

[54] **MULTIFLASH DEVICE FOR CLOSE-UP PHOTOGRAPHY**

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 [51] Int. Cl. **G03b 15/02**
 [58] Field of Search 240/1.3; 95/11 L;
 260/41 B; 431/92

[56]

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UNITED STATES PATENTS

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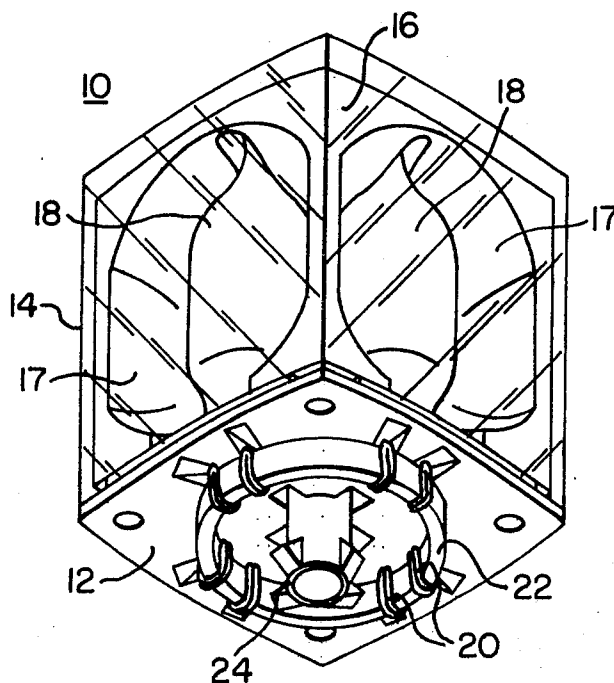
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[57]

ABSTRACT

The zonal lumen output of a flashcube (or magicube) is reduced by approximately 50% to provide a soft diffused flash of light for taking pictures at close range (60 to 120 cms.). The reduction in light intensity is effected by replacing the aluminized plastic reflector with a reflector component that is composed solely of white plastic and thus has a non-specular surface which attenuates the light without substantially changing its spectral characteristics.

4 Claims, 3 Drawing Figures



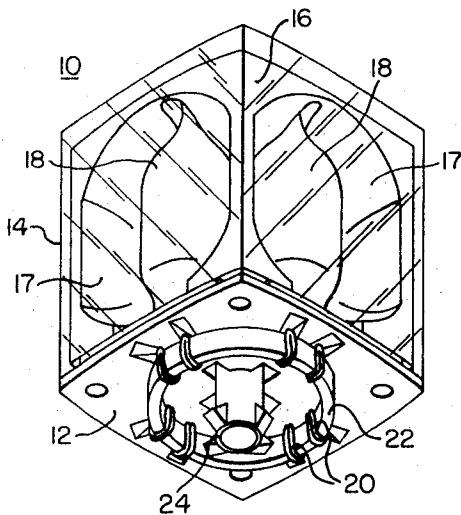


FIG. 1.

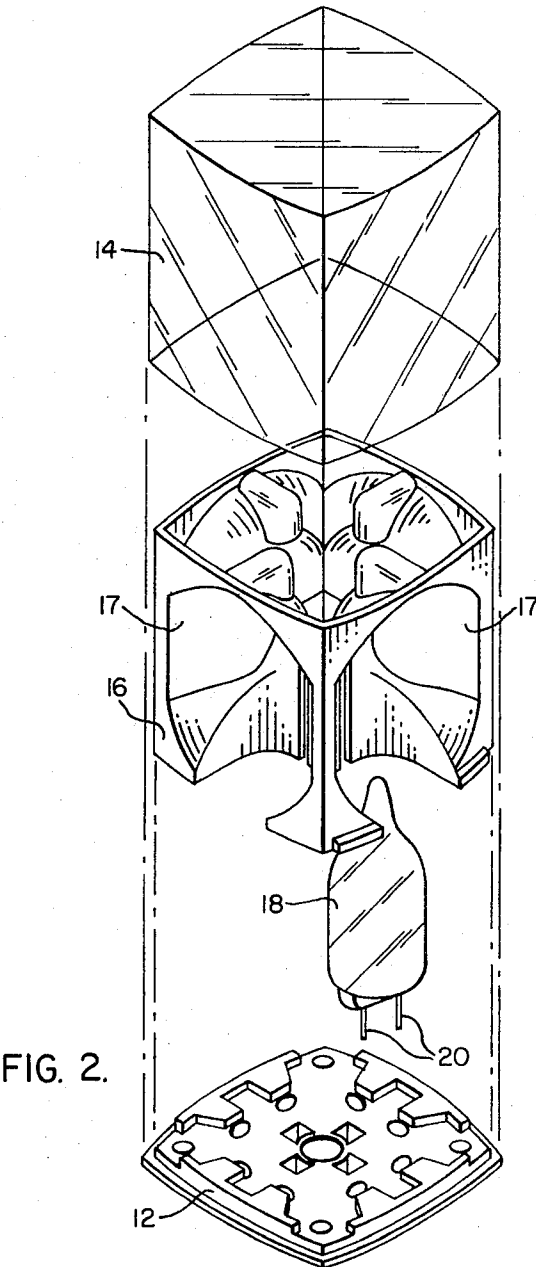


FIG. 2.

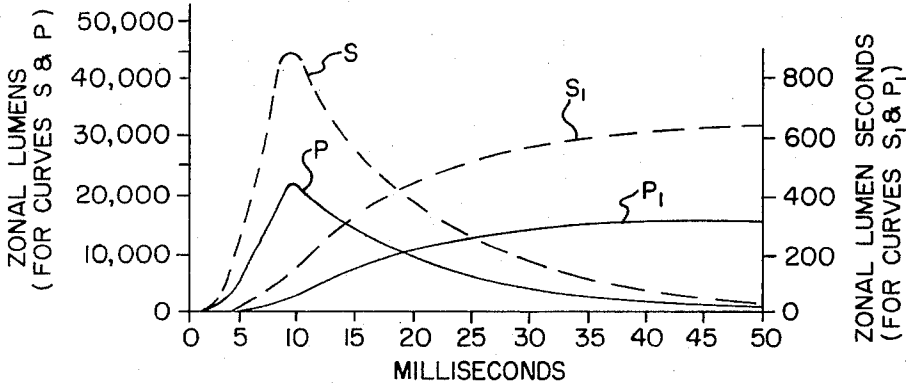


FIG. 3.

MULTIFLASH DEVICE FOR CLOSE-UP PHOTOGRAPHY

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to photographic light sources and has particular reference to an improved multiflash unit for a camera.

2. Description of the Prior Art

Disposable multiflash units such as flashcubes and magicubes are well known in the art. While these devices achieved the desired objective of providing a disposable and compact light source for taking a series of pictures, they employ a reflector which has a highly specular or mirror-like surface and is thus specifically designed to direct as much light as possible onto the subject being photographed so that proper exposure of the film will occur over a wide range of camera-to-subject distances. The reflector surface generally consists of a plastic member that is coated with a thin layer of vaporized aluminum.

However, it has been found that the flash of light produced by such prior art units is too intense when photographs, such as portrait shots, are taken at close range (from about 2 to 4 feet or 60 to 120 cms.). The intense flash of light at this distance has a tendency to overexpose the film and produce "hot spots" of the center of the picture and, more importantly, blinds and startles the person being photographed. This is particularly distressing when close-ups of young children or babies are being taken.

It would accordingly be very advantageous and desirable to have an inexpensive multiflash unit that would provide a "soft" diffused beam of light for taking close-up pictures and which would also be interchangeable with and use the same type of photoflash lamps as those employed in the flashcubes and magicubes now on the market.

SUMMARY OF THE INVENTION

The aforesaid objectives are achieved in accordance with the present invention by replacing the specular aluminum-coated reflector with a reflector component that is composed entirely of white plastic that has a non-specular surface which controllably attenuates the light rays which it reflects. The contour of the reflector is identical to that used previously and the light attenuation effected by the change in reflector surface is such that the brightness of the light flash is reduced by approximately 50% — even though identical lamps are used.

By eliminating the vacuum-metallizing operation heretofore required, the present invention also reduces the manufacturing cost of the improved multiflash unit. The white plastic reflector component also provides a visual difference which immediately identifies the "portrait" cube and prevents it from being confused with standard flashcube or magicube units now on the market.

BRIEF DESCRIPTION OF THE DRAWING

A better understanding of the invention will be obtained from the exemplary embodiment shown in the accompanying drawing, wherein:

FIG. 1 is a perspective view of a flashcube which embodies the present invention;

FIG. 2 is an exploded view of the various components employed in the flashcube shown in FIG. 1; and

FIG. 3 is a plot comparing the light output characteristics of a conventional lamp-reflector module used in a standard flashcube and the novel lamp-reflector module employed in the improved flashcube of the invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

A portrait flashcube 10 for taking close-up pictures is shown in FIG. 1. As will be noted, it comprises a plastic base member 12 that is fitted with a cubical cover 14 of suitable clear plastic which protectively encloses a reflector component 16 that defines a concave reflector element or surface 17 for each of the four photoflash lamps 18 mounted on the base member 12. The lead wires 20 of the flashlamps 18 extend through openings in the base member 12 and are bent around an annular collar 22 on the base member and thus serve as contacts or terminals for the flashcube 10. The base member 12 is also provided with a protruding post 24 that has four cogs or "teeth" which permit the flashcube 10 to be inserted into a suitable socket on the camera and sequentially rotated in the customary fashion as the pictures are taken and the film is advanced.

As illustrated in FIG. 2, the reflector 16 is preferably formed in one piece and can be conveniently injection molded from suitable plastic. It is so shaped that it fits snugly within the protective cover 14 to provide a subassembly that is slipped over the mounted photoflash lamps 18 and then ultrasonically welded or otherwise joined along its periphery to the indented rim of the base member 12 in the usual manner.

In accordance with the present invention, the reflector 16 is composed entirely of a suitable white and opaque plastic such as polystyrene that contains a suitable white inorganic pigment (such as powdered magnesium oxide or titanium dioxide) that is uniformly dispersed in the resin from which the reflector is formed. A sufficient amount of the pigment is added to crystal (colorless) styrene, for example, to make it white and opaque.

The surfaces of the reflector 16 which define the individual reflector elements 17 for the photoflash lamps 18 thus comprise an opaque white plastic which, by virtue of its dull or matte finish (as compared to a specular metallized or mirror finish), attenuates impinging light rays from the fired flashlamps and produces a soft diffuse beam of light which has substantially the same spectral characteristics as the actinic flash produced by the lamp.

The photoflash lamps 18 are conventional miniature type photoflash lamps used in conventional flashcubes. Such photoflash lamps are well known in the art and have a volume of about 0.6 cubic centimeter and are filled with shredded zirconium fuel and from 6 to 8 atmospheres of oxygen. The invention thus permits standard flashcube lamps to be employed in the portrait flashcube rather than specially-designed flashlamps which have a lower output. This avoids the manufacturing and inventory problems which would inherently be encountered in the factory in making and storing two different types of lamps that are identical or very similar in appearance.

The non-metallized reflector component 16 should reduce the brightness of the light flash by at least 30% and preferably 50% to provide a suitably soft beam of light. The white opaque polystyrene reflector previously described provided a 50% reduction, in brightness, as shown graphically in FIG. 3. As depicted by curve S, a standard zirconium-filled flashlamp and an aluminized reflector component of the type used in a conventional flashcube produce a flash of light that has a peak output of approximately 45,000 zonal lumens and an output of about 500 zonal lumen seconds at about 25 milliseconds (curve S₁). In contrast, the white plastic reflector component 16 when used with an identical flashlamp containing zirconium fuel had a peak output of around 22,000 zonal lumens (curve P) and an output of approximately 250 zonal lumen seconds at 25 milliseconds (curve P₁).

As will be apparent to those skilled in the art, the color temperature of the light flash can be altered by using shredded hafnium foil or other materials as a fuel in place of shredded zirconium foil. A hafnium-filled flashlamp is disclosed in U.S. Pat. No. 3,675,004 issued July 4, 1972 to E. A. Gulbransen et al., which patent is incorporated herein by reference.

The color temperature of the light flash can also be modified in the well-known manner by adding blue-colored or other dyes to the plastic cover or to the lacquer coating applied to the individual flashlamps. Percussive type lamps can also be used in place of the electrically-fired flashlamps shown in the drawing and the reflector can be made of other suitable white-pigmented and opaque plastics such as cellulose acetate, cellulose propionate, or a suitable acrylic.

I claim as my invention:

1. A multiframe lighting device adapted for use in taking photographs at close range, said device comprising the combination of:

a base member,
a plurality of photoflash lamps mounted on said base member,
a protective cover secured to said base member in enclosing relationship with said photoflash lamps, the walls of said cover that are adjacent to said lamps being light transmissive, and
a reflector member within said cover defining an individual reflector element for each of said photoflash lamps, each of said reflector elements being disposed in operative relationship with its associated lamp, said reflector member being composed of a plastic that contains a uniformly-dispersed inorganic white pigment in an amount such that the surfaces of the reflector elements are opaque and non-specular and reduce the peak light output of each of the flashlamp-reflector combinations to a value at least 30% lower than that produced by an identical flashlamp and a reflector of the same size and configuration that is coated with a specular layer of aluminum.

2. The multiframe device of claim 1 wherein said reflector member is composed of polystyrene and said white inorganic pigment is powdered magnesium oxide or titanium dioxide.

3. The multiframe device of claim 2 wherein four photoflash lamps are mounted on said base member and the device thus comprises a four-flash unit, and said white plastic reflector member reduces the brightness of the reflected flash of light by approximately 50%.

4. The multiframe device of claim 3 wherein each of said lamps is a miniature flashlamp that has a volume of about 0.6 cc and is of a type that produces a peak light output of approximately 45,000 zonal lumens when fired in said specular aluminum-coated reflector.

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