June 11, 1929. A. L. BECKET 1,716,912

INCANDESCENT ELECTRIC LAMP AND PROCESS OF PRODUCING THE SAME

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Fig. 1.

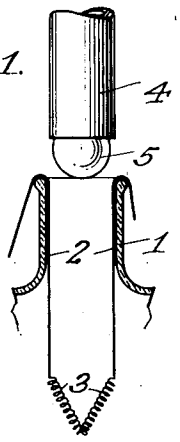


Fig. 2.

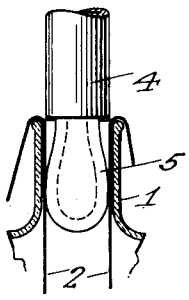


Fig. 3.

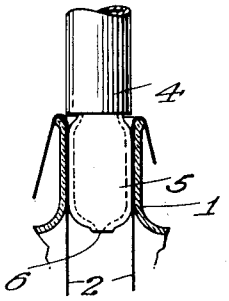


Fig. 4.

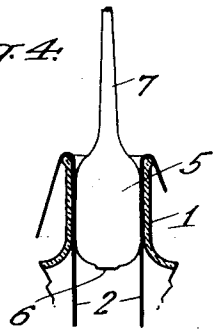


Fig. 5.

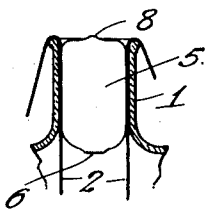
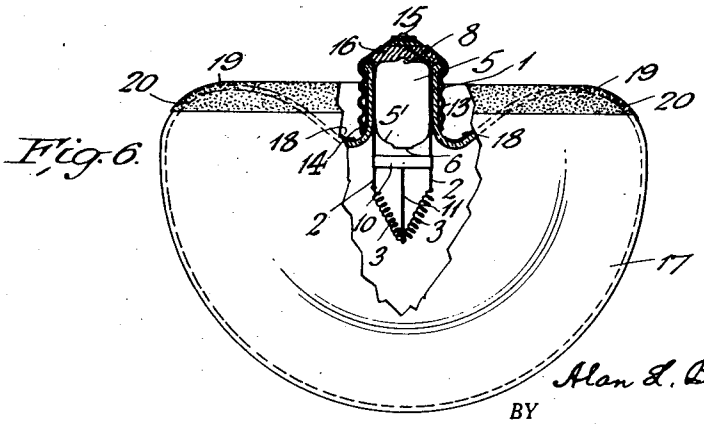


Fig. 6.



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INCANDESCENT ELECTRIC LAMP AND PROCESS OF PRODUCING THE SAME

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Fig. 7.

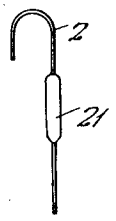


Fig. 8.

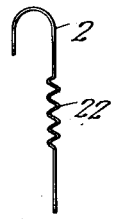


Fig. 9.

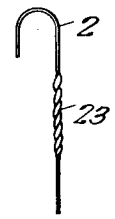


Fig. 10.

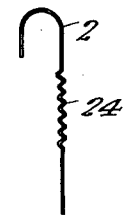


Fig. 11.

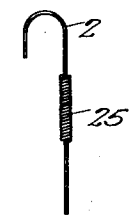


Fig. 12.

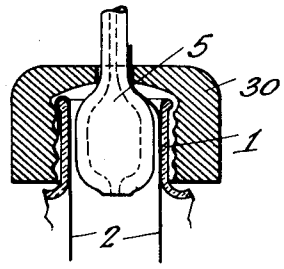


Fig. 13.

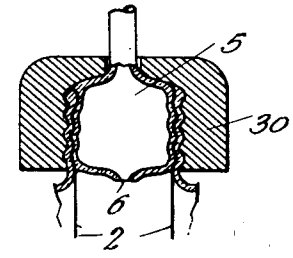
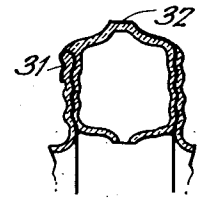


Fig. 14.



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UNITED STATES PATENT OFFICE.

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INCANDESCENT ELECTRIC LAMP AND PROCESS OF PRODUCING THE SAME.

Application filed November 11, 1925. Serial No. 68,267.

Heretofore in the manufacture of incandescent lamps, the lead-in wires have been sealed in fused glass, the wires being made of metals having substantially the same coefficient of expansion as the glass itself to prevent rupture of the glass or leakage alongside the wires. In prior practice, the leads are installed somewhat close together so that it becomes necessary, especially with gas filled lamps of high candle power, to dispose the filament a considerable distance from the point where the lead-in wires are sealed in the glass to prevent the material between the wires from becoming overheated and causing arcing between the leads. A mica disc is sometimes installed between the filament and the sealed lead-in wires to reflect the heat and avoid arcing, and even then it becomes necessary to provide a bulb of considerable length so as to obtain the proper distance between the filament and the point where the lead-in wires are sealed. Another disadvantage that occurs with electric lamps is that the cementitious material that attaches the metal base to the glass neck also sometimes becomes overheated from the filament and is ruined. Another disadvantage is that for manufacturing reasons it is necessary to use lead-in wires of limited shapes because of the pressure which must be applied to the glass to form the seal. For instance, a thin ribbon lead-in wire cannot be easily manipulated.

By the present invention, the above difficulties can be largely overcome, and other advantages that will be understood as the description proceeds will be obtained. With this invention the filament can be installed near the point where the lead-in wires are sealed in the glass without danger of arcing, thus enabling a shorter bulb and bulbs of a greater variety of shapes to be used. The cementing material between the metal base and the neck of the bulb is protected from excessive temperatures when a metal base is used, thus decreasing the tendency of the same to become overheated. The bulbs may be made of such shape that the blackening is not so objectionable, or can be segregated in portions where it will do the least harm and, at the same time, portions of the bulb may be coated to give better reflection of the light.

The invention will be understood from the description in connection with the accompanying drawings in which Figs. 1 to 5 show vertical sections through the neck of an incandescent light bulb, in which successive stages of the installation of the lead-in wires are shown; Fig. 6 shows the complete electric lamp, partly in section, and Figs. 7 to 11 inclusive illustrate different shapes of lead-in wires; Figs. 12, 13 and 14 are sectional views illustrating a modification.

In the drawings, reference character 1 indicates the cylindrical neck of an incandescent light bulb, the bulb itself not being shown, in which the lead-in wires 2 are shown hanging inside the neck portion with the filament 3 attached to the lower ends thereof, the upper ends being bent outwardly over the top edge of the neck. A glass blow pipe is shown at 4, with a molten mass of glass 5 at the lower end thereof in Fig. 1. Fig. 2 shows the glass blow pipe 4 lowered, and also shows the glass 5 after it has begun to be blown into a somewhat spherical shape. Fig. 3 shows further progress of blowing the glass until its outer surface has pressed against the wires 2 and enveloped the same. It will be understood that the neck portion 1 will also be simultaneously heated to the fusing temperature, so that the glass of the portion 5 will fuse therewith, thus causing the lead-in wires 2 to become sealed in place. Fig. 3 also shows the progress of blowing the glass to the point where the bubble bursts, leaving a hole at the lower portion, as shown at 6. After the bubble bursts, the glass blow pipe 4 is drawn outwardly, thus drawing a tube, as shown at 7 in Fig. 4. This tube is used for exhausting the air from the bulb, and also in case gas filled lamps are used, it may be used for introducing the gas into the bulb after the air has been exhausted. After exhaustion of the air and introduction of the gas, the tube 7 is sealed by fusing the same near the upper end of the glass 5, thus leaving the same as indicated at 8 in Fig. 5. The lead-in wires may have attached thereto an insulating or arcing support 10 (Fig. 6), from which a filament anchor 11 may extend to the filament 3 to support the same.

After the lead-in wires have been sealed to the neck of the bulb, as above described, the screw-threaded metal lamp base 13 may be attached, one of the lead-in wires being connected thereto, as shown at 14, and the other one being connected to the central middle contact 15, in the usual manner, the cementing material 16 being used to connect the base to the neck. In case it is not desired to

use a metal base on the neck of the bulb, the neck itself can be made to serve as the screw plug. This is shown most clearly in Figs. 12, 13 and 14. In Fig. 12 the neck 1 is shown surrounded by an internally threaded mold 30, while the glass bubble 5 is being expanded against the inside walls of the neck to seal the lead-in wires 2 in place. At the same time, the glass of the neck 1 is forced outwardly into the threads of the mold, as shown in Fig. 13, thus leaving a threaded glass neck when the mold is removed. The end of one of the lead-in wires is caused to be exposed along the outer threads of the glass as shown at 31 (Fig. 14) to make contact with the inside of a socket when the lamp is screwed in place, and the other lead-in wire is brought to the central position, as shown at 32, to form the center contact for the lamp. In the illustration shown in Fig. 6, a bulb is used whose main portion is hemispherical in shape, the neck thereof reentering along the top side, as shown in the drawing, thus producing a lamp that will occupy very little space longitudinally and can be screwed into a socket so as to hide the socket almost entirely. This is possible because the lead-in wires are sufficiently far apart to avoid danger of arcing, even when the filament is installed close to the point where the lead-in wires are sealed. Besides, the lower end 5' of the glass that was used for sealing in the wires and the chamber in the glass bubble aid in shielding both the lead-in wires and the cementitious material from the heat of the filament. With a bulb made in the shape indicated in Fig. 6, a large portion of the deposit from the filament will collect along the annular portion 20, so that there will not be a dense black background immediately behind the filament to cause glare. Also the top portion of the lamp can be coated, as shown at 19, with material which will cause the light to be reflected downwardly and distributed more satisfactorily.

Instead of using ordinary round lead-in wires, lead-in wires of a variety of shapes may be used with this invention. For example, Fig. 7 indicates a lead-in wire that has a flat portion 21 to be sealed in the neck of the bulb, Fig. 8 represents a lead-in wire in the shape of a ribbon 22 that is corrugated, Fig. 9 shows one in which the ribbon 23 is twisted, Fig. 10 shows a round wire that is corrugated as shown at 24, and Fig. 11 shows a coiled lead-in wire 25. These and other forms of lead-in wires may be used, as the sealing in bubble of fused glass will wet the lead-in wires and cause the same to become hermetically sealed along the inside of the neck portion of the glass bulb. The lead-in wires can be installed in all cases by merely hanging the same in the neck portion, as shown in Fig. 1, and expanding the molten glass against the same from the inside, while the glass of the neck portion of the bulb is also in a fused or semi-plastic state, so that no manipulation of the lead-in wires themselves is required during the time they are being sealed in the glass. The outward pressure of the expanding glass presses the wires into place and enables them to become embedded in the glass. The pressure from the expanding glass bubble is not excessive so that a coiled, hollow or flat lead-in wire, or one of other shapes, can be used and it will retain its shape while being sealed in place in this manner. The use of certain shapes of lead-in wires is impracticable in the present day incandescent lamp manufacture, due to the fact that the pressing or squeezing to produce the seal in the glass would distort the shape of the lead-in wire.

The bubble seal offers decided advantage for lamps designed to burn more than one filament. Such lamps often use more than two lead wires which are extremely difficult to arrange in the ordinary squeezed tubing seal. The bubble seal provides ample room for a large number of leads and avoids the complications involved in the tubing seal.

It is to be understood that this invention is not only applicable to incandescent lamp manufacture, but also to the manufacture of radio tubes, arc lamps and the like, in which lead-in wires are to be hermetically sealed through glass.

With a bulb shaped as indicated in Fig. 6, the reflector 19 does not focus the heat rays upon the filament or cause cross reflections between the walls of the bulb, but has the effect of distributing the rays. The lamp is very compact and because of its short axial length, the filament is less apt to vibrate when the lamp is used in trains or the like, where vibration is excessive. Also, due to the compactness of this lamp, it can be packed for shipping in much smaller space than the usual lamp and with less liability of breakage.

In manufacturing this lamp there will be a material saving in scrap and breakage since the operation of sealing the usual filament mount to the neck of the bulb is entirely eliminated on account of doing away with the filament mount itself. The fact that ribbon lead-in wires and other shapes may be used makes it possible to manufacture a lamp without the complicated dumet wire, which is a combination of different metals and expensive to manufacture.

I claim:

1. The process of manufacturing an incandescent lamp which comprises introducing lead-in wires into the neck of the lamp bulb, introducing molten glass between the wires and expanding it against the same.

2. The process of manufacturing an incandescent lamp which comprises introducing lead-in wires into the neck of the lamp bulb,

introducing molten glass between the wires and expanding a thin layer of the glass against the same.

3. The process of manufacturing an incandescent lamp which comprises introducing lead-in wires into the neck of the lamp bulb and blowing a bubble of glass against the same until it bursts.

4. The process of manufacturing an incandescent lamp which comprises introducing lead-in wires into the neck of the lamp bulb, introducing molten glass between the wires and expanding the glass against the wires while keeping said neck heated.

5. The process of manufacturing an incandescent lamp which comprises introducing lead-in wires into the neck of the lamp bulb, blowing a bubble of glass against the same until it bursts, and drawing a portion of said bubble into a tube.

6. The process of manufacturing an incandescent lamp which comprises introducing lead-in wires into the neck of the lamp bulb, blowing a bubble of glass against the same until it bursts, drawing a portion of said bubble into a tube, and using said tube for exhausting the air from said lamp bulb.

7. The process of manufacturing an incandescent lamp which comprises introducing lead-in wires into the neck of the lamp bulb, blowing a bubble of glass against the same until it bursts, drawing a portion of said bubble into a tube, and using said tube for exhausting the air from and introducing gas into said lamp bulb.

8. The process of manufacturing an incandescent lamp which comprises introducing lead-in wires into the neck of the lamp bulb, blowing a bubble of glass against the same until it bursts, and sealing said bubble by fusion.

9. The process of manufacturing an incandescent lamp which comprises introducing lead-in wires into the neck of the lamp bulb, introducing molten glass between the wires, expanding molten glass against the wires, and providing screw threads on the neck.

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