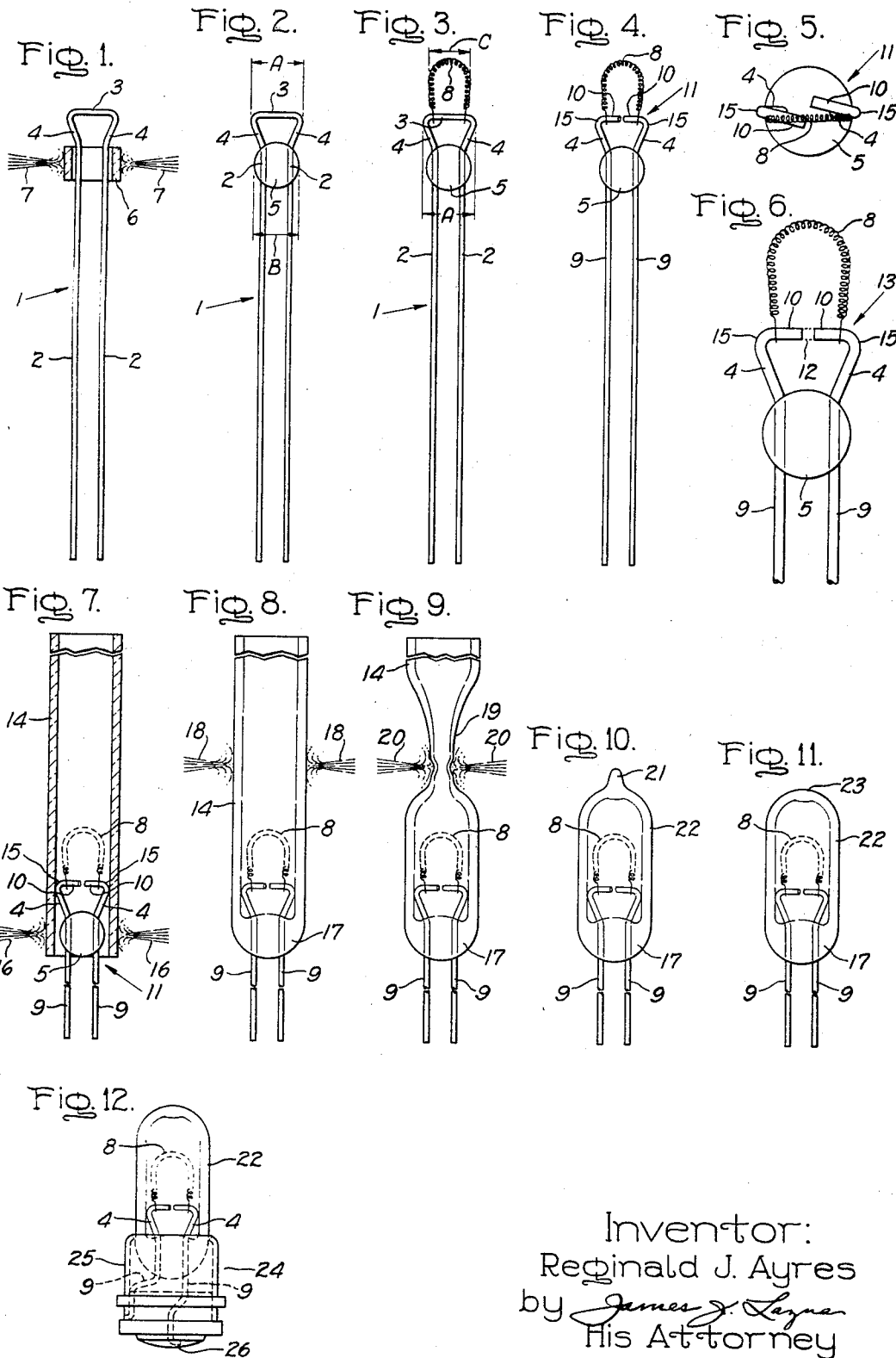


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ELECTRIC INCANDESCENT LAMP AND MOUNT STRUCTURE WITH
LEADING-IN WIRES HAVING INTURNED OFFSET INNER ENDS
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ELECTRIC INCANDESCENT LAMP AND MOUNT STRUCTURE WITH LEADING-IN WIRES HAVING INTURNED OFFSET INNER ENDS

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5 Claims

ABSTRACT OF THE DISCLOSURE

The mount structure for an electric incandescent lamp is made by first bending a length of lead-in wire into a hairpin-shaped wire preform with its bight end preferably of greater span than the adjacent leg portions, fusion-sealing a glass bead around the adjacent leg portions of the hairpin-shaped wire preform to tie them together, and then mounting a filament on the bight portion of the hairpin-shaped wire preform and severing the bight portion at a region between its connections to the filament to divide the hairpin-shaped wire preform into two separate lead-in wires with their severed ends out of contact with one another. The bight forming bends in the lead-in wires of the mount have a close sliding fit with the inner wall of the tubular lamp envelope to center the mount therein.

Background of the invention

This invention relates, in general, to electric incandescent lamps, especially those of minute size, and to a mount structure therefor, and to a method of manufacture thereof.

Electric incandescent lamps of very small size, employing tubular glass envelopes as small as $\frac{1}{8}$ " outside diameter and below and having a length as little as $\frac{1}{4}$ " or less are in general use at present for various purposes. These minute size lamps are customarily made by sealing a glass-beaded lamp mount into one end of a glass tube and then evacuating the glass tube through its open other end which is then sealed off to complete the lamp assembly. The lamp mounts are generally formed by fusion-sealing the glass bead around a pair of straight wire leads to rigidly tie them together, and then attaching a filament to the inner ends of the two wire leads to form the lamp mount.

Because of the extremely small size of the lamp mounts employed in such minute size lamps, it has been necessary heretofore to fabricate the lamp mounts by painstaking hand processing methods. This is readily understandable when it is considered that the specifications for some of these minute size electric incandescent lamps require, for example, the use of leading-in wires having a wire diameter as little as .010", and a loop or U-shaped coiled filament of tungsten wire having a wire diameter as little as .0002 to .0003" and having straight end leg portions extending endwise from the legs of the U-shaped coiled filament portion and pressed into the inner ends of the leading-in wires. The precise locating of the straight end legs of such a fine wire filament longitudinally alongside and in contact with the straight inner ends of the leading-in wires, in position for the pressing-in of the filament end legs thereto, is an extremely delicate operation which cannot be consistently performed, with satisfactory results, by present day automatic mount making equipment. Moreover, lateral bending of the inner lead portions of the leading-in wires above the glass bead, in order to render feasible the attachment of the filament to the inner leads by an automatic mount making machine, is not practical in the case of such minute size lamp mounts because of the extreme shortness of the inner leads, these

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inner leads having in some cases a length above the glass bead of as little as .030", which length is only around three to four times the wire diameter of the inner leads. Any attempt to form or bend such short inner leads to an appreciable degree would result in shaling and cracking of the glass bead tying the two leading-in wires together.

Summary of the invention

It is an object of the invention, therefore, to provide an electric incandescent lamp mount structure which can be fabricated automatically in minute sizes with uniformity and with a minimum amount of production rejects.

Another object of the invention is to provide an electric incandescent lamp having a mount structure which is supported and maintained in centered position within the lamp envelope at all times during the use of the lamp.

Still another object of the invention is to provide a novel method of making an electric incandescent lamp mount structure which enables the fabrication of extremely small size lamp mounts automatically and with great uniformity and freedom from rejects.

Briefly stated, and in accordance with one aspect of the invention, a lamp mount is formed by first bending a length of leading-in wire into a hairpin-shaped wire preform having its legs extending approximately parallel to one another and its bight portion preferably widened out so as to be of appreciably greater span than the adjacent portion of the legs of the wire preform. A glass bead is then fusion-sealed around the two legs of the wire preform, at a region closely adjacent the bight thereof, so as to rigidly tie the two legs together, following which the opposite ends of the wire filament are attached to the bight of the wire preform at spaced points therealong. The bight of the wire preform is then severed to divide the wire preform into two separate leading-in wires with their severed bight ends spaced apart so as to be out of contact with one another. The severed ends of the bight portion of the wire preform may be displaced so as to be offset, and thus out of contact with one another.

In accordance with a further aspect of the invention, both the glass bead and the filament of the mount have their lateral boundaries lying wholly within the lateral boundaries of the opposite ends of the bight portion of the wire preform defined by the bends therein, and the span of the bight portion is such that the opposite ends thereof defined by the bends in the wire preform have a close sliding fit within the tubular glass envelope of the lamp across the diameter thereof so as to locate and hold the lamp mount in laterally centered position within the envelope.

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

Brief description of the drawings

In the drawings:

FIGS. 1 to 4 are views illustrating the successive steps involved in fabricating a lamp mount according to the method comprising the invention.

FIG. 5 is a top plan view of the lamp mount formed by the method illustrated in FIGS. 1 to 4.

FIG. 6 is a top plan view of a modified form of lamp mount made by a slightly modified fabricating procedure according to the invention.

FIGS. 7 to 11 illustrate the successive steps involved in sealing the mount comprising the invention into a lamp envelope and hermetically sealing the lamp envelope to form a completed lamp assembly embodying the invention; and

FIG. 12 is an elevation of a completed lamp according to the invention having a base mounted thereon.

Description of the preferred embodiments

Referring to FIG. 1, in fabricating a lamp mount according to the invention, a length of leading-in wire such as that commonly employed in the lamp art for sealing into glass as known as "dumet" wire, is first bent into a hairpin-shaped wire preform 1 having its leg portions 2 extending substantially parallel to one another and its bight portion 3 preferably of appreciably greater span than that of the adjacent portions of the legs 2 of the wire preform. For this purpose, the two legs 2 of the wire preform 1 may be flared out near the bight end 3 thereof, as shown at 4 in FIG. 1. A glass bead 5 is then fusion-sealed around the two legs 2 of the wire preform 1, at a region closely adjacent the bight end 3 thereof, so as to embed the legs 2 and rigidly tie them together. The glass bead 5 may be conveniently formed by slipping a small glass ring 6 (FIG. 1) over the two legs 2 of the wire preform 1 and positioning it at the region where the glass bead 5 is to be formed thereon, and then suitably heating the glass ring 6, as by means of gas fires 7 directed thereagainst, for example, to cause the glass of which the ring 6 is made to soften and flow around the two legs 2 of the wire preform 1 so as to coalesce into a bead 5 embedding the wire legs 2 and rigidly tying them together. As shown in FIG. 2, the glass bead 5 is formed to a size such that its maximum lateral or width dimension B is less than the span A of the bight portion 3 of the wire preform 1, with the lateral boundaries of the glass bead 5 lying wholly within the lateral boundaries of the bight portion 3 defined by the opposite ends thereof.

A filament 8 of tungsten or other refractory metal wire is next secured at its opposite ends to the bight portion 3 of the wire preform 1 at spaced points therealong. The filament 8 may either be of coiled or coiled-coiled form or of uncoiled form, and it is secured to the bight portion 3 of the wire preform 1 by pressing the uncoiled end legs of the filament into the body of the bight portion 3 of the wire preform 1 by means of suitable pressing jaws. In the particular case illustrated, the filament 8 is in the form of a singly-coiled tungsten wire of U-shaped configuration having a maximum lateral width dimension C (FIG. 3) less than the span A of the bight portion 3 of the wire preform 1 and mounted approximately centrally on the bight portion 3 so that the lateral boundaries of the filament are located wholly within the lateral boundaries of the bight portion 3 defined by the opposite ends thereof. The appreciable transverse extent of the bight portion 3 permits a certain amount of latitude in the lateral positioning of the filament 8 relative to the wire preform 1 for its attachment thereto. As a result, the positioning of the filament for mounting on the leading-in wires of the mount is not a critical operation to perform such as it is in the case of the previous type mount constructions where the filament end legs must be precisely located in side-by-side parallel alignment with the straight inner leads of the mount for their attachment thereto. The elimination of this critical filament positioning requirement therefore renders feasible the fabrication, by conventional type automatic mount making machines, of lamp mounts according to the invention even in the extremely small sizes described hereinabove.

Simultaneously with or following the attachment of the filament 8 to the bight portion 3 of the wire preform 1, the bight portion 3 is suitably severed at its mid-region, between its points of connection to the filament 8, to thereby divide the wire preform into two separate leading-in wires 9 having their severed bight ends 10 spaced apart so as to be out of contact with one another. The severing of the bight portion 3 of the wire preform 1 completes the fabrication of the lamp mount 11 (FIG. 4). According to the preferred form of the invention, the facing or opposing severed ends of the inwardly bent ends 10 of the leading-in wires 9, formed by the severing of the bight portion 3 of the wire preform 1, are displaced

relative to one another, in a direction normal to the plane of the lead-in wires 9, so as to be offset and thus out of contact with one another, as shown in FIG. 5. This offsetting of the bent inner ends 10 of the lead-in wires 9 may be performed simultaneously with the severing of the bight portion 3 of the wire preform 1. Instead of severing the bight portion 3 of the wire preform 1 and offsetting the resulting bent inner end portions 10 of the leading-in wires 9 so as to be out of contact with one another, a short mid-section may be cut out of the bight portion 3, as shown at 12 in FIG. 6, to form the modified lamp mount construction 13.

In the formation of a finished lamp incorporating a lamp mount 11 or 13 according to the invention, the lamp mount is first sealed into one end of a glass tube 14, as shown in FIG. 7. To this end, the lamp mount 11 or 13 is inserted into the glass tube 14 and positioned in proper sealing relation thereto with its glass bead 5 located within an end of the glass tube and with the bent inner ends 10 of the lead-in wires 9 extending transversely across the interior of the glass tube. The glass tube 14 is of an inside diameter such that the tube will have a close tolerance sliding fit over the bends 15 in the leading-in wires 9 at the bent inner ends 10 thereof. This close sliding fit between the glass tube 14 and the bends 15 in the leading-in wires 9 thus serves to position the filament 8 of the lamp mount 11 more or less centrally within the glass tube during the sealing of the mount into the glass tube 14. As shown in FIG. 7, the sealing of the mount 11 into the glass bulb 14 may be effected by suitably heating the end of the glass tube surrounding the bead 5 of the mount 11, as by means of gas fires 16 directed against the end of the glass tube, to fuse and soften the glass of the tube as well as the glass of the bead 5 to cause them to coalesce and fuse together to thereby form a sealed tube end 17 (FIG. 8).

After the sealing of the mount 11 into one end of the glass tube 14, the glass tube is then necked-in at an intermediate region thereof a short distance inwardly of the tube from the filament 8 therein, by suitably heating and softening the said region of the glass tube, as by means of gas fires 18 directed thereagainst, and then stretching the softened intermediate section of the glass tube by axially displacing the opposite ends of the glass tube away from one another so as to attenuate the softened glass intermediate region and form the necked-in section 19. The glass tube 14 is then evacuated through its open end and is necked-in section 19 then tipped-off in the manner customary in the lamp making art, by directing gas tipping-off fires 20 against the intermediate necked-in section 19 of the glass tube at the region nearest the mount-containing end thereof, to cause the glass of the necked-in section 19 to soften and coalesce so as to form an exhaust tip 21 (FIG. 10) hermetically sealing off the portion 22 of the glass tube within which the filament 8 is located, the portion 22 of the glass tube thus becoming the envelope of the finished lamp. To improve the appearance of the finished lamp and also improve the light transmittance thereof through its tipped-off end, the exhaust tip 21 on the lamp envelope 22 may be suitably removed as by a grinding operation to thereby form a smooth rounded top end 23, as shown in FIG. 11.

Where desired, the lamp according to the invention may be provided with a conventional type lamp base 24, as shown in FIG. 12. The base 24 is suitably secured to the glass envelope 22 of the lamp, as by means of a conventional type basing cement, for instance, and it may comprise a side shell contact 25 and an end contact 26 to which the leading-in wires 9 of the lamp are respectively connected.

Although preferred embodiments of my invention have been disclosed, it will be understood that the invention is not to be limited to the specific construction and arrangement of parts shown, and to the specific procedures described, but that they may be widely modified within the

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spirit and scope of my invention as defined by the appended claims.

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

1. A lamp mount of minute size comprising a pair of side-by-side leading-in wires, a glass bead bridging and embedding said leading-in wires adjacent an end thereof to rigidly tie them together, said leading-in wires having their said ends bent transversely to form inturned inner end portions extending toward one another, and a filament connected at its opposite ends to respective ones of the said inturned end portions of said leading-in wires, the said inturned end portions of the leading-in wires having their facing end extremities offset from one another in a direction normal to the plane of said leading-in wires.

2. A lamp mount as specified in claim 1 wherein the span across the bends in said leading-in wires forming the said inturned end portions thereof is greater than the span across the portions of said leading-in wires between the said bends therein and said glass bead.

3. A lamp mount as specified in claim 2 wherein the lateral boundaries of the said filament and glass bead lie wholly within the lateral boundaries of the said bends in the leading-in-wires.

4. A lamp mount as specified in claim 2 wherein the portions of said leading-in wires extending from the said glass bead to the said bends therein diverge from one another.

5. An electric incandescent lamp comprising a sealed tubular glass envelope, and a lamp mount sealed in said envelope and comprising a pair of leading-in wires sealed through one end of said envelope in side-by-side relation and having inner lead portions extending into said enve-

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lope, said inner lead portions having their innermost ends bent transversely to form inturned inner end portions extending toward one another with their facing end extremities spaced apart, the span across the bends in said inner leads forming the said inturned end portions thereof being greater than the span across the other portions of said inner leads, and a filament connected at its opposite ends to respective ones of the said inturned end portions of the leading-in wires, the lateral boundaries of said filament lying wholly within the lateral boundaries of said inner leads defined by the said bends therein, said inner leads having their inturned end portions extending diametrically across the interior space of said tubular envelope with their said bends having a close tolerance fit with the inner wall of said envelope so as to locate the said mount in approximately laterally centered position therein.

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