

# United States Patent

[11] 3,600,053

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 [21] Appl. No. **888,719**  
 [22] Filed **Dec. 29, 1969**  
 [45] Patented **Aug. 17, 1971**  
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 [32] Priority **Feb. 13, 1969**  
 [33] **Great Britain**  
 [31] **7959/69**

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### [54] SINGLE-ENDED FILAMENT LAMPS 1 Claim, 2 Drawing Figs.

[52] U.S. Cl. .... 316/19,  
 313/222, 313/273, 313/279, 313/316

[51] Int. Cl. .... H01J 9/18

[50] Field of Search ..... 313/222,  
 271, 273, 279, 315, 316, 331, 333, 223; 316/19

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**ABSTRACT:** A single-ended tungsten halogen lamp having an envelope, a press seal closing one end of the envelope, two filament sections each having one end separately supported in said press seal, a common electrically conductive support for the other ends of said filament sections, and a tip in the wall of said envelope, said common support being embedded in said tip and said filament sections being secured in electrically conductive relation to said support. During manufacture the filament assembly is supported by a fine wire attached to the support and extending through the exhaust tube. On closure of the exhaust tube the tip is formed around the support and the fine wire is burnt through.

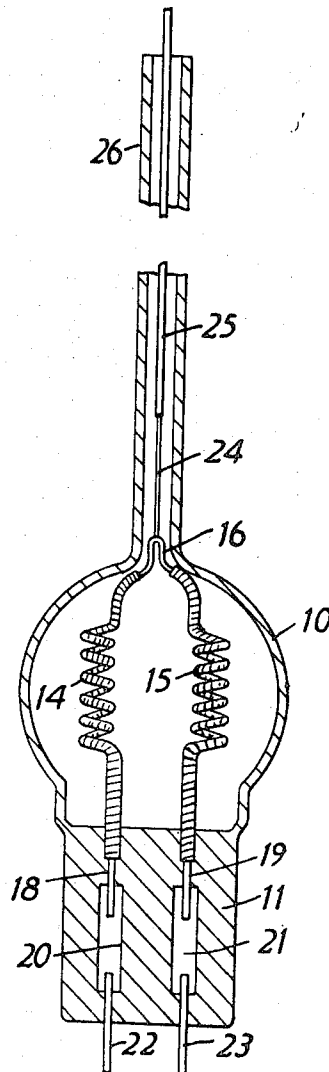


FIG. 1.

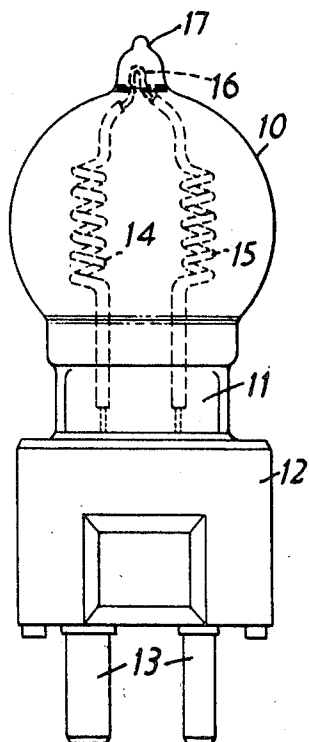
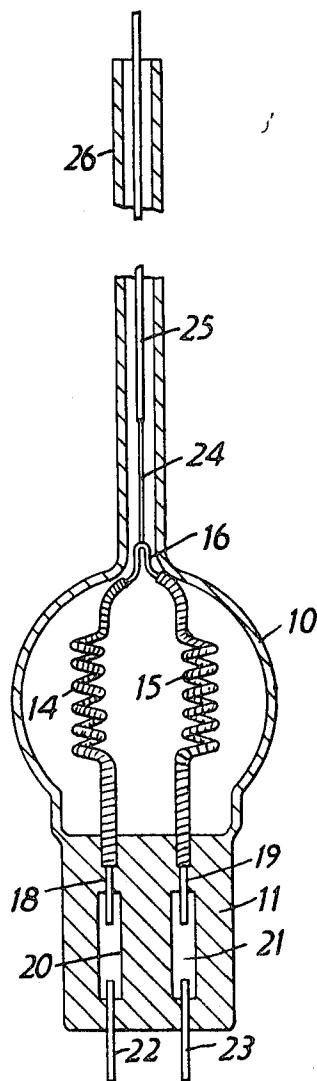


FIG. 2.



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## SINGLE-ENDED FILAMENT LAMPS

The present invention relates to single-ended tungsten halogen lamps.

Compact tungsten halogen lamps operating on mains voltage have presented considerable problems in construction. This is particularly so in the case of lamps which are single ended, i.e. both electrical conductors emerge from the lamp at one end. This is because a mains voltage lamp of necessity has a long filament made from comparatively fine wire as compared to a lamp operating on lower voltage where the wire is heavier and shorter. This means that the filament may have to be coiled coil. Such a filament in, say a 240v. 650v. lamp, is prone to arcing if not supported correctly. The supporting can be achieved in a number of ways, for example, by the use of a quartz bridge within the lamp from which supporting wires are hooked into the filament or by the use of a third electrode sealed into the pinch or press seal to which is welded a supporting wire which runs parallel to the filament. All these methods are not only costly, but introduce additional wires and hardware into the lamp which will increase the tendency to arc causing early failure of the lamp.

In accordance with the present invention there is provided a single-ended tungsten halogen lamp wherein the filament has two sections each supported at one end through a press seal and at the other end by a common electrically conductive support embedded in a tip in the wall of the lamp envelope and serving to convey current between the two filament sections.

The filament may be a single coil or a coiled coil. The support may be a separate piece of wire to whose ends the filament sections are attached or may be formed by the uncoiled portion of a gapped filament whose coiled portions form the two filament sections.

The support of one end of each filament section from a press seal is entirely conventional and may be effected by embedding the filament end itself or a lead wire on which the filament end is mounted in the press. The filament leads can be attached in conventional manner to molybdenum foils embedded in the press which convey the current to the filament while maintaining a secure seal. The support for the other ends of the filament sections is preferably a length of tungsten wire whose ends are inserted in the primary coil of two coiled coil filament sections and whose center is embedded in the tip in the wall of the envelope. Preferably the support is embedded in a tip formed by sealing-off an exhaust tube.

The new lamp construction facilitates manufacture since the support can be carried by a wire extending through the exhaust tube and, with the filament leads held by a clamp, this wire serves to hold the filament sections in the correct position with the required coil pitch while the press seal is formed and the exhaust tube is subsequently sealed-off. Using a short length of thin noble metal wire, such as platinum wire, attached to a stiffer wire to carry the support the wire can be melted through as the exhaust tube is sealed off.

The invention will now be described in more detail with the aid of an example illustrated in the accompanying drawing, in which:

FIG. 1 is a view in elevation of a single-ended coiled coil filament lamp in accordance with the invention, and

FIG. 2 is a cross section illustrating a stage in the manufacture of the lamp of FIG. 1.

The tungsten halogen lamp shown has a quartz envelope 10

with a press seal 11 which is mounted in a ceramic cap 12 having contact pins 13 to which the leads emerging from the press seal are connected. Within the envelope 10 are two coiled-coil tungsten filament sections 14 and 15 extending parallel to one another and each having one end embedded in the press seal 11. At their other ends the filament sections 14 and 15 are carried by a common support 16 embedded in a tip 17. The support 16 is a length of tungsten wire of "wish-bone" formation whose ends are inserted in the primary coils of the filament sections 14 and 15.

FIG. 2 shows how the lamp of FIG. 1 is manufactured. A filament assembly is first constructed which consists of the two filament sections 14 and 15 with respective inner leads 18 and 19, molybdenum foils 20 and 21, and outer leads 22 and 23, and of the common support wire 16. A short length of thin platinum wire 24 is welded or hooked to the support wire 16 and a length of stiffer wire 25 for example nickel wire is attached to the platinum wire 24. The whole assembly is inserted in the envelope 10 with the wires 24 and 25 extending through an exhaust tube 26. The outer leads 22 and 23 are clamped in a vice and the wires 24 and 25 through the support 16, hold the filament sections 14 and 15 in the required position, maintaining correct tension in the secondary coils of the filament sections. The press seal 11 is then formed, bringing the assembly to the condition shown in FIG. 2.

During formation of the press seal an inert atmosphere is maintained in the envelope 10 to prevent oxidation. This is subsequently evacuated through the exhaust tube 26 and replaced by the required lamp filling gas, including a halogen. The exhaust tube is then heated in the region around the bight of the support wire 16, causing the quartz to melt and reform around the wire 16. The heating burner is then applied to the part of the exhaust tube 26 around the platinum wire 24 causing the tube to collapse and melting through the platinum wire. In this way the tip 17 is formed which hermetically seals the lamp envelope 10 and serves to hold the support 16. The filament sections are thereby held firmly in position with very little additional structure within the lamp and the danger of arcing between the secondary coils of the filament is considerably reduced.

It will be apparent that the form of the support 16, which serves the dual function of providing mechanical support for the filament sections and connecting them electrically, can be varied considerably. The nature of the wire used to carry the support 16 during assembly can be changed and in particular the platinum can be replaced by other noble metals.

I claim:

1. In a method of manufacturing a single-ended tungsten halogen lamp including a halogen-containing envelope, a press seal closing one end of the envelope, two filament sections within the envelope, each having one end separately supported in the press seal and a common electrically conductive support connecting the other ends of the filament sections, the steps which comprise: attaching one end of a noble metal wire to the common support; attaching a stiffer wire to the other end of the noble wire; inserting the wires through an exhaust tube of the envelope, one end of the stiffer wire protruding beyond the exhaust tube; holding the filament sections in tension while the press seal is formed; melting the exhaust tube adjacent the envelope to reform it around the common support; and heating the exhaust tube around the noble wire to melt the noble wire and seal the exhaust tube.