

-1-

LED STAGE LIGHT APPARATUS

The present invention relates to a stage light apparatus, and more particularly to a multi-color focusable LED (light emitting diode) stage light apparatus comprising an array of LEDs of various colors.

A conventional design for a stage light is essentially composed of lamps and various filter lenses to achieve effects of various colors or soft-focus light. However, to obtain various colors of light, a considerable number of stage lamps are required, resulting in problems of spatial inefficiency and high power consumption.

To reduce the required number of stage lamps, a stage lamp with a filter lens rotary disk has been developed. The automatic filter lens rotary disk contains several filter lenses having different colors or focuses and is disposed in front of the stage lamp. A specific filter lens is selected and moved to a position corresponding to the lamp by controlling the filter lens rotary disk. In this way, light with different colors or different focuses can be obtained from a single light source. Although such a stage lamp with a filter lens rotary disk can provide various effects of light while occupying a limited space, the filter lens rotary disk must be controlled by means of a complicated mechanical structure. Furthermore, a significant delay will result when changing color.

One object of the present invention is to provide a multi-color LED stage light apparatus which can rapidly and smoothly change color occupy a small space and consume

limited power.

Another object of the present invention is to provide a focusable LED stage light apparatus which can change focus by a simple mechanical arrangement.

In accordance with one aspect of the present invention, the LED stage light apparatus comprises a number of LEDs arranged as an array on a flexible support base. The LEDs are divided into a plurality of groups, each of which contains several LEDs of different colors. Accordingly, the color of the light apparatus can be rapidly changed by controlling the operation status of the LEDs of respective color.

In accordance with another aspect of the present invention, the LED stage light apparatus further comprises an extensible rod connected with the flexible support base, whereby the curvature of the flexible support base can be varied by controlling the extension of the extensible rod to change the focus of the light apparatus.

Other objects, advantages and novel features of the invention will become more apparent from the following detailed description when taken in conjunction with the accompanying drawings.

IN THE DRAWINGS

Fig. 1 is a cross-sectional diagram showing a structure of an LED stage light apparatus in accordance with the present invention;

Fig. 2 shows a front view of the LED stage light apparatus in accordance with the present invention;

Fig. 3 shows a rear view of the LED stage light apparatus in accordance with the present invention;

Fig. 4 is a partial diagram showing groups of LEDs in the LED stage light apparatus in accordance with the present invention;

Fig. 5 is a partial, cross-sectional diagram showing the LEDs and a support base of the LED stage light apparatus in accordance with the present invention;

Fig. 6 shows an arrangement of LEDs of the LED stage light apparatus in accordance with the present invention; and

Fig. 7 shows another arrangement of LEDs of the LED stage light apparatus in accordance with the present invention.

Referring to Figs. 1, 2, and 3, an LED light apparatus in accordance with the present invention essentially has a light device 10 and a tube-like shield 20 combined therewith. The light device 10 comprises a support housing 30 and a support base 40 having a number of LEDs 41 arranged thereon. The support base is made of a flexible material such as rubber, or other soft material. As shown in Fig. 1, the shield 20 has an axially projecting collar portion 21, and the support housing 30 has a circumferential flange 32, which can be properly received in the collar portion 21 of the shield 20 so that the shield 20 and the light device 10 can be securely combined.

Several retainers 50 are disposed along an inner side of the collar portion 21 of the shield 20 to securely clamp

the support base 40 in cooperation with the support housing 30.

The light device 10 further comprises an actuator 34, which can be a linear servo motor, for controlling an extensible rod 35 extending therefrom. The extensible rod 35 is connected to a hub portion 42 which is fixed on a central portion of the support base 40. Accordingly, the curvature of the support base 40 can be adjusted by controlling the extension of the extensible rod 35 through the actuator 34, thereby varying the focus of the light omitted from of the light apparatus as desired. For example, if the extensible rod 35 is at a maximum extension position, the support base 40 is flat as indicated by the real lines in Fig. 1. When the extensible rod 35 is retracted so that the extension thereof from an end of the actuator 34 becomes shorter so as to draw thereby bringing the central portion of the support base 40 backward causing the support base 40 to curve as indicated by the imaginary lines in Fig. 1, the focus of the light emitted from the light apparatus will be manipulated.

The light device 10 further comprises a plurality of control elements 33. Each control element 33 has an end disposed inside the support housing 30 and electrically connected to a patterned copper foil (not shown) provided on a rear side of the support base 40 by means of cables (not shown for clearness), and the other end thereof can be coupled to an external control system (not shown). Each LED has leads 44, 45 (Fig. 5) thereof electrically connected to proper positions on the patterned copper foil. Accordingly,

the operation status of the LEDs can be controlled by the control system via the control elements 33.

The support housing 30 has several air hole 31 for the purpose of heat dissipation.

A bail 11 can be mounted to the shield 20 by a pair of winghead screws 13 (only one is shown) so that the light apparatus can be fixed at a desired location by suspending or mounting the bail thereto.

Referring to Fig. 4, in this embodiment three different colors of LEDs are provided on the support base 40 composing a group, for example, a red LED 41a, a green LED 41b, and a blue LED 41c. The color of light emitted from the light apparatus in accordance with the present invention depends upon the operation status or light intensity of the LEDs of the different colors in each group. When all the LEDs of each group are turned on, the light emitted from the light apparatus appears to be white light. In this way, the color of light can be rapidly and smoothly varied as desired. Although the LEDs 41 in Fig. 4 are arranged as an array, the LEDs 41 can be arranged in any other pattern.

Referring to Fig. 5, the support base 40 can be further provided with a light reflective coating 43 to enhance the effect of light projection.

In application, the light device 10 can be used as a non-projective stage light apparatus without the shield 20.

Referring to Figs. 6 and 7, the support base 40 can be substituted by a soft underlayer, which is a round fabric 60 or other soft material, and several fan-shaped circuit board

70 (Fig. 7) or arc circuit board 80 (Fig. 8) adhered to the round fabric 60. Each circuit board 70 (80) has a plurality of LEDs 41 attached to a front side thereof and a patterned copper foil (not shown) on a rear side thereof. Each LED 41 has the leads thereof penetrating through the circuit board 70 (80) and soldered to the copper foil. The circuit boards 70 (80) are coupled to each other by means of wires (not shown) or the like.

It is to be understood, however, that even though numerous characteristics and advantages of the present invention have been set forth in the foregoing description, together with details of the structure and function of the invention, the disclosure is illustrative only, and changes may be made in detail, especially in matters of shape, size, and arrangement of parts within the principles of the invention to the full extent indicated by the broad general meaning of the terms in which the appended claims are expressed.



CLAIMEDS:

1. An LED stage light apparatus comprising:

- a support housing;
- a support base mounted to said support housing and having a number of LEDs attached to a front side thereof and a copper foil provided on a rear side thereof toward said support housing, each of said LEDs having leads thereof electrically coupled to said copper foil; and
- at least one control element having a first end thereof electrically connected to said copper foil and a second end coupled to an external control system so that an operation status of said LEDs can be controlled by said external control system via said control element.

2. The LED stage light apparatus as claimed in Claim 1, further comprising a tube-like shield mounted to said support housing so that said support base is clamped therebetween.

3. The LED stage light apparatus as claimed in Claim 2, further comprising a bail mounted to said shield.

4. The LED stage light apparatus as claimed in Claim 1, wherein said support base is made of flexible material.

5. The LED stage light apparatus as claimed in Claim 4, further comprising:

- an actuator mounted in said support housing and having an extensible rod extending therefrom to be connected to said support base, so that a curvature of said support base can be varied by controlling an extending length of said extensible rod with said actuator.



-8-

6. The LED stage light apparatus as claimed in Claim 5, wherein said support base has a periphery edge thereof engaged with a circumferential flange of said supporting housing.

7. The LED stage light apparatus as claimed in Claim 5, wherein said actuator is a linear servo motor.

8. The LED stage light apparatus as claimed in Claim 5, wherein said extensible rod is connected to a central portion of said support base.

9. The LED stage light apparatus as claimed in Claim 4, wherein said support base is made of rubber.

10. The LED stage light apparatus as claimed in Claim 4, wherein said support base comprises a fabric and several circuit boards adhered to said fabric, and a number of said LEDs are attached to each of said circuit boards.

11. The LED stage light apparatus as claimed in Claim 4, further comprising a tube-like shield mounted to said support housing so that said support base is clamped therebetween.

12. The LED stage light apparatus as claimed in Claim 11, further comprising a bail mounted to said shield.

ABSTRACT

LED STAGE LIGHT APPARATUS

An LED stage light apparatus includes a number of LEDs arranged as an array on a flexible support base. The LEDs are divided into a plurality of groups, each of which contains several LEDs respectively having different callers. Accordingly, the color of the light apparatus can be rapidly switched by controlling on/off of the LEDs of respective color. The LED stage light apparatus further includes an extensible rod connected with the flexible support base, whereby the curvature of the flexible support base can be varied by controlling the extensible rod to change the focus of the light apparatus.

Fig.1

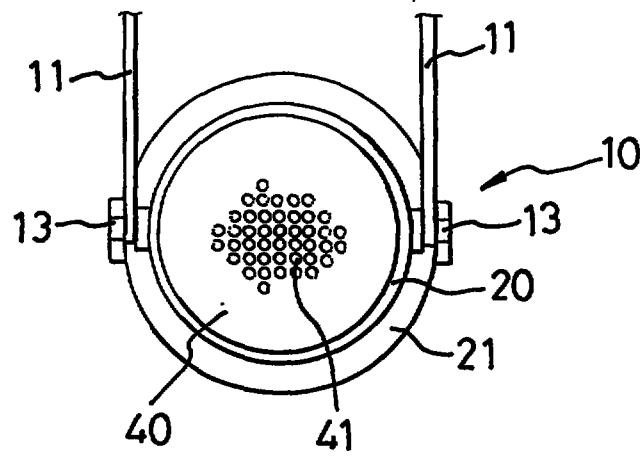


FIG. 2

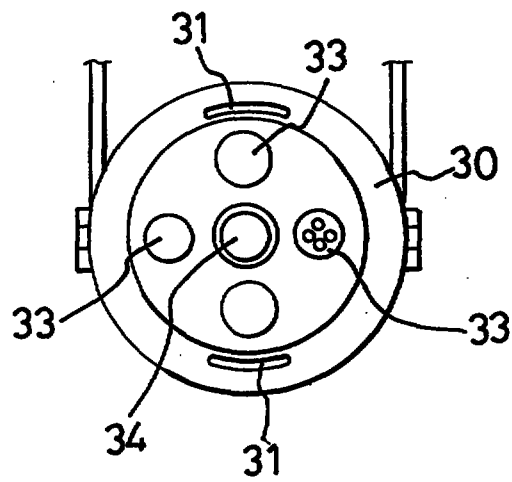


FIG. 3

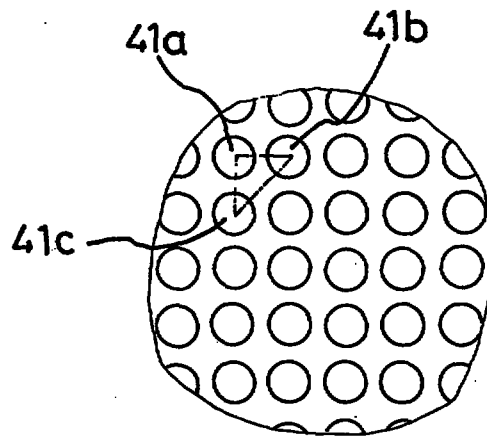


FIG. 4

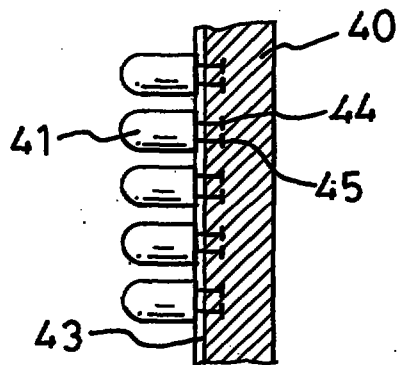


FIG. 5

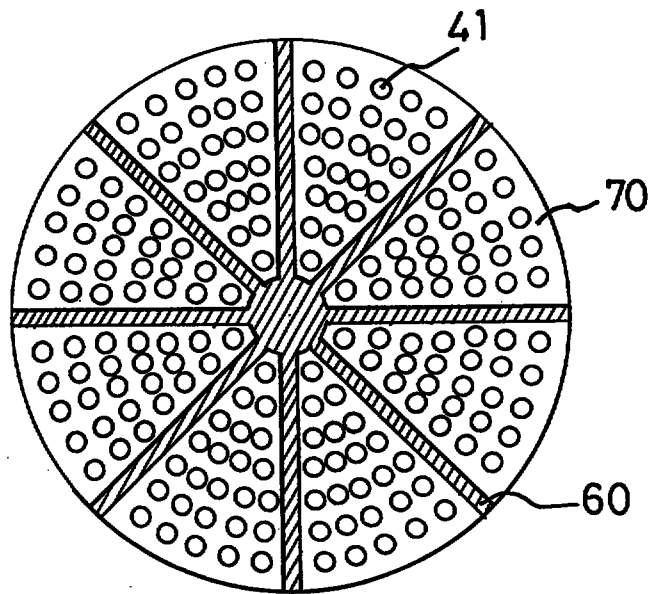


FIG. 6

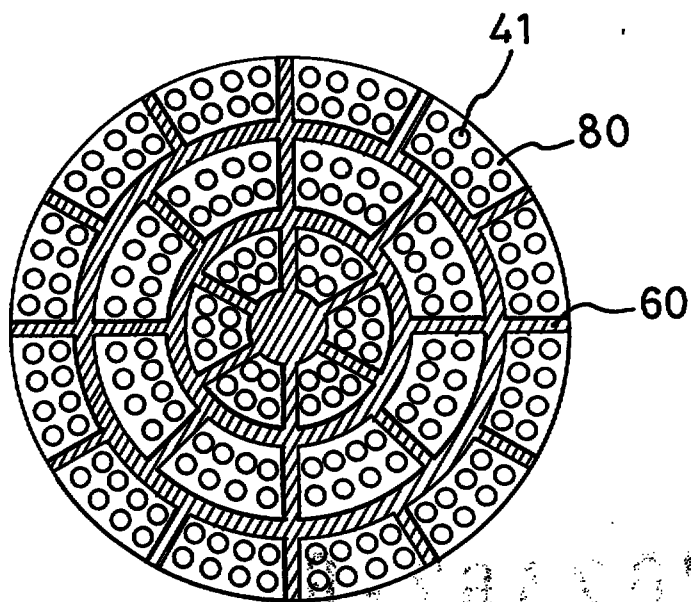


FIG. 7