April 22, 1947. A. G. FOOTE 2,419,395

ELECTRIC LAMP

Filed May 21, 1945

FIG. 1.

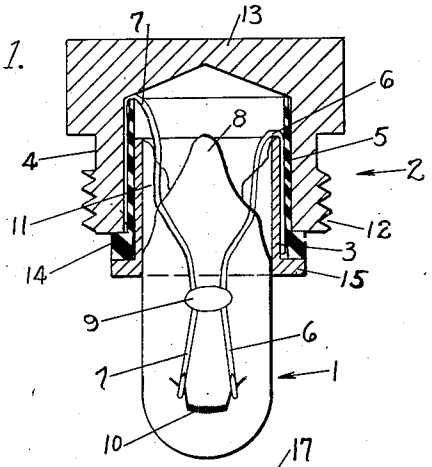


FIG. 2.

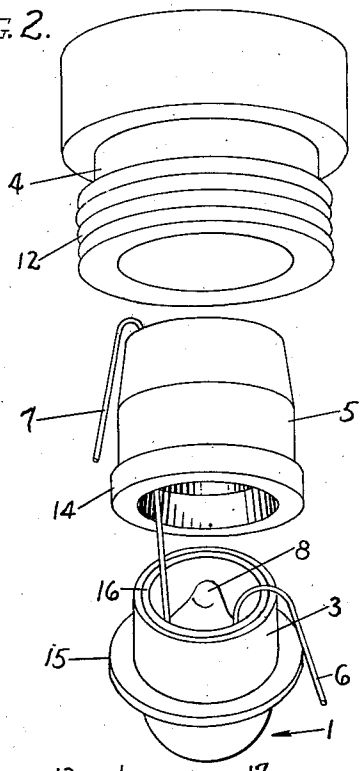


FIG. 4.

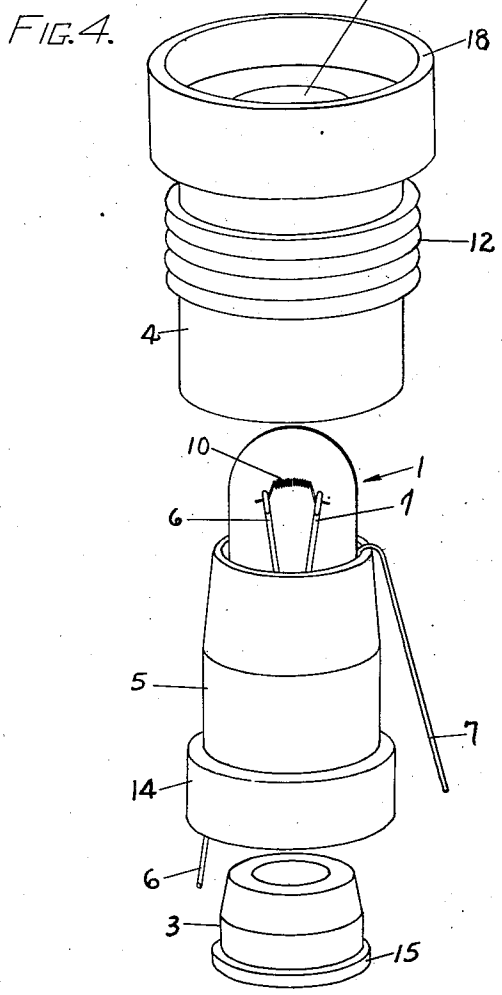
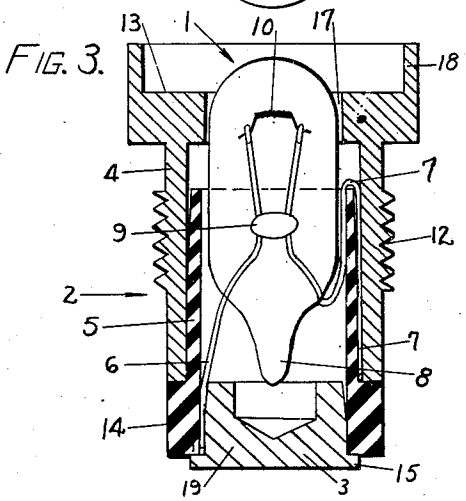


FIG. 3.



INVENTOR:
ALTON G. FOOTE
BY John H. Anderson
HIS ATTORNEY

Patented Apr. 22, 1947 2,419,395

UNITED STATES PATENT OFFICE

2,419,395

ELECTRIC LAMP

Alton G. Foote, Wickliffe, Ohio, assignor to General Electric Company, a corporation of New York

Application May 21, 1945, Serial No. 594,839

5 Claims. (Cl. 176—32)

1

This invention relates to mountings and current connections for electrical devices, such as electric lamps and electric discharge devices, and is hereinafter explained as applied to small incandescent filament lamps suitable for instrument panels or the like, for illumination or as tell-tales, for example. An important aim of the invention is to avoid the necessity of soldered or welded joints for connecting current leads of such devices to the electrical parts of their mountings. Other features and advantages of the invention will appear from the description of species and forms of embodiment, and from the drawing.

In the drawing, Fig. 1 shows an axial section through one form of lamp assembly conveniently embodying the invention; and Fig. 2 is an exploded view of the component parts of this assembly, variously tilted.

Figs. 3 and 4 are views similar to Figs. 1 and 2 illustrating a modified form of construction.

The assembly illustrated in Figs. 1 and 2 consists of an electric lamp 1 in a hollow mounting 2 comprising inner and outer conductive metal parts 3 and 4, adapted to serve as electrical contacts when the assembly is inserted in a suitable electric socket (not shown), and an associated hollow insulating part 5 with which the parts 3 and 4 severally telescope. The lamp 1 may be of any suitable type and construction, and is here shown as of a well-known "butt seal" type, comprising a cylindrical radiation-transmitting vitreous envelope hemispherical at one end, current leads 6, 7 sealed through the other envelope end adjacent its exhaust tip 8, with an insulative vitreous bead 9 interconnecting them, and a tungsten wire filament 10 (which may be a coil or a coiled coil) connected between the lead ends inside the envelope. As here represented, the inner part 3 has the form of a cylindrical sheet metal shell in one end of which the lamp 1 is mounted, being secured by means of insulative cement 11, which may also fill the other end of the shell 3. The outer part 4 also comprises a cylindrical metal shell, which is shown as externally screw threaded at 12 for securing it in a socket, and as closed at one end by a transverse end wall 13 whose margin overhangs to form an enlarged "head" affording a convenient hand hold. The insulative part 5 has the character of a sleeve approximately coextensive in axial length with the inner and outer shells 3 and 4, between which it is interposed, with external enlargement 14 at one end affording a stop shoulder corresponding to the open end of the outer shell 4. The corresponding end of the inner shell 3 (in which the lamp 1 is mounted) is exposed as a contact beyond the insulating sleeve 5, and is here shown as flanged outward at 15 substantially to the diameter of the sleeve end 14, thus affording an abutting contact and stop surface.

2

As thus far described, the assembly closely resembles constructions already in use. In such constructions, the lamp leads 6, 7 have been soldered or welded to the parts 3 and 4; but this has been a troublesome and expensive operation, involving considerable "shrinkage" or loss in manufacture owing to defective connections. In accordance with my invention, I am able to dispense with soldering, welding, or the like, and to make the necessary lead connections as a mere incident of the necessary putting together of the parts 3, 4, 5, without any special connective operation.

For this purpose, I make the connections by extending and wedging or clamping the leads 6, 7 between the parts 3, 4 and corresponding outer and inner surfaces of the insulating sleeve 5. I have found that when the parts 3, 4, 5 are made with small clearances between their correlative or mating surfaces and to close tolerances as regards variations in diameters, the wedging action produces reliable contacts of ample conductivity between the leads 6, 7 and the corresponding parts 3, 4. Elastic deformation of the sleeve 5 contributes to this firm clamping when the sleeve is made of suitably elastic but hard material and the difference in diameters of the mating surfaces of the parts 3 and 5 and 4 and 5 is less than the diameter of the leads 6, 7. Preferably, the leads 6, 7 are not directly adjacent one another, but at opposite sides of the sleeve 5, both to obviate risk of contact between them, and to allow elastic flexure of the sleeve at each lead. As shown in Figs. 1 and 2, the leads 6, 7 both extend back from the lamp 1 to the rear end of the part 3. There one lead 6 is retroverted around the rear edge of the part 3 to extend forward between the parts 3 and 5 when the part 3 (with the lamp 1 in it) is forcibly telescoped into the sleeve 5 from the front enlarged sleeve end 14; while the other lead 7 extends back past the rear edge of the part 3 and is retroverted around the end of the sleeve 5 to extend forward between the parts 4 and 5 when the part 4 is forcibly telescoped on to the part 5 from the rear unenlarged sleeve end. This latter lead 7 is kept out of contact with the shell 3 by making the shell 3 shorter axially than the sleeve 5, and by means of suitably arranged insulation, such as the cement 11, Fig. 1, or an insulative lining 16 in the corresponding sleeve end, Fig. 2.

When the parts are being telescoped together, the leads 6, 7 may be cut off short of the front ends of the parts 5 and 4, respectively, to allow the parts 3 and 4 to engage the stop shoulders of the part 5 as shown in Fig. 1. As shown in Figs. 1 and 2, the otherwise cylindrical part 5 is internally flared at its front end and externally tapered

at its rear end. This divergence of the "mating" surfaces at opposite ends of the sleeve 5 facilitates inserting the parts into one another, and also obviates risk of cutting off the lead 7 between the edges of the parts 4 and 5 when thus bringing the parts together.

It will be seen that the assembly shown in Figs. 1 and 2 is suitable for cases where the lamp 1 is intended to be inserted in a socket opening in a wall or panel from one side of the latter and to be observed or furnish light at the other side of the wall. Figs. 3 and 4 illustrate a modified assembly suitable for cases where the lamp 1 is to be observed or furnish light at the side of the wall from which it is inserted. While generally similar to the assembly of Figs. 1 and 2, it presents certain differences which will now be pointed out.

As shown in Figs. 3 and 4, the lamp 1 is reversed end for end as compared with Figs. 1 and 2, and the outer part 4, which provides one contact for the lamp, has a thinner transverse end wall 13, which is centrally apertured at 17 to expose or accommodate the lamp 1. The overhanging margin of the end wall 13 may have a peripheral laterally extending rim 18 to afford a better hand-hold. The lamp 1 is preferably mounted (as shown, without cement) in the sleeve 5, rather than in the inner part 3 which provides the other lamp contact. Accordingly, the part 3 may have its flanged end 15 closed by a transverse wall 19, and may be fabricated as a plug, preferably hollowed out from its opposite end. As shown, the lead 6 extends from the lamp 1 inside the sleeve 5 directly between the part 3 and the corresponding end of the sleeve 5, without retroversion, while the lead 7 extends in the opposite direction to the other end of the sleeve 5, where it is retroverted around this sleeve end back between the outside of the sleeve and the part 4. The divergence between the mating surfaces at the ends of the sleeve 5 and the parts 3, 4 may be produced by tapering the part 3 inside one end of the sleeve 5 and by tapering the sleeve 5 at its other end inside the part 4.

An important requirement for the insulating material of the parts 5 in both forms of construction is that it should be sufficiently elastic or resilient to clamp or grip the lead-wires 6, 7 tight against the metal parts 3, 4, and to maintain proper tightness with these parts 3, 4, without material permanent change in its own dimensions as result of heating and cooling. Likewise, it should be fairly hard and resistant as against allowing the wires 6, 7 to sink into it deeply and permanently. It should also be sufficiently resistant against absorption of moisture from the atmosphere. The insulating tubing which is known commercially as "paper base phenol-impregnated tubing" possesses these properties, and can be accurately machined to desired dimensions. But molded thermoplastics which shrink permanently as a result of heating and cooling—and thus ultimately lose their initial tightness to the metal parts 3, 4—are unsuitable. The parts 3, 4 may be conveniently made of brass or bronze, and shaped accurately by machining. With a lamp 1 of $\frac{5}{32}$ inch diameter and lead-wires 6, 7 of 0.008 inch diameter, parts 5 having external diameters of 0.227 inch and internal diameters of 0.185 inch (Figs. 1 and 2) or 0.172 inch (Figs. 3 and 4) for their untapered and unflared cylindrical midportions have proved satisfactory when the metal parts 4, 3 had clearances with these cylindrical mid-portions ranging from zero up to 0.004 inch.

In Figs. 3 and 4 various parts and features are marked with the same reference characters as those corresponding in Figs. 1 and 2, in order to dispense with repetitive description.

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

1. An assembly comprising a hollow lamp mounting itself comprising an outer metal shell contact, an insulating sleeve telescoped in said shell, and an inner metal contact telescoped in said sleeve; and an electric lamp in said mounting with current leads extending and wedged between said outer and inner contacts and corresponding outer and inner surfaces of said insulating sleeve.

2. An assembly comprising a hollow lamp mounting itself comprising an outer metal shell contact, an insulating sleeve telescoped in said shell, and an inner metal contact telescoped in said sleeve, the correlative surfaces of said telescoping parts diverging at the opposite ends of said sleeve; and an electric lamp in said mounting with current leads extending and wedged between said outer and inner contacts and corresponding outer and inner surfaces of said insulating sleeve.

3. An assembly comprising a hollow lamp mounting itself comprising an outer metal shell contact, an insulating sleeve telescoped in said shell, and an inner metal contact telescoped in said sleeve; and an electric lamp in said mounting with current leads extending and wedged between said outer and inner contacts and corresponding outer and inner surfaces of said insulating sleeve, the correlative surfaces of said sleeve and contacts diverging where said leads enter between them.

4. An assembly comprising a hollow lamp mounting itself comprising an insulative sleeve, an outer metal shell telescoped around said sleeve from one end of the sleeve, and an inner metal part telescoped in said sleeve from the other end of the sleeve; and an electric lamp in said mounting, within said sleeve, having a current lead extending and wedged between said inner part and said sleeve, and another current lead extending and retroverted around the last-mentioned end of the sleeve and wedged between the outer surface of the sleeve and the inner surface of the outer shell.

5. An assembly comprising a hollow lamp mounting itself comprising an outer metal shell contact, an insulating sleeve telescoped in said shell, and an inner metal shell contact telescoped in said sleeve, with insulation in at least one end of said inner shell; and an electric lamp in the other end of said inner shell with current leads therefrom extending out through the insulation-provided end of said inner shell, one of said leads being retroverted around the said insulation-provided end of the inner shell and wedged between the outer surface of said shell and the inner surface of said sleeve, another of said leads being retroverted around the corresponding end of said sleeve and wedged between the outer surface of said sleeve and the inner surface of the outer shell contact.

ALTON G. FOOTE.