

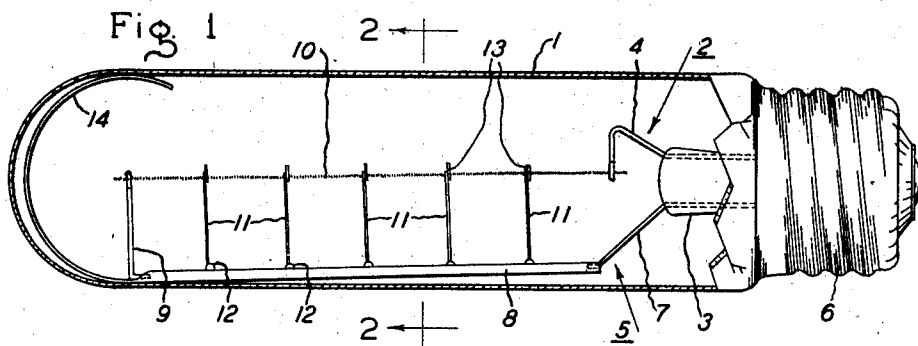
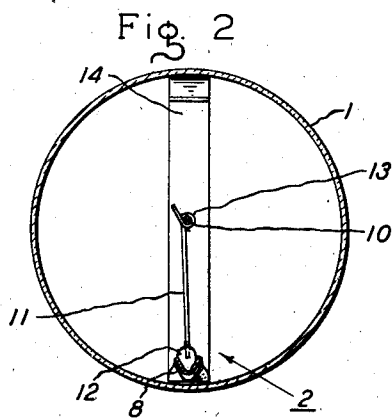
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FILAMENT SUPPORTING STRUCTURE FOR INCANDESCENT LAMPS

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FILAMENT SUPPORTING STRUCTURE FOR
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My invention relates to electric incandescent lamps and more particularly to a lamp of the tubular type, having a base at one end only and an elongated filament extending longitudinally of the bulb, which is especially suited for rough service applications.

Tubular incandescent lamps of the type having a base at one end only and an elongated filament extending longitudinally within the bulb are commercially available at present, such lamps being commonly known as show case type lamps. While such lamps are suitable for ordinary use where the lamp is mounted in a stationary socket, they are unsatisfactory for rough service where the lamp is apt to be subjected to severe impacts and shocks, such as where they are mounted at the end of an extension cord to provide a portable inspection lamp which is similar to that commonly used in garages, workshops, and the like and which is especially useful for inspecting the interiors of objects which do not have openings large enough to permit insertion of larger diameter lamps. When used in such service, the conventional type tubular lamps heretofore available will not withstand the rough handling ordinarily attending such use, the filament mounts not possessing the required strength to prevent distortion of the filament and consequent short-circuiting and premature burn-out thereof.

It is an object of the present invention therefore to provide a tubular incandescent lamp of the character described which is particularly suitable for and will effectively withstand rough service use.

Another object of my invention is to provide a filament mount for tubular incandescent lamps of the character described which is of simple and inexpensive construction and which possesses sufficient strength and will be held sufficiently rigid within the lamp bulb to prevent distortion of the filament by the ordinary impacts to which the lamp may be subjected during rough service usage.

Further objects and advantages of my invention will appear from the following description of a species thereof and from the accompanying drawings.

In the drawing, Fig. 1 is an elevation of an electric incandescent lamp comprising my invention with the envelope thereof partly broken away, and Fig. 2 is an enlarged section on the line 2—2 of Fig. 1.

Referring to the drawings, the lamp there shown comprises an elongated tubular glass bulb or envelope 1 which is hermetically sealed and

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evacuated. Sealed into one end of the bulb is a lamp mount 2 comprising a conventional re-entrant stem 3 having a pair of lead-in conductors 4, 5 sealed therethrough and projecting into the bulb, one of said conductors (4) being relatively short and the other of said conductors (5) being elongated. Outwardly of the bulb, the lead-in conductors 4, 5 are electrically connected to the terminals of a conventional lamp base 6 which is suitably secured to the neck end of the bulb, as by the usual basing cement. The elongated conductor or stay 5 comprises an angular section 7 extending into the bulb from the stem 3, an elongated straight section 8 extending longitudinally of the bulb adjacent one side of the wall thereof, and a lateral end extension 9 at the far end of the conductor.

Mounted within the bulb 1 and extending more or less longitudinally and preferably axially thereof is an elongated coiled tungsten filament 10 which is connected at its opposite ends, under a slight tension, to the short conductor 4 and to the end extension 9 of the elongated conductor 5. The filament 10 may be disposed either in a substantially straight line as shown, or in a zig-zag, undulating or any other desired manner. A plurality of wire supports or anchors 11 support the filament 10 at spaced points therealong. The said wire anchors 11 are insulatively supported on the straight section 8 of the elongated conductor 5, one end of each anchor wire 11 being embedded in a glass bead 12 fusion sealed to the conductor section 8. The other end of each anchor wire 11 is looped around the filament, as indicated at 13, to thereby support the same.

In accordance with the invention, distortion of the filament and consequent short-circuiting and early burn-out thereof, under the influence of the shocks and impacts to which the lamp may be subjected during use, is prevented by the use of an elongated conductor or stay 5 which is relatively rigid or stiff together with suitable means for anchoring or holding the unsupported far end of the said conductor against lateral displacement and vibration within the bulb. The particular construction of conductor 5 illustrated in the drawings has been found to be especially suited for the purposes of the invention. In the particular case illustrated, the angular section 7 of the said conductor 5 is formed of 25 mil nickel wire the end of which is welded or otherwise secured to the straight section 8. This straight section 8 is in the form of a V-shaped channel (Fig. 2) which may be made of any suitable material, preferably a stainless steel

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such as that commercially known as "Allegheny metal." Such a channel conductor possesses the required stiffness for the purposes of the invention. The channel section 8 may be conveniently formed from a flat strip of material having a thickness of the order of 5 mils or so and a width of the order of $\frac{3}{16}$ " and it is disposed in the bulb with its channelway preferably facing inwardly of the bulb, i. e., towards the filament 10 therein. The lateral end extension 9 of the composite conductor 5 may be made of 25 mil nickel wire spot welded or otherwise secured to the far end of the straight section 8.

The means for anchoring or holding the unsupported far end of the elongated conductor 5 against lateral displacement or vibration within the bulb comprises a flexible end extension or spring 14 which is yieldable laterally of the straight conductor section 8 and is engageable with that side of the inner wall of the bulb opposite the straight conductor section 8 to resiliently hold the latter against the bulb wall. As shown, the said spring 14 is conveniently formed as an integral flat extension of (i. e., in one piece with) the straight conductor section 8, which extension is bent back, to that side of the straight conductor section 8 facing the filament 10, to provide a laterally flexing spring of somewhat greater free height (for example at least $\frac{1}{8}$ " or so) than the inside diameter of the tubular bulb 1. In the particular case illustrated, the spring extension 14 is bent back into the shape of a half-loop or a semi-circle having a diameter approximately $\frac{1}{8}$ " or so larger than the inside diameter of the tubular bulb.

When the mount 2 is initially introduced into the tubular bulb 1 for sealing therein, the spring end extension 14 will be compressed laterally of the bulb, thereby resiliently holding the far unsupported end of the mount in place against lateral displacement and vibration in the bulb. Thus, a mount construction 2 of simple and inexpensive form is provided which is of sufficient strength and is held sufficiently rigid in the bulb to virtually eliminate distortion and resultant short-circuiting of the filament 10 under the influence of the ordinary shocks and impacts to which the lamp may be subjected during use.

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

1. An electric incandescent lamp comprising a bulb having a tubular portion, an elongated filament within said bulb extending longitudinally of the tubular portion thereof, and an elongated rigid lead-in conductor extending into the bulb substantially the full length of said filament and adjacent one side of the said tubular bulb portion, said conductor being connected adjacent its far end to the adjacent end of the filament and being provided at its far end with a flexible extension engaging the side of said tubular bulb portion opposite the side adjacent said conductor to thereby resiliently hold said conductor firmly against the said adjacent side of the tubular bulb portion.

2. An electric incandescent lamp comprising an elongated tubular bulb, an elongated filament extending longitudinally within said bulb, and an elongated rigid lead-in conductor projecting into the bulb from one end thereof and extending longitudinally of the bulb adjacent one side and to the remote end thereof, said conductor being connected adjacent its far end to the adjacent

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end of the filament and being provided at its far end with a flexible extension yieldable laterally of the conductor and engaging the side of the bulb opposite the side adjacent said conductor to thereby resiliently hold said conductor firmly against the said adjacent side of the bulb.

3. An electric incandescent lamp comprising an elongated tubular bulb, an elongated filament extending longitudinally within said bulb, and an elongated rigid lead-in conductor projecting into the bulb from one end thereof and extending longitudinally of the bulb adjacent one side and to the remote end thereof, said conductor being connected adjacent its far end to the adjacent end of the filament and having a flexible far end portion bent back to engage with the side of the bulb opposite the side adjacent said conductor for resiliently holding said conductor firmly against the said adjacent side of the bulb.

4. An electric incandescent lamp comprising an elongated tubular bulb, an elongated filament extending longitudinally within said bulb, and an elongated rigid lead-in conductor projecting into the bulb from one end thereof and extending longitudinally of the bulb adjacent one side and to the remote end thereof, said conductor being connected adjacent its far end to the adjacent end of the filament and having a flexible far end portion bent back into the shape of a half-loop to engage with the side of the bulb opposite the side adjacent said conductor for resiliently holding said conductor firmly against the said adjacent side of the bulb.

5. An electric incandescent lamp comprising an elongated tubular bulb, an elongated filament extending longitudinally within said bulb, support means for said filament comprising an elongated rigid lead-in conductor projecting into the bulb from one end thereof and extending longitudinally of the bulb and terminating at its far end in a resilient looped extension located approximately in a plane through the longitudinal axis of the bulb and resiliently engaging opposite sides of the bulb, and means supporting the filament from said conductor.

6. An electric incandescent lamp comprising an elongated tubular bulb having a re-entrant stem at one end thereof, a pair of lead-in conductors sealed through said stem and including a short conductor and an elongated rigid conductor extending longitudinally of the bulb adjacent one side and to the remote end thereof, and an elongated filament extending longitudinally within the bulb and connected between said short conductor and the remote end of said elongated conductor, said elongated conductor being provided at its remote end with a flexible extension yieldable laterally of the said conductor and engaging the side of the bulb opposite the side adjacent said conductor to thereby resiliently hold the said conductor firmly against the said adjacent side of the bulb.

7. An electric incandescent lamp comprising an elongated tubular bulb having a re-entrant stem at one end thereof, a pair of lead-in conductors sealed through said stem and including a short conductor and an elongated rigid conductor extending longitudinally of the bulb adjacent one side and to the remote end thereof, and an elongated filament extending longitudinally within the bulb and connected between said short conductor and the remote end of said elongated conductor, said elongated conductor being provided at its remote end with a flexible extension bent back into the shape of a half-loop the free end

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portion of which engages the side of the bulb opposite the side adjacent said conductor to thereby resiliently hold the said conductor firmly against the said adjacent side of the bulb.

8. An electric incandescent lamp comprising an elongated tubular bulb having a re-entrant stem at one end thereof, a pair of lead-in conductors sealed through said stem and including a short conductor and an elongated rigid conductor extending longitudinally of the bulb adjacent one side and to the remote end thereof, and an elongated filament extending longitudinally within the bulb and connected between said short conductor and the remote end of said elongated conductor, said elongated conductor comprising a straight channel-shaped portion approximately coextensive with said filament and having a flat integral extension at its remote end bent back to provide a spring yieldable laterally of said conductor and engaging the side of the bulb opposite the side adjacent said conductor to thereby resiliently hold the channel portion of said conductor firmly against the said adjacent side of the bulb.

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9. An electric incandescent lamp comprising an elongated tubular bulb having a re-entrant stem at one end thereof, a pair of lead-in conductors sealed through said stem and including a short conductor and an elongated rigid conductor extending longitudinally of the bulb adjacent one side and to the remote end thereof and provided adjacent its remote end with a rigid lateral extension, an elongated filament extending longitudinally within the bulb and connected between said short conductor and said lateral extension, said elongated conductor comprising a straight channel-shaped portion approximately coextensive with said filament and having its remote end provided with a flexible end extension bent back into the shape of a half-loop the free end portion of which engages the side of the bulb opposite the side adjacent said conductor to thereby resiliently hold the channel portion of said conductor firmly against the said adjacent side of the bulb, and a plurality of filament anchors insulatively supported on the channel portion of said elongated conductor at spaced points therealong.

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