

P. H. THOMAS.
CONTROLLING DEVICE FOR VAPOR APPARATUS.
APPLICATION FILED JULY 16, 1907.

958,195.

Patented May 17, 1910.

Fig. 1

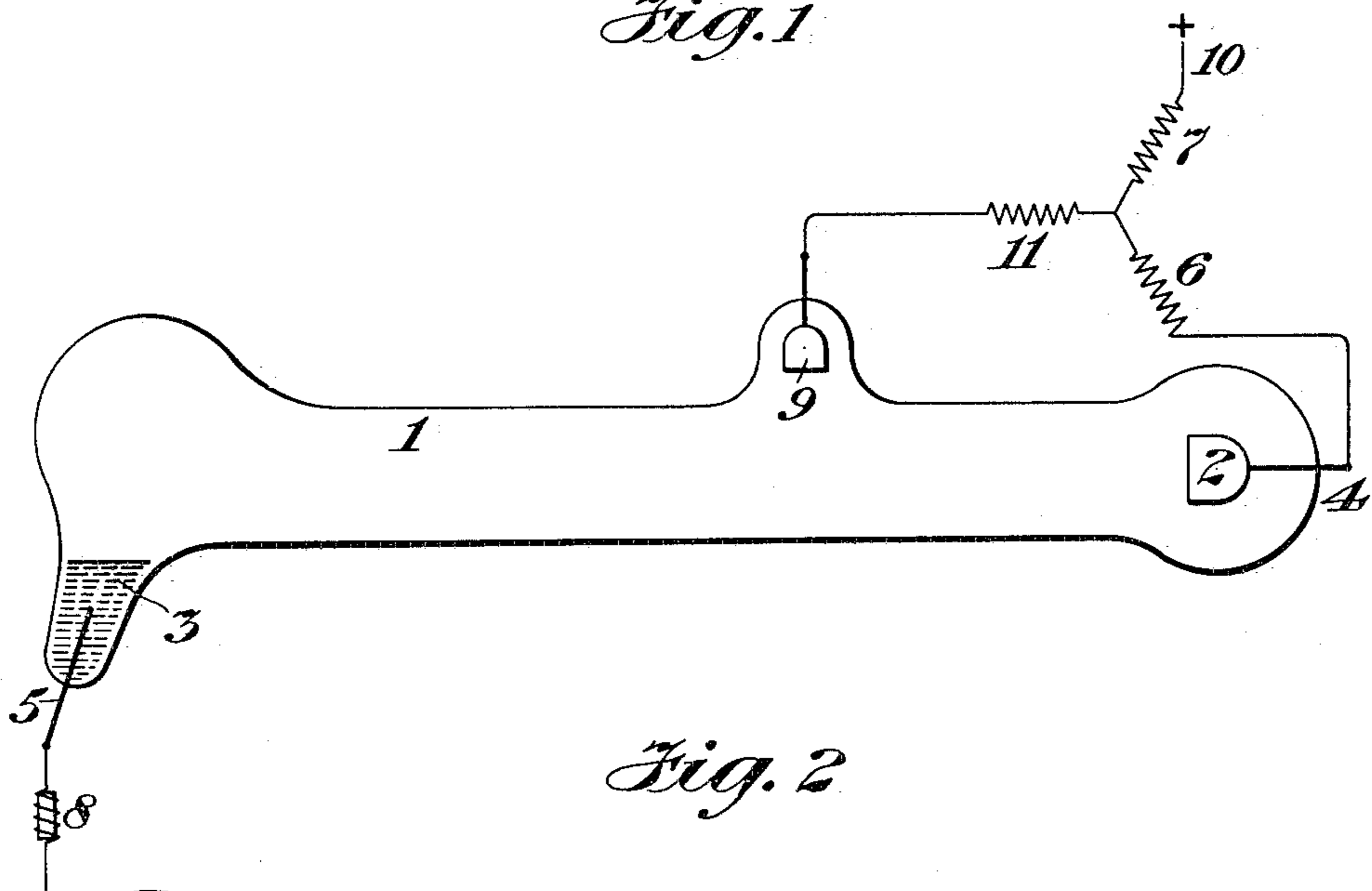


Fig. 2

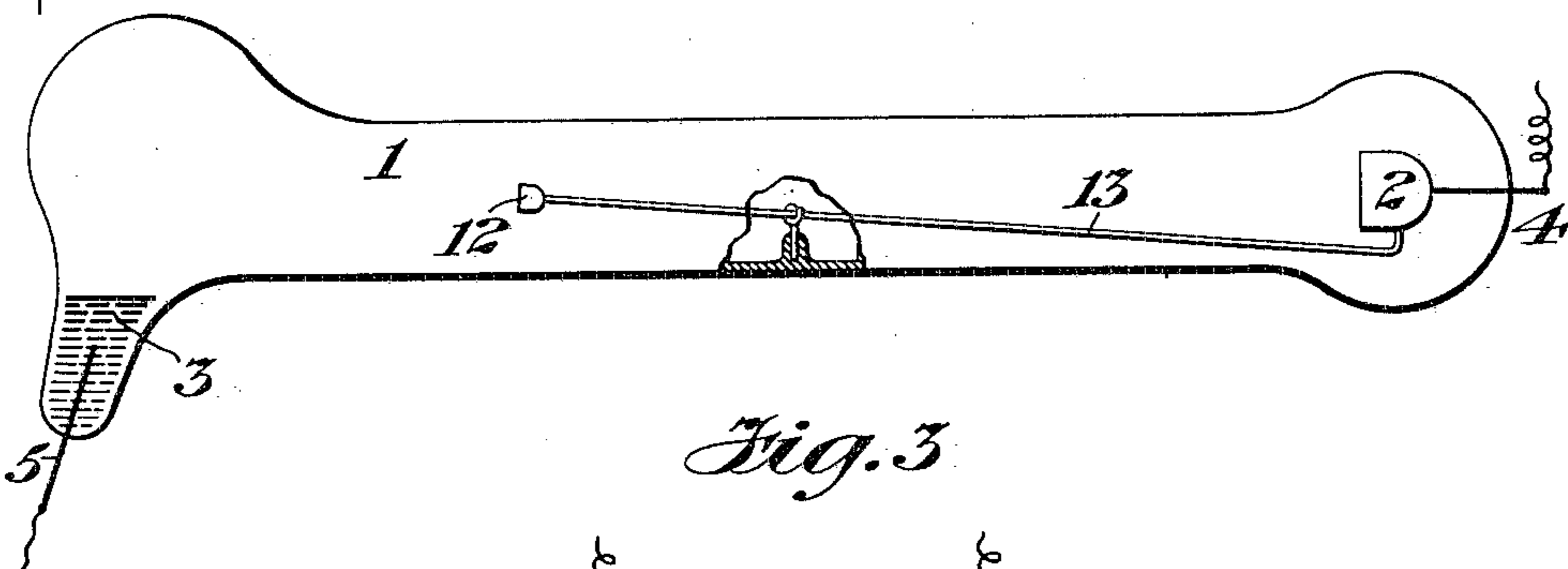
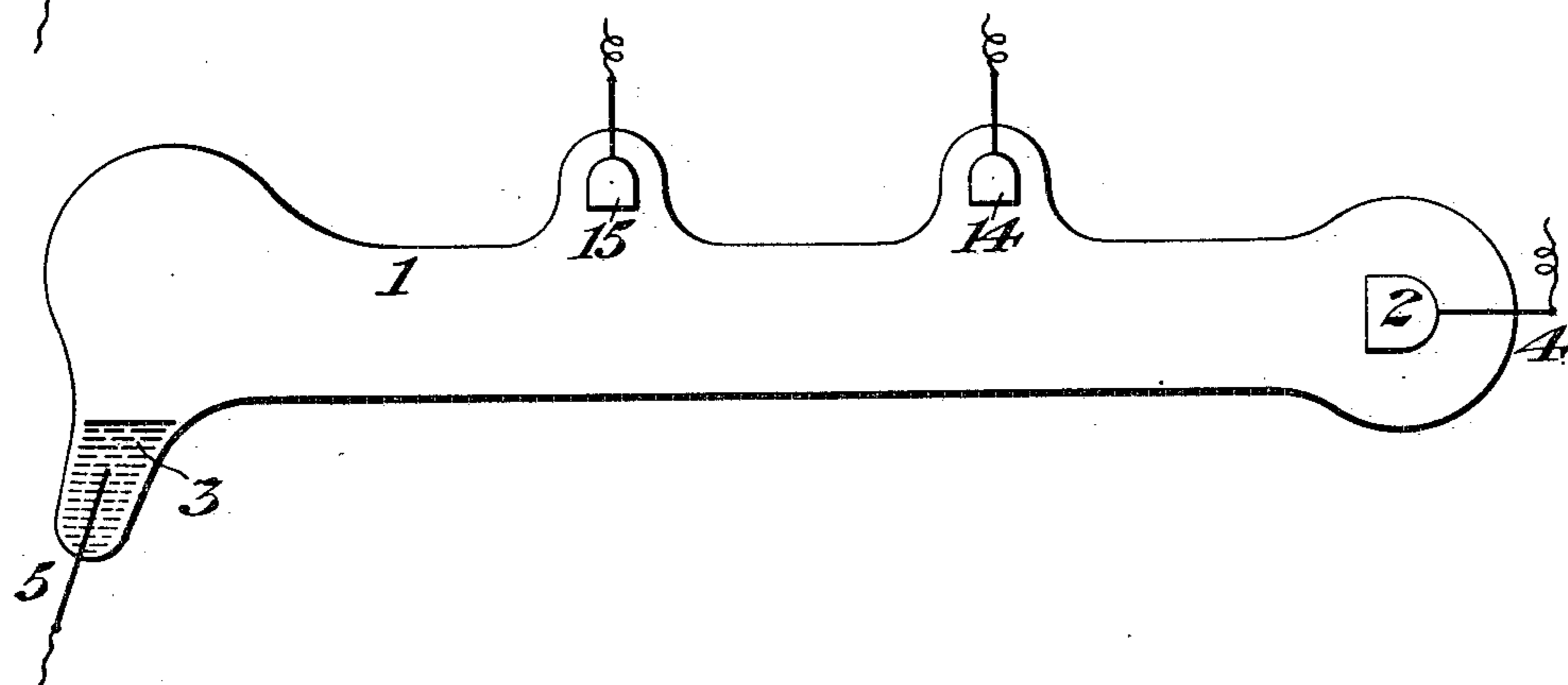


Fig. 3



Witnesses:
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By his Attorney
George H. Stocking

UNITED STATES PATENT OFFICE.

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CONTROLLING DEVICE FOR VAPOR APPARATUS.

958,195.

Specification of Letters Patent.

Patented May 17, 1910.

Original application filed April 14, 1904, Serial No. 203,077. Divided and this application filed July 16, 1907. Serial No. 384,106.

To all whom it may concern:

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

In operating gas or vapor electric apparatus, a type of which is now well-known in the mercury vapor lamp, it is found that the characteristics of such apparatus are such that the apparatus adapts itself gradually to alterations in the voltage and temperature conditions, such as are met with in the ordinary commercial service. By reason of the fact, however, that this self-adjustment is gradual, it may happen that in cases where the voltage of a circuit drops too quickly to allow automatic adjustment the apparatus may cease to operate. To prevent the effects of this tendency the use of series resistance is common, but in practice it is found that to meet the extreme conditions of commercial service such an amount of resistance has to be used as to seriously impair the efficiency of the apparatus. It is true, however, that by using a sufficient amount of series resistance, the apparatus may be kept alive on a small fraction of the operation current.

One of the objects of the present invention is to keep the vapor apparatus from going out or ceasing to operate under a momentary large drop of potential, and to do this without the permanent introduction of excessive resistance into the path of the main current. In this connection it may be stated that the shorter the vapor column the smaller is the amount of series resistance needed to keep the apparatus alive. Accordingly, by supplying the supplemental positive electrode to operate with the negative electrode at a lesser distance than the permanent positive, a greater voltage will be available for passing current through the series resistance by reason of the shorter vapor path which has to be traversed by the current passing through this supplemental electrode. If the parts are so proportioned that the amount of current flowing through this supplemental electrode is a small part of the total light giving current, little or no loss of efficiency takes place by reason of the subtraction of

this small amount of current from the vapor path at an intermediate point.

In the normal operation, the main current, with the exception just noted, passes between the permanent negative and the permanent positive electrode, showing throughout a portion of the path an efficiency of one hundred per cent. and throughout the remainder of the path an efficiency slightly reduced by the amount of current taken from the supplemental electrode. If, now, the voltage of the circuit should momentarily fall below a point at which the flow of current can be maintained from the main negative to the main positive electrode, current will cease to flow at the main positive electrode, in the absence of the supplemental electrode the apparatus would go out or cease to operate. With the supplemental positive electrode present, however, the smaller supplemental current will continue by virtue of the shorter vapor path and the great amount of series resistance in such path. It should here be mentioned that an extra resistance is introduced into the path traversed by the supplemental current, which resistance is, however, not traversed by the main current.

In some instances, the restoration of the current to the main positive electrode may be more easily accomplished, if, instead of using a separate supplemental positive electrode, the main positive electrode be extended to a point nearer to the negative electrode within the vapor path, a suitable resistance being introduced between the end of the extension and the main operating or working electrode. In some instances an advantage may be gained by the use of two or more supplemental currents in a similar manner.

Figures 1, 2 and 3 of the drawing illustrate different embodiments of the principle of the present invention.

In the first figure of the drawing 1 is the container of a vapor apparatus having a main positive electrode, 2, and a negative electrode, 3. The former may be of iron and the latter of mercury, subject, however, to the substitution of other materials for those named. Lead-wires, 4 and 5, connected with the respective electrodes named and series resistances, 6 and 7, may be connected with the first named lead-wire and an in-

ductance, 8, with the second named lead-wire, the former serving as steadying resistances for the apparatus and the latter serving to prevent sudden changes of current conditions in the circuit.

Notwithstanding the presence of the protective devices named, it is found that such changes of voltage may take place in the circuit as will make too great demands upon the vapor apparatus thus far described, and I, therefore, provide a supplemental positive electrode, 9, which, as shown in Fig. 1, is located nearer the negative electrode 3 than the main positive electrode 2 is located. Into the circuit between the main conductor, 10, and the supplemental electrode 9, I introduce a resistance 11, which may be of relatively large resistance providing for the maintenance of the current flow through the shorter path between the electrodes 9 and 3 under extreme conditions of commercial service.

When the apparatus is in operation, the main portion of the current flows between the electrodes 2 and 3, a comparatively small flow of current taking place between the electrodes 9 and 3. Should, now, a large drop of voltage take place suddenly in the circuit including the vapor apparatus, such a drop, for example, as would ordinarily cause the apparatus to cease to operate, the main current between the electrodes 2 and 3 will be cut off, but current will continue to flow between the electrodes 9 and 3. In this way the apparatus will be kept alive until, on the restoration of normal conditions of current in the circuit, the flow is restored through the entire length of the vapor path.

The described restoration of the current flow may be facilitated by the employment of a construction such as is illustrated in Fig. 2 where the part, 12, which may be regarded as the supplemental positive electrode, is connected to the main electrode 2 by a conductor 13 of considerable resistance. Here the distribution of the current under normal conditions of operation is similar to that which exists in the arrangement shown in Fig. 1, the main current passing between the electrodes 2 and 3 and a smaller current passing between the electrodes 12 and 13. When the main current is cut off, say by an excessive drop of voltage, the flow will take place between the last named pair of electrodes, while on the restoration of normal voltage, the main current will pass back from the electrode 12 to the electrode 2, where-

upon the apparatus will operate as originally described.

It may at times be advantageous to use two or more supplemental electrodes, as shown in Fig. 3, at 14 and 15. On the occurrence of an abnormal drop of voltage, the current will take the path best suited to it and pass either wholly between the electrodes 15 and 3 or partly between that pair of electrodes and partly between the pair of electrodes constituted by the electrodes 14 and 3.

In another application filed April 14, 1904, Serial Number 203,077, of which this application is a division, claims are made upon certain features of the apparatus disclosed herein.

I claim as my invention:—

1. In a vapor apparatus having a pair of main electrodes, a supplemental positive electrode located in the light-giving path nearer to the main negative electrode than the positive electrode and a resistance between the said supplemental electrode and the main positive electrode, such resistance being located within the vapor apparatus and consisting of a high resistance filament extending between said supplemental and said main positive electrodes.

2. In a vapor apparatus having a pair of main electrodes, a supplemental positive electrode located in the light-giving path nearer to the negative electrode than the main positive electrode, and a resistance between the said supplemental electrode and the main positive electrode, such resistance being located within the vapor apparatus.

3. In a vapor electric device, the combination with a hermetically sealed completely exhausted container, a vaporizable reconstructing cathode and an anode also therein separated from the cathode by a tubular portion of the container, of a high resistance filament extending partially through said tubular portion and attached to a point of the anode remote from the cathode whereby the resistance of the filament near the point of attachment forces normal current to run upon the anode instead of upon the filament.

Signed at New York, in the county of New York, and State of New York, this 15th day of July A. D. 1907.

PERCY H. THOMAS.

Witnesses:

WM. H. CAPEL,
THOS. H. BROWN.