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Cheng

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(54) **ILLUMINATION SYSTEM**

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F21V 7/00 (2006.01)

(52) **U.S. Cl.** **362/298**; 362/241; 362/247; 362/346

(58) **Field of Classification Search** 362/297, 362/298, 346, 241, 247
See application file for complete search history.

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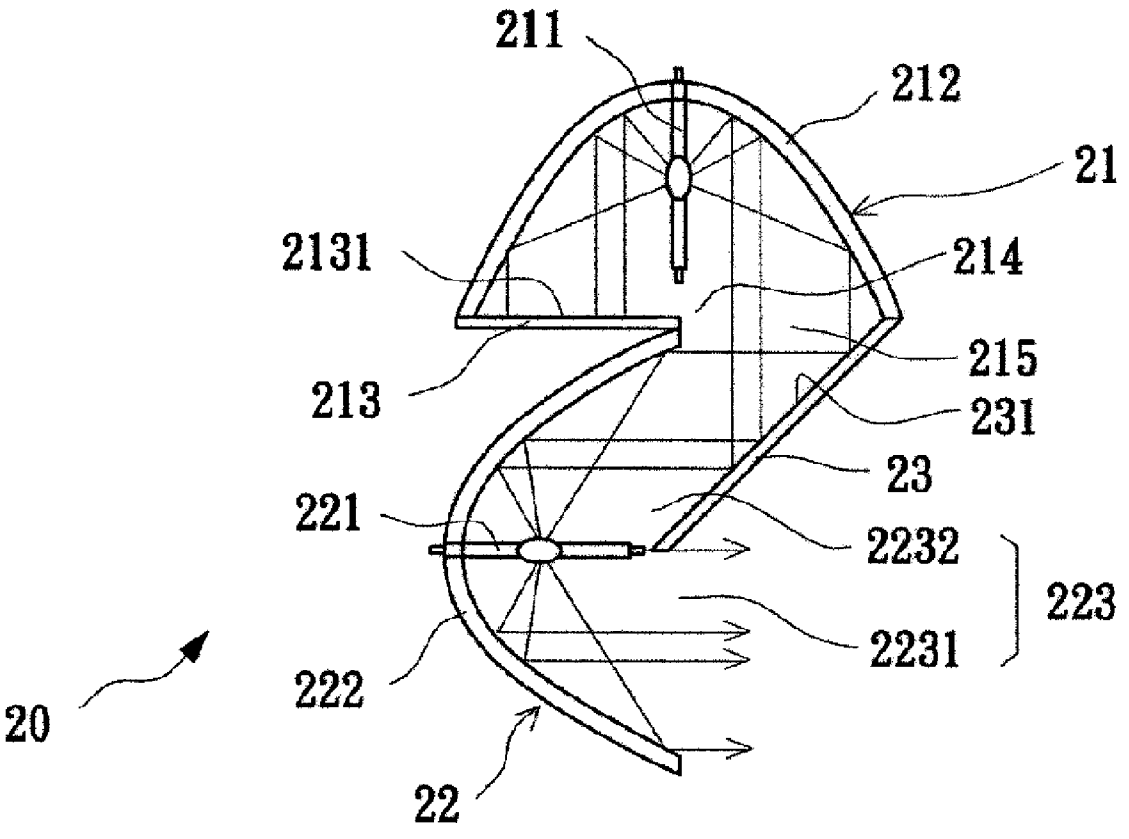
(57) **ABSTRACT**

An illumination system comprises a first light source device, a second light source device and a second reflecting portion. A first reflecting portion of the first light source device covers a part area of an opening of a reflecting shade, and the other area of the opening is formed a first light outlet. The second light source device is installed in front of the opening and has a second light outlet. A second reflecting portion is installed between the first and the second light source devices. After overlapping the optical routes of the multiple light source devices and integrating beams into a parallel light beam, the parallel light beam is then output out of the single light source device. Therefore, the brightness of entirety can be enhanced, and the uniformity of images on the screen is still maintained even one of the light source devices is damaged.

20 Claims, 8 Drawing Sheets



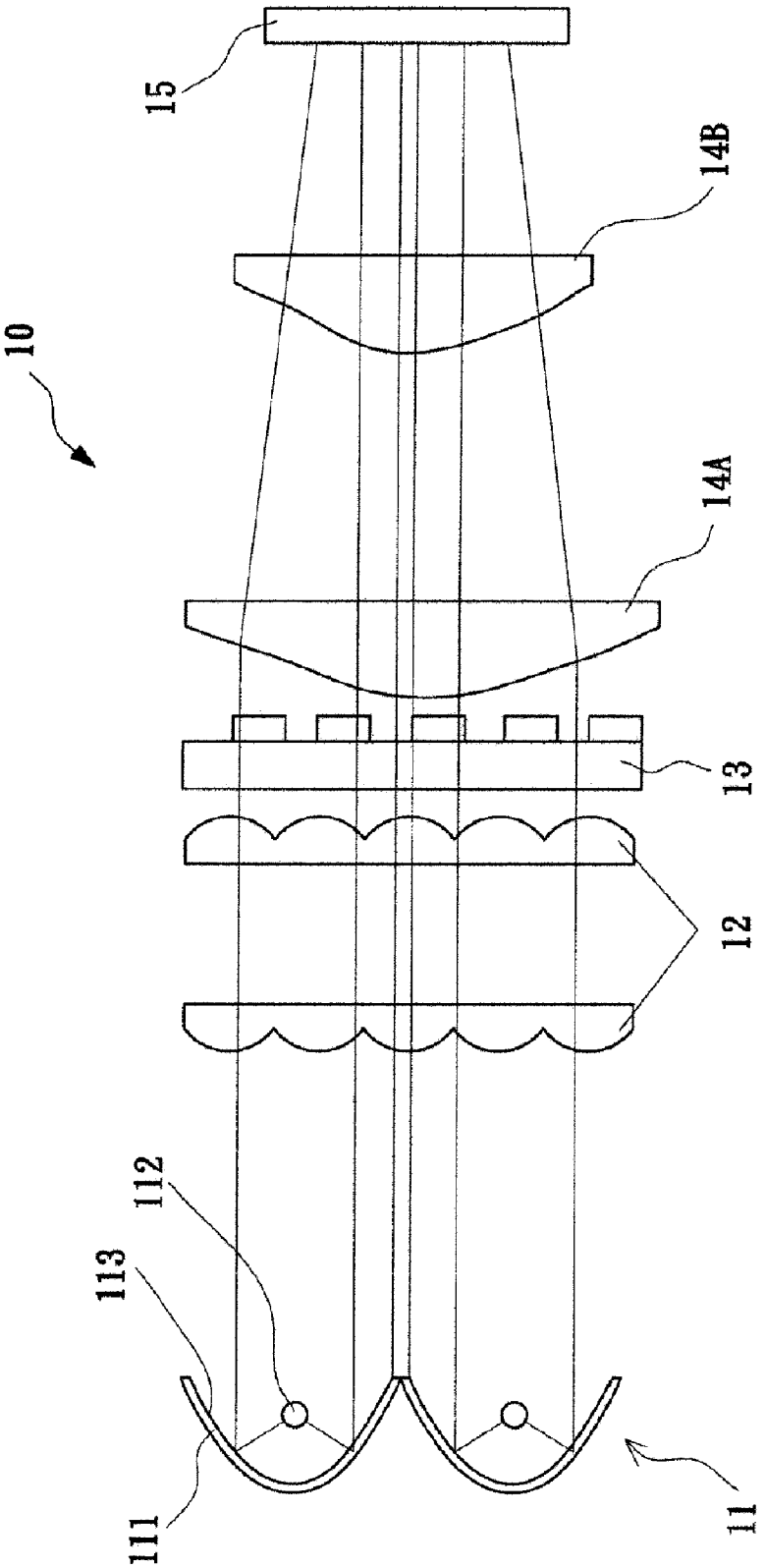


FIG. 1 (PRIOR ART)

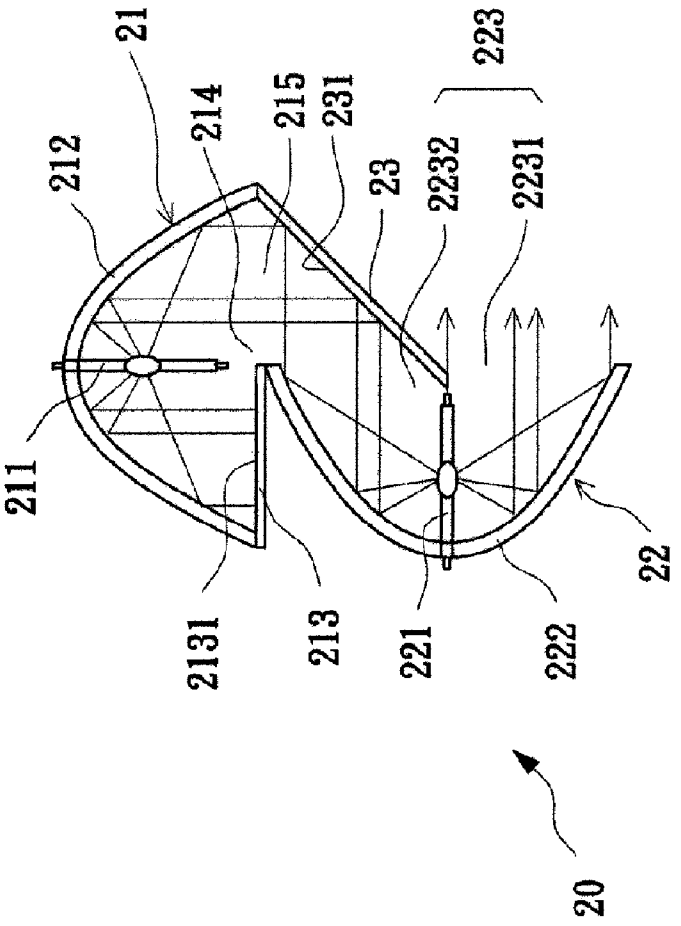


FIG. 2

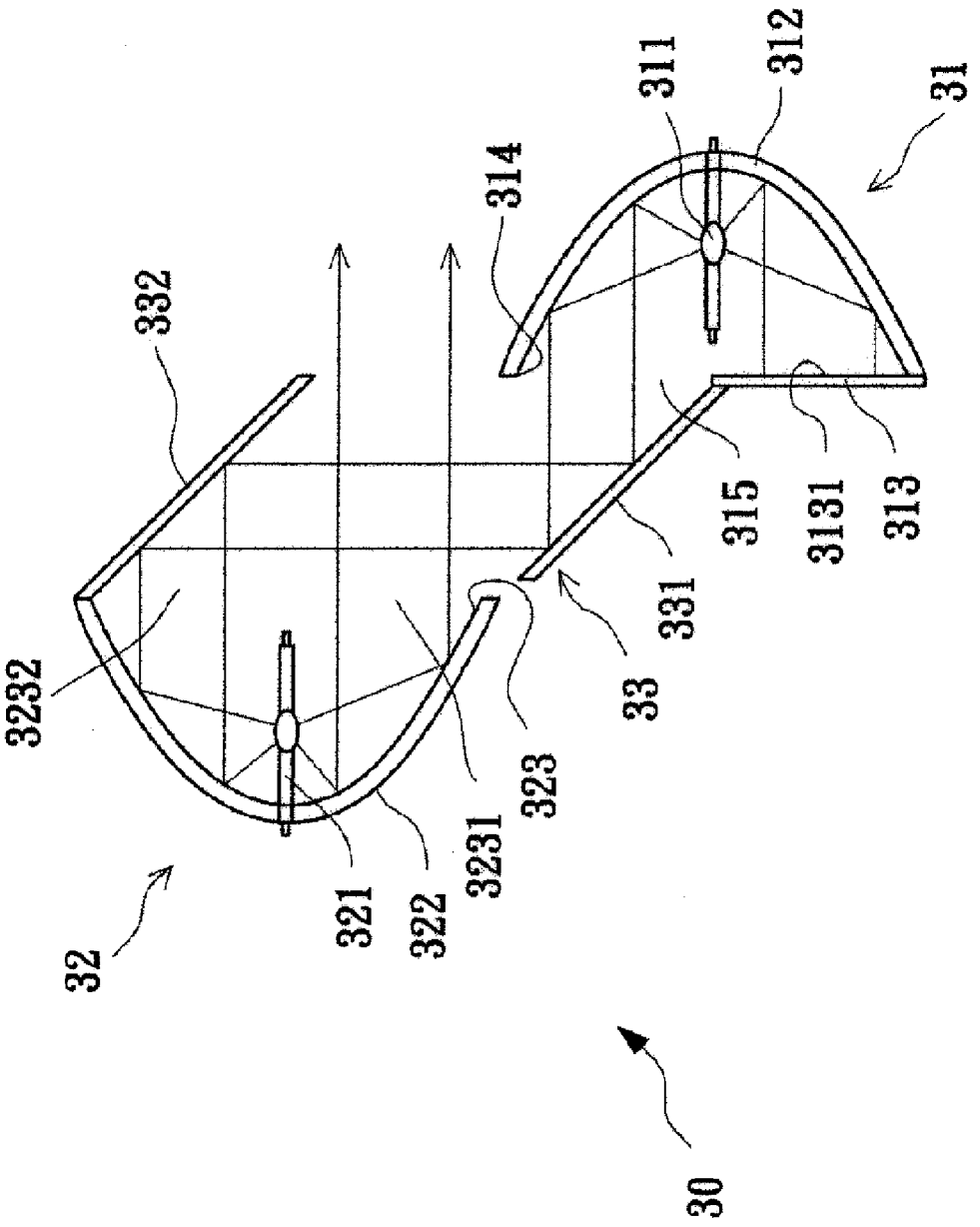

311
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FIG. 3

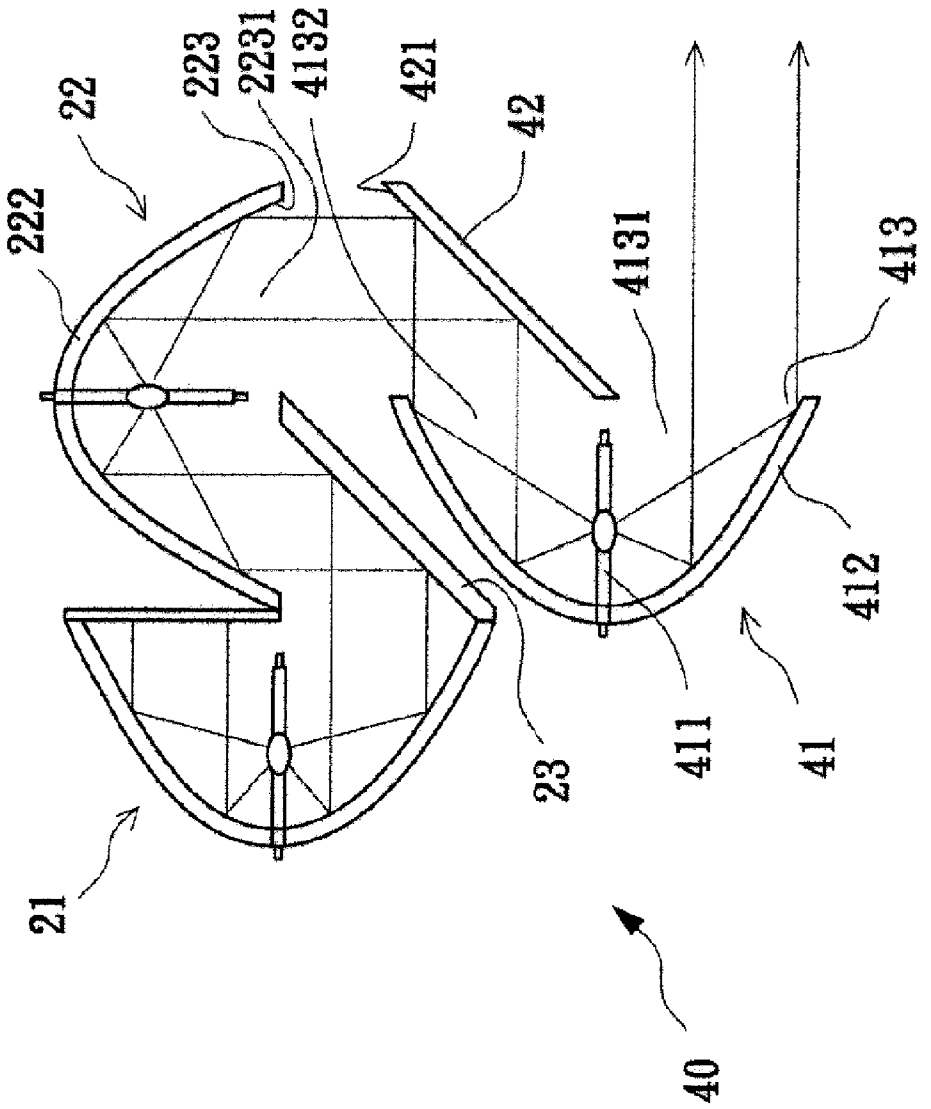

FIG. 4

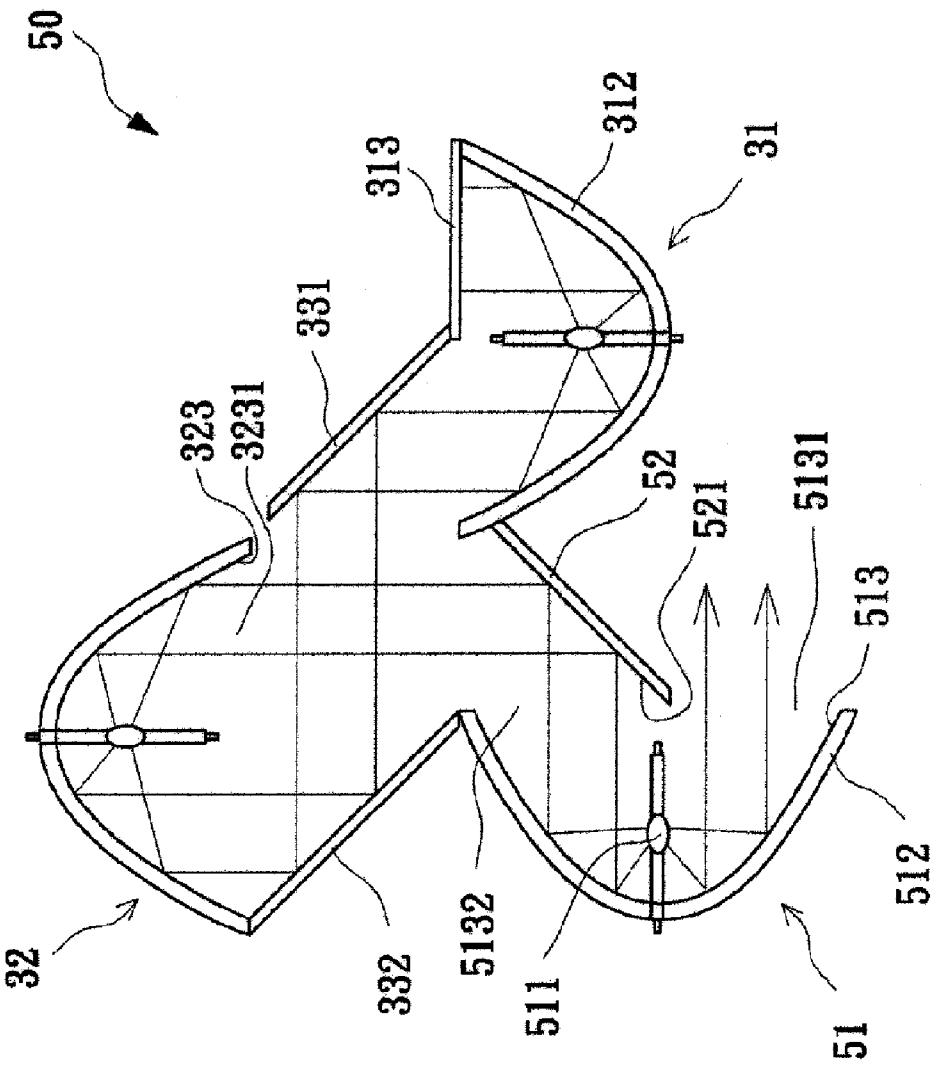

FIG. 5

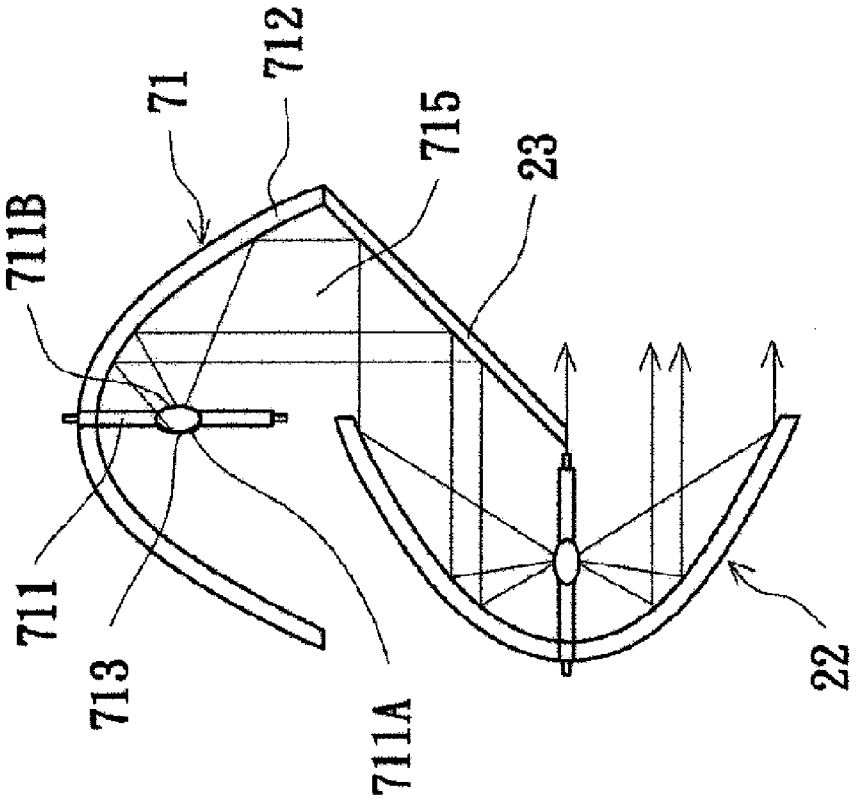

FIG. 6

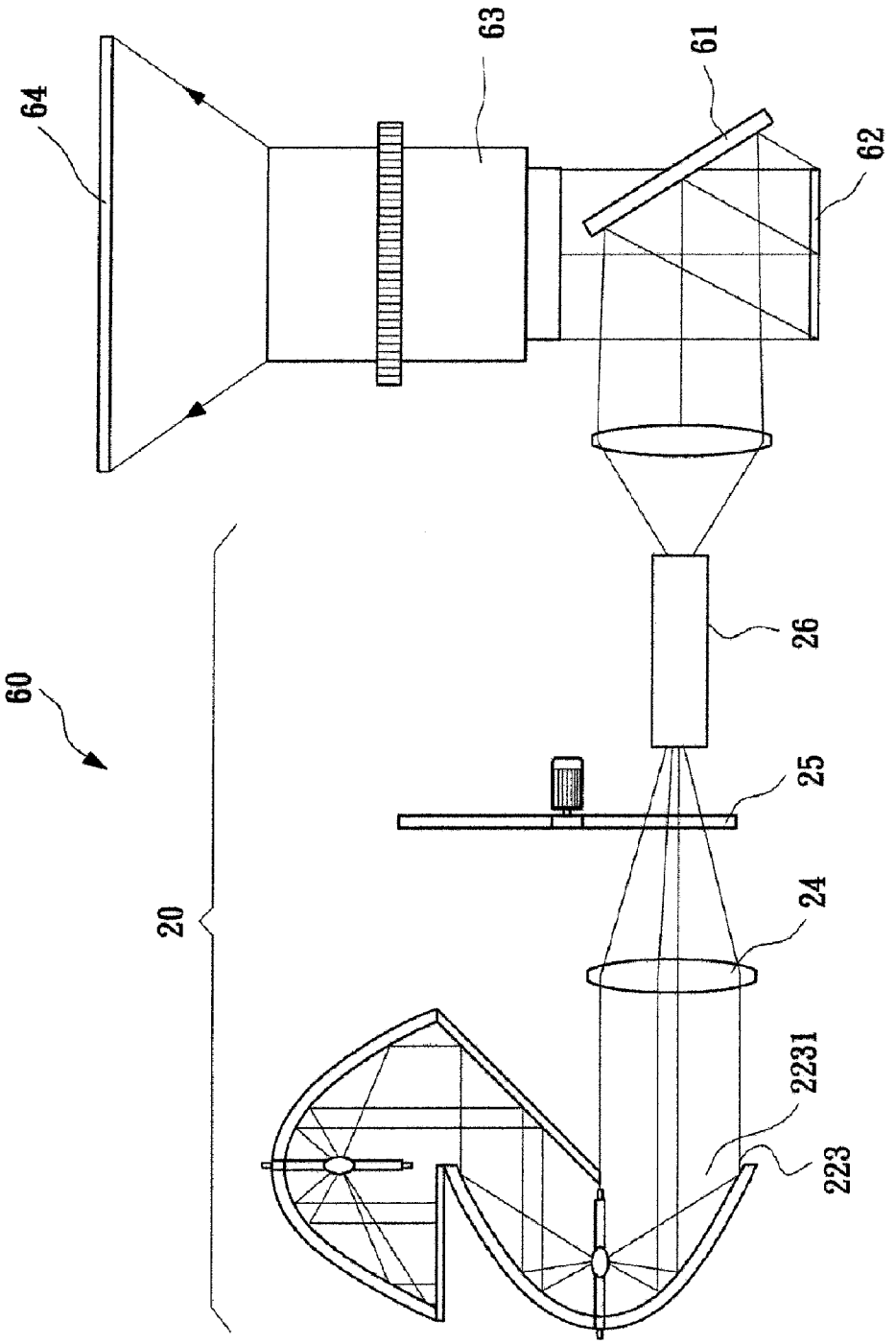

FIG. 7

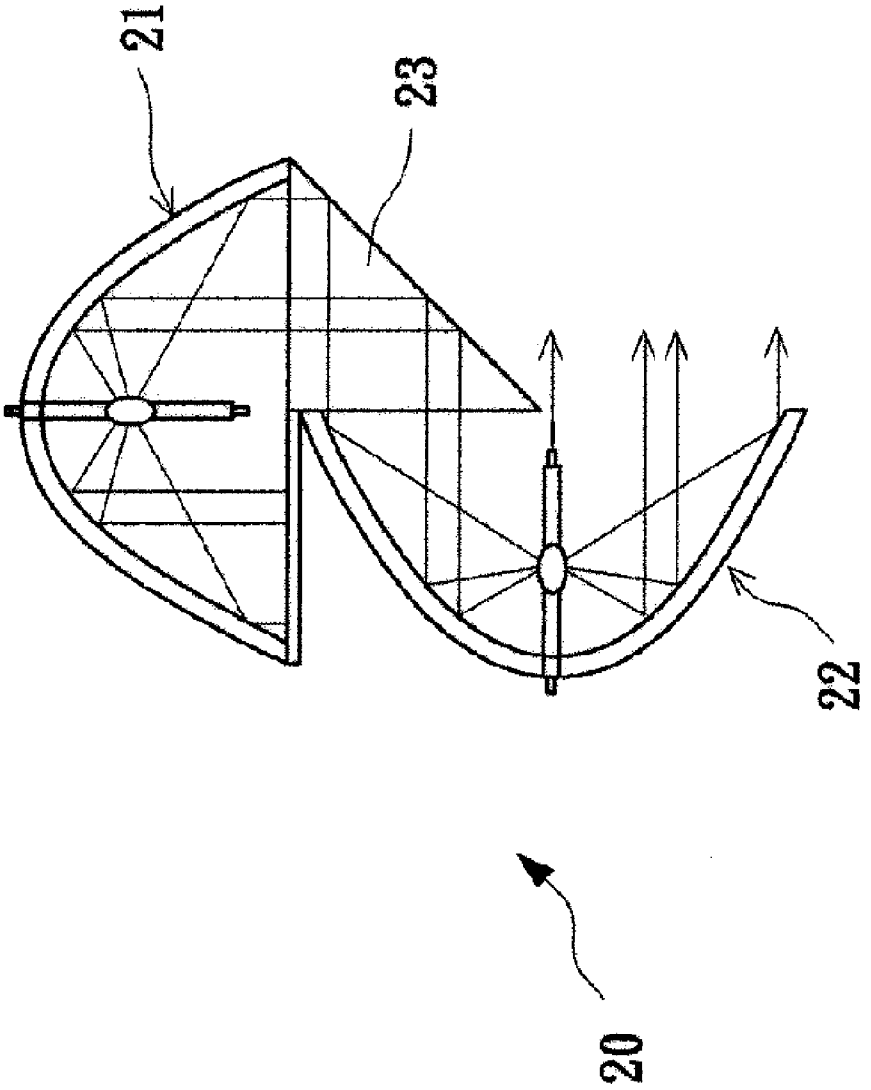

FIG. 8

ILLUMINATION SYSTEM

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to an illumination system, and more particularly to an illumination system of a multiple light source devices.

2. Description of Related Art

Currently, an illumination system with a single light source device is mostly adopted in a projection system. However, for a large-sized meeting place, the projection system needs to be used to emit images on a larger area and a screen with a longer distance so that a light beam output from the illumination system needs higher brightness to enable audiences in the whole meeting place to see the images on the screen clearly. If the single light source is adopted to provide the high brightness, the power of the adopted single source device is enhanced relatively, consequently, the problems such as high temperature, heat dissipation and difficult cooling are yielded. Therefore, how to improve the high temperature problem on the premise that the high brightness is provided is a serious problem to be improved for the illumination system.

An illumination system with multiple light source devices is adopted to solve the problem mentioned above at the present. Please refer to FIG. **1**. A projection system **10** comprises a collector module **11**, integrators **12**, a P/S converter **13**, condensers **14**A and **14**B and a display panel **15**, in which the collector module **111** has two parabolic-curved reflectors **111** installed side by side and two light sources **112** are respectively corresponding to the reflectors **111**. Each reflector **111** has a parabolic-curved reflecting surface **113** facing the integrator **12** and the light source **112** is positioned on a focus of the reflecting surface **113**. When the light sources **112** emit a light beam, the light beam can respectively be projected on the corresponding reflecting surfaces **113** to form a parallel light beam, and then the parallel light beam output into the integrators **12** to convert to a uniform light beam. Thereafter, the light beam is condensed again through the P/S converter **13** and the condensers **14**A and **14**B to project on the display panel **15**. Finally, images are displayed on a screen (not shown) through a projection lens (not shown). However, although the light sources installed side by side can be utilized to increase the brightness of the collector module **11** mentioned above, the parallel light beam reflected from each parabolic-curved reflector **111** has a definite light distribution area. The light distribution area of the reflectors **111** installed side by side is the double of the single reflector **111** so that the light distribution area is broad. Consequently, the integrator **12**, the P/S converter **13**, the condenser **14**A and etc are caused to need a larger volume. Therefore, the higher system cost is caused and design principles of light, thin, short and small cannot be conformed to. Moreover, when one of the light sources is damaged and malfunctioned, it causes only half of images on the screen. Therefore, problems such as the big volume and that only half of images on the screen are caused owing to the damage of one of the light sources still exist in multiple light sources of a conventional illumination system, these problems need to solve by researching and developing efforts.

SUMMARY OF THE INVENTION

One object of the present invention is to provide an illumination system, utilizing an installment of a reflecting portion to overlay optical routes of multiple light source devices and integrate light beams into a single parallel light beam, and being then output out of a single light source device. Therefore, the brightness of entirety can be enhanced, and when one of the light sources is damaged and malfunctioned, the uniformity of images on a screen can still be maintained to allow all images to be displayed normally.

Another object of the present invention is to provide the illumination system, utilizing outputting the integrated parallel light beam through a second light outlet with half opening area so as to reduce a light distribution area to allow the volume of the illumination system to be reduced.

Yet another object of the present invention is to provide the illumination system, in which the reflecting portion is a cold mirror so as to remove infrared light of the light source so as to lower the heat of the light source.

Yet another object of the present invention is to provide the illumination system, in which the reflecting portion can be a dichroic mirror for adjusting of color temperature of the system.

Yet another object of the present invention is to provide the illumination system with the multiple light source devices, in which a condensing element is installed in front of the light outlet to form a condensing light beam to be applied in a digital light processing (DLP) projection system.

For attaining to the objects mentioned above, the illumination system comprises a first light source device, a second light source device and a second reflecting portion, a first reflecting portion of the first light source device covers a part area of an opening of a reflecting shade, and the other area of the opening is formed to be a first light outlet, the second light source device is disposed in front of the opening and has a second light outlet, the second reflecting portion is installed between the first and the second light source devices to guide a light beam from the first light source device to output from the second light outlet. The installment of the reflecting portion is utilized to overlay optical routes of multiple light sources and integrate the routes into the single parallel beam, and the light beam is then output out of the single light source device, therefore, the brightness of entirety can be enhanced, and when one of the light source devices is damaged, the uniformity of the images on the screen can still be maintained to allow images to be displayed normally.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention can be more fully understood by reference to the following description and accompanying drawings, in which:

FIG. **1** is a schematic view, showing a conventional projection system with double light source devices;

FIG. **2** is an optically schematic view, showing an illumination system of a first preferred embodiment according to the present invention;

FIG. **3** is an optically schematic view, showing an illumination system of a second preferred embodiment according to the present invention;

FIG. **4** is an optically schematic view, showing an illumination system of a third preferred embodiment according to the present invention;

FIG. **5** is an optically schematic view, showing an illumination system of a fourth preferred embodiment according to the present invention;

FIG. **6** is an optically schematic view, showing an illumination system of a fifth preferred embodiment according to the present invention;

FIG. **7** is an optically schematic view, showing an illumination system of the present invention applied in a projection system; and

FIG. **8** is an optically schematic view, showing an illumination system with a prism according to the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Six preferred embodiments are brought to explain the adopted technological means and other effects for attaining to the objects of the present invention mentioned above accompanying the drawings as the followings:

The First Preferred Embodiment

The first embodiment provides an illumination system structure constituted by light source devices with two optical axes thereof perpendicular to each other. Please refer to FIG. **2**. An illumination system **20** comprises a first light source device **21**, a second light source device **22** and a second reflecting portion **23**, in which the first light source device **21** comprises a burner **211**, a parabola-shaped reflecting shade **212** and a first reflecting portion **213**. The burner **211** is installed inside of the reflecting shade **212** and positioned on a focus of the reflecting shade **212**. A light beam emitted from the burner **211** is reflected by the parabola-shaped reflecting shade **212** to generate a parallel light beam. The reflecting shade **212** has an opening **214** and the first reflecting portion **213** covers a part area of the opening **214**, the other area of the opening **214** is formed a first light outlet **215**. In the first embodiment, the first reflecting portion **213** approximately occupies a half area of the opening **214**. The first reflecting portion **213** is a reflection mirror that a surface thereof facing the burner **211** is a reflection mirror surface **2131** and the first reflecting portion **213** is disposed perpendicularly to the burner **211**. One end of the first reflecting portion **213** is connected to a rim of the reflecting shade **212** and the other end of the first reflecting portion **213** is extended to a place close to the burner **211** such that a light beam emitted from the burner **211** can return back to the reflecting shade **212** along an original route by means of the reflection of the reflection mirror surface **2131**, and the parallel light beam is then output from the first light outlet **215**.

The second light source device **22** is installed in front of the opening **214** of the first light source device **21**, and comprises a burner **221**, a parabola-shaped reflecting shade **222** and an opening **223**, in which a light beam emitted from the burner **221** is reflected by the parabola-shaped reflecting shade **222** to generate a parallel light beam and the burner **221** of the second light source device **22** is disposed perpendicularly to the burner **211** of the first light source device **21**. The burner **211** of the first light source device **21** is disposed in a vertical direction and the burner **221** of the second light source device **22** is disposed in a horizontal direction in the first embodiment. The opening **223** consists of a second light outlet **2231** and a third light outlet **2232**. The second light outlet **2231** is disposed far away from the first light outlet **215** of the first light source **21** to cause the light beam provided by the burner **221** is directly output out of the second light source device **22** and the first light source device **21**. The third light outlet **2232** faces the second reflecting portion **23** and is installed adjacently to the first light outlet **215** to allow the light beam emitted from the burner **221** to be reflected by the second reflecting portion **23** back into the first light source device **21**.

The second reflecting portion **23** is disposed between the first light source device **21** and the second light source device **22** so as to guide the light beam from the first light outlet **215** of the first light source device **21** to be output from the second light outlet the second light outlet **2231** or the light beam from the third light outlet **2232** of the second light source device **22** is output into the first light source device **21**. The second reflecting portion **23** in the first embodiment is a reflection mirror that a surface thereof facing the first light outlet **215** and the third light outlet **2232** is a reflection mirror surface **231**. One end of the second reflecting portion **23** is close to the rim of the reflecting shade **212** (different from the rim disposed in the first reflecting portion **213**), and the other end thereof is close to the burner **221** of the second light source **22** to cause the second light outlet **2231** to approximately occupy half area of the opening **223**. An inclined angle of the second reflecting portion **23** is formed in a direction opposite to the direction facing the burners **211** and **221**, it is the best that the inclined angle is 45 degree relative to the horizontal direction of the embodiment such that the light beam incident into the first light source device **21** and the light beam output out of the first light source device **21** can be reflected and transmitted along the original route and output out from the second light outlet **2231** of the second light source device **22**.

The light beam emitted from the burner **211** of the first light source device **21** is reflected by the reflecting shade **212** to generate the parallel light beam, a part of the light beam is directly output from the first light outlet **215**, the other part of the light beam is projected on the first reflecting portion **213** and output from the first light outlet **215** after it is reflected by the first reflecting portion **213** and the reflecting shade **212**. And, the light beam output from the first light outlet **215** is reflected by the second reflecting portion **23** and enters the second light source device **22** from the third light outlet **2232**. Among the light beam entering the second light source device **22** or the light beam emitted from the second the burner **221** of the second light source device **22**, a part of the light beam is directly reflected by the reflecting shade **222** and output out of the second light outlet **2231**, the other part of the light beam is reflected by the reflecting shade **222** and the second reflecting portion **23** and returns back to the first light source device **21**, the returned light beam is reflected many times between the first light source device **21** and the second light source device **22** and integrated finally to be the parallel light beam and output from the second light outlet **2231**.

The installations of the first reflecting portion **213** and the second reflecting portions **23** are used to overlay the optical routes of the multiple light source devices (i.e. the first light source **21** and the second light source device **22**) and integrate the beams to be the single parallel beam, and then output the single parallel light beam from the single light source device (i.e. the second light source device **22**). Therefore, the brightness of entirety can be enhanced, because the brightness after general double light source devices are mixed is 1.6 times of the single light source device. Furthermore, when one of the light sources is damaged, because two light sources are installed by overlapping the optical routes in the present invention, the single light source can still maintain the uniformity of images on the screen to enable images to be displayed normally.

Besides, the limitation of the angle for the first reflecting portion **213** and the second reflecting portion **23** of the first embodiment is utilized to enable the light beam to be still transmitted along the original route to allow the light beam to maintain as the parallel light beam to be output from the second light outlet **2231**.

The integrated parallel light beam is output from the second light outlet **2231** with half area of the opening **223** so as to reduce the light distribution area. Comparing to the double light source device structures side by side in FIG. **1**, the light distribution area of the present invention is a quarter of the light distribution area of the conventional system. Therefore, the volume of the illumination system can be allowed to reduce and the system conforms to the design principles of the lightness, thinness, shortness and smallness.

Besides, a cold mirror can be adopted in the first reflecting portion **213** and the second reflecting portion **23**, the cold mirror reflects short wavelengths and transmits long wavelengths, such as infrared light. When the first reflecting portion **213** and the second reflecting portion **23** are cold mirror, infrared light of the light beam transmits the first reflecting portion **213** and the second reflecting portion **23** to be removed so as to reduce the heat generated from the light source.

Moreover, dichroic mirrors can be adopted for the first reflecting portion **213** and the second reflecting portion **23** for adjusting the color temperature of the light source, the dichroic mirror is referred to a reflecting element in which the surface thereof is allowed to reflect at least one color light beam. For example, the dichroic mirror capable of reflecting blue light beam can be adopted for the first reflecting portion **213** or the second reflecting portion **23** to cause the proportion of the blue light of the integrated parallel light beam from the first light source device **21** and the second light source device **22** is increased the color temperature. Otherwise, the dichroic mirror capable of reflecting red color light and green color light is adopted for the first reflecting portion **213** or the second reflecting portion **23** to cause the proportions of the red color light and the green light of the integrated parallel light beam from the first light source device **21** and the second light source device **22** to be increased. The proportion of the blue light is lowered to decrease the color temperature.

Please further refer to FIG. **8**. The first reflecting portion **213** and the second reflecting portion **23** are used of a prism with 45 degree angle to allow the light beam to be reflected through the total reflection.

The Second Preferred Embodiment

The second embodiment is to provide an illumination system structure combined by two light source devices with the optical axes thereof parallel to each other. Please refer to FIG. **3**. The illumination system **30** comprises a first light source device **31**, second light source device **32** and second reflecting portion **33**, in which the first light source device **31** comprises a burner **311**, a parabola-shaped reflecting shade **312** and a first reflecting portion **313**. The burner **311** is installed inside of the reflecting portion **313** and disposed on a focus of the reflecting shade **312**. A light beam emitted from the burner **311** is reflected by the parabola-shaped reflecting shade **312** to generate a parallel beam. The reflecting shade **312** has an opening **314** and the first reflecting portion **313** is disposed to cover a part area of the opening **314**, the other area of the opening **314** is formed a first light outlet **315**. The first reflecting portion **313** occupies half area of the opening **314** in the second embodiment. The first reflecting portion **313** is a reflection mirror in which a surface thereof facing the burner **311** is a reflection mirror surface **3131** and the first reflecting portion **313** is disposed in a direction perpendicular to the burner **311** thereof. One end of the first reflecting portion **313** is connected to the lower end of the rim of the reflecting shade **312**, and the other end thereof is extended to a position close to the burner **311** to allow the light beam emitted from the burner **311** to be reflected by the reflection mirror surface **3131** to return back to the reflecting shade **312** along an original route, and the parallel light beam is then output from the first light outlet **315**.

The second light source device **32** is installed in front of the opening **314** of the first light source device **31** and comprises a burner **321**, a parabola-shaped **322** and an opening **323**, in which a light beam emitted from the burner **321** is reflected by the parabola-shaped reflecting shade **322** to generate a parallel beam, and the burner **321** of the second light source device **32** is disposed parallel to the burner **311** of the first light source device **31**. The burner **311** of the first light source device **31** and the burner **321** of the second light source device **32** are all disposed along the horizontal direction in the second embodiment. The opening **323** consists of a second light outlet **3231** and a third light outlet **3232**. The second outlet **3231** is disposed close to the first light outlet **315** of the first light source device **31**, and a light beam provide by the burner **321** can be allowed to output out directly of the second light source device **32** and the first light source device **31**. The third light outlet **3232** is disposed far from the first light outlet **315** and facing the second reflecting portion **33**.

The second reflecting portion **33** is installed between the first light source device **31** and the second light source device **32** and constituted by a pair of reflection mirrors **331** and **332** parallel to each other to guide the light beam from the first light outlet **315** of the first light source device **31** to output from the second light outlet **3231** or a light beam emitted from the burner **321** of the second light source device **32** to guide to output into the first light source device **31**. The surfaces of the reflection mirrors **331** and **332** facing the first light outlet **315** and the third light outlet **3232** are reflection mirror surfaces. One end of the reflection mirror **331** is close to the burner **311**, and the other end of the reflection mirror **331** is formed an inclined angle close to a lower rim of the reflecting shade **322** by facing the direction opposite to the direction of the burner **311**. One end of the reflection mirror **332** is close to an upper rim of the reflecting shade **322**, the other end of the reflection mirror **332** is formed an inclined angle by facing a direction opposite to the direction of the burner **321**, 45 degree is the best for the inclined angle so as to allow the light beam incident into the first light source device **31** and the light beam emitted out from the first light source device **31** can be transmitted along the original routes by the reflection, and finally output out from the second light outlet **3231** of the second light source device **32**.

The light beam emitted from the burner **311** of the first light source device **31** is reflected by the reflecting shade **312** to generate the parallel beam, a part of the light beam is directly output from the first light outlet **315**, the other part of the light beam is projected on the first reflecting portion **313**, further output from the first light outlet **315** after it is reflected by the first reflecting portion **313** and the reflecting shade **312**. Furthermore, the light beam output from the first light outlet **315** is reflected by the reflection mirrors **331** and **332** to change the optical route direction, the light beam is

caused to enter the second light source device **32** through the third light outlet **3232**. Among the light beam entering the second light source device **32** or the light beam emitted from the burner **321** of the second light source device **32**, a part of the light beam is reflected by the reflecting shade **322** and output from the second light outlet **3231**, and the other part of the light beam is reflected by the reflecting shade **322**, the reflection mirror **331** and the reflection mirror **332** and returns back to the first light source device **31**. The returned light beam is finally integrated into a parallel light beam to output from the second light outlet **3231** after many times reflections between the first light source device **31** and the second light source device **32**.

The installments of the first reflecting portion **313** and the second reflecting portion **33** are utilized to overlap the optical routes of the multiple light source devices (i.e. the first light source device **31** and the second light source device **32**) and integrate the light beam into the single parallel beam, and is then outputted from the single light source device (i.e. the second light source device **32**). Therefore, the brightness of entirety can be enhanced, because the brightness after general double light source devices are mixed is 1.6 times of the single light source device. Furthermore, when one of the light sources is damaged, because two light sources are installed by overlapping the optical routes in the second present invention, the single light source can still maintain the uniformity of images on the screen to enable images to be displayed normally. Besides, the limitation of the angle for the first reflecting portion **313** and the second reflecting portion **33** is utilized to enable the light beam to be still transmitted along the original route to allow the light beam to maintain as a parallel light beam to be output from the second light outlet **3231**.

The integrated parallel light beam is output from the second light outlet **3231** with a half area of the opening **323** so as to reduce the light distribution area. Comparing to the double light source device structures side by side in FIG. **1**, the light distribution area of the present invention is a quarter area of the conventional system. Therefore, the volume of the illumination system can be allowed to reduce and the system conforms the design principles of the lightness, thinness, shortness and smallness.

The Third Embodiment

The third embodiment is to provide an illumination system structure **40** combined by three light source devices. Please refer to FIG. **4**. The illumination system structure **40** of the third embodiment is constituted by further installing a third light source device **41** and a third reflecting portion **43** in the illumination system structure **20** of the first embodiment mentioned above, in which the first light source device **21** is installed along the horizontal direction, the second light source device **22** is installed along the vertical direction and the third light source device **41** is installed in front of the opening **223** of the second light source device **22**. The third light source device **41** comprises a burner **411**, a parabola-shaped reflecting shade **412** and an opening **413**. A light beam emitted from the burner **411** is reflected by the parabola-shaped **412** to generate a parallel light beam, and the burner **411** of the third light source device **41** is installed parallel to the burner **211** of the first light source device **21**. The opening **413** consists of a fourth light outlet **4131** and a fifth light outlet **4132**. The fourth light outlet **4131** is disposed far away from the second light outlet **2231** of the second light source device **22** so as to enable the light beam provided by the burner **421** to be output out of the third light source device **41**, the second light source device **22** and the first light source device **21**. The fifth light outlet **4132** is installed by facing the third reflecting portion **42** and adjacent to the second light outlet **2231** so as to enable the light beam provided by the burner **411** to return back into the second light source device **22**.

The third reflecting portion **42** is installed between the second light source device **22** and the third light source device **41** to guide the light beam from the second light outlet **2231** to be output from the fourth light outlet **4131** or to guide the light beam from the third light source **41** into the second light source device **22**. The third reflecting portion **42** is a reflection mirror in which a surface thereof facing the second light outlet **2231** and the fifth light outlet **4132** is the reflection mirror surface **421**, and one end of the third reflecting portion **42** is close to the rim of the reflecting shade **222** (far away from the rim of the first light source device **21**), the other end thereof is close to the burner **411** of the third light source device **41** so as to cause the fifth light outlet **4132** to occupy half area of the opening **413**, and an inclined angle is formed in a direction opposite to a direction that the third reflecting portion **42** faces the burners **221** and **411**. It is the best that the inclined angle is 45 degree so as to allow the light beam incident into the second light source device **22** and the light beam to output out of the second light source **22** can be transmitted along the original routes by the reflection, and finally to output from the fourth light outlet **4131** of the third light source device **41**.

The light beam output from the burner **411** of the third light source device **41** is reflected by the reflecting shade **412** to generate the parallel beam, a part of the light beam is directly output out of the third light source device **41**, the second light source device **22** and the first light source device **21** from the fourth light outlet **4131**, the other part of the light beam is projected on the third reflecting portion **42**, and returned back to the second light source device **22** and the first light source device **21**. The returned light beam is finally integrated into a parallel light beam and output from the fourth light outlet **4131** after it is reflected many times between the first light source device **21** and the second light source device **22**.

Utilizing three light source devices enables the brightness of the illumination system to be more enhanced, and the optical routes of the multiple light source devices (the first light source device **21**, the second light source device **22** and the third light source device **41**) are overlapped and integrated into the single parallel light beam, and then output out of the single light source device (i.e. the third light source device **41**). Therefore, when one of the light source devices is damaged, the illumination system can maintain the uniformity of images on the screen to enable images to be displayed normally.

The Fourth Preferred Embodiment

The fourth embodiment is to provide an illumination system structure **50** combined by three light source devices. Please refer to FIG. **5**. The illumination system structure **50** of the fourth embodiment is constituted by further installing a third light source device **51** and a third reflecting portion **52** in the structure of the illumination system **30** of the second embodiment mentioned above, in which the first and the second light source devices **31** and **32** are installed along the vertical direction and the third light source device **51** is installed in front of the opening **323** of the second light source device **32**. The third light source device **51** comprises

a burner **511**, a parabola-shaped reflecting shade **512** and an opening **513**. A light beam emitted from the burner **511** is reflected by the parabola-shaped reflecting shade **512** to generate a parallel light beam, and the burner **511** of the third light source **51** is installed perpendicular to the burner **311** of the first light source device **31** (i.e. along the horizontal direction). The opening **513** consists of a fourth light outlet **5131** and a fifth light outlet **5132**. The fourth light outlet **5131** is installed far away from the second light outlet **3231** of the second light source device **32** to enable the light beam provided by the burner **511** to be directly output out of the third light source device **51**, the second light source device **32** and the first light source device **31**. Furthermore, the fifth light outlet **5132** is installed adjacent to the second light outlet **3231** so as to enable the light beam provided by the burner **511** to return back into the second light source device **32**.

The third reflecting portion **52** is installed between the second light source device **32** and the third light source device **51** to guide the light beam from the second light outlet **3231** of the second light source **32** to be output from the fourth light outlet **5131** or to guide the light beam from the third light source device **51** to be incident into the second light source device **32**. The third reflecting portion **52** in the fourth embodiment is a reflection mirror in which a surface thereof facing the second light outlet **315** and the fifth light outlet **5132** is a reflection mirror surface **521**, one end of the third reflecting portion **52** is close to the rim of the reflecting shade **312** (far away from the rim of the first reflecting portion **313**) and the other end thereof is close to the burner **511** of the third light source device **51** so as to cause the fifth light outlet **5132** to occupy approximately half area of the opening **513**, and an inclined angle is formed in a direction opposite to a direction that the third reflecting portion **52** faces the burners **321** and **511**, it is the best that the inclined angle is 45 degree so as to enable the light beam incident into the second light source device **32** and the light beam output out of the second light source device **32** to transmit back along the original routes by the reflection, and output directly from the fourth light outlet **5131** of the third light source device **51**.

The light beam emitted from the burner **511** of the third light source device **51** is reflected by the reflecting shade **512** to generate a parallel light beam. A part of the light beam is output out of the third light source device **51**, the second light source device **32** and the first light source device **31** from the fourth light outlet **5131**, and the other part of the light beam is then projected on the third reflecting portion **52** to return back to the second light source device **32** and the first light source device **31**. The returned light beam is finally integrated into the parallel light beam and output from the fourth light outlet **5131** after it is reflected many times between the first light source device **31** and the second light source device **32**.

Utilizing the three light source devices can cause the brightness of the illumination system to be more enhanced, and the optical routes of the multiple light source devices (the first light source device **31**, the second light source device **32** and the third light source device **51**) are overlapped and integrated into a single parallel light beam, and then output out of the single light source device (i.e. the third light source device **51**). Therefore, when one of the light source devices is damaged, the uniformity of the images on the screen can still be maintained in the illumination system so as to enable images to be displayed normally.

The Fifth Preferred Embodiment

Please refer to FIG. **6**. The difference between the fifth preferred embodiment and the first preferred embodiment is installing a first reflecting portion **713** on a circumference surface **711**A of a semicircle of a burner **711**. The first reflecting portion **713** is installed on the circumference surface **711**A of the left semicircle of the burner **711** and the first reflecting portion **713** is a structure in which an inner surface (i.e. a surface facing the burner **711**) thereof is a reflecting surface so as to allow a light beam emitted from the burner **711** to be partly output directly from a circumference surface of another semicircle **711**B (i.e. a place where the first reflecting portion **713** is not installed), and the light beam is reflected by a reflecting shade **712** to generate a parallel light beam and output from the first light outlet **715**, the light beam emitted from the burner **711** is then partly projected on the first reflecting portion **713**, and then reflected by the reflecting shade **712** to cause the light beam to be output from the first light outlet **715** after it is reflected by the first reflecting portion **713** to output out of the burner **711** so as to replace the structure of the first reflecting portion **213** in the first embodiment. However, the second light source device **22** and the second reflecting portion **23** in the fifth embodiment are adopted from the structures of the first embodiment. The fifth embodiment can similarly attain to the effect that is outputting the light beam from the first light outlet **715** with a half area of the opening of a first light source device **71**.

The Sixth Preferred Embodiment

Please refer to FIG. **7**. The illumination system **20** of the present invention is utilized in a digital light processing (DLP) projection system **60**. It comprises the illumination system **20**, a reflection mirror **61**, a reflecting light valve **62** and a projection lens **63**, in which the light valve **62** is a digital micro-mirror device (DMD). The illumination system **20** further comprises a condenser **24**, a color wheel **25** and an integrated rod **26** installed in front of the second light outlet **2231**. Light beams of the two light source devices is integrated into a parallel light beam and output from the second light outlet **2231**, and then condensed to be a condensed light beam through the condenser **24**. Thereafter, the condensed light beam is projected on the light valve **62** through the reflection mirror **61** after light filtering and uniforming processes through the color wheel **25** and the integrated rod **26** to be formed an image light beam by means of the reflection process of the light valve **62**. Finally, images are displayed on a screen **64** through the projection lens **63**.

Because the integrated parallel light beam is output from the second light outlet **2231** with half area of the opening **223**, the light distribution area is decreased. Consequently, the volume of the condenser **24** is decreased so as to lower the production cost.

Besides, the illumination systems in the second, the third, the fourth and the fifth embodiments of the present invention all can utilize further installing a condenser in front of the light outlet for the parallel light beam and apply the condenser on a digital light processing (DLP) projection system. Furthermore, the illumination systems of the first, the second, the third, the fourth and the fifth embodiment of the present invention also can be applied directly on a projection system in which a parallel light beam is adoptable.

Additional advantages and modifications will readily occur to those skilled in the art. Therefore, the invention in

its broader aspects is not limited to the specific details and representative embodiments shown and described herein. Accordingly, various modifications are made without departing from the spirit or scope of the general inventive concept as defined by the appended claims and their equivalents.

What is claimed is:

1. An illumination system, comprising:

a first light source device, comprising a first burner, a first parabola-shaped reflecting shade and a first reflecting portion, said first burner being installed in said first parabola-shaped reflecting shade and positioned on a focus of said first parabola-shaped reflecting shade, said first reflecting portion covering a part area of an opening of said first parabola-shaped reflecting shade, the other part area of said opening being formed a first light outlet;

a second light source device, installed in front of said opening, and comprising a second burner, a second parabola-shaped reflecting shade and a second light outlet, said second burner being installed in said second parabola-shaped reflecting shade and positioned on a focus of said second parabola-shaped reflecting shade, said second light outlet being disposed at an opening of said second parabola-shaped reflecting shade; and

a second reflecting portion, installed between said first light source device and said second light source device to guide a light beam from said first light source device to be output from said second light outlet.

2. The illumination system according to claim **1**, further comprising a condenser installed in front of said second light outlet for transferring said light beam to be a condensed beam.

3. The illumination system according to claim **1**, wherein an area of said first reflecting portion and said second light outlet is smaller than an area of said opening.

4. The illumination system according to claim **1**, wherein said first reflecting portion occupies approximately half area of said opening of said first light source device.

5. The illumination system according to claim **1**, wherein said second light outlet occupies approximately half area of said opening of said second light source device.

6. The illumination system according to claim **1**, wherein said first reflecting portion is a reflection mirror, and is installed in a direction perpendicular to a direction of said first burner of said first light source device.

7. The illumination system according to claim **1**, wherein at least one of said first reflecting portion and said second reflecting portion is a cold mirror or a prism with a total reflection surface.

8. The illumination system according to claim **1**, wherein at least one of said first reflecting portion and said second reflecting portion is a dichroic mirror.

9. The illumination system according to claim **1**, wherein said first burner of said first light source device and said second burner of said second light source device are disposed perpendicular to each other.

10. The illumination system according to claim **9**, wherein said second reflecting portion is a reflection mirror, and said second reflecting portion is formed an inclined angle of approximate 45 degree facing a direction opposite to a direction of said second burner of said second light device.

11. The illumination system according to claim **1**, wherein said first burner of said first light source device and said second burner of said second light source device are disposed parallel to each other.

12. The illumination system according to claim **11**, wherein said second reflecting portion comprises a pair of reflection mirrors parallel to each other, and said reflection mirror is formed an inclined angle of approximate 45 degree facing a direction opposite to a direction of said first burner of said first light source device.

13. The illumination system according to claim **1**, further comprising a third light source device and a third reflecting portion, said third light source device being installed in front of second light outlet, and said third light source device comprising a third burner, a third reflecting shade and a third light outlet, said third reflecting portion being installed between said second light source device and said third light source device to guide a light beam from said second light source device to be output from said third light outlet.

14. The illumination system according to claim **13**, wherein the first burner and third burner of said first and said third light source devices are respectively disposed along a horizontal direction, the second burner of said second light source device is disposed along a vertical direction, and said second and said third reflecting portions are reflection mirrors, and said third reflecting portion is formed an inclined angle of approximate 45 degree facing a direction opposite to a direction of said third burner of the third light device.

15. The illumination system according to claim **13**, wherein the first burner and the second burner of said first light source device and said second light source device are disposed along a vertical direction, the third burner of said third light source device is disposed along a horizontal direction, and a second reflecting portion comprises a pair of reflection mirrors parallel to each other, and said reflection mirror is formed an inclined angle of approximate 45 degree facing a direction opposite to a direction of said first burner of said first light device, said third reflecting portion is a reflection mirror, and said third reflecting portion is formed an inclined angle of approximate 45 degree facing a direction opposite to a direction of said third burner of said third light device.

16. The illumination system according to claim **13**, wherein said third reflecting portion is a cold mirror or a dichroic mirror or a prism with a total reflection surface.

17. A projection system, comprising:

an illumination system, comprising:

a first light source device, comprising a first burner, a first parabola-shaped reflecting shade and a reflecting portion, said first burner being installed in said first parabola-shaped reflecting shade and positioned on a focus of said first parabola-shaped reflecting shade, said first reflecting portion covering a part of area of an opening of said first parabola-shaped reflecting shade, the other area of said opening is formed a first light outlet;

a second light source device, installed in front of said opening, and comprising a second burner, a second parabola-shaped reflecting shade and a second light outlet, said second burner being installed in said second parabola-shaped reflecting shade and positioned on a focus of said second parabola-shaped reflecting shade, said second light outlet being positioned at an opening of said second parabola-shaped reflecting shade;

a second reflecting portion, installed between said first light source device and said second light source device to guide a light beam from said first light source device to be output from said second light outlet; and

a condenser installed in front of said second light outlet for transferring said light beam to a condensed beam;

a reflecting light valve, installed on an optical route of said condensed light beam for processing and reflecting said condensed beam; and

a projection lens, installed on a route of the light beam reflected from said reflecting light valve.

18. The projection system according to claim **17**, wherein said reflecting light valve is a digital micro-mirror device (DMD).

19. The projection system according to claim **17**, wherein said illumination system further comprises a third light source device and a third reflecting portion, said third light source device is installed in front of second light outlet, and said third light source device comprises a third burner, a third reflecting shade and a third light outlet, said third reflecting portion is installed between said second light source device and said third light source device to guide a light beam from said second light source device to be output from said third light outlet.

20. The projection system according to claim **17**, wherein said reflecting portion is a reflection mirror, a cold mirror, or a prism with a total reflection surface or a dichroic mirror.

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