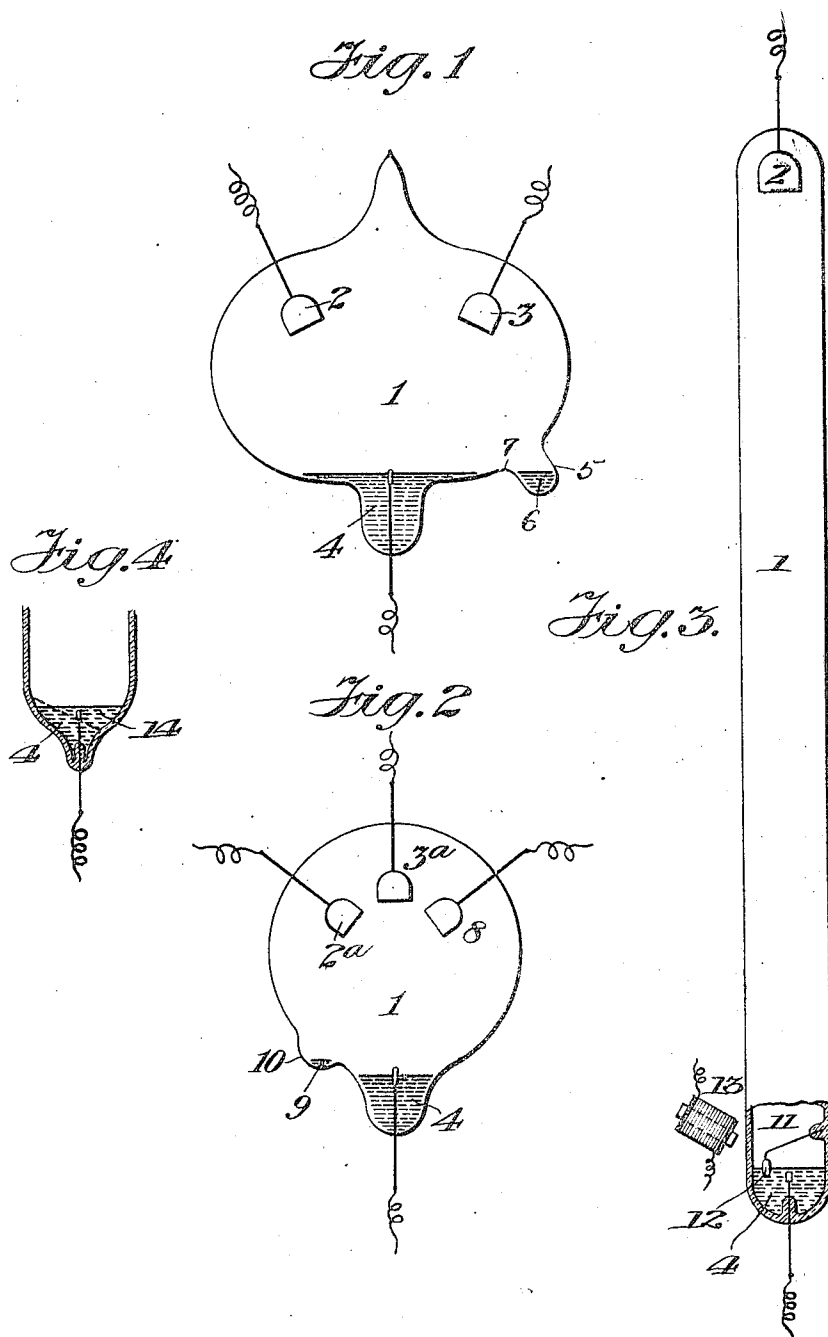


P. H. THOMAS.
 STARTER FOR VAPOR APPARATUS.
 APPLICATION FILED MAY 25, 1904.

1,031,890.

Patented July 9, 1912.



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UNITED STATES PATENT OFFICE.

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STARTER FOR VAPOR APPARATUS.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, PERCY H. THOMAS, a citizen of the United States, and resident of East Orange, county of Essex, State of New Jersey, have invented certain new and useful Improvements in Starters for Vapor Apparatus, of which the following is a specification.

I am aware that it has been proposed to start mercury vapor apparatus by using a supplemental positive electrode which shall be brought into contact with the main negative electrode and afterward this contact shall be broken, whereby the resistance normally existing at the negative electrode is initially broken down and current afterward flows between the main negative electrode and the main positive electrode. Under these circumstances the supplemental positive electrode is normally connected with the circuit and the current flows between the said supplemental electrode and the main negative electrode when contact is made as described. It is on the rupture of the circuit carrying this current that a flow through a portion of the vapor is inaugurated and the flow is afterward transferred to the main body of the vapor.

I have discovered that the initial negative electrode resistance may be broken down by means of a material which may either normally be in contact with the main negative electrode or may be brought into contact therewith, this material not being included in the circuit and not being vitalized by the current flowing through the apparatus or any part thereof. When the negative electrode makes contact with the material thus described, or is separated therefrom, while the operating current is applied to the main electrodes, a flow of current may be established between the said main electrodes through the vapor. So far as I can at present explain this phenomenon, it results from the breaking up of the surface tension at the negative electrode by reason of the clinging or adhering of the mercury to the described material, thus permitting the entrance of the electric current into the negative electrode without encountering the resistance which normally belongs to the said electrode. In general, the material selected

for the purpose described should be a material that is wetted by mercury.

In order to cause contact between the mercury and the described material, I may simply jar or agitate the apparatus slightly by hand, and by the same means I may separate the mercury from the material. Or, I may use electro-magnetic means for making or breaking the contact for the purpose described.

The material selected may be mercury and I have found that such material on being brought into contact with or separated from the mercury of the main electrode will cause a sufficient breaking up of the surface tension of the said electrode to start a flow of current. Another material which may be utilized for the purpose is an amalgam of any suitable metal which may be placed in such relation to the negative electrode as to be readily moved into contact and out of contact therewith.

Broadly considered, the invention consists in starting a mercury vapor apparatus by providing means whereby the normal surface tension of the mercury can be momentarily broken down so as to remove a few molecules from the attractive action of the molecules in the immediate neighborhood thereof, and thus break down the normal resistance of the electrode at a particular point or points.

Otherwise expressed, the invention consists in physically overcoming the cohesion of certain of the particles of one of the electrodes while an electric strain is upon the electrodes, the said overcoming of the cohesion being due to means other than electrical. In describing the main negative electrode as of mercury, I simply cite an example, and do not wish to exclude any other suitable conducting fluid.

Certain embodiments of my invention are illustrated in the accompanying drawings, in which—

Figures 1, 2, 3 and 4 represent different constructions to which my invention may be applied.

Referring to the first figure of the drawing, 1 is a container, generally of glass, 2 and 3 are positive electrodes therein, and 4 is a common negative electrode which may

be of mercury. The electrode 4 is the main negative electrode of the apparatus. At a point outside of the container I may form a pocket, 5, containing mercury, 6, the electrode 4 and the body of mercury in the pocket 5 being separated by a wall, 7, of the same material as the container. I find that by jarring the container so as to bring some of the mercury from the pocket 5 into contact with the mercury of the electrode 4, a condition is created at the surface of the said electrode which enables current to pass from one or the other of the positive electrodes 2 and 3 through the apparatus into the negative electrode. The theory which I hold at present in respect to the action thus described is that at a point or points near where contact takes place between the mercury running over from the pocket 5 and the mercury of the electrode 4, the surface tension of the mercury constituting the said electrode is momentarily broken down, whereupon current may pass through the apparatus as described. It will be understood that when the agitation of the container takes place, the circuit outside the vapor apparatus is closed so that current is ready to flow as soon as the normal negative electrode resistance is broken down. By the means described such a breaking down takes place and current will flow even though, as shown, the mercury 6 in the pocket 5 is normally entirely disconnected from the circuit.

In Fig. 2 I show three positive electrodes, 2^a, 3^a and 8, and a common negative electrode, 4. The extra material, which in this instance may be mercury, is shown at 9 in the small pocket, 10, formed at one side of the container. The action is the same as that already described.

Referring to Fig. 3 I here show a container, 1, having a single positive electrode, 2, and a negative electrode 4. I arranged inside the container 1 a spring, 11, which may be of iron having a tip, 12, of some material which is wetted by mercury or whatever conducting liquid constitutes the negative electrode. This part 12 may be an amalgam of mercury and some suitable metal, such as copper. The tip 12 may be normally in contact with the mercury of the negative electrode, or it may be just out of contact therewith, and in either case it may be moved away from or into contact with the mercury as the case may be by means of a magnet, 13, connected in series with the apparatus or in a high resistance shunt around the same. If preferred for any reason, the magnet 13 may be placed in an independent circuit and its action may be controlled by a suitable switch which can be made to close and open the circuit of the magnet at the will of the operator. By making or breaking contact between the tip 12 and the material of the negative electrode

4, such a disturbance of the surface tension at the negative electrode takes place as permits a flow of current through the apparatus, it being understood that the current is turned on at the time when the making or breaking of contact takes place.

In Fig. 4 I show a point, 14, which may be of platinum, or of other material, which is capable of being wetted by the liquid constituting the negative electrode 4, the said point being normally located just below the surface of the liquid electrode. When the apparatus is tilted by hand or by other means, the point may be made to project slightly above the surface of the liquid, whereupon a breaking down of the surface tension will take place which permits the passage of current as already described.

I have indicated in dotted lines the position to which the liquid may flow under the influence of a tilting of the container.

The theory of action given herein is that which at present I believe to be correct. At the same time, I do not wish to depend upon the correctness of the said theory, believing that in any case, whether the said theory is correct or not, the disclosure herein made is sufficient to enable one skilled in the art to make and use the invention described herein. In other words, I believe that with the present disclosure as a basis, any person skilled in the art can start and operate a vapor electric apparatus whether used for lighting or other purposes, depending upon the structural features disclosed, and without regard to the theory of operation which is herein set forth. Accordingly, while the claims herein made specify in language a certain theory of action, yet it is not desired that the claims should be invalidated by reason of any insufficiency or incorrectness in respect to the theory devised.

I claim as my invention:—

1. In a vapor electric apparatus having a positive electrode and a negative electrode, and containing a material in proximity to the negative electrode, the said material being independent of the circuit of the apparatus but capable of being wetted by the liquid of the negative electrode, means for changing the contact relations of the said material and the liquid, whereby the surface tension of the liquid is momentarily broken down.

2. In a mercury vapor apparatus, a positive electrode, a negative electrode of mercury, a material near the negative electrode capable of being wetted thereby but independent of the circuit of the apparatus, such material being normally in contact with the negative electrode, and means for separating the said material and the negative electrode whereby the surface tension of the latter is momentarily broken down.

3. In a mercury vapor apparatus compris-

ing a hermetically sealed and completed exhausted container, a plurality of anodes therein and a vaporizable cathode, starting means comprising an insulated pocket for
5 mercury in cooperative relation with said cathode.

Signed at New York, in the county of

New York, and State of New York, this 21st day of May, A. D. 1904.

PERCY H. THOMAS.

Witnesses:

WM. H. CAPEL,

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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,
Washington, D. C."