Jan. 22, 1957 R. W. LOEHR 2,778,929

LUMINAIRE

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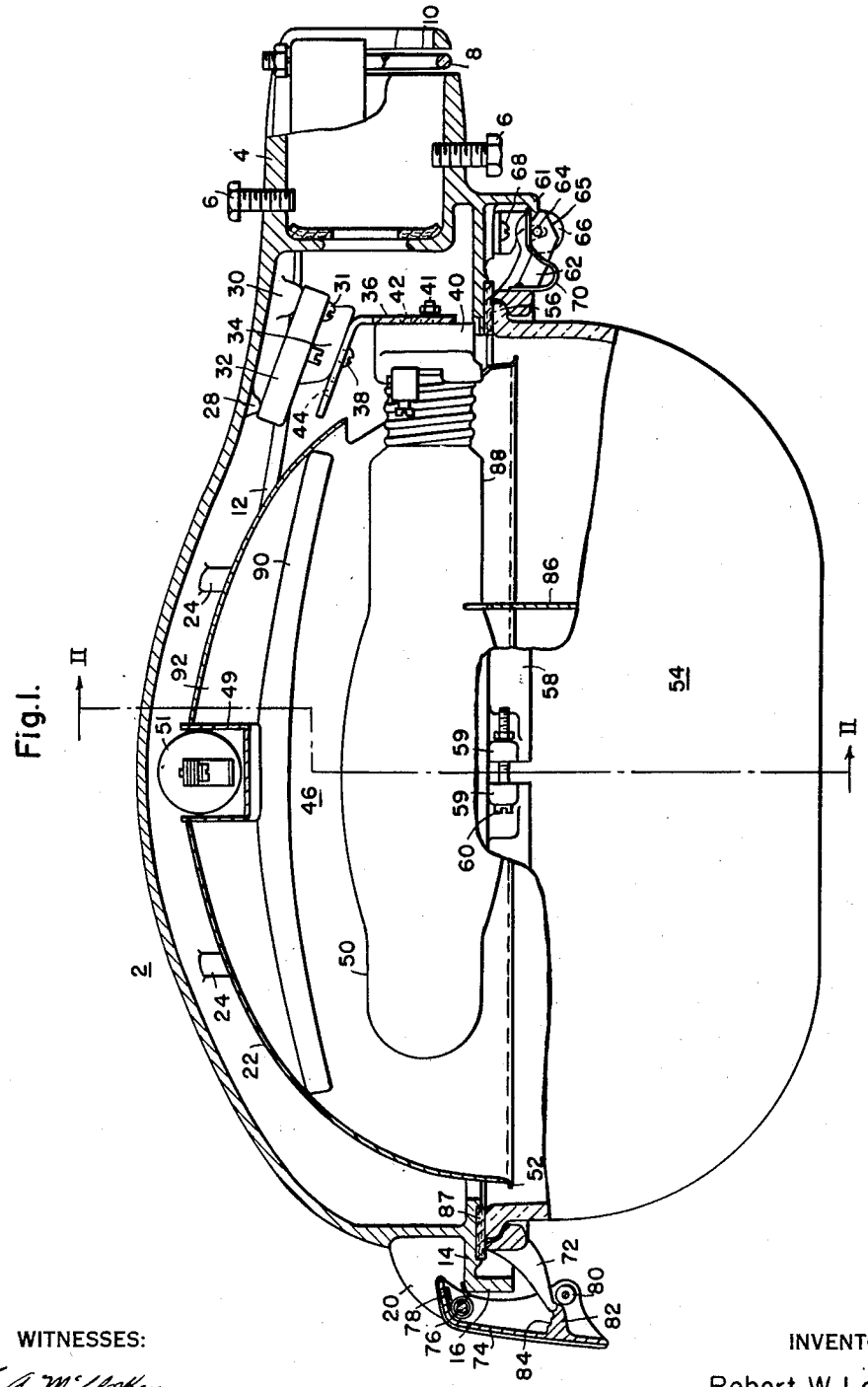


Fig. 1.

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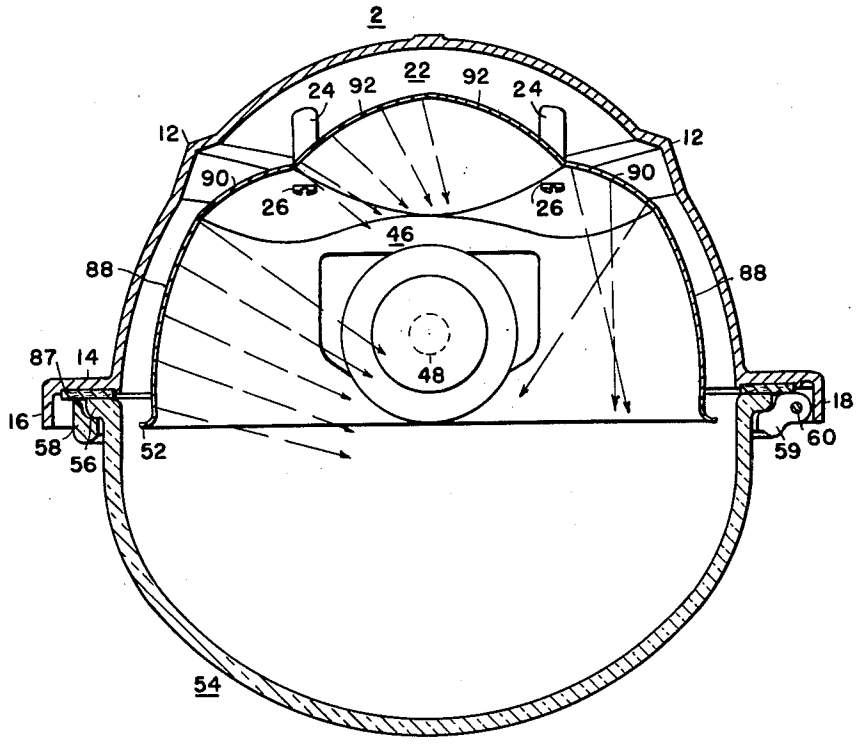
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Fig. 2.



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LUMINAIRE

Filed Dec. 31, 1952 3 Sheets-Sheet 3

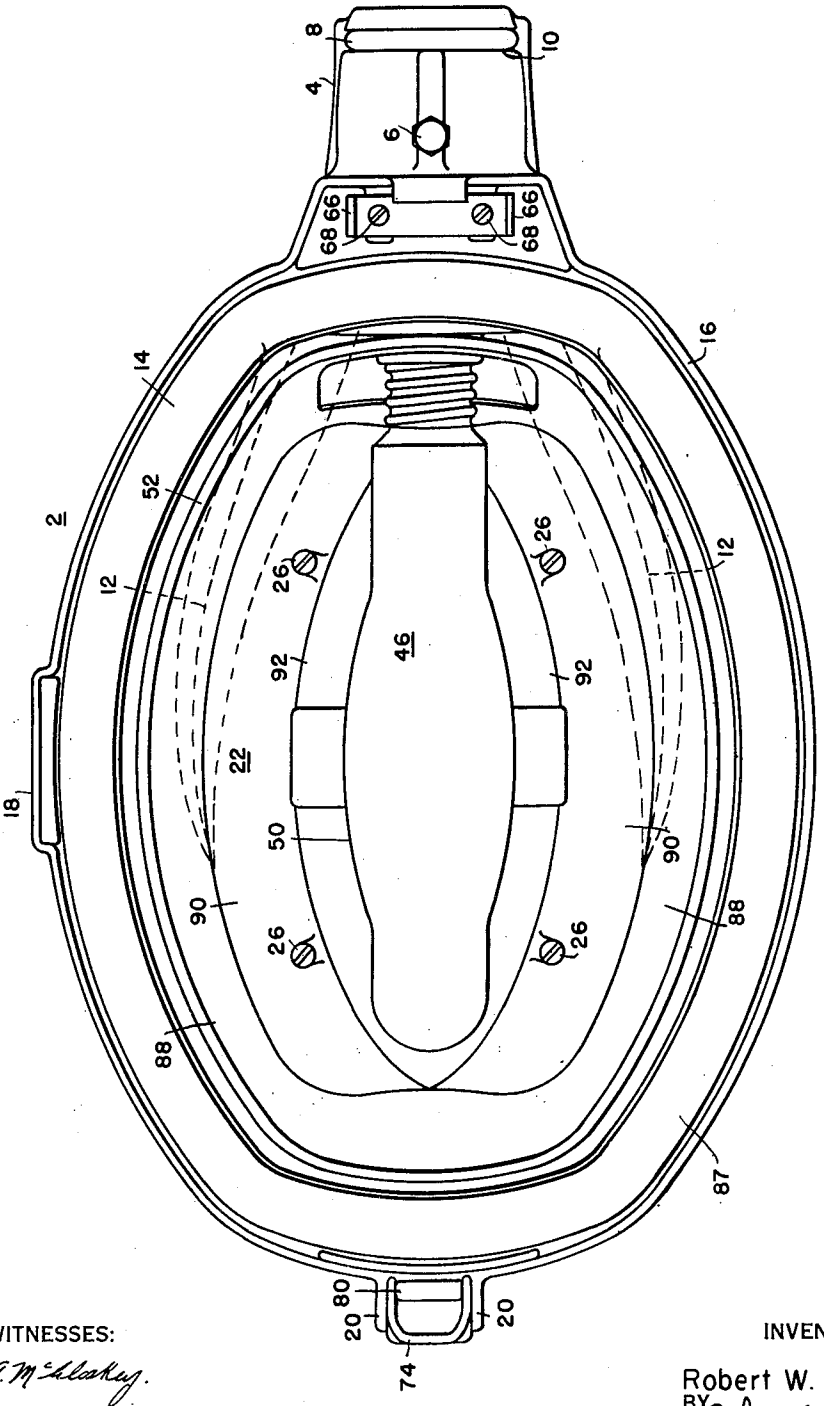


Fig. 3.

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2,778,929

LUMINAIRE

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5 Claims. (Cl. 240—25)

This invention relates generally to luminaires and more particularly to a reflector type of luminaire which employs an elongated light source.

While luminaires of this general type have been used in the past, they have been relatively complex in form, and/or the reflectors used have been of relatively simple and regular form. This has resulted in a high relative cost of manufacture or in many cases a relatively low reflector efficiency, and a relatively large over-all luminaire structure.

One object of this invention, therefore, is to provide a luminaire with a novel unitary reflector construction having a high light utilization efficiency.

Another object of this invention is to provide a luminaire of the type described having a novel reflector construction providing a high reflector efficiency.

Still another object of this invention is to provide a simplified form of luminaire for street lighting or the like service, employing an elongated high intensity light source in an efficient manner, while keeping the size of the luminaire at a minimum.

A more specific object of this invention is to provide a luminaire of generally ovate form having a unitary housing and mounting portion, and a unitary reflector contained therein comprising a plurality of differently shaped portions for efficiently directing reflected light in a predetermined manner.

These and other objects of this invention will become more apparent upon consideration of the following detailed description of a preferred embodiment thereof, when taken in connection with the attached drawings, in which:

Figure 1 is a side elevation view of a luminaire constructed in accordance with this invention, with certain of the parts shown in section.

Fig. 2 is a transverse cross-section view of the luminaire shown in Fig. 1, and taken substantially on the line II—II of Fig. 1; and

Fig. 3 is a bottom plan view of the luminaire shown in Fig. 1, with the refractor bowl removed.

While the invention is herein specifically disclosed as embodied in a street lighting type of luminaire, it should be understood at the outset that the invention in its various aspects may find application in other types of luminaires than that specifically herein disclosed, and consequently the following specific disclosure is not intended as limiting with respect to any of the features of this invention.

The luminaire shown on the drawings is depicted as having a housing 2 which is generally ovate in form, being provided with a bottom opening so that it forms in effect one-half of an ovate spheroid. The housing 2 is formed of one integral piece of material, preferably a single metal casting, such for example as aluminum or an aluminum alloy. The housing 2 has integral therewith at one end a mounting sleeve 4 which is adapted to receive a mounting bracket, and is provided with opposed set

screws 6 for engaging the bracket, and adjusting the position of the luminaire thereon. A U-bolt 8 is mounted to be movable in a slot 10 provided in the lower portion of mounting sleeve 4 of the housing, and is adapted to be drawn up into clamping engagement with the mounting bracket when inserted in the mounting sleeve 4, to firmly secure the housing 2 on any such bracket.

The housing 2 has also formed integrally therewith a pair of longitudinally extending reinforcing ribs 12, which extend generally longitudinally from the mounting sleeve 4 of the housing, over the major part of the length of the housing in divergent relation. The bottom opening of the housing 2 is provided with an outwardly extending integral flange 14 which has a downwardly extending lip 16 at its outer end. A portion of the flange 14 at one side of the housing is offset as at 18, for a purpose to be described. At the end of the housing 2 opposite the mounting sleeve 4, there are provided spaced outwardly extending ears 20, also for a purpose which will be hereinafter described.

A reflector 22 is adapted to be mounted within the housing 2, and is formed of one piece of sheet material, and while generally of the same form as the housing 2, it differs specifically in details of form as will be hereinafter described. Preferably, the reflector 22 is stamped from a single sheet of metal which is capable of being provided with good reflecting characteristics, such as aluminum sheet which can be polished and/or anodized to provide a good reflecting surface. The housing 2 has a plurality of spaced, integral supporting bosses 24 depending from the inner surface thereof, and these studs are internally threaded for receiving screws 26 for mounting the reflector 22 in operative position in the housing.

There may also be mounted in the housing 2 for the luminaire, between the reflector 22 and the mounting sleeve 4, a terminal block 32 supported on a pair of projections 28 and 30 integral with the housing 2, and at least one of which is threaded for receiving a mounting screw 31 to secure the terminal block 32 in position. In the same general location within the housing 2, there is also provided a supporting projection 34 integral with the top wall of the housing 2, which has a tapped opening for receiving a mounting screw 38 for an angled supporting bracket 36. The supporting bracket 36 when mounted in operative position has its other leg extending vertically for mounting thereon a lamp socket 40, for example as by screws 41 engaging the lamp socket and adapted to be mounted in a lower set of openings in the vertical arm of the supporting bracket 36. The lamp socket 40 is herein illustrated as being of the screw base type for receiving a lamp 46 having a screw base. The lamp 46 is illustrated as being elongated in form and is preferably of the high intensity mercury type. The particular lamp 46 illustrated when mounted in the lamp socket 40 lies substantially on the longitudinal center line of the housing 2 and reflector 22, at or slightly above the lower edge of the reflector 22. The mounting bracket 36 for the lamp socket 40 is capable of adjustment to accommodate a lamp having a greater distance between its base and the midpoint of its luminous column. Thus, the top inclined leg of the mounting bracket 36 is provided with a second opening 44 for receiving the mounting screw 38 to thus position the vertical leg of the mounting bracket closer to the mounting sleeve 4 of the housing 2. At the same time, in order to accommodate the thus lowered position of the vertical leg of the mounting bracket 36, this leg is provided with additional openings 42 for receiving the mounting screws 41 on the lamp socket 40.

As previously mentioned, the lamp 46 is preferably of the high intensity mercury type having an inner tubular envelope 48 of a high temperature-resistant transparent material, such for example as fused quartz, and having a

larger outer envelope 50 of a transparent material, such as glass. In a lamp of this type, the illumination originates, of course, within the inner tubular envelope 48. Sometimes this type of lamp may have an inner envelope of a material which is less resistant to high temperatures than quartz, in which case it may be desirable to provide an arc stabilizing magnetic coil 51 which is illustrated as being located transversely of the housing 2 and reflector 22, at the upper portion thereof, being accommodated in a transversely extending slot cut in the upper wall of the reflector 22. Such a stabilizing coil 51 is adapted to be connected in series with the lamp and to produce a magnetic field such that the elongated arc within the lamp is not permitted to bow upwardly into contact with the inner lamp envelope. The coil 51 is preferably covered by a generally cup-shaped cover 49 which may be formed of the same material as reflector 22. Preferably, the lower open bottom of the reflector 22 terminates in a short outwardly turned flange 52.

In most cases, it will be desirable to provide a globe 54 over the bottom opening in the housing 2, with this globe to be made of any desired transparent material, such as glass, and it may be additionally formed with various interior and/or exterior prisms for directing the light rays passing therethrough in the desired pattern. The upper open end of the refractor 54 has an integral outside rib 56 which is adapted to be engaged by a clamping band 58 which surrounds the upper open end of the refractor 54 and has laterally extending apertured ends 59 for receiving a clamping bolt 60 to securely clamp the band 58 to the upper end of the refractor bowl 54.

The refractor bowl 54 is adapted to be releasably supported in closed relation with the bottom opening in the housing 2 by a pivot support at one end adjacent the housing mounting sleeve 4, and comprising a pair of supporting arms 62 provided integral with clamping band 56 and joined at their outer ends by pivot pin 64 which is adapted to be removably mounted in a hook-shaped support 66 secured to the underside of the housing at the mounting sleeve 4 thereof in any desired manner, such as by mounting screws 68. There is also provided a leaf spring 70 which is secured to the clamping band 58 intermediate the pivot supporting arms 62, and which is engageable with a lip 61 formed integral with the housing.

At the other end of the housing and the refractor bowl, the clamping band 58 for the refractor bowl 54 is provided with an integral latch projection 72 extending outwardly therefrom for engagement with a movable latch 74, which is generally U-shaped in cross-section. The movable latch 74 is adapted to be mounted on a pivot pin 76 extending between the supporting ears 20 on the housing 2, and is biased in a counter-clockwise direction as viewed in Fig. 1 to latching position by a coil spring 78 mounted on the pivot pin 76 and reacting against the housing and the movable latch 74 at its opposite ends, respectively. The movable latch 74 is also provided with a latch reset roller 80 mounted on a pin connecting the sides thereof, and with an integral latch projection 82 also located between the sides thereof, preferably formed with transverse ridges 84 on the upper side thereof. If desired, a light shield 86 of opaque material, such as aluminum or the like, may be inserted in the refractor and held therein in any suitable way, such as by a frictional fit, toward the end of the refractor and housing 2 having the mounting sleeve 4 on the housing.

The refractor bowl 54 is illustrated in Fig. 1 as being latched in position where its upper rim is in engagement with a sealing gasket 87, which in turn engages the lower flange 14 of the housing 2. Preferably the gasket 87 is of a weather-proof material, such as water repellent felt or the like, and is in compressed condition at the closed position of the refractor bowl 54, to exclude the elements from the luminaire, and it will be observed that the downwardly extending lip 16 on the housing flange 14 further acts to protect the seal between the refractor bowl 54 and the housing 2. If it is desired to open the luminaire for lamp replacement or for cleaning purposes, it is merely necessary to release the movable latch member 74 by moving the lower end to the left as viewed in Fig. 1, until its latch projection 82 and reset roller 80 clear the latch projection 72 on the housing. The refractor bowl 54 is then freed so that its pivot pin 64 can drop down to the bottom of the slot in bracket 66 and pivot downwardly about the pivot pin 64. During such downward movement the leaf spring 70, previously referred to, moves up and disengages the lip 61 on the housing. The refractor bowl may then be readily replaced by rotating it a further amount until flat surfaces 65 on arms 62 are at a position to clear screws 68 whereupon the bowl may be merely lifted to move its pivot pin 64 out of the slots in support 66 on the housing, and a new bowl inserted in its place. Thereafter, the luminaire may be closed merely by swinging the refractor bowl 54 back to the position shown in Fig. 1, and this results in automatically latching it in closed position, as the latch projection 72 on the refractor bowl will engage the reset roller 80 on the movable latch 74 during closing movement of the refractor bowl, to move the movable latch member 74 in a clockwise direction and to enable the latch projection 72 to slip past the roller and latch projection 82, whereupon the biasing spring 78 for the movable latch member 74 will cause it to move back where its latch projection 82 engages beneath the latch projection 72 on the refractor bowl, to thereby latch it in the closed position shown in Fig. 1 of the drawings. During closing movement of the bowl, the free end of spring 70 ultimately engages the lip 61 on the housing. Thereafter, pivot pin 64 is lifted in the slots of support 66 while pivotal movement continues about the free end of spring 70. When the adjacent edge of bowl 54 engages gasket 87, spring 70 is stressed, and the gasket is placed under spring pressure.

Turning now to the reflector 22, it will be observed to consist of a special form for reflecting incident light rays emanating from the lamp 46 in a particularly useful and efficient manner. Thus, the lower opposite longitudinal sides of the reflector 22 have substantially vertically extending curved portions 88 preferably paraboloidal in form, which extend for substantially the entire length of the lamp. The reflector 22 also has at each side immediately above the portions 88, curved portions 90 which are rather sharply turned inwardly towards each other, and finally, the reflector has at each side curved top portions 92 which are rather sharply turned upwardly and towards each other from the intermediate portions 90, to join substantially on the vertical center line of the luminaire. These longitudinal side portions of the reflector 22 are joined at each end by generally smoothly curved end portions.

The purpose of the particular formation of the reflector 22 can be best realized by reference to Fig. 2 of the drawings, wherein reflected ray traces are illustrated. It will be observed that the rays reflected from the lower side portions 88 of the reflector are directed downwardly at a substantial angle above the nadir, illustratively at an angle of 55° to 75°, and that these reflected rays pass just below the inner lamp envelope 48 and the point of cut off at the opposite side defined by the lower edge of the reflector, and impinge on the refractor bowl 54 at the opposite side of the luminaire. Intermediate reflector surfaces 90 are designed to direct reflected light rays at a relatively low vertical angle, and it will be observed that the ray traces extend downwardly more nearly vertical at the same side of the lamp as the particular intermediate portion 90, and that these rays avoid even the outer envelope 50 of the lamp. It will be noted that the top ray trace from reflector portion 88 and the bottom ray trace from reflector portion 92 converge so as to eventually overlap. The upper reflector surfaces 92 are designed to direct reflected rays in a manner to fill in the distribution pattern between the regions provided

for by surfaces 88 and 90, and it will be observed that these rays are directed from either reflector surface 92 toward the other side of the reflector and above the inner lamp envelope 48, but are within the cut off angle defined by the lower edge of the reflector at the opposite side.

It will be noticed that substantially all of the reflected rays are thus within the cut-off angle provided by the lower edges of the reflector 22 and housing 2, and that the reflector 22 has its lower edge extending below the inner lower edge of the housing 2 and into the refractor bowl 54 when in operative position. This obviously prevents loss of direct light from the lamp by absorption by the inner faces of clamping band 58. The fact that this particular reflector is capable of directing all reflected light rays in a manner to avoid the inner envelope 48 of the lamp prevents absorption of reflected light by the envelope which immediately surrounds the light source. Furthermore, since a substantial amount of reflected light, in fact all of that reflected from reflector portions 90, and at least a portion reflected from the other parts of the reflector 22 avoids even the outer envelope 50 of the lamp, further increases the efficiency of the luminaire. The light source is thus provided in an isolated zone through which no reflected light passes, but such isolated zone is surrounded by multiple zones of reflected light.

As previously pointed out, it is desired that this invention be not limited to the particular form of luminaire specifically described herein, as it will be readily apparent to persons skilled in the art that various changes and modifications may be made in this particular construction without departing from the broad spirit and scope of this invention. Thus, the luminaire may have various forms of housing or support, it may be used with or without a refractor, and instead of being symmetrical about any axis, it can be adapted to direct the maximum candle power at any predetermined lateral angle with respect to any axis of the support or refractor. These are illustrative, but not limiting, as to other forms which this invention might take and of various other ways in which the invention could be used. Accordingly, it is desired that the invention be given a broader scope, and that it be limited only as required by the prior art.

I claim as my invention:

1. A luminaire comprising, an ovate spheroidal housing having an open bottom, a generally similarly shaped reflector mounted in said housing with its longitudinal axis generally coincident with the longitudinal axis of said housing, means for supporting an elongated light source generally centrally and longitudinally within said reflector, said reflector being comprised in part of adjoined differently shaped longitudinally extending light ray reflecting portions, and each of said light ray reflecting portions being located with respect to an inserted elongated light source to reflect incident light rays in avoidance thereof and at an angle less than the cut-off angle of the reflector.

2. A luminaire comprising, an ovate spheroidal housing having an open bottom, a generally similarly shaped reflector mounting in said housing with its longitudinal axis generally coincident with the longitudinal axis of said housing, means for supporting an elongated light source generally centrally and longitudinally within said reflector, said reflector being comprised in part of adjoined differently shaped longitudinally extending light ray reflecting portions, each of said light ray reflecting portions being located with respect to an inserted elongated light source to reflect incident light rays at an angle less than the cut-off angle of the reflector, said light-

ray reflecting portions including at least at one side of a vertical plane extending longitudinally through said reflector a lower reflector portion directing reflected light rays to one side of an inserted source, and an upper reflector portion directing reflected light rays to the other side of an inserted source.

3. A luminaire comprising, an ovate spheroidal housing having an open bottom, a generally similarly shaped reflector mounted in said housing with its longitudinal axis generally coincident with the longitudinal axis of said housing, means for supporting an elongated light source generally centrally and longitudinally within said reflector, said reflector being comprised in part of adjoined differently shaped longitudinally extending light ray reflecting portions with each of said light ray reflecting portions being located with respect to an inserted elongated light source to reflect incident light rays at an angle less than the cut-off angle of the reflector, said light ray reflecting portions including at least at one side of a vertical plane extending longitudinally through said reflector a lower substantially paraboloidal reflector portion directing reflected light rays at a substantial angle to the nadir towards the other side of said plane and beneath an inserted source, an intermediate reflector portion directing reflected light rays at a relatively small angle to the nadir at said one side of said plane, and an upper reflector portion directing reflected light rays to the opposite side of said plane.

4. A luminaire comprising, an elongated dished housing having an open bottom, an ovate spheroidal reflector mounted in close relationship within said housing and with its longitudinal axis generally coincident with the longitudinal axis of said housing, means for supporting an elongated light source generally centrally and longitudinally within said reflector, said reflector being comprised in part of adjoined differently shaped longitudinally extending light ray reflecting portions, and each of said light ray reflecting portions being located with respect to an inserted elongated light source to reflect incident light rays in avoidance thereof and at an angle less than the cut-off angle of the reflector.

5. A luminaire comprising, an elongated dished housing having an open bottom, an ovate spheroidal reflector mounted in close relationship within said housing and with its longitudinal axis generally coincident with the longitudinal axis of said housing, means for supporting an elongated light source generally centrally and longitudinally within said reflector, said reflector being comprised of a plurality of adjoined differently shaped longitudinally extending light ray reflecting portions extending longitudinally along each of its sides, said light ray reflecting portions being located with respect to an inserted elongated light source to reflect incident light rays in avoidance thereof and at an angle less than the cut-off angle of the reflector, and each side of said reflector having at least two light ray reflecting portions formed to direct reflected light rays to one side of an inserted elongated light source.

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