

Dec. 18, 1962

C. P. REILLY ET AL
LAMP FILAMENT CONNECTION

3,069,582

Filed Sept. 27, 1960

FIG. 1.

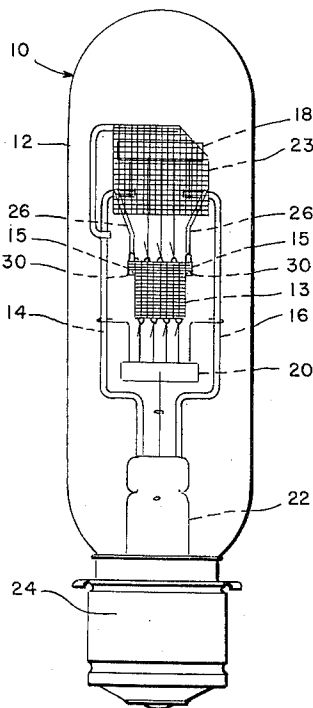


FIG. 2.

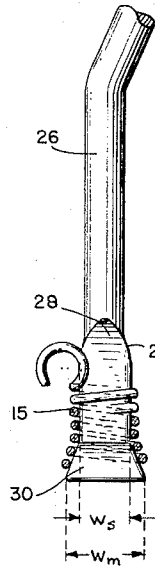


FIG. 3.

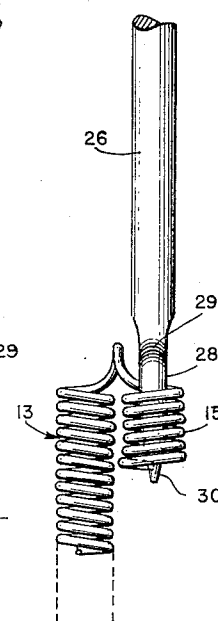


FIG. 5.

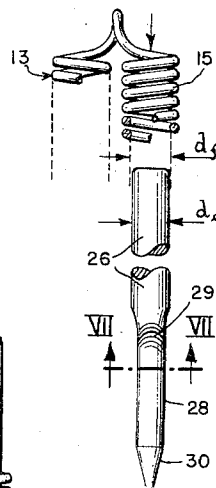


FIG. 6.

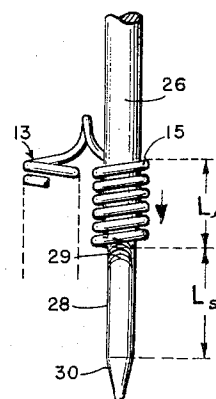


FIG. 4.

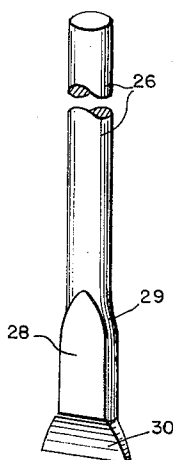


FIG. 7.

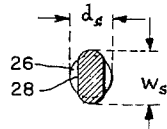
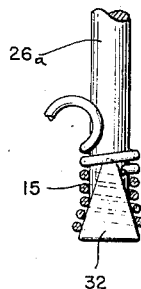


FIG. 8.



INVENTORS,
CHARLES P. REILLY and
JOSEPH S. GORECKI,
BY
D. S. Bulaga
AGENT.

1

3,069,582

LAMP FILAMENT CONNECTION

Charles P. Reilly, Bloomfield, and Joseph S. Gorecki, Cedar Grove, N.J., assignors to Westinghouse Electric Corporation, East Pittsburgh, Pa., a corporation of Pennsylvania

Filed Sept. 27, 1960, Ser. No. 58,768

7 Claims. (Cl. 313—271)

This invention relates to electrical devices and, more particularly, to an improved mechanical and electrical junction between the filament and lead-in conductor or supporting member of an incandescent electric lamp.

In the manufacture of certain types of electrical devices that contain an energizable element, such as high wattage projection lamps having concentrated planar filaments for example, it is the general practice to provide a short coiled section at each end of the filament and to attach such coiled sections to the respective lead-in conductors by means of so-called "coiled leg inserts." These inserts are formed by tightly winding a wire around a solid rod or mandrel to provide, so to speak, threads having the same pitch as the turns in the end coils of the filament. During filament mounting the inserts are screwed into the end coils thereby threadably coupling the members together and effecting the desired mechanical and electrical juncture thereof. Threaded inserts and connections of this character are illustrated and described in U.S. Patent No. 2,449,679 to Van Horn issued September 21, 1948.

Such screw type inserts and junctures, apart from being expensive, are complicated to make and assemble and accordingly require the use of highly skilled labor. In addition, despite all precautions it sometimes happens that the overwound coil slips on the mandrel during the threading operation thus making this operation even more tedious and time consuming and resulting in a high rate of shrinkage. A large amount of shrinkage also occurs at mounting as a result of burrs that are unavoidably formed on the ends of the inserts when the continuously wound mandrel from which they are made is cut into the desired length.

It is accordingly the general object of this invention to provide an improved juncture for connecting the energizable and conductor components of an electrical device which will overcome the foregoing and other disadvantages of the prior art structures.

A more specific object is the provision of a filament connection for an electric lamp or the like which is simple and inexpensive to make and which will effect a reliable and positive electrical and mechanical juncture of the filament and a wire conductor without any additional parts.

The aforesaid objects, and others which will become obvious as the description proceeds, are achieved in accordance with this invention by deforming one end of the conductor or support member to provide an enlarged segment that is wider at its greatest dimension than the inside diameter of the coiled end section of the filament into which the conductor is inserted. During the filament mounting operation a preselected part of the enlarged segment is forcibly thrust into the coiled end section of the filament thereby expanding the outermost turns thereof and effecting a force fit that locks the members in positive electrical and mechanical engagement.

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

FIG. 1 is an elevational view of a 1000 watt incandescent projection lamp that incorporates the improved filament connection of this invention;

FIGS. 2 and 3 are front and side elevational views,

2

respectively, on an enlarged scale of the preferred form of juncture between the filament and lead-in conductor according to the invention;

FIG. 4 is a pictorial view of the preformed conductor illustrated in the preceding figures, prior to the bending thereof during mounting;

FIGS. 5 and 6 are fragmentary elevational views of the filamentary coiled end section and conductor illustrating the initial and an intermediate phase in the assembly thereof;

FIG. 7 is a cross-sectional view of the conductor along the line VII—VII of FIG. 5, in the direction of the arrows; and

FIG. 8 is a front elevational view, partly in section, of an alternative form of connection in accordance with this invention.

While the improved juncture of this invention may be employed in various types of lamps and electrical devices, it is especially suited for use in conjunction with incandescent projection lamps and has accordingly been so illustrated and will be so described.

In FIG. 1 there is illustrated a 1000 watt T12 incandescent projection lamp 10 which consists, in general, of the usual tubular bulb 12 and enclosed mount assembly comprising a biplane filament 13 that is supported between spaced upright portions of the main leads 14 and 16 by means of an upper bridge assembly 18, a lower bridge assembly 20 and a stem 22. The filament 13 is of the biplane type and is provided at each end with a relatively short coil or coiled end section 15 that parallels the main coils and is electrically and mechanically connected to the adjacent main support leads by means of a secondary lead-in conductor 26 and the juncture hereinafter described. A prefocus type base 24 is fastened to the sealed end of the bulb and, insofar as the lamp here shown is designed for base-down burning, a heat dissipating screen 23 is provided above the filament in accordance with standard lamp-making practice.

According to this invention the filamentary coiled end sections 15 are connected to their respective lead-in conductors 26 solely by means of a force interfitting of the members. The preferred means of accomplishing this is to flatten one end of the lead-in conductors 26 in such a manner as to form an enlarged shank 28 that is terminated by a wedge-like segment 30, as shown in FIGS. 2 to 7. The width "Ws" (FIG. 2) of the shank 28 is substantially uniform and exceeds the diameter "dc" (FIG. 7) of the conductor 26 which, in turn, is slightly smaller than the inside diameter d_f (FIG. 5) of the coiled end section 15. The wedge-like segment 30 flares outwardly in opposite directions from the axis of the conductor 26 and progressively increases in width longitudinally to a maximum width "Wm" (FIG. 2) at the end of the conductor that is considerably greater than the width "Ws" of the aforesaid shank and, accordingly, considerably greater than the inner diameter " d_f " of the coiled end section as well. The aforesaid wedge-like segment is also desirably symmetrical about the axis of the conductor and coplanar with the shank.

As shown in FIGS. 5 and 6, the juncture of the lead-in conductors 26 and the coiled end sections 15 is very conveniently accomplished by first slipping the latter over the unflattened end of the conductor which, as shown in FIG. 4 is straight at this stage of the mounting operation, until the end turn of the coiled section is seated against the shoulder 29 at the base or inward end of the enlarged shank 28. The coiled end section is then forcibly screwed onto or simply thrust over the shank thereby forcing the outermost coil turns over the narrow inward part of the wedge-like segment 30 and securely locking the members together as shown in FIGS. 2 and

3. Because the shank and wedge-like segment are larger in width than the coil diameter the turns, and particularly the outermost turns, are slightly distended as shown and tightly grip the encircled parts of the conductor. The wedge-like segment is so tapered that when the members are locked together in the aforesaid manner the tip of the segment is wedgingly seated against but located outside of the outermost turn of the coil.

As shown in FIG. 6, the length "Ls" of the shank 28 is at least as long as and preferably longer than the length "Lc" of the coiled end section 15 so that all of the turns of said section are engaged and shorted out. This prevents any of the turns from lighting up when the filament is energized and introducing undesirable variations in lamp rating.

In order to prevent any possibility whatsoever that the coiled end section might become decoupled and slip off of the conductor under severe shock or vibration conditions, the enlarged end of the conductor and wedge-like segment thereat is preferably so oriented with respect to the lamp axis that at least a portion of the protruding tip of said segment is located below the engaged end turn of the coiled section when the lamp is disposed in the position in which it is designed to operate.

After the conductor and end coil are forcibly interlocked in the aforesaid fashion, the unflattened end of the conductor is bent toward and fastened, as by welding, to the adjacent main lead and the mounting operation completed in the regular manner.

The lead-in conductors 26 are fabricated from a suitable refractory metal wire such as molybdenum or the like and the aforesaid shank and wedge-like segment formed by compressing one end of the conductor with a pair of suitably shaped and actuated press jaws. As a specific example of properly dimensioned components, in the case of the 1000 watt projection lamp 10 here shown having coiled end sections that are approximately 0.078" long and have an inside diameter of about 0.037", good results have been obtained with lead-in conductors 0.036" in diameter having a shank approximately 0.118" long and 0.038" in width, and a wedge-like segment approximately 0.049" long and 0.045" wide at its greatest dimension.

In FIG. 8 there is shown another form of juncture wherein the enlarged shank portion is omitted and one end of the lead-in conductor 26a is flattened to form an elongated triangular-shaped segment 32 that has a more gradual taper and is symmetrically disposed about the axis of the conductor. As shown, the engaged outermost turns of the coiled end section 15 are expanded by and firmly grip a much longer section of the narrow part of the segment to provide the same type of stopper-like joint as that obtained with the preferred embodiment described above.

As will be recognized from the foregoing, the objects of the invention have been achieved by providing a filament connection which is not only simple and inexpensive to fabricate but which effects a reliable and positive juncture between the filament and its lead-in conductor. It has been found that when the improved one-piece insert or lead-in member and juncture of the present invention were substituted for the two-piece "coiled-leg" insert and threaded connection heretofore in use, the shrinkage during manufacture of the inserts was decreased by about 90% and the cost of the inserts was approximately 50% less. Substantial reductions in both shrinkage and manufacturing costs were also realized at filament mounting.

While several embodiments have been illustrated and described, it will be understood that various modifications can be made without departing from the spirit and scope of the invention.

We claim:

1. In an electric lamp, the combination of a filament having a coiled end section, and a supported lead-in con-

ductor that is smaller in diameter than the inside diameter of said coiled end section and is provided at one end with an enlarged flat segment that progressively increases in width longitudinally to a width at the extremity of said conductor that is greater than the inside diameter of said coiled end section, said lead-in conductor extending through and beyond said coiled end section, the narrow inward part of said enlarged flat segment being located within said coiled end section and in force-fitting engagement with at least the outermost turns thereof, and the tip of said enlarged flat segment being located outside said coiled end section and wedgingly seated against the outermost turn thereof, whereby said enlarged flat segment is firmly gripped by said coiled end section and said conductor locked in positive electrical and mechanical engagement with said filament.

2. The combination of a filament having a coiled end section, and a wire conductor that is smaller in diameter than the inside diameter of said coiled end section and is terminated at one end by a flat wedge-like segment the widest part whereof constitutes the terminus of said conductor and exceeds the inside diameter of said coiled end section, said conductor extending through and beyond said coiled end section, and the narrow inward part of said wedge-like segment being within and in force-fitting engagement with at least the outermost turns thereof, whereby the engaged turns of said coiled end section firmly grip the encircled narrow part of said wedge-like segment and effect a positive electrical and mechanical juncture of said conductor and coiled end section.

3. The combination of an interlocked wire conductor and a filamentary coiled end section as set forth in claim 2 wherein said flat wedge-like segment is of triangular configuration and symmetrical about the axis of said conductor.

4. The combination of a filament having a coiled end section, and a wire conductor that is smaller in diameter than the inside diameter of said coiled end section and is compressed at one end to provide an enlarged shank that is of substantially uniform width and terminated by a flat wedge-like segment the widest part whereof constitutes the terminus of said conductor, said enlarged shank having a width slightly greater than the inside diameter of said coiled end section but considerably smaller than said wedge-like segment at its greatest dimension, said conductor extending through and beyond said coiled end section, and said enlarged shank and the narrow inward part of said wedge-like segment being within and in force-fitting engagement with at least the outermost turns of said coiled end section, whereby said engaged turns are distended and firmly grip said shank and the encircled part of said wedge-like segment and effect a positive electrical and mechanical juncture of said conductor and coiled end section.

5. The combination of an interlocked wire conductor and a filamentary coiled end section as set forth in claim 4 wherein, said enlarged shank is at least as long as said coiled end section and engages and thus shorts out all of the turns of said section, and said flat wedge-like segment flares outwardly in opposite directions from and is disposed in the same plane as said shank.

6. In an electric lamp that is adapted to be operated with its longitudinal axis extending in a predetermined direction, the combination of a filament having a coiled end section, and a lead-in conductor that is smaller in cross-section than the inside dimension of said coiled end section and is provided at one end with an enlarged flat segment that progressively increases in width and is terminated by a tip having a width greater than the inside dimension of said coiled end section, said lead-in conductor extending through and beyond said coiled end section, the narrow inward part of said enlarged segment being located within said coiled end section and disposed in force-fitting engagement with at least the outermost turns thereof, and the tip of said enlarged segment being located outside

5

said coiled end section and seated against the outermost turn thereof, said lead-in conductor being so oriented with respect to said coiled end section that at least a portion of the protruding tip of said enlarged flat segment extends below said coiled end section when the lamp is oriented so that its longitudinal axis extends in the aforesaid predetermined direction.

7. In an electrical device, the combination of an electrically energizable element within said device, a filamentary wire coil attached to and extending from said element, and a lead-in conductor that is dimensioned to fit freely within said coil and has an enlarged segment at one end that is terminated by a tip that is larger than the inside dimension of said coil, said lead-in conductor extending

5

10

6

ing through and beyond said coil, the inward part of the enlarged segment of said conductor being located within said coil and disposed in force-fitting engagement with at least the outermost turns thereof, and the tip of said enlarged segment being located outside said coil and seated against the free end thereof so that said lead-in conductor is mechanically locked in positive electrical connection with said coil and element.

References Cited in the file of this patent

UNITED STATES PATENTS

2,134,574	Pinkle -----	Oct. 25, 1938
2,961,568	Pertwee -----	Nov. 22, 1960