

(No Model.)

F. S. SMITH.
INCANDESCENT LAMP.

No. 520,088.

Patented May 22, 1894.

Fig. 1.

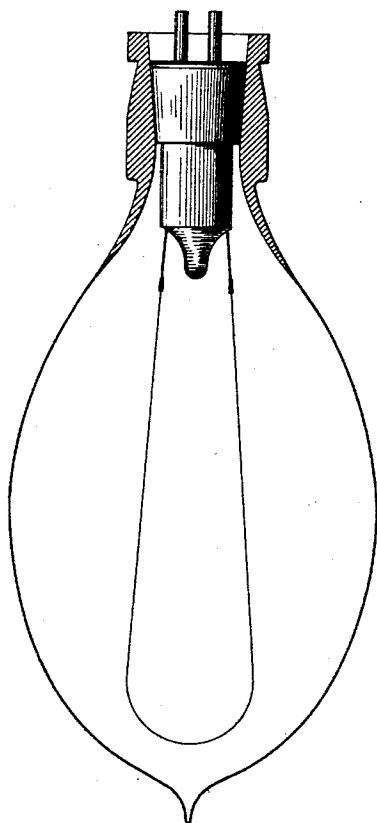
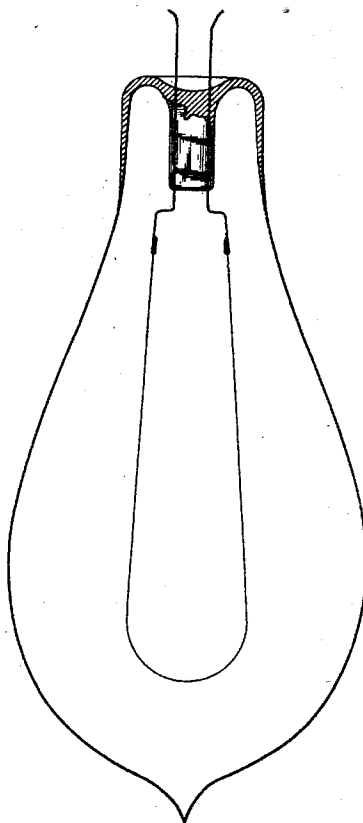


Fig. 2.



WITNESSES:

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FRANK S. SMITH, OF PITTSBURG, PENNSYLVANIA.

INCANDESCENT LAMP.

SPECIFICATION forming part of Letters Patent No. 520,088, dated May 22, 1894.

Application filed June 28, 1893. Serial No. 479,080. (No model.)

To all whom it may concern:

Be it known that I, FRANK S. SMITH, a citizen of the United States, residing in Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Leading-In Wires for Incandescent Electric Lamps, (Case No. 556,) of which the following is a specification.

My invention relates to improvements in incandescent electric lamps, and particularly to a method of producing in the same a tight seal at the leading-in wires, when said wires are made of iron or other metal.

In making incandescent lamps hitherto with iron or steel leading-in wires, great difficulty has been found in making a proper seal on account of gases which are found to be contained within the body of the wires, and which are liable to interpose themselves between the surface of the iron and that of the glass molded around the same. When the leading-in wires are molded into the glass, the heat of the latter causes the expulsion of these gases, which form bubbles along the surface of the leading-in wires and produce a defective joint. The consequence of this is that a greatly increased surface of contact between the glass and the leading-in wires is rendered necessary, and the bulb is apt to leak, thus shortening the life of the filament.

It is the object of my invention to do away with this difficulty, and to supply a method whereby an intimate contact between the glass and the wire may be secured along the whole length of the seal.

Leading-in wires of iron or steel have heretofore been used with a coating of tin to produce a better seal between the wire and the glass, and my invention contemplates the use of such wires, either with or without the tin in this connection.

In the drawings, Figure 1 represents a lamp of the stopper type with iron leading-in wires, and Fig. 2 represents an all-glass bulb provided with the same kind of wires.

Of course my invention is not limited in its application to any particular form of lamp.

In the ordinary mode of manufacture of incandescent lamps, using iron or steel leading-in wires, the wires are first brightened in an ordinary pickle, and then dipped into molten tin, whereby the surface of the wire is cov-

ered with a thin film of tin. The wire so covered is then placed in a proper mold and a body of molten glass is pressed around the same, so that on cooling the wire is firmly embedded in the glass. This is the operation where a stopper lamp is to be made, and the glass so pressed around the wires forms the stopper of the lamp. Where the all-glass bulb is employed, I prefer to use the process of application of glass to the wires specifically set forth in my Patent No. 471,576, dated March 29, 1892. In either case, the hot glass is made to surround, and is hardened upon, the leading-in wires and the difficulties above set forth have been found to be hitherto incident to these processes of manufacture.

According to my present invention, before pickling the wires in the acid bath, I first thoroughly anneal the wire in a proper furnace to the temperature somewhat higher than a cherry red, continuing such application of heat until substantially all the gases occluded have been driven out. I have discovered that wire so annealed does not immediately take up new gases, and may be kept on hand for use several days after annealing before the next step of the process of manufacture is entered upon. The wires so annealed are then pickled in order to remove the scale of oxide which naturally forms during the annealing process. When this scale is removed the wires are dipped into molten tin, if such is to be used; or if not, the next step in the process may be immediately proceeded with. This step is as before, the molding of the wires into the glass, and I have found that when wires so annealed are used, the glass makes intimate contact with the wires along the whole length of the seal, and I am thus able to preserve a high vacuum in the lamps.

It should be understood that my method applies equally well to all metals that are capable of taking up gases from the atmosphere, and likewise that such invention is useful in any connection where wires of such metal are necessarily embedded in glass, whether for incandescent lamps or other devices.

What I claim is—

1. The process of forming a tight seal between a body of glass and a body of metal,

which consists in subjecting said metal to such a degree of heat as shall be sufficient to drive out all gases contained therein, letting said metal cool so slowly as to accomplish the
5 annealing of the same, and introducing such metal into the body of the glass while the latter is in a molten condition, substantially as described.

2. The process of forming a tight seal at
10 the leading-in wires of an incandescent lamp, which consists in heating such wires until all occluded gases are driven off, permitting them to cool so slowly as to anneal them, and embedding the wires after such cooling in that
15 portion of the lamp destined to surround them.

3. The process of forming a tight seal at the leading-in wires of incandescent lamps, which consists in heating such wires until all
20 occluded gases are driven off, permitting them to cool so slowly as to anneal them, removing the scale from the surface of the wires and introducing said wires into that portion of the lamp destined to surround them while the
25 glass of the lamp is softened by heat.

4. The process of forming a tight seal at the leading-in wires of an incandescent lamp, which consists of first heating said wires until all occluded gases are driven off, removing the scale in a pickle, dipping the wires into a
30 bath of tin and molding said wires into that portion of the chamber destined to surround them.

5. The process of forming a tight seal at the leading-in wires of an incandescent lamp
35 which consists in driving off the occluded gases in the wires by heat, letting the wires cool so slowly as to anneal them, coating a certain portion of the surface of the wires with a thin coat of tin and molding said wires
40 into that portion of the chamber destined to surround them.

In testimony whereof I have hereunto subscribed my name this 23d day of June, A. D. 1893.

FRANK S. SMITH.

Witnesses:

JAMES W. SMITH,

HAROLD A. MACKAYE.