Jan. 2, 1951 J. H. CANNON 2,536,533

DIRECTIONAL-BEAM LIGHTING UNIT

Filed May 13, 1946

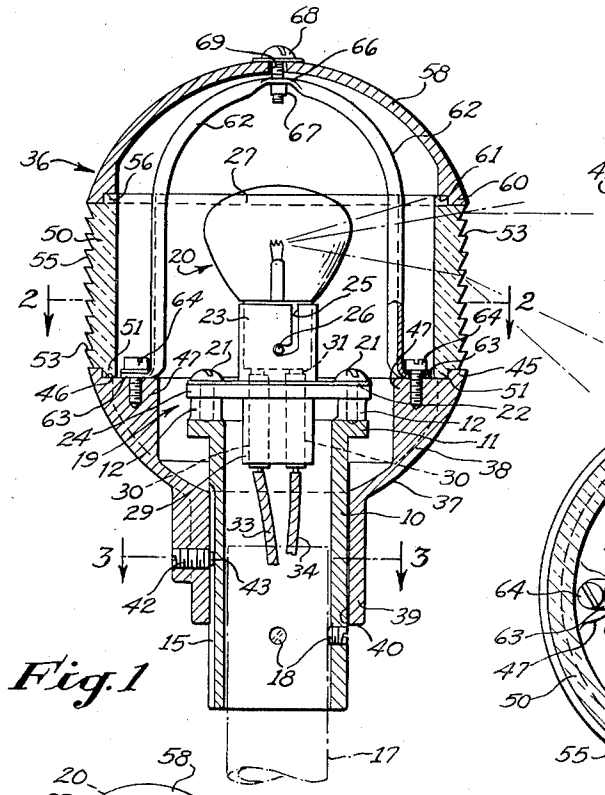


Fig. 1

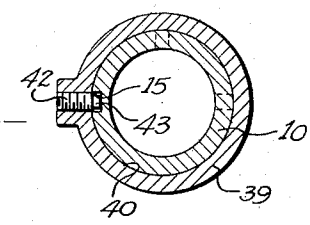


Fig. 3

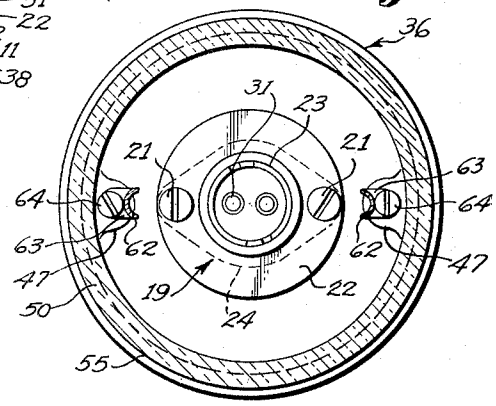


Fig. 2

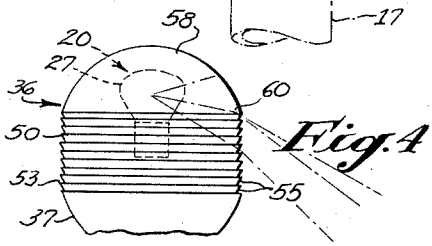


Fig. 4

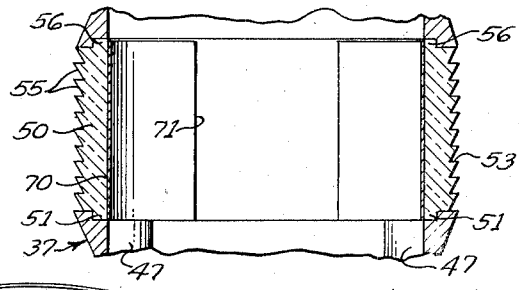


Fig. 7

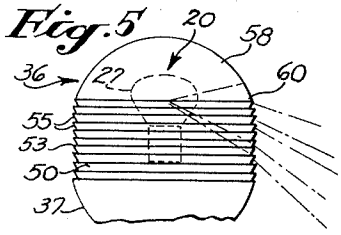


Fig. 5

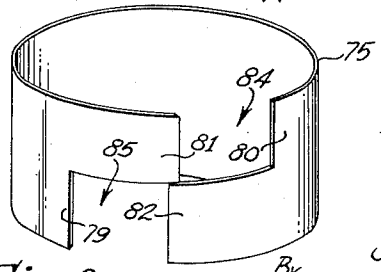


Fig. 8

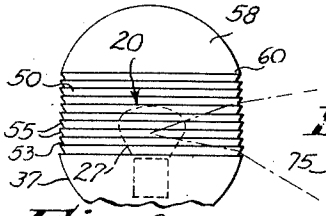


Fig. 6

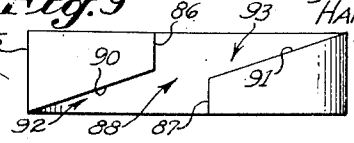


Fig. 9

INVENTOR:
JAMES H. CANNON.,
By HARRIS, KIECH, FOSTER & HARRIS.,
FOR THE FIRM
ATTORNEYS

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DIRECTIONAL-BEAM LIGHTING UNIT

James H. Cannon, Pasadena, Calif.; Citizens National Trust & Savings Bank of Los Angeles and Robert J. Cannon executors of said James H. Cannon, deceased

Application May 13, 1946, Serial No. 669,257

13 Claims. (Cl. 240—11.2)

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My invention relates generally to illuminating devices and particularly to a lighting unit especially adapted for use in illuminating steps, paths or circular areas.

One object of the invention is to provide a lighting unit capable of transmitting a circular beam of light for flood-lighting an area surrounding the unit or for directing one or more beams of light concentrated in selected directions to illuminate various objects or areas.

Another object is to provide a lighting unit of the character referred to having a hollow body for enclosing a source of light such as an electric lamp, and a lens member forming part of the body and provided with inclined surfaces adapted to deflect rays of light emanating from the lamp and to transmit one or more beams of the deflected rays from the unit.

Another object is to provide a lighting unit of the type indicated having means for relatively adjusting the source of light and the lens member to vary the angle of deflection of the light rays whereby to change the direction of the beam or beams of light transmitted from the unit.

Another object is to provide a lighting unit of the type specified employing a reflector member which surrounds the lamp and which is provided with one or more openings for directing beams of light in one or more selected directions, to adapt same to inclined walks, step risers, or varying widths or contours of walks or driveways.

Another object is to provide a lighting unit of the class referred to which is of especially pleasing appearance and one which is composed of a minimum number of parts adapted for economical manufacture and convenient assembly.

Further objects of my invention will appear from the following specification and the drawing, which is intended for the purpose of illustration only, and in which:

Fig. 1 is a longitudinal mid-sectional view of a lighting unit constructed in accordance with my invention;

Fig. 2 is a cross-sectional view of the unit taken on line 2—2 of Fig. 1;

Fig. 3 is a cross-sectional view taken on line 3—3 of Fig. 1;

Figs. 4, 5, and 6 are small-scale side elevational views of the upper portion of the lighting unit showing the source of light and the lens member relatively adjusted to cause beams of light to be directed at various angles;

Fig. 7 is a vertical sectional view through a portion of the unit, showing a reflector or baffle

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disposed within the body for concentrating the light rays in a predetermined radial direction;

Fig. 8 is a perspective view of another form of reflector or baffle suitable for use in my improved lighting unit and providing openings for upward and downward projection of light; and

Fig. 9 is a perspective view of still another form of reflector or baffle particularly suited to the illumination of three adjacent areas of different elevation, e. g., a landing and steps descending and ascending therefrom.

My improved lighting unit comprises, in general, a hollow casing or body including a tubular support member, a base member adjustably mounted on the support member, a cover member or dome supported from the base member in spaced relation thereto, and a tubular lens member interposed between the base member and cover member, said lens member being provided with inclined peripheral light-deflecting surfaces, a source of light disposed within the body, said light-deflecting surfaces being adapted to deflect rays of light emanating from the source of light and to transmit a beam of the rays from the body, and adjusting means for effecting relative axial adjustment between the support member and the body to vary the angle of deflection of said rays of light whereby to change the direction of the transmitted beam.

Referring to the drawing in detail, my improved lighting unit comprises a tubular support member or post 10 provided with a peripheral flange 11 at its upper end and spaced screw-threaded bosses 12 projecting upwardly from the flange. The support member 10 has a longitudinally extending groove or channel 15 in its periphery. The support member or post 10 is adapted to be mounted for vertical adjustment on the upper end of a vertical electrical conduit 17, indicated by dotted lines in Fig. 1, and to be secured in adjusted position by means of set-screws 18 screwed through tapped holes in the support member and engaging against the side of the conduit.

The support member 10 is adapted to support a lamp mounting means 19 for mounting an electric illuminating means or source of light, indicated generally at 20. Fastened to the upper ends of the bosses 12 by means of screws 21 is the base 22 of a lamp socket member 23 and interposed between the base and the bosses is an insulating plate 24. The socket member 23 may be threaded to receive the screw-threaded base of a suitable electric lamp and the present drawing illustrates the socket member as pro-

vided with a bayonet slot 25 adapted to receive a pin 26 on the periphery of the base of an electric bulb or lamp 27. The plate 24 has a central boss 29 in which spring-actuated contact elements 30 are slidable, the contact elements being adapted to engage the contacts 31 of the lamp 27 in the usual manner. The lower ends of the contact elements are connected to electrical wires 33 and 34 enclosed within the conduit 17.

Slidably mounted on the support member 10 is a body or casing 36. The body 36 includes a base member 37 having a concavo-convex portion 38 and an axial hub portion 39 which has an axial bore 40 to adapt the base member to be mounted on the post or support member 10. A set-screw 42 screwed through a tapped hole in the side of the hub portion 39 has a reduced inner end 43 which is engageable in the groove 15 of the support member 10 to retain the base member 37 in adjusted position and to key the base member and support member together to prevent relative rotation therebetween. The upper concavo-convex portion 38 of the base member 37 surrounds the upper end of the support member 10 and its rim 45 is provided on its interior with an annular groove 46. The base member 37 also has a pair of threaded bosses or pads 47.

Supported by the rim 45 of the base member 37 is a tubular lens member 50, the lower end of which is provided with an annular projection 51 adapted to seat in the groove 46 of the base member to provide a tight joint. The lens member 50 may be made from glass or plastic material of a transparent or translucent nature and its periphery is provided with a plurality of circumferential grooves 53 having inclined light-deflecting surfaces 55. The inclined surfaces 55 are adapted to deflect the light rays emanating from the electric lamp 27 and to transmit a beam of the light rays radially from the lighting unit in a manner to be hereinafter explained. The upper end of the lens member 50 also has an annular projection 56.

A concavo-convex cover or dome member 58 is provided with a circumferential rim or lip 60 having an annular recess 61 for receiving the annular projection 56 of the lens member 50. It is thus seen that the base member 37, lens member 50 and dome member 58 together form the hollow casing or body of the lighting unit. These parts are held in assembled relation by means of an inverted U-shaped holder 62 having laterally bent feet 63 which rest upon the bosses 47 within the base member 37. Headed screws 64 passing through holes in the feet 63 are screwed into the threaded bosses 47 to secure the holder 62 to the base member 37. The holder 62 is preferably channel-shaped in cross section (Fig. 2) to provide strength and rigidity and its upper looped end is flattened as shown at 66 and the metal extruded to form a boss 67. The boss 67 is provided with a tapped hole for receiving the threaded end of a headed screw 68 which extends through a hole 69 at the center of the dome member. When the screw 68 is tightened, the dome member 58 is drawn downwardly toward the base member 37 to clamp the lens member 50 between these two members and when it is desired to insert a new lamp 27 into the body 36 the screw may be withdrawn to permit removal of the dome member 58 and the lens member 50. It will be noted that due to the interengaging portions of its parts 37, 50, and 58, the body 36 is substantially waterproof,

but should water enter the body it will descend into the base member 37 and drain out through the bore 40 to prevent short-circuiting of the electrical wiring and prevent leakage into the supporting conduit 17.

The lighting unit is adapted for use in illuminating circular zones and when used for such a purpose the body 36 may be adjusted vertically on the support member 10 to any of the positions shown in Figs. 1, 4, 5, and 6 to vary the position of the lamp 27 with respect to the lens member 50. To adjust the relative position of the lamp 27 and lens member 50, the set-screw 42 is loosened and the body or casing 36 is moved upwardly or downwardly on the support member 10, after which the set-screw is re-tightened to retain the parts in adjusted position. Relative axial movement between the lens member 50 and the lamp 27 causes the rays of light emanating from the lamp to strike the inclined deflecting surfaces 55 at different angles so that the angle of deflection of the rays is altered. For example, when the lamp 27 is located in lower position relative to the lens member 50 as shown in Fig. 6, the uppermost light rays diverge upwardly and the inclined surfaces 55 act to direct these rays radially outward at an angle slightly inclined with respect to the horizontal and to deflect other rays downwardly. The projected beam is capable of illuminating a relatively large area and will light objects arranged slightly above the height of the ighting unit.

When the parts of the device are adjusted to the position shown in Fig. 1, the upper boundary of the projected beam is determined by the lip 60 of the dome member 58 so that the upper rays of the beam will be directed substantially horizontally from the lighting unit and this is desirable when it is unnecessary to illuminate objects or zones above the elevation of the unit.

To produce a beam of light which is concentrated in an area or zone closer to and at a lower level than the lighting unit the parts are adjusted to cause the lamp 27 to be partially disposed within the dome member 58 as shown in Fig. 5. In this position of adjustment the lip 60 further disrupts the transmission of the uppermost light rays and the inclined surfaces 55 act to deflect the rays downwardly to produce a substantially conical beam capable of illuminating a smaller circular zone around the lighting unit.

When it is desired to illuminate a relatively small zone adjacent the lighting unit, the parts are adjusted to position the lamp further within the confines of the dome member 58 as shown in Fig. 4. It will be apparent by reference to Fig. 4 that the lip 60 further reduces the magnitude of the projected beam by entirely eliminating the uppermost rays of light and since the remaining rays are deflected downwardly by the inclined surfaces 55, the conical beam is concentrated in an area of relatively small compass adjacent the unit.

It is thus seen that my improved lighting unit is adapted to illuminate zones of various sizes and that the device may be readily adjusted to produce circular beams capable of lighting such areas. The adjustment previously described gives a wide range of diametrical control of light distribution, but in making an installation the height of riser pipe 17 is varied to meet required conditions. Thus a wider spacing of the units along the zone to be illuminated will require greater height to obtain continuity of illumined areas.

It is sometimes desirable to illuminate objects or relatively small zones to one side of the lighting unit or to illuminate selectively garden paths, aisles, or steps. The invention provides means for accomplishing this by directing a concentrated beam or beams substantially radially outward to "spotlight" such zones. This is accomplished by disposing within the cylindrical lens member 50 a reflector or baffle with one or more openings for the desired concentrated beam or beams. Such a reflector or baffle may be a strip of thin material fitting immediately inside the lens member 50. The configuration of this member will depend upon the light pattern to be emitted, and I prefer to employ a member sufficiently thin to be easily shaped by a scissors or tin snips to the desired contour for the particular installation. Alternatively, the reflector or baffle may be pre-cut to the desired configuration and supplied in this form with the lighting unit. Several forms of such reflectors or baffles will be hereinafter described. In all instances, such a member is partially or completely opaque. For example, it may be formed of colored transparent or translucent material, e. g., a colored plastic, or it may be formed of thin metal or other opaque material. In the latter instance, a light-reflective surface facing the light source is usually desirable, the preferred structure being a reflector or baffle made of thin chromium-plated zinc.

In Fig. 7 is shown a reflector or baffle, indicated by the numeral 70, designed to concentrate the light in a relatively small zone to one side of the lighting unit. Here, the reflector 70 is formed of a strip of material with spaced ends providing an opening or window 71 through which the light rays emanating from the source of light 27 may pass to the lens member 50 to be deflected thereby. In this embodiment, the window 71 is of rectangular outline to transmit a rectangular beam. The source of light 27 and the lens member 50 may be relatively adjusted to deflect the light rays adjustably in varying degree. When it is desired to use the lighting unit to illuminate long outdoor paths, driveways, or walks, the window 71 may be made larger, typically by using a substantially semi-cylindrical reflector 70 so that substantially one entire side is open. The lighting units are then disposed along one side of the zone to be illuminated and light will be emitted through the unobstructed portion of the lens member, typically about 180°. The spacing of the lighting units may be such as to provide overlapping of the end portions of the beams from adjacent units, the overlapping tending to equalize the illumination along the zone.

When the lighting unit is to be used for illuminating steps or areas disposed at different levels, the reflector or baffle may be shaped as in Fig. 8 or Fig. 9. In Fig. 8, for example, the reflector or baffle is indicated by the numeral 75 and is formed from a strip of suitable material having its ends notched as indicated at 79 and 80 to provide upper and lower projecting tabs 81 and 82, respectively. Each of the tabs is adapted to be positioned adjacent the respective notch of the opposite end of the strip when the strip is bent into circular form, as shown in Fig. 8. The tabs may overlap slightly to provide separate openings or windows 84 and 85 at different elevations. In this event, upper and lower light beams will be formed and these may be directed respectively to upper and lower steps or zones of different elevation. If the ends of the tabs 81 and 82 do not overlap, a central full-height beam will be produced in addition to the upper and lower beams previously mentioned.

In the embodiment of Fig. 9, the reflector or baffle 75 provides ends 86 and 87 spaced from each other to define a central light-transmitting zone 88. The ends 86 and 87 respectively provide tapered portions 90 and 91 which respectively bound lower and upper light-transmitting zones 92 and 93 disposed on opposite sides of the central light-transmitting zone 88. This arrangement is particularly desirable when the light beam from the central zone 88 reaches a landing, in which event the light from the lower and upper zones 92 and 93 will respectively flood steps descending and ascending from the landing. Still other arrangements of the reflector or baffle will be apparent to those skilled in the art.

A feature of the lighting unit of the invention is that the degree of deflection of the beam is adjustable without movement of the source of light 27, whereby such adjustment does not flex and tend to break the wires 33, 34 energizing the unit. In the present invention, the lamp-mounting means 19 is stationary on the end of the vertical conduit 17 carrying the wires, and adjustment is effected by unitarily moving the lens member 50 at its associated casing 36, such adjustment causing no movement of the wires or any connecting terminals.

It will be observed from the foregoing that my invention provides a particularly simple, yet efficient lighting unit adapted to illuminate various objects such as steps and paths, aisles, and circular areas. As a particular feature of improvement, the lighting unit is provided with a circular lens member having inclined peripheral light-deflecting surfaces and has means for effecting relative adjustment between the source of light and the lens member to change the angle of deflection of the rays of light whereby to control the direction of the beam of light transmitted from the unit. Moreover, the present invention provides means for controlling the magnitude of the light rays transmitted through the lens member and for eliminating upwardly directed rays of light to avoid glaring. As a further feature of improvement, the invention provides means for concentrating the light rays in one or more radial beams extending at different levels whereby to adapt the unit to illuminate objects, such as steps, which are arranged at different heights. Furthermore, the improved lighting unit is especially ornamental in design and thus may be utilized without detracting from the appearance of the area in which it is applied to use.

Although I have shown the lighting unit as embodied in a preferred form of construction, by way of example, it will be understood that it may be modified in various particulars without departing from the spirit of the invention. Consequently, I do not desire to be limited by the foregoing specification, but desire to be afforded the full scope of the appended claims.

I claim as my invention:

1. A lighting unit adapted to contain a source of light, said unit comprising: a base member; a cover member spaced from said base member to provide a circular opening therebetween; a cylindrical lens member disposed in said opening and provided with light-deflecting surfaces; means inside said lens member and extending between said base member and said cover member for clamping said lens member between said base and cover members, said base member, lens member, and cover member together constituting a

hollow casing externally exposed to the atmosphere; lamp mounting means including a tube for mounting said source of light within said casing, said source of light producing light rays reaching said lens member for deflection; and relatively slidable adjusting means for effecting relative axial adjustment between said source of light and said lens member to change the angle of deflection of said light rays, said adjusting means including a hollow neck depending from said base member and of a size to slidably receive said tube, clamping means for clamping said tube and neck together and a stop means for limiting the relative movement of said neck and tube.

2. A lighting unit adapted to contain a source of light, said unit comprising: a base member, a hollow dome member spaced from said base member to provide a circular opening therebetween; a cylindrical lens member disposed in said opening and provided with light-deflecting surfaces all sloping in the same direction to direct a beam of light rays downwardly when emanating at a position within said cylindrical lens member, said base member, lens member, and dome member forming a hollow casing exposed externally to the atmosphere; lamp mounting means for mounting said source of light within said casing; and means for relatively moving said lamp mounting means and said casing in a direction along the axis of said cylindrical lens member from a first position in which said source of light is disposed at least partially within said hollow dome member to a second position wherein said source of light is removed from said dome member and is disposed opposite said cylindrical lens member, said dome member providing a lower peripheral edge determining the position of the uppermost ray of the beam when said casing and lamp mounting means are in said first position.

3. A lighting unit adapted to contain a source of light, said unit comprising: a casing externally exposed to the atmosphere and provided with a peripheral opening; lamp mounting means for mounting said source of light within said casing substantially opposite said opening; a cylindrical lens member disposed in said opening to be exposed externally to the atmosphere, said cylindrical lens member providing light-deflecting surfaces all sloping in the same direction to deflect downwardly rays of light emanating from said source of light; and a curved light-impeding member extending at least partially around the interior of said lens member in contact with the interior thereof and providing ends having edges extending toward each other in a direction peripherally of said lens to form an opening between such edges through which rays of light from said source are exclusively delivered to said lens member for deflection.

4. A lighting unit as defined in claim 3 including means for changing the relative position of said lamp mounting means and said cylindrical lens member to vary the angle of deflection of said light rays.

5. A lighting unit as defined in claim 3 in which the ends of said light-impeding member provide edges spaced from each other to form a pair of openings spaced from each other peripherally of said cylindrical lens member.

6. A lighting unit as defined in claim 3 in which the ends of said light-impeding member provide edges spaced from each other to form a pair of openings spaced from each other peripherally of said cylindrical lens member, said openings being spaced from each other axially of said cylindrical lens member.

7. A directional lighting unit for mounting on the upper end of an upright electrical conduit and adapted to contain an electric light bulb energized from conductors extending upward in said electrical conduit, said lighting unit comprising: a tubular support member vertically movable on the upper end of said conduit; means for adjustably securing said tubular support member to the upper end of said electrical conduit; a base member providing an opening slidably receiving said support member; guide means for guiding said base member in its sliding movement on its support member and comprising a slot in one of such members and an element on the other of such members sliding along said slot; lamp mounting means for mounting said electric light bulb fixedly on said support member; a tubular lens member extending upward from said base member; a cover member above said tubular lens member; means extending between said base member and said cover member internally of said tubular lens member for clamping said tubular lens member therebetween; and means for clamping said support member and said base member together to hold same in an adjusted axial position of said electric light bulb with respect to said tubular lens member.

8. A lighting unit as defined in claim 7 in which said base member is a concavo-convex member and in which said cover member is a concavo-convex dome member.

9. A directional lighting unit for mounting exposed to the atmosphere and on the upper end of an upright electrical conduit and adapted to contain an electric light bulb energized from conductors extending upward in said electrical conduit, said lighting unit comprising: a tubular support member; means for clamping said tubular support member on the upper end of said electrical conduit; a base member providing a tubular hub portion slidably movable on said support member from a position exposing said clamping means to a position covering said clamping means; lamp mounting means detachably connected to said support member for mounting said electric light bulb fixedly on said support member; a tubular lens member having light deflecting surfaces and extending upward from said base member; a cover member above said tubular lens member; and means extending between said base member and said cover member inside said tubular lens member for clamping said lens member between said base member and said cover member, said base member, lens member and cover member together constituting a hollow casing exposed externally to the atmosphere and axially adjustable relative to said support member and its electric light bulb by sliding of said base member on said support member.

10. A directional lighting unit for mounting on the upper end of an upright electrical conduit and adapted to contain an electric light bulb energized from conductors extending upward in said electrical conduit, said lighting unit comprising: a tubular support member surrounding and adapted to be connected rigidly to the upper end of said electrical conduit; a base member slidably adjustable on said support member, said base member including means for clamping said members together in adjustable relationship and said support member having a peripheral flange disposed within the base member and extending into the locus of motion of said base member to

act as a stop preventing withdrawal of said base member from said support member; lamp mounting means connected to said support member for mounting said electric light bulb fixedly on said support member; a tubular lens member extending upward from said base member; a cover member above said tubular lens member; and an inverted U-shaped holder member having its leg ends connected to said base member and its upper looped portion adjustably connected to said cover member to clamp said lens member between said cover member and said base member.

11. A directional lighting unit for mounting on the upper end of an upright electrical conduit and adapted to contain an electric light bulb energized from conductors extending upward in said electrical conduit, said lighting unit comprising: a tubular support member surrounding and adapted to be connected rigidly to the upper end of said electrical conduit; a base member slidably adjustable on said support member; means for clamping said members together in adjustable axial relationship, said base member including a pair of spaced interior bosses; lamp mounting means connected to said support member for mounting said electric light bulb fixedly on said support member; a tubular lens member extending upward from said base member; a cover member above said tubular lens member; and an inverted U-shaped holder member having its leg ends connected to said base member bosses and its upper looped portion adjustably connected to said cover member to clamp said lens member between said cover member and said base member.

12. A directional lighting unit for mounting exposed to the atmosphere and on the upper end of an upright electrical conduit and adapted to contain an electric light bulb energized from conductors extending upward in said electrical conduit, said lighting unit comprising: a tubular support member and means for securing same to the upper end of said electrical conduit, said support member having a longitudinally extending groove in its periphery; a base member exposed externally to the atmosphere and providing an opening slidably receiving said support member, said base member having a tapped hole in its hub portion and a set screw therein engageable in said support member groove for slidably adjusting the axial position of said base member relative to said support member; lamp mounting means for mounting said electric light bulb fixedly on said support member; a tubular lens member having light deflecting surfaces and extending upward from said base member, said lens member being externally exposed to the atmosphere and being axially adjustably positioned relative to said electric light bulb by the slidable adjustment of said base member; a cover member above said tubular lens member and exposed externally to the atmosphere; and means inside said tubular lens member for clamping said lens member between said cover member and said base member.

13. A lighting unit adapted to contain a source of light, said unit comprising: a casing provided with a peripheral opening; lamp mounting means for mounting said source of light within said casing substantially opposite said opening; a cylindrical lens member disposed in said opening and provided with light-deflecting surfaces, said lens member being adapted to deflect rays of light emanating from said source of light; and a curved light impeding member extending at least partially around the interior of said lens member in contact therewith, said light-impeding member having ends notched at different elevations to provide tabs overlapping each other and each extending only partially into an opposed notch to define a plurality of separate openings between the ends of said tabs and the bottoms of the opposed notches through which rays of light from said source are delivered to said lens member for deflection.

JAMES H. CANNON.

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