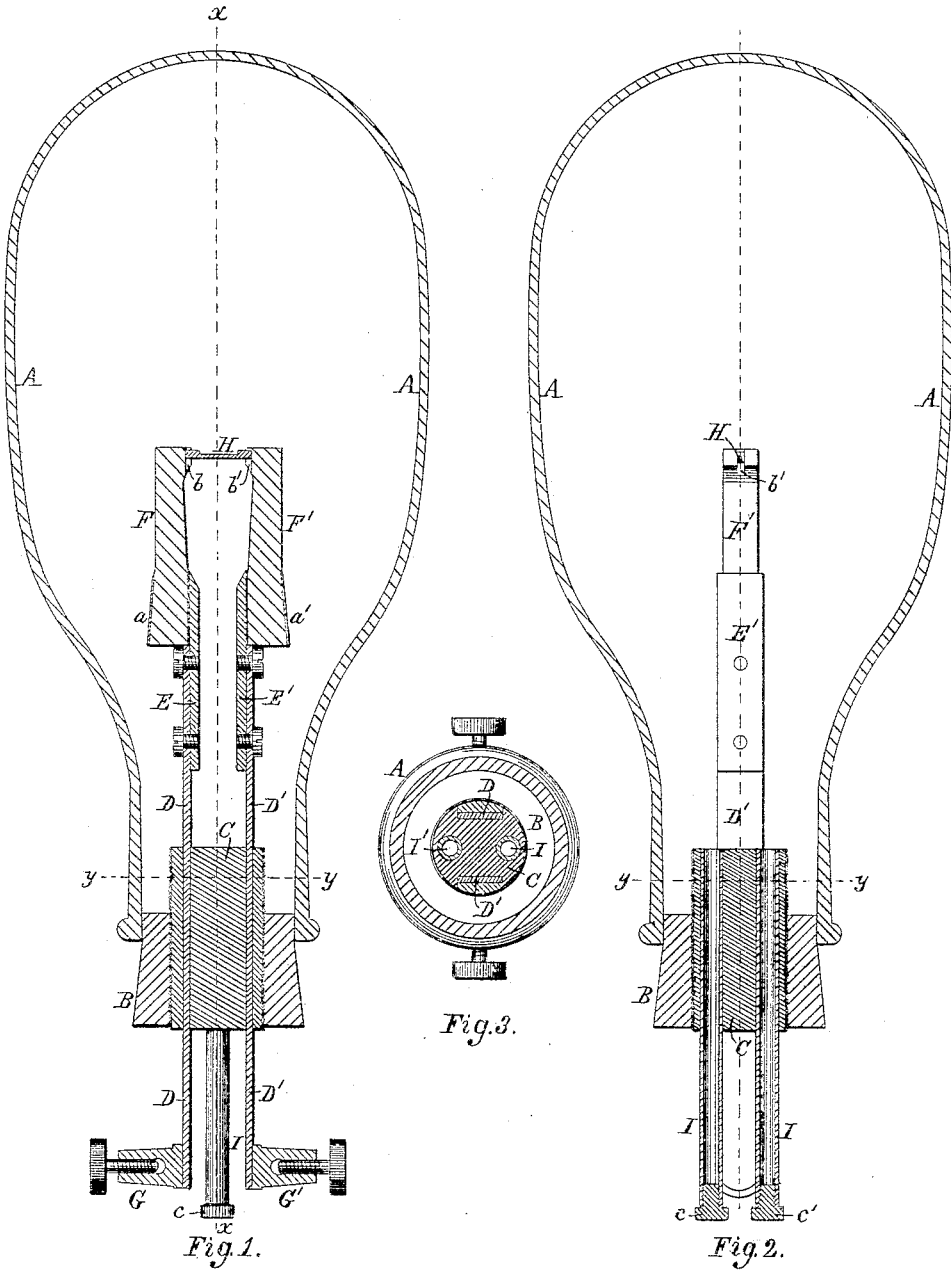


M. G. FARMER.
Electric Light.

No. 213,643.

Patented Mar. 25, 1879.



Witnesses.
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UNITED STATES PATENT OFFICE.

MOSES G. FARMER, OF NEWPORT, RHODE ISLAND.

IMPROVEMENT IN ELECTRIC LIGHTS.

Specification forming part of Letters Patent No. **213,643**, dated March 25, 1879; application filed November 20, 1878.

To all whom it may concern:

Be it known that I, MOSES G. FARMER, of Newport, in the county of Newport and State of Rhode Island, have invented certain new and useful Improvements in Electric Lamps; of which the following, taken in connection with the accompanying drawings, is a specification.

My invention relates to certain improvements in that class of electric lamps in which an electric current is made to pass through and heat sticks of carbon placed in the circuit, and hermetically closed in a globe filled with an artificial atmosphere; and it consists, first, in the use, in combination with an air-tight transparent globe or receptacle, of two large bars or rods of carbon, secured by their lower ends to spring conducting bars or rods, in positions parallel, or nearly so, to each other, and a short distance apart, and a small pencil or thin bar of carbon connecting the upper ends of said large carbon bars, and held in position and in contact with said large carbon bars by pressure caused by the tension of the spring conducting rods or plates.

It further consists in the use, in an electric lamp, of a transparent globe having its mouth closed air-tight by a stopple of rubber or other elastic non-conducting material, two conducting bars or plates passing through said stopple, in positions parallel, or nearly so, to each other, and adapted to serve as springs, a thick bar of carbon secured to the end of each of said spring conducting-bars within said globe, and a thin pencil or bar of carbon connecting the upper ends of said thick carbon bars, and held in position between them by friction consequent upon the spring of said conducting-bars, and adapted to be heated to incandescence by the passage of a current of electricity through the same.

It further consists in the combination of a transparent globe or receptacle, an annular cylinder of rubber surrounding and firmly secured to a cylinder of non-conducting material, and fitted to and adapted to close the mouth or open end of the globe, and two tubes or pipes passing through said non-conducting cylinder, and provided at their lower or outer ends with removable caps, plugs, or cocks as

a means of opening or closing communication through said pipes to the interior of the globe or receptacle.

Figure 1 of the drawings is a central vertical section of my improved electric lamp. Fig. 2 is a central vertical section on line $x x$ on Fig. 1. Fig. 3 is a transverse section on line $y y$ on Figs. 1 and 2.

A is a globe or receptacle made of glass, and may be of any desired shape, except that its open end should be contracted in diameter into a shape somewhat resembling the neck of a bottle, which open end or mouth is closed air-tight by a stopple fitted to and adapted to enter and fill the mouth of said glass receptacle, said stopple being composed of the annular ring of rubber B, or other suitable elastic material, surrounding and firmly secured by glue or other suitable adhesive material to the cylinder C, made of wood or other non-conducting material, as shown.

D and D' are two bars of metal passing longitudinally through the non-conducting cylinder C, and secured firmly in position therein, so as to form air-tight joints, said bars D and D' extending upward into the receptacle A a sufficient distance, and having screwed thereto the shorter metal bars E and E', to the upper ends of which are respectively attached, in a manner to be hereinafter described, the carbon bars F and F', and the bars D and D' also extend below the end of the stopple B C, and have attached to their lower ends the screw-cups G and G', respectively, from which suitable wires (not shown) lead to and connect with the opposite poles of a battery, (also not shown.)

The carbon bars F and F' are made thick and comparatively short, and have their bases or a portion of their lower ends covered, by electroplating or otherwise, with thin films of copper, a and a' , and are secured to the bars E and E' in positions substantially parallel to each other by soldering the bars E and E', respectively, to the copper coverings a and a' . The upper ends of the carbon bars F and F' have formed in their inner or contiguous sides vertical slots or grooves b and b' , to receive the ends of the small thin bar of carbon H, which is held in position by the pressure of the bars

F and F' against its ends, caused by the tension of the bars D and D', the carbon rod H being made of such a length as to necessitate a slight springing of the bars D and D', in order to insert it in position between the carbon bars F and F'.

I and I' are two pipes passing through the stopple B C, and closed at their lower ends by the screw plugs or caps *c* and *c'*, as shown; or, instead of the plugs *c* and *c'*, each pipe may be provided with a cock, by which communication with the interior of the globe A may be opened or closed at will.

The operation of my improved electric lamp is as follows: The lamp being fitted up in the manner shown and described, it is first necessary to substitute for the common atmosphere contained in the globe a vacuum or an artificial atmosphere; and to do this the plugs or caps *c* and *c'* are removed from the pipes I and I', when one of said pipes is connected with a pipe or nozzle opening from a reservoir containing nitrogen or other non-oxygen, containing gas, and said gas is allowed to flow into the globe A, while the common air contained in said globe escapes or is exhausted from said globe through the other pipe, care being taken to hold the globe in an upright position, so that the gas, being lighter than the atmosphere, will rise to the top of the globe and compel the atmosphere to escape from the bottom through the pipe, which is open to the exterior atmosphere. When the air is all expelled from the globe, and the gas begins to escape from the open pipe, the lamp is disconnected from the gas-supply pipe, and the pipes I and I' are both closed by replacing the caps or plugs *c* and *c'*, the lamp being held in an upright position till said pipes are securely closed. The lamp is then placed in the position where it is to be used, and connected by suitable wires to the battery. If, now, the circuit be closed by a proper operation of a suitable switch, the current of electricity passes up the bar D, through the bar E, carbon bar F, along

the carbon rod H, through the carbon bar F', metal bars E' and D', and thence to the battery.

The resistance presented by the small carbon rod H to the passage of the current of electricity causes said rod H to be heated to incandescence, and produces a brilliant light without igniting or consuming the gas contained in the globe A.

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

1. The combination, in an electric lamp, of the transparent globe or chamber A, conducting bars or plates D and D', adapted to serve as springs, the thick carbon bars F and F', secured to said spring conducting bars or plates, and the thin carbon rod H, connecting the tops of the carbon bars F and F', and held in position between them by pressure consequent upon the spring of the conducting bars or plates D and D', substantially as described.

2. The combination, in an electric lamp, of the transparent globe A, a stopple of rubber or other elastic non-conducting material fitted to the mouth of said globe, and retained therein by friction conducting-bars D and D', adapted to serve as springs, the thick carbon bars F and F', secured to said spring conducting-bars, and the thin carbon pencil H, connecting the tops of said thick carbon bars, and held in position between them by friction consequent upon the spring of the conducting-bars D and D', substantially as described.

3. The combination of the globe A, non-conducting cylinder C, elastic ring or sleeve B, and the two pipes I and I', each provided with means for opening and closing communication through said pipe, substantially as and for the purposes described.

Executed at Boston, Massachusetts, this 16th day of November, A. D. 1878.

MOSES G. FARMER.

Witnesses:

N. C. LOMBARD,

E. A. HEMMENWAY.