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(54) **A variable colour light.**

(57) A variable colour light comprises a container (10) for constituting a light bulb, red, green and blue lights (R,G,B) so situated in the container that colours from the lights mix together, and a device (14) for controlling the red, green and blue lights (R,G,B). The controlling device (14) controls brightness and length of operation of each light so that the colour emitted from the container (10) can be changed as desired. The colour of the light bulb (10) may be changed automatically.

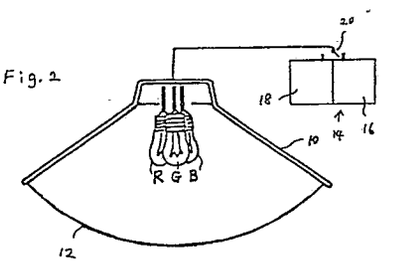

Fig. 2

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## Description

### A variable colour light

The present invention relates to a variable colour light, in which the colour of the light is changed as desired.

The present invention has been made based on the trichromatic theory in colorimetry, in which red, green and blue are used to create any desired colour. Although the trichromatic theory has been known and the technique thereof has been used in creating colours and so on, the trichromatic technique has not been used in light, i.e. to display a desired colour in a light.

Accordingly, one object of the present invention is to provide a variable colour light, in which a desired colour can be displayed easily.

Another object of the present invention is to provide a variable colour light in which the colour of the light can be continuously changed as desired.

A further object of the present invention is to provide such a variable colour light which can be manufactured easily and economically.

The invention provides a variable colour light comprising: a container; red, green and blue lights so situated in the container that the colours emitted by the lights can be mixed together; and means for so controlling the brightness and operating time of each of the red, green, and blue lights that the colour generated from the container can be changed as desired.

The invention also provides a variable colour light that comprises a container for constituting one light bulb, red, green and blue lights situated in the container so that colours of the lights can be mixed together in the container, and means for controlling the red, green and blue lights. The controlling means controls brightness and operating length of each light so that the colour of the light bulb can be changed as desired.

The controlling means preferably includes a manual controller, an automatic controller, and a switch for operating one of the manual controller and automatic controller. In the manual controller, red, green and blue lights are individually controlled to show a desired colour in total.

The automatic controller includes oscillating means for changing colour variation rates of the red, green and blue lights. In the automatic controller, the brightness and operating length of each light are cyclically controlled so that the colour of the light bulb changes cyclically and automatically.

One form of light constructed in accordance with the invention, and its manner of operation, will now be described by way of example with reference to the accompanying drawings, in which:

Fig. 1 is a schematic digram for showing a colour variation when three primary colours are successively changed;

Fig. 2 is a diagrammatic sectional view of one form of variable colour light; and

Fig. 3 is a circuit diagram.

Referring to the drawings, and initially to Fig. 1, in one example of a continuous colour variation the three primary colours, red, green and blue, are successively changed. From $t_0$ to $t_1$, for example, the intensity of a red light is gradually reduced, while that of a green light is gradually increased. Therefore, the resultant colour changes from red through orange and yellow to green. In the course of the time period from $t_0$ to $t_3$, all the visible lights or colours, e.g. red, orange, yellow, green, blue, purple and so on, successively appear.

Referring now to Fig. 2, in view of the above trichromatic theory, one form of light bulb 10 according to the invention includes a bulb R for red light, a bulb G for green light and a bulb B for blue light. The bulbs R, G, B are situated in the centre of the light bulb 10, so that colours emitted from the bulbs R, G, B are mixed together in the bulb 10. The mixed colour is emitted through a glass 12.

The bulbs R, G, B are connected to a control device indicated by the reference number 14 including an automatic control device 16 and a manual control device 18. The control mode can be changed by a switch 20. In the manual control mode, a desired colour can be produced by the bulb 10. For example, if orange is to be displayed in the bulb 10, the bulb R is adjusted to show relatively strong red, and the bulb B is adjusted to show relatively weak green, while the bulb B is off. As a result, the bulb 10 shows orange. The strength of the light, or the brightness of the bulbs R, G, B can be adjusted as well.

In the automatic control mode, the colour changes cyclically and successively. For example, as shown in Fig. 1, the brightness of the bulb G is changed from zero to zero through maximum. When the brightness of the bulb G is maximum, the bulb B is turned on and its brightness is gradually increased to maximum. At the same time as the brightness of the bulb B becomes maximum, the bulb G reaches zero brightness and becomes off, and the bulb R is turned on and its brightness is gradually increased to maximum. When the brightness of the bulb R reaches maximum, the brightness of the bulb B becomes zero, and then the bulb G is turned on again. Thus, the brightnesses of the bulbs R, G, B gradually and cyclically change to change the colour in the light bulb 10 continuously.

Referring to Fig. 3, in one example of a circuit for the control device 14 three CMOS NOT circuits 21, 22, 23 are connected to form a circular sine wave oscillator. The oscillating cycle is the sum of time constants of the circuits $R_1C_1$, $R_2C_2$, $R_3C_3$. By changing the values of these resistors and capacitors, the oscillating frequency, which controls the colour variation rate, can be changed. If the time constants of the circuits $R_1C_1$, $R_2C_2$, $R_3C_3$ are the same, the signal phases at the three outputs are successively delayed by 60 degrees.

The signals in the circuits 21, 22, 23 are transferred to NOT circuits 24, 25, 26, each controlling the length of time for which a respective one of the bulbs R, G, B is lit, in which the sine wave output of the

oscillator is changed to a rectangular wave, which is then integrated by a resistor and capacitor to produce an angular wave outout at the respective one of the points 27, 28, 29. The angular waves for the respective bulbs R, G, B are separately amplified by transistors. For example, the angular wave for the bulb B is amplified by a transistor 30 and is transferred to a circuit 31 through a switch 32.

In the circuit 31, the brightness of the bulb B is controlled. The circuit 31 operates so that the brightness of the bulb B is changed from zero to zero through maximum during a period of receiving a signal from the transistor 30 (i.e. the bulb B is on). The bulbs R, G are controlled in the same way as the bulb B. Consequently, the colour of the light bulb 10 changes automatically and cyclically.

The switch 32 is a switch to change the operation mode. When the operation mode is changed to manual, the brightness of the bulb B is controlled by a variable resistor 33. By also controlling in the same way the brightness of the bulbs R and G, a desired colour can be displayed.

In the automatic control mode, the bulbs R, G, B are cyclically and automatically varied respectively. As a result, the colour of the light bulb 10 is cyclically and automatically changed. All the colours can be changed automatically.

On the other hand, in the manual control mode, a desired colour can be displayed without changing the colour. It is possible to change cyclically the desired colours only.

## Claims

1. A variable colour light comprising: a container; red, green and blue lights so situated in the container that the colours emitted by the lights can be mixed together; and means for so controlling the brightness and operating time of each of the red, green and blue lights that the colour generated from the container can be changed as desired.

2. A variable colour light as claimed in claim 1, wherein the said container constitutes one light bulb.

3. A variable colour light as claimed in claim 1 or claim 2, wherein the controlling means includes a manual controller, an automatic controller, and a switch for selecting one of the manual controller and the automatic controller.

4. A variable colour light as claimed in claim 3, wherein when the switch is turned to the manual controller, a desired colour is continuously displayed in the light bulb.

5. A variable colour light as claimed in claim 3 or claim 4, wherein when the switch is turned to the automatic controller, the colour in the light bulb changes automatically as desired.

6. A variable colour light as claimed in any one of claims 3 to 5, wherein the automatic controller includes oscillating means for individually changing colour variation rates of the red, green and blue lights so that the colour of the light bulb changes cyclically and automatically.

7. A variable colour light as claimed in claim 6, wherein the automatic controller includes means for automatically changing the brightnesses of the red, green, and blue lights whenever the respective red, green, and blue lights are turned on.

8. A variable colour light comprising: a container, red, green and blue lights situated in the container so that colours of the lights can be mixed together, and means for controlling the red, green and blue lights, said controlling means controlling brightness and operating length of each light so that colour generated from the container can be changed as desired.

Fig. 1

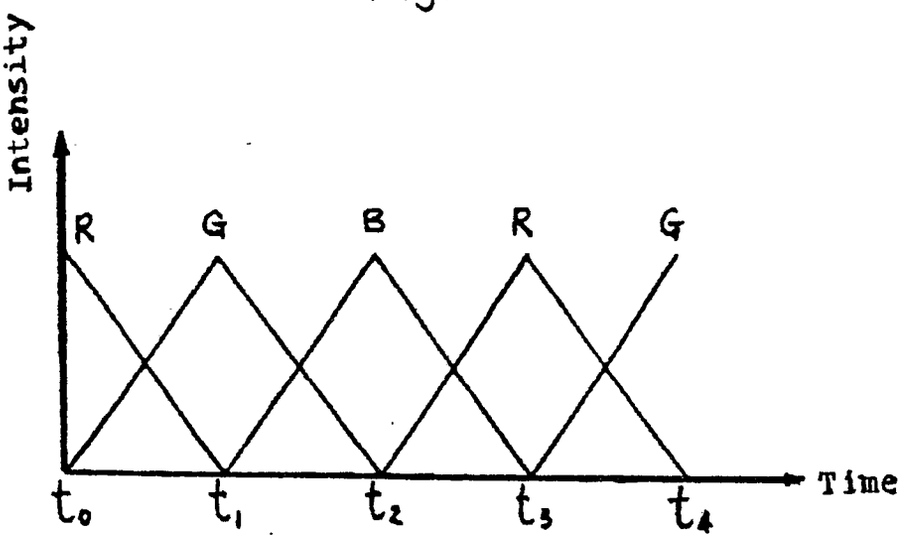
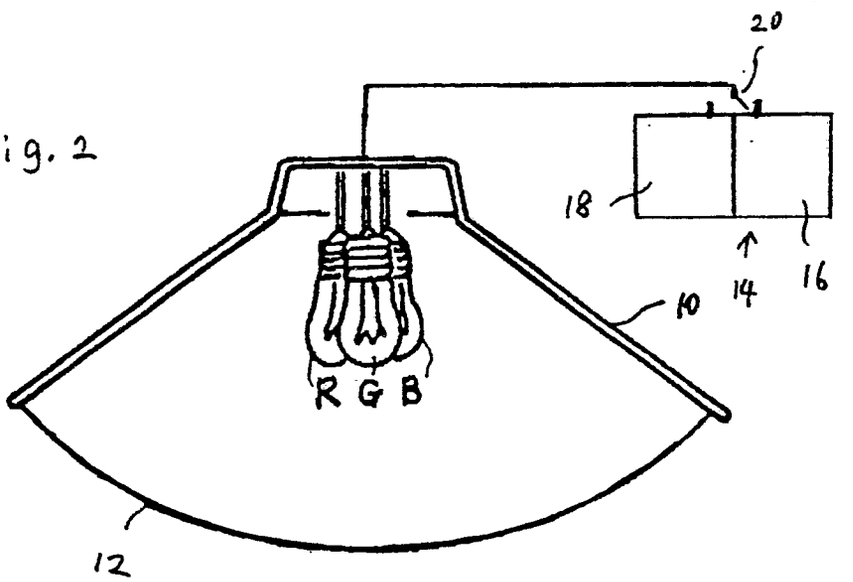
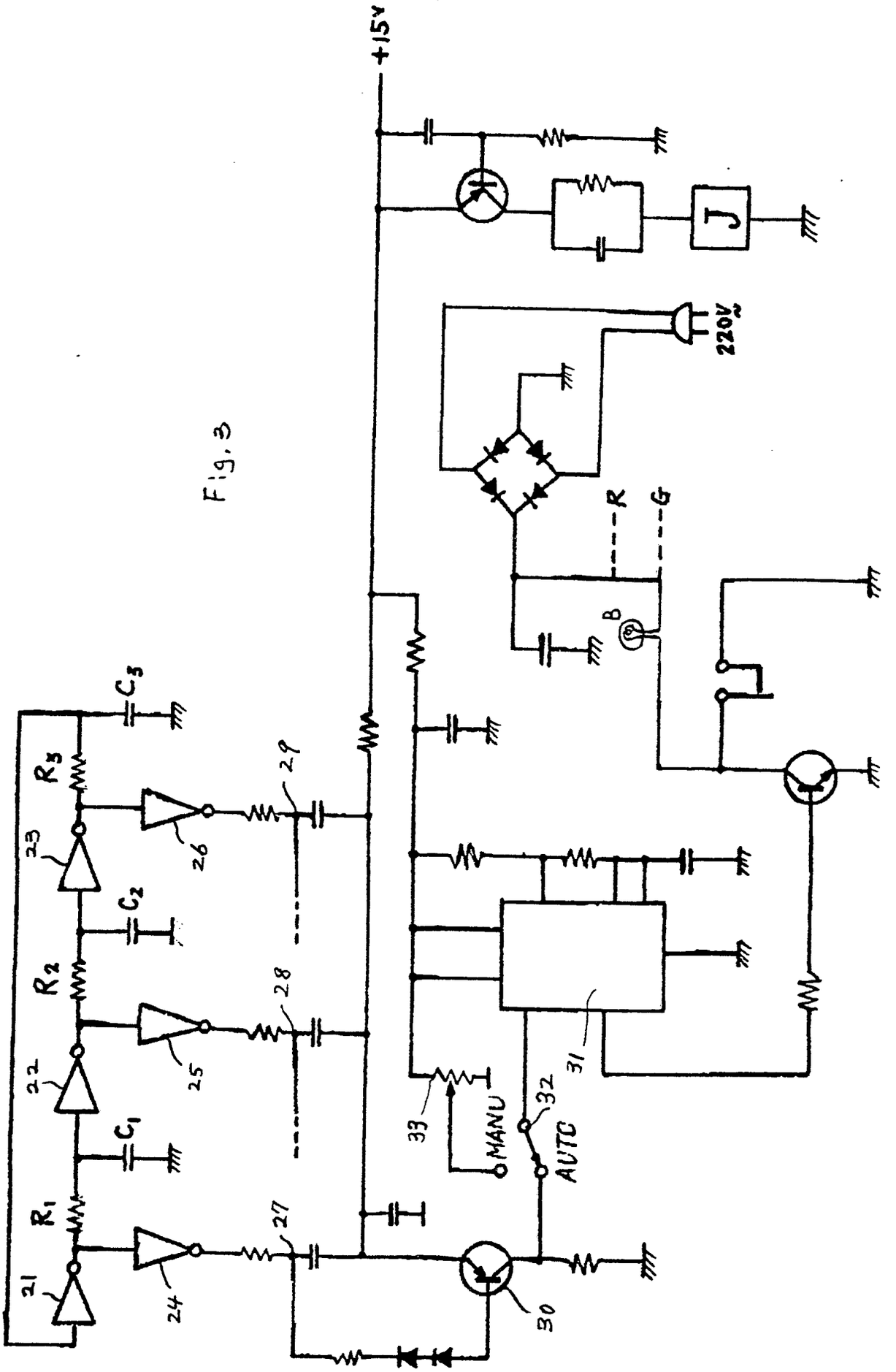



Fig. 2

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220V
R
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Fig. 3