July 30, 1968 D. E. WELTY 3,395,273

REFRACTOR STREET LIGHTING LUMINAIRE

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FIG. 1

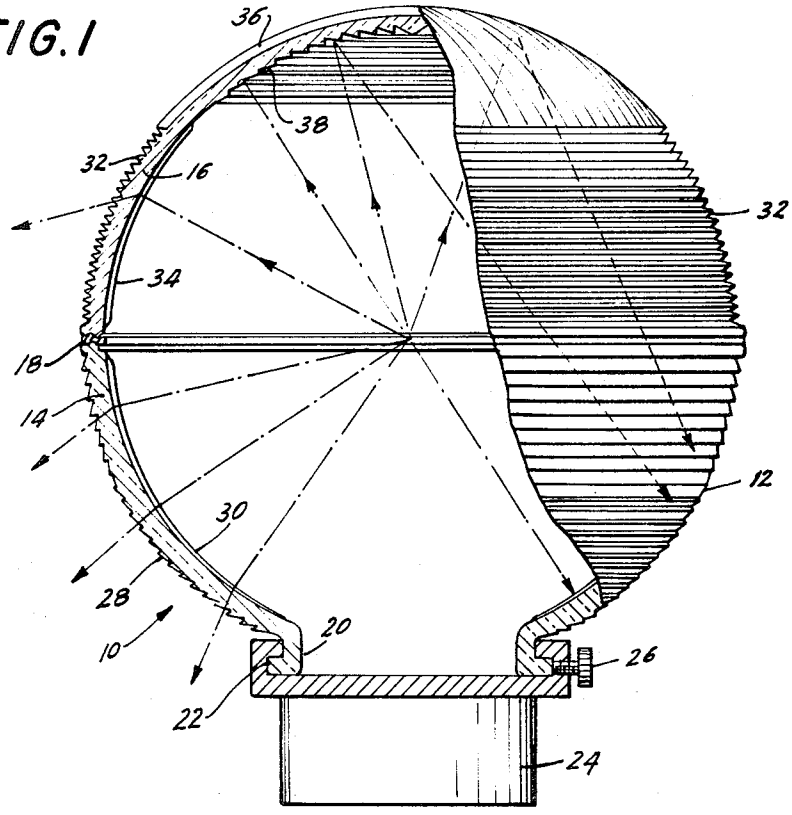
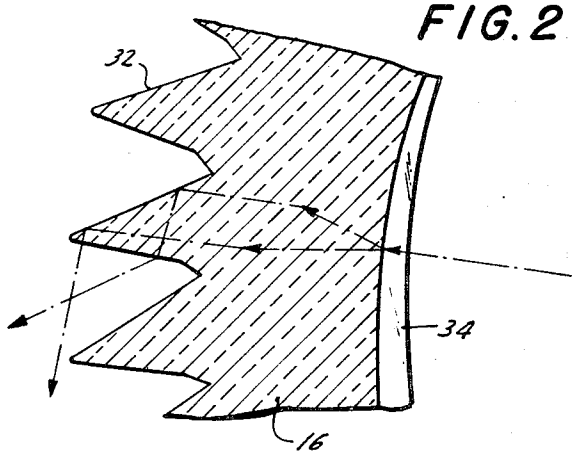


FIG. 2



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FIG. 3

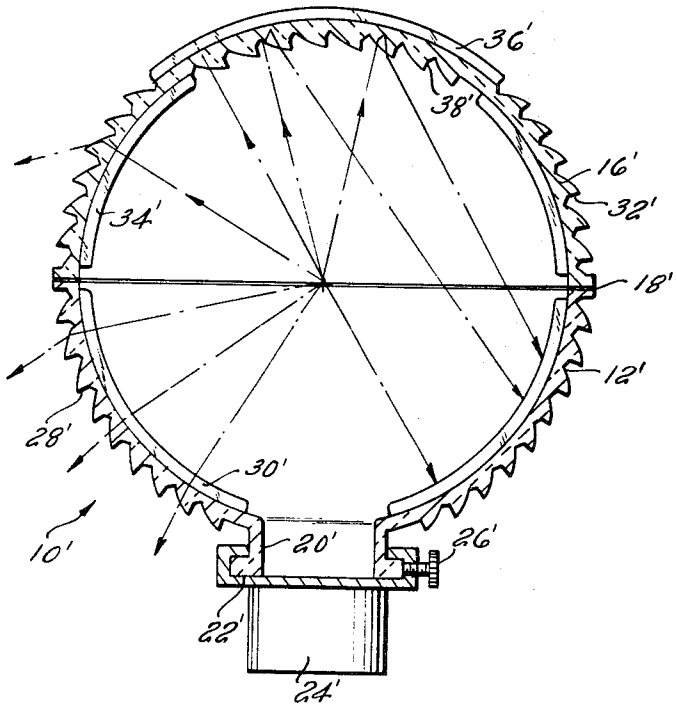
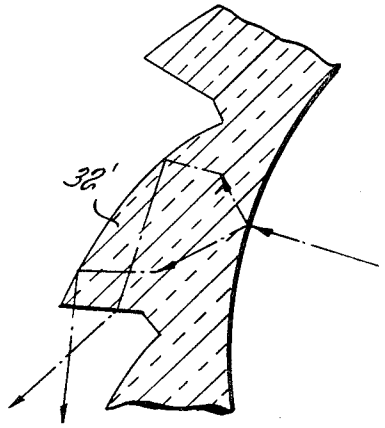


FIG. 4



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REFRACTOR STREET LIGHTING LUMINAIRE

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ABSTRACT OF THE DISCLOSURE

A street-lighting refractor adapted to be mounted on top of a post. The refractor has a hollow substantially spherical globe consisting of a transparent wall having an open bottom portion surrounding a central axis and adapted to be mounted on the upper end of a post. This transparent wall carries prismatic light-directing means which in the lower half of said globe constitute means for forming a beam from direct light to provide proper fill below beam direction as well as for receiving reflected light from the upper half of the globe. This prismatic means also provides lateral light distribution to provide diffusion of the light for concealing the lamp and reducing glare. The prismatic means includes in the upper half of the globe light-directing prisms constituting means for directing light downwardly from a lower portion of the upper globe half and additional prisms situated at an upper portion of the upper globe half and constituting means for directing light downwardly to the lower globe half while avoiding the lower opening of the globe, so that a minimum amount of light is directed toward the top of the post.

The present invention relates to street-lighting.

In particular, the present invention relates to a refractor which is adapted to be mounted on top of a post.

It is an object of the invention to provide a refractor of this type which will provide a totally luminous street-lighting arrangement having substantially no metal parts situated above the lamp.

Thus, it is an object of the invention to provide the refractor of the above type which will increase the size of the light source while reducing glare.

The refractor of the invention is in the form of a hollow substantially spherical globe consisting of a transparent wall having a lower opening with the bottom end of the globe which surrounds this lower opening being connected to the top of a post with a lamp extending into the interior of the refractor. In accordance with the invention, the globe has prismatic light-distributing control means which provides proper fill from direct light at the lower portion of the globe and which has at the upper portion of the globe prismatic controls directing light down to the lower portion, avoiding the upper part of the post, so that a minimum amount of light is wasted while the control means also provides proper lateral distribution of the light.

The invention is illustrated by way of example in the accompanying drawings which form part of the application and in which:

FIG. 1 is a sectional elevation of one possible structure according to the invention schematically illustrated with a fitter for the top of a post, the section of FIG. 1 being taken in a vertical plane which includes the center of the refractor;

FIG. 2 shows on an enlarged scale a section of the wall of the refractor to illustrate in greater detail part of the prismatic structure;

FIG. 3 is a sectional elevation of another embodiment of a structure according to the present invention; and

FIG. 4 shows on an enlarged scale, as compared to

FIG. 3, a section of the wall of the refractor so as to illustrate in greater detail part of the prismatic structure thereof.

Referring now to the drawings, the refractor **10** illustrated therein includes a globe **12** made of a transparent wall material, such as glass which is clear, which has prismatic control means to obtain maximum light transmission and utilization on the street or other desired areas such as malls, city parks, etc. The refractor **10** can take the form of a sphere which is uniformly constructed with respect to the center of the sphere, while having prismatic structures providing desired light distribution.

The refractor **10** formed by the clear glass globe **12** includes a lower half **14** and an upper half **16** which are fastened together in a horizontal plane **18** which passes through the maximum diameter of the globe **12**. The bottom half **14** has a knockout opening **20** formed at its bottom end and surrounding a vertical central axis containing the center of the globe. At its bottom end the globe has an outwardly directed flange **22** adapted to be fastened to the top of an unillustrated post by way of a suitable post top fitting **24** schematically indicated in FIG. 1 and provided with a thumb screw **26** for releasably holding the refractor fixed to the top end of the post. The lamp and socket extend upwardly through the opening **20** so as to place the light center at or near the center of the spherical interior of the refractor **10**. While the two halves **14** and **16** may be fastened together with a metal or plastic band, it is preferred to cement or weld them together at the horizontal plane **18**, since in this way there will not be any opaque ring around the center of the sphere.

The refractor of the invention carries a prismatic light-control means which includes in the bottom half **14** conventional circumferentially extending horizontal refracting prisms **28** situated at the exterior surface of the bottom half **14** of the globe respectively in horizontal planes normal to the central axis so as to form a beam from direct light and to provide the proper fill below beam direction. These prisms **28** also handle reflected light received from the top half **16**, as described below. At its interior the lower half **14** of the refractor is provided with radial prisms **30** respectively situated in vertical planes which contain the central axis used to obtain the proper lateral distribution and also to provide diffusion for concealing the lamp and "flashing" larger areas of the refractor to reduce glare.

The top half **16** of the globe is provided also with portions of the prismatic control means of the invention, and at the upper half **16** this control means includes exterior reflecting-refracting prisms **32** which extend upwardly from the central flange to approximately 40° above the horizontal, these prisms also extending horizontally circumferentially around the refractor respectively in horizontal planes normal to the central axis. A typical prism **32** is indicated in FIG. 2. The upper surface is inclined so as to reflectively spread the light from beam direction downwardly through the lower surface which refracts the spread light through lateral angles to light the area below. These prisms will light up the top half of the refractor when viewed from the ground. This lower portion of the upper half **16** is provided at its interior with radial prisms or flutes **34** which spread the light laterally and make the entire globe luminous from normal viewing angles. The required prism angles at the exterior, as shown in FIG. 2, are of such a configuration that the mitre in the mold is very sharp. In order to strengthen the mitre, a small portion of the bottom surface of each prism is cut at a steeper angle, as indicated in FIG. 2

The upper portion of the upper refractor half **16** is

provided with a portion of the prismatic control means in the form of exterior radial reflecting prisms **36** oriented perpendicularly with respect to prisms **32** and distributed in the manner shown in FIG. 1 across the space surrounded by the uppermost one of the lower prisms **32** respectively in vertical planes containing the central axis. In conjunction with these reflecting prisms the refractor has interior prisms of varying depths to reflect and refract the reflected light from the reflecting prisms **36** toward the bottom half of the refractor and away from nadir for use in the street. These inside prisms **38** thus make it possible to utilize light which would normally be reflected toward the lamp socket and fitting **24**. Prisms **38** are oriented perpendicularly with respect to prisms **34** and **36** and are respectively situated in planes which are parallel to the central axis of the globe. The lines of the drawings which carry the arrowheads indicate the direction in which the light travels.

In the embodiment of FIGS. 3 and 4, it will be seen that there are groups of prisms corresponding to those of FIGS. 1 and 2, but having a different configuration. The reference characters of FIGS. 3 and 4 correspond to those of FIGS. 1 and 2 and indicate the same groups of prisms, the corresponding reference characters of FIGS. 3 and 4 being primed. Thus, the lower section **12'** of FIG. 3 has the horizontal circumferential prisms **28'** curved differently from the prisms **28** of FIG. 1, and in addition the lower section **12'** has the interior radial prisms **30'**. The upper section of FIG. 3 has the exterior upper prisms **36'** corresponding to the prisms **36** and the horizontal circumferential prisms **32'**. In the interior of the upper section **16'**, there are the upper prisms **38'** corresponding to the prisms **38** and the radial prisms or flutes **34'**, and of course the sections of FIG. 3 are joined by the adhesive **18'** which corresponds to the adhesive **18** of FIG. 1.

As may be seen from FIG. 4, the circumferential prisms **32'** have upper convexly curved surfaces providing a somewhat different direction of movement for the light, as indicated by the arrows in FIG. 4.

What is claimed is:

1. A street-lighting refractor comprising a hollow substantially spherical globe consisting of a transparent wall having an open bottom portion surrounding a central globe axis and adapted to be mounted adjacent the upper end of a post, said transparent wall carrying prismatic light-directing means which in the lower half of said globe constitute means for forming a beam from direct light to provide proper fill below beam direction as well as for receiving reflected light from the upper half of said globe, and said prismatic means also providing lateral light distribution to provide diffusion of the light for concealing the lamp and reducing glare, said prismatic means including in the upper half of said globe light-directing prisms constituting means for directing light downwardly from a lower portion of said upper globe half and additional prisms situated at an upper portion of said upper globe half and constituting means for directing light downwardly to the lower globe half while avoiding the lower opening of said globe so that a minimum amount of light is directed toward the top of the post.

2. A refractor as recited in claim **1** and wherein said prismatic means includes at the lower half of said globe exterior prisms extending around said central axis and interior radial prisms respectively situated in planes which contain said central axis, said prismatic means including in the upper half of said globe at the lower portion of said upper half up through a distance of approximately 40° above the largest horizontal diameter of the globe exterior circumferential prisms surrounding said central axis and interior radial prisms respectively situated in planes which contain said central axis and in the upper portion of said upper half of said globe interior prisms respectively situated in planes parallel to said central axis and oriented perpendicularly with respect to said radial prisms in said lower portion of said upper globe half for refracting light down to the lower globe half at its portion which surrounds its bottom opening and exterior radial prisms respectively situated in planes containing said central axis and distributed between and oriented perpendicularly with respect to the exterior horizontal prisms in the lower portion of said upper globe half.

3. The combination of claim **2** and wherein the exterior prisms at the lower-portion of said upper globe half are of substantially V-shaped cross section and respectively have lower surfaces provided with innermost circumferential portions at a steeper angle than the remainder of the bottom surfaces of said prisms, respectively.

4. The combination of claim **3** and wherein all of the exterior surfaces of said exterior circumferential prisms of the lower portion of said upper globe half are straight in any plane which contains said central axis.

5. The combination of claim **3** and wherein the exterior upper circumferential surface of each exterior circumferential prism at the lower portion of said upper globe half has a convexly curved configuration in any plane which contains the central globe axis.

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