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UNITED STATES PATENTS			
1,985,915	1/1935	Chelioti	313/272
2,159,794	5/1939	Hagen et al.	313/220
3,082,345	3/1963	Bottone	313/113
3,364,377	1/1968	Nygorden et al.	313/272
3,445,713	5/1969	Cardwell	313/115 X

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[54] **INCANDESCENT PROJECTION LAMP HAVING A
PREALIGNED PROXIMITY REFLECTOR AND
FILAMENT MOUNT ASSEMBLY**
5 Claims, 4 Drawing Figs.

[52] U.S. Cl. 313/115,
313/272

[51] Int. Cl. H01j 5/16

[50] Field of Search 313/113-
—115, 272, 273, 220

ABSTRACT: A pair of separately wound coiled-coil filaments are connected in series and suspended in coplanar relationship in front of a concave metal reflector by a mount assembly that is formed from the inner ends of the lead wires and an auxiliary conductor that is fastened to a spud wire. Suspension of the two filaments is achieved without the glass bridge members customarily employed and the proper reflector-filament spacing is obtained by attaching the reflector to the mount assembly by a single prebent support wire.

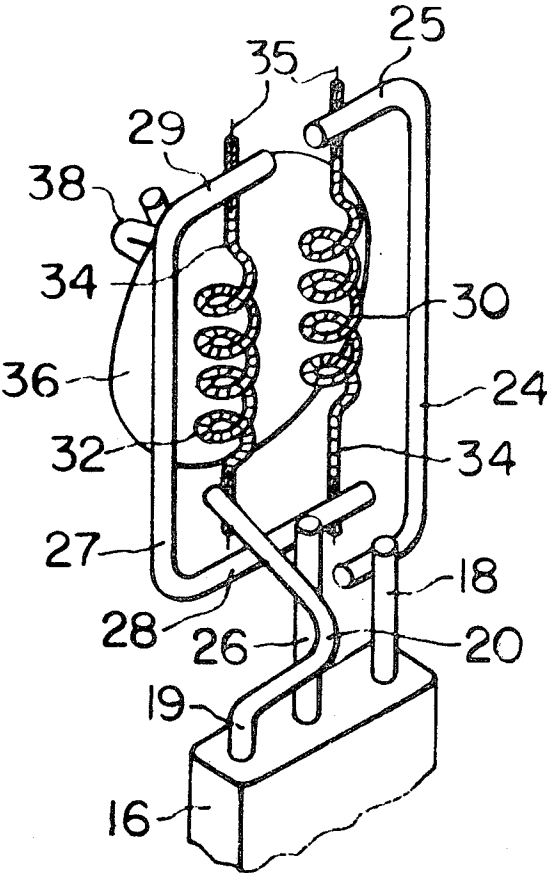


FIG. 4.

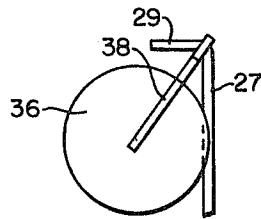
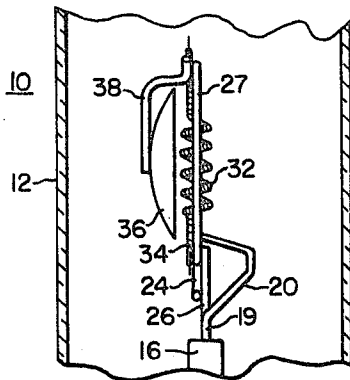


FIG. 2.

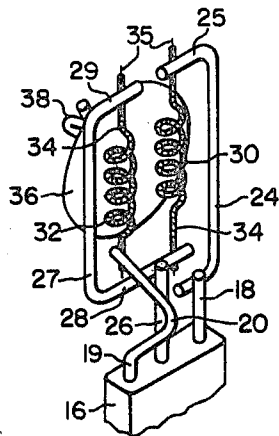


FIG. 3.

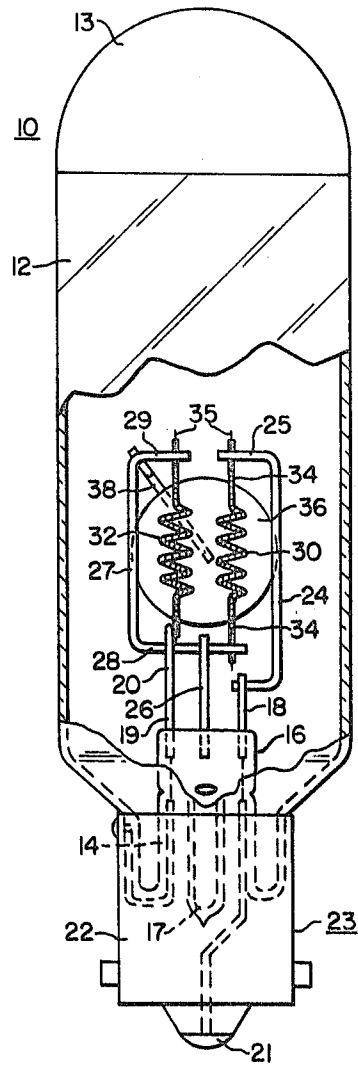


FIG. 1.

WITNESSES

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INCANDESCENT PROJECTION LAMP HAVING A PREALIGNED PROXIMITY REFLECTOR AND FILAMENT MOUNT ASSEMBLY

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to electric lamps and has particular reference to an incandescent projection lamp having an improved filament mount-and-proximity reflector assembly.

2. Description of the Prior Art

Incandescent projection lamps having a metallic proximity reflector which is mounted within the envelope behind a planar filament are well known in the art. A lamp of this type is disclosed in U.S. Pat. No. 3,082,345 issued Mar. 19, 1963 to A. A. Bottone.

Heretofore, either a monoplane or biplane type filament was employed and the reflector was held in position behind the filament by a support wire that was anchored in a glass bridge member which constituted part of the mount structure. A pair of such bridge members were required in order to support the intermediate portions of the multicoil filament. Since the proximity reflector must be positioned at a precise distance from the filament in order to obtain optimum light output and a consistent screen lumen rating, it was necessary in the case of such bridge-type mounts to adjust the reflector-filament spacing after the reflector was fastened to the bridge member. This was a time consuming operation and, in conjunction with the other operations required to assemble the bridge members with the wire frames, prevented the rapid assembly of such lamps and increased their manufacturing cost.

A projection lamp having a plurality of coiled-coil filaments suspended in a three-dimensional array by the lead wires and a pair of support wires that are embedded in the stem is disclosed in U.S. Pat. No. 3,364,377 issued Jan. 16, 1968 to P. J. B. Nygorden et al.

SUMMARY OF THE INVENTION

It is accordingly the general object of the present invention to provide an incandescent projection lamp that has a prealigned proximity reflector and a concentrated planar array of individual filaments which permits the lamp to be rapidly and economically manufactured on a mass production basis.

Another and more specific object is the provision of an improved proximity reflector-filament mount assembly for an electric projection lamp which eliminates the need for glass bridge members and is so constructed that it aligns the reflector with the planar light source without the additional adjusting operation heretofore required.

The foregoing objects and other advantages are achieved in accordance with the invention by utilizing a pair of separately wound coiled-coil filaments that are connected in series with each other and suspended in coplanar relationship by a wire frame that is constructed from the inner ends of the lead-in wires, a prebent auxiliary conductor wire and a single spud wire. The proximity reflector is held in precise spatial alignment with the filaments by a single prebent support wire that is secured to the mount structure. The mount components are so designed that they can be readily and accurately assembled by spot welding and provide an economical simplified mount structure having a consistent filament-reflector spacing which is maintained within very close tolerances.

BRIEF DESCRIPTION OF THE DRAWINGS

A better understanding of the invention will be obtained by referring to the accompanying drawing, wherein:

FIG. 1 is an enlarged elevational view of a 150 watt T8 incandescent projection lamp embodying the improved filament mount-and-proximity reflector assembly of the present invention;

FIG. 2 is a fragmentary side view of the assembly illustrating the spatial alignment of the coplanar filaments and the reflector;

FIG. 3 is a perspective view of the assembly illustrating the configuration and arrangement of the various components; and,

FIG. 4 is a fragmentary elevational view of the back of the reflector illustrating the manner in which the reflector is attached to the mount structure by a single prebent support wire.

DESCRIPTION OF THE PREFERRED EMBODIMENT

In FIG. 1 there is shown a 150 watt T8 incandescent projection lamp 10 which embodies the invention and comprises a tubular glass envelope 12 that has the usual reentrant glass stem 14 sealed into one of its ends. The stem 14 has a press seal 16 at its inner end and an exhaust tube 17 at its outer end through which the lamp is evacuated and filled with an inert gas such as nitrogen. The exhaust tube 17 is then tipped off in accordance with standard lamp-making practice. A pair of lead-in conductors such as wires 18, 19 are embedded in the press seal 16 and have rigid inner portions that extend longitudinally into the envelope 12. The outer ends of the lead-in wires are connected to the end contact 21 and the metal shell 22, respectively, of a base member 23, such as a bayonet type base of the type herein shown, which is attached to the sealed end of the envelope with a suitable basing cement. The top of the envelope 12 is provided with an opaque coating 13 of suitable material to intercept light that would otherwise pass through this part of the lamp and leak out of the projector housing.

The present invention resides in an improved filament mount-and-reflector assembly and this will now be described. As will be noted in FIG. 1, the inner ends of the lead wires 18, 19 extend into the envelope 12 and are disposed on opposite sides of the longitudinal axis of the envelope. The lead wire 18 is rather short and is fastened, as by spot welding, to a generally U-shaped extension wire 24 that has an offset medial portion which extends longitudinally along a wall of the envelope 12 and terminates in a short lateral arm segment 25 that extends toward the longitudinal axis of the envelope. While the inner end of the lead wire 18 is of two-piece construction as here shown, it will be appreciated that it can be made from a single piece of stiff wire which is bent to provide the aforementioned offset and lateral arm segments.

A rigid spud wire 26 is embedded in the center of the press seal 16 and extends along the envelope axis between the lead wires 18, 19. A generally U-shaped auxiliary conductor 27 of stiff wire is attached to the spud wire 26 and is disposed in up-standing opposed relationship with the U-shaped extension 24 of the lead wire 18. The lower laterally extending segment 28 of the auxiliary conductor 27 is spot welded to the end of the spud wire 26 and extends a short distance therebeyond toward the offset medial portion of the lead wire extension 24. The offset medial portion of the auxiliary conductor 27 extends along a sidewall of the envelope 12 and is terminated at its upper end by a shorter laterally extending segment 29 that is disposed toward but spaced from the inturned arm segment 25 of the lead extension 24.

As will be noted in FIG. 1, the foregoing components form a generally rectangular support frame for a pair of separating wound coiled-coil filaments 30, 32 that are symmetrically disposed in parallel side-by-side relationship on opposite sides of the longitudinal axis of the envelope 12. Each of the filaments have a coil barrel portion that is terminated by axially extending straight leg sections 34 that are provided with leg inserts 35 such as short pieces of molybdenum wire. As illustrated, one leg of the filament 30 is spot welded to the arm segment 25 located at the end of the lead wire extension 24, and its opposite leg is spot welded to the end of the lateral segment 28 of the auxiliary conductor 27. The other filament 32 has one of its legs welded to the short lateral segment 29 of the

auxiliary conductor 27 and its opposite leg welded to the end of the other lead wire 19.

As is shown more clearly in FIGS. 2 and 3, the inner end of the lead wire 19 is terminated by a necked segment 20 that extends around and terminates at a point located above the lateral segment 28 of the U-shaped auxiliary conductor 27. The filaments 30 and 32 are thus connected in series and, as will be noted in FIG. 2, are located in a common plane that passes through the longitudinal axis of the envelope 12. The rectangular frame formed by the U-shaped extension 24 of the lead wire 18 and the U-shaped auxiliary conductor 27 is also located in the aforesaid plane along with the end of the necked segment 20 of the lead wire 19. The end of the spud wire 26 is also aligned with this plane to permit the coplanar suspension of the filaments. However, the retroverted bent portion of the necked segment 20 extends transversely beyond the plane toward the front or light-transmitting part of the lamp 10.

A concave proximity reflector 36 is suspended behind the filaments 30, 32 by means of a single support wire 38 that is spot welded to the auxiliary conductor 27. As shown in FIGS. 1 and 3, the reflector 36 is preferably of spherical configuration and centered on the lamp axis so that it circumscribes the barrel sections of the filament 30, 32. The reflector 36 is also spaced a very short distance from the filament plane, as will be noted in FIG. 2, and is fabricated from a refractory metal such as molybdenum, tungsten or tantalum which has a high melting point and a reflectivity that increases with temperature. The reflector 36 incandesces when the lamp 10 is operated and, as is disclosed in the aforementioned Bottone Pat. No. 3,082,345, reflects both heat and light back toward the filaments and accordingly enhances the intensity and uniformity of the light projected onto the screen. The reflector-to-filament spacing is thus very critical and in the 150 watt T8 lamp here illustrated is maintained within 0.025 to 0.050 inch.

The aforesaid critical spacing is obtained during the assembly of the mount, without the need for subsequent adjustment, by attaching the reflector 36 to the U-shaped auxiliary conductor 27 with a single prebent support wire 38. As is shown in FIGS. 2 and 4, this support wire is generally S-shaped and has its long leg spot welded to the center of the convex rear surface of the reflector 36 and its short leg welded to the bend that joins the lateral segment 29 to the offset medial portion of the auxiliary conductor 27. The reflector 36 and necked segment 20 of the lead wire 19 are thus located on opposite sides of the filament plane.

It will be appreciated from the foregoing that the objects of the invention have been achieved in that a rugged and compact filament mount-and-proximity reflector assembly has been provided which requires a minimum number of parts that can be rapidly and accurately joined together on a mass production basis. The individual filaments are connected directly to the lead wires and the filaments are suspended at the required distance in front of the reflector by means of an auxiliary conductor that is supported by a single member.

While one embodiment has been illustrated and described, it will be understood that various modifications can be made in the shape and arrangement of the components without departing from the spirit and scope of the invention. For example, the concave surface of the reflector is preferably specular but it can also have a matte or slightly roughened finish. The improved amount can also be employed in wafer-stem type lamps as well as the reentrant stem type lamp shown in the drawing. The filaments can also be clamped rather than spot welded to the conductors.

I claim as my invention:

1. In an incandescent projection lamp having a tubular envelope and a vitreous stem that is joined to one end of said envelope, an improved filament mount-and-proximity reflector assembly comprising:

a first rigid lead-in conductor that is sealed through said stem and extends longitudinally into said envelope, the medial portion of said first lead-in conductor being offset from the longitudinal axis of said envelope and terminating in a lateral arm segment that is disposed toward said axis and is located in a predetermined plane that extends

longitudinally of said envelope.

- a second rigid lead-in conductor sealed through said stem and extending longitudinally into said envelope a shorter distance than said first lead-in conductor, said second lead-in conductor terminating in a retroverted necked segment that extends transversely to one side of said predetermined plane and has its free end located at said plane,
 - a rigid spud wire anchored in said stem and extending longitudinally between said first and second lead-in conductors, said spud-wire being insulated from both of said lead-in conductors by said stem and having its free end aligned with said plane,
 - a rigid auxiliary conductor having (a) a first laterally extending segment that is located in said plane, is fastened to the free end of said spud wire and extends therebeyond toward said first lead-in conductor and past the necked segment of said second lead-in conductor toward a wall of said envelope, (b) a medial portion that longitudinally extends along and is offset from the axis of said envelope, and (c) a second laterally extending segment that extends toward but is spaced from the arm segment of said first lead-in conductor and is also located in said plane,
 - a first linear filament having one end attached to the arm segment of said first lead-in conductor and its opposite end attached to the free end of said first laterally extending segment of said auxiliary conductor,
 - a second linear filament having one end attached to the end of the necked segment of said second lead-in conductor and its opposite end attached to the second laterally extending segment of said auxiliary conductor,
 - said first and second linear filaments being connected in series and suspended in spaced side-by-side relationship in said predetermined plane between the offset portions of said first lead-in conductor and said auxiliary conductor,
 - a concave reflector of refractory metal positioned proximate said plane with its concave surface facing toward said first and second filaments, and
 - a rigid support member fastened to said reflector and to said auxiliary conductor and suspending said reflector in the aforesaid position.
2. The incandescent projection lamp of claim 1 wherein: said plane extends along the longitudinal axis of said envelope, and said first and second filaments are disposed in substantially parallel relationship with one another on opposite sides of the longitudinal axis of the envelope.
3. The incandescent projection lamp of claim 1 wherein: said first and second filaments are of the coiled-coil type and have substantially straight leg sections that are fastened to the associated segments of said lead-in and auxiliary conductors, and said concave reflector circumscribes the barrel sections of said filaments and is located in such proximity to said filaments that it is heated to incandescence when the lamp is energized.
4. The incandescent projection lamp of claim 3 wherein: said plane extends along the longitudinal axis of said envelope and said filaments are substantially parallel to one another and symmetrically disposed on opposite sides of said axis, and said spud wire constitutes the sole supporting means for said auxiliary conductor and the attached reflector.
5. The incandescent projection lamp of claim 4 wherein: the inner end of said first lead-in conductor is generally U-shaped, said auxiliary conductor is also generally U-shaped and together with said first lead-in conductor forms a generally rectangular support frame for said filaments, said reflector is of spherical configuration, and said reflector-support wire is generally S-shaped and has one end fastened to the back of the reflector and its opposite end fastened to a part of said auxiliary conductor that is remote from said stem.