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LIGHT MIXER

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FIG. 2

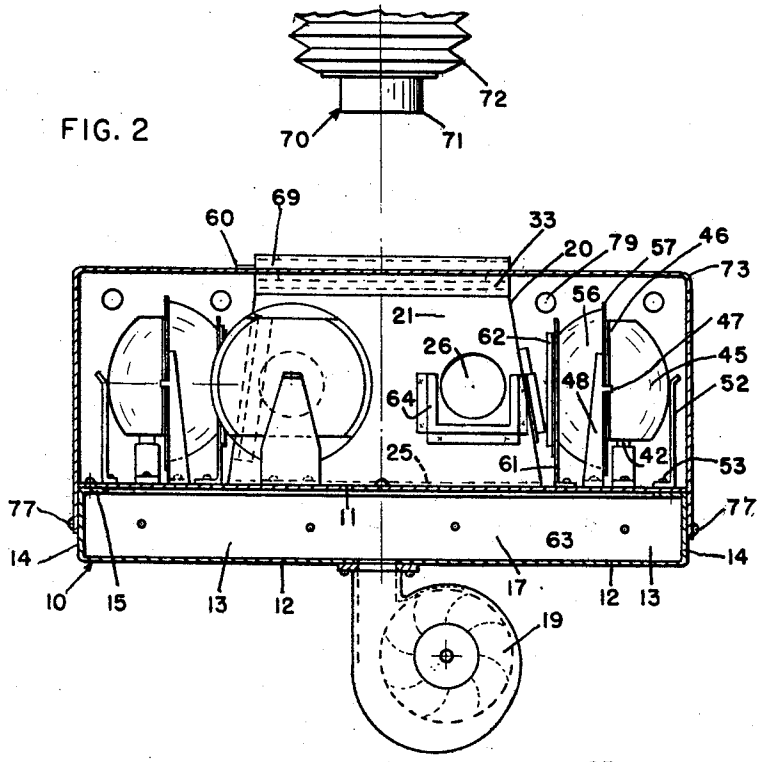

FIG. 1

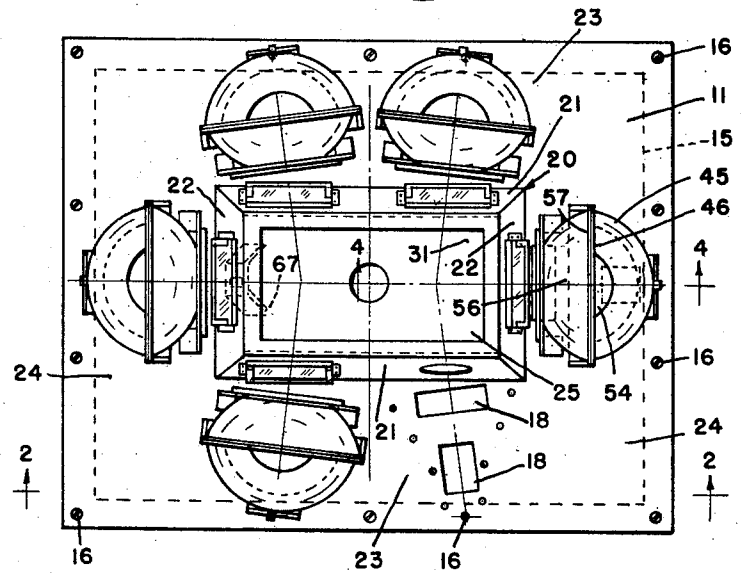

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FIG. 3

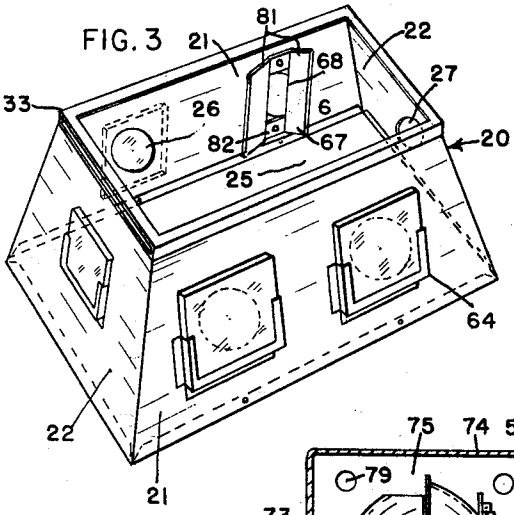


FIG. 6

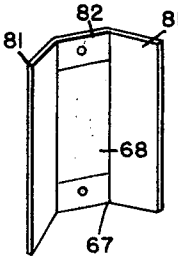


FIG. 7

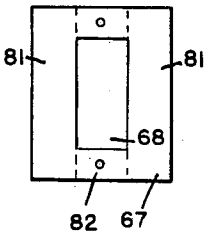


FIG. 5

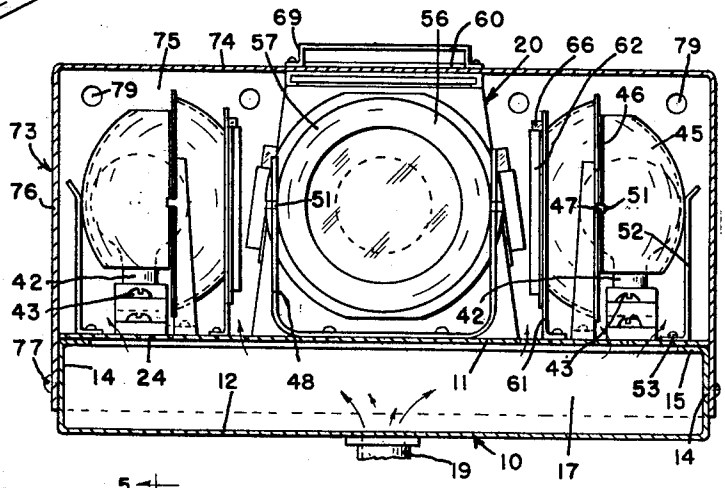
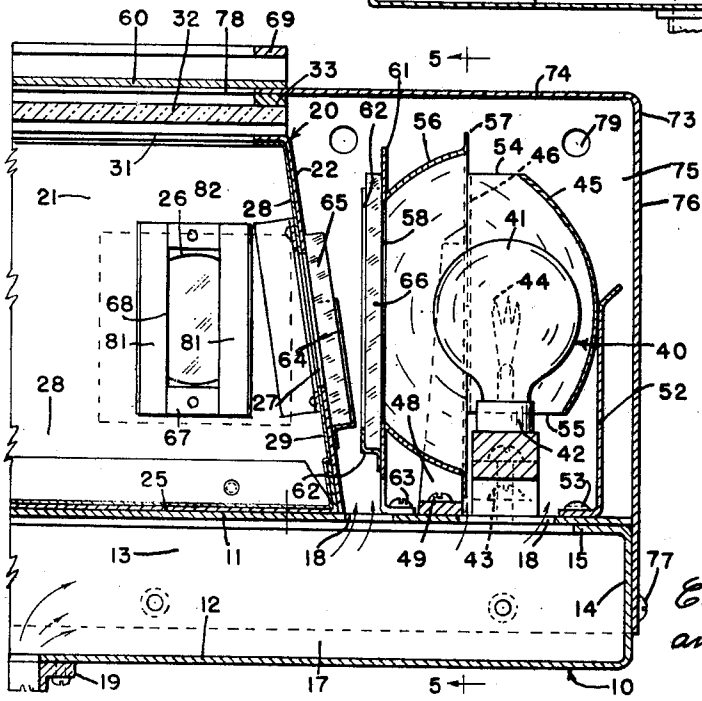


FIG. 4



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3,135,471

LIGHT MIXER

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2 Claims. (Cl. 240—3.1)

The herein disclosed invention relates to light mixers and has for an object to provide a mixer producing photographic illuminant having predetermined spectral content with components of selected intensity.

Another object of the invention resides in providing means for readily and effectively varying the intensity of the components.

A still further object of the invention resides in providing means for producing a light having the desired characteristics for color photographic printing and at the same time without producing visual glare.

An object of the invention resides in providing means for producing a highly diffused and uniform light.

Another object of the invention resides in providing a highly efficient light mixer producing a high luminosity from a given amount of light flux.

An object of the invention resides in providing a light mixer having an enclosure in the form of a truncated pyramid provided with a diffuse highly reflecting inner surface.

Another object of the invention resides in providing the light mixer with an emission opening at the smaller end of the lateral wall structure thereof and in providing the lateral wall structure with inlet ports.

A still further object of the invention resides in arranging the light sources exteriorly of the enclosure adjacent the ports and in mounting an elipsoidal reflector in back of each light source and an annular spheroidal reflector between the light source and the enclosure.

Other objects of the invention reside in the novel combination and arrangement of parts and in the details of construction hereinafter illustrated and/or described.

In the drawings:

FIGURE 1 is a plan view of a light mixer illustrating an embodiment of the invention.

FIGURE 2 is an elevational view of the structure shown in FIGURE 1 with the housing and one of the lamp assemblies removed.

FIGURE 3 is a perspective view of the enclosure detached from the remaining structure.

FIGURE 4 is a fragmentary elevational sectional view taken on line 4—4 of FIGURE 1.

FIGURE 5 is an elevational cross-sectional view taken on line 5—5 of FIGURE 4.

FIGURE 6 is a perspective view of one of the light directors.

FIGURE 7 is an elevational view of the structure shown in FIGURE 6.

The invention is mounted on a base **10** best shown in FIGURES 1, 2, and 4. This base comprises a table **11**, a bottom **12**, and end walls **13** and **14**, the side and end walls are permanently secured together and have a flange **15** extending inwardly therefrom and about the upper edges of the said walls. Table **11** overlies the flange **15** and is secured thereto by means of screws **16**. By means of this construction, a chamber **17** is formed within the base **10**.

Mounted on the table **11** is a light-mixing enclosure **20**, which is in the shape of a truncated, right pyramid. This enclosure has side walls **21** and end walls **22**. The enclosure **20** is of smaller dimensions than the table **11** to leave marginal portions **23** and **24** between the side and end walls **21** and **22** and the edges of the table **11**.

Extending across the lower edges of the side and end walls **21** and **22** is a bottom wall **25**, which is permanently secured thereto. The walls **21** have formed therein, two light ports **26** and the wall **22** have each formed in them a single light port **27**. These light ports are located about half way between the bottom wall **25** and the upper edges of said walls and are arranged about the perimeter of the enclosure in a manner to equally distribute light to all of the inner surfaces **28** of the enclosure. Formed on the inner surfaces **28** of the walls **23**, **24**, and **25** is a diffuse, highly reflective coating **29**. This coating may consist of several coats of white acrylic latex paint which dries with a matte finish found to be highly effective in reflecting and diffusing light impinging thereon.

The upper portion of the enclosure is open to provide a light emission opening indicated by the reference numeral **31**. A light diffusing plate **32** covers this opening and is removably mounted in a frame **33** secured to the upper ends of the walls **21** and **22**.

Opposite each of the light ports **26** and **27** are mounted on the marginal portions **23** and **24** of the table **11** of base **10** light sources **40**, which are identical in construction. Only one of these light sources will be described in detail and is best shown in FIGURES 1, 2, and 4. This light source includes an electric light bulb **41**, which is mounted in a light socket **42**. This socket is attached to the table **11** by means of screws **43**. The filament **44** of the light bulb **41** is located opposite the light port **27** and outwardly of the wall **22**. At the rear of the light bulb **41** is provided an elipsoidal reflector **45**, which is located at a position such that one of its foci is at the filament **44** of light bulb **41** which therefore produces an image of the filament at its other focus which is in the vicinity of the center of the port **27**. This reflector has a flange **46** extending partially about the outer circumference of the same and which is formed with notches **47** on opposite sides thereof. The reflector **45** is supported on a yoke **48** attached to the table **11** by means of screws **49**. This yoke has ears **51** which are received in the notches **47**. A leaf spring **52** is secured to table **11** by means of a screw **53** and presses lightly on the reflector **44** to urge the same toward said yoke and maintain said reflector in engagement with the ears **51**. The upper and lower portion of reflector **45** have openings **54** and **55** therein which provide ventilation for the light bulb **41**. In addition, opening **55** receives the light socket **42** and is of a suitable size to permit the removal of the reflector **45** while the light bulb **41** is in position to permit the replacing of light bulbs when required.

In addition to the reflector **45**, a second reflector **56** is employed which has a reflecting surface **57** spherical in form and whose center is located at the light bulb filament **44**. This reflector is turned in the opposite direction from the reflector **45** and is formed with a flange **57** similarly constructed to the flange **46**. This flange overlies the flange **46** and is also notched to receive the ears **51**. Spring **52** holds both of the reflectors **45** and **56** detachably mounted on the yoke **48**. The reflector **56** has an outlet opening **58** through which the light produced by the light bulb **41** passes through port **27** and into the interior of the light mixing enclosure **20**. At the locality of the opening **58** and attached to a bracket **61** is a holder **62** for a heat absorbing filter **66**. This filter covers the opening **58** in the reflector **56**. This bracket is attached to the table **11** by means of screws **63**. Mounted on the wall **22** of enclosure **20** is a holder **64** for a color screen **65** and through which the light emanating from the heat absorbing filter **66** passes. These color screens transmit certain selected portions of the

light spectrum and which differ from one another. There are preferably three types of filters, one for each emulsion layer of the sensitized photographic material and in the instant case there are two filters of each kind. These filters are preferably red, green, and blue.

The light on entering the interior of the light mixing enclosure **20** is dispensed by means of light directors **67**, each of which has angularly disposed reflectors **81** preferably specular issuing outwardly from a base **82**, and which have openings **68** in the center of said bases. The bases **82** are attached to the walls **21** and **22** of the enclosure **20** with the openings **68** overlying the light ports **26** and through which part of the light passes to the opposite walls. The remainder of the light is directed to the adjacent walls of the enclosure by the reflectors **81**. If desired, light directors in the form of prisms or negative lenses may be used in place of the reflectors. In this manner the light leaving the mixing enclosure through the light emission opening **31** is uniformly mixed and contains the desired light components for the proper printing of the color sensitized material. The light, on leaving the mixing enclosure, passes through the diffusing plate **32** and through the negative which is held in a negative holder **69** overlying frame **33** and is highly diffused.

To prevent overheating of the various parts of the light mixer, the base **10** is constructed hollow to provide the chamber **17** within the same. Extending through the table **11** and adjacent the lamp sockets, are openings **18** which communicate with said chamber. A blower **19**, attached to the bottom **12** of said base, delivers cool air into chamber **17** and from which it is discharged through the openings **18** in table **11** and about the light bulbs **41** to cool the same.

The entire light mixer may be enclosed within a case **73**, best shown in FIGURES 2 and 5. This case has a top **74** and side and end walls **75** and **76** depending therefrom. These walls overlie the walls **13** and **14** of base **10** and are secured thereto by means of screws **77**. The top **74** of this case has a light emission opening **78** therein which registers with the light emission opening **31** in the light mixing enclosure **20**. In addition ventilating openings **79** are formed in the walls **75** and **76**. A negative holder **69** is mounted on the top **74** and holds the negative in proper position to receive the light passing through the diffusing plate **32**.

If desired, contact prints may be made by placing the sensitized paper upon the negative **69**. If enlargements are preferred, an enlarger **70** may be employed. The objective lens **71** of such an enlarger, together with a portion of the bellows **72**, have been shown in FIGURE 2 in proper relation to the diffusing plate **32**.

The method of using the invention is as follows: It is well known that color printing material is sensitive to three approximately equal portions of the spectrum. However, there is not a sharp cut off between each of these portions and over laps between the portions exist. This is particularly the case with blue and green sensitivity regions where the overlap is most pronounced. This is objectionable because the blue and green colors are degraded thereby. The instant invention overcomes the disadvantage by selecting color screens which do not transmit light in the regions of overlapping sensitivity. When such filters are employed, the resultant light emitted is substantially free from the objectionable portion of the spectrum which causes the degrading of the denoted colors. It has been found that the following filters meet with the requirements:

(1) Wratten No. 98 which transmits blue in the spectral range of 400 to 490 milli-microns.

(2) Wratten No. 99 which transmits green in the range of 520 to 600 milli-microns.

(3) Wratten No. 29 which transmits red in the spectral range of 610 milli-microns to beyond 700 milli-microns.

In the printing of the sensitized material, the intensity of the individual light sources may be varied to conform to the color requirements of the negatives and to the type of material used, or the length of exposure of each light source may be adjusted to produce the desired results.

The advantages of the invention are manifest. Improved color saturation is attained with the instant invention. A highly diffused light is produced by means of which defects in printing due to scratches and other defects in the negative are rendered less noticeable. The apparatus is highly efficient. Every portion of the negative is uniformly illuminated. The device is inexpensive to manufacture and will not readily get out of order, there being no moving parts.

Changes in the specific form of the invention, as herein described, may be made within the scope of what is claimed without departing from the spirit of the invention.

Having described the invention, what is claimed as new and desired to be protected by Letters Patent is:

1. A light mixer comprising a hollow enclosure in the form of a truncated pyramid having an end wall and lateral wall connected thereto defining a mixing chamber, said walls having interior optically diffuse and highly reflective surfaces, light sources producing light fluxes of different colors, means for introducing colored light flux from said light sources into said chamber and against certain portions of said surfaces from which scattered multiple reflections occur covering the entire interior surface of said enclosure, said enclosure having an emission opening therein through which uniformly mixed and diffused light of predetermined spectral contents is emitted.

2. A light mixer comprising a hollow enclosure in the form of truncated pyramid having an end wall at the base end thereof and lateral walls connected thereto, said base and walls having interior optically diffuse and highly reflective surfaces, light producing means providing a plurality of light fluxes of different colors impinging upon the interior surface of said enclosure from which scattered multiple reflections occur covering the entire interior surface of said enclosure, said enclosure having an emission opening at the smaller end of said lateral walls through which uniformly mixed and diffused light of predetermined spectral contents is emitted.

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