W. E. SAWYER & A. MAN.

Electric-Lamp.

No. 210,809. Patented Dec. 10, 1878.

FIG. 3.

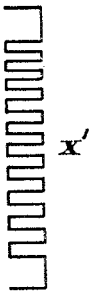


FIG. 1.

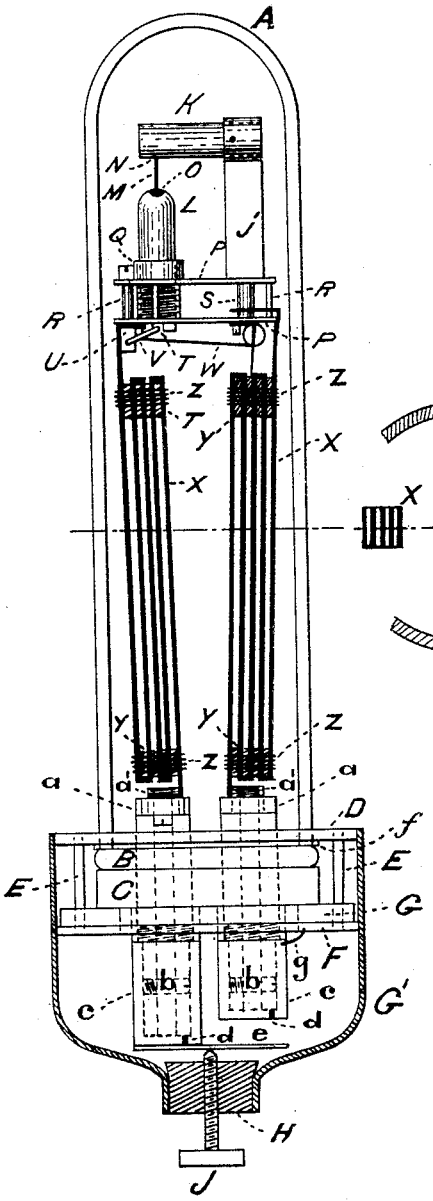


FIG. 2.

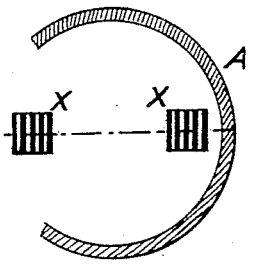
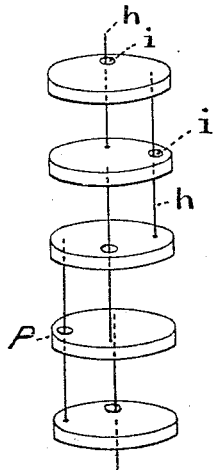


FIG. 4.



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UNITED STATES PATENT OFFICE.

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IMPROVEMENT IN ELECTRIC LAMPS.

Specification forming part of Letters Patent No. **210,809**, dated December 10, 1878; application filed November 5, 1878.

To all whom it may concern:

Be it known that we, WILLIAM EDWARD SAWYER, of the city, county, and State of New York, and ALBON MAN, of the city of Brooklyn, county of Kings, State of New York, have invented certain new and useful Improvements in Electric Lamps, of which the following is a full, clear, and exact description.

In Letters Patent of the United States No. 205,144, dated June 18, 1878, granted to us, we have shown and described an electric lamp differing not essentially, in so far as its main features are concerned, from that of our present invention, the object of which is to produce a lamp more tasteful in appearance and better adapted to afford a successful electric light.

Referring to the drawings accompanying and forming a part of this specification, Figure 1 is a sectional view of the lamp, and Fig. 2 a cross-section of a part thereof. In Figs. 3 and 4 we have indicated modifications which may be made in the form of the internal conductors.

A is a glass globe, provided with a flange, B, substantially as shown and described in the Letters Patent referred to. C is the stopper; *a a* are the tubular bolts passing through the same, and *f* and G are cushions to soften the pressure upon the glass flange and stopper of the two metal flanges D and F, drawn together by bolts E E, the whole of which has been fully described and claimed in the above-mentioned Letters Patent as the clamping device of our invention, and of which we do not deem it necessary, therefore, to enter into a detailed description here. The tube-bolts *a a* are provided with ordinary stop-cocks *b b*, the construction of which is well known. Over the outer ends of these bolts, stop-cocks, and all, are the metal caps *c c*.

In charging a globe with an artificial atmosphere—such, for instance, as described in the above-mentioned Letters Patent—a long tube is passed through one of the tube-bolts *a*, so as to reach the upper portion of the globe, space being provided therefor. The lamp then being inverted the artificial atmosphere, entering by way of the other tube-bolt *a*, displaces the gaseous contents of the globe, which flow out by way of this long tube. When the globe is sufficiently well charged, and while the flow still continues, the long tube is slowly withdrawn, the outward flow of the gas preventing the entrance of atmospheric air during the operation. The long tube having been withdrawn, the stop-cock through which it had passed is closed. To fully seal the joint we pour melted bees-wax into the opening outside of the stop-cock, and filling the nut *c* with melted bees-wax we screw it up, so as to incase the entire external end of the tube with the bees-wax, an opening, *d*, in the end of the cap permitting superfluous wax to exude. Thus the joint is hermetically sealed. To seal the other tube-bolt we close its stop-cock *b*, disconnect the charging apparatus, and proceed to treat the bolt and cap as in the first instance. To further hermetically seal the entire globe, as by a hydraulic joint, we have recourse to a spun-metal cap, G′, fitting closely to the flange D, and held in place to it, if desired, by suitable pins or screws.

The lower and smaller end of the spun cap, which is made open, is fitted with an insulating-plug, H, through which passes a metal screw, I, which, when all is in place, makes contact with metal strip *e*, fixed to a cap, *c*. The other cap *c* is connected by wire *g* with flange F, thence, by way of bolts E E, with flange D, and thence with cap G′. Thus, to make connection of the lamp with a chandelier or a bracket, a metal arm of which is provided with an opening containing an exposed insulated contact-joint in its center, the two constituting the terminals of the conductors leading from the generator, all that is necessary is to screw the smaller end of the spun cap into the same until the insulated contact-joint and the screw I make connection, the electric current passing in by way of the spun cap and leaving by way of the screw I, or vice versa.

The application of the spun cap G′ is as follows: The lamp is first perfectly charged and the caps *c c* are put on, as already described. The spun cap G′ is then filled, or partially filled, with melted bees-wax, and the lower extremity of the globe A, the stopper C, the clamping device, and all the parts appertaining thereto are sunk into this fluid mass, which, upon cooling, effectually seals the lamp. We

have spoken of bees-wax as the sealing agent, but it is clear that any other easily-fused material, or even an oil or other liquid, will answer the purpose equally well.

The spiral internal conductors shown and described in the Letters Patent referred to are somewhat unsightly. In place of them we prefer the long conductors X X, referring to Figs. 1 and 2, which are made of a copper ribbon, polished or electroplated, and folded in the manner shown, so as to form square grid-iron-shaped uprights. These are screwed at their lower extremities to the tube-bolts *a a* by screws *a' a'*. To prevent electrical connections at the bends or at intermediate points, we place in the same small pieces of mica Y Y Y Y, and to render the rods firm and substantial we bind them at the ends with insulated wires Z Z Z Z. These conductors meet all the requirements of the spiral conductors of the Letters Patent referred to, and are much more pleasing to the eye. If desired, they may be constructed as shown in Fig. 3.

The diaphragm, to prevent downward radiation of the heat, as fully set forth in the aforesaid Letters Patent, may be of any infusible opaque insulating substance, or of metal, as shown in the present application. In our present invention it consists of two metal plates, P P, held together by bolts R R. The lower plate absorbs any possible radiation from the upper plate; but we may use more than two plates, or a single plate, if desired. Joining the two plates is a tube-bolt, Q, in which the round metal bar or rod L is free to slide. The bar L is capped with a platinum or iridium contact-piece, O, and is actuated by means of spring W, acting upon stirrup V, which has a bearing in the groove T of rod L, and is pivoted in nut U, to which the upper extremity of one of the conductors X is connected. The rod L thus allows for any contraction or expansion of the carbon pencil M. For this rod we have chosen the term the "anvil" of the lamp. The hammer consists of a metal bar, K, provided also with a platinum or iridium contact-piece, N, and it is held firmly in place by standard J', to which, by way of its extension S, one of the conductors X is connected. The hammer-standard and its conductor are insulated in any of the well-known ways, preferably by the interposition of layers of mica at the points of contact.

The contact-points N and O may be of carbon, although we prefer platinum or iridium.

In the drawing we have shown a method of combining several of the diaphragm-disks P, of metal, so as to constitute the conductors of the lamp. The disks are held together by small rods *h*, alternate plates being electrically connected, as shown, and insulated from the intermediate plates by the rods *h*, passing through the holes *i*, but not touching the sides thereof.

The importance of a number of plates, P, to prevent downward radiation of heat is manifest.

To charge the globe we proceed as follows: The lamp being connected with a hydrogen-generator, we first exhaust the air, then we charge the globe with pure dry hydrogen; again we exhaust and charge with hydrogen, and this operation we repeat until the original gaseous contents of the globe are entirely replaced by the hydrogen. We then, in place of the hydrogen, connect the lamp with a generator of pure dry nitrogen, keeping the globe A constantly heated by having it immersed in a bath of hot water, exhausting the hydrogen. We fill the partial vacuum with nitrogen, or we may do it by displacement, and this operation we continue until the globe contains nothing but nitrogen, excepting such gases as may be occluded by the inclosed materials. To drive these out we pass an electric current through the conductors *x x*. The carbon pencil M is intensely heated, and considerable heat having extended throughout all the inclosed material, thus driving out occluded gases, the operation of exhaustion and refilling with nitrogen is continued until finally all the elements of danger are eliminated from the lamp.

Having thus fully described our invention, what we claim as such, and desire to secure by Letters Patent, is—

1. In an electric lamp, the cap G', provided with an insulated contact, J, for the purpose of establishing the electric connection of the lamp with the terminals of the conductors leading from the generator when the lamp is set in a suitable holder, substantially as shown and described.

2. An internal conductor in an electric lamp consisting of strips of metal fluted or plain, insulated at their ends or heads with slips of mica or other suitable insulating material, and bound together to insure solidity of construction.

3. In an electric lamp, the combination of the diaphragm P, standard J', sliding bar L, spring W, and stirrup V, in the manner substantially as described.

4. A sliding anvil L, held in a socket, Q, and supported by a spring to carry the burner M and hold it against the hammer K, the contact-points to be of platinum or iridium, substantially as described.

5. The herein-described method of charging the globe of an electric lamp with nitrogen, consisting, first, of replacing the original gaseous contents of the globe with hydrogen, and then replacing the hydrogen with nitrogen.

6. In an electric lamp, two or more diaphragm-disks, as and for the purpose specified.

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Witnesses:
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