Dec. 29, 1953 R. A. KUEBLER 2,664,551

LAMP BASE END CONTACT

Filed Aug. 2, 1951

Fig. 1

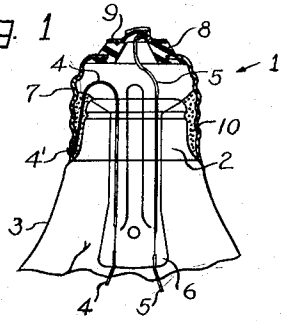


Fig. 2

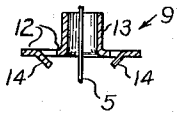


Fig. 2a

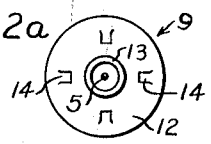


Fig. 3

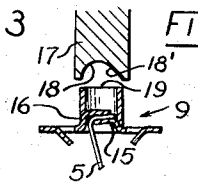


Fig. 3a

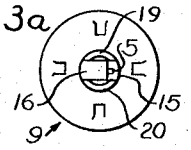


Fig. 4

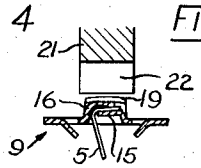


Fig 4a

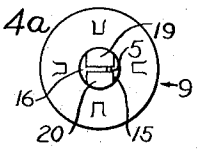


Fig. 5

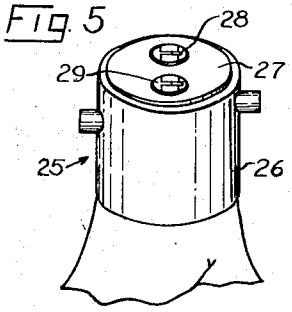
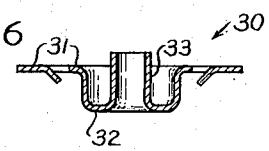


Fig. 6



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UNITED STATES PATENT OFFICE

2,664,551

LAMP BASE END CONTACT

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Application August 2, 1951, Serial No. 239,953

6 Claims. (Cl. 339—146)

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This invention relates to electric lamps and similar devices requiring bases having end contacts for making connections to the enclosed filament or electrodes. The invention is more particularly concerned with the means for securing the lead-in wire of the lamp to the end contact and for achieving a firm electrical connection thereto.

In the manufacture of electric lamps, particularly to household type incandescent lamps, it has become standard practice to employ a base, usually comprising a metallic shell having its cylindrical surface threaded and provided with an end contact or eyelet insulated from the shell. This base is applied to the neck of the bulb and is secured to it by a cement or other suitable means. In order to provide external contact surfaces for energizing the filament of the lamp, one of the lead-in wires is connected to the side wall or shell of the base and the other is connected to the end contact or eyelet.

Although some attempts have been made in the past to connect the lead-in wires to the end contact or eyelet, and also to the shell, by mechanical means such as crimping or wedging, such attempts have met with limited success only, at least in the large volume household types of lamps. The general practice has been to use a metal which is readily soldered, for the shell and the end contact, and to make the permanent connection to the lead-in wires by means of a solder joint. This soldering operation presents certain difficulties, particularly when performed by the automatic machines used in the mass production of incandescent lamps, and is a relatively costly procedure from the standpoint of the time and maintenance required in connection with the soldering mechanism.

The desirability of eliminating the soldering operation in the manufacture of electric lamps has lately been accentuated by reason of the high cost of readily soldered metals such as copper or brass. Concurrently, other metals such as aluminum have become available at relatively low cost. Aluminum constitutes a good conductor and it has a good appearance without any additional treatment so that it provides a highly desirable substitute for brass. Even though it is possible to solder aluminum, this is a relatively costly and generally uneconomical process, since cadmium is required in the solder material and the operation is more critical.

An object of the present invention is to provide a new and improved end contact or eyelet structure for the bases of electric lamps and

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similar devices, to which a lead-in wire may be connected without the use of solder.

A further object of the invention is to provide a base for an incandescent lamp whereof the end contact or eyelet may be mechanically connected to the lead-in wire.

A more specific object of the invention is to provide a screw type base for incandescent lamps wherein the end contact is mechanically connected to the lead-in wire so as to secure a firm and permanent electrical connection having a neat appearance, and which is not subject to loosening and disengagement during the life of the lamp.

In accordance with the invention, the end contact of the base is shaped to the form of a thin disc having an outwardly turned flare or tubular extension through which the lead-in wire of the lamp is threaded. Considering the tubular flare or extension as made up of four quadrants, the term quadrant being used in the imaginary sense only, the lead-in wire is first caught between two diametrically opposite quadrants by turning one in on top of the other. Thereafter the two remaining diametrically opposite quadrants are turned down inwardly one top of the first two. The lead-in wire is thus bent over and caught between the first two mentioned quadrants, which in turn are protected by the last two mentioned quadrants, thereby providing a firm electrical connection which is mechanically protected from external pressure or shock.

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 of a fragment of an incandescent lamp provided with a base embodying the invention.

Figs. 2 and 2*a* are side-sectional and plan views respectively of an end contact of a base in accordance with the invention prior to the crimping of the lead-in wire; Figs. 3, 3*a* and 4, 4*a* are corresponding views illustrating the configuration of the same contact after the first step in the crimping operation, and after the final step, respectively.

Fig. 5 is a pictorial view of a lamp utilizing a bayonet type base provided with end contacts constructed in accordance with the invention.

Fig. 6 is a side-sectional view of a modified end

contact construction for a base embodying the invention.

The general appearance of a screw type base in accordance with the invention, and the internal construction and means for securing it to the neck of a bulb, are shown in Fig. 1. The base 1 is mounted on the constricted upper portion or neck 2 of an evacuated bulb of which a fragment is shown at 3. The bulb may be of conventional construction and contains a filament (not shown in the drawing) mounted within it on the ends of the lead-in wires 4 and 5 which pass out of the bulb through a press 6.

The base proper comprises a threaded metal shell 7, an end insulator or web 8, and an end contact 9 constructed in accordance with the invention. 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 shown herein as fastened to the neck of the bulb by means of a suitable cement indicated at 10, although it may equally well be fastened mechanically by means of indentations in the neck of the bulb and corresponding notches in the skirt of the shell 7. The contact surfaces for the lead-in wires 4 and 5 are provided by shell 7 and end contact 9 of the base respectively. The lead-in wire is bent down around the neck of the bulb and is cut off at 4', slightly beyond the point where it emerges from under the skirt of the shell. The electrical connection may be made through soldering at that point, or, if an aluminum shell is used, the connection may be made by shaping the seal of the bulb such that the wire is squeezed between it and the inside edge of the shell. This type of connection is described in the copending application of Charles E. Beck, No. 244,753, filed September 1, 1951, entitled "Electric Lamp and Base Construction," and assigned to the same assignee as the present invention.

The detailed construction of the eyelet 9 and the manner of fastening the lead-in wire thereto may be seen more readily in Figs. 2 to 4. The eyelet may be shaped out of any suitable sheet metal, for instance brass, steel or aluminum. In a preferred construction aluminum is utilized for reasons which have been explained, and the present invention eliminates the use of solder which is particularly undesirable in connection with aluminum. The contact member is preferably formed by stamping and may be termed a disc having a flat portion 12 and an upwardly turned portion or tubular extension 13 about a generally circular aperture. The tubular extension may be of a diameter 2 to 5 times the size of the lead-in wire 5, and its length or vertical height may be substantially equal to its diameter. It will be understood that these proportions are given merely by way of illustration and that wide variations therefrom may be utilized. The contact member may be held down onto the top surface of the insulating web by means of downwardly projecting portions, such as the inclined tabs 14, which become imbedded in the plastic material of the web. Alternatively the end contact may be secured to the web by turning down the outer rim of the flat portion 12 and imbedding it directly in the plastic material.

As a preliminary step in the crimping operation for achieving the finished article, the lead-in wire 5 is cut off substantially flush with, or projecting just slightly through, the open end of the tubular extension 13 as shown in Fig. 2. Then a pair of diametrically opposite lips in the form of quadrant portions 15 and 16 of the tubular flare are turned down, as illustrated in Fig. 3, through a punching operation. The lips thus formed are integral with the body of the eyelet or contact member 9, projecting outwardly from the rim of the aperture and having bent end portions overlapping one another and clamping the lead-in wire 5 in between. It will be observed that the right hand quadrant 15 was collapsed or turned down first, the lead-in wire 5 then bent over it, and the left hand quadrant 16 then collapsed over the first with the lead-in wire caught between them.

The shearing and turning down of the quadrant portions may be achieved by means of a punch 17 having a generally semi-cylindrical opening 18 in its lower face. The thickness of the punch 17 is preferably approximately ⅔ of the outer diameter of the tubular flare 13. This leaves upstanding quadrant portions 19 and 20 of substantially the same size as the quadrant portions 15 and 16 which have been turned down. In general it does not appear necessary to make special provision for insuring that one of the lips or quadrant portions 15 or 16 turns down before the other so as to catch the lead-in wire between them. This appears to occur more or less automatically, either one or the other of the portions 15 and 16 turning down first whereupon the lead wire bends over the one first to turn down, and the remaining member then turns down over it. However, if desired, one side of the opening or cavity 18 in punch 17, may be cut in less steeply than the other so as to insure that the same quadrant portion is always turned down first. In the drawing, the right hand side 18' of the opening drops down slightly more than the left hand side, thereby insuring that quadrant portion 15 is turned down under portion 16.

The final step in the crimping operation is to turn down the remaining pair of lips formed by quadrant portions 19 and 20. This may be done, as illustrated in Figs. 4, 4*a*, by means of a punch 21 similar to the punch 17 which has been described but turned at right angles to it on the vertical axis of the tubular extension 13. The semi-cylindrical cavity 22 in this punch is somewhat deeper than that in the former punch 17, since quadrant portions 19 and 20 in this case will preferably merely abut together medially on top of the previously turned down quadrant portions 15 and 16. It will be appreciated that the result is a mechanical connection of the lead wire to the eyelet wherein the end of the lead is clamped between the overlapped bent end portions of one pair of diametrically opposite lips, and in which the bent end portions of the other pair of lips overlying those of the first pair, preferably abutting together medially thereover.

The end contact fastening which has been described is simple to manufacture and provides a low resistance electrical connection which is very firm and which does not work itself loose. The eventual loosening of the connection during the life of the lamp has always been the main objection to mechanically fastened connections on lamp bases. It is realized that proposals have been made heretofore for mechanically fastening the lead-in wires into tubular extensions of the end contacts similar to that which has been described herein, and that patents have issued on such constructions. However these proposals have generally advocated a tubular extension or flare having an internal diameter just slightly greater than the size of the lead-in wire, which was then caught in the extension merely by squeezing in its sides. The disad-

vantage with this type of construction is that the lead-in wire is not positively locked in place but is held merely by lateral pressure on its sides. Thus when a lamp having an end contact of such type is inserted in a socket, the socket spring member exerts a direct pressure on the end of the lead-in wire, tending to force it back inwards into the base thereby breaking the contact and ruining the lamp. With the present construction on the other hand, the lead-in wire is first bent at right angles and caught between two of the quadrant portions of the extension, that is, between two metal lips. Any pressure exerted on these quadrant portions or lips tends but to compress further the lead-in wire between them, and, far from breaking the connection, serves but to make it more secure. Furthermore, the two remaining quadrant portions or lips which are turned down over the first two serve to protect the connection against mechanical shock. They also serve to hide the lead-in wire and to provide the whole with a neat and finished appearance.

While the invention has been particularly described with reference to a screw type base, it is equally applicable to a bayonet type base such as is illustrated in Fig. 5. The base **25** illustrated therein comprises a straight-walled metal shell **26** whereof the top end is closed by an insulating web **27** in which are imbedded a pair of metal contacts **28** and **29**. These contacts may be of substantially similar construction to that which has been described previously, only reduced in size, and the connections to the lead-in wires are made in the same way.

In Fig. 6 there is illustrated an alternative construction of an end contact or eyelet for a base. The eyelet **30** comprises a flat portion **31**, and a depressed bowl portion **32** from the bottom of which is extruded upward a tubular extension or flare **33** similar to that which has been described in connection with Figs. 1 to 4. The lead-in wire may be fastened to this eyelet in the same way as has been described previously, namely by turning down opposite quadrants of the tubular extension, the first pair to catch the lead wire between them and the second pair to fold down on top of the first two. The eyelet construction illustrated in Fig. 6 has the advantage that a substantially flat surface without any projections is presented at the end of the lamp.

While certain specific embodiments have been shown and described, it will of course be realized that various modifications therefrom may be made without departing from the invention. Thus the types of bases to which the contact member has been applied and in connection with which it has been described, are provided by way of illustration only. The invention may evidently be used with other types of metallic contact members secured to an insulating portion and through which a lead wire may be threaded for fastening thereto. The appended claims are therefore 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. A construction providing connections for an electric device comprising a lead-in wire and a thin metal contact member, said member having a generally circular aperture and two pairs of lips formed integrally with the said member and projecting outwardly from the rim of the aperture, the lips of one pair having bent outer end portions overlapping one another, said lead-in wire being clamped between said overlapped portions, and the other pair having end portions overlying those of said one pair.

2. A base construction providing connections for an electric device comprising a lead-in wire, a base including an insulating portion and a thin metal contact member secured thereto, said member having a generally circular aperture and two pairs of lips formed integrally with the said member and projecting outwardly from the rim of the aperture, the lips of one pair having bent outer end portions overlapping one another, said lead-in wire being drawn out through said aperture and clamped between said overlapped portions, and the other pair having end portions overlying those of said one pair.

3. A base construction providing lead-in wire connections for an electric device comprising a lead-in wire and a base including an insulating portion and a thin metal contact member secured thereto, said member having a generally circular aperture and two pairs of lips formed integrally with the said member and projecting outwardly from the rim of the aperture, the lips of one pair having bent outer end portions overlapping one another, said lead-in wire being drawn out through said aperture and clamped between said overlapped portions, and the other pair having end portions overlying those of said one pair and abutting together medially thereover.

4. A base construction providing lead-in wire connections for an electric device comprising a lead-in wire and a base including an insulating member and a thin metal disc contact secured thereto, said disc having a generally circular aperture and two pairs of lips formed integrally with the said disc and projecting outwardly from the rim of the aperture, the lips of one pair having bent outer end portions overlapping one another over said aperture, an opening in said insulating member leading to said aperture, said lead-in wire being threaded through said opening and said aperture and clamped between said overlapped portions and the other pair of lips having bent end portions overlying those of said one pair and abutting together medially thereover.

5. An electric device comprising a bulb having lead-in wires projecting therefrom, and a base fastened to said bulb and providing contact surfaces for said wires, said base comprising an insulating portion and a thin metal disc, said disc having a generally circular aperture and two pairs of lips formed integrally with the said disc and projecting outwardly from the rim of the aperture, the lips of one pair having bent outer end portions overlapping one another, one of said lead-in wires being drawn through said aperture and clamped between said overlapped portions, and the other pair having end portions overlying these of said one pair.

6. An electric lamp comprising a bulb having lead-in wires projecting therefrom and a base fastened to the neck of said bulb, said base comprising a metal shell, an insulating web closing the outer end thereof, and an end contact in the form of a metal disc secured to the outer face of said web, said disc having a depressed bowl portion and a central generally circular aperture within said bowl portion, two pairs of lips formed integrally with said disc and projecting outwardly from the rim of the aperture within

said bowl portion, the lips of one pair having bent outer end portions overlapping one another, one of said lead-in wires being threaded through said aperture and clamped between said overlapped portions, and the other pair of lips having bent outer end portions overlying those of said one pair and abutting together medially thereover.

ROBERT A. KUEBLER.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
1,965,231	Gustin	July 3, 1934

FOREIGN PATENTS

Number	Country	Date
610,286	Great Britain	Oct. 13, 1948