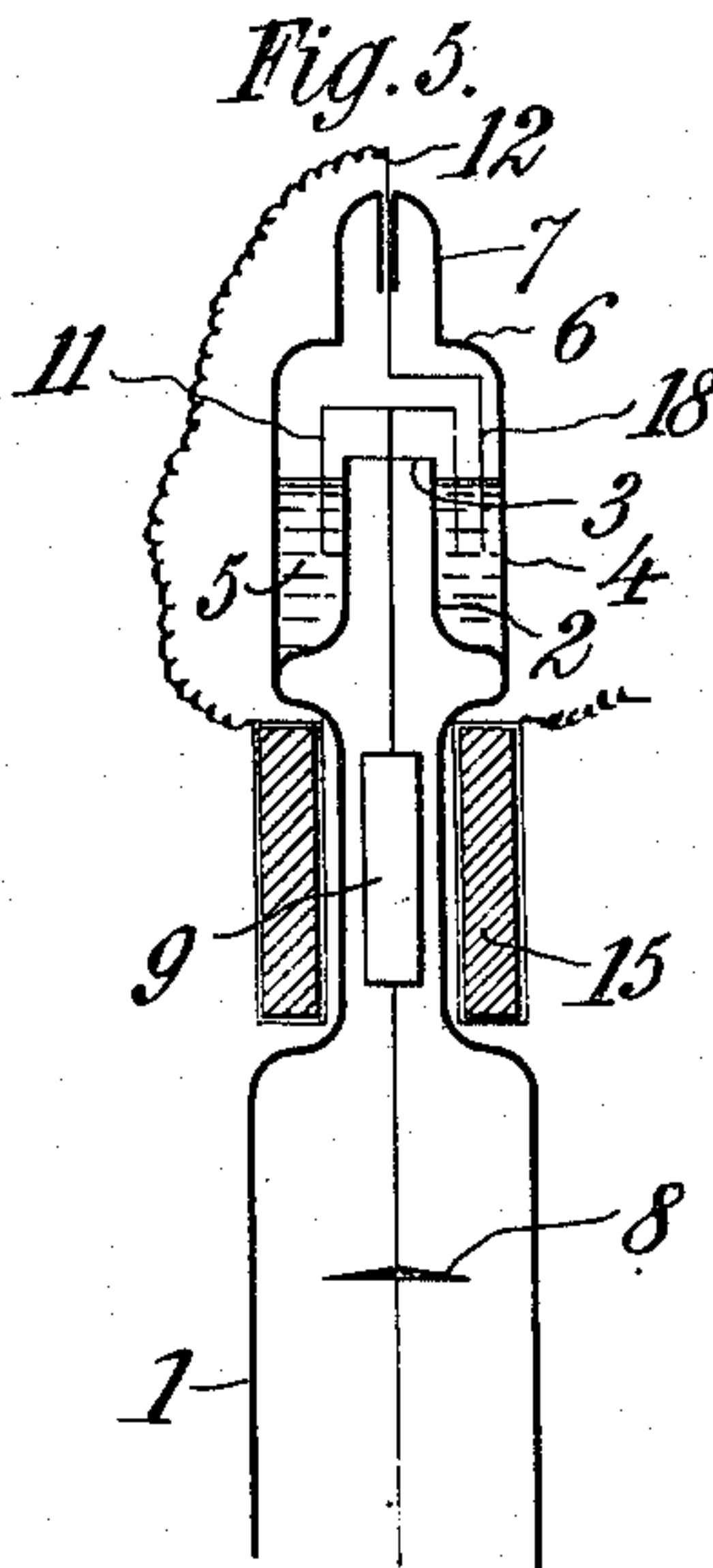
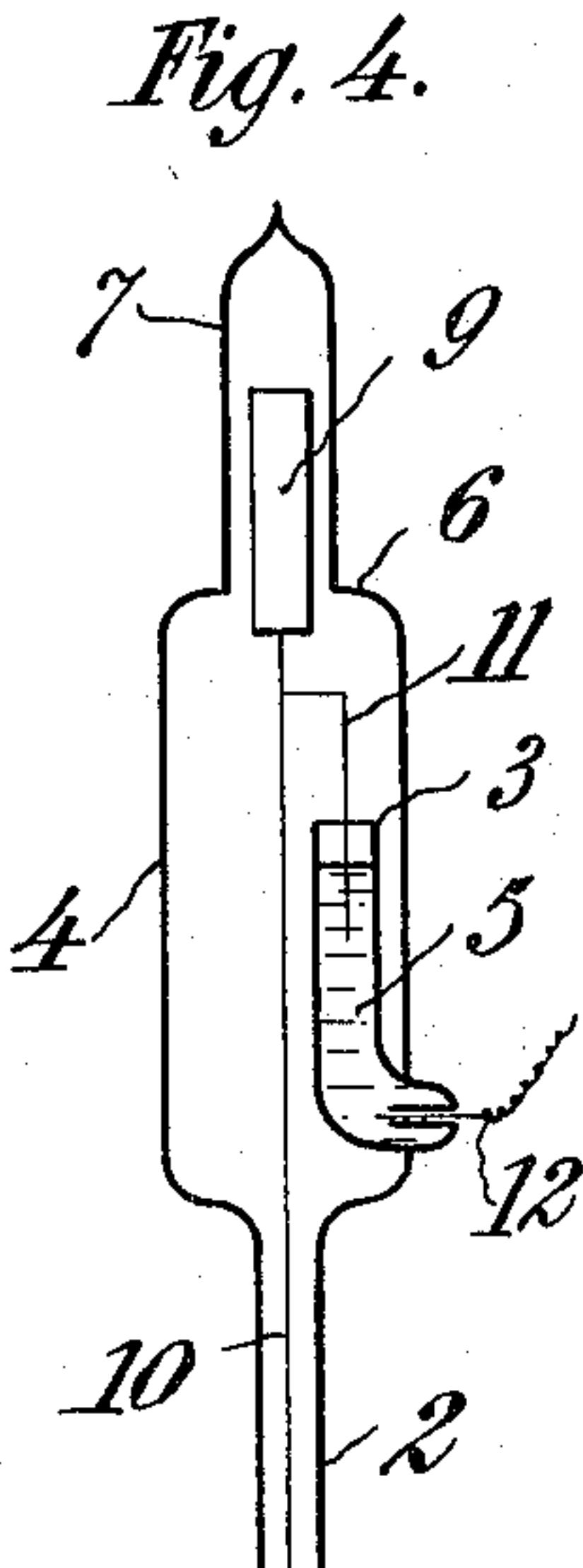
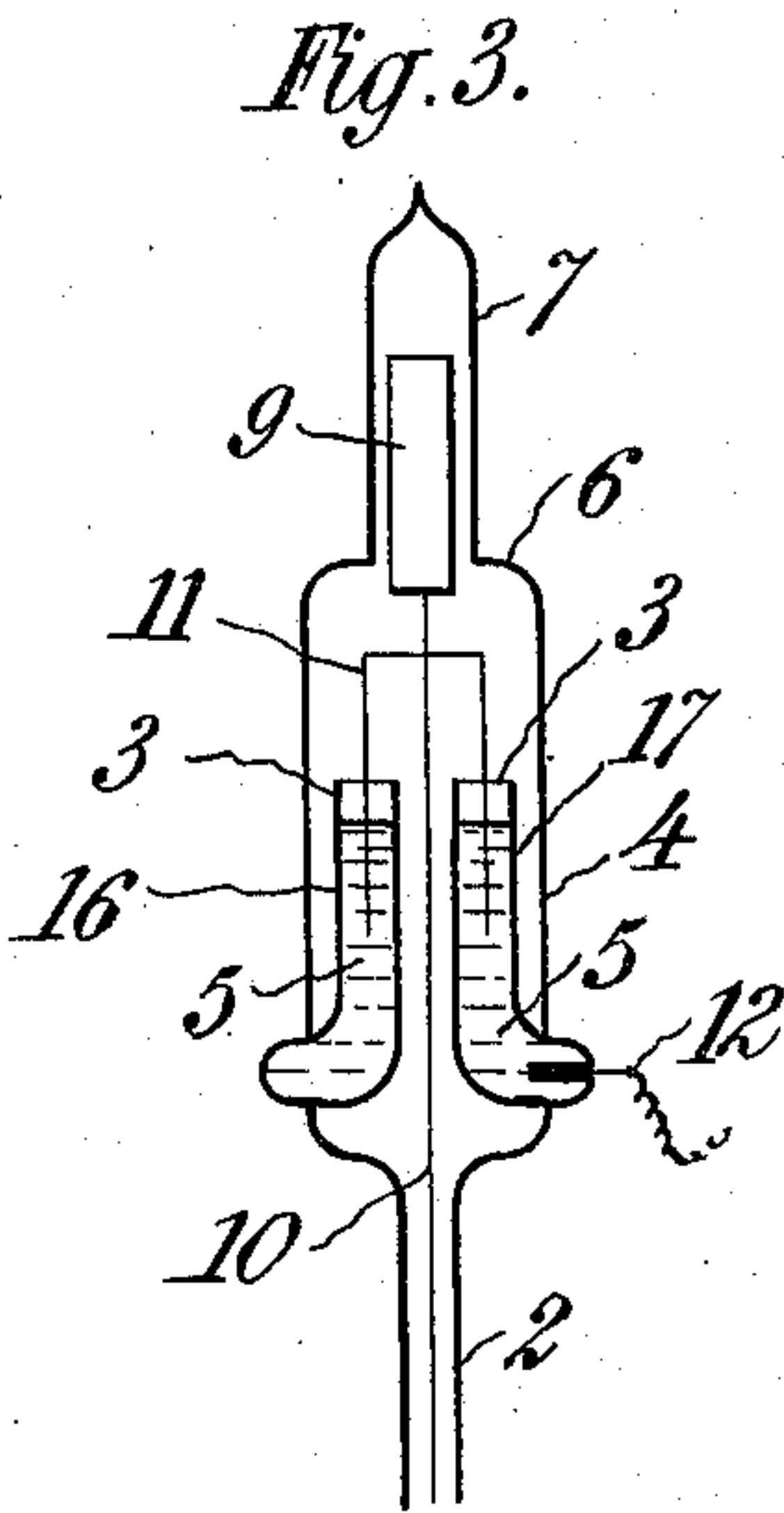
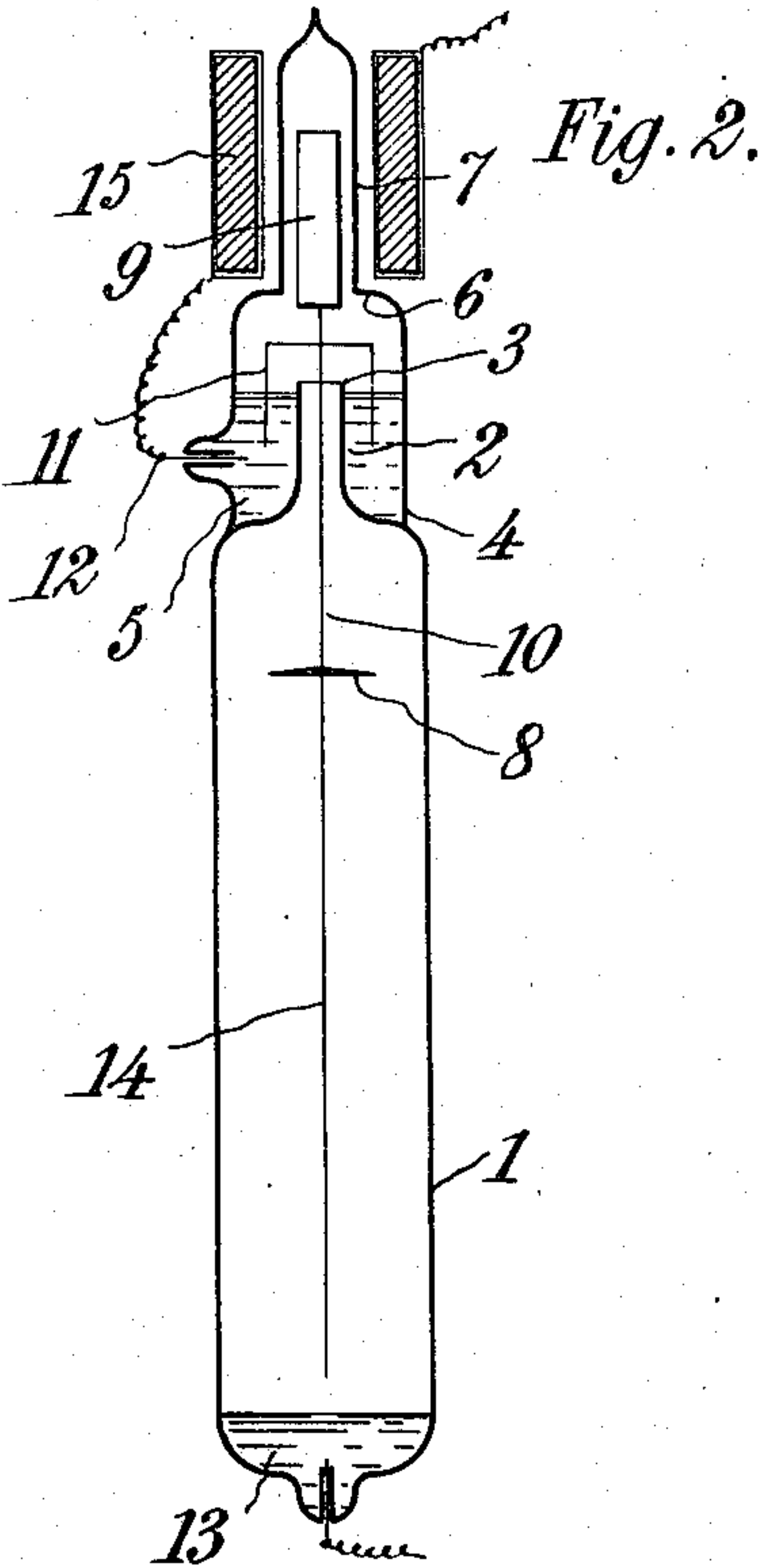
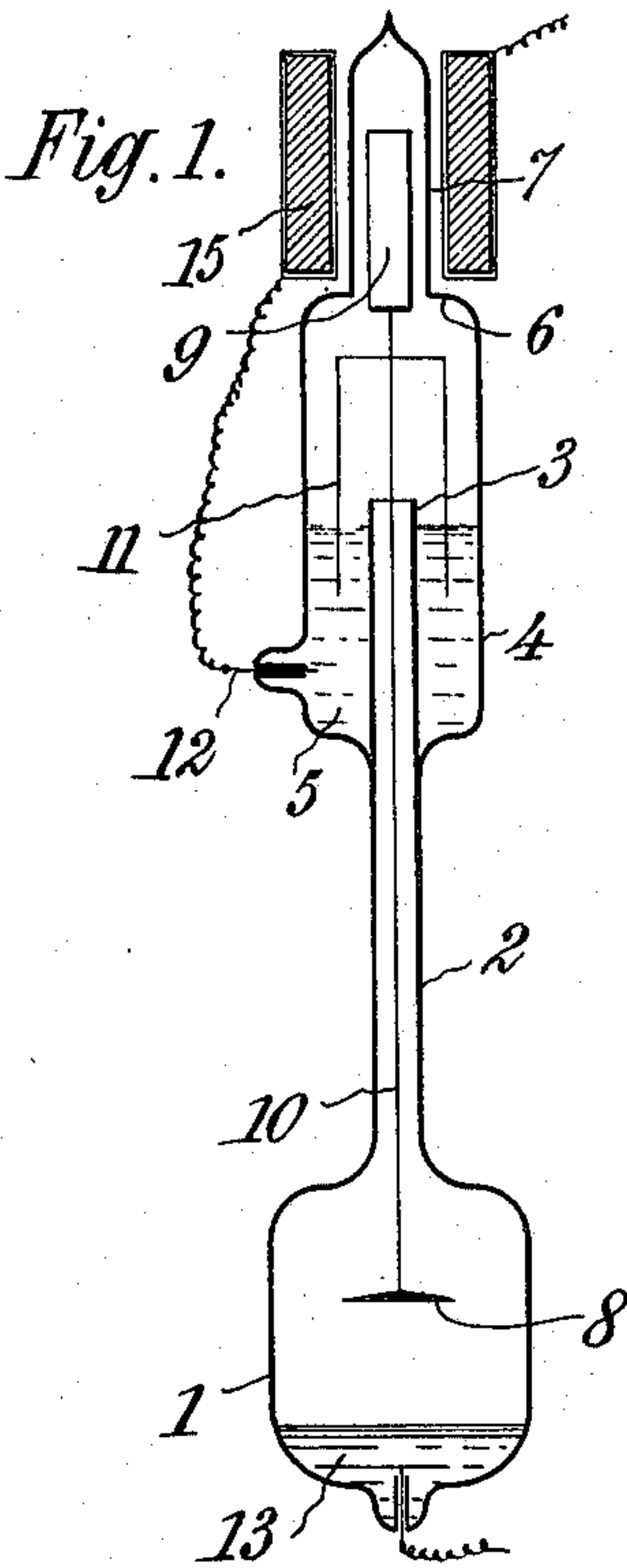


L. A. AUDIBERT.
STARTING DEVICE FOR MERCURY VAPOR ELECTRIC LAMPS.
APPLICATION FILED SEPT. 14, 1906.



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UNITED STATES PATENT OFFICE.

LOUIS ANTOINE AUDIBERT, OF LODÈVE, FRANCE.

STARTING DEVICE FOR MERCURY-VAPOR ELECTRIC LAMPS.

No. 881,765.

Specification of Letters Patent.

Patented March 10, 1908.

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To all whom it may concern:

Be it known that I, LOUIS ANTOINE AUDIBERT, a citizen of the Republic of France, residing in Lodève, Hérault, France, have invented certain new and useful Improvements in Starting Devices for Mercury-Vapor Electric Lamps, of which the following is a specification.

Among the methods of starting mercury vapor electric lamps, that which proves the best in practice is undoubtedly the method known as "by preliminary contact". The principle of the mechanism for putting this method into practice is the same as that adopted for arc lamps, in which the anode is controlled by the core of a solenoid. In mechanisms of the kind as used hitherto, the movable anode is suspended by a spring to the wire forming the terminal of the lamp, or to a slide on a conductor in contact with this terminal wire. These arrangements have certain defects which, according to my invention are eliminated by interposing a mass of mercury playing the part of a conductor between the terminal wire and the movable system carrying the anode. This mercury forms a substitute for the solid slide and may be regarded as a sort of liquid slide.

In the accompanying drawings Figure 1 is a diagram illustrating the invention as applied to a bulb lamp; Fig. 2 is a similar diagram representing the arrangement for a tube lamp; Figs. 3, 4 and 5 are respectively diagrams of the upper part of the lamp showing modifications.

In Fig. 1 the bulb 1 is drawn down to a narrow tube 2 the upper end 3 of which is open and is cut off at right angles to the axis. In Fig. 2 the tube 1 which incloses the mercury arc is drawn down to a narrower section to form a short narrow tube 2 of which the end 3 is also cut off at right angles to the axis.

In both figures a tube 4 of suitable dimensions is sealed to the external surface of the tube 2 so as to form an annular and cylindrical cup or chamber between itself and the tube 2. In this chamber is contained the mercury 5. At its upper part the tube 4 has a shoulder 6 and is extended by a narrower tube 7 closed at its upper end and thicker in the wall than the tube 4 is.

The anode 8, Figs. 1 and 2, is connected with the core 9 by a metal wire 10 which also carries two bent conducting arms 11 of iron wire, for example, extending into the mercury

5. The terminal wire 12 is sealed into the tube 4. The stroke of the movable system is limited on the one hand by the end 3 of the tube 2 and on the other hand by the shoulder 6 of the tube 4, against which end and shoulder the horizontal portion of the arms 11 come in contact when the system moves down and up respectively.

The stroke of the movable system determines the length of the arc which is formed in Fig. 1 between the anode 8 and the mercury cathode 13. In a tube lamp where the stroke would be too long for forming the arc in this manner, a conducting filament 14 is affixed to the anode 8, Fig. 2, so as to make contact with cathode 13 when the movable system descends; this arrangement is already known. In the state of rest or in the lowest position of the movable system, the anode or the conducting filament attached thereto is immersed to a slight extent in the mercury cathode 13. The bobbin or solenoid 15 which is in series with the terminal of the lamp, attracts the core 9 as soon as it is energized by the current. The movable system is thus raised, but the ends of the arms 11 remain immersed in the mercury 5. The advantages of this arrangement are—(1) That perfect contact between the terminal and the movable system carrying the anode is insured. (2) That sparking between the sliding contacts used by various inventors for conducting the current is suppressed. (3) That the shocks which the terminal wire suffers when it carries the anode through the intermediary of a spring are eliminated, so that the hermetic sealing of the terminal is not damaged. Moreover this arrangement is not influenced and is not altered by lapse of time and the contact is always insured, as the mercury cannot be accidentally ejected from the cup containing it.

The shocks produced when the arms 11 come against the end of the tube 3 or the shoulder 6 are always very mild and may even be rendered insensible by reducing the weight of the movable system and by arranging the solenoid in such a manner that its attraction for the core is not too powerful. The descent of the movable system may be moderated by various known or suitable damping mechanisms.

Referring to Figs. 3, 4 and 5, the conducting arms may be reduced or increased in number as may be desired, or indeed there may be substituted for them a hollow metal

cylinder. Instead of the cup containing the mercury there may be one or two cylindrical cavities within the tube 4. In Fig. 3, for instance there are shown two narrow tubes 5 16 and 17 sealed into the tube 4 and containing the mercury 5 in which the arms 11 are immersed. One of these tubes 17 contains the terminal 12. Fig. 4 shows the same modification having a single tube 17 into 10 which extends the single arm 11. The mercury contact and the arms may be arranged above the core of the solenoid 15 instead of below it, as shown in Fig. 5. The terminal 12 is then connected with the mercury 5 by 15 a flexible conductor 18.

The simplicity and symmetry of the system present several advantages. It is also an advantage that the arms move freely in the mercury without touching the wall of 20 the tube, so that friction against the glass or adhesion thereto is avoided, these effects being likely to occur owing to the surface tension of the mercury. These effects may be still further guarded against by increasing 25 the weight of the movable system; it would then be possible to reduce the mass of the mercury by diminishing the capacity of the cup. This advantage, however, in any case only small, is counterbalanced by the inconveniences due to friction as a result of reducing the capacity of the cup. Friction or adhesion becomes more considerable when a hollow cylinder is substituted for the arms; moreover, mercury exerts considerable pressure on such a cylinder. 35

Having thus described the nature of this invention and the best means I know of carrying the same into practical effect, I claim:—

40 1. In a mercury vapor electric lamp having an anode and a mercury cathode, and in which the lighting is effected by a preliminary contact between the anode and the cathode, an annular chamber above the cathode formed by two concentric tubes and 45 containing a quantity of mercury independent of the electrodes of the lamp and which is permanently connected to one of the lamp terminals, and a contact member 50 connected to the anode and movable therewith and extending permanently into the quantity of mercury in said annular chamber so that the latter forms a liquid-conducting slide maintaining a perfect and permanent contact of the anode with its lamp 55 terminal.

2. In a mercury vapor electric lamp having an anode and a mercury cathode and in

which the lighting is effected by a preliminary contact between the anode and 60 the cathode, a chamber above the cathode and containing a quantity of mercury independent of the electrodes of the lamp and which is permanently connected to one of the lamp terminals, and a contact member 65 connected to the anode and movable therewith and extending permanently into the quantity of mercury in said chamber so that the latter forms a liquid-conducting slide maintaining a perfect and permanent con- 70 tact of the anode with its lamp terminal, the anode being solid, and its connection with said contact member being of sufficient conductivity to insure that the arc shall be between the solid anode and the mercury 75 cathode.

3. In a mercury vapor electric lamp which is lighted by a preliminary contact of anode and cathode, a condensing chamber carrying a supply of mercury forming the cathode, 80 and an annular chamber above the condensing chamber formed by two concentric tubes and containing a supply of mercury independent of the electrodes of the lamp, a movable contact member connected with the 85 anode and extending into the mercury in said annular chamber so as to form a liquid-conducting slide which maintains a perfect and permanent contact of the anode with the mercury in said annular chamber, the 90 mercury in said annular chamber being connected to one of the terminals of the lamp.

4. In a mercury vapor electric lamp, a movable contact member having an arm, a chamber containing a supply of mercury 95 connected to one of the terminals of the lamp and into which said contact member permanently extends so as to form a sliding liquid contact with said terminal, an anode 100 connected with said arm at one side, a solenoid having a core connected with said arm at the other side, said chamber being provided with upper and lower shoulders forming abutments for said arm against which it strikes in its upward and downward move- 105 ment and by which its movement is limited to maintain it permanently in contact with the mercury.

In witness whereof I have hereunto signed my name this 3rd day of September, 1906 110 in the presence of two subscribing witnesses.

LOUIS ANTOINE AUDIBERT.

Witnesses:

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