

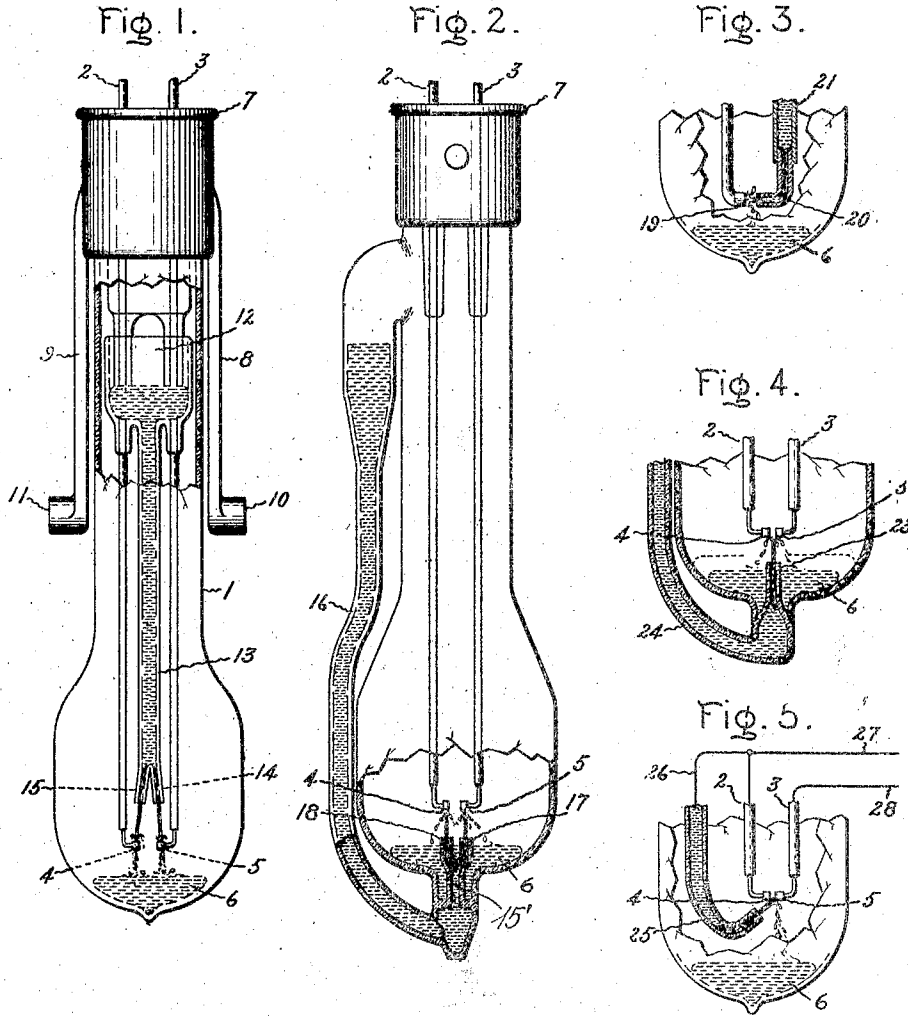
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C. A. B. HALVORSON, JR

ELECTRIC ARC DEVICE

Filed Sept. 27, 1922



Inventor:  
Cromwell A. B. Halvorson Jr.  
by *Allen & S. Davis*  
His Attorney.

# UNITED STATES PATENT OFFICE.

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## ELECTRIC ARC DEVICE.

Application filed September 27, 1922. Serial No. 590,981.

*To all whom it may concern:*

Be it known that I, CROMWELL A. B. HALVORSON, Jr., a citizen of the United States, residing at Lynn, in the county of Essex, State of Massachusetts, have invented certain new and useful Improvements in Electric Arc Devices, of which the following is a specification.

The present invention comprises an improved electric arc device of the incandescent cathode type and it is the particular object of my invention to provide means for starting the operation of the arc between the electrodes.

In accordance with my invention an electric discharge is produced between the refractory arcing electrodes by projecting a stream of conductive fluid, conveniently mercury, against the electrodes in such a manner as to complete the electric circuit.

The accompanying drawings illustrate different embodiments of my invention, Fig. 1 showing a lamp provided with conduits above the electrodes for delivering mercury streams into contact with the electrodes; Fig. 2 shows a modification in which mercury streams are projected against the electrodes from beneath; and Figs. 3, 4 and 5 are fragmental views illustrating other modifications for starting an arc by the projection of mercury into a gap between electrodes.

The device shown in Fig. 1 comprises a bulb 1 into which are sealed conductors, 2, 3, carrying at their ends electrodes 4, 5 consisting of tungsten or other conductive, refractory material suitable for supporting an arc at incandescence. The envelope contains a quantity of mercury 6 and preferably also contains a filling of gas which is inert with respect to the electrodes when at incandescence, for example, argon or nitrogen. The gaseous filling may have a pressure when operating varying from a few millimeters to atmospheric pressure, or thereabouts. Lamps of this class are described in Frederick U. S. Patent 1393520 of October 11, 1921. The upper end of the bulb is provided with a metal cap 7 to which are connected supporting arms 8, 9. The arms may be rotatably supported upon bearings 10, 11, so as to permit tilting.

Within the upper part of the bulb is provided a cup 12 into which part of the mercury within the bulb may be introduced

by tilting the bulb. When the bulb is brought to a vertical position, the mercury escapes from the cup 12 through a tube 13 which terminates in two tubes 14, 15, consisting of heat resisting glass or quartz. Streams of mercury escaping from the tubes 14, 15, strike the electrodes 4, 5. When the electrodes 4, 5 are connected to a suitable source of current, the completion of the circuit through the mercury escaping from the tube 13, followed by a breaking of the circuit when the mercury in tube 13 is emptied, starts an arc across the gap between the electrodes 4, 5, which continues to operate with the electrodes at incandescence.

The sequence of operations in the starting of an arc in the device shown in Fig. 2 having an external mercury tube 16 is the same as that described above in connection with Fig. 1. In this case the mercury after having been introduced into the tube 16 by tilting the lamp is projected upwardly through the tubes 15', 17, 18, bridges the gap between the electrodes 4, 5, and starts an arc, assuming a suitable current supply therefor.

In the device shown in Fig. 3, a mercury stream bridges the gap between the electrodes 19, 20 through a duct in the electrode 20 and the supporting stem 21. The construction otherwise may be similar to the structure shown in Fig. 1.

As shown in Fig. 4, a single jet of mercury may be projected against the arc electrodes by a tube 23 located below the electrodes, the mercury being supplied by a tube 24 communicating with the main bulb as shown in Fig. 2. Sufficient mercury has been provided in this case to cover the tip of the tube 23 during the operation of the lamp, the upper level of the mercury being indicated by a dotted line. Fig. 5 illustrates a lamp in which a tube 25 within the lamp projects a jet of mercury against the arc electrodes 4, 5, current connection being made to the mercury column within the tube 25 by a conductor 26, for example, by connecting the same to the positive side of the supply lines 27, 28.

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

1. An electric discharge device comprising a sealed envelope, solid electrodes therein, a body of liquid conductive material

adjacent said electrodes, and means constructed to receive a part of said material when the device is tilted and providing a conduit whereby the received material may be projected to bridge the gap between said electrodes when the device is restored to an operating position after having been tilted.

2. An arc device comprising a sealed envelope, refractory electrodes therein separated by a gap, means for containing a column of mercury, and a conduit leading therefrom to a point opposite said electrodes for temporarily bridging the gap between the same by a stream of mercury to start an arc across said gap.

3. An arc device comprising a sealed envelope, electrodes therein consisting of a refractory metal, a duct located adjacent said electrodes, and a reservoir in said envelope located above said electrodes for renewably supplying said duct with mercury at sufficient head to project streams of mercury into contact with said electrodes.

4. An electric lamp comprising a bulb, electrodes therein consisting of refractory

conducting material and separated by a gap, a filling of conductive liquid in said bulb which is gaseous at the operating temperature of said bulb and means for producing in said bulb a column of said material which when released will flow by gravity, bridging the gap between said electrodes to start a discharge between said electrodes.

5. An electric lamp comprising a bulb, electrodes of refractory material therein, a body of mercury, a reservoir in said bulb adapted to receive said mercury when said bulb is tilted, and conduits for delivering said mercury against said respective electrodes.

6. An electric device comprising a container electric discharge supporting electrodes therein, and a conduit external to said container and communicating therewith for conveying a liquid conductor into contact with said electrodes.

In witness whereof, I have hereunto set my hand this 23rd day of September, 1922.

CROMWELL A. B. HALVORSON, Jr.