No. 749,793. PATENTED JAN. 19, 1904.

P. C. HEWITT.

REGULATOR FOR GAS OR VAPOR ELECTRIC APPARATUS.

APPLICATION FILED MAY 16, 1902.

NO MODEL.

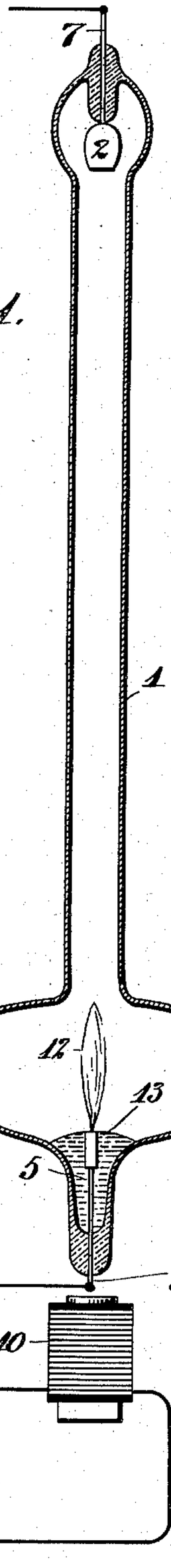

Fig. 1.

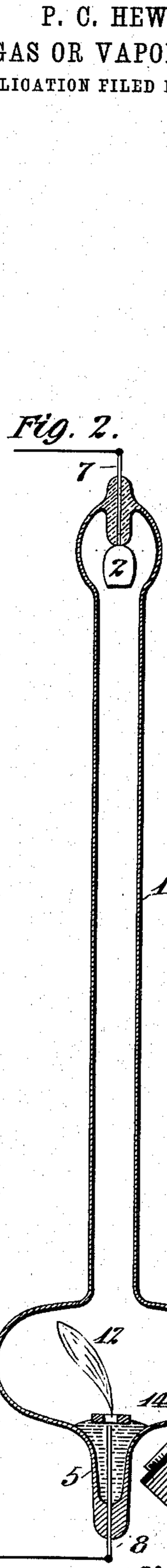

Fig. 2.

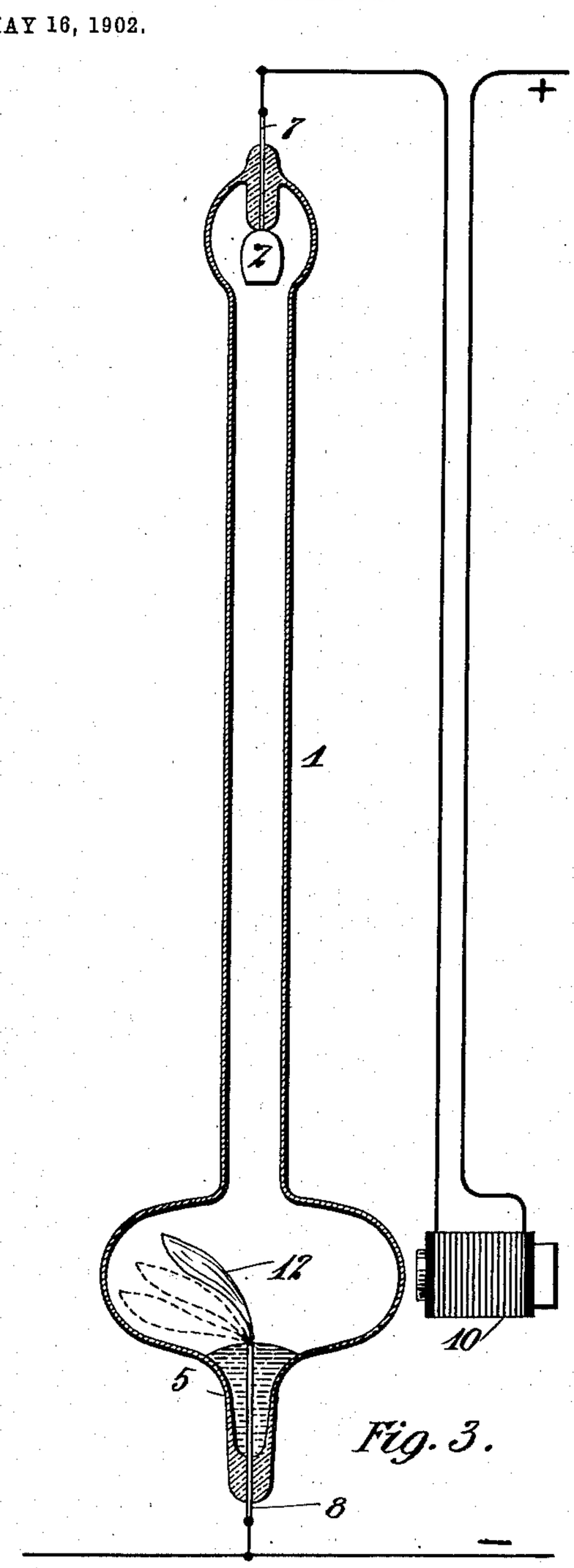

Fig. 3.

Witnesses
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By his Attorney
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No. 749,793. Patented January 19, 1904.

UNITED STATES PATENT OFFICE.

PETER COOPER HEWITT, OF NEW YORK, N. Y., ASSIGNOR, BY MESNE ASSIGNMENTS, TO COOPER HEWITT ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

REGULATOR FOR GAS OR VAPOR ELECTRIC APPARATUS.

SPECIFICATION forming part of Letters Patent No. 749,793, dated January 19, 1904.

Application filed May 16, 1902. Serial No. 107,603. (No model.)

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, in the county of New York and State of New York, have invented certain new and useful Improvements in Regulators for Gas or Vapor Electric Apparatus, of which the following is a specification.

The appearance of what I have called the "negative" flame in certain types of gas or vapor electric lamps has been referred to in an application for Letters Patent of the United States, Serial No. 99,333, filed by me on the 21st day of March, 1902. In the said application reference is made to the fact that under ordinary conditions the negative flame acts as a resistance to the passage of the electric current, particularly when the flame stands in the direct line of the current between the positive and negative electrodes of the lamp. The application referred to describes mechanical means for removing the negative flame from the direct path of the current, and thereby lessening the total lamp resistance. In the same application attention is called to the fact that when the negative flame is acted upon by a magnet or solenoid the condition of lowest lamp resistance is attained when the flame lies in the direct path of the current through the lamp. It is found, in other words, that either a permanent or an electro magnet will so influence the negative flame as to change its character as a resisting medium and cause it to actually lessen the normal lamp resistance. In this connection it is to be noted that the tendency of the flame is to project itself or lie along the lines of magnetic force, and in this way the flame is made very steady by the action of a magnet, so that the normal resistance of a lamp in which the negative flame is mechanically controlled can be governed without any essential fluctuation. Accordingly if it be desired to construct a lamp with as low a normal resistance as possible, assuming a vertical type of lamp in which the negative electrode is at the bottom of the transparent container, the proper position for the magnet or solenoid would be directly below the negative electrode, with the lines of force projecting toward the lamp-electrode. This would cause a projection of the flame in an upward direction, thus bringing it into a right line with the current between the electrodes, thereby minimizing the normal lamp resistance. On the other hand, it may sometimes be desired to operate lamps at a resistance higher than the lowest possible resistance, in which case the magnet or solenoid may be located in such relation to the negative electrode as to throw the flame into other than a vertical position, thus predetermining the lamp resistance at a desired value within certain limits.

When a magnetic field is utilized for fixing the position of the negative flame or for deflecting it from the direct line between the electrodes, a permanent magnet may be employed, if desired, or an electromagnet supplied from any suitable source. By using an electromagnet, however, and putting it in series with the lamp and then so placing it with respect to the negative electrode as to deflect the flame away from the direct line it is possible to secure excellent regulation of the lamp resistance in a manner which will be described in the specification which follows. It should be said that the length of the flame and under certain conditions the amount of the deflection depend upon the strength of the magnet employed. When, for example, a vertical magnet is placed so that its poles are located anywhere below the negative electrode in a vertical lamp, successive increases of magnetic strength will project the flame farther and farther, but in a fixed direction, while if the magnetic pull be located above the surface of the negative electrode successive increases of magnetic strength will project the flame farther and farther away from the vertical, thereby increasing the lamp resistance. By these means variations in the circuit of the electromagnet, if an independent circuit, may be recreated in the circuit of the lamp with varying intensity, depending on the magnetic circuit and on the lamp-circuit.

My invention is illustrated in the accompanying drawings, in which—

Figure 1 is an elevation of one of my vertical lamps in which the flame is projected vertically upward by an electromagnet underneath the lamp. Fig. 2 is a similar view of a vertical lamp in which the flame is projected at an angle, and Fig. 3 is a diagram illustrating electromagnetic means for automatically regulating the resistance of a lamp.

In Fig. 1 the main lamp-tube is shown at 1, the respective positive and negative electrodes at 2 and 5, the same being severally connected with leading-in wires 7 and 8. Below the negative electrode 5 is arranged an electromagnet 10, energized by a suitable source 11. Under the conditions illustrated in this figure the negative flame 12 is projected vertically upward, thus giving to the lamp its lowest resistance.

In Fig. 2 the relations are changed only to the extent that the magnet 10 is shifted a little to one side, thereby causing the flame to be projected at an angle to the vertical, under which conditions the lamp has an increased resistance as compared with the lamp shown in Fig. 1.

In Fig. 3 the magnet 10 is arranged at the side of the lamp and somewhat above the surface of the negative electrode 5. Here the flame 12 is deflected, as shown, the deflection being still more marked in case the strength of the magnet 10 increases. The magnet is here arranged in series with the lamp, so that any change of potential on the line will be felt not only in the lamp but also in the magnet 10. For example, should the conditions of the circuit be so altered as to cause too great a flow of current the strength of the magnet 10 will be increased, the flame 12 will be deflected, so as to increase the lamp resistance, in consequence of which the excessive flow of current is checked. Thus the arrangement illustrated in Fig. 3 is adapted to cause a very sensitive regulation of the lamp-circuit. When the electromagnet is in an independent circuit, variations in the magnet-circuit will be reproduced in the lamp-circuit, and this arrangement may be used for many purposes—for instance, as a relay.

Means for starting the flow of current through the apparatus are set forth in certain patents issued to me on the 17th day of September, 1901.

The results described above are more readily accomplished when the flame is proceeding from a projecting point, as shown at 13 in Fig. 1, or is fixed by a plate floating on the mercury, the plate having a hole in its center, as illustrated at 14 in Fig. 2.

It is manifest that the operation of the device forming the subject of the present invention is the same whether the apparatus is used as a lamp or a source of light or for any other purpose.

I claim as my invention—

1. In an electric vapor apparatus in which a path is provided for the electric current between a positive and a negative electrode, and in whose normal operation a negative flame is developed at the negative electrode, magnetic means for projecting the flame in such a direction with relation to the path of the current between the electrodes as to produce a definite normal resistance in the apparatus.

2. In an electric circuit, an electric vapor apparatus and an electromagnet in series therewith, the magnet being placed at the side of the apparatus and in operative proximity thereto.

3. The combination with an electric circuit containing a gas or vapor apparatus, of an electromagnet, placed in such relation to the negative electrode of the apparatus that electrical variations in the magnet-circuit will be reproduced in the circuit of the apparatus.

Signed at New York, in the county of New York and State of New York, this 9th day of May, A. D. 1902.

PETER COOPER HEWITT.

Witnesses:
WM. H. CAPEL,
GEORGE H. STOCKBRIDGE.