(No Model.)

J. H. GUEST.

ELECTRIC INCANDESCENT LAMP.

No. 259,008. Patented June 6, 1882.

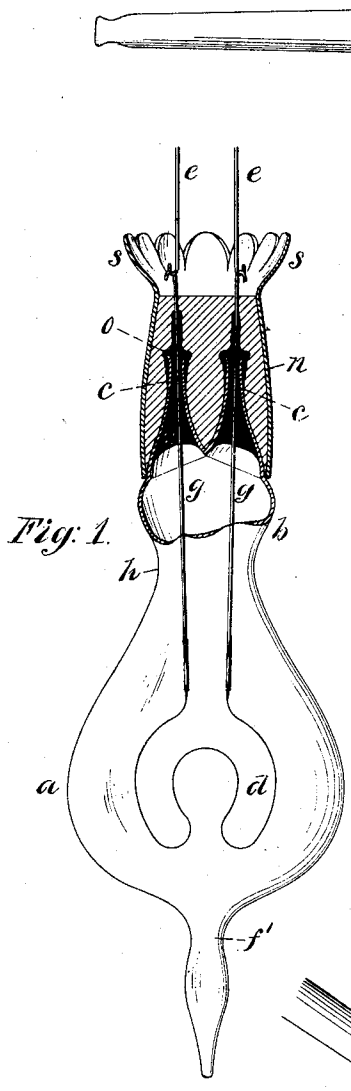

Fig. 1.

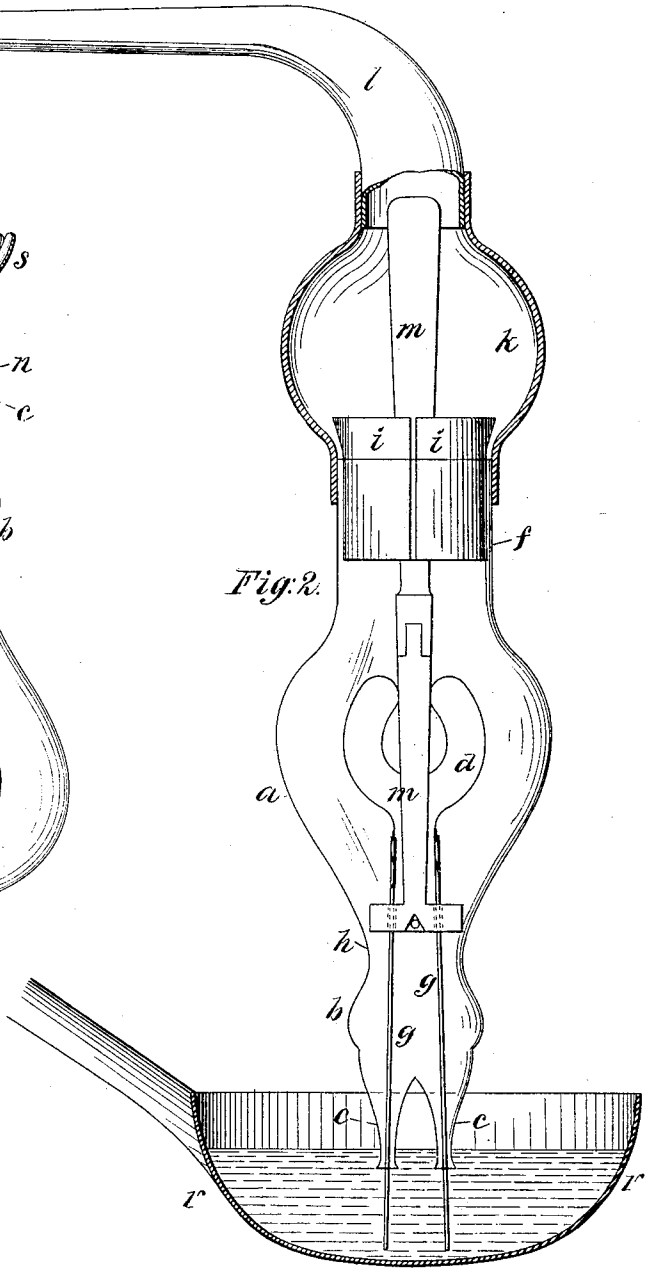

Fig. 2.

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JOHN H. GUEST, OF BROOKLYN, NEW YORK.

ELECTRIC INCANDESCENT LAMP.

SPECIFICATION forming part of Letters Patent No. 259,008, dated June 6, 1882.

Application filed September 12, 1881. (No model.)

To all whom it may concern:

Be it known that I, JOHN H. GUEST, of Brooklyn, Kings county, New York, have invented certain new and useful Improvements in Electric Incandescent Lamps, of which the following is a specification.

My invention applies more especially to incandescent electric lamps in which the luminant portion is inclosed in sealed and exhausted glass globes; and the chief object of my present improvement is to hermetically seal the globe at the points where the circuit-wires issue therefrom. Heretofore this has been effected either by sealing or welding the platinum circuit-wires directly into the glass of the globe, or by the use of certain plastic cements.

Now, the chief feature of my present invention consists in sealing the wires in the globe by means of a filling of metal deposited around the wires in the tubes or necks of the globes through which the wires issue, such metal filling being preferably of a composition having a strong chemical adhesion for the glass, and being preferably drawn into the tubes around the wires while in a molten state, so as to adhere chemically to both wire and glass, thus rendering the joint perfectly air-tight, and by means which are both simple and inexpensive.

My improvement also consists partly in the mode of performing the aforesaid operation, and in certain details of construction of the lamp at the end where the wires issue, as hereinafter fully set forth.

Figure 1 of the annexed drawings represents an elevation of my improved electric lamp completed and embodying the features here claimed, the end at which the wires issue being broken away and shown in central vertical section. Fig. 2 is an elevation showing the lamp in one of its unfinished stages and illustrating my improved mode for sealing the wires into the globe.

The globe *a* of the lamp is preferably made of glass in the usual pear shape shown, with a swell or bulb, *b*, at the contracted end, from which bulb two tubular stems or necks, *c c*, extend to allow the circuit-wires *g g* to issue, as usual, from the inclosed carbon loop or other luminant part, *d*, to the external circuit-connections, *e e*. Before the carbon loop and its circuit-wires are inserted in the globe, and before the globe is exhausted, the large end of the globe is formed with a wide neck, *f*, as seen in Fig. 2. The circuit-wires *g g* are of course properly connected with the carbon loop *d* previous to the insertion of the same in the lamp; and to prepare the same for insertion the circuit-wires are seized by a special form of tongs, *m*, at a certain point from the connection of the wires with the loop *d*, and the tongs, with the grasped loop and wires, is thence inserted into the globe through the wide neck *f*, and moved forward till the wires *g g* protrude from the tubular stems *c c* and till the nose of the tongs seats against the contraction *h* in the narrow end of the globe, as seen in Fig. 2. The handle end of the tongs, which will slightly protrude from the neck *f*, is now nicely wedged into the neck by the two halves of a split shell-cork, *i*, so as to hold the tongs, with its wires and loop, in the position described and shown in Fig. 2. The tongs is preferably so formed that its joint is about midway of its length, so that the carbon loop *d* will lie freely in the opening between the grasping-jaws without being touched by the jaws, and the grasping ends of the jaws are extended laterally in the form of a T-head, so as to seize the circuit-wires *g g* on either side of the center of the tongs, as will be understood from the drawings.

The jaws always tend to close in their grasping position by means of a spring, and the grasping-faces of the jaws have coincident semicircular grooves, as illustrated by dotted lines, to better receive and grasp the wires, and one jaw has a projecting pin, which registers with a V-notch in the other jaw, so as to keep the jaws always in true position and prevent any displacement of the wires when once grasped. The tongs, &c., being now inserted and secured, one end of a rubber coupling or bulb, *k*, is slipped tightly over the neck *f* of the globe and over the protruding end of the tongs, and the opposite end of the coupling is connected with the wide end of a mouth-pipe, *l*, which is preferably made of glass and bent at right angles with the lamp-globe, and terminated with a tip similar to the mouth-piece of a pipe. The parts being now formed and arranged as described and shown in Fig. 2, a ladle or other vessel, *r*, of molten metal, is pro-

cured, and the lamp-globe, &c., is held over the same with the projecting wires dipping into the molten metal and the tubular stems *c c* approaching the surface of the metal. The lamp is thus held for a few seconds until the wires are well heated by conduction from the metal, and until the glass necks *c c* are also highly heated in an efficient yet safe manner by the hot air and direct radiation arising from the metal. The necks *c c* are then plunged into the molten metal, preferably only to a slight distance, but well below the film of oxides on the surface, as seen in Fig. 2. The mouth of the operator is then applied to the mouth-pipe *l*, and by the act of inspiration the air is sucked out of the globe sufficiently to cause the molten metal to rise by atmospheric pressure in the necks *c c* to about the roots thereof, or to the point at which the necks spring from the bulb. The tongue is then applied to the aperture of the mouth-pipe so as to close the same, and the lamp thus raised from the molten metal, when in a few seconds the metal will solidify in the necks, when the tongue can be removed, and the wires will now be hermetically sealed in the necks by means of the solidified metallic deposit or filling around them.

The necks *c c*, as will be observed, are flared at each end, so that the metal in shrinking tends to become tighter in its socket. The metal used should preferably be of a kind which has a strong chemical adhesion for the glass of the globe. Alloys of lead and zinc possess this quality on account, presumably, of the similar composition of the glass in containing oxides of lead and other metals. I prefer to use five per cent. of zinc with the lead, but many other formulas may be used. When this alloy is melted and drawn into the wire necks of the globe, while both the wires and the glass are highly heated, as before described, it enters into strong chemical adhesion with the surface of the glass and with the surface of the copper wires, and forms a species of weld or chemical union therewith, which renders the sealing of the wires in the necks absolutely hermetic and air-tight, and is superior to the system of welding or sealing of the platinum wires directly into the glass, which latter is an operation that requires to be conducted with great care and accuracy to be successful, while my operation is simple, rapid, and inexpensive, and, as compared with ordinary plastic cements, this mode of chemical cementation of a molten metal with the glass and the circuit-wires is obviously far superior.

In Fig. 1 the solidified metal is represented by solid black, and it will be observed that it not only fills the stems *c c*, but will extend along a portion of the protruding wire, and will overrun the stems for a short distance from the extremity, thus rendering the seal more secure and strengthening the stems and the wires.

After the wires are sealed in place by the solidification of the metal, as described, the unfinished lamp is detached from the bulb *k* and its mouth-piece *l*, the corks *i* are removed, and the tongs *m* opened carefully and removed from the lamp without displacing or impairing the carbon loop. The neck *f* is then heated by the glass-blower, and is contracted and drawn out, and is then attached to the exhausting apparatus. When fully exhausted the neck is again heated till its sides seal or close together, and is then drawn off, when it will appear as seen at *f'* in Fig. 1, thus detaching the exhausted lamp from the exhauster without breaking the vacuum in the lamp, in the usual manner. When the wires are thus sealed in the lamp-globe and the globe exhausted and detached, as seen in Fig. 1, I inclose and protect the stems *c c* and their protruding wires by a tubular sheath, *n*, made preferably of glass in cylindrical or barrel shape, whose lower edge abuts closely against the bulb *b*, while its upper end is preferably flared and scalloped into a bell-shaped top, *s*, similar to a flower or tulip, thus giving the lamp an ornamental finish, and also serving a useful purpose, as will hereinafter appear.

When the sheath *n* is properly placed, as described, and shown in Fig. 1, its interior is filled with thin freshly-mixed or liquid plaster-of-paris, *o*, which is poured into the same around the stems *c c*, and allowed to rise to about the base of the tulip-shaped tip, as illustrated, so as to fully submerge and conceal the stems, and also the greater part of the projecting circuit-wires, the ends of which, however, protrude above the plaster into the tulip-cup. These ends, it should be noted, should be previously denuded of the film of solidified metal, so that they shall present a good clean copper surface for making a good connection, and these ends, which project above the plaster, are bent or curved into suspensory hooks, as illustrated, which may be hung onto similar hooks, which terminate the external circuit-connections in the ordinary manner, as shown in Fig. 1. It may now be understood that the plaster filling *o* of course locks the sheath in firm position about the stems and their wires, and completely conceals and protects these parts, and greatly strengthens what would be otherwise a frail part of the lamp, and at the same time renders the seal at this part more complete. It will be also observed that as the tulip-cup *s* extends above the hooked end of the wires it protects the same and conceals the connection with the external wires, and gives the whole lamp an ornate and finished appearance.

I prefer to coat the interior of the sheath *n* with a film of the same alloy used for sealing the wires, which film will adhere with great tenacity and impart great strength to the glass, so that even if it should be cracked it will yet remain in firm position. This film will also impart an ornamental appearance, for if the glass be clear the effect will be that of silver, and if the glass be amber a gilt effect will be obtained.

This sheath may also be made of fancy-colored glass, if desired.

Instead of using the mouth to suck up the molten metal into the necks, a collapsible and expansible rubber bulb may be used with the same effect, and instead of warming the wires and the necks by conduction or radiation from the molten metal previous to immersion the heat of a furnace or an alcohol or Bunsen flame may be used, as will be understood, a dull-red heat being preferable.

Instead of sealing the wires in the necks by a deposit of molten metal let into the same and solidified, the inner surface of the necks may first be coated with a mere film of this metal by dipping the necks into and raising them from the same, and an electro-deposit of copper may then be deposited in the necks around the wires by dipping the necks and wires into a copper-plating cell and sending the current through the grasping-tongs and the wires in the position shown in Fig. 2.

What I claim is—

1. An electric lamp of substantially the described kind, having its issuing circuit-wires hermetically sealed into the lamp-globe by a charge of solidified metal deposited in the tubes or apertures surrounding the issuing wires, substantially as herein set forth.

2. An electric lamp consisting of a globe constructed with tubular stems through which its wires issue, and with a charge of adherent metal forced into said tubes around the wires, substantially as herein shown and described.

3. The described mode of sealing circuit-wires into the glass globes of electric lamps, consisting in depositing or forcing into the tubes surrounding the issuing conducting-wires a charge of molten metal having a chemical adhesion for the glass and solidifying the same therein, substantially as herein shown and described.

4. The mode of affixing and sealing luminant loops and their circuit-wires in the globes of electric lamps, consisting in first temporarily supporting the loop and the wires in the globe by a suitable clamping or supporting device, with the ends of the wires protruding from apertures or tubes in the globe, then immersing these tubes and wires in molten metal and causing the same to rise in the tubes around the wires, retaining the column of metal in said tubes and raising them out of the molten mass and allowing the charge in the tubes to solidify, substantially as herein shown and described.

5. The mode of depositing a charge of solidified metal in the tubes of electric-lamp globes surrounding the issuing wires thereof by immersing said tubes and wires in a mass of molten metal, withdrawing a portion of the air from the globe, and thereby causing the molten metal to rise in said tubes by atmospheric pressure, and thence retaining the metal so raised and allowing it to solidify in said tubes around the wires, substantially as herein set forth.

6. An electric-lamp globe formed with tubes through which its wires issue, flared at both ends, with a charge of solidified metal in said tubes around the issuing wires, substantially as and for the purpose set forth.

7. An electric lamp formed with a sheath or cup surrounding and extending beyond the stems, through which the wires issue, and concealing and protecting said stems and wires, but open at the end to permit free connection with the wires, substantially as herein shown and described.

8. An electric lamp of substantially the described kind, having the end of its globe where the wires issue provided with a flared cup, *s*, open at the rim, with the protruding circuit-wires terminating with said cup and concealed thereby, substantially as herein shown and described.

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