W. HARRISON.

LIGHTING UNIT.

APPLICATION FILED FEB. 20, 1917.

1,299,936.

Patented Apr. 8, 1919.

Fig. 1

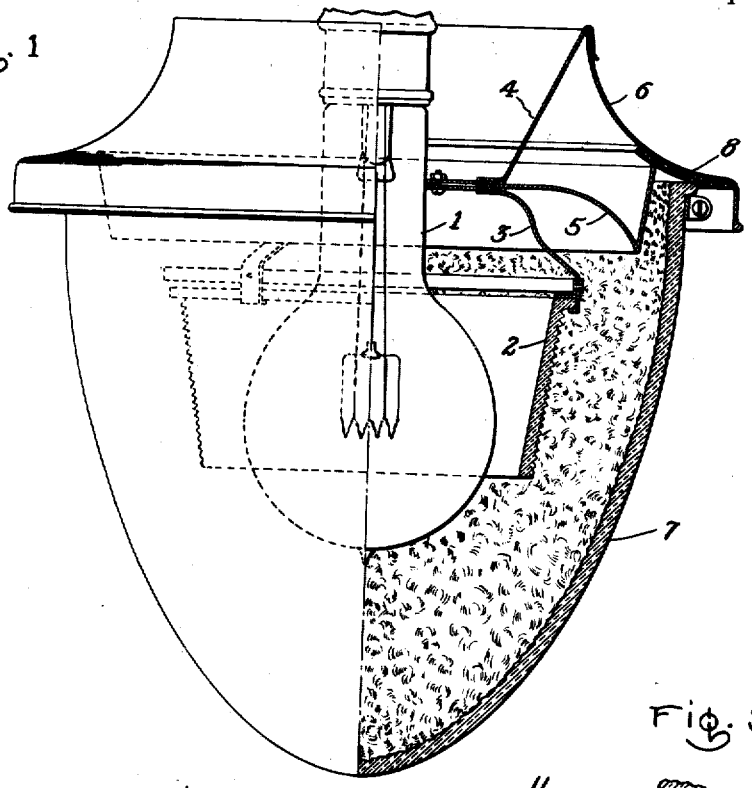


Fig. 3

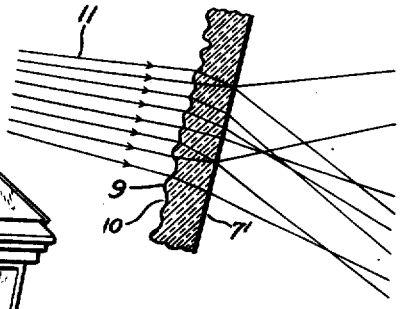
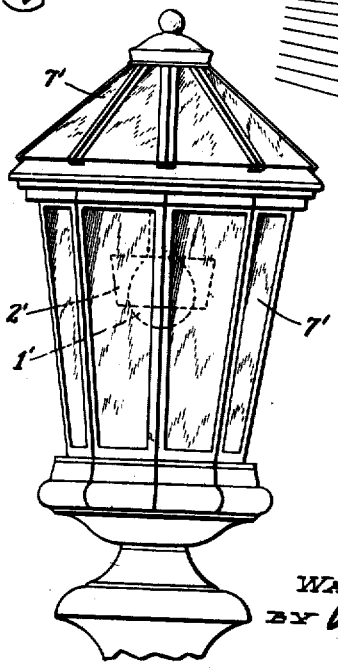


Fig. 2



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LIGHTING UNIT.

1,299,936. Specification of Letters Patent. Patented Apr. 8, 1919.

Application filed February 20, 1917. Serial No. 149,928.

To all whom it may concern:

Be it known that I, WARD HARRISON, a citizen of the United States, residing at East Cleveland, in the county of Cuyahoga, State of Ohio, have invented certain new and useful Improvements in Lighting Units, of which the following is a specification.

My invention has reference to improvements in lighting units, designed to overcome the defects of fixtures, heretofore used.

When an intense source of light is used in a lighting fixture, the transmission of light is usually modified by shades, refractors, globes, etc., with the view of directing the light to regions where the illumination is mostly needed, and diverting it from regions where the illumination is either not required or is objectionable. Thus, for instance, in street lighting the aim is to direct the main part of the light to the hemisphere below the horizontal plane passed through the source, and it is desirable in this case to avoid the glare which the direct rays from the source would produce. For all these purposes it has been suggested that refractors of definite geometrical design be placed in the path of the rays from the source by which indeed the light was directed, mainly below the horizontal plane. In addition to this, or independently thereof, a diffusing globe, either opalized or sand-blasted or etched was used, whereby the source of light as such became practically invisible. The fixture acted upon the eye as if the diffusing medium itself were the source of light, that is to say, a much larger source of light, which therefore had only a comparatively low intrinsic luminosity. All this was desirable, but a great loss of light resulted from the use of such globes. The diffusing globe alone, without the refracting medium was mainly used in connection with a light source, which, without the aid of refractors directed the light rays into the desired region below the horizontal plane. Of these sources of light the magnetic lamp is a good example.

The opalized globes absorb a great portion of the light emitted by the source. The sand-blasted or etched globes absorb less of the light emitted by the source, but have the objections that the light transmitted therethrough is more or less streaked. Moreover in practice such globes have proven impossible to keep presentably clean.

By my invention these difficulties are overcome by the use of a globe in combination with a refractor. The globe is formed by molding into its surface rather small protuberances and depressions, whereby each protuberance is more or less rounded and merges into the depressions in a smooth and gradual manner. The light passing through such a globe is not resolved into its elements, since all sharp edges formed by the intersection of small plane surfaces are absent. Globes of this character absorb less of the light received by the same than either the opalized or the sand-blasted or etched glass globes. But if the light is transmitted in a direction, at or below the horizontal, these globes do not appreciably modify the direction of the rays. When such globe is used in conjunction with a definite refractor the refracting rays reaching the globe retain the general direction given to the same by the refractor.

For a better understanding of my improved lighting unit reference may be had to the illustrations accompanying this specification. Figure 1 of which shows one type of unit embodying my invention; Fig. 2 shows another type of unit; Fig. 3 is an enlarged sectional view of a portion of the protective globe illustrating the directions of a number of light rays passing therethrough.

Referring to Fig. 1, the lower part of a fixture is shown which is particularly adapted to the housing of a high efficiency incandescent lamp 1. Closely surrounding the lamp bulb is a band refractor 2, the latter being supported in any convenient manner, as for instance by strips 3, which engage an annular shoulder on the top of the refractor and are equally spaced apart by a suitable spacing ring as shown. The upper ends of strips 3 are conveniently bolted to downwardly depending supporting strips 4, and between the adjacent ends of these strips is secured a reflector 5 which is adapted to intercept the upward rays and direct them downwardly in useful directions. The reflector 5 and strips 3 and 4 are adapted to be suspended as a unit from the top of a flar-

ing outer shell 6, it being understood that the shell 6 is adapted to fit into and be secured to a standard fixture of the type shown in Fig. 4. Surrounding the lamp 1 and band refractor 2 is a larger outer protective and light scattering globe 7 which is adapted to be secured to the interior of the shell 6. A suitable dust proof packing, as for instance felt 8, is located between the upper rim of the globe 7 and the shell. In Fig. 2 is illustrated a fixture especially designed for street lamps which embodies also an incandescent lamp 1′ and a band refractor 2′, illustrated in dotted lines, which are inclosed within an outer globe 7′. In this case the globe 7′ consists of a number of glass panes suitably assembled together to form a closure of octagonal contour. In both cases the globe embodies on its interior surface refracting media for producing irregular refraction or bending of the rays in every imaginable direction. These refracting media consist, as shown in Fig. 3 on an exaggerated scale, of a multiplicity of minute merging hills 9 and valleys 10. The rays of light 11 in passing through the globes are bent in various directions in some such manner as is indicated in the vertical plane illustrated in Fig. 3, from which it will be apparent that the general direction of the rays before encountering the globe is substantially preserved. It is understood that these hills and valleys are of such small dimensions and so numerous that practically every light ray entering the glass encounters the glass at an inclination different from every other ray and at an inclination so small as to avoid internal reflections and consequent internal losses which are especially noticeable in prismatic and other diffusing glassware. Substantially every ray is transmitted through the globe, as indicated in Fig. 3, and the efficiency, therefore, of transmission is practically the same as if both surfaces of the glass were plain, whereas the irregular refraction indicated results in the blurring of the most intense light source in such a manner that its outlines are obliterated and the unit is rendered pleasing and harmless to the eyes of the observer. The irregular refractor or globe, therefore, does not substantially affect the directional value of the unit when all of the light is considered and the full effect of the directive value of the band refractor 2 for directing the light below the horizontal is given to the unit, resulting in a distribution particularly adapted to street and certain industrial lighting. As said above, these irregularly formed hills 9 and valleys 10 are pressed into the glass during the process of molding as distinguished from sand-blasting and etching or other types of diffusing glassware. The formation of these refracting media by pressing results in the elimination of sharp points and crevices, which in the sand-blasted and etched and prismatic glassware, in addition to causing streaking cause considerable inconvenience, due to the difficulty of dislocating dirt and foreign matter collected therein. Furthermore, losses by internal reflections are avoided and the characteristic lifeless appearance of diffusing glass is eliminated. It is understood that one of the coöperating mold forms used in making the glassware has irregular hills and valleys formed thereon which correspond to the refracting media 9 and 10 illustrated in Fig. 3. In the case of the panes 7′ illustrated in Figs. 2 and 3 these refracting media are incorporated in the rolling or pressing process, and in the case of the globe illustrated in Fig. 1, this is accomplished in the pressing operation by incorporating on the plunger of the mold an irregular surface which corresponds to the irregularly refracting surface formed on the interior of the globe. The moldmaker goes over the entire surface of the plunger with some convenient tool, as for instance, a chisel or milling tool, and forms thereon numerous little depressions, or cavities, as close together as it is practicable to make them, these little depressions corresponding to the hills or bulbular projections 9 formed on the interior of the glass globe. These depressions or indentations on the plunger literally cover the entire surface and are made of small dimensions for a double purpose. In the first place, the sticking of the plunger during the process of molding the globe is entirely avoided, by making the depth of the depressions as small as possible, and, second, the resultant minature refracting media on the interior of the globe, while producing irregular refraction, do not give rise to internal reflections and there are no resultant sharp points or crevices to interfere with the cleaning of the globe.

It has been found that the appearance of the globe may be somewhat improved by incorporating a very slight amount of white coloring material in the glass batch from which it is made so as to make the globe slightly opal.

What I claim as new and desire to secure by Letters Patent of the United States, is:—

1. A lighting fixture for housing a highly intense artificial light source comprising a band refractor closely surrounding the source for modifying the distribution of the light rays and a larger outer protective inclosing glass globe surrounding said source and refractor and having incorporated therein media for producing diffusion of the light rays without impairing the directional value of the unit.

2. A lighting fixture comprising an artifi-

cial light source, a prismatic refractor surrounding said light source shaped to direct the light rays from said source in a desired general direction, and a diffusing element in the path of the directed light rays provided with protuberances and depressions which gradually merge into each other whereby the light rays received by said element are caused to pass through the same without substantial deviation from the general direction given to them by the directing means.

In witness whereof, I have hereunto set my hand this 17th day of February, 1917.

WARD HARRISON.

Correction in Letters Patent No. 1,299,936.

It is hereby certified that in Letters Patent No. 1,299,936, granted April 8, 1919, upon the application of Ward Harrison, of East Cleveland, Ohio, for an improvement in "Lighting Units," an error appears in the printed specification requiring correction as follows: Page 1, line 46, for the word "magnetic" read *magnetite;* and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 6th day of May, A. D., 1919.

[SEAL.]

R. F. WHITEHEAD,

Acting Commissioner of Patents.

Cl. 240—92.