

[54] LIGHTING FIXTURE FOR ILLUMINATING PLANAR SURFACES

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[57] ABSTRACT

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240/78 CF, 78 H, 103, 104, 105, 25, 78 R, 78 HA,
41.35 R, 41.35 C, 103 R; 350/292, 294

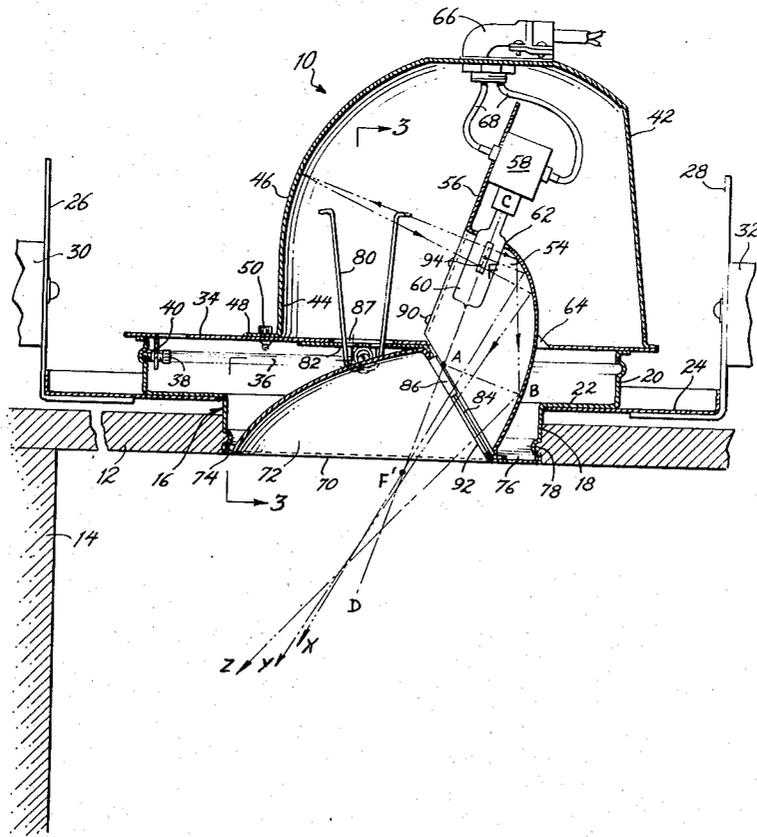
A lighting fixture for illuminating planar surfaces such as walls or the like, is disclosed. The fixture comprises an ellipsoidal primary reflector open at one end and on one side on a plane generally parallel to its major axis, an elongated light source at a focus of the primary reflector and extending along a portion of the major axis thereof adjacent the focus, and a second reflector juxtaposed to the open side of the primary reflector and the light source.

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8 Claims, 4 Drawing Figures



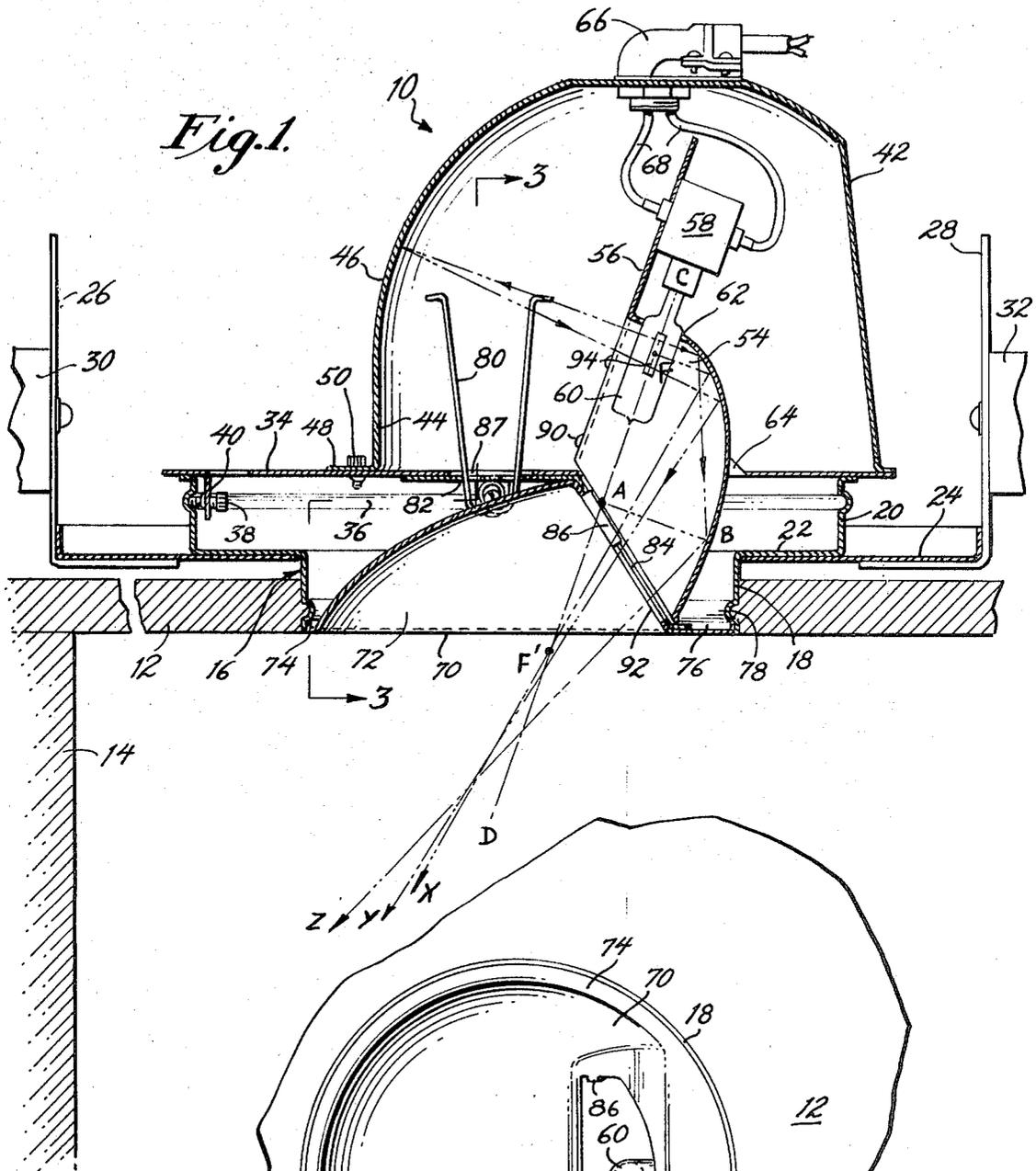
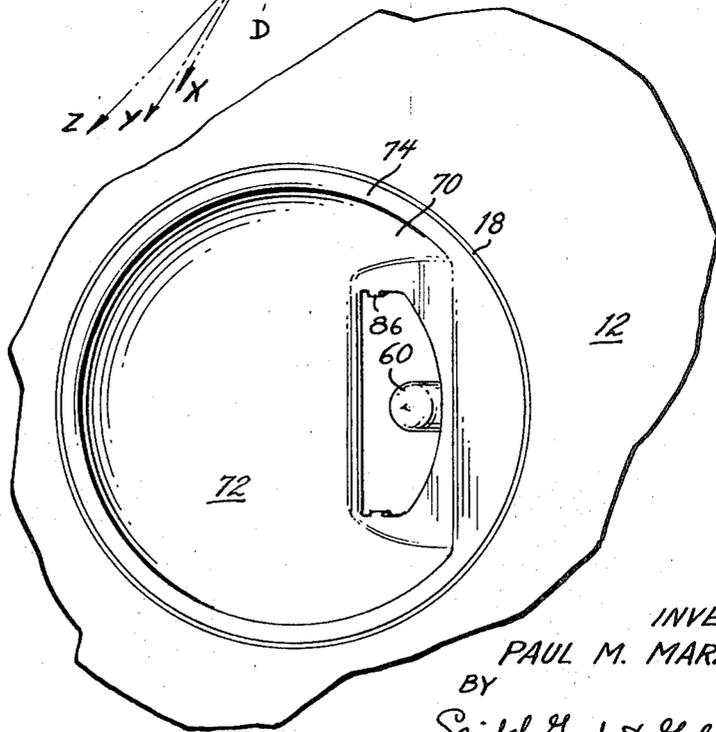


Fig. 1.

Fig. 2.



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Fig. 3.

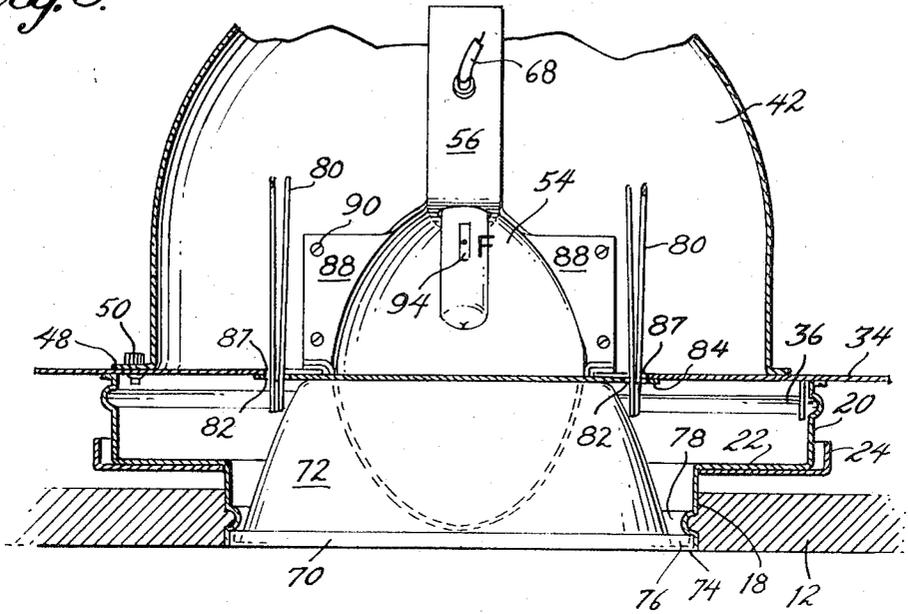
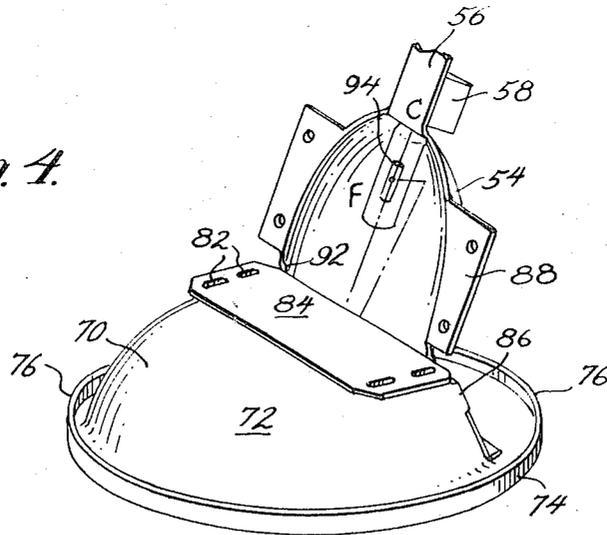


Fig. 4.



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LIGHTING FIXTURE FOR ILLUMINATING PLANAR SURFACES

This invention relates to lighting fixtures for illuminating planar surfaces, and more particularly, to recessed lighting fixtures having minimum brightness at the aperture and capable of providing a relatively even light distribution over a planar surface.

Lighting fixtures for illuminating planar surfaces, commonly referred to as "wall washer" units, have heretofore been proposed. Such units, when used to illuminate vertical walls, are generally associated with the ceiling a short distance away from the wall. Both surface-mounted and flush-mounted wall washers have heretofore been provided. In many applications, the latter type is more desirable, since its unobtrusive nature results in minimal interference with room decor.

In creating a lighting unit, particularly of the flush-mounted type, it is necessary to first consider, and to optimize if possible, optical performance. Next, it is necessary to deal with purely mechanical considerations; unit construction, installation, and accessibility for service. A common shortcoming of known flush-mounted wall washer units has been difficulty of access for service, such as routine bulb replacement. It is most undesirable, of course, to compromise performance for accessibility, but such compromise has frequently been necessary in the past. Consequently, it is an object of this invention to provide a flush-mounted wall washer unit with optimum illuminating characteristics but ready accessibility.

It is a primary object of this invention to provide a lighting fixture with minimum brightness of the aperture.

It is another object of this invention to provide a lighting fixture for illuminating flat planar surfaces, and having a minimal number of parts.

It is yet another object to provide a lighting fixture suitable for flush mounting and providing a neat external appearance.

Other objects will appear hereinafter.

The foregoing and other objects are achieved, in a presently preferred form of the invention, by a fixture comprising a housing adapted to be recessed in a surface disposed generally at right angles to the surface to be illuminated; a primary reflector, open at one end and one side, disposed in the housing; a light source disposed in the housing at a focus of the primary reflector; and a trim member yieldingly coupled to the housing. In such preferred embodiment the trim portion is so disposed that its edges and the peripheral edge of the primary reflector define the aperture through which light emanates from the fixture. Also in such preferred form, a portion of the interior of the housing provides a secondary reflector, in juxtaposition to the primary reflector.

For the purpose of illustrating the invention, there is shown in the drawings a form which is presently preferred; it being understood, however, that this invention is not limited to the precise arrangements and instrumentalities shown.

FIG. 1 is a side elevation view, in cross section, showing a lighting fixture in accordance with the invention.

FIG. 2 is a bottom plan view of a fixture in accordance with the invention, mounted in association with a supporting surface.

FIG. 3 is a partial cross-sectional view taken along the line 3—3 in FIG. 1.

FIG. 4 is a partial perspective view showing the association of the primary reflector and trim portion of the present fixture.

Referring now to the drawings in detail, wherein like numerals indicate like elements, there is seen in FIG. 1 a lighting fixture designated generally by the reference numeral 10. The lighting fixture 10 is mounted flush with a ceiling 12 at a position spaced from a vertical wall 14 intersecting the ceiling 12.

Engaging the ceiling 12 is a plaster ring, designated generally by the reference numeral 16. The plaster ring 16 includes a lower portion 18 of generally circular cross section, and an enlarged upper portion 20. A transition portion 22 joins the lower portion 18 and enlarged upper portion 20. Contacting the transition portion 22, in supporting relation to the plaster ring 16, is a mounting pan 24. Brackets 26, 28 extend

upwardly from opposite sides of the mounting pan 24. Leveling clips 30, 32 are provided in association with respective brackets 26, 28.

A chassis plate 34 is rotatably and removably coupled to the upper portion 20 of the plaster ring 16. To effect such coupling, the upper portion 20 of the plaster ring 16 is provided with a peripheral groove 36. Peripherally spaced screws associated with the chassis plate 34 cooperate with the groove 36 to retain the chassis plate 34 in contact with the plaster ring 16. Only one screw 38 is seen in FIG. 1. Others are provided, however, at peripherally spaced points on the chassis plate 34. In the illustrated embodiment, the thumbscrew 38 is in threaded engagement with a downturned flange 40, offset at right angles to the chassis plate 34.

A housing 42 is coupled to and supported by the chassis plate 34. The housing 42 includes a part-cylindrical lower portion 44 and a part-hemispherical upper portion 46. The interior of the housing 42 is preferably made highly reflective, for a purpose to be explained later.

A peripheral flange 48 is provided in association with the lower portion 44 of the housing 42. Thumbscrews 50, at spaced points about the flange 48, removably couple the housing 42 to the chassis plate 34.

Disposed within the housing 42 is a reflector 54. In the illustrated embodiment, a bracket 56 is coupled to the reflector 54 and is adapted to support a socket 58. A light source 60, associated with the socket 58, extends through an opening 62 into the concavity of the reflector 54.

In the illustrated embodiment, the reflector 54 is coupled to upstanding triangular brackets 64 coupled to the chassis plate 34. Also, in the illustrated embodiment a conduit 66 disposed at an upper portion of the housing 42 provides a means of entry for lead wires 68 associated with the socket 58.

A trim member 70 is yieldingly coupled to the plaster ring 16. Referring to FIGS. 2 and 4, the trim member 70 includes a concave optical portion 72, juxtaposed to an open end of the reflector 54. The concavity of the optical portion 72 is preferably coated with a specular finish, such as a gloss black enamel. Associated with the optical portion 72 is a skirt portion 74. The skirt portion 74 has a plan shape corresponding generally to the shape of the lower portion 18 of the plaster ring 16. Referring to FIGS. 1, 3 and 4, the skirt portion 74 in the illustrated embodiment, includes an upwardly extending annular flange 76. The annular flange 76, when the trim member 70 is in its operative position, rests against an inwardly extending shoulder 78 in the lower portion 18 of the plaster ring 16, best seen in FIGS. 1 and 3. When in its operative position, the trim member 70 is preferably flush with the surface of the ceiling 12. This is perhaps best seen in FIG. 1. Thus, the trim member 70 provides a neat unobtrusive external appearance for the fixture 10. Indeed, when it is properly installed, little of the fixture 10 is visible from the ceiling exterior other than the trim member 70.

The illustrated form of the trim member 70 is intended for use in conjunction with plaster ceilings. For ceiling of dry construction, a variation of the trim member 70, not shown, may be provided wherein the flange 74 extends horizontally past the edge of the plaster ring 16.

The trim member 70 is maintained in its operative position by a pair of torsion spring members 80. The spring members 80 pass through slots 82 in a bracket 84, secured to the trim member 70 by tabs 86 or the like. The spring members 80 also pass through slots 87 in the chassis plate 34. The spring members 80, therefore, normally bias the trim member 70 to an operative position wherein its annular flange 76 is seated against the shoulder 78. If access to the interior of the fixture 10 is required, the trim member 70 can be withdrawn against the bias of the spring members 80 from the lower portion 18 of the plaster ring 16. At such time, the light source 60 and other internal components at the fixture 10 are readily accessible.

Referring once again to FIG. 4, the reflector 54 is seen in perspective. The reflector 54 includes laterally extending flanges 86 adapted for securement to the triangular brackets

64. Screws 90 or the like may be used to secure the flanges 88 to the brackets 64.

The shape of the reflector 54 is an important aspect of the present invention. Such reflector 54 is a segment of an ellipsoid of revolution. Referring to FIGS. 3 and 4, the reflector 54 is open at one side and one end. In the illustrated embodiment, the edge 92 defining the open end lies in a plane intersecting the active surface of the reflector 54 on an opposite side of the plane A-B of the semiminor axis from the light source 60. In one operative form of the invention, the plane of the edge 92 intersects the semiminor axis A-B at an angle of about 50°. The light source 60, preferably a "tungsten-halogen" bulb, includes a linear light-producing element 94, aligned with the major axis C-D of the reflector 54. The light-producing element 94 of the source 60 is thus coincident with the focus F of the reflector 54, and extends along the major axis C-D on both sides of the focus F.

The major axis C-D of the reflector 54 extends generally downwardly. Thus, in the illustrated embodiment, the axis C-D extends downwardly at an angle of about 20° to the vertical and toward the wall 14.

The focus F of the reflector 54 is also the center of the part-hemispherical upper portion 46 of the housing 42.

Referring to FIG. 1, a light ray X originating at the focus F and impinging directly on the reflector 54 is reflected, due to the ellipsoidal contour of the reflector 54 toward point F', the other focus of the reflector 54. Another light ray, designated by the letter Y, is shown originating at a point spaced from the focus F. The light ray Y is directed at the hemispherical upper portion 46 of the housing 42, and is reflected therefrom back toward the reflector 54. From the reflector 54, the light ray Y is reflected toward the wall 14. Another light ray, designated by the letter Z, is shown originating from a point close to the point of origin of the light ray Y, but impinges directly upon the reflector 54. The light ray Z is twice reflected from the surface of the reflector 54 and follows a path defining a greater angle with respect to the plane of the wall 14 than the rays X and Y. Due to the elongation of the light-producing element 94, the shape of the reflector 54, and the juxtaposition of the part-hemispherical upper portion 46 of the housing 42 to the reflector 54, the light pattern cast upon the wall 14 by the fixture 10 is of even intensity over a relatively large surface area. The surface of the reflector 54 is preferably somewhat textured to "defocus" the rays, thereby eliminating striations due to local variations in the light producing element 94.

The trim member 70 cuts off most rays emanating from the light-producing element 94 but not directed or reflected toward the wall 14.

The reflector 54 is conveniently formed from light-reflective sheet material.

As has already been explained, the above-described construction provides a readily accessible and easily serviced fixture. The thumbscrews 50 provide for rapid assembly of the housing 42 to the chassis plate 34. Also, the arrangement of the thumbscrews 38 and peripheral groove 36 permits initial adjustment of the angular disposition of the reflector 54 with respect to the plaster ring 16 and trim member 70.

The present invention may be embodied in other specific forms without departing from the spirit or essential attributes thereof.

I claim:

1. A lighting fixture for illuminating a planar surface, comprising chassis means adapted to be operatively disposed in a surface extending at right angles to the surface to be illuminated, a reflector coupled to said chassis means and having an open end thereof adapted to face the surface to be illuminated when the fixture is operatively disposed, said reflector

being an ellipsoidal surface having a major axis thereof extending at an oblique angle with respect to the surfaces to be illuminated when the fixture is operatively disposed, said reflector being open along a plane parallel to its major axis on its side closest the surface to be illuminated when the fixture is operatively disposed, and an elongated light source coupled to said chassis means and disposed at the focus of said reflector, the light axis of said source being coincident with the major axis of said reflector so that light rays emanating from said light source in the direction of said reflector are directed toward the surface to be illuminated, and a concave specular member coupled to said chassis means and having an open side and an open end, the open side having edges thereof adapted to be positioned flush with the surface in which the chassis means is disposed, and the open end thereof being disposed adjacent said open end of said first-mentioned reflector to define a light-emitting aperture.

2. A lighting fixture in accordance with claim 1, and a second reflector coupled to said chassis means and juxtaposed to the open side of said first-mentioned reflector so that rays emanating from said light source in a direction away from said first-mentioned reflector are returned to said first-mentioned reflector.

3. A lighting fixture in accordance with claim 1 wherein said concave specular member is resiliently suspended from said chassis means so that said member may be displaced for access to said chassis means.

4. A lighting fixture in accordance with claim 3 wherein said chassis means includes spaced upstanding brackets, said reflector being coupled to said brackets, and spaced upwardly extending spring members coupled to said chassis means and said concave specular member being suspended from said spring members.

5. A lighting fixture for illuminating a flat planar surface comprising a housing adapted to be recessed in a surface disposed generally at right angles to the surface to be illuminated, a curved reflector associated with said housing, an elongated light source in said housing, a second reflector in said housing adjacent said light source, said second reflector being an ellipsoidal surface having a major axis thereof extending at an oblique angle with respect to the surface to be illuminated when the fixture is operatively disposed, the major axis of said second reflector being generally parallel to the light axis of said source, said source being disposed at a focus of said second reflector, said second reflector being open at one side thereof to receive light rays reflected from said curved reflector, said second reflector being open at one end thereof remote from the light source so that light rays received by said second reflector are reflected toward the surface to be illuminated, and a concave specular member associated with said housing and having an open side and an open end, the open side having edges thereof adapted to be positioned flush with the surface in which the housing is recessed, and the open end thereof being disposed adjacent said open end of said second reflector to define a light-emitting aperture.

6. A lighting fixture in accordance with claim 5 wherein the surface of said second reflector extends, adjacent its open end, beyond the intersection of a plane containing the minor axis of said second reflector and the surface of said reflector.

7. A lighting fixture in accordance with claim 5, wherein said housing and said concave specular member are coupled to a chassis means.

8. A lighting fixture in accordance with claim 7 wherein said concave specular member is resiliently suspended from said chassis means so that said member may be displaced for access to said chassis means.

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