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METHOD FOR MAKING LAMP BULB

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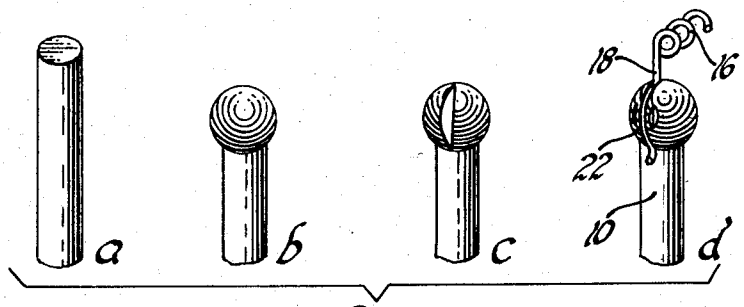

Fig. 1

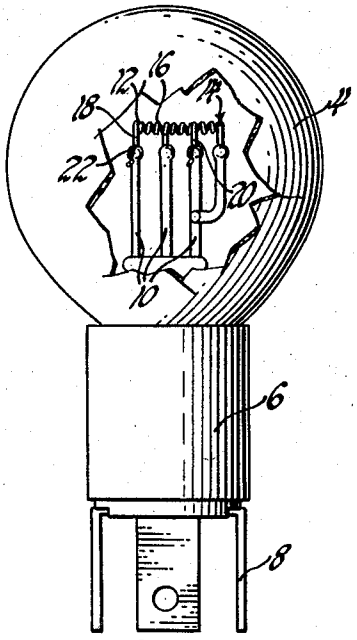

Fig. 2

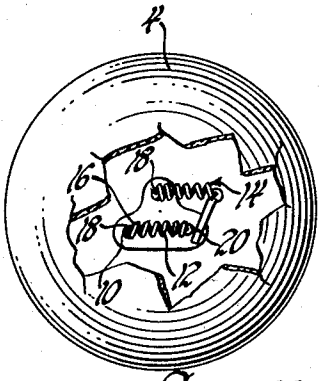

Fig. 3

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METHOD FOR MAKING LAMP BULB

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1 Claim. (Cl. 219—117)

This invention relates to light bulbs of the type used in automotive vehicle lamps and to a process for making same. More particularly the invention relates to a new and improved filament-to-lead joint for use in such lighting elements.

Heretofore, it has been the practice to form the filament-to-lead joint in automotive type light bulbs by means of a resistance welding operation, whereby the end of the filament leg is embedded in the end of the lead while the latter is softened by resistance heating. There are many disadvantages to this type of connection, the chief one of which is the high percentage of failures after but a relatively short period of lamp operation. Such failures are usually caused by the softening of the lead metal due to the intense heat generated by the filament. When this occurs, the filament leg vibrates loose from its embedded position. Another reason for such failures is filament leg breakage which generally occurs just above the joint. This latter type failure stems from the fact that the tungsten metal of the filament leg is somewhat weakened adjacent the joint due to the intense heat used in the resistance welding operation.

It is an object of the present invention to solve the aforementioned difficulties by the provision of a new and improved filament-to-lead joint which is simple in construction, economical and durable.

Another object is the provision of a process for forming such a filament-to-lead joint.

These and other objects are carried out in accordance with the invention by providing an enlarged portion on the free end of the lead, forming a slot in this enlarged portion, locating the filament leg in the slot and then swaging the enlarged portion to close the slot and thereby tightly and securely sandwich the filament leg within the enlarged portion to form the joint.

Other objects and advantages of the invention will appear more clearly from the following description of a preferred embodiment and from the drawings in which:

Fig. 1 shows the free end of the lead in its various process stages;

Fig. 2 is a side view with parts broken away of a light bulb constructed in accordance with the present invention; and

Fig. 3 is a top view with parts broken away of the light bulb shown in Fig. 2.

Referring now to Fig. 1, at *a* is shown the free end of one of the cylindrically shaped wire leads of the light bulb prior to any of the processing steps for forming the filament-to-lead joint. The light bulb leads are generally formed of nickel (or a nickel-rich alloy) because of its great heat resistance and relatively high conductivity. As the first step in the joining process, an enlarged portion is formed on the free end of the lead as is shown at *b*. In the particular embodiment shown, this enlarged portion is spherical in shape and is formed by heating the tip of the lead with an atomic hydrogen torch. The lead metal softens from the intense heat and naturally forms

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the spherical enlargement which, in the embodiment shown, has a diameter about twice that of the lead wire. After cooling to permit solidification of the metal, the axially extending V-shaped slot shown at *c* is formed preferably by stamping with a V-shaped punching or cutting tool. It is preferable that the slot extend to about the center of the spherical enlarged portion of the lead. After the slot is formed, the tungsten filament leg, the free end of which is slightly outwardly bent, is positioned lengthwise in the slot after which the spherical projection is stamped or swaged thereby closing the slot around the filament leg to form the joint as is shown at *d*. The tungsten metal of the filament, being much harder than the nickel lead, naturally slightly embeds itself in the side walls of the slot when it is closed by the stamping operation. Thus, the filament is tightly and securely gripped thereby affording excellent electrical conductivity through the joint. If desired, the electrical conductivity can be further increased by welding the outwardly bent free end of the filament leg to the lead just below the spherical projection.

In Figs. 2 and 3 there is shown a light bulb constructed in accordance with the invention and comprising an evacuated or inert gas filled glass envelope 4 provided with base member 6 having contacts 8 electrically connected to lead wires 10. Secured to the leads in the manner described above and as shown in Fig. 1 *d* are tungsten or tungsten alloy filaments 12 and 14, each of these filaments having coiled portion 16 and downwardly extending legs 18 and 20 the free ends of which are secured within the spherical enlargements on the leads as illustrated at 22.

The particular lamp bulb shown is of the two-filament type commonly used in vehicle head lamps, 12 being the major or high beam filament and 14 being the minor or low beam filament. However, it is to be understood that this type bulb is shown merely for purposes of illustration, the present invention not being limited to this particular structure.

The chief advantage of the present invention is the increased bulb life which results from the more durable structure of a filament-to-lead joint. The filament leg, being clamped in a greater mass of metal than in previously used constructions, has less tendency to loosen because of vibration. The tungsten metal is not in a weakened condition such as is caused by the intense heat required for the previously used welding processes. Further, the mass of metal in the enlargement at the end of the lead is able to withstand a great amount of heat without softening to the point where filament loosening and resulting bulb burn-out occurs.

While the invention has been described with reference to a particular lamp bulb, it is to be understood that it may be used in other types of lighting devices such for example, as one having a glass reflector and a glass lens fused together and commonly referred to as an all-glass sealed beam lamp. Also, various changes and modifications of the embodiments of the invention described herein may be made by those skilled in the art without departing from the spirit and principles of the invention.

I claim:

In a process for making a lamp bulb, the steps of applying heat to the end of a nickel lead wire to form an enlarged spherically shaped portion thereon, forming a slot in said enlarged portion axially aligned with said lead wire and extending to about the center of said enlarged portion, positioning a leg portion of a tungsten filament in said slot and stamping said enlarged portion to close the slot over the leg portion, and resistance welding the free end of the filament leg portion to the lead wire.

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