H. H. NEEDHAM.

MANUFACTURE OF INCANDESCENT LAMPS.

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1,231,416.

Patented June 26, 1917.

Fig. 1

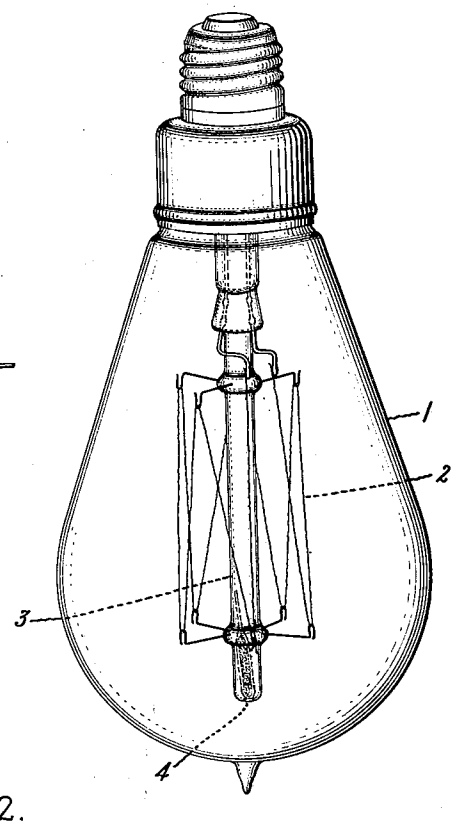


Fig. 6.

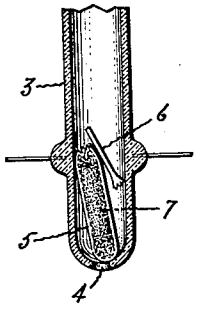


Fig. 2.

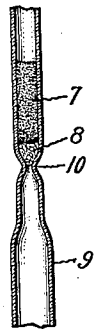


Fig. 3.

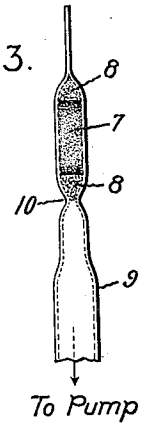


Fig. 4.

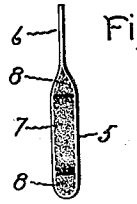
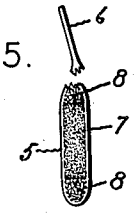


Fig. 5.



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UNITED STATES PATENT OFFICE.

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MANUFACTURE OF INCANDESCENT LAMPS.

1,231,416. Specification of Letters Patent. Patented June 26, 1917.

Application filed January 19, 1916. Serial No. 72,930.

To all whom it may concern:

Be it known that I, HARRY H. NEEDHAM, a citizen of the United States, residing at East Orange, county of Essex, State of New Jersey, have invented certain new and useful Improvements in the Manufacture of Incandescent Lamps, of which the following is a specification.

In manufacturing incandescent lamps and similar devices having a bulb, the component parts of such devices are assembled and sealed into the bulb, which is pumped out through a small glass tube or tubulature and then sealed off from the pump. Such devices may be improved by exposing in the finished device certain substances some of which are often designated by the term "getter". Some of these substances can be introduced when the device is assembled, as they are substantially unaffected by the treatment on the pump, but many others produce bad results if they are free in the bulb during the treatment on the pump. Most of these substances are of such a nature that it is not feasible to introduce them through the tubulature into the bulb just before sealing off.

The object of my invention is to provide a method by which a substance in the bulb can be protected from the effects of variations of pressure and temperature of the bulb contents as long as desired and then after the bulb is sealed off may be liberated in the bulb at will. Another object is to provide a safe and simple method of introducing into a lamp powdered substances which will produce very valuable and desirable effects if they can be exposed in the lamp during its operation, but which may be deleterious and mar the lamp if exposed while the lamp is on the pumps. A further object is to provide a method by which material to be introduced into a lamp may be given a preliminary treatment to adapt it to exposure in the finished lamp, then protected from alteration until after the lamp is sealed off, and then exposed whenever desired by suitable manipulation of the lamp. A still further object of my invention is to provide an improved incandescent lamp containing a substance which has not been exposed to the conditions of temperature and pressure which exist in a lamp bulb during the manufacture of the lamp and before the lamp bulb is sealed off from the pumps.

To this end I inclose the substance in a hermetically sealed envelop, which is placed in the lamp, and not opened or broken until after the lamp is sealed off. By forming this envelop from a portion of a glass tube, I may subject the substance to heat and pressure before sealing up the envelop. In many cases the substance is placed in a glass tube which is connected to the pumps, heated and exhausted and then formed into a sealed envelop containing the substance.

My invention will best be understood in connection with the accompanying drawing in which merely for purposes of illustration, I have shown one of the various forms in which my invention may be embodied and in which Figure 1 is a view of an incandescent lamp embodying one form of my invention. Figs. 2, 3, 4 and 5 show successive steps in carrying out this embodiment of my invention, and Fig. 6 is an enlarged view of a portion of the lamp shown in Fig. 1 with the parts in position to expose the substance during the operation of the lamp.

The lamp shown in Fig. 1 comprises a bulb 1, and a filament 2 mounted upon suitable supports which are carried by a central support 3 made in the form of a tube contracted at the lower end so as to leave only a small opening 4. A frangible sealed envelop or capsule 5 having at one end a fragile and easily broken tip 6 is placed inside the tubular support 3 and contains the substance or material 7 which is to be exposed to the contents of the bulb after the lamp is finished. In some cases it is advantageous to use porous packing or plugs 8 of glass wool or other refractory material to hold the substance 7 in place.

The method by which I prefer to construct the envelops or capsules is best shown in Figs. 2, 3 and 4. A glass tube 9 is first drawn down to form a contraction 10 and then a small amount of glass wool or similar packing material is pushed down to the contraction to form one of the plugs 8. The substance 7 which is usually in the form of a powder is then loaded into the tube as shown in Fig. 2 and more glass wool placed in the tube just over the substance 7 to form the other plug 8. The upper end of the tube is then heated and as shown in Fig. 3 drawn down to form a very fine tube or point 6 which is either hermeti-

cally sealed or is of such fine bore that the envelop or capsule is to all practical purposes hermetically sealed. The capsule is then in the condition shown in Fig. 3 and if it is desired to subject the material 7 to any preliminary treatment it can be done through the tube 9. For example, if the substance 7 is an inorganic halogen compound such as thallium potassium chlorid, the tube 9 may be connected to the exhaust pump and the capsule exhausted while heated to a temperature sufficiently high to remove all water vapor and other harmful gases which might cause arcing in the lamp, but not high enough to cause any material change in the substance 7. The time of exhaustion and the temperature will vary with the type of lamp, the size of the capsule and the characteristics of the substance 7.

After the preliminary treatment such as exhausting and heating is concluded, the capsule or envelop may be sealed off at the contraction 10 and is then in the condition shown in Fig. 4, ready for use in the lamp.

When the lamp is assembled, the capsule or envelop 5, in the condition shown in Fig. 4 is placed in the lamp so that the tip 6 may be broken off by shaking or jarring the lamp. I prefer to place it in the tubular support 3 with the fragile tip 6 of the capsule toward the base of the lamp. The tip of the tubular support 3 is then contracted until it assumes the form best shown in Fig. 6 with the small opening 4 through it. The central support 3 with the filament mounted on it is then sealed into the bulb 1 in the usual manner and the lamp is connected to the pumps through a tubulature in the usual manner. The lamp may be heated and exhausted, or filled with gas, or subjected to any desired treatment without reference to the properties of the substance 7, which is thoroughly protected by the envelop 5. After the lamp is sealed off from the pump, and whenever desired, the capsule or envelop 5 is opened and its contents liberated by giving the lamp a sharp jar which causes the fragile tip 6 to break off, as shown in Fig. 5 and put the interior of the capsule 5 in communication with the interior of the lamp.

This method is especially applicable to substances or getters such as thallium potassium chlorid which will discolor the bulb if placed in the lamp and heated to the temperature commonly used in exhausting lamps. If the temperature of exhaustion is kept low enough to avoid discoloration of the bulb by the thallium potassium chlorid, the lamp cannot be exhausted in the standard manner and at standard temperature. By my invention, it is possible to exhaust or treat the lamp at any desired temperature or in any desired manner without reference to the substance 7, which is thoroughly protected from the effect of temperature and pressure until after the lamp is finished and the fragile tip 6 is broken from the capsule 5.

Although I have described my invention as applied to an incandescent lamp, it is useful in many other relations, particularly in devices having an evacuated bulb or vessel and is not restricted to introducing powdered or solid materials, but may be used to advantage to liberate at will in the vessel a liquid or a gas. I therefore do not restrict my invention to incandescent lamps nor to the particular form of embodiment disclosed.

What I claim as new and desire to secure by Letters Patent of the United States is as follows:

1. The method which consists in introducing into the envelop of a lamp a sealed frangible capsule containing a getter, sealing said envelop, and opening said capsule.

2. The method which consists in introducing into the vitreous envelop of an electric lamp a sealed frangible capsule bodily movable in the envelop and containing a substance affected by variations of pressure and temperature, sealing said vessel, and then producing relative movement of said capsule and said envelop to fracture said capsule.

3. The method which consists in placing in the envelop of a lamp a sealed capsule containing a powdered material and having a fragile end, said capsule being bodily movable in said envelop to cause breakage of said fragile end, sealing said envelop while said capsule is intact, and then producing relative movement of said capsule and said envelop to break said fragile end portion of said capsule.

4. The method of introducing a substance into the evacuated envelop of a lamp which consists in placing the substance in a frangible capsule, evacuating and sealing said capsule, placing said capsule in said envelop, evacuating and sealing said envelop, and then breaking said capsule.

5. The method of introducing a substance into an incandescent lamp which consists in placing said substance in a glass tube sealed at one end, evacuating said tube, sealing off that portion of said tube which contains said substance to produce a sealed frangible capsule, introducing said capsule into the lamp, sealing the lamp, and then breaking said capsule.

In witness whereof, I have hereto set my hand this 17th day of January, 1916.

HARRY H. NEEDHAM.