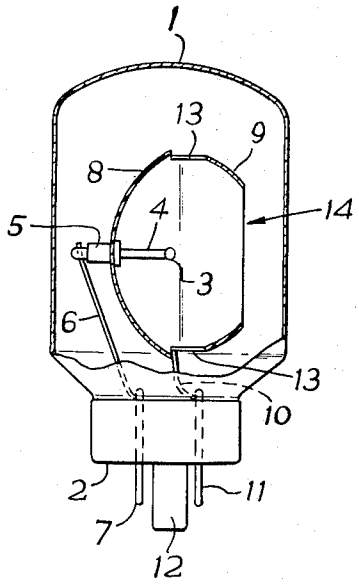
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PROJECTION LAMP HAVING ELLIPSOIDAL-SPHERICAL REFLECTOR WITH VENTS THEREBETWEEN

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INVENTOR
WILLIAM JAMES McLINTIC

BY Laurence Brown

ATTORNEY

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PROJECTION LAMP HAVING ELLIPSOIDAL-SPHERICAL REFLECTOR WITH VENTS THEREBETWEEN

William James McLintic, London, England, assignor to Thorn Electrical Industrial Limited, London, England, a British company

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1 Claim. (Cl. 313—113)

The present invention relates to projection lamps.

According to the present invention a projection lamp incorporates a sealed transparent envelope within which are disposed a light-producing source and an optical reflecting structure, the latter consisting of a concave ellipsoidal reflector the line joining the foci of the ellipsoid lying substantially along the direction of projection, and a concave spherical reflector facing the ellipsoidal reflector, the first focus of the ellipsoidal reflector and the centre of the spherical reflector substantially coinciding with one another and with the light-producing source, an aperture being formed in the spherical mirror in such a position that light rays originating from the first focus of the ellipsoidal reflector or passing through the first focus of the ellipsoidal mirror after being reflected thereby can pass out of the reflecting structure.

In a preferred form of the invention the light-producing source comprises an incandescent filament of well-known kind, supported within the light-reflecting structure and electrically connected between a pair of terminals extending through the envelope. The reflectors may be of vitreous material, or of metal having a polished reflecting surface. If desired, a reflective coating may be applied to the reflecting surfaces of the reflectors.

The two reflectors may form an integral cup-like unit supported within the envelope and surrounding the filament. Where the light-producing source is an incandescent filament, vents may be formed in the unit in positions above and below the filament (in relation to the normal mounting position of the lamp).

One embodiment of the invention will now be described by way of example, with reference to the accompanying drawing, which is an elevation, largely in medial section, of a projection lamp embodying the invention.

The projection lamp comprises a glass envelope **1** sealed into a metal base **2**. Within the envelope **1** a filament **3** of the usual kind used in electric projection lamps, preferably a coiled coil filament, is supported by two lead wires **4** (one only shown) extending from its two ends through a block **5** of insulating material and supported by two conducting strips **6** (one only shown) extending from the base **2**. Two pins **7** (one only shown) which make contact with the strips **6** extend through the base **2**, being insulated therefrom, for external connection of the filament with a source of electric current.

Also supported within the envelope **1** is an optical reflecting structure consisting of a concave ellipsoidal reflector **8** rearward of the filament **3** and a truncated concave spherical reflector **9** forward of the reflector. In the arrangement shown the two reflectors **8** and **9** are formed integral with one another although, of course, this need not be the case. The reflectors are supported by two legs **10** (one only shown) connected at one end to lugs (not shown) at the common periphery of the two reflectors and at the other end to earthing pins **11** extending through the base **2**. The latter is of conventional design, having a central post **12** with a locating flange (not shown) formed therein for mating with a co-operating socket of standard type.

Further support is provided for the ellipsoidal reflector by the block **5** which extends through an aperture at the pole of the ellipsoidal reflector **8** in a force fit, the block **5** having a flanged end on the inner side of the reflector against which the latter abuts.

Vents **13** are formed in the edge of the spherical reflector **9** at positions above and below the filament **3**. These serve to allow metal vapour expelled from the filament, when in use, to be distributed throughout the interior of the envelope.

The two reflectors **8** and **9** are so arranged that the filament **3** is substantially coincident with the first focus of the ellipsoidal reflector **8** and with the centre of the spherical reflector **9**. Both reflectors are symmetrical about the major axis of the ellipsoidal reflector **8**, and the edge of the latter reflector describes a circle lying in a plane at right angles to the major axis and passing through the first focus. A circular aperture **14** is formed in the polar region of the spherical reflector **9**, the edge of the aperture lying in a plane at right angles to the said major axis.

In use, some of the light emitted by the filament passes directly out of the aperture **14**, but most is first reflected by one or other of the two reflectors **8** and **9**. Considering the filament as a point source, those light rays which strike the spherical reflector are reflected directly back through the centre thereof, and therefore through the first focus of the ellipsoidal reflector, thus adding to the rays which are emitted from the filament towards the ellipsoidal reflector. By virtue of the geometrical properties of an ellipsoidal reflector, these rays are so reflected as to converge on a point in space situated at the second focus thereof. Conveniently, the aperture **14** is made of such a size that a light ray emitted from the filament and reflected from the periphery of the ellipsoidal reflector **8**, just passes out at the edge of the aperture **14**.

The lamp described may be employed in a cinematographic light projecting system. In this case the film gate aperture is positioned at the second focus of the ellipsoidal reflector and a lens of the correct aperture is placed on the optical axis on the opposite side of the gate to the projection lamp.

The lamp is arranged to best advantage when the angle of light collection α matches the angle for a lens correctly focused and positioned on the optical axis. For example, using a lens of angle approximately 50° (aperture f 1.4) the reflex angle of light collection is approximately 255°, these angles being related to the diameter of the aperture in the spherical reflector.

The lamp described provides an optical arrangement by virtue of which a high proportion of the light emitted by the filament is collected for projection, while avoiding the disadvantages of projection lamps having shaped silvered envelopes which also function as reflectors for the light, namely, loss of light in reflection from the envelope.

A further advantage of the lamp is that because of the finite size of the filament sufficient distortion of the optical image of the filament occurs to remove the undesirable effect of alternate dark and light spaces which would otherwise be caused by the coiled shape of the filament.

I claim:

A projection lamp incorporating a sealed transparent envelope within which are disposed a light-producing source and an optical reflecting structure, the latter consisting of a concave ellipsoidal reflector, the line joining the foci of the ellipsoid lying substantially along the direction of projection, and a concave spherical reflector facing the ellipsoidal reflector, the first focus of the ellipsoidal reflector and the centre of the spherical reflector substan-

tially coinciding with one another and with the light-producing source, an aperture being formed in the spherical mirror in such a position that light rays originating from the first focus of the ellipsoidal reflector and passing through the first focus of the ellipsoidal mirror after being reflected thereby can pass out of the reflecting structure, said reflecting structure forming an integral, cup-like unit spaced from the walls of the envelope and supported from an end of the envelope, and an incandescent coiled-coil filament at substantially the first focus of the ellipsoidal reflector and supported from a block of insulating material extending through the ellipsoidal reflector, the two reflectors having peripheral edges which are united to form a cup-like unit surrounding said filament, said cup-like unit having vents formed thereon in positions above and below the filament when the axis of the cup-like reflector is horizontal.

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HERMAN KARL SAALBACH, *Primary Examiner.*

ARTHUR GAUSS, ROY LAKE, GEORGE N. WESTBY, *Examiners.*

S. CHATMON, JR., *Assistant Examiner.*