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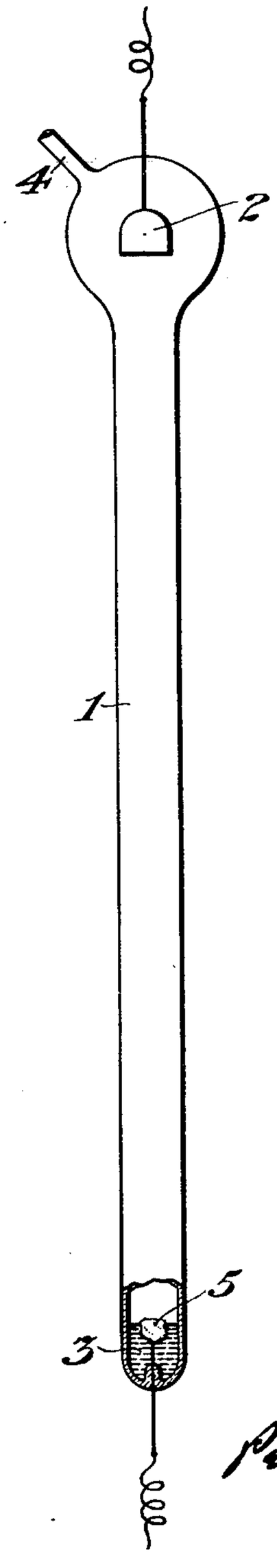
P. C. HEWITT.

METHOD OF CREATING A VACUUM.

APPLICATION FILED JULY 1, 1904.



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METHOD OF CREATING A VACUUM.

No. 862,333. Specification of Letters Patent. Patented Aug. 6, 1907.

Application filed July 1, 1904. Serial No. 214,902.

To all whom it may concern:

Be it known that I, PETER COOPER HEWITT, a citizen of the United States, and a resident of New York, county of New York, State of New York, have invented certain new and useful Improvements in Methods of Creating a Vacuum, of which the following is a specification.

It is known that under normal conditions aluminium or magnesium and mercury do not readily amalgamate, whereas these elements when affected by an electric current under certain conditions readily unite. It is also true of other elements besides aluminium and magnesium that they do not readily amalgamate with mercury except under what may be described as abnormal conditions. At the same time these elements, when present in a vapor device under certain conditions have the property of uniting with gaseous elements which property may be absent under normal conditions.

The present invention is designed to take advantage of this property of amalgamated aluminium or other suitable material, for the purpose of improving the vacuum in an apparatus wherein mercury is normally contained or wherein the presence of mercury would not be injurious to the apparatus during the process of manufacture.

For convenience, I shall refer only to the employment of aluminium under the conditions named, but other materials may be employed in place of aluminium.

The invention is especially applicable to the process of exhausting mercury vapor apparatus, whether used for lighting or for any other purpose. It contemplates the use of aluminium or other suitable material placed in contact with the mercury constituting one or more of the electrodes of the apparatus, the said material being practically inert with relation to the gases normally contained in the envelop surrounding the electrode or electrodes, but being rendered active with respect to such gases when electric current is passed through the envelop so as to cause an amalgamation of the aluminium or other material with the mercury.

It is a fact of observation that the process of amalgamation between mercury and a substance such as aluminium is hastened or facilitated by the passage of an electric current. This is probably due to the chemical activity at what are sometimes called the cathode spots where current passes between the cathode and the intervening space, vapor or vacuum. The cathode spots are the points at which the negative electrode flame appears and when the flame strikes the boundary surface between the mercury and the unamalgamated material there appears to be a chemical excitation of both materials which facilitates their union in the form of an amalgam. In this way, a considerable portion of the gases which might otherwise be injurious to the action of the apparatus is taken by the amalgamated material or substance and a more perfect vacuum is made than would otherwise be the case.

In carrying out the process of exhaustion any suitable pumping or exhausting means may be employed. I show in the drawing, by way of example, an apparatus which can be utilized for the purposes indicated.

In the drawing, 1 is the envelop or container of a mercury vapor lamp, and 2 and 3 are, respectively, the positive and negative electrodes thereof. The apparatus thus constituted may be exhausted through the exit tube, 4, by any suitable means. When the exhaustion has been carried to any desired degree, the tube 4 may be sealed off in the usual way.

In the mercury constituting the negative electrode 3, I may place a piece, 5, of aluminium or other suitable material which, during the initial pumping operation may remain inert as respects the gases contained in the envelop 1. Before the tube 4 is sealed off, however, and generally while the pumping operation is still going on, electric current is caused to pass through the envelop between the electrodes 2 and 3. Owing to the passage of current as described, an amalgamation takes place between the mercury 3 and the aluminium or other material 5, whereupon the said material is brought into a condition in which it readily unites with the elements of the injurious gases in the container, thereby improving the vacuum in the apparatus. Any appropriate way of securing an amalgamation between the elements 5 and 3 may be employed in place of that described herein.

I claim as my invention:—

1. The method of creating a high vacuum in an inclosed chamber containing mercury and also containing a material which is incapable in its natural state of combining with the gases within the chamber, which consists in exhausting the chamber by any approved process and afterwards amalgamating the described material, thereby producing a change of condition in said material such that it will absorb or combine with all or a portion of the gases within the chamber.

2. The method of creating a high vacuum in an inclosed chamber containing mercury and also containing a material which is incapable in its natural state of combining with the gases within the chamber, which consists in exhausting the chamber by any approved process, sealing off the chamber, and afterwards amalgamating the described material, thereby producing a change of condition in the said material such that it will absorb or combine with all or a portion of the gases within the chamber.

3. In a vapor apparatus provided with a negative electrode of conducting liquid material and with a solid wetted material in a different plane from the general surface of the liquid, but in contact therewith, the method of rendering the said solid material effective for localizing the entrance of current into the negative electrode, which consists in removing from the surface of the solid material the air or gases which accumulate thereon.

4. In a vapor electric apparatus provided with a nega-

tive electrode of conducting liquid material with a solid wetted material in a different plane from the general surface of the liquid, but in contact therewith, the method of rendering the said solid material effective for localizing the entrance of current into the negative electrode, which consists in throwing the said material into an active state, and absorbing by means thereof the air or gases which accumulate on the surface of the said solid material.

5. In a vapor apparatus provided with a negative electrode of mercury and with a solid material adapted to be wetted by the mercury and being in a different plane from the general surface of the mercury but in contact therewith, the method of rendering the said solid material effective for localizing the entrance of current into the negative electrode, which consists in amalgamating with the mercury of the negative electrode an absorbent material, and thereby causing to be absorbed the film or coating which accumulates on the surface of the said solid material.

6. In a vapor apparatus provided with a negative electrode of conducting liquid material and with a solid wetted material in a different plane from the general surface of the liquid, but in contact therewith, the method of rendering the said solid material effective for localizing the entrance of current into the negative electrode, which consists in removing from the surface of the solid material the film or coating of gas which acccumulates thereon.

Signed at New York, in the county of New York, and State of New York, this 24th day of June A. D. 1904.

PETER COOPER HEWITT.

Witnesses:

WM. H. CAPEL,

GEORGE H. STOCKBRIDGE.