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LAMP SUPPORTED REFLECTOR UNIT

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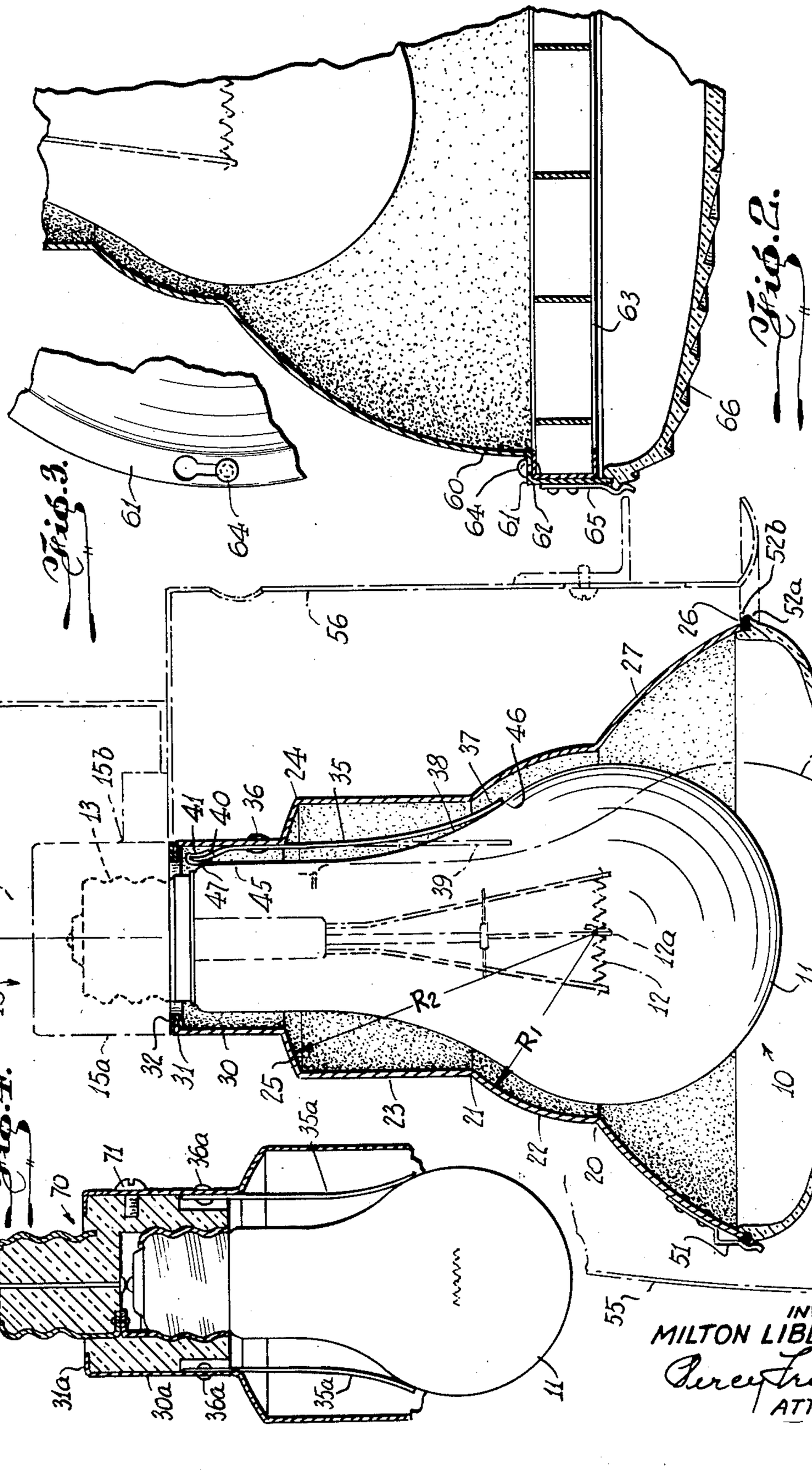

Fig. 2.

Fig. 3.

Fig. 4.

Fig. 1.

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LAMP SUPPORTED REFLECTOR UNIT

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6 Claims. (Cl. 240—103)

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The present invention relates to a reflector unit for use with a conventional electric light bulb.

In the field of display and advertising, use is made of an enormous quantity of spot and flood lamps. Many different types of units are utilized but one form in particular has achieved widespread use because of its simplicity. This form makes use of a specially designed lamp having a portion of its bulb structure internally silvered and properly shaped to make a combination lamp and reflector. Probably simplicity has been its best selling point for it has many drawbacks. Of foremost consideration is the high cost per lamp. In addition to this the entire lamp has to be replaced when the filament burns out. The reflector portion, being integral with the lamp, is, of necessity, no longer useful. The waste in material and in production costs is self-evident.

It is the purpose of the present invention to produce a reflector unit for use with a conventional light bulb which will provide an assembly which is much more economical than the aforesaid special lamp and which has more efficient light accumulating and directing properties as well as providing for the use of filters, lenses, louvres, and the like.

The reflector unit is constructed to be supported by the bulb and is provided with means for positioning it with respect to the bulb and its filament for proper focusing of the light rays. In one embodiment, the reflector is provided with a brightened matte finish as distinguished from a specular finish, the matte finish resulting in new and improved light directing properties.

A different size reflector is provided for each size bulb intended to be used. Aside from differences in size, the reflectors are in all other respects the same.

The basic reflector, where desired, can be provided with means for removably positioning in the path of the directed light beam a lens or diffuser, a louvre, colored filters or the like. The above items can be used singly or in combination.

In addition, the reflector is so constructed as to be insertable in the conventional "bullet" type lamp housing or in the recessed can type or "high-hat" fixture, without making any mechanical or electrical changes, and regardless of the angle of inclination of the housing. The reflector will always retain its uniformity spaced relationship to the bulb without regard to the angularity of the bulb within the range of the whole 360°. The bulb and reflector, being yieldably coupled, any vibration of the bulb is damped, thus contributing to longer life of the bulb.

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Further advantages and feature will be apparent from the following detailed description taken in connection with the accompanying illustrative drawings, in which:

Fig. 1 is an elevational view of an electric light bulb with my reflector applied thereto, the reflector being shown in cross-section and the relative locations of the sidewalls of a "bullet" and "high-hat" fixture being shown in phantom.

Fig. 2 is an enlarged fragmentary sectional view similar to Fig. 1, but showing a modification thereof with a louvre and lens in place.

Fig. 3 is a fragmentary plan view of the bayonet lock used to secure the louvre to the reflector in Fig. 2.

Fig. 4 is a fragmentary sectional view similar to Fig. 1, but showing a modification thereof.

Referring now to Fig. 1 of the drawing, there is shown at **10** a standard clear type electric light bulb having the conventional glass envelope **11** and internal filament **12**. The bulb is usually pear-shaped and has a bulbous body in which the filament is positioned below the cylindrical neck. It is provided with a threaded base **13** which is shown inserted in a socket **15** having an outwardly facing edge and which may be cylindrical as shown at **15***a*, or it may be provided with lugs as shown at **15***b*. The particular socket as well as the bulb construction forms no part of the present invention, being entirely conventional, and is shown merely by way of illustration. As will appear below, the invention is not limited in its application to a clear bulb but is adapted for use with frosted and colored bulbs of common design.

The invention is predicated on the fact that the conventional bulbs on the market are constructed according to standard specifications wherein the filaments are located substantially the same distance from the base in each bulb of the same wattage. The various reflective surfaces of the reflector are so constructed and arranged as to have a given relationship with respect to the center **12***a* of the filament when the reflector is in operative position.

The reflector as shown in Fig. 1 is circular in horizontal cross-section, while it is composed of a plurality of differently curved surfaces in the vertical plane. As shown, it is in operative position on lamp **10**.

Taking the center **12***a* of the filament as a reference point, the reflector is provided with a spherical surface **22** having the radius R*1*. This surface extends from point **20**, which lies in the same horizontal plane with filament **12**, to point

21. At point 21 the spherical surface 22 connects with the cylindrical surface 23 which extends to a point adjacent the neck of the lamp where it connects with a spherical zone 25. Zone 25 has point 12*a* as a center and is constructed with radius R2. The portion of the reflector 27 from point 20 to the outer edge 26 is parabolically formed with the focus at point 12*a*. Surfaces 22, 25 and 27 comprise the main operative reflective areas while cylinder 23 and cylindrical neck 30 serving primarily as interconnecting and positioning media, the reflective surfaces of the cylinder 23 and cylindrical neck 30 contribute to the overall efficiency. Neck 30 is provided at its free end with an inwardly extending flange 31, the latter being covered with a suitable insulating material 32. As seen, the flange abuts the edge of the socket 15 while neck 30 is constructed so as to have approximately the same diameter as the standard socket.

In order to maintain the reflector properly positioned on the lamp, a plurality of resilient finger elements are employed. One such element is shown at 35 secured near one end to the inside of neck 30 by a rivet 36. In preferred form three such fingers are employed equally spaced around the reflector neck. But any number can be employed. The element 35 is a flattened blade-like member and is deflected to position 37 by the curved portion 38 of the lamp 10 when the elements are in operative position. Thus positioned, the lamp 10 will also be yieldingly urged outwardly of its socket and hence more intimate electrical contact will be had on the threads of the lamp plug. When the lamp is removed, the spring finger will assume the position 39 shown in dot-dash lines. The other end of finger 35 is provided with an inwardly bent portion 40 covered with suitable insulating material 41. The end 40 is also resilient and bears inwardly against the neck 45 of the lamp. It will be seen, therefore, that each finger 35 makes two-point contact with the lamp, at points 46 and 47. The contact at point 47 serves to center the neck of the lamp with respect to the reflector. More accurately speaking, the lamp is fixedly positioned in the socket and the reflector is concentrically positioned about the lamp. The point of contact 46 serves to center the outer portion of the reflector and cooperates with contact point 47 to align the reflector axis with that of the lamp. Contact point 46 serves another function. It bears against curved surface 38 of the lamp and, as can be readily appreciated, develops a thrust tending to urge the reflector toward the base of the lamp into contact with the socket edge.

The reflector is installed as follows. With the bulb removed from the socket, it is inserted into the reflector until the spring fingers 35 in relaxed position 39 bear against the bulb at the base of the curved portion as suggested by the dot-dash outline of the bulb 50. The reflector is then brought into contact with the socket 15 and the bulb urged toward the socket and screwed therein. The reflector will automatically locate itself about the bulb. Some persons might find it desirable as an alternative method to slide the reflector toward the bulbous portion of the lamp so as to expose its base before engaging it in the socket. In this case, the springs will be deflected beyond their operative position wherein the friction becomes greater than the axial thrust and thus retains the reflector high on the bulb. After the bulb is screwed into the socket, the reflector need only be touched lightly to overcome the friction, the fingers then snapping it into place against the socket.

The location of points 21 and 24 are controlled by several factors. It is necessary to provide clearance for the end 37 of finger 35 while maintaining surface 22 as extensive as possible for a given reflector size. It is also necessary to provide adequate free movement length for finger 35. This latter factor, of course, is dependent upon the elasticity of the member 35 and the strength of the lamp's glass envelope. Naturally by proper choice, surface 25 can be shifted axially within a wide range but I prefer to proportion my reflector substantially as shown in Fig. 1.

The outer edge 26 of the reflector is provided with a plurality of spaced spring clip elements, one of which is shown at 51. These are secured to the reflector by any suitable means. The clips are utilized to removably secure a lens or similar element 52 to the mouth of the reflector. Element 52 may be made of glass or other suitable material and may be clear, frosted, colored or a combination of either to suit the application. In addition to performing the functions naturally flowing from its make-up, the element 52 acts as a cover for the reflector excluding dust therefrom and, thereby changing the appearance of the entire unit as compared with the bare reflector and lamp.

In order more effectively to prevent atmospheric deterioration of the reflective surfaces of the reflector, a rubber gasket 52*a* may be provided between the reflector and the lens 52.

In certain installations, the embodiment shown in Fig. 2 may be preferred. The construction is identical to that in Fig. 1, except that the parabolic portion 27 is extended and accelerated to the asymptotic condition at point 60. It is then provided with a lateral offset 61 connecting with an apron 62. The offset and apron cooperate to form a seat for a louvre 63 provided with a bayonet lock 64, the details of which may be more clearly seen in Fig. 3. The apron 62 is provided with a plurality of spring clips such as the one shown at 65, which clips removably support a lens 66. As with the embodiment of Fig. 1, the lens 66 may be replaced by a frosted glass for diffusion or colored lenses or the like. In addition, colored filters could be inserted adjacent the louvre in an obvious manner.

Referring back to Fig. 1, there is shown by the phantom lines 55, the relationship of a bullet-shape fixture with respect to the reflector when the latter is inserted in the former. Phantom lines 56 show the relationship when a can type fixture is employed. It is to be understood that these showings are merely for illustrative purposes.

With regard to both embodiments, it will be apparent that the two spherical reflecting surfaces tend to return most of the light rays emitted above the filament back to approximately point 12*a*. In a sense, this forms an effective point source of light. The parabolic portion of the reflector then converts the effective point source into a parallel beam.

I have found that when the reflector is provided with a specular finish and it is employed with a clear bulb, it will, in the absence of a diffuser, project an image of the lamp filament on the surface to be illuminated. One way to correct this is to use a frosted glass for element 52 or 66. But I have discovered a more efficient means. Instead of providing the inner surfaces

of the reflector with a specular finish, I provide them with a brightened matte finish. This sufficiently diffuses the light rays to eliminate the objectionable image while retaining substantially the same reflective efficiency. Of course, when the reflector is provided with a brightened matte finish, a diffusing glass may also be employed for further control. The matte finish is produced by roughening the surface in any suitable manner as, for example, using a roughened form upon which the reflector is spun. The resulting surface is then brightened by electroplating or by the use of a mild acid bath or by any other suitable process whereby the hills and dales in the surface are not materially altered although the surface is brightened.

It will be seen that with my particular construction utilizing the spaced spherical zones **25** and **22**, I am able to provide more reflecting surface than if surface **22** were extended until it touched the lamp. At the same time, my construction makes it possible to use the spring fingers for supporting the reflector in spaced relationship from the bulb. This in itself is advantageous in reducing the amount of heat conveyed to the reflector. The surface **25** reflects the light rays projected toward the base of the lamp, which rays are normally lost, back towards the filament where they are re-directed for useful application. Surface **23** may be made reflective so as to re-direct any light rays which travel a skew path.

A further modification is shown in Fig. 4 wherein a combination male and female electric plug element **70** of insulating material is integrally secured to the reflector neck **30***a* by screw **71**, the flange **31***a* of the reflector embracing the shoulder of the combination plug. The resilient fingers **35***a* are in all respects similar to fingers **35** except that the rear end of the fingers back of the rivet **36***a* is omitted. With this modification the reflector, the plug element **70** and lamp **11** may be supplied as a unit and may be so installed.

Thus there is provided by the present invention a highly efficient, simple, inexpensive reflector adapted for use in connection with the ordinary sockets and light bulbs.

Having described my invention in great detail, I desire to secure by United States Letters Patent and, therefore, claim:

1. In an electric lamp supported reflector unit adapted for display and advertising purposes, the combination which comprises an electric lamp socket having an outwardly-facing edge, a pear-shaped electric lamp screwed into said socket and having a bulbous body with a lighting filament at approximately the center thereof and a substantially cylindrical neck, and a reflector closely surrounding said electric lamp and having an end held against the edge of said socket, said reflector having at said end a short cylindrical neck with a narrow diameter closely surrounding the neck of said lamp, an elongated cylindrical reflecting zone spaced axially from said short neck and surrounding the neck of the bulb to a region adjacent to the junction with the bulbous body, a narrow annular reflecting zone joining said neck and said cylindrical reflecting zone and reflecting light rays coming from said filament, a parabolic reflecting zone with a wide mouth and a narrow base, a spherical reflecting zone connecting said narrow base of said parabolic reflecting zone and the end of said cylindrical reflecting zone, and means for holding said short neck against the edge of the socket and for holding the said reflecting zones in close spaced relationship with said supporting electric lamp.

2. In an electric lamp supported reflector unit adapted for display and advertising purposes, the combination which comprises an electric lamp socket having an outwardly-facing edge, a pear-shaped electric lamp screwed into said socket and having a bulbous body with a lighting filament at approximately the center thereof and a substantially cylindrical neck, and a reflector closely surrounding said electric lamp and having an end held against the edge of said socket, said reflector having a flange at said end having a covering of insulating material and adapted to abut the edge of said socket, a substantially cylindrical short neck at said end of the reflector extending substantially parallel to and closely surrounding the neck of said electric lamp, a short curved zone extending from said neck for a short distance to provide an annular reflecting zone for reflecting light rays coming from said filament, a cylindrical reflecting zone joined with said short curved zone and extending to a region close to the bulbous body of said lamp, a spherical reflecting zone extending from said cylindrical surface and having its center coincide approximately with the center of the said bulbous body, a parabolic reflecting zone extending from said spherical reflecting zone at a region approximately on line with the filament of said lamp to a region in alignment approximately with the front of the said bulbous body, three short resilient fingers secured at equi-spaced points to said neck and having the free ends thereof covered with insulating material and adapted to press against the neck of said lamp in front of the edge of said socket, and three resilient flattened blade-like members mounted inside of said reflector at equi-spaced points and adapted to press against the said bulbous body and yieldingly couple the reflector and force it against the edge of the said socket whereby the reflector will automatically locate itself about the said supporting electric lamp and will be concentrically positioned about the filament for proper focusing of light rays and for reflection of a major portion of said rays.

3. In an electric lamp reflector unit adapted for display and advertising purposes, the combination which comprises an electric lamp socket, a pear-shaped electric lamp screwed into said pocket and having a bulbous body with a lighting filament at approximately the center thereof and a substantially cylindrical neck, and a reflector closely surrounding said electric lamp and held in proper focusing relationship, said reflector having an elongated reflective cylindrical surface adapted to surround the neck of said electric lamp, a spherical reflective surface joined to the one end of said cylindrical surface and to form a portion of a sphere surrounding and being close to the upper part of the bulbous body of said electric lamp, a narrow annular curved reflective surface joined to the other end of said cylindrical surface and extending laterally close to the neck of said lamp to reflect light rays emitted by said filament outwardly, a parabolic reflective surface joined to the end of said spherical reflective surface to reflect light rays coming from said lamp, and means for holding the aforesaid reflective surfaces of the reflector in close spaced relationship with said electric lamp.

4. In an electric lamp reflector unit, the combination which comprises an electric lamp socket, a pear-shaped electric lamp mounted in said socket and having a bulbous body with a lighting filament at approximately the center thereof and a substantially cylindrical neck, and a reflector closely surrounding said electric lamp, said reflector having a wide mouth parabolic section terminating adjacent the front of the bulbous body of said electric lamp and receding back to near the center of said bulbous body, a spherical section joining said parabolic section and receding in substantial conformation with said bulbous body to a region adjacent the junction with the lamp neck, a receding cylindrical section joining the spherical section and extending substantially parallel with the neck, and another spherical section joining said cylindrical section at a region closely adjacent the neck of the bulb whereby substantially all of the light rays coming from the electric lamp are reflected forwardly.

5. In an electric lamp supported reflector unit, the combination which comprises an electric lamp socket having an outwardly-facing edge, a pear-shaped electric lamp mounted in said socket and having a bulbous body with a lighting filament at approximately the center thereof and a substantially cylindrical neck, and a metal reflector closely surrounding said electric lamp and held against the outwardly facing edge of the socket, said reflector having at said end a short cylindrical neck with a narrow diameter closely surrounding the neck of said lamp, an elongated cylindrical reflecting zone spaced axially from said short neck and surrounding the said neck of the bulb to a region adjacent to the junction of the bulb neck and the bulbous body, a narrow annular spherical reflecting zone joining said neck and said cylindrical reflecting zone and having a radius with a center substantially coincident with the center of said electric lamp to reflect light rays coming from said filament, a parabolic reflecting zone with a wide mouth and a narrow base, a spherical reflecting zone connecting said narrow base of said parabolic reflecting zone and the end of said cylindrical reflecting zone and having a radius with a center substantially coincident with the center of said electric lamp, and a brightened matte reflective

surface covering the aforesaid reflecting zones and adapted to effectively reflect light coming from said electric lamp.

6. In an electric lamp supported reflector unit, the combination which comprises an electric lamp socket having an outwardly-facing edge, a pear-shaped electric lamp mounted in said socket and having a bulbous body with a lighting filament at approximately the center thereof and a substantially cylindrical neck, and a reflector closely surrounding said electric lamp and held against the outwardly facing edge of the socket, said reflector having an elongated reflective cylindrical surface surrounding the neck of said electric lamp, a spherical reflective surface joined at one end to the said cylindrical surface and forming a portion of a sphere surrounding and being close to the upper part of the bulbous body of said electric lamp, a narrow annular curved reflective surface joined to the other end of said cylindrical surface and extending laterally close to the neck of said lamp to reflect light rays emitted by said filament outwardly, and a parabolic reflective surface joined to the end of said spherical reflective surface to reflect light rays coming from said lamp.

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