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LAMP AND METHOD OF MANUFACTURE

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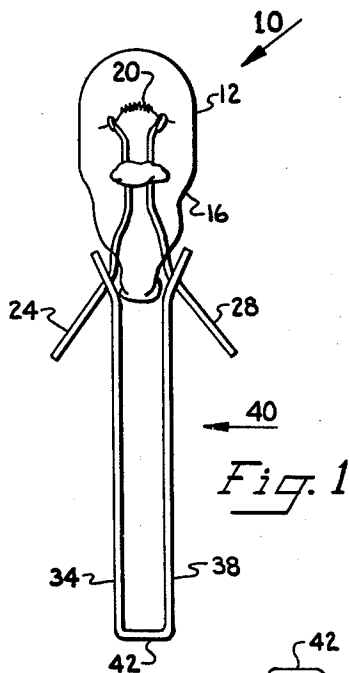


*Fig. 1*

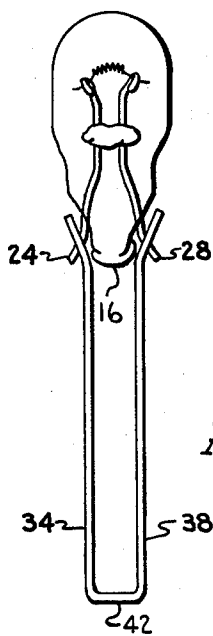


*Fig. 2*

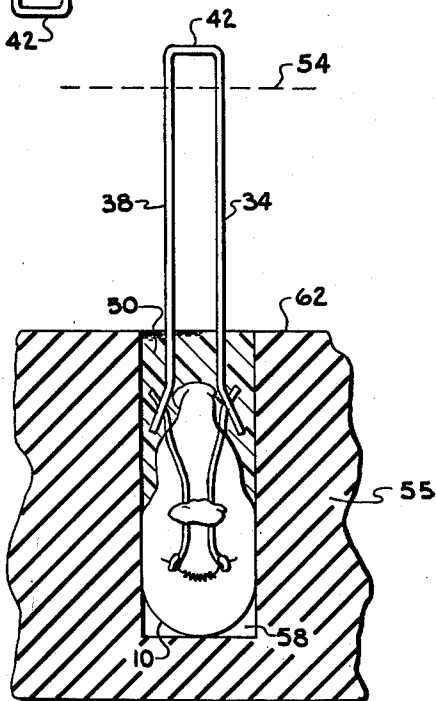


*Fig. 3*

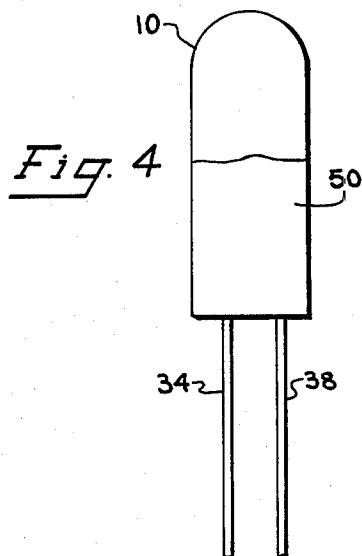


*Fig. 4*

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## LAMP AND METHOD OF MANUFACTURE

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This invention relates to miniature lamps, and particularly to bases for lamps and their manufacture.

At the present time, light-producing lamps generally include two types of bases, one comprising a metal cylinder surrounding the glass envelope and the other comprising merely the glass envelope from which "flying leads" extend. Flying leads comprise fine wires which are flexible and are easily deformed. Because of this, lamps with flying leads cannot be conveniently used with sockets, and are soldered in place in a circuit. Thus, lamps of this type are difficult to replace. On the other hand, while lamps having metal bases are convenient to use, the combination of the metal base and its socket occupies too much space to be suitable for many applications.

In the preferred construction, a miniature light-producing lamp includes strong, rigid contact pins which may be inserted in a conventional tube socket, and its maximum diameter is determined by its envelope and not its base.

Accordingly, the principles and objects of the present invention concern the provision of an improved miniature lamp having a novel base construction, and method of making the same.

Briefly, a lamp embodying the invention includes an envelope from which "flying leads" extend. A pair of strong, rigid pins or rods, which are held spaced apart parallel to each other, are secured to the flying leads adjacent to the base of the lamp envelope from which the flying leads exit. A body of insulating material is formed enclosing a portion of the rigid pins and the flying leads to which they are secured and a portion of the lamp envelope. The rigid pins which extend from the insulating body are then cut to a convenient length, and the desired lamp with its new base is ready for use.

The invention is described in greater detail by reference to the drawing wherein:

FIG. 1 is an elevational view of a device to be processed according to the invention;

FIG. 2 is an elevational view of the device of FIG. 1 at a first stage in the method of the invention;

FIG. 3 is an elevational view of the device of FIG. 1 at a later stage of the invention; and

FIG. 4 is an elevational view of a completed device embodying the invention.

The principles of the present invention are described below with reference to a light-producing incandescent lamp, but it is clear that other types of devices may also utilize the invention.

Referring to the drawing, a lamp 10 includes an envelope 12 having a base 16 which is tapered and has a smaller diameter than the major portion of the envelope. The envelope contains a light-producing filament 20, the ends of which are connected to thin, flexible wires 24 and 28 inside the envelope, and these wires extend through the base 16 of the envelope. Such leads outside the envelope are known as "flying leads." These leads are not sufficiently rigid and strong for insertion into a typical tube or transistor-type socket.

In order to provide the lamp 10 with strong, rigid electrical contact pins, it is provided with a new base. In accordance with the invention, there is first provided a pair of strong, rigid pins 34 and 38 which are held spaced apart parallel to each other by any suitable

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means. In one construction, such pins are provided as the legs of a U-shaped member 40, and the desired uniform spacing of the legs is achieved by the base 42 of the U. For convenience, the ends of the pins or legs 34 and 38, remote from the base of the U, are bent away from each other as shown. Next, the U-shaped member 40 is positioned adjacent to the lamp with the base 16 of the lamp positioned between the flared ends of the legs 34 and 38. The ends of the legs 34 and 38 are soldered or welded, or otherwise secured to the flying leads 24 and 28 adjacent to the base of the lamp. The free ends of the flying leads are then removed to provide the structure shown in FIG. 2.

Next, a strong, rigid insulating body 50 is provided enclosing the lower portion and base 16 of the lamp envelope and a portion, perhaps half, of the length of the legs 34 and 38 of the U-shaped member 40. This step of the invention is achieved most conveniently by providing a plate 55 of rubber or the like (FIG. 3) in which any convenient number of mold cavities 58 are provided for processing a number of lamps at one time. Each cavity is preferably of such diameter that a lamp forms a tight fit therewith, and each is of such a depth that, when a lamp is inserted, upside down, the top surface 62 of the plate extends a convenient distance above the points of connection of the flying leads 20 and 24 and the rigid legs 34 and 38.

Next, with a lamp inserted in a mold cavity, the cavity is filled with a suitable insulating material, such as an epoxy resin. With the parts arrayed and constructed as above, a strong, rigid insulating body 50 is provided enclosing the lower portion and base 16 of the lamp envelope and a portion of the length of the legs 34 and 38 of the U-shaped member 40. After the insulating body has been cured and hardened as required, the lower portion of the U-shaped member is removed, for example along the dash line 54, to leave two strong, rigid pins 34 and 38 of the desired length extending from the insulating body. Thus, the insulating body 50 and the two pins 34 and 38 comprise a new base for the lamp (FIG. 4), with the rigid pins being suited for use with a conventional tube-type socket. It is to be noted that the diameter of the insulating body is no greater than the maximum diameter of the envelope 12. The insulating body 50 may be colored for code or identification purposes, if desired.

It is clear that the principles of the invention may be used to provide a base structure including strong, rigid electrical contact pins for any type of device. It can be seen from the foregoing description that, whereas size limitations prevent the initial manufacture of a device having such rigid pins, the present invention provides the required pins without adversely affecting the size of the device itself. The completed devices themselves may now be used with transistor sockets in which the contact elements lie inside the maximum diameter of the socket and the lamps may be mounted side by side in contact with each other. Thus, the only limitation on lamp spacing resides in the envelope of the lamp itself, and not in its base.

What is claimed is:

1. A method of forming a base on a lamp having an envelope including a base from which flying leads extend comprising the steps of
  - providing a U-shaped rigid metallic member comprising a pair of strong, relatively rigid legs held uniformly spaced apart by the base of the U,
  - securing the legs of said U-shaped member to said flying leads adjacent to the base of said lamp,
  - embedding a portion of said U-shaped member and a portion of said envelope in a single, relatively rigid insulating body,

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removing the base of said U-shaped member to leave the two rigid legs thereof still uniformly spaced apart and extending from said insulating body, said insulating body and the portions of said rigid legs embedded therein comprising the new base of said lamp.

2. A method of forming a base for a lamp which includes an envelope through which deformable electrical leads extend to make external electrical connections, comprising the steps performed in the sequence of providing a pair of rigid pins having a spacer means integral with said pins for holding the pins uniformly spaced apart, securing said pins to said deformable leads adjacent said envelope, embedding a portion of said pins and said deformable leads and a portion of said envelope in a single insulating body with said spacer means lying outside said insulating body, removing said spacer means to leave two separate pins extending from said insulating body, said insulating body and said rigid pins comprising the new base of said lamp.

3. A method of forming a base for a lamp which includes an envelope through which deformable electrical leads extend to make external electrical connections, comprising the steps performed in the sequence of providing a pair of rigid pins having a spacer means integral with said pins at one end thereof to form a U-shaped member in which the upright portions serve as the rigid pins and the base serves as the spacer means for holding the pins uniformly spaced apart, securing said pins to said deformable leads adjacent said envelope, embedding a portion of said pins and said deformable leads and a portion of said envelope in a single insulating body with said spacer means lying outside said insulating body, removing said spacer means to leave two separate pins extending from said insulating body, said insulating body and said rigid pins comprising the new base of said lamp.

4. A method of forming a base for a lamp which includes an envelope through which deformable electrical leads extend to make external electrical connections, comprising the steps performed in the sequence of providing a pair of rigid pins having a spacer means integral with said pins for holding the pins uniformly spaced apart, connecting said pins to said deformable leads adjacent said envelope, removing the portions of the deformable leads extending beyond said connection, embedding a portion of said pins and said deformable leads and a portion of said envelope in a single insulating body with said spacer means lying outside said insulating body, removing said spacer means to leave two separate pins extending from said insulating body, said insulating body and said rigid pins comprising the new base of said lamp.

5. A method of forming a base for an electron tube which includes an envelope through which deformable flying leads extend to make external electrical connections thereto comprising the steps performed in the sequence of

providing a pair of rigid pins having spacer means integral with said pins for holding the pins uniformly spaced apart, securing said pins to said flying leads adjacent to the base of said lamp, molding a single insulating body about a portion of said pins and said flying leads and a portion of said envelope with said spacer means lying outside said insulating body,

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removing said spacer means to leave two separate pins extending from said insulating body, said insulating body and said rigid pins comprising the new base of said lamp.

6. A method of forming a base on a lamp having an envelope and deformable electrical leads extending through said envelope for connection to an external circuit comprising the steps in the following sequence of connecting a rigid conductive member to each of said leads at a point adjacent said envelope, maintaining the rigid conductive members spaced apart by a spacing member, inserting said envelope followed by a portion of the attached rigid conductive members into a mold cavity a sufficient distance so that the connection between the deformable leads and the rigid conductive members is positioned within said cavity, filling the cavity with an insulating material in a plastic state, permitting the plastic insulating material to set to form a base surrounding in intimate contact the deformable leads and the connection between said leads and the rigid conductive members, and removing the spacing member.

7. A method of forming a base on a lamp having an envelope and deformable electrical leads extending through said envelope for connection to an external circuit comprising the steps of connecting a rigid conductive member to each of said leads at a point adjacent said envelope, maintaining the rigid conductive members spaced apart, inserting said envelope followed by a portion of the attached rigid conductive members into a mold cavity having an inside diameter approximately equal to the maximum outside diameter of said envelope, filling the cavity with an insulating material in a plastic state, and permitting the plastic insulating material to set to form a base about the connection between the deformable leads and the rigid conductive members.

8. A method of forming a base on a lamp having an envelope and deformable electrical leads extending through said envelope for connection to an external circuit comprising the steps of

welding a rigid conductive member to each of said leads at a point adjacent said envelope, maintaining the rigid conductive members spaced apart, inserting said envelope followed by a portion of the attached rigid conductive members into a mold cavity having an inside diameter approximately equal to the maximum outside diameter of said envelope, filling the cavity with an insulating material in a plastic state, and permitting the plastic insulating material to set surrounding the connection between the deformable leads and the rigid conductive members in intimate contact and surrounding the lower portion of the envelope.

9. A method of forming a base on a lamp having an envelope and deformable electrical leads extending through said envelope for connection to an external circuit comprising the steps of

connecting a rigid conductive member to each of said leads at a point adjacent said envelope, maintaining the rigid conductive members spaced apart by means of a spacing element integral with the rigid conductive members, inserting said envelope followed by a portion of the attached rigid conductive members into a mold cavity having an inside diameter approximately equal to the maximum outside diameter of said envelope, filling the cavity with an insulating material in a plastic state, permitting the plastic insulating material to set to form a base about the connection between the deformable

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leads and the rigid conductive members, and removing said spacing element to leave the rigid conductive members extending from said insulating material.

10. A method of forming a base on a lamp as in claim 9 in which the rigid conductive members are spaced apart by means of a spacing bar integral with and joining said conductive members at a point remote from the connection of the rigid conducting members to the deformable leads.

11. A method of forming a base on a lamp having an envelope and deformable electrical leads extending through said envelope for connection to an external circuit comprising the steps of

connecting a rigid conductive member to each of said leads at a point adjacent said envelope, maintaining the rigid conductive members spaced apart, inserting said envelope followed by a portion of the attached rigid conductive members into a mold made of resilient material and including at least one cavity having an inside diameter approximately equal to the maximum outside diameter of said envelope, said resilient material permitting the insertion of envelopes of slightly different outside diameters and yet making firm engaging contact with such envelopes,

filling the remaining portion of the cavity rearwardly of the inserted envelope with an insulating material in a plastic state,

permitting the plastic insulating material to set to form a base about the connection between the deformable leads and the rigid conductive members and about the lower portion of the envelope.

12. A method of forming a base on a lamp having an

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envelope and deformable electrical leads extending through said envelope for connection to an external circuit comprising the steps of

connecting a rigid conductive member to each of said leads at a point adjacent said envelope,

maintaining the rigid conductive members spaced apart by means of a spacing element integral with the rigid conductive members,

inserting said envelope followed by a portion of the attached rigid conductive members into a mold formed of resilient material and containing at least one cavity having an inside diameter approximately equal to the maximum outside diameter of said envelope, completely filling the remaining portion of the cavity with an insulating material in a plastic state from the point of maximum diameter of the envelope rearwardly to the end of the cavity so that an unbroken line is formed by the outer surface of the envelope and the plastic insulating material,

permitting the plastic insulating material to set to form a base about the connection between the deformable leads and the rigid conductive members and about the lower portion of said envelope, and removing said spacing element to leave the rigid conductive members extending from said insulating material.

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