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[Continued on next page]

(54) **Title:** A LIGHTING APPARATUS INCLUDING LED'S AND A REFLECTOR ASSEMBLY

(57) **Abstract:** An LED light source is positioned at a light entry of a reflector assembly having at least one compound elliptical reflector surface to produce a smooth asymmetric light beam for illuminating, e.g., a wall.

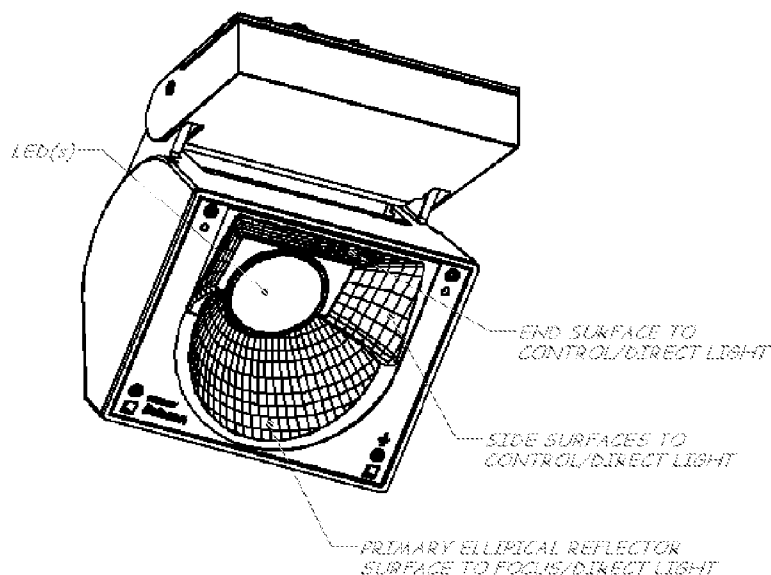


FIG. 1



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## A LIGHTING APPARATUS INCLUDING LED'S AND A REFLECTOR ASSEMBLY

Traditional backdrop (CYC) and wall wash lighting products use an elliptical reflector with a linear tungsten halogen or metal halide lamp source to produce an asymmetric  
5 light distribution to produce a smooth and even beam up/down and across a given surface.

To date, units with light emitting diodes (LED) light sources have employed arrays of LEDs mounted with either singular or multiple lenses to provide an asymmetric distribution with limited success.

LEDs modified to provide an asymmetric light beam through use of  
10 conventional methods produce an uneven distribution that is of a lower quality relative to a conventional tungsten halogen or Metal Halide light sources.

The current LED-based solutions also provide multiple shadows and a lack of beam/light homogeneity.

15 The essential feature of this invention is the use of an LED light source(s) with a multi-surface reflector having one or more elliptical surfaces to direct the light beam from the LED light source(s) into an asymmetric distribution that is smooth and even, lighting up/down and across a given surface.

The lighting apparatus can be used by itself or enhanced through use of multiple  
20 lighting apparatus to provide an illusion of infinity (even and smoothly blended lit surface).

This optical distribution system can be utilized in all lighting applications where a smooth and even beam is required on a surface, where the luminaire is located above and/or below or to the side of the surface being lit.

25 With the above and additional objects and advantages in mind as will hereinafter appear, the invention will be described with reference to the accompanying drawings, in which:

Fig. 1 is a front perspective view of the lighting apparatus of the subject invention;

30 Fig. 2 is a front view of the lighting apparatus of Fig. 1; and

Fig. 3 is a cross-sectional view of the lighting apparatus taken along the line A-A in Fig. 2.

An LED light source, which may be formed by an array of LEDs, is placed adjacent to the base (light entrance) of a reflector assembly. The reflector assembly contains one or more elliptically-shaped surfaces to control the light beam emanating from the LED light source and to direct the light beam into an asymmetric distribution pattern. In a preferred embodiment as shown in Fig. 1, the elliptically-shaped surfaces include a primary elliptical reflector surface, side elliptical reflector surfaces, and an end (or top) elliptical reflector surface. Each of the reflector surfaces may be formed by a single smooth element. However, in the preferred embodiment, each of the reflector surfaces is formed by a plurality of rectangular flat elements, schematically shown in Figs. 1-3. Such an arrangement enables a better control of color mixing.

In a further embodiment, the lighting apparatus includes a diffuser and/or holographic disk positioned between the LED light source and the reflector assembly to further manipulate the light beam/distribution.

Although this invention has been described with reference to particular embodiments, it will be appreciated that many variations will be resorted to without departing from the spirit and scope of this invention as set forth in the appended claims. The specification and drawings are accordingly to be regarded in an illustrative manner and are not intended to limit the scope of the appended claims.

In interpreting the appended claims, it should be understood that:

- a) the word "comprising" does not exclude the presence of other elements or acts than those listed in a given claim;
- b) the word "a" or "an" preceding an element does not exclude the presence of a plurality of such elements;
- c) any reference signs in the claims do not limit their scope;
- d) several "means" may be represented by the same item or hardware or software implemented structure or function;
- e) any of the disclosed elements may be comprised of hardware portions (e.g., including discrete and integrated electronic circuitry), software portions (e.g., computer programming), and any combination thereof;
- f) hardware portions may be comprised of one or both of analog and digital portions;
- g) any of the disclosed devices or portions thereof may be combined together or separated into further portions unless specifically stated otherwise; and
- h) no specific sequence of acts is intended to be required unless specifically indicated

## CLAIMS:

1. A lighting apparatus comprising:  
a light source formed by at least one light emitting diode (LED) for generating a light beam; and  
a reflector assembly having at least one elliptically-shaped surface to control a light beam from the light source and to direct the light beam into an asymmetric distribution pattern.
2. The lighting apparatus as claimed in claim 1, wherein the light source is formed by an array of LEDs.
3. The lighting apparatus as claimed in claim 1, wherein the reflector assembly comprises:  
a primary elliptical reflector surface to focus and direct the light beam from the light source;  
two elliptical side surfaces to control and direct the light beam; and  
an elliptical top surface to control and direct the light beam.
4. The lighting apparatus as claimed in claim 1, wherein the lighting apparatus further comprises:  
a diffuser disk positioned between the light source and the reflector assembly through which the light beam from the light source passes.
5. The lighting apparatus as claimed in claim 1, wherein the lighting apparatus further comprises:  
a holographic disk positioned between the light source and the reflector assembly through which the light beam from the light source passes.

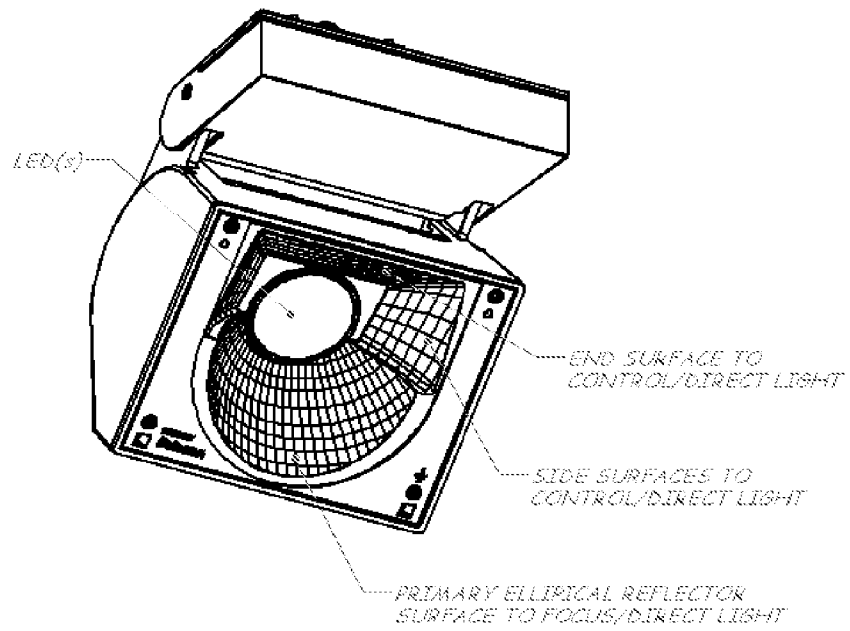


FIG. 1

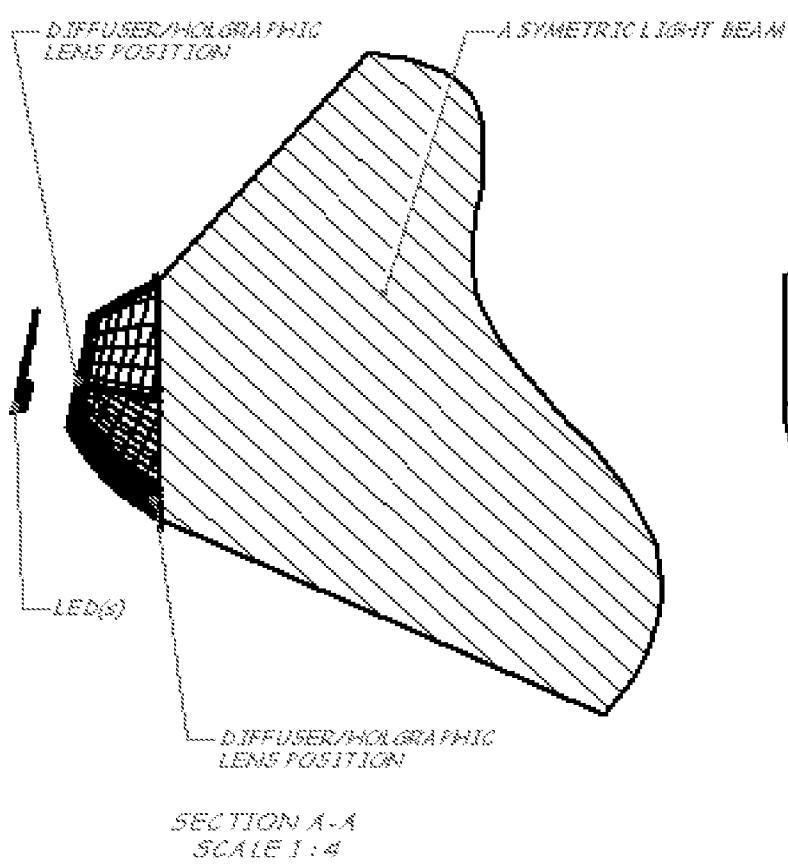


FIG. 3

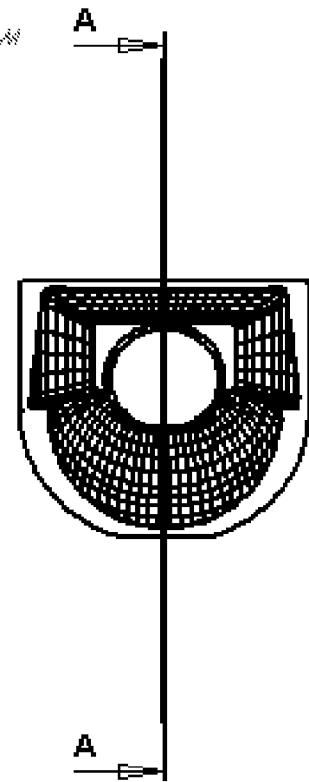


FIG. 2