

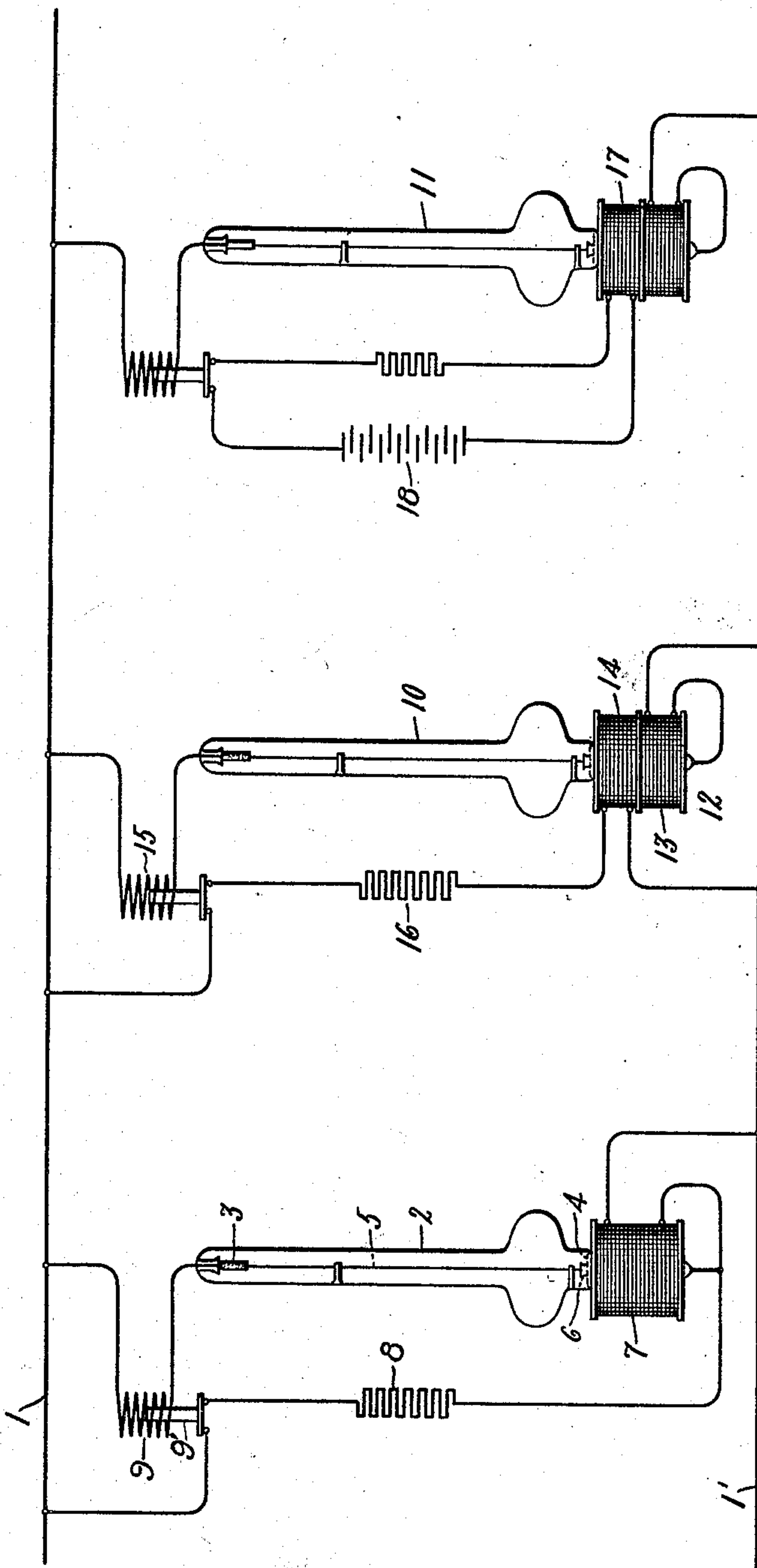
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No. 885,882.

PATENTED APR. 28, 1908.

C. P. STEINMETZ.
STARTING DEVICE FOR MERCURY LAMPS.

APPLICATION FILED OCT. 17, 1904.



Witnesses:

Benjamin B. Rice
Allen Oxford

Inventor

Charles P. Steinmetz,

by *Albert H. Davis*
Att'y.

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

STARTING DEVICE FOR MERCURY-LAMPS.

No. 885,882.

Specification of Letters Patent.

Patented April 28, 1908.

Application filed October 17, 1904. Serial No. 228,661.

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 Starting Devices for Mercury-Lamps, of which the following is a specification.

This invention relates to a means for starting mercury arc lamps or similar apparatus and is particularly applicable to lamps of the type in which a solenoid operates a plunger or other movable member to start the arc.

The invention will be more readily understood by reference to the following description taken in connection with the drawing forming a part of this specification.

In the figure the conductors 1, 1' represent the distributing mains of the constant pressure circuit supplying current to a mercury vapor tube 2 of ordinary construction which may be operated in parallel with suitable translating devices such for instance, as the vapor lamps 10 and 11. The complete mercury lamp comprises the upper electrode 3, the mercury electrode 4, the starting filament 5 of suitable resistance material, the solenoid 7 and a magnetic plunger 6 floating on the mercury and carrying in a cup-shaped depression in its top a small quantity of mercury which makes contact with the lower end of the filament 5. When the lamp is started the current in solenoid 7 draws down the plunger 6 and opens the circuit through filament 5 thus forming a spark at the end of the filament and starting the mercury vapor arc. The starting filament 5 is preferably of very high resistance so that under normal conditions of working, practically all of the current passing through the lamp will be carried by the mercury arc. As the consequence of this high resistance the starting current in solenoid 7 is relatively small. Considerable difficulty has been encountered in making the solenoid 7 sufficiently powerful to operate the plunger 6 without unduly increasing its resistance and hence its heat loss under normal conditions of working. To overcome these difficulties I provide a resistance 8 in parallel with the starting filament 5, but in series with the solenoid 7 so that at the instant of starting the current passing through solenoid 7, consists not only of the current in the starting filament, but also of the current through the

resistance 8. An automatic circuit breaker 9 of ordinary form has its coil connected in series with the lamp tube so that when the current in the lamp has reached substantially its normal value the armature 9' of the circuit breaker will automatically open the circuit through resistance 8 and will keep the circuit open so long as normal current flows through the lamp.

While the arrangement above described for abnormally increasing the effectiveness of the solenoid during the interval of starting is believed to be the preferable arrangement it is obvious that other modifications might be used to produce a similar result and I do not wish to limit my invention to the specific details described above. Such a modification is illustrated in connection with lamp 10, the solenoid 12 of which is composed of two separate windings 13 and 14. Winding 13 is connected directly in series with the vapor tube whereas winding 14 is energized by current received from the main 1 through a cut-out 15 and resistance 16, and hence derives its current through a path independent of the vapor carrying tube. Another form of supplemental means for energizing the solenoid or electro-magnet during the starting operation is shown in connection with lamp 11, and differs from that shown in connection with lamp 10 by having one of the coils 17 of the solenoid energized by current from a battery 18 instead of by current from the mains 1 and 1'. These and similar modifications I desire to include within the scope of the annexed claims.

By my improved construction I am able to use a solenoid of comparatively few turns, and to insure great reliability in the operation of the plunger 6, thereby materially improving the operation of lamps of the type illustrated.

My present application is directed to certain improvements in vapor electric devices and systems of the general type shown in my application, Serial No. 185,790, electric lamp, filed December 19, 1903. In my said earlier application claims are made broadly on the vapor lamp of the plunger type and on other features and details herein shown. I am not herein attempting to claim anything that could be claimed in said earlier application.

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

1. In an electrical system, the combination of a vapor electric device having an initially conductive path of high resistance therein, means for supplying current therethrough, a
5 movable member to start an arc in said device, electro-magnetic means traversed by said current and disposed for operating said movable member, and means for abnormally increasing the effectiveness of said electro-
10 magnetic means at starting.

2. In an electrical system, the combination of a mercury arc tube, means for supplying current thereto to form an arc, a movable member to start said arc, electro-magnetic
15 means traversed by all the current flowing through said tube and disposed for operating said movable member, and means for abnormally increasing the ampere turns of said solenoid during the interval of starting.

3. In an electrical system the combination of a mercury vapor tube, means for supplying current thereto, a movable member within said tube, a solenoid for operating
20 said movable member, and an auxiliary conducting path for supplying current to said solenoid independent of that transmitted by said vapor tube.

4. In an electrical system, the combination of a mercury vapor tube, means for supplying current thereto, a movable member
30 within said tube, a solenoid for operating said movable member, an auxiliary conductive path for supplying current to said solenoid independent of that transmitted by said vapor tube, and means for automatically opening said auxiliary path when the current
35 in said vapor tube has attained substantially its normal value.

5. In an electrical system, the combination of a mercury vapor tube, a plunger within said tube, a solenoid for operating
40 said plunger, and a resistance device connected in series with said solenoid and receiving current independent of that transmitted by said vapor tube.

6. In an electrical system, the combination of a mercury vapor tube, means for supplying current thereto, a movable plunger within said tube, a solenoid for operating
50 said plunger, a resistance device connected in series with said solenoid and receiving current independent of that transmitted by said vapor tube, and automatic means for opening the circuit through said resistance device

when the current in said vapor tube has attained substantially its normal value. 55

7. In an electrical system, the combination of a mercury vapor tube, a movable member within said tube, an electro-magnet normally connected in series with said tube
60 and traversed by the main current thereof, and means for increasing the strength of said electro-magnet at starting to operate said movable member.

8. In an electrical system, the combination of a vapor electric device, means for supplying current thereto to form an arc, a movable member within said tube to start
65 said arc, an electro-magnet for operating said movable member and normally traversed by current from said vapor electric device, and a path for current in series with said electro-magnet and in shunt with said vapor tube. 70

9. In an electrical system, the combination of a mercury vapor tube, means for supplying current thereto, a movable member within said tube, an electro-magnet for
75 operating said movable member connected in series with said tube, a path for current in series with said electro-magnet and in shunt with said tube, and means for automatically decreasing the current in said auxiliary path
80 when the current in said vapor tube increases.

10. In an electrical system, a vapor electric device having a high resistance conductor therein, means for supplying current
85 to said device, an electro-magnet receiving current through said high resistance conductor, and a current path independent of said vapor electric device for permitting the passage of additional current to said electro-
90 magnet when the device is started.

11. In an electrical system, a vapor electric device having a stationary tube, a high resistance path permitting the passage of
95 current therethrough before an arc is established therein, electro-magnetic means energized by said current for starting an arc in said tube, and supplemental means for energizing said electro-magnetic means at
100 starting.

In witness whereof I have hereunto set my hand this 15th day of October, 1904.

CHARLES P. STEINMETZ.

Witnesses:

HELEN ORFORD,
C. C. HOLLISTER.