Sept. 24, 1968 J. G. CARDWELL, JR 3,403,280

SINGLE-ENDED ELECTRIC INCANDESCENT LAMP FILAMENT SUPPORT

Filed March 4, 1966

Fig. 1.

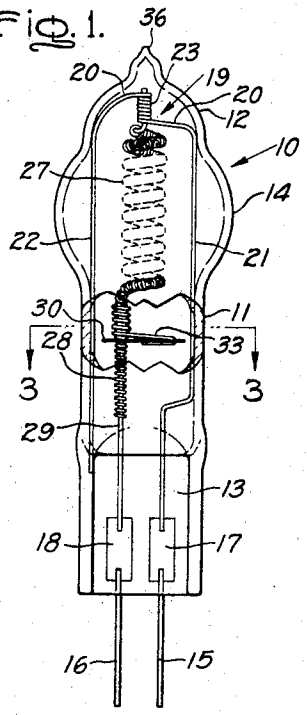


Fig. 2.

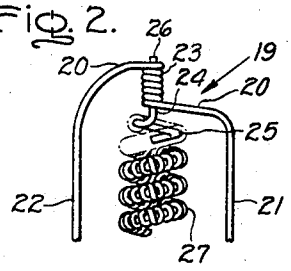


Fig. 3.

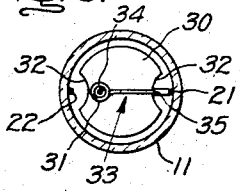
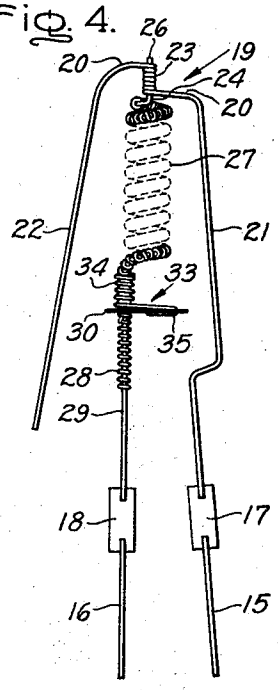


Fig. 4.



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3,403,280

SINGLE-ENDED ELECTRIC INCANDESCENT LAMP FILAMENT SUPPORT

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6 Claims. (Cl. 313—271)

This invention relates to electric incandescent lamps and more particularly to the filament supporting or mount structure for such lamps.

Even more particularly, this invention pertains to single-ended electric incandescent lamps having a generally tubular bulb which is closed at one end by a pinch seal. These single-ended incandescent lamps usually comprise a bulb or envelope, a filament, support means for the filament, and a pinch seal through which extend lead-in conductors. The main functions of the support means are to align the filament along the longitudinal axis of the bulb and to maintain this alignment when the lamp is subjected to the shock and vibration incurred in shipment and use. The strength required of the support means is greatly dependent on the filament weight.

In certain prior art constructions, the filament support means are free to move or sway within the lamp under the influence of external shock and vibration; the results can be disastrous especially when heavy filaments, such as coiled-coils, are involved. To strengthen the support with relation to the filament, it has been common practice to provide bridge members and other such auxiliary components with their added complications of assembly and cost.

Therefore, it is the object of my invention to provide an improved support member which will adequately support a relatively heavy filament coil structure prior to and during assembly with the bulb, will align the coil in all directions, eliminate the need for a bridge, and will serve as a mount brace as well as a current conductor.

Briefly stated, in accordance with one aspect of the invention, a single-ended incandescent lamp, having a generally tubular bulb and a pinch seal at its end, is provided with a generally U-shaped support member comprising an intermediate bend portion to which one end of the filament is connected, and side leg portions which extend longitudinally of the axis of the bulb and bear against the inside of the bulb. One side leg portion extends into and is connected within the pinch seal to a lead-in conductor; the other side leg portion extends into and terminates within the pinch seal.

Further features and advantages of the invention will appear from the following detailed description to be read in conjunction with the following drawings wherein like reference symbols denote corresponding parts throughout the several views.

FIG. 1 is a side elevation of a single-ended halogen incandescent lamp embodying the invention.

FIG. 2 is an enlarged view of the intermediate bend portion of the U-shaped support member illustrating a preferred form of connection to one end of the filament.

FIG. 3 is a transverse section view of the lamp along section lines 3—3 of FIG. 1.

FIG. 4 illustrates the assembled metal components or "mount" structure of the lamp prior to their insertion within the bulb.

Referring to FIG. 1 of the drawing, the single-ended incandescent lamp **10** comprises a generally tubular envelope or bulb **11**, of vitreous material such as quartz or a high silica material, having a dome-shaped end **12** opposite the pinch seal **13** and, in this case, an enlarged bulbous portion **14**. A pair of lead-in conductors comprise outer lead portions **15** and **16**, preferably of molybdenum, connected to foil portions **17** and **18**, which are

also preferably of molybdenum and are hermetically sealed in the pinch seal **13**.

The envelope **11** preferably contains an inert gas filling and may also contain a reactive atmosphere such as a halogen to produce a regenerative cycle whereby the evaporated tungsten from the filament reacts with the halogen and is redeposited on the filament. A regenerative cycle employing iodine is more fully discussed and disclosed in Patent 2,883,571—Fridrich et al.

The U-shaped support **19** comprises an intermediate bend portion **20** and side leg portions **21** and **22**. In accordance with the invention, side leg portions **21** and **22** bear against the inner wall of the bulb **11**. The leg portions bearing against the wall of the bulb virtually secure it against displacement in all directions. Intermediate bend portion **20**, in this embodiment has a helically coiled section **23**, which has its longitudinal axis aligned with the longitudinal axis of the bulb **11**. The bend portion **20** engages the walls of the bulb **11** and at least one side thereof conforms to and engages a dome-shaped end **12** of bulb. This engagement serves to align coil section **23** of the intermediate bend portion **20** axially of the bulb **11**.

Side leg **21** is attached to foil portion **17** of the lead-in conductor **15** within pinch seal **13**, preferably by welding and with a tab of platinum-clad molybdenum foil interposed therebetween. Side leg **22** extends into and terminates within the pinch seal **13**.

A spud or leg member **24**, which is preferably made of tungsten wire, has a helical end section **25** (FIG. 2) which is fitted as a mandrel into the primary coiling of a secondary turn of the coiled-coil filament **27** adjacent to the intermediate bend portion **20**, and a straight section **26** which extends along the axis of the filament into engagement with the coiled section **23** of the intermediate portion **20** where it is preferably tack-welded. Since straight section **26** extends along the axis of the filament as a leg member, a precise alignment of the filament in the bulb is obtained.

The other end of the filament has a longitudinal single coiled leg **28** containing one end of a spud wire **29** to which it is preferably welded. The other end of spud **29** is welded to foil **18** with a platinum-clad molybdenum foil tab interposed therebetween.

When desired to minimize heating of the pinch seal, there is provided a reflector disc **30** of tungsten which has a hole **31** for the passage of filament leg **28**, and arcuate sections **32** (FIG. 3) removed adjacent to the legs **21** and **22** of the U-shaped frame to avoid short-circuiting the filament. The disc **30** is frictionally engaged with the filament leg **28**, but, to avoid turning of the disc, disc support **33** is used. Disc support **33** is a tungsten wire having a helical end **34** (FIG. 4) to embrace by a screw-on action, the exterior of the leg **28**, and hook end **35** which loops over the periphery of the disc. The need for the heat deflecting disc, in some cases, will be appreciated when it is realized that in the type of lamp here involved the filament **27** may be designed to dissipate 1000 watts in a bulb **11** formed from tubing of about ⅝ inch diameter, and the temperature of the pinch seal **13** must not exced about 350° C. in order to avoid destructive oxidation of the molybdenum lead-in conductors **15**, **16** and especially the foils **17**, **18**.

In one method of assembly (see FIG. 4), U-shaped support **19** has its side leg portions **21** and **22** spread apart so that the distance between them is greater than the diameter of the bulb **11** in which they will be placed. This effect can be produced by either bending one or both of the side legs outward from each other. Filament **27** is brought into place between the two side legs and is attached to the helical coil **23** of the intermediate bend portion **20** of the support by means of spud **24**. The helical

section **25** of spud **24** is engaged in the filament **27**; its straight section is then threaded up through the opening in helical coil **23** where it is preferably tack-welded to secure it. The free end of the filament leg **28** is then threaded to the helical end **34** of the disc support **33** while also being threaded through the hole **31** in disc **30** both of which are frictionally engaged with the filament. When the support **33** has been put in the proper position the hook end **35** is looped over the periphery of the disc **30** at one of its arcuate sections **32**. Spud wire **29** is then inserted into the filament leg **28**, preferably for its full length, where it is spot-welded to secure it. The foil portions **17** and **18** of the lead-in conductors are then spot-welded by means of an inter-spaced tab of platinum-clad molybdenum foil to the respective side leg **21** and spud wire **29**.

When this mount assembly is completed, it is fed into the bulb **11** until the intermediate bend portion **20** frictionally engages dome-shaped portion **12** of the bulb. In accordance with the invention, the side legs **21, 22** bear firmly against the inner wall of bulb **11**. This aids in holding the weight of the filament during the pinch sealing. Also the upper end of the filament is aligned along the longitudinal axis of the bulb since helical coil **23** is positioned so that when the U-shaped support **19** engages the bulb it will be axially aligned. The lead-in conductors **15** and **16** are held by exterior means while the pinch seal **13** is performed. Side leg **21** extends into and terminates within the pinch seal. In addition, the foil portions **17** and **18** are hermetically sealed within the pinch **13** with lead-ins **15, 16** extending out of the pinch seal.

The bulb **11** is finally exhausted of air and filled with inert gas and halogen through an exhaust tube which is then sealed or tipped off as shown at **36**.

It will be evident that the side leg portions **21, 22** of the U-shaped support **19** bearing against the wall of the tubular bulb **11** give added support to the filament by retaining its alignment when the lamp is subjected to forces from all directions. Since the U-shaped support **19** is not free to move within the bulb, the filament **27** is held securely at both ends. Also, the U-shaped support, as noted in the method of assembly, helps support the weight of the filament during the pinch sealing of the bulb. In the specific embodiment shown, the helical coil **23**, the spud **24**, the dome-shaped end **12** of the bulb, and the generally dome-shaped intermediate portion **20** of the U-shaped support, all in combination, insure proper alignment and firm support of the filament within the bulb.

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

1. A single-ended electric incandescent lamp comprising
- a generally tubular bulb of vitreous material having a pinch seal at one end,
- a pair of lead-in conductors extending through said pinch seal,
- a coiled filament extending longitudinally of said bulb and having a leg portion at one end connected to one of said lead-in conductors,

- and a generally U-shaped support member comprising an intermediate bend portion to which the other end of said filament is connected,
- and side leg portions of said support member extending longitudinally downward from said intermediate portion and bearing against the inner wall of the bulb, one of said side leg portions extending into said pinch seal and connected to the other lead-in conductor, the other side leg portion extending into and terminating within said pinch seal.

2. A single-ended incandescent lamp as set forth in claim **1** wherein the intermediate bend portion of the U-shaped support member at its mid-section is a helical coil in the bulb axis, and a leg member extends from the proximate end of the filament into said coil and is secured thereto.

3. A single-ended incandescent lamp as set forth in claim **2** wherein the said leg member is a wire spud which comprises a helical end section which is fitted as a mandrel in the primary coiling of a secondary turn of the filament, and a straight section which is aligned along the longitudinal axis of the filament and extends into the coil of said intermediae bend portion.

4. A single-ended incandescent lamp as set forth in claim **1** wherein the bulb end opposite from the pinch seal is generally dome-shaped, and at least a part of the bend portion of said support member is correspondingly curved and in frictional engagement with the said dome-shaped bulb end.

5. A single-ended lamp as set forth in claim **1** including a reflector disc disposed transversely of the bulb axis between the pinch seal and the proximate end of the filament, and means securing said disc to the leg portion at the said proximate end of the filament in insulating relation with respect to the side leg portions of the U-shaped support member.

6. A single-ended incandescent lamp as set forth in claim **1** wherein a reflector disc is attached to the leg portion at the end of the filament which is connected to said one lead-in conductor by virtue of a hole through which said end of the filament extends, said disc having arcuate portions removed from it adjacent to the side leg portions of the U-shaped support member, said disc being held by a support wire which has a helical section in screw-thread engagement with said end of the filament and a hook which engages the periphery of said disc.

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