Sept. 23, 1947. P. O. CARTUN 2,427,711

ELECTRIC LAMP AND SEAL THEREFOR

Filed Feb. 16, 1945

FIG. 1.

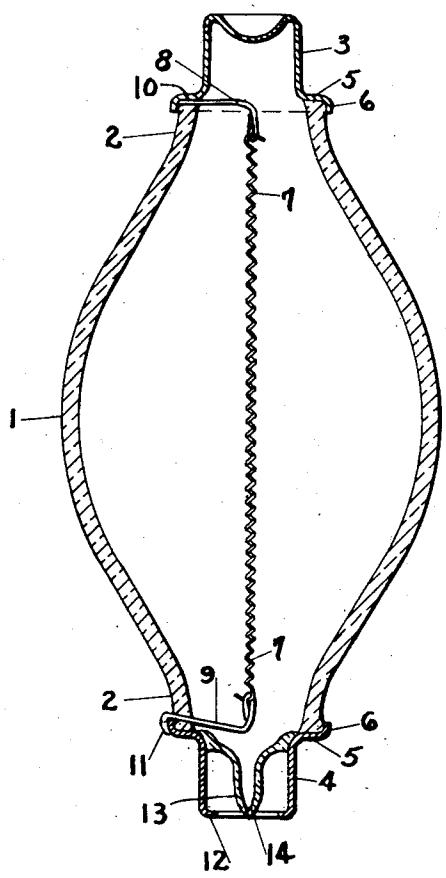


FIG. 2.

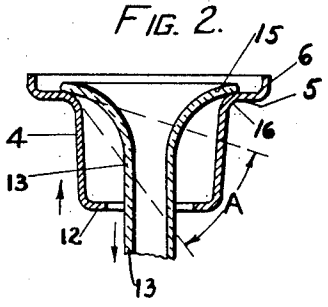


FIG. 3.

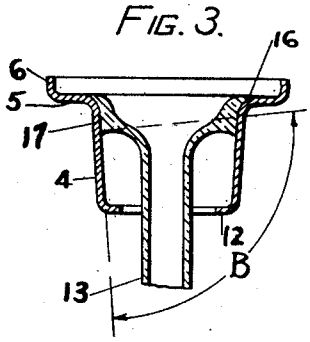
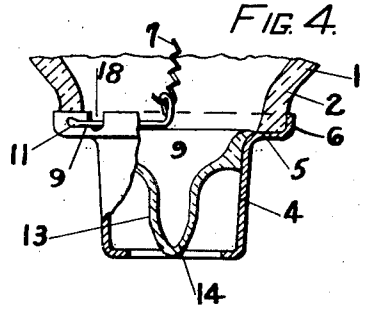


FIG. 4.



INVENTOR:
PAUL O. CARTUN
BY John H. Anderson
HIS ATTORNEY

Patented Sept. 23, 1947

2,427,711

UNITED STATES PATENT OFFICE

2,427,711

ELECTRIC LAMP AND SEAL THEREFOR

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

Application February 16, 1945, Serial No. 578,306

4 Claims. (Cl. 176—29)

1

This invention relates to electrical devices, including incandescent lamps and various kinds of electric discharge devices. An object of the invention is to improve and simplify such devices and their manufacture, including their bases or contact terminals and their exhaust connections and seals. The invention is especially adaptable and advantageous for rather small lamps and devices, and particularly lamps useful for decorative purposes, such as Christmas tree lighting strings and the like, as well as lamps for automobile dome or dash lighting. Lamps of this character are exemplified in U. S. Patents Nos. 2,191,346 to Geiger, 2,221,868 to Geiger and Davidson, and 2,240,331 to Geiger and Ayres, and I have hereinafter explained my invention as applied to such lamps. Various features and advantages of the invention will become apparent from the description of a species and form of embodiment, and from the drawings.

In the drawings, Fig. 1 shows a vertical axial section through an electric lamp conveniently embodying the invention; Figs. 2 and 3 are fragmentary axial sectional views illustrating stages in its fabrication; and Fig. 4 is a similar view illustrating a variant construction.

The invention is illustrated in Fig. 1 as embodied in a vitreous envelope 1 provided with contact terminals at different portions thereof: viz. the rather oval glass envelope 1 shown has at opposite ends reduced portions or necks 2, 2 which are closed by attached tubular sheet metal caps 3, 4 whose main portions (as shown on a larger scale in Figs. 2 and 3) may taper somewhat to facilitate forming them by die-stamping. As shown, the tubular caps 3, 4 have external rims or flanges 5, 5 against which the bulb ends 2, 2 abut endwise and are sealed by fusion of the glass. Preferably these rims 5, 5 have marginal lips 6, 6 which surround and protect the joints, and may even adhere to the fused seals. The electric translation means of this particular device consists of an incandescent filament of fine tungsten wire 7 extending more or less axially through the envelope 1, and preferably coiled in a fine helix. This filament 7 may be connected between the contact terminal caps 3, 4 by means of lead-wires 8, 9 clamped tight on the filament ends. As shown in Fig. 1, the upper lead 8 is welded directly to the inner surface of the rim or flange 5 of its cap 3 at 10, while the lower lead 9 extends out through the fused end of the neck 2 which seals to the cap 4 and is electrically connected to the latter outside the seal, as by spot welding the lead to the lip 6 at 11.

2

While the upper cap 3 is shown with a closed bottom, the lower cap 4 is shown as open ended, though with an inturned marginal lip 12 around its mouth. In manufacture, the envelope 1 may be exhausted through an exhaust tube 13 extending out through the open end of the cap 4, as shown in Fig. 3, after which the tube may be sealed off as shown at 14 in Fig. 1, substantially or approximately at the open end of the cap. In order that the ends of the caps 3, 4 may serve as contact terminals for connecting the device in circuit, as shown for instance in Patent No. 2,240,331 cited above, the originally open end of the cap 4 must, of course, be kept free of adherent glass which might prevent it from actually engaging the corresponding circuit contact. Practically, this means that the seal of the exhaust tube 13 to the cap 4 must be made inside the cap, rather than at its mouth or lip 12, so as to allow the tube to be sealed off at 14 at least partly inside the cap. This offers difficulties, which can be overcome, I have found, in the following manner:

As shown in Figs. 2 and 3, the exhaust tube 13 is small enough to extend through the open lower cap end 12 with some clearance around it, but is enlarged or flared at its upper end 15 to a size which overlaps the corner or shoulder 16 where the flange 5 joins the tubular portion of the cap. If the flare 15 is simply fused to the corner 16 at the junction of the flange 5 with the cap 4 by heating the parts, the resulting seal covers only a narrow zone at the corner 16. What is more important, cracks tend to develop in the seal where the side of the flare diverges from the inner surface of the cap at an angle about corresponding to the acute angle marked A in Fig. 2. I have found, however, that by shifting or displacing the tube 13 and flare 15 relative to the cap 4 as indicated by the arrows in Fig. 2, the flare can be brought inside the tubular main portion of the cap 4, with the effect of extending its peripheral seal over a wider zone 17 of the internal cap surface extending below the corner 16, as shown in Fig. 3. As also shown in Fig. 3, the fused seal portion of the flare at 17 is in longitudinal contact with the inner surface of the cap over a distance substantially greater than the thickness of the tube 13. This results in a larger angle B between the inner cap surface and the outer surface of the flare 15 remote from the corner 16, an angle B, greater than acute, which is at least a right angle, or prefer-

ably an obtuse angle. Obtuseness of the angle B can if necessary be assured by reversely shifting the tube 13 upward a little after initially shifting it downward and thus extending the sealing zone 17 down inside the cap 4 as shown in Fig. 3. The shift of tube 13 and its flare 15 relative to the cap 4 may be produced by relative displacement of these parts in any suitable way, as by an actual pull or push on one or both of them. When an angle B greater than an acute angle obtains, the tendency for cracks to develop in the seal is obviated.

The sealing of the tube 13 and its flare 15 to the cap 4 may most conveniently be done before sealing the cap 4 to the bulb neck 2. After exhaustion of the bulb 1 through the tube 13, the latter may be sealed off at 14, Fig. 1, by heat from any suitable source applied to the tube 13 below the cap 4, or to the lower portion of the cap, or both. The cap 4 should be of metal that wets and seals well to the vitreous material of the bulb ends 2, 2, such as the chrome iron known commercially as "Allegany 55" for a bulb 1 of ordinary lead or lime glass.

As shown in Fig. 1, the leadwire 9 extends out through the seal of the corresponding bulb neck 2 above the uninterrupted edge of the flange lip 6, and is then bent down to its weld 11 to the flange. Fig. 4, however, illustrates a variation in which the flange lip 6 is interrupted by a notch 18 about as deep as the lip, thus allowing the wire 9 to extend through the neck seal right at or very close to the upper face of the flange 5, and to be then bent aside to the weld 11.

The herein described method of sealing the tube 13 to the cap 4 is separately claimed in my divisional application Serial No. 693,356, filed August 27, 1946.

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

1. An electric lamp comprising a vitreous bulb with opposite necks, tubular metal caps having external flanges to which the bulb necks are sealed, at least one of said caps having an opening in its end, a current lead electrically connected to the other of said caps, and a current lead extending through the seal of the bulb neck to said open-ended cap and electrically connected to the latter outside the seal, with an electric filament in said bulb connected between said current leads, and a vitreous flared tube having its flare peripherally sealed to the interior of the open-ended cap and itself sealed off substantially at the open end of this cap.

2. The combination with a vitreous bulb having a neck, of an externally flanged metal cap having its flange sealed to the bulb neck, and a vitreous flared tube having its flare peripherally sealed by fusion to the interior of said cap at and adjacent its junction with said flange, and at the side of the flare remote from said junction diverging from the inner surface of the cap at an obtuse angle.

3. The combination with an externally flanged metal cap of a vitreous flared tube having its flare peripherally sealed by fusion to the corner of said flange and to an adjacent zone of the interior of the cap, and at the side of the flare remote from said corner diverging from the inner surface of the cap at an angle greater than an acute angle.

4. The combination of a metal cap having an outwardly flanged end, and a glass tube concentrically located within said cap having a flared end fusion sealed to the interior surface of the cap at its flanged end, the fused seal portion of said flare being in longitudinal contact with the inner surface of said cap over a distance substantially greater than the thickness of the glass tube, the side of said seal portion remote from the flanged edge of the cap diverging from the inner surface of the cap at an angle greater than an acute angle.

PAUL O. CARTUN.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,125,694	Knight	Jan. 19, 1915
1,125,744	Knight	Jan. 19, 1915
2,191,346	Greiner	Feb. 20, 1940
258,965	Weston	June 6, 1882
2,217,398	Baier	Oct. 8, 1940
2,229,962	De Reamer	Jan. 28, 1941

FOREIGN PATENTS

Number	Country	Date
225,038	Great Britain	Nov. 27, 1924