(No Model.)

E. J. HOUSTON.

ELECTRIC INCANDESCENT LAMP.

No. 259,017. Patented June 6, 1882.

FIG. 1.

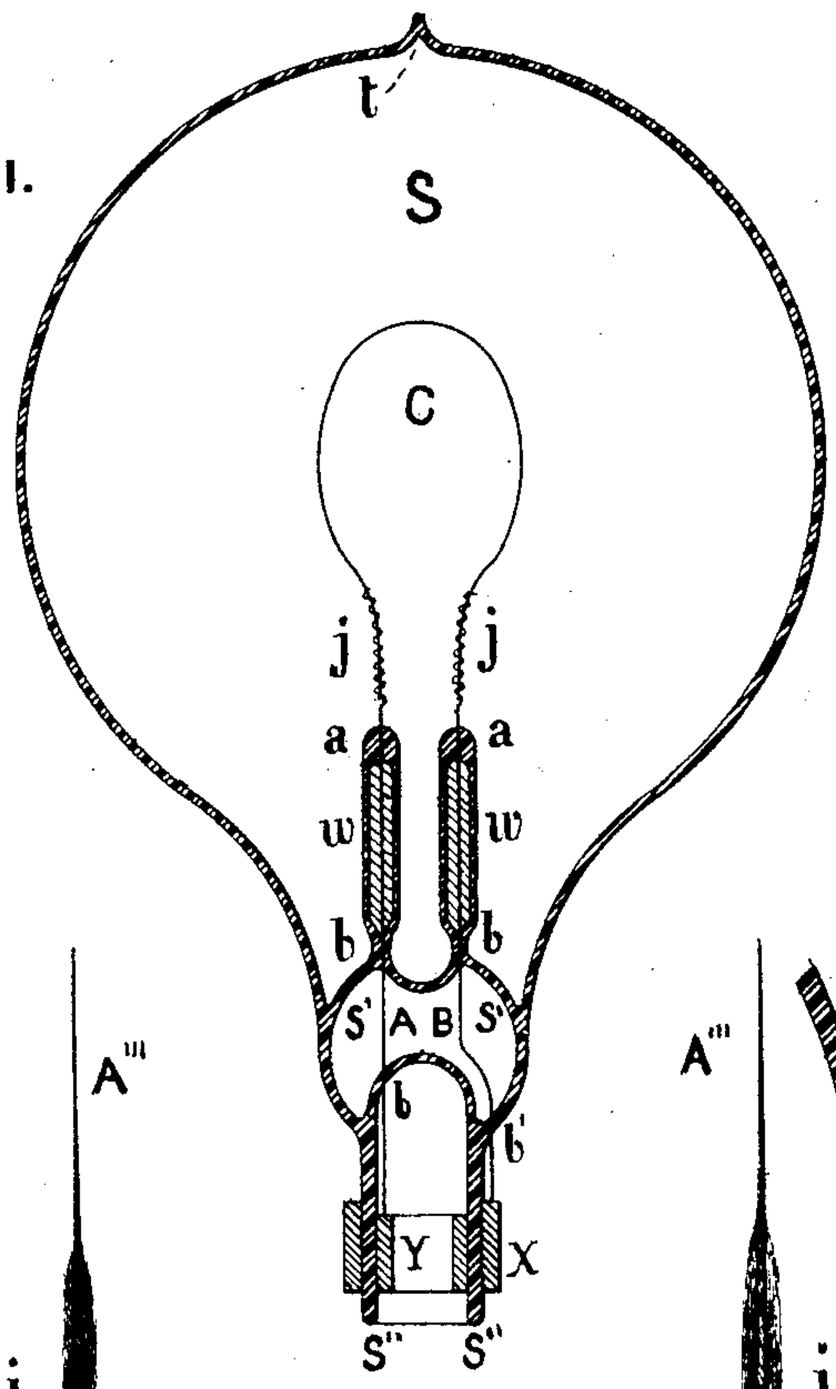


FIG. 2.

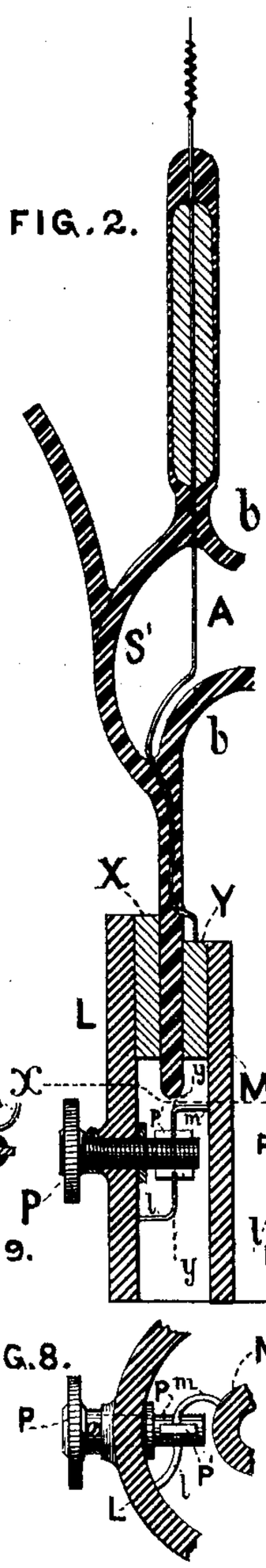


FIG. 3.

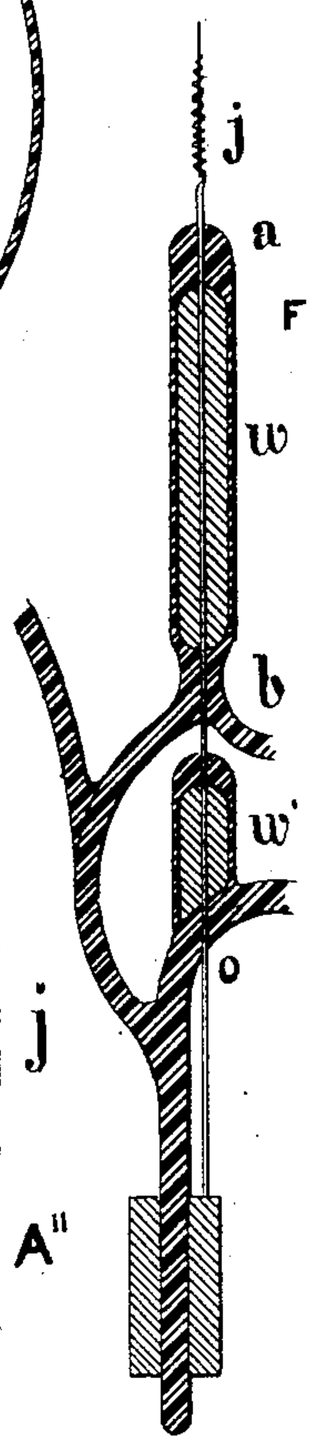


FIG. 6.

FIG. 7.

FIG. 4.

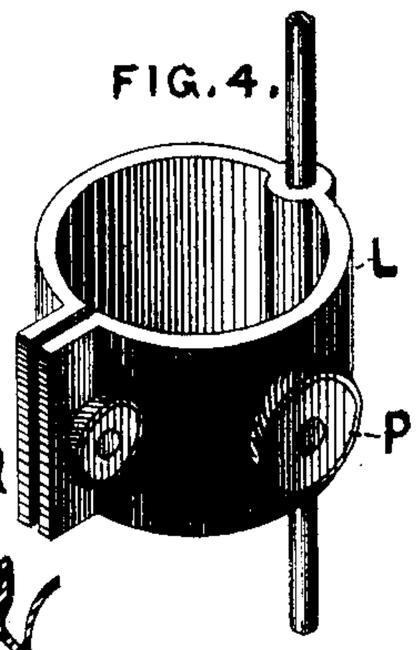


FIG. 8.

FIG. 9.

FIG. 10.

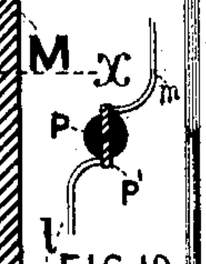
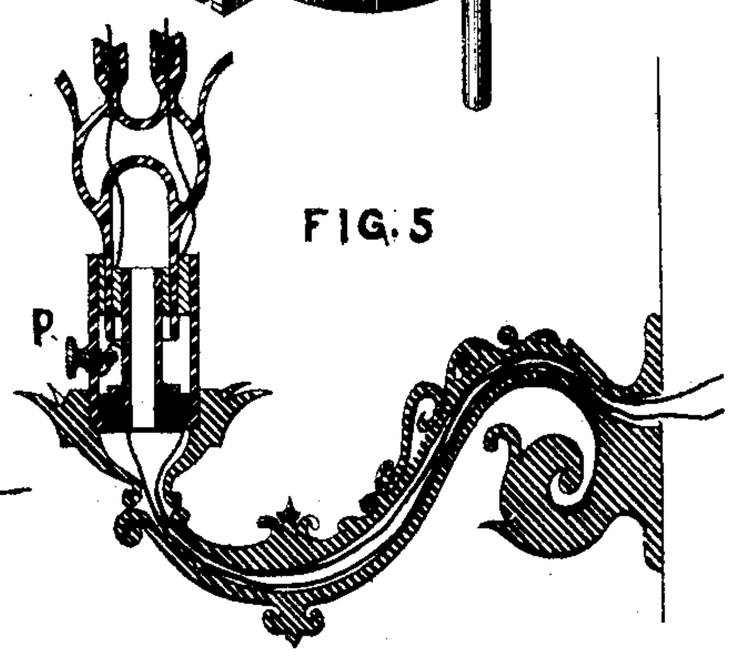


FIG. 5



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ELECTRIC INCANDESCENT LAMP.

SPECIFICATION forming part of Letters Patent No. 259,017, dated June 6, 1882.

Application filed March 14, 1882. (No model.)

To all whom it may concern:

Be it known that I, EDWIN J. HOUSTON, of the city and county of Philadelphia, State of Pennsylvania, have invented certain new and useful Improvements in Electric Incandescent Lamps, of which the following is such a description as will enable those skilled in the art to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

The object of my invention is to improve the general construction and to increase the durability and efficiency of incandescent lamps. These ends I accomplish by an improved means of forming the electric conducting-joints between the ends of the incandescent carbon filament and the conductors conveying the current into the lamp, and by other details of construction, all of which will be hereinafter more fully described.

Considerable difficulty has hitherto been experienced in obtaining a good electrical conducting-joint between the ends of the carbon filament and the conducting-wires attached thereto. I obtain such a joint by the following means: To the ends of the carbon filament, which I prefer to make out of paper-pulp or card-board, prepared and carbonized in the usual manner, I attach short lengths of wire made of iron or other material capable of entering into chemical combination with carbon by any suitable means—as, for example, by wrapping the wire about the filament or by passing it through a hole in the ends of the filament, and bring the iron wires into as intimate contact with the ends of filament as possible. I then by preference insure better contact by electroplating the junction with a thin deposit of iron. This being done I still further increase the electrical conductivity and secure a more intimate union between the junction of the wire and the filament by converting the iron into steel or a carbide containing more carbon than ordinary steel. This latter process may be effected by exposing the junction, while highly heated by any means—as by the passage of an electrical current—to any hydrocarbon gas or vapor. Under these circumstances, as is well known, the hydrocarbon is decomposed and carbon of high electrical conductivity is deposited on the heated surfaces. If any of these surfaces be formed of any other substance that, like iron, is capable of entering into chemical combination with the carbon, it will so combine. In the case of iron it will be converted into steel, while pure carbon will be deposited on the junction and on the filament, thus insuring a true chemical contact at the junction. If so desired, the deposition of the carbon on the other portions of the filament may be prevented by any suitable means. Instead of exposing the junction to hydrocarbon gases or vapors while the parts are incandescent, it may, if so desired, be dipped in any hydrocarbon liquid and carbon deposited thereon by simple electrolytic action.

I sometimes slightly modify the above-described processes as follows, viz: Before the paper or pulp forms are carbonized I secure the iron wires to the ends thereof by wrapping them with strands of flax or other pliant carbonizable material. During the ordinary process of carbonization, which is then resorted to, the pliant fibrous material is not only carbonized, but partially converts the iron into steel. Immediately on removal from the furnace I electroplate the junction with iron, and then expose the filament and its conducting-wires, while heated to electrical incandescence, to the same hydrocarbon vapor or gas that is employed for the purpose of improving the electrical conductivity and homogeneity of the filament. The length of iron or other wire thus connected to the carbon is not passed through the globe, as a good joint cannot be formed between the iron and glass, but is attached to a piece of platinum or other conductor suitable for forming a tight joint at the point where the leading-in conductor passes through the walls of the globe. By thus constructing the leading-in conductor of two parts, one capable of entering into chemical union with carbon and the other suitable for sealing in glass, I insure a tight joint at the point of sealing as well as a good electrical connection between the carbon and the leading-in conductor.

Figures 1 to 10 show the various details of my invention as applied to my improved construction of incandescent lamps. Fig. 1 is a view of the completed lamp with its incandes-

cing filament, showing the support therefor and its inclosing glass globe or envelope. Fig. 2 is a vertical section through part of the lamp, showing the method of supporting the same and the device for turning the current into or away from the lamp. Fig. 3 shows a modified form of sealing for the conducting-wires. Fig. 4 shows in detail a simple form of supporting-clamp for the lamp. Fig. 5 shows the method of support for a bracket-lamp. Figs. 6 and 7 show the construction of the conducting-wires. Figs. 8, 9, and 10 show the details of the mechanism for turning the light on or off.

In Fig. 1 is shown a lamp completed according to the details of my invention, and ready for placing on its supporting-bracket. C is the carbon filament. *j j* are the steelified and carbonized junctions, prepared in the manner previously described. The conducting-wires A and B, leading to the junctions *j j*, are fused into the ends of two glass tubes, *w w*, by melting the glass around them, as at *a a*. These tubes are constricted, at *b b*, near their points of attachment to the supporting mass S′ S′ S″ S″, which is also of glass. The glass mass S′ S′ S″ S″ *w w*, which forms the support for the carbon filament C, has an inclosing globe, S, also of glass, securely attached to it by fusing it to the neck of the supporting-stand at S′ S′, as shown, and exhausted of air in the usual manner. Before closing the lower part of S′ S′, and by preference before attaching the globe S, melted sealing-wax is run in the tubes *w w*, so as to completely surround the conducting-wires. The end is then fused at the constricted portions *b b*. The object of the tubes *w w*, with their inclosing sealing-wax, is to prevent the entrance of air into the chamber containing the carbon filament. Sealing-wax or any other partially-flexible substance answers this purpose admirably, and I have used it with considerable success for sealing the wires connected with highly-exhausted glass tubes. It probably owes its efficiency to the strength of its adhesion both to the glass and the conducting-wire, and also to the fact that purely local expansions of the conducting-wires are not so liable to fracture it as to fracture a more brittle material. Other sealing materials may, however, be used in place of the wax. The lower part of the glass support is shaped as shown, and fashioned at its bottom into the form of a hollow cylinder, as seen at S″ S″. At some little distance from the lower end of S″ S″ brass or copper rings Y X are placed, one inside and the other outside the glass cylinder. These rings, which are attached to the glass in any suitable manner, form the terminals of the conducting-wires A and B, and afford a ready means of placing the lamp in electrical connection with the conductors furnishing the electric current. The bracket or chandelier that supports the lamp is provided with two concentric conducting-rings, suitably insulated from each other and connected respectively to the wire leading to and from the source furnishing the electric current. These rings are placed such a distance apart as to permit the rings X and Y, connected to the supporting-stand S″ S″, to be forced between them. They may be caused to press more firmly against the conductors X and Y, and thus insure better electrical contact, by means of suitably-placed springs, or the outer ring of the supporting-bracket may be firmly clamped against the outer ring of the lamp-stand, by means of the contrivance I have shown in connection with Figs. 2 and 4. This contrivance consists in a simple hinged joint which holds the two halves of the outer ring, L. Lips formed on the other ends of the sections are connected by a screw, Q, by means of which the diameter of the ring can be varied within certain limits.

I have also shown in Figs. 2, 8, 9, and 10 simple means by which the current can be caused to flow through or past the lamp, thus lighting or extinguishing it. This consists of the screw or spindle P, seated in and passing through ring L, and preferably made of some insulating material or resting in an insulating sleeve. By turning the screw a quarter-revolution metallic contact is established between L and M by means of the devices to be presently described, and the lamp is thus extinguished, the incandescent portion being short-circuited. When in this position another quarter-turn breaks the short circuit between L and M, and thus lights the lamp.

Fig. 8 is a horizontal transverse section through *x x* of Fig. 2. Fig. 9 is a vertical transverse section through P on line *y y* of Fig. 2, showing the position of parts when the lamp is lighted. Here the metallic piece P′, extending through the insulating material of P and suitably attached thereto, is shown as out of contact with the conducting wires or springs *m* and *l*, connected respectively with M and L. Under these conditions, if the lamp be in its socket, the current is forced to pass through the carbon filament.

Fig. 10 shows the device with the screw P turned so as to bring the pin or conducting-piece P′ simultaneously into contact with springs or wires *m l* and close the circuit around the lamp by forming a short circuit from L to M, thus extinguishing the light.

In Fig. 3 I have shown a modified form of the sealing-joint shown in Fig. 1 at *w w*. The letters refer to similar parts to those shown Fig. 1. In the lower part of the stand S S, I provide a tube, *w′*, which is filled with melted wax in a manner similar to that described in connection with Fig. 1. I sometimes adopt this method in preference, so as to avoid the possibility of injury to the vacuum in S, due to the leakage of gases evolved from the wax in *w w*. In this form, the wax being entirely within the supporting-stand S′ S′, injury from leaking is much less liable to occur. To still further avoid the danger from this source I sometimes purposely leave an opening at *o* in the lower part of the tube *w′*, so as to facilitate the escape of compressed vapors.

I have shown in Fig. 5 the mode of attach-

ing the lamp to its supporting bracket or stand. The conducting-wires, which are suitably insulated, are passed through the hollow tube forming part of the bracket. The conducting-rings L and M are separated from one another and from the metal of the supporting-bracket by insulating material. One of the conducting-wires is brought into metallic contact with the outer ring and the other to the inner ring. In order to place the lamp on the bracket, the screw Q is turned so as to open the ring L. The lamp is then placed therein, so that its ring X is brought into metallic contact with L, and Y into metallic contact with M. The screw Q is then turned so as to firmly clamp the ring L, and the lamp is ready for use.

In Figs. 6 and 7 I have illustrated some of the different methods of forming the conducting-wire.

A''' A''' is the end of the carbon filament. *j j* are the joints, steelified and carbonized, as already explained. A'' A'' are the lengths of iron wire. *j' j'* are the welded or wrapped joints. The wires A' A' are either copper or platinum.

What I claim as my invention is—

1. The herein-described method of forming a good electrical connection with the carbon strip or filament of an incandescent lamp, consisting in fastening the strip or filament to a conductor of iron or other conducting substance capable of entering into chemical combination with carbon, and then carbonizing the conductor thus attached.

2. The herein-described method of forming an electrical connection between the carbon strip or filament of an incandescent electric lamp and the outside conductor, consisting in fastening the strip or filament to a conductor of a material capable of entering into chemical combination with carbon, electroplating the joint with a similar material, capable also of entering into chemical combination with carbon, and then converting the joint thus formed into a carbide of the material employed.

3. The herein-described method of forming an electrical connection with the strip or filament of an incandescent carbon lamp, consisting in fastening said strip to a length of iron conducting-wire, and then converting the iron thus attached into a carbide.

4. The herein-described method of forming an electrical connection with the strip or filament of an incandescent carbon lamp, consisting in fastening said strip to an iron conductor, electroplating the joint with iron or other suitable metal, and then treating the joint thus formed so as to convert the iron into a carbide.

5. The herein-described method of forming an electrical connection between the strip or filament of an incandescent carbon lamp, consisting in connecting the strip or filament before carbonization to an iron conductor, wrapping the iron with a carbonizable material, carbonizing the strip or filament with the conductor thus attached, and afterward electroplating with iron and heating to incandescence in a carbon vapor, gas, or liquid.

6. A compound leading-in conductor for an incandescent light, composed of platinum at the point where it passes through the walls of the glass inclosing globe and of iron or similar material capable of entering into chemical combination with carbon at the point where it is attached to the carbon strip or filament.

7. In an incandescent electric lamp, a carbon strip or filament, in combination with a leading-in conductor of carbide of iron covered with carbon at the point of junction, deposited in the manner set forth.

8. In an incandescent lamp, a compound conductor for the purpose of carrying the current to and from the carbon filament, consisting essentially of a metallic wire of suitable material for sealing into the glass support by melting the glass around it, welded to or wrapped around one end of a wire capable of entering into chemical combination with the carbon of the filament, and combined chemically in the manner substantially as described with the end of the filament and with other carbon deposited thereon.

9. A glass supporting and an inclosing globe for the incandescing filament of an electric lamp, fashioned at its bottom into the form of a hollow cylinder, S'' S'', to the inside and outside of which respectively are attached the conducting-rings X Y, connected to the ends of the filament.

10. The combination, substantially as described, of an electric lamp provided at its base with a conducting-ring forming a terminal of its incandescing portion, and a ring-socket for holding the lamp formed in two parts, said ring being provided with a suitable clamping device, and connected with the conductor by which the electric current is supplied to the lamp.

11. The combination of the double-ring socket L and M and shunting-key P.

12. The combination of the double-ring socket L M, springs or conductors projecting from said rings, and the turning screw or spindle P, mounted in the outer ring and provided with means for completing and breaking the circuit between the springs.

EDWIN J. HOUSTON.

Witnesses:
EDWARD W. VOGDES,
GEO. W. SCHOCK.