110,561. Patented Sept. 15, 1914.



WITNESSES

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VAPOR ELECTRIC APPARATUS.

1,110,561. Specification of Letters Patent. Patented Sept. 15, 1914.

Original application filed January 3, 1911, Serial No. 600,443. Divided and this application filed April 3, 1912. Serial No. 688,173.

To all whom it may concern:

Be it known that I, PETER COOPER HEWITT, a citizen of the United States and resident of Ringwood Manor, county of Passaic, State of New Jersey, have invented certain new and useful Improvements in Vapor Electric Apparatus, of which the following is a specification.

The present application is a division of my application Serial Number 600,443, filed January 3rd, 1911.

The invention relates to improvements in vapor electric apparatus having regard more particularly to means for controlling the gaseous conductor in such apparatus; to permitting the passage of heavy currents through the apparatus; to means for dissipating the internal heat generated in operation; and to means for maintaining the chamber tight and in operative condition. As a means for carrying out the invention, attention has been directed to the character of the walls of the containing vessel; the proper assembling of the parts; the special construction of the electrodes; means for maintaining the negative electrode in a condition of low resistance and for dissipating the heat generated at said electrode; and, in general, suitable circuits for the system. Moreover the conveying of the leading-in conductor through the walls of the containing vessel and the connecting of said conductors to the electrodes electrically; maintaining the positive electrode within proper temperature limits; preventing short circuiting; properly controlling the cycle of evaporation; securing and maintaining control of the condensation and return of the fluid of the electrode; maintaining the vacuum, and other matters are the subject of attention in the apparatus herein described.

The application refers more specifically to a rectifier for one wave or one impulse of the heavy current circuit, similar rectifiers being used for other supply impulses. Accordingly, the device here shown as a rectifier may be regarded as an electric valve controlling one wave of a supply system. This is not intended to exclude the duplication or multiplication of the anodes in a given vessel, whereby more than one wave may be made subject to control.

The invention with which the present divisional application is concerned is illustrated in a single figure of drawing showing a form of rectifier with special cooling arrangements. The left hand part of the drawing is shown as a section through the rectifier and the right hand portion as an elevation.

In the drawing 1 is a dome shaped gas tight inverted metal bowl resting upon a porcelain section, 2, and made tight thereto by means of a mercury seal, 3. The container is closed by the base cap, 4, through which passes an auxiliary anode, 5, which is supported upon an insulating tube, 6, which terminates in a cup shaped portion, 7, providing for a mercury seal with a hollow boss, 8, forming part of the base cap or plate, 4. The lead, 9, of the auxiliary anode, 5, is connected at the bottom with a cup shaped portion, 10, which serves to provide a mercury seal with the insulating cup, 7. The external circuit is then connected to the part 10 in any desired manner. The parts last described are held in close contact, say by one or more bolts, 11, passing through the bottom plate, 12, through an internally screw-threaded bushing, 13. The plate, 12, is connected by bolts, 14, 14, with a ring, 15, which, through the medium of a flange, 16, is inter-connected with the tank, 40, thus dividing the space inside the tank and outside the container into two parts with a horizontal plane of division between them. An insulating tube, 60, surrounds, for the most part, the mercury cathode, as clearly shown in the drawing.

A ring, 17, made in sections held together by a strap, 18, is pressed down upon a flange at the bottom of the dome shaped bowl, 1, by means of bolts, 19, 19. When the bolts, 14, 14, and 19, 19, are tightened the parts 1, 2 and 4 are held firmly together with joints made as close and tight as possible. Into each of the two separate spaces in the tank, one above and one below the flange, 16, is introduced a cooling medium such as oil, or water, or glycerin, or a forced draft of air. In some instances natural air currents may be relied upon. The cooling means in the upper space, 41, serves to cool the metal portion, 1, of the container, which metal portion acts as an anode. The cool-

ing fluid may be fed in at the entering pipe, 20, and may pass out or be removed through the exit, 21, after absorbing heat from the anode or metal portion of the container. If desired, the structure may be given sufficient heat radiating capacity and the fluid merely circulated within the same, transferring heat from the rectifier to the tank. In like manner, the cooling fluid may enter the lower space at 22 and leave by the exit, 23, or the renewal of fluid may be omitted and the tank dissipate the heat externally.

It will usually be found desirable to maintain the fluid in the upper space at a higher temperature than the fluid in the lower space, so that whatever condensation occurs will take place largely in the lower section and be kept from the metal on the anode. This result is accomplished through the operation of the well known law by which condensable vapor in a given space condenses entirely on the coolest exposed surface, even though a large quantity of heat be extracted from the vapor by other surfaces. Obviously, the vapor which is condensing in contact with the coolest exposed surface will be saturated at that temperature, and, consequently, the vapor will not be saturated at the higher temperature of the other surfaces within the container and can not there condense. There are many modifications of the means which I have shown for accomplishing this purpose which will readily occur to persons skilled in the art and which come within the present invention. To further serve the purposes of cooling, pipes or tubes 24 located within the body of the mercury of the cathode 25, which pipes may be traversed by cooling fluid as may be desired.

I claim as my invention:

1. The combination in a mercury vapor rectifier, of an anode near the top thereof, a mercury cathode near the bottom thereof, means operated at a selected temperature for cooling the upper portion of the container and independent means operated at a slightly lower temperature for cooling the bottom portion of the container, whereby condensation of vapor within the container occurs at the lower part thereof.

2. A container for a mercury vapor rectifier, comprising an upper condensing portion, a lower cathode portion, an intermediate insulating portion provided with a reentrant coil, and a mercury cathode at the lower portion of the container, whereby condensed mercury is prevented from flowing along the wall of said insulating portion.

3. A mercury vapor rectifier comprising a container, the upper portion of said container being of metal operating as a main anode, the lower portion of said container being also of metal, a mercury cathode resting thereon and an intermediate material in combination with a single centrally located auxiliary anode mounted on an insulating tube passing through said metal base portion, whereby electrical connection to said auxiliary anode can be made from an external circuit.

4. A cooling means for a vapor rectifier, comprising a tank, an upper chamber therein and means for cooling said upper chamber, a lower chamber and separate means for cooling said lower chamber, in combination with a diaphragm between the chambers serving to prevent the interfering of the upper and the lower cooling means.

5. A case for a mercury vapor rectifier, having three parts consisting of two conducting portions and an insulating band therebetween, in combination with an insulating auxiliary electrode lead passing through one of said conducting portions.

6. A container for a vapor electric rectifier, having three parts, consisting of two conducting portions, and an insulating band therebetween, in combination with leads connecting with said conducting portions, whereby said portions operate as electrodes.

7. A container for a vapor electric rectifier, having three parts, consisting of two conducting portions, and an insulating band therebetween, in combination with leads connecting with said conducting portions, whereby said portions operate as electrodes and liquid means for cooling said conducting portions.

8. A mercury vapor rectifier having a container, the major portion of which is of metal, a positive electrode therein and a negative electrode and a centrally located intermediate strip between the said electrodes, a hermetical seal uniting the several parts of the container, and independent means for cooling the respective electrodes.

9. A mercury vapor rectifier having a container, the major portion of which is of metal, a positive electrode and a negative electrode therein and a centrally located intermediate strip between said electrodes, the said parts constituting the container and being hermetically sealed with relation to each other, and means for maintaining said electrodes at different temperatures.

10. In a vapor rectifier, a suitable container including a hollow shell of metal or other good conducting material, a belt or ring of insulating material supporting the said shell and a base piece insulated from the said shell by the said belt or ring and a separate insulating sleeve or ring extending into a hollow portion of the first named belt or ring.

11. In a vapor rectifier, a suitable container including a hollow shell of metal or other good conducting material, a belt or ring of insulating material supporting the said shell and a base piece insulated from the said shell by the said belt or ring and a

separate insulating sleeve or ring extending into a hollow portion of the first named belt or ring, all in combination with a cathode of mercury or other suitable material forming contact with the base piece.

12. In the container of a mercury vapor apparatus adapted to the rectification of large currents, an insulating section comprising a single porcelain piece cylindrical in form, including an upper ground surface adapted for use in a mercury seal, a lower ground surface also adapted for use in a mercury seal, a ring flange surrounding and rising above said upper ground surface, thus forming an annular trough for sealing mercury, a downward projecting flange integral with said porcelain piece and located intermediate of said ground surfaces together with one or more hollow posts formed integral with and of the material of said section and communicating with the outside thereof.

Signed at New York in the county of New York and State of New York this 27th day of March A. D. 1912.

PETER COOPER HEWITT.

Witnesses:

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