Feb. 12, 1929. 1,701,541

F. RAY

CONSTRUCTION OF INCANDESCENT LAMPS

Filed March 29, 1924 2 Sheets-Sheet 1

Fig. 1.

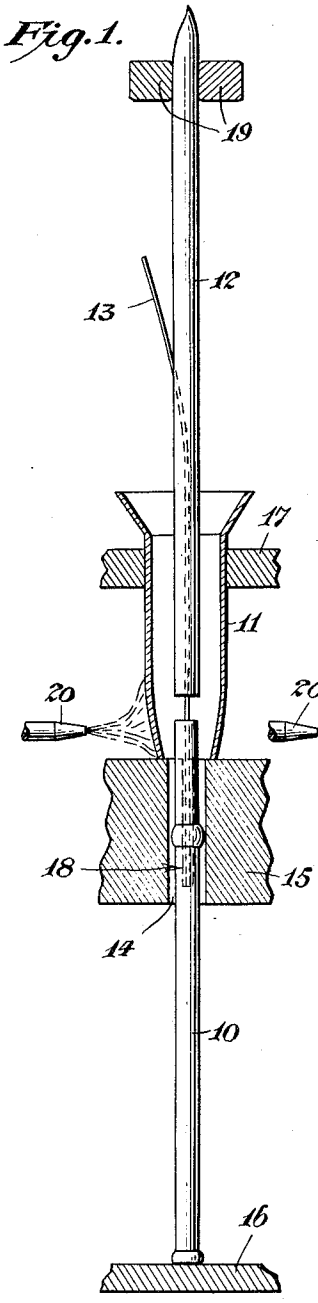


Fig. 2.

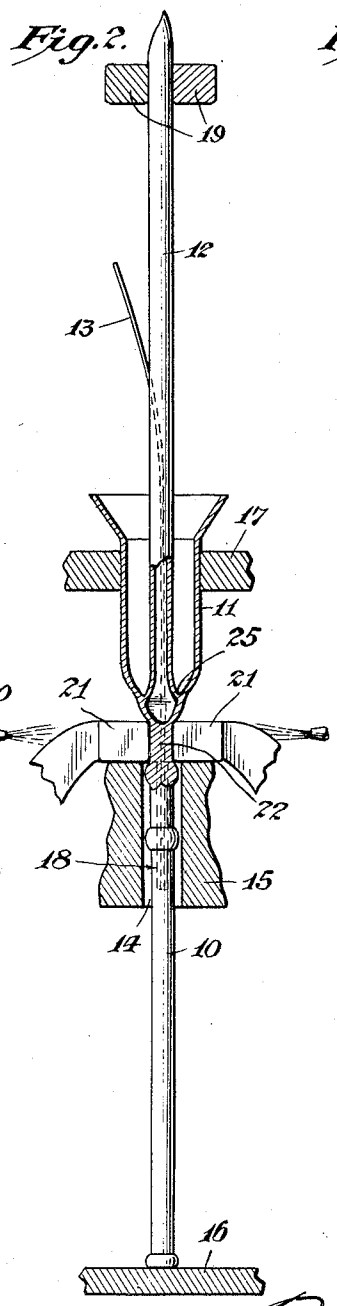
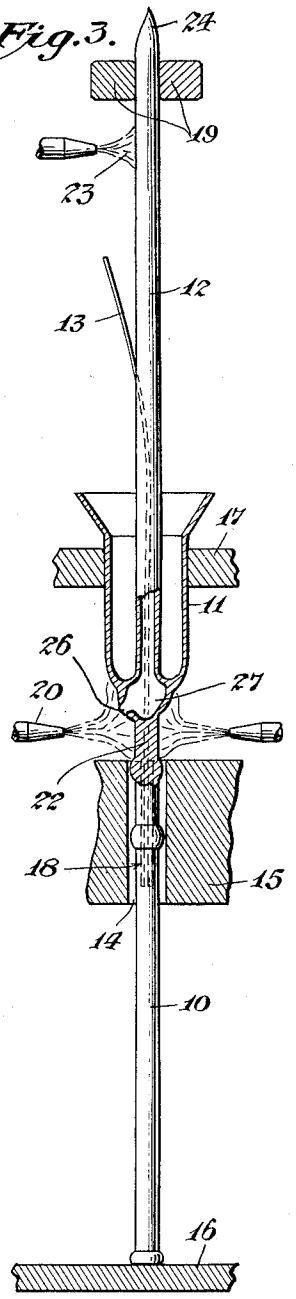


Fig. 3.



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Fig. 4.

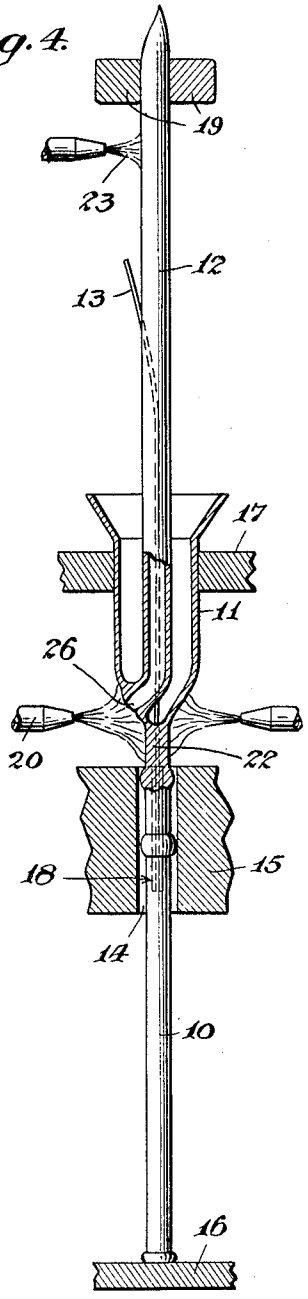
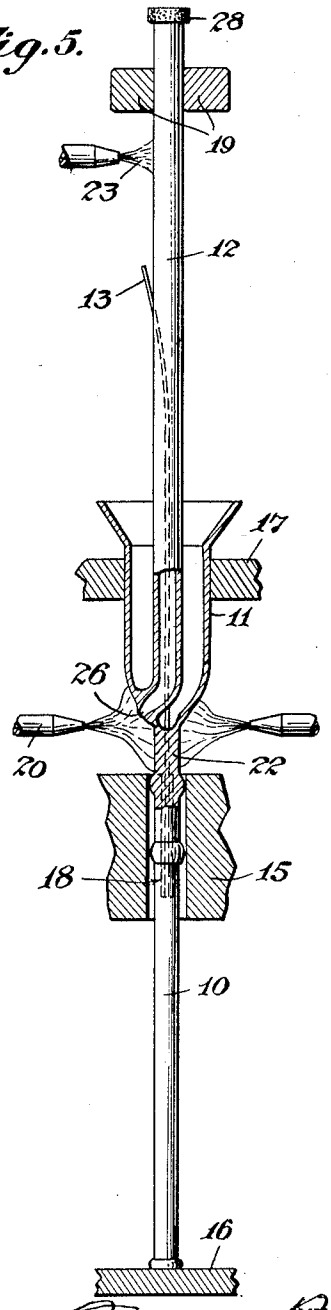


Fig. 5.



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UNITED STATES PATENT OFFICE.

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CONSTRUCTION OF INCANDESCENT LAMPS.

Application filed March 29, 1924. Serial No. 702,740.

This invention relates generally to the construction of electrical incandescent lamps.

In the manufacture of electric incandescent lamps of the tipless type in which the bulbs are evacuated through the stem a common practice is to assemble into a unitary construction a filament supporting rod, a flare or stem tube, and an exhaust member through which to exhaust the bulb. In the fusing together of these parts to form a unitary construction a passage has been provided in the wall of the flare by blowing a stream of air into the exhaust tube so that the pressure of air at the softened end of the tube would force its way through the mass of softened glass and provide the passage or port required to afford communication between the interior of the tube and the exterior surface of the flare at or near its junction with the filament supporting rod.

This method of providing the perforation in the inner end of the exhaust tube has been open to the objection that the relatively cool stream of air which was blown into the exhaust tube for the purpose tended to create disadvantageous temperature conditions within the mass of glass forming the various parts which resulted in the production of undesirable stresses and strains in the structure and contributed to the production of an unduly high percentage of breakage and waste in the manufacture of the lamps.

It has been found that the use of the objectionable stream of air for creating the communicating perforation at the inner end of the exhaust tube can be avoided by closing the outer end of the exhaust tube before the assembling operation is effected and then in heating the exhaust tube to thereby heat and produce an expansion of the air trapped within the exhaust tube to bring about a degree of pressure therein which will cause the air to force its way through the soft and plastic wall of the flare at the junction therewith of the exhaust tube. This method of operation has the distinct and substantial advantage that the air which is used to produce the perforation is subjected to a heating operation such as will nullify the detrimental effects of the cold stream of air heretofore referred to as having been used in the prior art.

In the drawings in which a preferred embodiment of the invention has been selected for illustration,

Figure 1 is a view in vertical section and side elevation of an assemblage of lamp parts together with the supporting members forming part of a lamp assembling and forming machine and showing the parts in the relative positions occupied while a preliminary heating step is being produced.

Figure 2 is a view similar to Figure 1 showing a clamping operation in which the fused parts are pressed together into an integral relation.

Figure 3 is a view showing the operation of producing a perforation in the wall of the structure at the inner end of the tubular exhaust tube.

Figure 4 is a view similar to Figure 3 showing a perforating operation in an assembly where the exhaust tube is joined to the flare separately from the junction of the flare with the filament supporting rod.

Figure 5 is a view similar to Figure 4 showing a modified form of closure for the outer end of the exhaust tube.

Referring to the drawings for a more detailed description of the invention, Figure 1 shows a first step in the assembling of a filament supporting rod 10, a flare 11 and an exhaust tube 12 together with a pair of lead-in wires 13. The filament supporting rod 10 is placed in position in a passageway 14 extending through a table member 15 on the machine and rests at its lower end on a platform 16. The flare 11 is passed through a perforation in the shelf 17 and rests at its lower end on the surface of the table 15. The lead-in wires 13 are placed in position extending through the flare piece 11 and rest at the lower end of passageways 18 formed in the table 15. The exhaust tube 12 is supported in alinement with the filament supporting rod 10 and is held in place between the clamping members 19 forming part of the general assembling machine.

With the parts in the relative positions indicated the nozzle 20 of a blow torch is caused to direct its flame against the lower extremity of the flare 11 to thereby soften the same as well as the adjacent extremities of the filament supporting rod 10 and the exhaust tube 12. When the flame has been applied for a sufficient length of time to bring about a desirable softening of the parts a pair of clamping jaws 21 is brought into pinching relation to the heated parts as in Figure 2 of the drawing and operates to press the parts into connected and unitary relation and produce a

body of glass at 22 through which the lead-in wires 13 extend.

Following the fusing and joining operations described heat is applied to the side of the exhaust tube 12 as at 23 so that the body of air which is trapped in the exhaust tube between the closed outer end 24 thereof and the inner end which is joined to the flare piece 11 at 25 is caused to expand whereupon the pressure of the imprisoned air breaks through the wall of the flare 11 as at 26 in Figure 3 of the drawing. The expansion of the air within the tube 12 through the application of the flame 23 thereto not only produces the desired degree of pressure within the tube but also heats the imprisoned air to a degree which prevents the setting up of undue temperature conditions within the glass with the subsequent creation of undesirable stresses and strains therein.

At a later step in the operations when the parts referred to have been assembled within a bulb the outer closed end 24 of the exhaust tube 12 is removed usually by cutting it off, and a suitable exhausting pump or other device is applied thereto to bring about the desired evacuation of the tube in a known manner following which the exhaust tube 12 is sealed off just within the end of the flare to thereby seal off the evacuated bulb.

Not only is it contemplated to produce a perforation substantially within the junction of the three parts as in Figure 3 of the drawing but the perforation 26 may also be formed at the junction of the inner end of the exhaust tube 12 with the side wall of the flare 11 as in Figure 4 of the drawing. This construction avoids the chamber or hollowed-out portion 27 which is shown in Figures 2 and 3 of the drawing.

Instead of closing the outer end of the exhaust tube 12 in advance of the assembling operation referred to, it is contemplated also to place within the end of a normally open tube a closure member 28 such as is shown in Figure 5 of the drawing, the closure plug being formed of asbestos or the like.

In the successive operative steps by which the inner end of the flare 11 is softened or rendered plastic, then clamped into welded relation to the adjacent ends of the filament supporting rod and the exhaust tube, and in which the exhaust port is formed, the application of heat is regulated or proportioned in accordance with the requirements of the operative step that is to be performed. For example, in Figure 1 of the drawing a single torch 20 provides an adequate heating effect to soften the lower end of the flare 11 preparatory to the operation of the clamping jaws 21 in the next operative step illustrated in Figure 2.

In the stage of operation disclosed in Figure 2 wherein the parts have been carried bodily from the position wherein the single torch shown in Figure 1 acted on the flare 11, a plurality of blow torches is made use of to bring about the necessary degree of temperature in the structural parts to be welded as well as in the clamping jaw members 21 to bring about the most effective degree of plasticity to produce a perfect juncture or joining of the interengaged glass parts.

In the further step of forming the perforation 26 as in Figures 3, 4 and 5 a plurality of blow torch nozzles is again made use of to produce the required degree of softening of the glass for the purpose. It will be clear that in addition to using one or more blow torches arranged to direct flame on the work located in a common center, the work may also be rotated about its vertical axis to still further enhance the heating effect.

What is claimed is:—

1. The method of making stems for incandescent lamps and other sealed devices which consists in positioning an exhaust tube, closed at one end, inside a stem tube with its open end adjacent one end of said stem tube, fusing the open end of said exhaust tube to a portion of said stem tube and thereby sealing said exhaust tube, and heating the air in said exhaust tube while the fused glass is still plastic to cause the air to expand and blow a port through the plastic glass.

2. The method of making a mount for incandescent lamps and other sealed devices which consists in fusing together a supporting rod, a stem tube and the inner end of an exhaust tube closed at its outer end and thereby sealing said exhaust tube with plastic glass and thereupon applying heat to the exhaust tube to expand the air in the exhaust tube while the glass is still plastic and causing perforation of the plastic glass to provide a port between the exterior of the stem tube and the interior of the exhaust tube.

3. The method of making stems for incandescent lamps and other sealed devices which consists of positioning an exhaust tube longer than necessary for the finished stem and closed at one end with its open end inside a stem tube, joining the open end of the exhaust tube to the stem tube by fusion, heating the air in the sealed exhaust tube while the fused juncture is plastic to cause the confined air in the exhaust tube to blow a port through said juncture, and removing the outer sealed end of the exhaust tube.

4. The method of making stems for tubes and bulbs comprising the steps of fusing one end of a glass exhaust tube which is closed at the other end to the wall of a glass stem tube by heating the stem tube sufficiently to soften the same at the point of juncture and heating the entrapped air contained in the exhaust tube to blow an opening through the wall at the softened stem point of juncture therewith.

5. The method of making stems for tubes

and bulbs comprising the steps of forming a lateral bend in one end of a glass exhaust tube, closing the other end thereof, and then simultaneously fusing the laterally bent end to the side wall of a glass stem tube and heating the entrapped air contained in the softened stem exhaust tube to blow an opening through the wall at the point of juncture therewith.

6. The method of making stems for tubes and bulbs comprising the steps of simultaneously fusing one end of a glass exhaust tube which is closed at the other end to the wall of a glass stem tube by heating the stem tube sufficiently to soften the same at the point of juncture therewith, heating the entrapped air or gas contained in the exhaust tube to blow an opening through the softened stem wall at the point of juncture therewith and sealing the leading-in wires to one end of the tube.

7. The method according to claim 4 wherein the exhaust tube is fused to the stem tube at a point removed from one end of the latter comprising the step of sealing in to said end loading-in wires and a support.

8. The method according to claim 5 wherein the exhaust tube is fused to the stem tube at a point removed from one end of the latter comprising the step of simultaneously sealing in to said end leading-in wires and a support.

9. The method of making stems for tubes and bulbs comprising the steps of laterally bending one end of a glass exhaust tube, joining the laterally bent end to the interior of a glass stem tube by relatively rotating the tubes and a burner with the flame from the latter playing upon the exterior of the stem tube and thereby softening a ring of the stem tube in the vicinity of the point of juncture and heating the air contained within the exhaust tube to create sufficient pressure to blow an opening through the softened ring of the stem wall at the point of juncture.

In testimony whereof I affix my signature.

FREDERICK RAY.