

May 3, 1938.

P. O. CARTUN

2,116,384

ELECTRIC LAMP OR SIMILAR DEVICE

Filed March 2, 1937

2 Sheets-Sheet 1

Fig. 1.

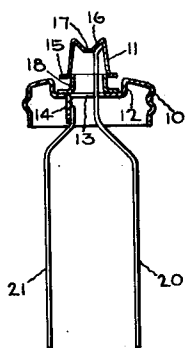


Fig. 2.

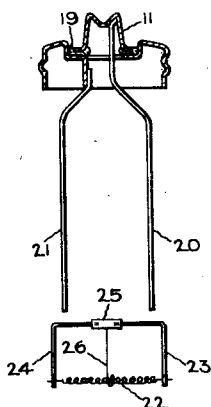


Fig. 3.

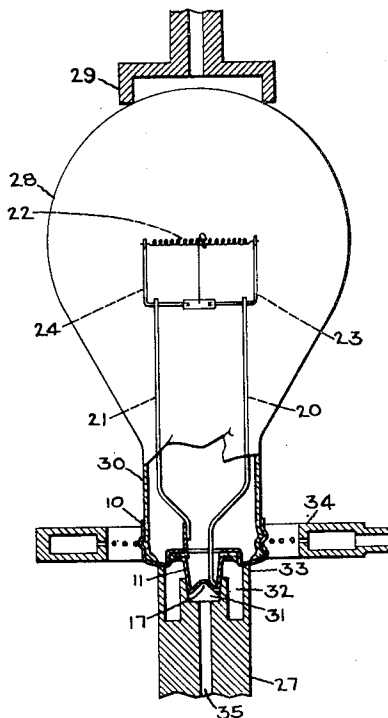


Fig. 4.

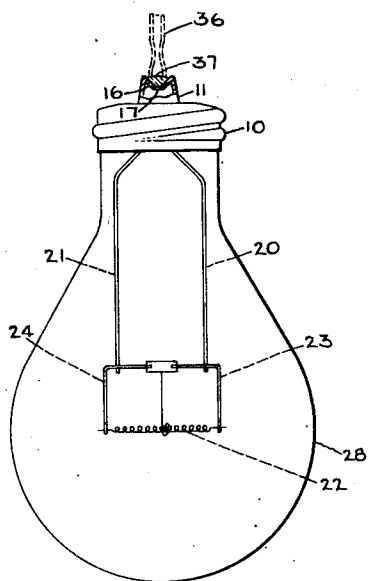


Fig. 6.

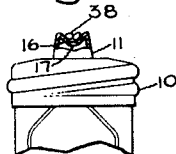


Fig. 7.

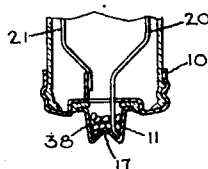
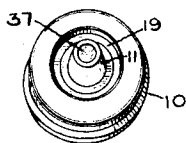


Fig. 5



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Fig. 8.

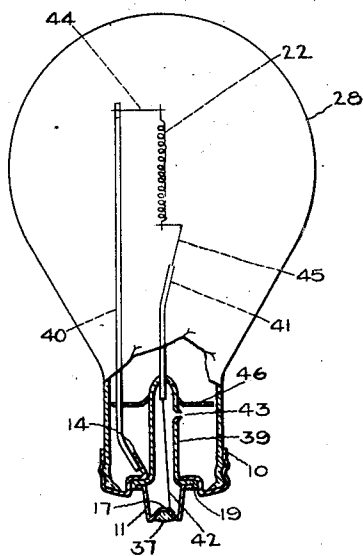
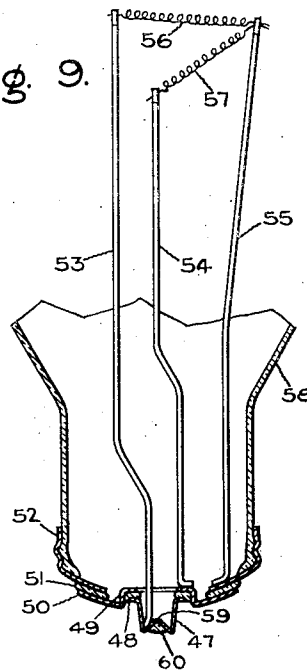


Fig. 9.



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UNITED STATES PATENT OFFICE

2,116,384

ELECTRIC LAMP OR SIMILAR DEVICE

Paul O. Cartun, Cleveland Heights, Ohio, assignor to General Electric Company, a corporation of New York

Application March 2, 1937, Serial No. 128,617

8 Claims. (Cl. 176—2)

My invention relates to electric incandescent lamps and similar devices comprising an electric energy translation element, such as a filament, enclosed or sealed in a bulb or envelope, and to methods of manufacturing such devices. More particularly, my invention relates to improvements in the type of devices shown in United States Patent 1,968,290, D. K. Wright, and my United States patent application Serial No. 669,189, Filed May 3, 1933, Patent No. 2,084,192, in which the internal "mount," comprising the translation element or filament and its supporting structure, is mounted on the base independently of the attachment of the bulb to the base. The glass bulb wall is sealed directly to the base by fusion so that the base becomes an integral part of the lamp or similar device. Such a construction has the advantages that the current lead wires do not pass through the glass envelope, the usual separate basing operation is eliminated, it is much easier to locate the translation element accurately and uniformly with reference to the base, the internal mount structure is greatly simplified, lamps may be made with very short light center length, the number of operations is reduced considerably, and the device is much simpler and stronger and less expensive to make. Various features and advantages of my invention will appear from the following description of species thereof and from the drawings.

In the drawings, Figs. 1-4 show various steps in the manufacture of an incandescent lamp according to my invention, Fig. 4 showing an elevation, partly in section, of the completed lamp; Fig. 5 is a perspective view of the base; Figs. 6 and 7 are elevations, partly in section and wholly in section respectively, of the base end of the lamp illustrating alternative methods of sealing an exhaust opening in the base; Fig. 8 is an elevation, partly in section, of a lamp having a modified mount structure; and Fig. 9 is an elevation, in section, of a modified base having three contacts for a multiple filament lamp.

Referring to Fig. 1, the base illustrated therein is of the screw-thread type comprising a cylindrical metal shell 10 and a metal eyelet 11. The shell 10 has a round cavity or depression 12 in the bottom or end thereof with a round opening 13 at the center thereof and a narrow tongue or tab 14 extending axially inward of the shell from the rim of said opening, the said tongue 14 being formed from the material punched out to form the said opening. The eyelet 11 is substantially cylindrical or conical and has an outwardly ex-

tending flange 15 at one end, the opposite end being inwardly recessed at 16 and having an opening 17 therein through which the lamp is subsequently exhausted.

The base may be assembled as shown in Fig. 1, with the shell 10 held in an inverted position in a suitable holder with the flanged portion of a flare 18 of glass or other vitreous material disposed in the cavity 12. The eyelet 11 is gripped in a holder such as a suction head or mechanical jaws and is brought down against the upper end of the glass flare 18. Heat is then applied, preferably by directing the flame of a ring type burner downwardly into and around the edges of the cavity 12 to heat the metal parts and to fuse the glass flare 18. During the fusion of the said glass flare 18, the eyelet 11 is pushed downward by the weight of the head in which it is held until a stop on said head engages a coating stationary stop, thereby spacing the eyelet 11 and shell 10 as shown in Fig. 2 and uniting the two parts through the medium of the fused glass seal 19. As shown in Fig. 1, preferably prior to the assembly of the shell 10 and eyelet 11, the ends of lead and support wires 20 and 21 are secured, as by welding or clamping, to the tongue 14 on the shell 10 and to the eyelet 11 respectively. The shell 10 and eyelet 11 may, if desired, be assembled in an upright position, the shell being pressed downward during the fusion of the glass ring 18.

After the base has been assembled, a filament 22, which may be of the coiled or coiled-coil type, is mounted on the ends of the lead wires 20-21. The said filament may be mounted directly on the ends of the said leads. However, as shown in Fig. 2, a separate filament assembly may be made comprising a pair of bent wires 23 and 24 having their ends embedded in a glass bead 25 to form a U-shaped frame, the filament 22 being secured to the ends of said wires. The filament may be supported at its middle by the looped end of a support wire 26 having its opposite end embedded in the glass bead 25. The filament assembly is then mounted merely by securing, preferably by welding, portions of the wires 23-24 to the upper ends of the leads 20-21. Obviously, by using a suitable jig the filament may be positioned very accurately with respect to the base.

The next operation is the sealing of a bulb or envelope to the base. Referring to Fig. 3, the base and mount assembly may be placed in an upright position on a suitable holder 27, and a bulb 28, held in a suction head 29, may then be lowered so that the neck 30 thereof enters the

inside of the base shell 10 and is seated firmly on the bottom thereof. The bulb may however, if desired, be pushed upward into the inverted base held in the position shown in Fig. 2 so that the base need not be removed from its holder. The holder 27 has a cavity 31 at the center thereof shaped to engage the eyelet 11 and an annular groove 32 which forms a ring 33 which engages the bottom of the shell 10 around the cavity 12 and prevents the base from wobbling. The groove 32 also prevents excessive heating of the fused joint between the shell 10 and eyelet 11 during the sealing of the bulb to the base. The base shell 10 and the adjacent neck 30 of the bulb are then heated, preferably by a ring type burner 34 surrounding said shell, to cause said bulb neck to become plastic, and air under pressure is admitted to the interior of the bulb through the opening 17 in the eyelet 11 and through the cavity 20 31 and a passage 35 in the holder 27 so that the plastic glass is pressed against the inner surface of the base shell 10 to form a tight seal.

The final step is the exhausting and "tipping off." One method of accomplishing this is to seal an end of a glass exhaust tube 36 (Fig. 4) to the surface of the recess 16 in the end of the eyelet 11. The lamp is then exhausted in the usual manner, and filled with gas if desired, through the opening 17 in the eyelet 11, after which the exhaust tube 36 is heated to close and sever it and the residue is fused down to form a glass seal 37 which seals the opening 17. The glass seal 37 is sheltered within the recess 16 thereby eliminating any sharp projections and preventing accidental breakage of the said seal.

Alternative methods of exhausting and sealing the exhaust opening are illustrated in Figs. 6 and 7, the lamp in each case being exhausted, and filled with gas if desired, within a chamber. In Fig. 6, the lamp is disposed in a base-up position and pebbles 38 of a fusible material such as glass, preferably a low melting point glass such as French sealing glass made by the Corning Glass Works, are placed in the recess 16 in the end of the eyelet 11. After the lamp has been exhausted, heat is applied to the end of the eyelet 11 to fuse the glass pebbles 38 to form a seal like that shown at 37 in Fig. 4. In Fig. 7, the lamp is placed in a neck-down position and the glass pebbles are placed within the eyelet 11, the said pebbles being fused after the lamp has been evacuated. Instead of glass pebbles 38, a small piece or pieces of a fusible metal may be used to seal the opening 17.

In the modification shown in Fig. 8, a long flared glass tube 39 is used in place of the short flare 18 of Fig. 1, and it is assembled so that it extends into the bulb. The seal 19 is fused from the flare or flange at the end of the said tube 39, although if desired, an extra glass ring or flare similar to the flare 18 may be used to provide more glass for the seal 19. One lead wire 40 is secured at one end to the tongue 14 on the base shell 10. The other lead may comprise two sections 41 and 42, the section 42 constituting a fuse wire which is disposed within the tube 39 which serves as a shield therefor. The said tube 39 may be open at its upper end, or it may be closed and sealed around the lead wire 41 as shown in the drawings in which case an opening 43 is made in the side of the said tube in order that the bulb may be evacuated. The coiled or coiled-coil filament 22 is shown in this case as extending along the longitudinal axis of the bulb 28 and is mounted on support wires 44 and 45 which are se-

cured, preferably by welding, to the leads 40 and 41 respectively. A heat deflecting shield 46 of a metal such as aluminum, or an insulating material such as mica, may be mounted on the tube 39 if necessary to prevent overheating of the base when the lamp is burned in a base-up position. The bulb 28 is sealed to the base shell 10 and the lamp is exhausted, and filled with gas when desired, as explained above with reference to Figs. 3-6.

Fig. 9 shows a multiple filament lamp having a base comprising a metal eyelet 47, like the eyelet 11, which is united by a fused seal 48 to the cavity or depression 49 in a metal disc 50 of the same shape as the bottom or end of the shell 10. The said disc 50 is in turn united by a glass seal 51, formed by the fusion of a glass ring, to a screw-threaded metal shell 52. One end of each of the lead wires 53, 54 and 55 is secured, preferably by welding, to the eyelet 47, disc 50 and shell 52 respectively. One filament 56 may be mounted on the ends of the leads 53 and 55 and another filament 57 on the ends of the leads 54 and 55, the lead 55 in this case thereby serving as a common lead for both filaments. The bulb 58 is sealed to the base shell 52 in the same manner as shown and explained with reference to Fig. 3. The lamp is then exhausted, and gas filled if desired, through the opening 59 in the eyelet 47 and then sealed at 60, as shown and explained with reference to Figs. 4-7.

Where the glass parts of the devices described above are made of soft glass, the metal parts of the base are preferably made of an iron alloy containing about twenty-eight per cent of chromium. Such an alloy is one marked by the Allegheny Steel Corporation as "Allegheny 55." Where the glass parts are made of a hard glass, such as "Pyrex", the metal may be an iron-nickel-cobalt alloy such as that known as "Fenico" and disclosed in the United States Patent 1,942,260, H. Scott.

It will be obvious to one skilled in the art that various changes and substitutions may be made without departing from the spirit of my invention. For example, instead of a glass flare 18 (Fig. 1) a simple ring or short tube of glass or other vitreous material may be used to form the fused joint 19. The shell 10 or 52 instead of being screw threaded, may be a plain cylinder having bayonet pins or other engagement means such as a flange thereon. The shape of the eyelet 11 may be varied—for example, a plain disc may be used. The metal-to-glass seals may be made by heating the metal by means of a high frequency coil instead of a gas flame. A heat deflecting disc may also be used in the lamp shown in Fig. 4, similar to the disc 46 in Fig. 8 and supported by the leads 20-21. The filament constructions could also be changed to accommodate various demands.

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

1. The method of manufacturing an electric lamp or similar device which comprises assembling a metal base shell and eyelet with a glass ring therebetween, said shell and eyelet each having one end of a lead wire secured thereto, applying heat to fuse said glass ring and unite said shell and eyelet, mounting a filament on the opposite ends of said lead wires, inserting the neck of a bulb into said shell, applying heat to said shell to fuse the portion of the said bulb neck located therein and cause it to be sealed to the inner surface of said shell, exhausting the

interior of said bulb through an opening in said eyelet and then sealing said opening with a fusible material.

2. The method of manufacturing an electric lamp or similar device which comprises assembling a metal base shell and eyelet with a glass ring therebetween, said shell and eyelet each having one end of a lead wire secured thereto, applying heat to fuse said glass ring and unite said shell and eyelet, securing to the opposite ends of said lead wires a pair of support wires united in insulated and spaced relationship and carrying a filament, inserting the neck of a bulb into said shell, applying heat to said shell to fuse the portion of the said bulb neck located therein and cause it to be sealed to the inner surface of said shell, exhausting the interior of said bulb through an opening in said eyelet and then sealing said opening with a fusible material.

3. An electrical device comprising a glass bulb having a neck portion, a cylindrical metal base shell sealed directly to said bulb neck, said shell having an inwardly flanged bottom with a round depression therein, a substantially cylindrical eyelet at the bottom of said shell having an outwardly extending flange united by a fused vitreous seal to the said depression in the bottom of said base shell, said eyelet having a sealed exhaust opening therein, a pair of lead wires in said bulb, one end of each of said lead wires being secured respectively to said shell and said eyelet, and a filament in said bulb mounted on the opposite ends of said lead wires.

4. An electrical device comprising a glass bulb having a neck portion, a cylindrical metal base shell sealed directly to said bulb neck, a glass tube, a metal eyelet on the end of said base shell united to said shell through the medium of a fused glass seal formed from a portion of said glass tube, said glass tube extending axially into said bulb, a lead wire secured at one end to said base shell and extending into said bulb, another lead wire secured at one end to said eyelet and extending through said glass tube into said bulb, the portion of said second-mentioned lead wire located within said tube constituting a fuse wire, and a filament mounted on the ends of said lead wires within said bulb, said eyelet having an exhaust opening therein communicating through said glass tube with the interior of said bulb, said exhaust opening being sealed with a fusible material.

5. An electrical device comprising a glass bulb having a neck portion, a cylindrical metal base

shell sealed directly to said bulb neck, a glass tube, a metal eyelet on the end of said base shell united to said shell through the medium of a fused glass seal formed from a portion of said glass tube, said glass tube extending axially into said bulb, a lead wire secured at one end to said base shell and extending into said bulb, another lead wire secured at one end to said eyelet and extending through said glass tube into said bulb, the end of said glass tube opposite said base being fused around a portion of said lead wire, the portion of said second-mentioned lead wire located within said tube constituting a fuse wire, and a filament mounted on the ends of said lead wires within said bulb, said eyelet having an exhaust opening therein communicating through said glass tube and through an opening therein with the interior of said bulb, said exhaust opening being sealed with a fusible material.

6. A base for an electric lamp or similar device comprising a shell of metal readily sealable to glass having an inwardly flanged bottom with a round depression therein, and a substantially cylindrical metal eyelet at the bottom of said shell having an outwardly extending flange at one end united by a fused vitreous seal to the said depression in the bottom of said shell, said eyelet having an exhaust opening therein.

7. A base for an electric lamp or similar device comprising a shell of metal readily sealable to glass having an inwardly flanged bottom with a round depression therein, and a substantially cylindrical metal eyelet at the bottom of said shell having an outwardly extending flange at one end united by a fused vitreous seal to the said depression in the bottom of said shell, the opposite end of said eyelet being inwardly recessed and having an exhaust opening therein, said recess serving as a shelter for a fused glass seal.

8. An electrical device comprising a glass bulb having a neck portion, a base comprising a cylindrical metal shell sealed directly to said bulb neck, a metal disc sealed to the bottom of said shell through the medium of a fused glass ring, and a metal eyelet sealed to the bottom of said disc through the medium of a fused glass ring, a plurality of lead wires each secured at one end to said shell, ring and eyelet respectively and extending into said bulb and a plurality of filaments mounted on the opposite ends of said lead wires, said eyelet having an exhaust opening therein sealed with a fusible material.

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