Jan. 31, 1956 C. E. BECK 2,733,419

MEANS FOR SECURING A LEAD WIRE TO AN ELECTRIC LAMP BASE

Filed Dec. 26, 1951

Fig. 1

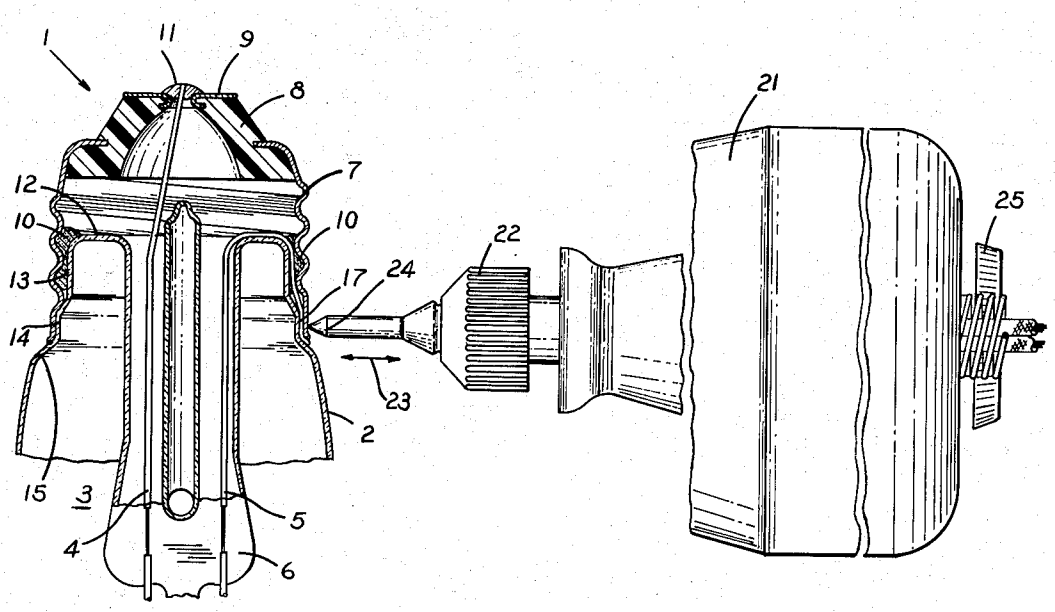
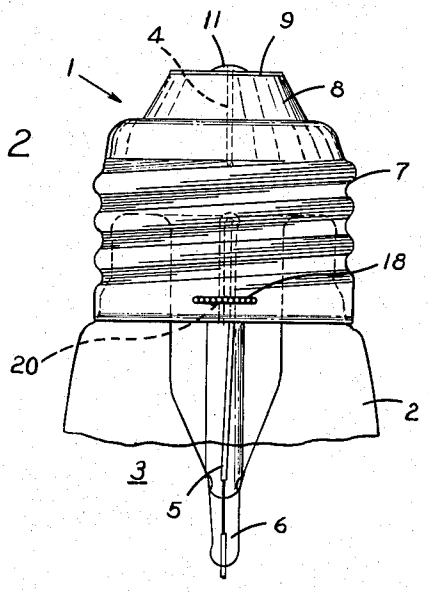


Fig. 2



Inventor:
Charles E. Beck
by Vincent C. Kaufmann
His Attorney

United States Patent Office 2,733,419 Patented Jan. 31, 1956

2,733,419

MEANS FOR SECURING A LEAD WIRE TO AN ELECTRIC LAMP BASE

Charles E. Beck, East Cleveland, Ohio, assignor to General Electric Company, a corporation of New York; patent dedicated to the Public insofar as it relates to lamps and lamp parts to the extent stated in document recorded in the United States Patent Office, January 4, 1954, liber U–238, page 394

Application December 26, 1951, Serial No. 263,438

3 Claims. (Cl. 339—144)

This invention relates generally to electric lamps and similar devices comprising a glass bulb and a base including a cylindrical portion or shell for locating the lamp in a socket and which also serves as a current terminal. The invention is more particularly concerned with an improved structure for making the connection between the side lead-in wire of the lamp and the shell or cylindrical portion of the base.

A base for an incandescent lamp generally comprises a metal shell having its cylindrical surface threaded and an end contact or eyelet insulated from the base proper. The base is applied to the neck of the bulb, that is to the constricted and generally cylindrical extension of the main spherical portion of the bulb, and is usually cemented to it. The external contact surfaces for energizing the filament of the lamp are the end contact or eyelet and the shell of the base, these being connected to the lead-in wires which project into the bulb and support the filament.

The lead-in wire which is connected to the end contact is generally known as the top lead-in wire whereas the other which is connected to the shell is generally known as the side lead-in wire. My invention is more particularly concerned with a means for connecting the side lead-in wire to the shell of the base without the use of solder. It is possible to make a contact connection by using a bulb having a full blown seal and pressing a tight fitting base on it so as to wedge the side lead-in wire between the seal shoulder and the shell of the base. However this solution is difficult to realize effectively due to the manufacturing tolerances in producing the bulbs and the bases. As a result, some bases will be too small to seat squarely on the bulb neck, while others will be too large to achieve a good contact connection with the lead-in wire. A solution to this problem is presented in the copending application No. 263,457 filed December 26, 1951, of C. E. Bechard et al., now abandoned in favor of continuation-in-part application No. 313,276, filed October 6, 1952, entitled "Electric Lamp" and assigned to the same assignee as the present invention. In that application, it is proposed to form an indentation in the shell of the base which crosses over the lead-in wire and causes the wire to become embedded in the resulting ridge on the inside of the shell. My invention provides an improved method and apparatus for making a specific type of indentation which assures a more reliable connection than obtained heretofore.

Accordingly, an object of my invention is to provide an electric lamp assembly comprising an improved solderless connection between the side lead-in wire and the shell of the base.

In accordance with my invention, the lamp assembly preferably comprises a bulb having a full blown seal, that is a seal which conforms closely to the inner diameter of the skirt or edge of the base over a substantial width. The side lead-in wire is drawn out along the outside of the seal and passes between the seal and the shell of the base. In the region where the side lead-in

wire emerges from between the seal and the shell of the base, the shell is peened inwardly along a line transverse to the direction in which the lead-in wire lies. The peening effects an inward indentation in the metal of the shell which appears on its inside surface as a raised line or ridge. This ridge traverses the lead-in wire which becomes slightly embedded in it at the crossover point, resulting in a firm electrical contact. I have found that it is possible to peen the base and form such an indentation, despite the fragile nature of the bulb which supports it, by means of a high-speed pointed vibratory tool such as an electrical vibrator for engraving metals. With this device, it is possible to deform inwardly the metal of the base without danger of breaking the neck of the bulb, because a high stress is developed on a small area of the base at each blow of the tool but the resultant pressure averaged over the whole of the base is relatively light.

For further objects and advantages and for a better understanding of the invention, attention is now directed to the following description and accompanying drawings. The features of the invention believed to be novel will be more particularly pointed out in the appended claims.

In the drawings:

Fig. 1 is a side sectional view through the neck portion of an incandescent lamp embodying the invention and illustrating the manner of peening the base by means of a vibratory engraving tool.

Fig. 2 is a side view of the lamp seen at right angles with respect to the view of Fig. 1 and showing the line of indentation traversing the side lead-in wire.

The invention will be described with reference to an ordinary screw base of the type generally used for household incandescent lamps. It will be understood however that the invention is equally applicable to different types of bases; for instance the invention may be used with bayonet type bases wherein it is desired to effect a connection between the side lead-in wire and the straight-walled cylindrical shell of the base.

Referring to Fig. 1 which illustrates the fastening of the base in the case of an ordinary incandescent lamp, the base 1 and is mounted on the constricted lower portion or neck 2 of an evacuated glass lamp bulb of which a fragment is shown at 3. The bulb may be of conventional construction and containing a filament (not shown) mounted within it on the ends of the lead-in wires 4 and 5 which enter the bulb through a glass press 6.

The base proper comprises a threaded metal shell 7, an insulating body or web 8, and an end contact 9 fastened to the upper surface thereof. The insulating web 8 may be made of glass in accordance with the common practice or it may be made of a thermal setting plastic. The base is fastened to the neck of the bulb by means of a cement as indicated at 10. Previous to the assembly of the base to the bulb, a quantity of cement is disposed within the base as an annular ring preferably located a slight distance inwardly from the edge or skirt of the shell. A base having such a disposition of cement is generally termed a deep filled base and it permits maintaining the inner lower edge or skirt of the shell free and clear of cement. This is particularly desirable for a lamp structure in accordance with the present invention because a contact connection is desired between the skirt of the shell and the side lead-in wire, and the basing cement is an insulator which would interfere with such a connection were it allowed to enter the contact region. The external connections to the lamp are made through the end contact 9 and the shell 7 of the base. The top lead-in wire 4 may be soldered to the end contact in the usual manner as indicated at 11.

The invention is more particularly concerned with the means whereby the connection between the side

lead-in wire 5 and the shell 7 of the base is effected. As illustrated in Fig. 1, the seal region of the neck comprises an end portion 12 which is generally annular and perpendicular to the axis of the bulb. Adjacent the annular portion 12 is a generally cylindrical portion 13 of a diameter slightly less than the root diameter of the threads of the base in order to permit the disposition of the cement 10 therebetween. The cylindrical portion 13 merges into the main body of the neck through a shoulder including an expanded cylindrical portion 14 and a conical or flaring portion 15.

The connection between the side lead-in wire 5 and the shell 7 of the base occurs at 17 between the skirt of the shell and the expanded cylindrical portion 14. The outer diameter of the portion 14 and the inside diameter of the shell are proportioned to give a reasonably tight fit in the region 17. However I have found that where reliance is placed solely upon a tight fit between the seal shoulder of the bulb and the skirt of the base in order to effect a contact connection between the lead-in wire and the shell, a relatively large number of defective lamps occur. The reason for this is that the lead-in wire is quite fine, and if there is any appreciable variation in either the expanded portion 14 or in the skirt of the base, either a loose fit will occur and the connection will be intermittent, or a tight fit will prevent the base from sitting squarely on the bulb. Since both the bulb and the base are mass produced, manufacturing tolerances will allow variation to occur, and it is generally not feasible to attempt to reduce the tolerances to the extent required to assure the manufacture of lamps with a reasonable low shrinkage or loss factor. In the case of the bases particularly, they are made through a drawing operation which leaves considerable room for variations. Under certain circumstances, the actual circumference of any one base may vary by as much as 5% from the mean or design circumference. It will thus be seen that in commercial production, it is simply not feasible to rely solely upon the dimensioning of the seal and of the base to achieve a contact connection by a tight fit.

In accordance with the invention, a firm and reliable contact connection is obtained by peening the skirt of the base inwardly against the seal shoulder and along a line transverse to the side lead-in wire as shown at 18 in Fig. 2. The peening may be performed by means of a small vibrator 21 comprising a head or chuck 22 which is reciprocated backwards and forwards at a high speed in the direction indicated by the arrow 23. The vibrator may for instance be an electric engraving tool or a small pneumatic air hammer. A suitable electrical vibrator is marketed by the Burgess Vibrocrafters, Inc., of 180 North Wabash Avenue, Chicago 1, Illinois. For peening the base, I prefer to provide a slightly rounded or ball point tool 24 which is secured in the chuck 22. The stroke of the point may be adjusted by means of the knurled nut 25 and I have found that a stroke of approximately 1/32 of an inch is generally satisfactory for a medium size base made of aluminum.

The peening may be done by swinging the ball point along the circumference of the shell parallel to its rim so as to give a line of small indentations which is transverse to the direction in which the lead-in wire lies and passes over it. This may readily be seen in Fig. 2 wherein the line of indentations 18 crosses over the side lead-in wire 5 which has been indicated in dotted outline. With a high-speed vibrator, it is possible to deform the metal of the base inwards because it places a high stress on a very small area of the base at a particular moment. Nevertheless the average pressure applied by the tool is relatively small and may be as little as a few ounces. When it has previously been attempted to perform the same peening operation by means of a single blow of a chisel applied to the base, a much higher force is required. Likewise if the indentation is made by means of a sharp edged roller, a considerably greater constant force must be applied. With a high-speed vibrator the average pressure applied against the base is so small that breakage of lamps during the peening operation is practically non-existent and shrinkage is insignificant.

Referring to Fig. 2, it will be observed that the inwardly peened furrow 18 consists of a series of minute indentations. At the point 20 where the furrow crosses over the side lead-in wire 5, the wire becomes slightly embedded in the ridge which is produced on the inside of the shell and a firm contact connection is thereby assured. Each minute indentation was made by a blow of the ball point 24. With the vibrator 21 which has been described, 120 light blows are struck per second. By adjusting the rate at which the ball point is swung along the circumference of the base, the points of indentation may be made to occur so close together as to result in a substantially continuous furrow as indicated; in any case, as seen in Fig. 2, the spacing between indentations is not substantially in excess of the diameter of the lead wire.

I have found over a period of continuous production that lamps constructed in accordance with the invention have a maintenance substantially as good as those constructed in accordance with prior art practice wherein the side lead-in wire is soldered to a brass base. My invention, by eliminating the use of solder, permits the use of more readily available metals such as aluminum for the shell of the base. It will readily be realized that this is a considerable advantage which in itself would justify the use of my invention, and in addition, the manufacturing process embodying my invention is generally more economical than the soldering process utilized in the prior art.

While a certain specific embodiment of my invention has been shown and described, it will of course be understood that various modifications may be made without departing from the invention. The appended claims are intended to cover any such modifications coming within the true spirit and scope of the invention.

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

1. An electric lamp comprising a vitreous bulb having a main portion and a neck portion of reduced diameter and generally cylindrical section, a lead-in wire sealed into said bulb through said neck portion, a cylindrical base fastened on said neck portion and having a shell fitting closely thereon, said lead wire being drawn out between said shell and said neck portion, and an inwardly peened furrow in the region of said shell next said lead wire, said furrow being directed transversely to the direction of said lead-in wire and disposed to cross over said wire and consisting of a series of closely spaced minute indentations forming at the inside of the base shell a ridge in which the said lead-in wire is slightly embedded.

2. An electric lamp comprising a vitreous bulb having a main portion and a neck portion including a seal and an intermediate expanded portion adjacent thereto, lead-in wires sealed into said bulb through said neck portion, and a base comprising a cylindrical shell fitting tightly on said expanded portion, one of said lead-in wires being drawn out between said skirt and said expanded portion, and an inwardly peened furrow consisting of a series of closely spaced minute indentations in said shell opposite said expanded portion, said furrow being disposed to cross over said one lead-in wire and forming at the inside of the base shell a ridge in which the said lead-in wire is slightly embedded in order to achieve a firm electrical contact between said one lead-in wire and said shell at the point of cross-over.

3. An electric lamp comprising a vitreous bulb having a main portion and a neck portion including a seal and an intermediate expanded portion adjacent thereto, lead-in wires sealed into said bulb through said neck portion, a base fastened to said neck portion and comprising a

cylindrical shell fitting over said expanded portion, one of said lead-in wires being drawn out between said shell and said expanded portion, said shell having an inside diameter proportioned to wedge said one wire against said expanded portion, and an inwardly peened furrow consisting of a series of closely spaced minute indentations in said shell opposite said expanded portion, said furrow being substantially parallel to the edge of said shell and disposed to cross over said one lead-in wire and forming at the inside of the base shell a ridge in which the said lead-in wire is slightly embedded in order to achieve a firm electrical contact between said one lead-in wire and said shell at the point of cross-over.

References Cited in the file of this patent

UNITED STATES PATENTS

1,020,035	Freeman	Mar. 12, 1912
1,629,694	Ford	May 24, 1927
1,660,455	Plumb	Feb. 28, 1928
2,077,199	Asmussen	Apr. 13, 1937
2,375,741	Dibner	May 8, 1945
2,379,063	Brown et al.	June 26, 1945
2,403,137	Strickland	July 2, 1946
2,509,259	Wittek	May 30, 1950
2,551,376	Hroch	May 1, 1951