No. 834,172. PATENTED OCT. 23, 1906.

C. P. STEINMETZ.

VAPOR ELECTRIC APPARATUS.

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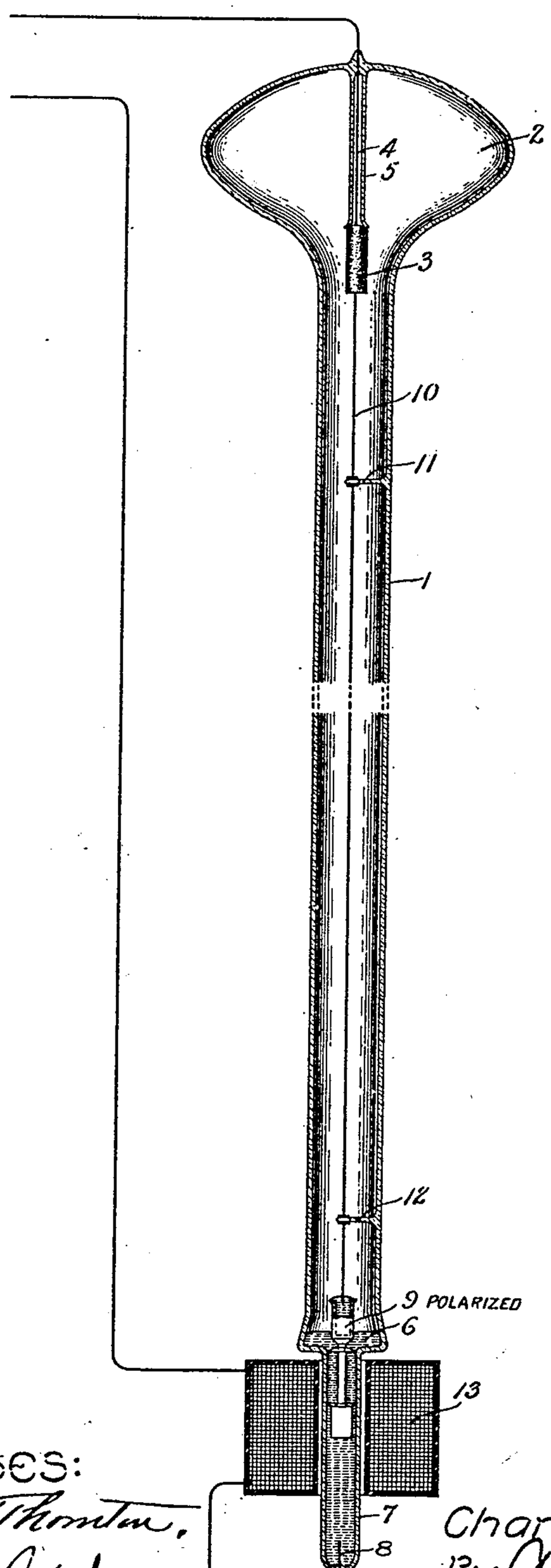

WITNESSES:

George A. Thornton.

Helen Orford

INVENTOR:

Charles P. Steinmetz,

By Albert G. Davis

Atty.

UNITED STATES PATENT OFFICE.

CHARLES P. STEINMETZ, OF SCHENECTADY, NEW YORK, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

VAPOR ELECTRIC APPARATUS.

No. 834,172. Specification of Letters Patent. Patented Oct. 23, 1906.

Application filed July 1, 1904. Serial No. 214,884.

To all whom it may concern:

Be it known that I, CHARLES P. STEINMETZ, a citizen of the United States, residing at Schenectady, county of Schenectady, State of New York, have invented certain new and useful Improvements in Vapor Electric Apparatus, of which the following is a specification.

My present invention relates to vapor electric apparatus, and more especially to devices of this character in which magnetic cores or plungers are utilized for starting.

In apparatus of this character it is essential in the proper operation thereof that the current therein should flow in a given direction. When current is applied to the apparatus in the opposite direction, the apparatus, although it does not start, is apt to have its operating parts damaged by the momentary passage of current even though this current in the wrong direction be small. I therefore make the magnetic cores or plungers of apparatus of this character of magnetized hardened steel. The polarity is so chosen as to make the cores responsive only to current of the proper direction and irresponsive to current of the opposite direction.

The novel features which are characteristic of my invention are pointed out with particularity in the appended claims. The invention itself, however, will be better understood by reference to the following description, taken in connection with the accompanying drawing, which represents my invention as applied by way of illustration to a mercury-vapor electric lamp in which the starting action is initiated by means of a floating plunger.

In the drawing the lamp-container consists of a tube 1 of indefinite length surmounted by an enlargement or bulb 2, constituting a condensing-chamber. The upper electrode or anode consists of a hollow cylinder 3 of artificial graphite or the like supported in position near the mouth of the tube 1 by means of a depending wire 4, the upper end of which is sealed through the upper portion of the bulb or condensing-chamber 2. This wire 4 is surrounded by a protecting glass tube 5, the lower end of which flares slightly over the upper end of the electrode 3.

The lower electrode or cathode of the lamp consists of a body of mercury 6, filling the lower end of the tube 1, as well as the contracted extension 7. Electrical connection to the body of mercury is afforded by the leading-in conductor 8. A hardened-steel plunger 9 of somewhat dumb-bell shape floats in this body of mercury and is guided by the walls of the contracted extension 7. This plunger is strongly and permanently magnetized and is preferably inserted in the container with its south pole uppermost, whereby the lines of force of the plunger are more nearly in the direction of the earth's magnetic field. This arrangement tends to secure permanency of the magnet.

The upper end of the plunger is hollowed out, as indicated in dotted lines, so that upon being once submerged in the mercury the hollow is filled with mercury, which is retained therein when the upper end of the plunger is allowed to emerge.

For the purpose of starting a carbon filament 10 is suspended from the upper electrode 3 and extends centrally down the tube 1 through guides 11 and 12 and so that its lower end dips into the mercury contained in the cup formed by the top of the plunger 9. A solenoid 13 surrounds the contracted extension 7 and is connected in series with the lamp, as shown. When this solenoid is energized by current in the proper direction through the lamp, the polarized plunger 9 is drawn down beneath the surface of the mercury 6. As soon as the plunger falls, so that the mercury carried thereby is lowered out of contact with the filament 10, an arc is formed which extends immediately up the filament to the anode 3 and puts the lamp into normal operation. The arc then flows between the anode 3 and the mercury cathode 6.

If current is applied to the lamp in the wrong direction—namely, so as to flow from the cathode 6 to the anode 3—the polarized plunger fails to be attracted and is, in fact, repelled. No interruption of the current through the filament is thus occasioned and the destructive action which would otherwise occur at the end of the filament upon such a break taking place is thus avoided. The polarity of the solenoid is of course so arranged as to attract the polarized armature only when current flows from the anode to the cathode 6.

My invention is of course applicable to various other types of vapor electric devices employing magnetic cores or plungers, while

numerous modifications thereof may be made, for which reason I do not wish to be limited to the details above described.

What I claim as new, and desire to secure by Letters Patent of the United States, is—

1. In a vapor electric apparatus, the combination of an envelop or container, electrodes therefor, one at least of which is of vaporizable material, and starting means therefor including a solenoid and a polarized magnetic core.

2. In a vapor electric apparatus, the combination of a fluid electrode, a polarized magnetic plunger therein, and a coil for said plunger.

3. The combination of electrodes, one at least of which is vaporizable, a filament extending between the electrodes, and a polarized magnet for making and breaking connection between said electrodes.

4. In a vapor electric apparatus, a starting device therefor including a solenoid, and a polarized magnet within the influence of said solenoid.

5. In a vapor electric apparatus, the combination of an envelop, a container, electrodes therefor, a solenoid, and a starting device responsive to current in said solenoid of one direction only.

In witness whereof I have hereunto set my hand this 30th day of June, 1904.

CHARLES P. STEINMETZ.

Witnesses:
BENJAMIN B. HULL,
HELEN ORFORD.