

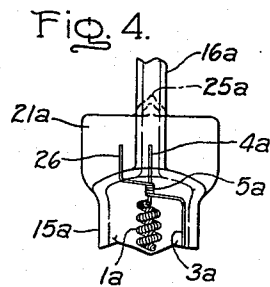
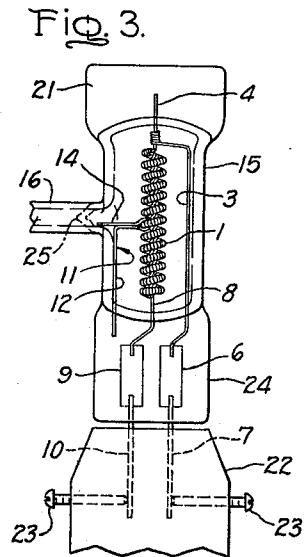
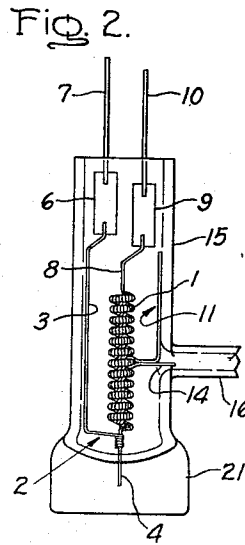
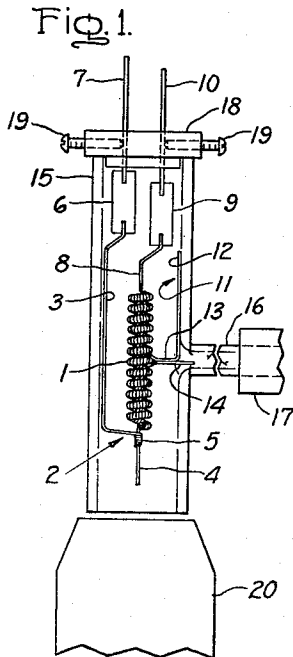
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V. G. McCLUSKY ET AL

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ELECTRIC INCANDESCENT LAMP FILAMENT SUPPORT

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Inventors:
Val G. McClusky
Francis T. Wirth
by *Otto Turky*
Their Attorney

1

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ELECTRIC INCANDESCENT LAMP FILAMENT SUPPORT

Val G. McClusky and Francis T. Wirth, South Euclid,
Ohio, assignors to General Electric Company, a corpo-
ration of New York

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3 Claims

ABSTRACT OF THE DISCLOSURE

In a single-ended compact incandescent lamp having a mount structure comprising long and short lead-in wires extending longitudinally from respective ends of a coiled filament and through a pinch seal at one end of a tubular envelope, the tip of the mount structure at the end of the filament to which the long lead-in wire is connected is first pinch sealed and anchored in the other end of the tubular envelope after which the lead-in wires are supported with tension applied to the short lead-in wire to stretch the filament a desired small amount while the envelope is pinch sealed at the said one end.

BACKGROUND OF THE INVENTION

Field of the invention

The invention relates generally to electric incandescent lamps comprising a sealed envelope containing an incandescent filament. More particularly, the invention relates to a new construction and method of assembly for lamps of the single-ended type where in both lead-in conductors extend through the same end of the lamp envelope and are connected to respective ends of a coiled filament which extends longitudinally of a tubular envelope.

Description of the prior art

In the manufacture of certain compact single-ended lamps of the now well-known halogen cycle type having a tubular envelope of fused silica or quartz, it is customary to use a transverse quartz bridge which rigidly holds the long and short lead-in conductors and an auxiliary support wire. The mount structure comprising the lead-in conductors and auxiliary support, is placed in a jig with the lead-in conductors connecting opposite ends of the filament and adjusted longitudinally to stretch the filament a desired amount; the auxiliary support wire engages and supports the filament at a location midway of its length. The quartz bridge is then heated and pressed around the wires to maintain the proper filament tension such that the filament coil will not sag and become distorted when heated to operating temperature. The mount, so formed, is then enclosed in a tubular quartz envelope which has a carefully formed, dome-shaped end which has been tubulated at its center and into which extends a portion of the support and current conductor means at the end of the filament to which the long lead-in conductor is connected. The other end of the envelope is then pinch sealed to enclose portions of the lead-in conductors which extend through that end.

SUMMARY OF THE INVENTION

It is an object of this invention to provide a new construction and method of assembly which eliminates the need for the relatively expensive bridge as well as the dome-shaped envelope end. It is a further object to provide a method and a construction in which any desired amount of stretch may be imparted to the filament coil without the expensive bridge. A resultant advantage of the elimination of the bridge is that it permits the use of a

2

shorter envelope, thereby resulting in a saving in the amount of quartz which is a costly part of the lamp.

In accordance with one aspect of the invention, therefore, the objects are achieved by a construction wherein a mount structure comprising the coiled filament, and long and short lead-in conductors connected to respective ends of the filament, is enclosed in a tubular envelope which is open at both ends, one end of the envelope is pinch sealed with a tip portion of the mount structure embedded therein, and then the other end of the envelope is pinch sealed about portions of both lead-in conductors while they are held in a relationship such that tension is applied to the filament coil to stretch it a predetermined amount.

BRIEF DESCRIPTION ON THE DRAWING

FIGS. 1 to 3 are elevations showing a lamp in several stages of manufacture in accordance with the invention; and

FIG. 4 is a fragmentary elevation showing one end of a lamp of modified construction.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to FIG. 1, the mount structure illustrated therein comprises a helically coiled-coil tungsten wire filament 1. At its far end, the filament is supported by support and conductor means 2 comprising a long lead-in wire 3 and a spud 4. The spud 4 extends axially of the filament coil 1 and is attached thereto by an end portion which is formed as part of a helical turn having the same diameter and pitch as the secondary turns of the coiled-coil filament 1, said helical turn being inserted into the end-most secondary turn of the filament as a close-fitting mandrel therefor. The end of the long lead 3 is secured to the spud 4 in any suitable manner, as by an end portion 5 tightly coiled around the spud 4, and which may also be welded thereto. The support and conductor means 2 further includes a molybdenum foil portion 6 and an outer lead wire portion 7.

At its near end, the filament is supported by a short lead-in conductor comprising a spud wire member 8 which has an end portion shaped as part of a helical turn and fitted as a mandrel into the end-most secondary turn of the filament coil 1, the same as described above in connection with spud member 4. The short lead-in conductor also comprises a molybdenum foil 9 and outer lead wire 10.

The mount structure also includes, in this case, an auxiliary support wire member 11 which may be of a so-called "square-root" type as is fully disclosed in U.S. patent application Ser. No. 506,644, filed Nov. 8, 1965, by R. H. Van Sickler et al. and assigned to the same assignee as the present case. The said support 11 is formed with a long leg 12 which terminates in a transversely bent portion 13 which extends toward the filament coil 1 and is looped about a localized part of a turn of said filament coil and is bent back upon itself as a free leg portion 14 which extends transversely beyond the long leg portion 12.

The envelope 15 is a straight tube of fused silica or quartz having a quartz exhaust tube 16 projecting from the side thereof. The envelope may be supported by a suitable chuck 17 into which the exhaust tube 16 is fitted.

For making the first seal, the mount may be suspended from a cap member 18 which is placed over the upper end of the tube 15. As herein illustrated, the outer leads 7 and 10 extend through passages or bores in the cap 18 and are frictionally held securely therein by suitable means, here illustrated as screws 19. The tip of the mount, repre-

sented by the spud 4 is near the rim of the lower end of the tube 15 but is contained wholly within the tube, and the mount is so oriented that the transverse leg 14 of the auxiliary support member 11 is located in the cavity formed by the inside of the exhaust tube 16. The lower end of the tube 15 is preferably spaced a small distance from some solid surface such as a block or a chuck 20.

A flow of non-oxidizing or inert gas, such as nitrogen, is started through tube 15 by way of exhaust tube 16 and chuck 17 to displace the air and prevent oxidation of the filament 1 and other parts of the mount structure during sealing. The lower end of the tube 15 is then heated and softened, and then pinch sealed in known manner to form the flattened pinch seal 21 (FIG. 2) in which the end of the spud 4 is embedded and anchored. The sealing may be performed on equipment generally similar to that shown in Patent 2,855,265 to A. G. Foote et al.

The cap 18 is then removed, the tube or envelope 15 is raised and inverted and again lowered, as shown in FIG. 3, and the outer lead wires 7 and 10 are guided into passages or bores in a chuck 22 where they are securely held by suitable frictional engagement, here represented by the screws 23. At this time, the outer lead 10 is pulled down to impart the desired stretch or tension to the filament 1. As the said lead 10 is pulled down, the long leg of the auxiliary support 11 (which tends to swing toward the filament 1) is held against the inner wall of the envelope 15 by virtue of clockwise pivotal movement (FIG. 3) of said support 11 due to engagement of its lateral end 14 with the inner wall of the exhaust tube 16.

The then lower end (FIG. 3) of the envelope 15 is heated and softened and pinched to form the flattened pinch seal 24 in which are hermetically sealed the foils 6 and 9. The end of the long leg 12 of auxiliary support 11 is also embedded in the pinch seal 24, and the stretch in filament 11 is maintained permanently by the fixed position or location of the foil 9 and inner lead 8 longitudinally relative to the long lead 3.

The lamp is completed by evacuating the envelope 15 through exhaust tube 16 and then introducing therein an inert gas such as nitrogen, argon, krypton or xenon, as well as a small quantity of halogen getter such as iodine or bromine. The halogen, especially the bromine, may be added as a compound such as hydrogen bromide or a hydrocarbon of bromine. The exhaust tube 16 is then sealed or tipped off as indicated at 25.

In the modification shown in FIG. 4, where parts corresponding to those in FIGS. 1 to 3 are numbered the same with the addition of the letter "a," the exhaust tube 16a is sealed into the first pinch 21a while preserving its interior open through the seal 21a in known manner. For this purpose, the exhaust tube 16a may be held in an axial bore in the chuck 20 (FIG. 1) during forming of the seal 21a. Since the end of the mount represented by the spud 4a is located in the open portion of exhaust tube 16a within the pinch, the long lead 3a may be continued beyond the coiled portion 5a to terminate in an offset longitudinally extending tip portion 26 which is embedded and anchored in the pinch seal 21a to permit stretching the filament 1a as described in connection with FIG. 3. The inner side wall of the envelope 15a may be provided with

an indentation or cavity to receive the end 14 of an auxiliary support 11 of the type shown in FIGS. 1 to 3, or a different form of support may be used, or in some cases the auxiliary support may be dispensed with.

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

1. An electric incandescent lamp comprising a tubular envelope of vitreous material, a pinch seal at each end of said envelope, a coiled filament extending longitudinally of the envelope, support and current conductor means supporting one end of said filament and having a portion thereof embedded and anchored in the proximate pinch seal and including an elongated lead-in conductor electrically connected to said one end of the filament and extending longitudinally of the envelope and through the other pinch seal wherein a portion of said lead-in conductor is hermetically sealed, and another lead-in conductor connected physically and electrically to the other end of said filament and extending through said other pinch seal where it is hermetically sealed and anchored in a position to hold said coiled filament in a stretched condition.

2. A lamp as set forth in claim 1 and further comprising an auxiliary filament support wire member having one end embedded and anchored in said other pinch seal and another portion thereof engaging and supporting said filament at a location intermediate its ends.

3. The method of assembling the lamp set forth in claim 1 which comprises inserting the assembly of the coiled filament, the support and current conductor means and the other lead-in conductor within the envelope and with said portion of said support and current conductor means near to the rim of but wholly within one open end of the envelope and with said elongated lead-in conductor and said other lead-in conductor extending outwardly through the other open end of said envelope, softening and pinch sealing the said one open end of the envelope with said portion of said support and current conductor means embedded and anchored therein, supporting both said lead-in conductors outside said envelope and displacing said other conductor longitudinally relative to said elongated conductor and in a direction to hold the filament in a stretched condition while softening and pinch sealing the said other open end of the envelope to hermetically seal portions of both said lead-in conductors and to maintain the relative positions of said conductors and the stretched condition of the filament.

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JOHN W. HUCKERT, Primary Examiner

A. J. JAMES, Assistant Examiner

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