

[54] METHOD OF MANUFACTURING AND ASSEMBLING AN ELECTRIC LAMP BASE

[75] Inventors: **Richard F. Hasell**, West Caldwell;
Walter A. Boyce, Glenridge, both of N.J.; **Chrisman O. Smith**, Paris, Tex.[73] Assignee: **Westinghouse Electric Corporation**, Pittsburgh, Pa.[22] Filed: **July 25, 1973**[21] Appl. No.: **382,420****Related U.S. Application Data**

[60] Division of Ser. No. 209,300, Dec. 17, 1971, Pat. No. 3,775,634, which is a continuation-in-part of Ser. No. 126,639, March 22, 1971, abandoned.

[52] U.S. Cl. **29/25.15, 29/25.13**[51] Int. Cl. **H01j 9/18**

[58] Field of Search 29/25.13, 25.15; 313/318; 339/144, 145 R, 146

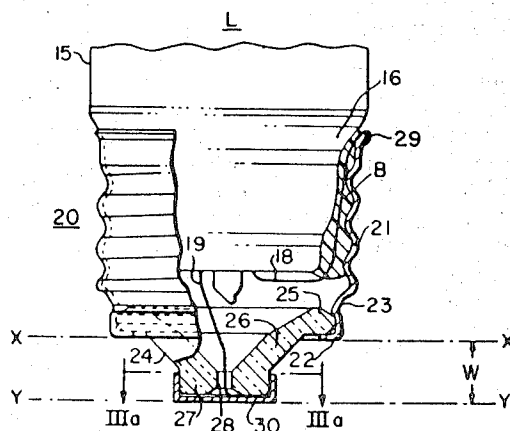
[56] **References Cited****UNITED STATES PATENTS**

2,403,137	7/1946	Strickland.....	339/146
3,260,888	7/1966	Webb, Jr.	313/318 X
3,315,216	4/1967	Krupp et al.	339/145 R
3,629,640	12/1971	Audesse.....	313/318

Primary Examiner—Roy Lake*Assistant Examiner*—James W. Davie*Attorney, Agent, or Firm*—D. S. Buleza[57] **ABSTRACT**

The insulator portion of the base assembly is formed

as a separate piece and mechanically locked to the metal shell by providing an inturned flange on one end of the shell and subsequently rolling a circumferential groove in the side wall of the shell which clamps the rim of the inserted insulator against the flange. The flange defines a transverse reference plane which insures that the axial length of the finished base assembly, and thus the "light-center-length" dimension of the lamp which is fitted with the base, are maintained within prescribed limits. The shell is stamped from sheet metal and the blank which is removed from the bottom wall to form the flanged end of the shell is fashioned into a contact member — preferably a hollow cap that is subsequently force-fitted onto the protruding end of the insulator in clamped engagement with one of the lamp leads during the basing operation and thus serves as the end contact for the finished lamp. The various stamping, rolling and force-fitting operations required to manufacture the base components and then assemble them with the sealed-in lamp are carried out by automated machines and permit the bases to be continuously mass-produced and assembled without any manual labor. A "tamper-proof" base is provided by forming an annular groove in the insulator and positioning the cap so that its inner edge is recessed in the groove. The use of a separately formed insulator which is mechanically locked within the base shell permits thinner shell material and various plated metals, such as brass-plated steel, to be used — thus further reducing the overall cost of the base and lamp.

10 Claims, 19 Drawing Figures

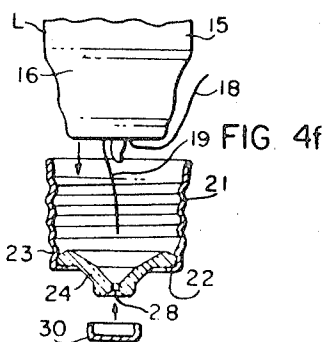
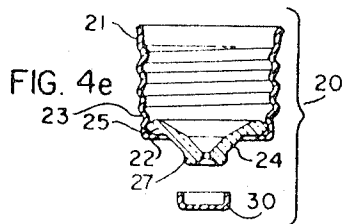
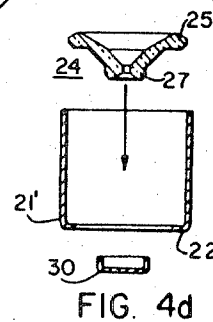
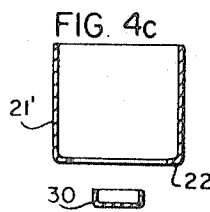
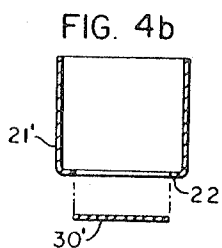
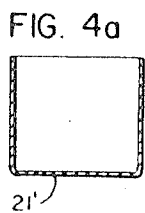
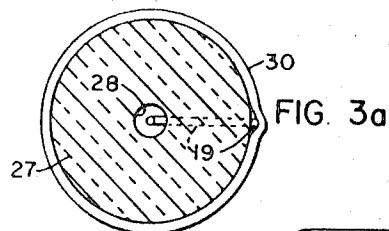
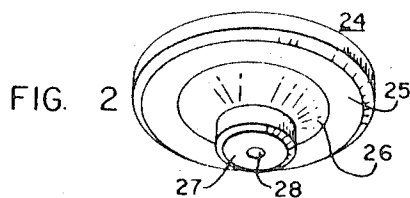
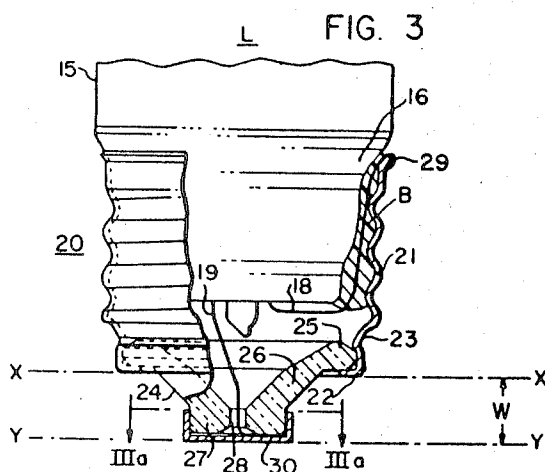
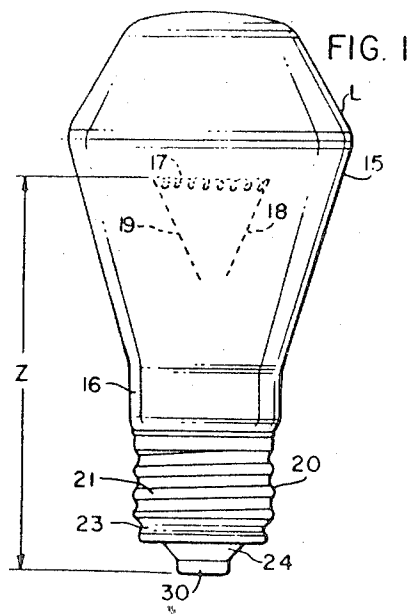


FIG. 5

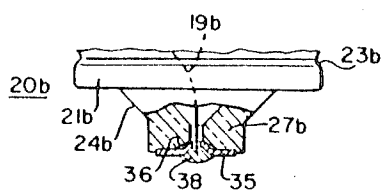
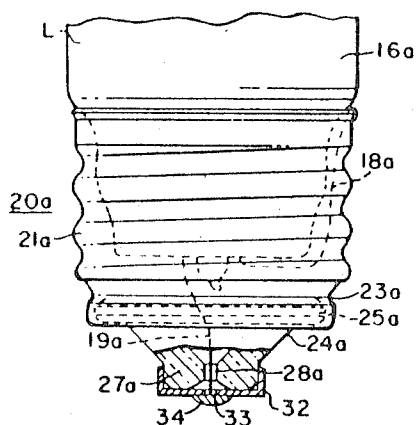


FIG. 6

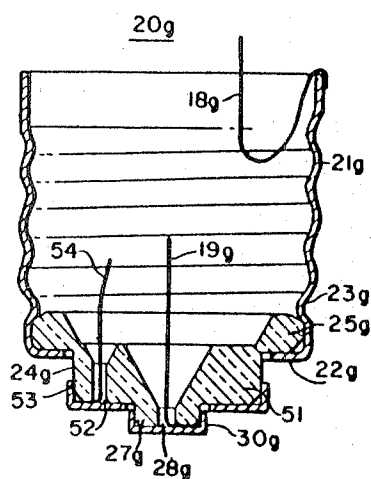


FIG. 12

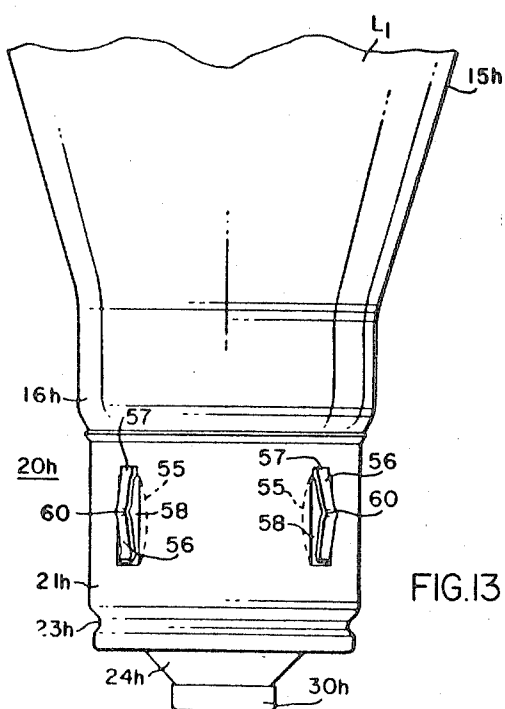


FIG. 13

METHOD OF MANUFACTURING AND ASSEMBLING AN ELECTRIC LAMP BASE

CROSS REFERENCE TO RELATED APPLICATION

This application is a division of application Ser. No. 209,300 filed Dec. 17, 1971 (now U.S. Pat. No. 3,775,634), which application in turn is a continuation-in-part of application Ser. No. 126,639 filed Mar. 22, 1971 (now abandoned).

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to the art of basing electric lamps and similar devices and has particular reference to an improved method of making and assembling bases for incandescent type lamps which reduces the manufacturing cost of the base and also improves the quality and the aesthetic appearance of the finished lamp.

2. Description of the Prior Art

Present practice in the electric lamp industry is to manufacture the base members as completely-assembled components by placing a metal shell and one or more eyelets in a suitably-contoured die, feeding a gob of molten glass into the die, and molding the glass into an insulator which joins the base and eyelet(s) together and forms the desired unitary structure. While this technique produces bases of acceptable quality, it leaves much to be desired insofar as the heat introduced into the metal parts by the molten gob of glass inherently anneals and discolors the metal. In the case of aluminum bases, the initial bright luster and sheen of the shell is lost and the finished bases have a dull tarnished appearance — even after they are chemically treated in an attempt to clean and brighten the shell and eyelet. Moreover, the annealing weakens the thin sheet metal to such a degree that some of the shells are frequently deformed while being shipped en masse to the lamp-making machines, resulting in a serious quality control problem. This problem, in turn, necessitated the use of sheet aluminum having an initial wall thickness of at least 0.0113 inch (0.287 mm.).

It has also been found that the glass insulators sometimes crack before or during the lamp-basing operation. Such cracks, in addition to being objectionable from an appearance and functional standpoint, can cause a piece of the insulator to subsequently break off and produce a disconcerting rattling noise within the base after the latter has been attached to the lamp envelope.

Among the various alternative base-making proposals made down through the years are designs in which the insulator component of the base was formed separately and mechanically locked to the metal shell. In U.S. Pat. No. 760,065 issued May 17, 1904 to H. Gilmore, for example, there is disclosed a base structure wherein the end of the metal shell is bent inwardly to form a re-entrant annular pocket which nestingly receives a preformed insulator-eyelet component and permits it to be anchored in place by spinning the up-standing lip of the shell down onto the insulator. Various other arrangements for locking preformed insulators within re-entrant annular pockets formed on the ends of base shells are disclosed in U.S. Pat. Nos. 2,210,525; 2,197,562; 2,379,063 and 2,403,137.

It has also been proposed in the prior art to make the shell pocket and insulator of such configuration that the latter can be snap-locked within the base shell and the end contact member, in turn, to be snap-locked with the insulator or mechanically anchored therein. Base structures having such snap-interlocking parts are disclosed in U.S. Pat. Nos. 2,336,529 and 2,913,697.

SUMMARY OF THE INVENTION

Briefly, the present invention provides an improved method of manufacturing bases which permits the shell, insulator, and end contact components to be separately formed on a continuous mass-production basis with a minimum amount of time, equipment, and material and then be assembled with the sealed-in lamp. The insulator is preferably molded from a fast-firing ceramic which contains up to 45 percent by weight of scrap glass in powdered form and thus constitutes a durable low-cost material. The insulator is subsequently securely locked in precisely-controlled spatial relationship with the metal shell by inserting the insulator into the shell, seating the rim of the insulator against a flat inturred flange provided on the opposite end of the shell, and then rolling an indent or groove in the side wall of the shell that securely clamps the insulator in place within the flanged end of the shell. The inturred flange defines a reference plane which, in conjunction with the configuration and careful dimensioning of the insulator, insures that the "light-center-length" dimension of the lamp which is fitted with the base will be maintained within the prescribed limits.

The end contact member is fabricated from the disc of sheet metal that is punched from the bottom of the base shell by forming the disc into a hollow cap that is force-fitted onto a cylindrical boss provided on the protruding end of the molded insulator and has its peripheral edge recessed in an annular groove formed in the insulator. The base is thus not only tamper-proof but is fabricated in such a way that there is practically no waste material and, in fact, utilizes and "recycles" scrap glass. Since literally millions of such bases are made and used each year in the incandescent lamp industry, the cost savings and the amount of scrap glass that is recycled are quite substantial.

The manufacturing cost of the improved base is further reduced by the fact that each of the operations required to form the various parts and assemble them with the sealed-in lamp can be readily performed by high-speed machines without the assistance of any operators. Since there is no annealing and weakening (or tarnishing) of the base shells by molten glass as in the case of in situ molded insulators, the shells can also be made from thinner sheet metal and both the shells and end contacts retain their original lustrous finish.

BRIEF DESCRIPTION OF THE DRAWING

A better understanding of the invention will be obtained from the exemplary embodiments shown in the accompanying drawing, wherein:

FIG. 1 is an elevational view of an electric incandescent lamp having a base made and assembled in accordance with the present invention;

FIG. 2 is an enlarged perspective view of the preformed insulator employed in the base assembly shown in FIG. 1;

FIG. 3 is an enlarged elevational view of the basal end portion of the lamp shown in FIG. 1, a part of the

base being removed to illustrate the spatial relationship of the various parts;

FIG. 3a is an enlarged cross-sectional view of the capped end portion of the base insulator, taken along line IIIa—IIIa of FIG. 3;

FIGS. 4a to 4f are sectional views illustrating the various steps in fabricating the base components and assembling them with the lamp envelope and lead wires;

FIG. 5 is an elevational view, partly in cross-section, of the basal end of a lamp having an alternative form of threaded base wherein the metal end cap is apertured and soldered to one of the lead wires;

FIG. 6 is a fragmentary view, partly in section, of another base embodiment wherein a soldered "washer-like" member constitutes the end contact;

FIG. 7 is an enlarged elevational view of the basal end of a "tamper-proof" lamp embodiment, portions of the base being broken away and shown in section;

FIG. 8 is a perspective view of the grooved insulator employed in the base shown in FIG. 7;

FIG. 9 is an elevational view, partly in section, of another "tamper-proof" lamp wherein a soldered end-cap is used;

FIG. 10 is a perspective view of the end cap employed in the base structure shown in FIG. 9;

FIGS. 11 and 11a are perspective and cross-sectional views, respectively, of an alternative end cap embodiment;

FIG. 12 is a sectional view of a three-light lamp base structure according to another form of the invention; and

FIG. 13 is a fragmentary elevational view of an electric lamp having an alternative base structure that includes depressible elements which permit the lamp to be inserted in "plug-like" fashion into a threaded socket.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

(FIGS. 1-3 and 7-11)

In FIG. 1 there is shown a representative electric incandescent lamp L for general lighting applications that comprises the usual vitreous envelope 15 which has a sealed neck portion 16 and contains a coiled filament 17, lead-in wires 18 and 19, and a suitable inert gas, such as a mixture of nitrogen and krypton. The improved base assembly 20 (a medium-screw No. 102 type base in the case of the general lighting lamp illustrated) is attached to the envelope neck 16 and consists of a threaded metal shell 21 and an insulator 25 that is provided with a contact member 30 which serves as the end terminal for the lamp L. As will be noted, the flat face of end contact 30 is spaced a predetermined axial distance Z from the filament 17 and thus defines the "light-center-length" dimension of the lamp L. Since this dimension determines the type of fixture in which the lamp L can be used, it is quite important and must be maintained within a certain tolerance.

The insulator 24 in accordance with this invention is separately formed from a suitable non-conductive material, preferably a fast-firing ceramic composition of the type referred to above. Such a material and a method of molding it into an insulator that has a predetermined shape and dimensions is disclosed in application Ser. No. 126,485, of Walter A. Boyce, which application was filed Mar. 22, 1971, and is assigned to the

same assignee as the present application. As shown in FIG. 2, in this particular embodiment the molded insulator 24 is of button-like configuration and has a flat circular rim portion 25, a frustoconical shaped medial portion 26, and a depending centrally-disposed boss 27 that has a central aperture 28 which extends through the insulator.

As illustrated in FIG. 3, the base shell 21 has a series of threads formed therein and it is made from a suitable sheet metal, such as aluminum for example. One end of the shell 21 is attached to the sealed neck 16 of the lamp envelope 15 by suitable means, such as a quantity of cured basing cement B, and its opposite end is partly closed by a substantially flat laterally-extending flange 22. As will be noted, the flange 22 extends around the shell periphery and defines a reference plane X—X that is normal to the longitudinal axis of the lamp L. The flat outer face of the insulator rim 25 is seated against the flange 22 and is firmly clamped in this position by an indented portion 23 of the shell 21 which defines a circumferential groove and is in pressured engagement with the inner peripheral lip of the insulator rim 25. The insulator 24 is thus securely locked to the shell 21 and its tapered medial portion 26 and cylindrical boss portion 27 extend axially beyond the flanged end of the shell.

As will be noted in FIG. 3, one of the lead wires 18 extends through the basing cement B between the bulb neck 16 and base shell 21 and is joined, as by welding or soldering, to the rim of the shell in the usual manner to form an electrical juncture 29. The other lead wire 19 extends through the aperture 28 in the insulator boss 27 and around the end face and side of the boss and is thus clamped in place by the end cap 30. The length of the lead wire 19 is such that it is entirely enclosed by the cap 30. The cap 30 is of cylindrical configuration and has an inside diameter that is slightly less than the combined diametrical dimensions of the lead wire 19 and the cylindrical boss 27 so as to effect a force fit with the latter and remain in positive contact with the lead wire. The peripheral edge of the boss 27 is also tapered to facilitate the force fitting of the cap 30 onto the boss.

The relative dimensions of the insulator boss 27 and end cap 30 are such that the end of the lead wire 19 is tightly wedged therebetween and causes the overlying side wall portion of the cap to bulge outwardly, as shown in FIG. 3a.

Alternatively, a loose-fitting contactor cap can be used and cemented in place on the insulator boss in electrical engagement with the lead wire.

Since the insulator 24 extends a predetermined distance beyond the shell flange 22 (as shown in FIG. 3), the outer surface of the end cap 30 is disposed in a plane Y—Y that is spaced a controlled distance W from the reference plane X—X defined by the flange 22 of the base shell 21. The flat contact surface of the end cap 30 is thus located a controlled axial distance Z from the lamp filament 17 (see FIG. 1) and insures that the "light-center-length" dimension of the lamp L is maintained within the prescribed limits.

A preferred "tamper-proof" base structure and its premolded insulator are depicted in FIGS. 7 and 8, respectively. As will be noted, the lamp L is identical to that previously described in that it has the usual glass envelope 115 with a neck portion 116 that is attached to the threaded shell 121 of the base assembly 120 by

basing cement B. One of the lamp leads 118 is joined at 114 to the shell rim, the other lead 119 is clamped in place on the cylindrical boss 127 of the preformed insulator 124 by a force-fitted end cap 130, and the insulator rim 125 is locked in seated engagement with the inturned flange 122 of the base shell 121 along reference plane X—X by a circumferential indent 123 in the shell as before.

However, according to this embodiment the medial portion 126 of the insulator 124 has an outer surface (see FIG. 7) that is sharply curved in an axial direction (rather than gradually tapered) and the aforesaid medial portion is terminated by a retroverted shoulder S which defines an annular channel such as a groove or recess R that extends around the bottom of the insulator boss 127 (see FIG. 8). The inner rim or edge of the end cap 130 is located within this recess (as will be noted in FIG. 7) and is thus protectively "counter-sunk," so to speak, within the confines of the insulator 124. It is thus impossible, as a practical matter, to pry the cap off of the insulator by inserting a pointed instrument (or a finger-nail) under the edge of the cap and applying pressure. As an additional safeguard, a series of radially-spaced indents 131 are made in the side wall of the end cap 130 (after the latter has been forced down onto the insulator boss 127 and lead 119) to tightly crimp the cap in place on the insulator.

The portion of the insulator boss 127 around the aperture 128 is also beveled to provide an outwardly-flared recess 129 thereat (see FIG. 8).

An alternative "tamper-proof" lamp L is illustrated in FIG. 9. As shown, the end cap 130a according to this embodiment is provided with a hole 133 that is aligned with the aperture 128a in the insulator boss 127a and receives the end of the lead wire 119a. The latter is joined to the end cap 130a by a globule 134 of solder that is located within a pocket formed by an inwardly-tapered portion 132 (best seen in FIG. 10) of the cap which surrounds the hole 133. As will be noted in FIG. 9, the tapered portion 132 of the end cap 130a nests within the flared cavity 129a in the insulator boss 127a and the boss aperture 128a is made smaller than the cap hole 133. This arrangement prevents molten solder from falling through the aperture 128a into the base 120a during the basing operation. It also prevents the lead wire 119a from snagging on the tapered edge portion 132 of the cap 130a and buckling while it is being threaded through the passageway formed by the boss aperture 128a and cap hole 133.

An alternative form of metal end cap 130b is shown in FIGS. 11 and 11a. In this embodiment, a suitable protuberance such as an annular bead or ridge 135 of arcuate cross-section is formed on the flat end face of the cap 130b during the stamping operation. This ridge is of such dimensions that it provides a contactor surface on the end cap which is of uniform and precisely-fixed height pursuant to the teachings of U.S. Pat. No. 2,999,220 issued Sept. 5, 1961 to L. C. Werner. The pocket formed by the tapered segment 132b around the cap hole 133b is large enough to receive the droplet of solder (not shown) and prevent it from extending beyond the ridge 135.

Base Manufacture and Assembly (FIGS. 4a to 4f)

The unique manner in which the improved base is manufactured and assembled with the sealed-in lamp provides important cost savings. The various steps involved in these operations will now be described.

As shown in FIG. 4a, the first step consists of stamping or otherwise forming a hollow cylindrical metal shell 21' from suitable sheet metal of the proper thickness, which shell has a flat bottom wall.

The next operation is illustrated in FIG. 4b and consists of punching or otherwise removing a blank such as a disc 30' from the bottom wall of the metal shell 21', thus leaving a narrow laterally-protruding flange 22 that extends around the periphery of the shell. The disc 30' is then formed (as by stamping or other suitable means) into a cylindrical metal cap 30 of the proper dimensions, as shown in FIG. 4c.

The performed button-like insulator 24 is then inserted (with its boss portion 27 facing downwardly as shown in FIG. 4d) into the non-constricted end of the shell 21' so that the flat rim 25 of the insulator 24 is seated against the shell flange 22, and the shell 21' is subjected to suitable tools that form the threads and peripheral indent 23 — thus locking the insulator 24 and resulting threaded shell 21 together and completing the manufacture of the base components, as shown in FIG. 4e.

The assembly of the base components with the sealed end of the lamp envelope 15 is shown in FIG. 4f and consists of slipping the subassembly formed by the conjoined base shell 21 and insulator 24 over the envelope neck 16 and concurrently threading the lead wire 19 through the insulator aperture 28 and positioning the other lead wire 18 between the bulb neck 16 and threaded portion of the shell 21. Of course, the shell 21 contains a filling of basing cement (not shown) which is subsequently heated and cured to securely anchor the shell 21 to the lamp envelope 15 in the well known manner.

The protruding ends of the lead wires 18 and 19 are then trimmed to the proper length, lead 19 is bent around the lip of the insulator boss 27, and the cylindrical cap 30 is force-fitted over the boss in tightly-clamped and positive electrical engagement with the entrapped end of the lead 19.

The end cap 30 is thus formed from the offal produced when making the shell portion 21 of the base 20 and the cap, accordingly, has a planar configuration and dimensions that correspond exactly with the configuration and dimensions of the opening into the base shell 21 defined by the inturned flange 22.

Experience has shown that the threads and locking indent 23 in the shell 21 can be formed by modifying standard thread-forming equipment known in the art, such as a Barth Threading Machine, and that the shells can be processed at a rate of about 800 units per minute — thus enabling the base-insulator subassemblies to be manufactured automatically at a high rate of speed.

Alternative Terminal Embodiments (FIGS. 5-6)

In the embodiment shown in FIG. 5, the base assembly 20a incorporates the same threaded metal shell 21a and mechanically locked preformed insulator 24a as those previously described but is provided with a metal end cap 32 that has a central aperture 33. The cap 32 is force-fitted over and locked in place on the insulator boss 27a as before, but the end of the lead wire 19a is threaded through the boss aperture 28a and the aligned opening 33 in the cap 32, trimmed to the proper length, and is then joined to the cap by a globule of solder 34. In this particular embodiment, since the "light-center-length" dimension of the lamp L will be measured from

the outer surface of the globule 34, the axial dimensions of the insulator 24a or base shell 21a will be correspondingly shortened. Cap 32 can also be loose fitting and cemented in place on the boss 27a if desired.

In the embodiment shown in FIG. 6, the end terminal for the lamp consists of a sheet metal washer 35 that is provided with an inwardly-concave central portion 36 that is nestingly seated in the suitably recessed end face of the insulator boss 27b and fastened to the latter by a suitable cement (not shown). The lead wire 19b is threaded through the apertured boss 27b and the hole in the washer 35, and (after being trimmed flush with the outer surface of the washer) is anchored in place by a globule 38 of solder that fills the small pocket formed by the indented central part 36 of the washer.

Alternative Threaded Base Embodiment (FIG. 12)

The invention can also be used in base types which require more than end contact. A base assembly 20g for a three-light lamp having this feature is shown in FIG. 12 and consists of a threaded metal shell 21g that is locked with its inturned flange 22g in seated engagement with the flat underside of the insulator rim portion 25g by a circumferential indent 23g that is disposed in clamping engagement with the upper edge of the preformed insulator 24g. As will be noted, the insulator 24g is of modified configuration and has a first boss 51 of cylindrical configuration with a tapered rim and an offset aperture 52 that extends from the flat outer face of the boss into the interior of the shell 21g, and a smaller cylindrical boss 27g that has a similarly-shaped rim and a centrally-disposed aperture 28g which also extends into the base interior. The side contact or terminal for the lamp is effected in the usual manner by bringing the end of one of the lead wires 18g out over the upper rim of the shell 21g and soldering or otherwise fastening it to the outer surface of the shell. The end terminal is fashioned in the same manner as previously described by threading the second lead wire 19g through the boss aperture 28g and clamping it in place against the lip and side of the small boss 27g by a force-fitted cylindrical metal cap 30g whose flat end face is spaced a predetermined distance from the reference plane defined by the inturned flange 22g.

The intermediate contact or terminal for the lamp comprises a second and larger metal cylindrical cap 53 that is force-fitted over and mechanically locked in place on the end of the large boss 51 in clamped and positive engagement with the end of the third lead wire 54 that is threaded through the boss aperture 52 and is bent around the lip and side of the boss 51.

The end faces of the respective bosses 27g and 51 are substantially flat and spaced predetermined distances from each other and the reference plane defined by the shell flange 22g so that the contact surfaces defined by the respective metal caps 30g and 53 are parallel to one another and axially spaced apart the required distance to insure proper engagement with the terminals of the three-light socket into which the lamp is screwed.

Alternative Push-In Type Base Assembly (FIG. 13)

In FIG. 13 there is shown an alternative type of electric lamp L₁ having a vitreous envelope 15h with a constricted neck portion 16h that is cemented or otherwise fastened to a "push-in" type base assembly 20h. As shown, the base assembly consists of a non-threaded cylindrical metal shell 21h having a peripheral indent 23h which mechanically locks it to a preformed insula-

tor 24h that has a force-fitted metal end cap 30h which serves as one of the lamp terminals, as described above in connection with the FIGS. 1-3 embodiment.

In contrast to screw-type or bayonet-type bases, the base assembly 20h shown in this embodiment is adapted to be inserted in "plug-like" fashion into a threaded socket. This is accomplished by forming a plurality (preferably three) elongated recesses 55 in the medial portion of the base shell 21h, which recesses extend longitudinally along the shell and are spaced equal distances from one another circumferentially. A corresponding number of outwardly-bowed leaf springs 56 are attached to the base shell 21h by spot welding or otherwise securing one end 57 of the springs in overlapped relationship with the shell, as shown in FIG. 17. The springs 56 are thus aligned with the respective openings 58 into the recesses 55 and are free to flex inwardly and outwardly with respect to the shell 21h. Each of the leaf springs 56 can be provided with a nodule or projection 60 to insure a positive interlock with the socket threads when the lamp L₁ is pushed into the socket and the springs 56 are depressed. Such "push-in" type bases are well known in the art and the particular leaf-spring design illustrated is disclosed in U.S. Pat. No. 1,761,344 issued June 3, 1930 to J. Huber.

While aluminum has been specifically mentioned as being the material from which the shell and end caps are formed, the invention is not limited to this material but permits the use of plated sheet metal which heretofore could not be used in conventionally-manufactured bases having molded glass insulators due to the corrosion which subsequently formed at the cut unplated end edges of the metal. The present invention overcomes this difficulty since the metal pieces can be completely protected by plating them en masse after they have been formed. Thus, brass-plated or zinc-plated steel in sheet form can be used.

Experience has also shown that a considerable cost saving is also achieved by the invention in that the base shells can be made from thinner sheet metal since heating and annealing of the shells by molten glass is eliminated. In the case of aluminum, shells of satisfactory compressive strength and rigidity have been made from stock 0.0100 inch (0.254 mm.) thick compared to the 0.0113 inch (0.287 mm.) thick stock heretofore required. A further reduction to aluminum sheet stock 0.006 inch (0.1524 mm.) thick appears feasible. While these differences seem trivial and miniscule, they represent savings of many thousands of dollars due to the larger numbers of bases made and the tons of sheet metal used each year in the lamp industry for such bases.

Since neither the base shells nor end caps are heated during the fabricating or assembly operations, the sheet metal retains its original clean lustrous finish and the completed base structures thus have a very attractive appearance.

We claim as our invention:

1. The method of manufacturing a base assembly for an electric lamp or similar device, which method comprises;

stamping a cup-like member from sheet metal to form a metal shell,

removing a segment from the bottom wall of said shell of such size and configuration that an inturned flange is formed thereat which partly constricts that end of the shell,

separately forming an insulator which has a substantially flat rim portion and a medial portion that is terminated by a depending boss,

inserting said insulator, boss portion down, into the metal shell through the non-constricted end thereof until the rim portion of the insulator engages the inturned flange at the opposite end of the shell,

holding said shell and insulator in the aforesaid position and concurrently bending selected portions of the side wall of the shell inwardly into overlying relationship with the peripheral edge of the insulator to thereby lock the end of the metal shell to the enclosed rim portion of said insulator and provide a shell-insulator subassembly,

forming the removed segment of sheet metal into a hollow cap that is slightly smaller in size than the insulator boss, and

after said shell-insulator subassembly has been attached to the end of the lamp envelope, force-fitting the cap onto the insulator boss and locking it thereon.

2. The method of claim 1 wherein said insulator is mechanically locked to said shell by rolling a circumferential indent in the side wall of the shell.

3. The method of manufacturing a base assembly and fastening it in operative relationship on an electric lamp or similar device that has a vitreous envelope and depending lead wires, which method comprises;

stamping a generally-cylindrical cup-like member from sheet metal,

cutting a blank of disc-like configuration from the bottom wall of said cup-like member and thereby forming a hollow metal shell that has an inturned flange at one end which partly constricts the shell opening thereat,

separately forming an insulator that has a substantially flat rim and a protruding medial portion that is terminated by a depending boss,

placing said insulator, boss portion down, into the metal shell through the non-constricted end thereof until the rim of the insulator is seated against the inturned flange at the opposite end of the shell,

holding said shell and insulator in the aforesaid position and concurrently bending selected portions of the side wall of the shell inwardly into overlying relationship with the peripheral edge of the insulator to thereby lock the flanged end of the shell to the enclosed rim of the insulator and provide a shell-insulator subassembly,

forming the disc-like blank of sheet metal into a hollow cap having an inner dimension that is slightly smaller than the dimension of the insulator boss, fastening the open end of said shell-insulator subassembly to the vitreous envelope, and then force-fitting the cap onto the insulator boss and locking it thereon.

4. The method of claim 3 wherein;

said insulator is mechanically locked to said shell by

rolling a circumferential indent in the side wall of the shell that effects a pressured interlock with the rim of the insulator and thus clamps the members together, and

the shell-insulator subassembly is fastened to the vitreous envelope by basing cement.

5. The method of claim 4 wherein;

said insulator is formed with an aperture that extends through the insulator boss,

one of the lamp lead wires is threaded through said insulator aperture as the shell-insulator subassembly is placed on and cemented to said envelope, and

the end of said one lead wire is bent over and around said boss and mechanically clamped in such position by the force-fitted metal cap which thus serves as an end contact for the lamp.

6. The method of claim 5 wherein;

another of the lamp lead wires is positioned and entrapped between the shell and vitreous envelope as the shell-insulator or subassembly is placed on and cemented to said envelope, and

the end of said entrapped lead wire is electrically connected to said shell.

7. The method of claim 4 wherein;

said insulator, when formed, is provided with an annular groove that extends around the bottom of the boss along the region where said boss merges with the protruding medial portion of the insulator, and

the cap is made of such length that the inner edge thereof is recessed within said groove when the cap is force-fitted onto the boss.

8. The method of claim 4 wherein;

said insulator is formed with an aperture that extends through the insulator boss,

one of the lamp lead wires is threaded through said insulator aperture as the shell-insulator subassembly is placed on and cemented to said envelope,

said cap is provided with a hole in its end wall that is aligned with the insulator aperture when the cap is force-fitted onto the boss,

one of the lamp lead wires is threaded through said insulator aperture and cap hole as the shell-insulator subassembly is placed on and cemented to said envelope, and

the end of said one lead wire is joined to the cap by soldering.

9. The method of claim 8 wherein;

the portion of said cap around said hole is tapered inwardly to form a pocket, and

the soldering of said one lead wire to the cap is performed in a manner such that the solder is located within said pocket.

10. The method of claim 8 wherein said cap, when formed, is provided with a protuberance on its end face that extends beyond the soldered lead wire juncture and thus constitutes the contactor surface of the cap.

* * * * *