(No Model.)

2 Sheets—Sheet 1

A. MAN.

Electric Lamp.

No. 227,118. Patented May 4, 1880.

FIG. 1.

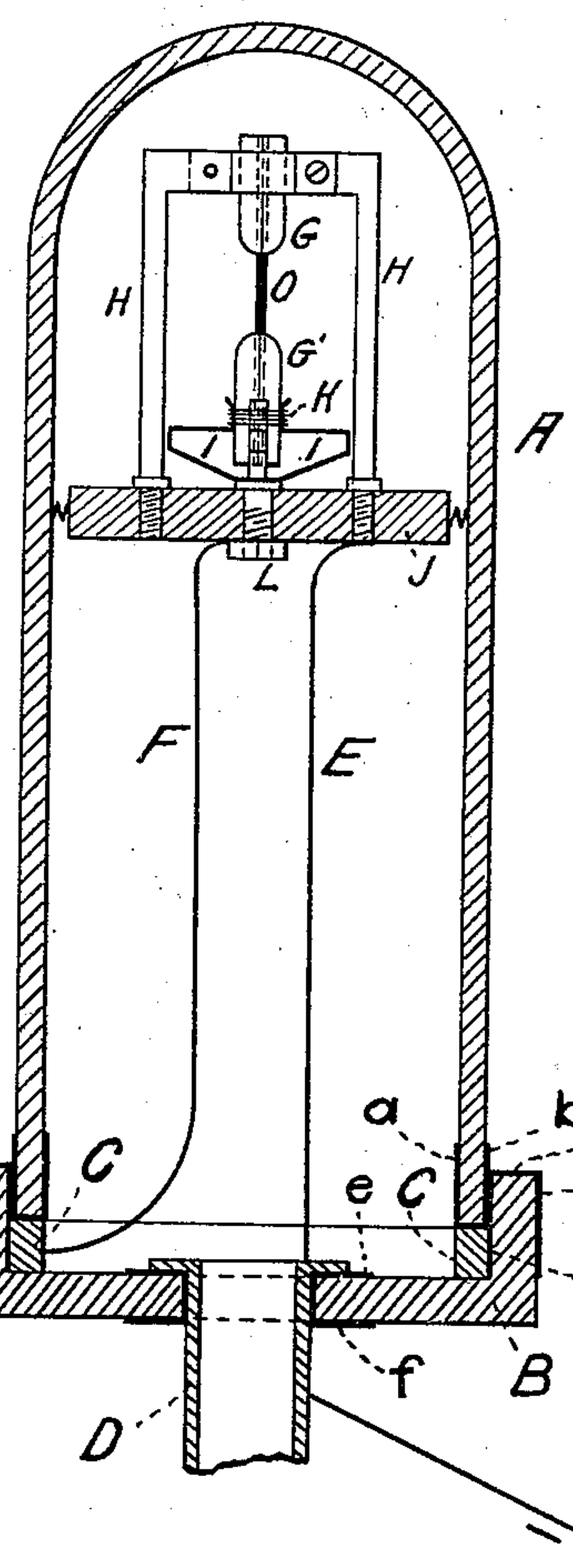


FIG. 3.

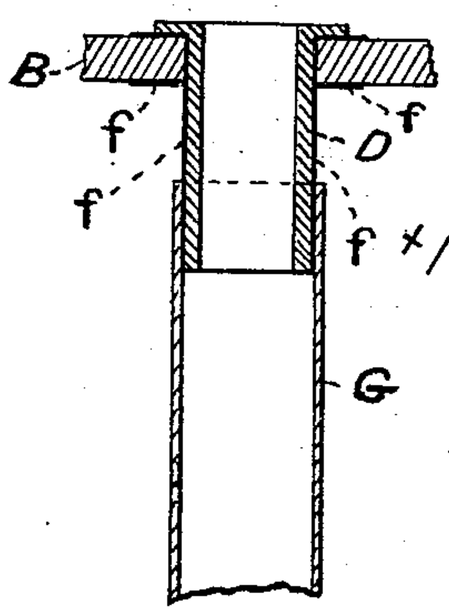
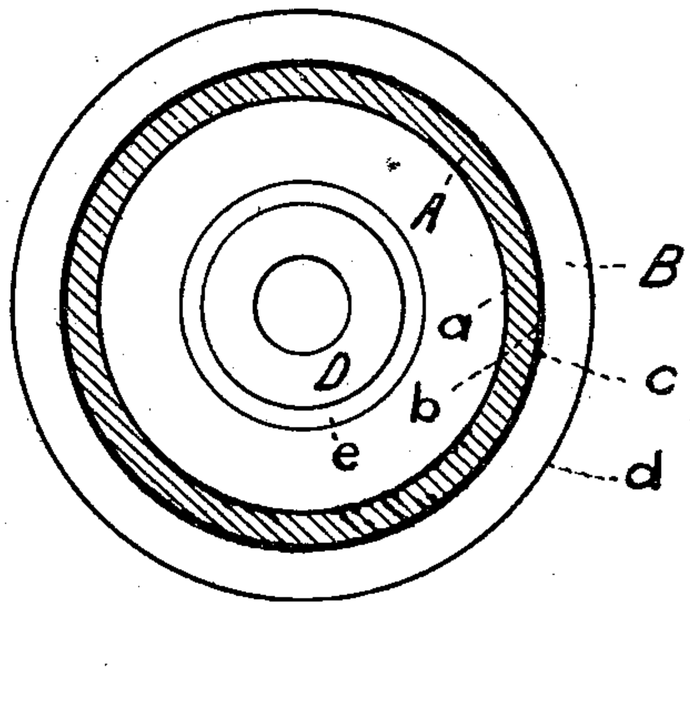


FIG. 2.



WITNESSES.

Chas. C. Bull

Wm. A. Broadway

INVENTOR.

Albon Man

By Amos Broadway & Co

(No Model.)

2 Sheets—Sheet 2.

A. MAN.

Electric Lamp.

No. 227,118. Patented May 4, 1880.

FIG. 4.

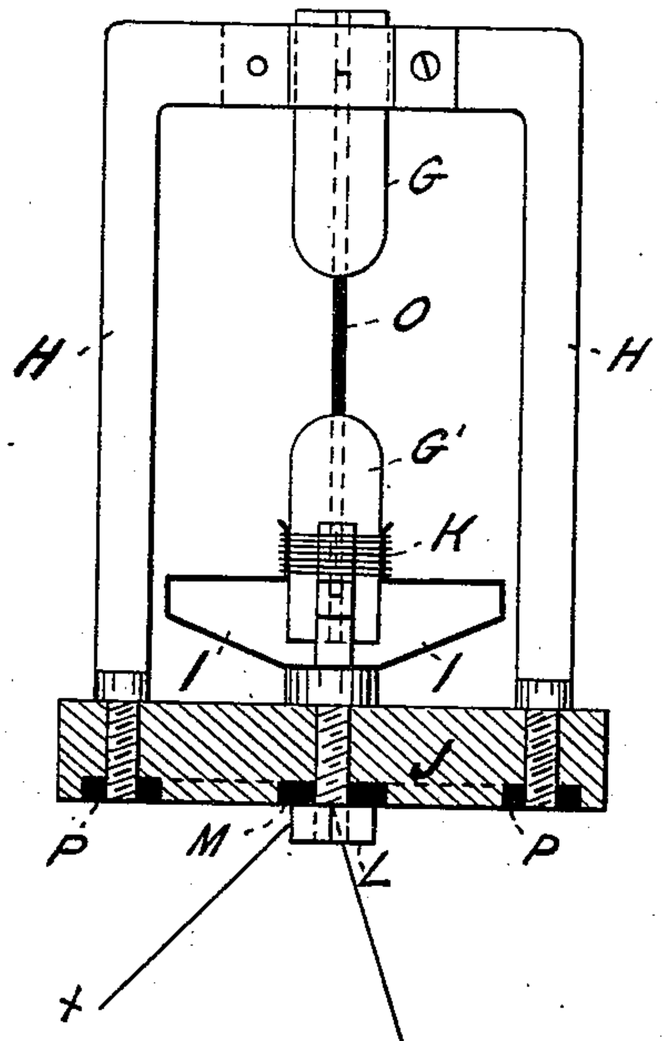


FIG. 5.

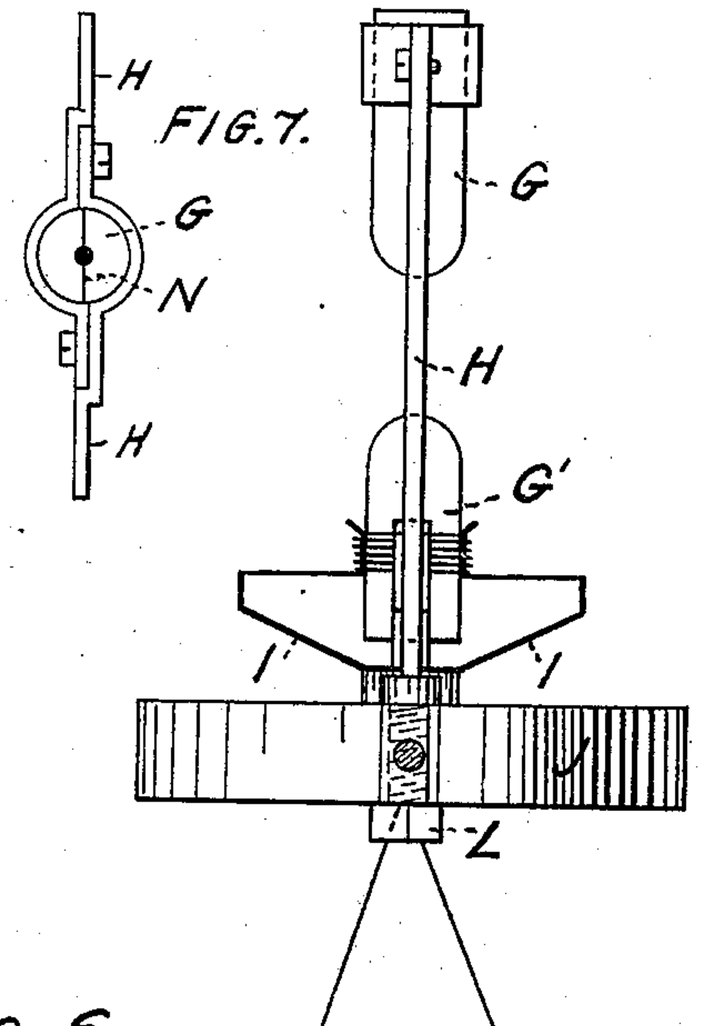


FIG. 8.

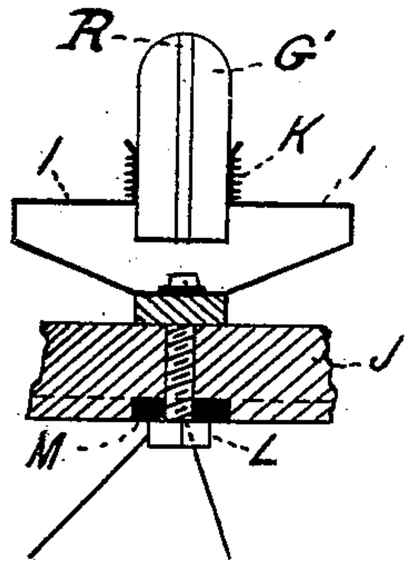


FIG. 6.

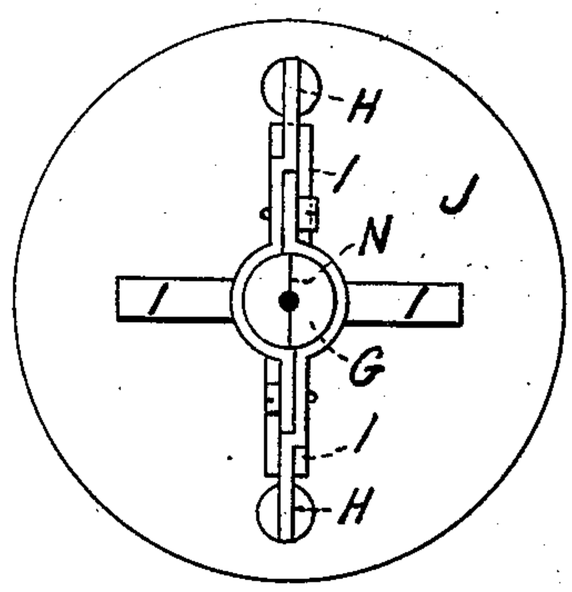


FIG. 9.

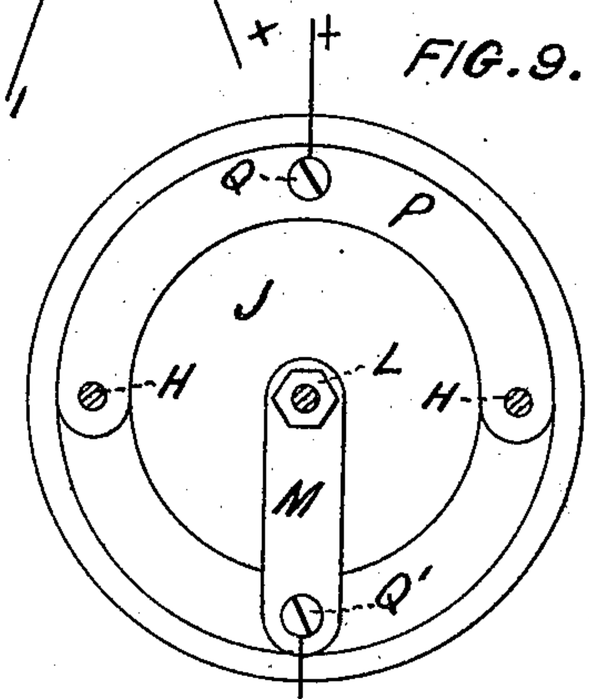
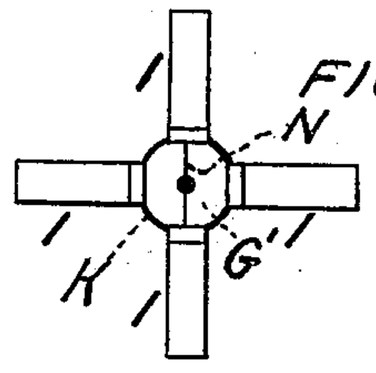


FIG. 10.



WITNESSES.

Wm. A. Shaw

Wm. H. Broadnax

INVENTOR.

Albon Man. By his Atty

Amos Broadnax

UNITED STATES PATENT OFFICE.

ALBON MAN, OF BROOKLYN, NEW YORK.

ELECTRIC LAMP.

SPECIFICATION forming part of Letters Patent No. 227,118, dated May 4, 1880.

Application filed March 31, 1880. (No model.)

To all whom it may concern:

Be it known that I, ALBON MAN, of Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Electric Lamps, of which the following is a description in such full, clear, exact, and concise terms as to enable any one skilled in the arts or sciences to which it appertains or with which it is most nearly connected to make and use the same, reference being had to the annexed drawings, making part of this specification, and to the figures and letters of reference marked thereon.

In incandescent electrical lights positive electrical connection equal to or greater than the conducting power of the incandescent pencil must be made with the pencil in order to prevent the occurrence of an electrical arc, which immediately destroys the pencil itself. Tension, torsion, or compression upon the pencil acts in the end, by continual repetition, to destroy it.

Expansion and contraction of the electrical supporters or connections of the pencil, causing or tending to cause motion of the pencil in any direction other than that in which it can freely move, puts tension upon it, and sooner or later destroys it. The more yielding the parts sustaining the pencil (while at the same time making electrical connections) can be made the smaller the pencil or light-giving portion may be made, and the smaller the pencil the greater the amount of light that may be obtained by passing a given current of electricity through it.

It is evident that one end of the pencil may be rigidly held if the other is flexibly connected; but at the same time such other end must be sustained laterally, and prevented from vibrating or moving in any direction other than in the line of its axis.

I prefer to place the pencil in an upright position, as in this position it is less likely to give way under the high heat to which it is subjected, and it can be more readily attached to its supports, and such supports in this position do not so much interfere with the radiation of its light.

It is to accomplish these results and purpose that I have devised the following method of making and supplying the incandescent portion of an electric lamp, that the expansion and contraction of the two parts caused by the heat of electricity shall be equal, the expansion of one part neutralizing the expansion of the other and the contracting of one part neutralizing the contraction of the other in all directions, except in the direction of the axis of the pencil or light-giving portion of the circuit supported by these parts.

My invention appertains to sealed incandescent electric lamps; and it consists, first, of hermetically joining and sealing, with a tight metal joint, the globe of the lamp, made of glass, porcelain, or other similar material, through which the light is radiated, to its base, bottom, stopper, and all the other parts or fittings appertaining to it, by which it is made a completely hermetically-sealed lamp, while providing at the same time for free flow of the electric current or circuit through the lamp, and also for exhausting the atmosphere and charging the lamp with a carbon-preservative gas or atmosphere; second, of a symmetrical suspending electrical connection to the top part of the incandenscent carbon pencil, consisting of a divided metallic conductor arranged to embrace, hold, and support the pencil, and to equally divide the current going to and from it, so that the expansion and contraction of the supporting parts shall be equal, the expansion occasioned by the passage of the electric current through one part of the supporting-conductor being equalized by the passage of an equal amount through the other part, the object being to maintain all the supporting parts of the pencil in their normal relative position—that is, not affected in their relative position by the heat of the current through them, or by the heat of the incandescent portion of the lamp; third, of an electrical connection and support to the lower portion of the pencil, consisting of a divided conductor, whose expansion and contraction, occasioned by the passage of the current, will equalize each other, and thus prevent any lateral motion of the pencil, while at the same time it is left free to expand and contract in the line of its axis; fourth, of an electrical suspending-

support for the carbon pencil of an incandescent electric lamp, consisting, substantially, of a yoke constructed and arranged symmetrically with reference to the pencil, as a conductor of heat and electricity, that the only motion given to the pencil by expansion and contraction through its support shall be in the line of its axis; fifth, of an electrical connection with the opposite end of a suspended carbon pencil, consisting of two semi-cylindrical grooved pieces of carbon united upon the pencil by wire or a clamping-ring, and in the embrace of yielding metallic connection, equally divided and disposed around it in such relation and manner that the expansion and contraction on all sides and in all parts shall be equal, in so far as there may be any tendency to throw the pencil out of its normal position laterally; sixth, of an electrical connection to the top and bottom end of the carbon pencil of an incandescent electric lamp, consisting of equally-divided metal electric conductors, united to the pencil at top and bottom by divided and intervening pieces of carbon, the bottom conductor being not only equally divided, but also made yielding to avoid weight, pressure, and tension upon the pencil; seventh, of an electrical connection to the lower end of the carbon pencil, consisting of a yielding conductor divided equally around it, and arranged to allow it freedom of motion in the line of its axis and at the same time avoid all lateral or torsionate strain upon it.

A detail description of the first part of my invention is as follows:

In the drawings the globe of the lamp is shown by A. It is made of glass, porcelain, or any similar material suitable for the radiation of light. The base or stopper of the lamp is shown by B. It may be made of any of the materials aforesaid, or it may be made wholly of metal; but if made of metal proper provisions must be made for insulating the conducting-wires through it in and out of the lamp.

Assuming, now, the base or stopper of the lamp to be made of glass, the joint between it and the globe is made and sealed as follows:

The surface of the globe at *a* and *b* and the surface of the stopper or base at *c d* and *e f* are first metallized—that is, covered or filled with metal—either by fire-gilding, silvering, or platinizing in the ordinary method of fire-gilding, silvering, platinizing, or otherwise metallizing the surface of glass, porcelain, crockery, stoneware, and other similar material. These parts, having been thus metallized, are put into an electroplating bath or solution and electroplated by the ordinary process of electroplating. In the base of the lamp a narrow metal ring, *c*, is fitted, upon which the bottom end of the globe sets. The parts, being thus prepared, are brought together and are united, joined, and sealed with solder applied to the electroplated parts of the base and globe of the lamp.

Instead of first electroplating the several parts and afterward uniting them with solder, as above described, I can secure them together after metallizing them, and put them thus united in the electroplating-bath and electroplate directly upon the metallized surface and over the joints or parts of contact, thus making a solid metal joint by electroplating instead of soldering.

The drawings show a tube, D, which may be of glass or metal, and which is joined with a tight joint to the base or stopper of the lamp, in the same way the globe is joined to the base. The object of this tube is to furnish means to charge the lamp with the carbon-preservative atmosphere, or to exhaust the air out of it.

In case the tube be made of glass or porcelain, it must be thoroughly metallized and electroplated in the joint to make it a conductor of electricity, and means (connecting-post) must be supplied to connect the wires; but there is no objection to making the tube of metal and joining it to the base or stopper, as above described, the wire E being connected to the upper end of the tube and the wire F to the metallic ring *c* in contact with the electroplating and solder of the joint, the positive and negative poles being applied as shown, the connection being made by any of the well-known means.

My intention is to make the tube D of lead or other soft metal and use it as part of the conducting-circuit, and as means of finally sealing the lamp after it has been exhausted of air and charged with a carbon-preservative gas or atmosphere, the conducting-wire to be connected to the outer and inner end of the tube, or carried through the tube or its wall into the globe of the lamp, the sealing being accomplished by forcing the walls of the tube together and sealing it with a blow-pipe or with solder.

The second part of my invention is shown in the drawings, more especially by Figs. 4, 5, and 7. It consists of a divided conductor, the two parts of which are shown by H H. These conductors are made of metal, of equal size and of equal conducting power. Their upper ends are formed in the shape of a yoke, the two parts of which are made exactly symmetrical with reference to each other, and are clamped by means of screws upon two grooved semicircular pieces of carbon, G, in which the illuminating-pencil *o* is held. These pieces of semi-cylindrical grooved carbon are to be made exactly of the same size, divided in the center longitudinally, the dividing-joint N to be arranged upon the line of the joint of the yoke, as shown by Figs. 6 and 7.

Upon the bottom ends of the divided conductors H H a screw-shank is made, that passes through holes in the soap-stone diaphragm-plate J and screws into the respective ends of a semicircular metal conductor, P, set in the

bottom side of the diaphragm-plate J, as shown by Figs. 4 and 9 of the drawings.

The points of contact between the lower ends, H, of the divided conductor with the plate P are exactly equidistant from the +-point Q, the two ends of the plate from that point being made of exactly the same volume and conducting power. By these means the current entering at Q is made to divide equally and enter the illuminating-pencil *o* from both sides with equal intensity, equally heating and expanding the two branches of the conductor, from the top of which the carbon pencil is suspended, thus avoiding all lateral or torsionate strain upon the illuminating-pencil, while at the same time it is left free to expand and contract upon the line of its longitudinal axis, the divided conductor acting as a divided electrical support of equal expanding capacity, between which the carbon pencil is suspended, and by which all lateral or torsionate strain upon it is avoided.

The third point of my invention is more especially illustrated by Figs. 8 and 10 of the drawings, though its connection with the other parts of the invention is especially shown by Figs. 4 and 5, and incidentally by the other figures of the drawings. It consists of a divided metal conductor composed of strips of thin metal, forged and arranged substantially in the form of two elliptical springs set across each other, as shown by I, Figs. 8 and 10, for the support of the lower end of the carbon pencil. These elliptical springs or strips of metal are all of equal length, size, volume, and conductivity electrically. They are set across each other equidistant apart, and are held to the diaphragm-disk J by means of a screw, L, reaching down and making contact with the piece U, to which the — - pole is connected at Q′.

The top ends of the elliptics are turned up, as at *k*, forming together an open slotted socket of the ends of the several strips of metal, into which is inserted a cylindrical piece of carbon, G′, divided longitudinally in the center, and grooved, as shown by R, to receive the lower part of the carbon pencil. The carbon-support G′ is secured in the divided elliptical conductors and the pencil in the carbon-support by means of wire wrapped around the slotted socket, or by means of a clamping-ring upon the socket, as may be most convenient. By these means the lower part of the carbon pencil is supported upon a divided electric conductor yielding and equal on all sides, and the carbon pencil is allowed to expand and contract in the line of its axis, while at the same time all tensile, torsionate, or lateral strain upon it is avoided.

The shape and size of the elliptical or divided conductors must be substantially alike on all sides, that the expansion, contraction, and electrical conducting power may be alike on all sides and the normal position of the carbon pencil with reference to its connections and supports be equally maintained.

The fourth, fifth, sixth, and seventh parts of my invention are fully described in the description given above of the second and third parts of it. A description of these two parts includes a description of the above-mentioned four.

Having described my invention, I claim and desire to secure by Letters Patent—

1. Hermetically sealing and joining the globe and stopper of an electric lamp by electroplating and solder, or by electroplating alone, applied to the metallized surfaces of the parts joined, preserving at the same time the insulation of the electric circuit through the lamp, substantially as described.

2. A soft-metal tube hermetically joined with a metal joint to the glass bottom or stopper, as part of the electric circuit in the lamp, and for the purpose of filling, exhausting, and finally sealing it, substantially as described.

3. A symmetrical suspending electrical connection to the top part of the incandescent carbon pencil, consisting of a divided metallic conductor arranged to embrace, hold, and support the pencil, and to equally divide the current going to and from it, so that the expansion and contraction of the supporting parts shall be equal, substantially as described.

4. An electrical connection and support to the lower portion of the pencil, consisting of a divided conductor whose expansion and contraction, occasioned by the passage of the current, will equalize each other, and thus prevent any lateral motion of the lower portion of the pencil, while at the same time it is left free to expand and contract in the line of its axis, substantially as described.

5. An electrical suspending support for the carbon pencil of an incandescent electric lamp, consisting, substantially, of a yoke constructed and arranged symmetrically with reference to the pencil, as a conductor of heat and electricity, that the only motion given to the pencil by expansion and contraction through its support shall be in the line of its axis.

6. An electrical connection with the opposite ends of a suspended carbon pencil, consisting of two semi-cylindrical grooved pieces of carbon united upon the pencil by wire or a clamping-ring, and in the embrace of yielding metallic connection, equally divided and disposed around it in such relation and manner that the expansion and contraction on all sides and in all parts shall be equal, in so far as there may be any tendency to throw the pencil out of its normal position laterally.

7. An electrical connection to the top and bottom end of the carbon pencil of an incandescent electric lamp, consisting of equally-divided metal electric conductors, united to the pencil at top and bottom by divided and

intervening pieces of carbon, the bottom conductor being not only equally divided, but also made yielding to avoid weight, pressure, and tension upon the pencil.

S. An electrical connection to the lower end of a yielding conductor, divided equally around it, and arranged to allow it freedom of motion in the line of its axis and at the same time avoid all lateral or torsionate strain upon it.

ALBON MAN.

Witnesses:
WM. H. ALLEE,
ROBERT M. STRATTON.