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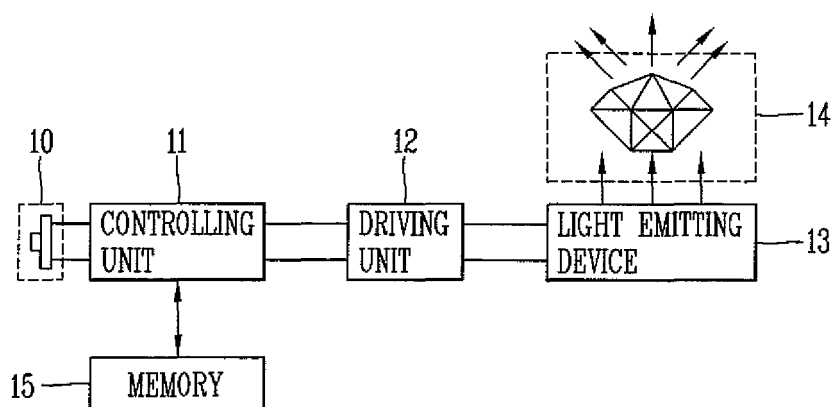
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(54) **Watch having color control function, color control apparatus and method thereof**

(57) A watch having a color control function, in which light emitting diodes such as RGB LEDs and radiating devices such as diamonds mounted on the light emitting diodes are provided to radiate various colors of light generated from the light emitting diodes through the radiating

devices, and a color control apparatus and method for the watch are provided. Accordingly, various colors can be shown with respect to various jewels mounted in the watch to thusly achieve more enhanced merits of the watch and jewels.

FIG. 1



Description

RELATED APPLICATION

[0001] The present disclosure relates to subject matter contained in priority Korean Application No. 10-2007-0109188, filed on October 29, 2007, which is herein expressly incorporated by reference in its entirety.

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0002] The present invention relates to a color control for the different diamond colors of diamonds using light emitting diodes and a wristwatch having the same.

2. Background of the Invention

[0003] In general, a watch (wristwatch, clock, etc.) denotes an appliance or machine for visually (or auditorily) informing time. The watch has recently been designed in various shapes and with various colors according to the user's preference. Also, watches having specific functions (e.g., waterproof, communication, computer, and the like) have appeared.

[0004] The watches may be divided into an analog watch and a digital watch. Also, according to their uses, the watches may include various types, for example, a wall-hanging clock, a wristwatch, a table clock and the like. In particular, in addition to indicating time, the wristwatch can be used to express a user's individuality. Furthermore, in order to visually make it more attractive and increase its merit as a collection, various types of jewels can be used for the wristwatch during its manufacturing process. Among various types of jewels, diamond is a representative jewel to be used for the wristwatch, in terms of its superior hardness and bright sparkle.

[0005] In the related art, the type and color of jewel (e.g., diamond) was determined from the manufacturing process of the wristwatch. Accordingly, it is very limitative (i.e., very difficult) to change a type and color of jewel contained in a completely-manufactured watch. So, as time goes, the value of the watch decreases.

[0006] In addition, since jewels mounted at a watch are typically disposed inside the watch, the value as jewel cannot often be shown. Hence, the present invention aims to emit light onto jewels thus to show the value of splendid jewels.

SUMMARY OF THE INVENTION

[0007] Therefore, an object of the present invention is to provide a watch having a function of displaying various colors.

[0008] Another object of the present invention is to provide a color control apparatus capable of controlling a color of jewel mounted in a watch, and a method thereof.

[0009] To achieve these and other advantages and in accordance with the purpose of the present invention, as embodied and broadly described herein, there is provided a color control apparatus for a watch in accordance with one embodiment, the apparatus comprising: at least one or more diamonds; and Red Green Blue Light Emitting Diodes (RGB LEDs) respectively located at one side of each diamond to emit at least one or more colors of light onto the one or more diamonds.

[0010] Preferably, each diamond may be configured to have a culet portion at an upper side thereof and a table portion at a lower side thereof.

[0011] Preferably, pavilion depth and crown height of the diamond are the same to each other, and each angle thereof is equally 25°.

[0012] The color control apparatus for the watch related to the one embodiment may further include a switch configured to select a light emitting mode, a memory configured to store information related to the light emitting mode selected by the switch, a controlling unit configured to generate color corresponding to the selected light emitting mode, and a driving unit configured to convert the color data generated from the controlling unit into a pulse width modulation signal to output to the LEDs.

[0013] Preferably, the switch is implemented rotatably or as a type of button, and the light emitting mode is set by the rotation of the switch, the number of pressing the button or the combination thereof.

[0014] Preferably, the information related to the light emitting mode is stored in a form of table, the information including a type of light emitting mode, a type of color, brightness, a light emitting time (period), and a harmony of colors of light from the LEDs.

[0015] The watch described in this specification may include both analog watch and digital watch. Also, the watch described in the this specification may include various types of watches mounted in a variety of electronic instruments, as well as wall-hanging clock, wristwatch, table clock and the like, according to their uses.

[0016] The foregoing and other objects, features, aspects and advantages of the present invention will become more apparent from the following detailed description of the present invention when taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0017] The accompanying drawings, which are included to provide a further understanding of the invention and are incorporated in and constitute a part of this specification, illustrate embodiments of the invention and together with the description serve to explain the principles of the invention.

[0018] In the drawings:

Figure 1 is a block diagram showing a color control apparatus for a watch in accordance with one embodiment of the present invention.

Figure 2 is an LED chromaticity diagram in accordance with one embodiment of the present invention. Figure 3 is a view showing a diamond used as a radiating device according to the present invention. Figure 4 is a view showing a comparison result between a diamond used in the present invention and a typical diamond.

Figure 5 is a flowchart showing a method for controlling colors for a watch in accordance with an embodiment of the present invention.

Figure 6 is a view showing an example in which a color control apparatus according to the present invention is actually applied to a wristwatch.

DETAILED DESCRIPTION OF THE INVENTION

[0019] Description will now be given in detail of the present invention, with reference to the accompanying drawings.

[0020] Hereinafter, a color control apparatus for a watch according to the present invention will be described with reference to the accompanying drawings.

[0021] Fig. 1 is a block diagram showing a color control apparatus for a watch in accordance with one embodiment of the present invention.

[0022] As shown in Fig. 1, a color control apparatus according to the present invention may include a switch 10 for inputting data to select a light emitting mode, a controlling unit 11 for generating color data by sensing the input of the switch 10, a driving unit 12 for converting the color data generated from the controlling unit 11 into a pulse width modulation (PWM) signal, Light Emitting Diodes (LEDs) 13 for generating various colors of light according to the PWM signal outputted from the driving unit 12, at least one or more radiating devices 14 for radiating the various colors of light generated from the LEDs 13, and a memory 15 for storing various information related to the selected light emitting mode.

[0023] The switch 10 may be implemented in a type of spring or button, and typically be located at a side surface of a watch. A user can select different light emitting modes according to the number of winding a spring or pressing a button. For example, it is allowed to change colors according to the number of winding a spring or to adjust strength and weakness of color according to the number of pressing a button. If the user does not separately set any light emitting mode through the switch 10, a light emitting mode set as a default may automatically be selected. Here, the types of light emitting modes or colors configuring each light emitting mode may be provided from a guide book or in a different manner. For example, in case of a brand-new watch, they are announced to the user through a separate display.

[0024] The controlling unit 11 may be implemented as a Micro Controller Unit (MCU). When a user selects his desired light emitting mode from various light emitting modes stored in the separate memory 15 through the switch 10, then the controlling unit 11 generates color

data in cooperation with the selected light emitting mode.

[0025] The driving unit 12, as a block for performing a data interfacing function, converts the color data generated from the controlling unit 11 into a PWM signal. Here, the PWM signal is a signal for controlling harmonious colors of light from the LEDs 13.

[0026] The LEDs 13 may be configured as Red Green Blue (RGB) LEDs for electrically generating various colors of light. The LEDs 13 generate various colors of light corresponding to the light emitting mode selected by the user according to the PWM signal outputted from the driving unit 12.

[0027] Fig. 2 is an LED chromaticity diagram in accordance with one embodiment of the present invention.

[0028] As shown in Fig. 2, the LEDs 13 may generate a harmony of various colors in an LED chromaticity diagram according to the PWM signal. Based on width of the PWM signal indicates a specific location of a color on the LED chromaticity diagram. Therefore, the LED 13 generates light corresponding to a color of a specific location on the LED chromaticity diagram determined by the width of the PWM signal.

[0029] The radiating device 14 may be configured as a device which is fixed onto the LED 13 for facilitating a radiation of light generated from the LED 13. Such radiating device 14 may be configured as a variety of transparent jewels, for example, diamond. The radiating device 14 is an important portion which shows grade and merit of a watch. Accordingly, the radiating device 14 may be formed in a shape or of a material easy to radiate light.

[0030] The memory 15 may store information related to a light emitting mode desired by a user. Preferably, the information related to the light emitting mode may include a type of light emitting mode, color configuring each light emitting mode, brightness, a light emitting time (period) and the like.

[0031] Fig. 3 is a view showing a diamond used as a radiating device according to the present invention, and Fig. 4 is a view showing a comparison result between a diamond used in the present invention and a typical diamond.

[0032] As shown in Figs. 3 and 4, a typical diamond may be composed of a culet portion and a table portion. A surface of the diamond is cut to have crown angles and pavilion angles. Here, the culet portion is located at a lower side of the typical diamond and the table portion is located at an upper side thereof so as to implement a structure for concentrating light onto the culet portion.

[0033] On the other hand, unlike the typical diamond structure, the present invention implements a structure in which the culet portion is located at an upper side and the table portion is located at a lower side. Also, the diamond of the present invention may be cut to have the crown angle less than 25°. In addition, the crown and the pavilion are set to be the same to each other in their depth (or height). Such structure allows light generated from the LEDs 13 to be well emitted (or radiated).

[0034] Hereinafter, description will be given of an apparatus for adjusting color of jewel in a watch and an adjusting method thereof according to the present invention having such configuration. For the sake of explanation, RGB LED and diamond will exemplarily be designated respectively as the LED 13 and the radiating device 14.

[0035] First, a user selects his desired light emitting mode by operating the switch 10 disposed at a side surface of a watch (S10). The light emitting mode may be selected in various manners according to how to operate the switch 10 (e.g., pressing, rotating or the combination thereof). For example, upon pressing the switch 10 once, the first light emitting mode is selected. Upon pressing the switch 10 twice, the second light emitting mode is selected. If the user does not select or set any light emitting mode, a default light emitting mode is automatically selected.

[0036] That is, the light emitting mode may be comprised of various information preset to be appropriate for requirements, and be configured in a form of table, including a type of color, a light emitting time period, a harmony of colors of light from the LEDs and the like. The table may be stored in the memory 15.

[0037] Hence, upon setting a light emitting mode by means of the switch 10, the controlling unit 11 generates color data based upon the stored light emitting mode and light emitting period (S12), and transfers the generated color data to the driving unit 12 via an interface.

[0038] The driving unit 12 then converts the color data generated from the controlling unit 11 into a PWM signal to drive the RGB LEDs 13 (S13). The RGB LEDs 13 generate light with a specific color included in the LED chromaticity diagram shown in Fig. 2 according to the PWM signal (S14). Here, the driving unit 12 may also perform a function of raising a voltage with respect to the PWM signal.

[0039] Accordingly, the diamonds 14 radiate the various colors of light generated from the RGB LEDs 13 (S15). For example, as shown in Fig. 6, 4 diamonds 14 mounted in the watch respectively radiate red, blue, light green and orange colors of light all generated from the RGB LEDs 13.

[0040] Here, the present invention disposes the diamond in an upside-down structure and employs a new cutting technique, so as to allow light to be better spread through the diamonds. Therefore, the present invention can enhance the value of the jewels as well as the merit of the watch.

[0041] The preferred embodiments of the present invention have been described by limiting jewels mounted in the watch for radiating generated light only through the diamonds. However, the present invention may not be limited to the diamonds, but every jewel mounted in the watch can provide the same effect. Also, the present invention can be configured to be capable of differently controlling a time (or period) for emitting light on each jewel, thereby further enhancing a visual effect. In addition,

the present invention can use an alarm to notify information required by a user.

[0042] As such, the present invention provides the various embodiments related to controlling brightness of various jewels mounted in a portable or fixed watch and digital or analog watch. The embodiments may be configured as a manufacturing method, a manufacturing apparatus or a manufacture by using a standard programming and/or engineering technology in order to produce software, hardware or a combination thereof.

[0043] The watch having the function of displaying various colors for the aforesaid jewels may not limitedly be applied to the configuration and method shown in the foregoing embodiments. However, the embodiments may be configured by combining all of the embodiments or part of the embodiments so as to allow many variations.

[0044] As described above, the present invention can display various colors through various jewels mounted in the watch using light emitting diodes, so as to enhance the merits of the watch and jewels much more.

[0045] As mentioned above, the present invention has been described with reference to the embodiments, which are, however, merely illustrative. It will also be apparent to those skilled in the art that various modifications and variations can be made in the present invention without departing from the spirit or scope of the invention. Thus, it is intended that the present invention cover modifications and variations of this invention provided they come within the scope of the appended claims and their equivalents.

Claims

1. A color control apparatus for a watch comprising:
 - at least one or more radiating devices; and
 - light emitting diodes respectively disposed at one side of each radiating device and configured to generate at least one or more colors of light toward the radiating devices according to a driving signal.
2. The apparatus of claim 1, wherein the radiating devices are diamonds.
3. The apparatus of claim 2, wherein the diamond has a structure in which a culet portion thereof is located at an upper side and a table portion thereof is located at a lower side.
4. The apparatus of claim 2, wherein the diamond has a structure in which a pavilion depth is the same as the crown height, and each of the pavilion angle and the crown angle is 25°.
5. The apparatus of claim 1, wherein the radiating de-

vices include transparent jewels, wherein the driving signal is a Pulse Width Modulation (PWM) signal.

6. The apparatus of claim 1, wherein the light emitting diodes are Red Green Blue Light Emitting Diodes (RGB LEDs). 5
7. The apparatus of claim 1, further comprising:
 - a switch configured to select a light emitting mode; 10
 - a memory configured to store information related to the light emitting mode selected by the switch;
 - a controlling unit configured to generate color data corresponding to the selected light emitting mode; and 15
 - a driving unit configured to convert the color data generated from the controlling unit into the pulse width modulation signal to thusly output to the light emitting diodes. 20
8. The apparatus of claim 7, wherein the switch is configured to be rotatable or in a type of button, wherein the light emitting mode is set by the rotation of the switch, the number of pressing a button, or a combination thereof. 25
9. The apparatus of claim 7, wherein the information related to the light emitting mode is stored in a form of table, the information including a type of light emitting mode, a type of color, brightness, a light emitting time and a harmony of colors of light from the light emitting diodes. 30
10. A color control method for a watch comprising: 35
 - selecting a light emitting mode by operating a switch;
 - generating color data corresponding to the selected light emitting mode; 40
 - converting the color data into a pulse width modulation signal so as to drive light emitting diodes; and
 - radiating various colors of light generated from the light emitting diodes through radiating devices. 45
11. The method of claim 10, wherein the emitting diodes are Red Green Blue Light Emitting Diodes (RGB LEDs), and the radiating devices are diamonds. 50
12. The method of claim 11, wherein the diamond has a structure in which a culet portion thereof is located at an upper side and a table portion thereof is located at a lower side. 55
13. The method of claim 12, wherein the diamond has

pavilion and crown both having the same length and angle.

14. The method of claim 10, wherein the light emitting mode is set by the rotation of the switch disposed at the watch, the number of pressing a button or the combination thereof.
15. The method of claim 10, further comprising storing information related to the light emitting mode in a form of table, wherein the information related to the light emitting mode includes a type of light emitting mode, a type of color, brightness, a light emitting time and a harmony of colors of light from the light emitting diodes.

FIG. 1

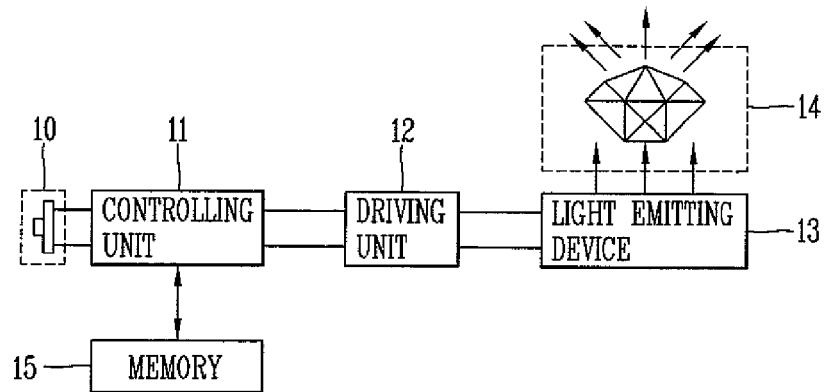


FIG. 2

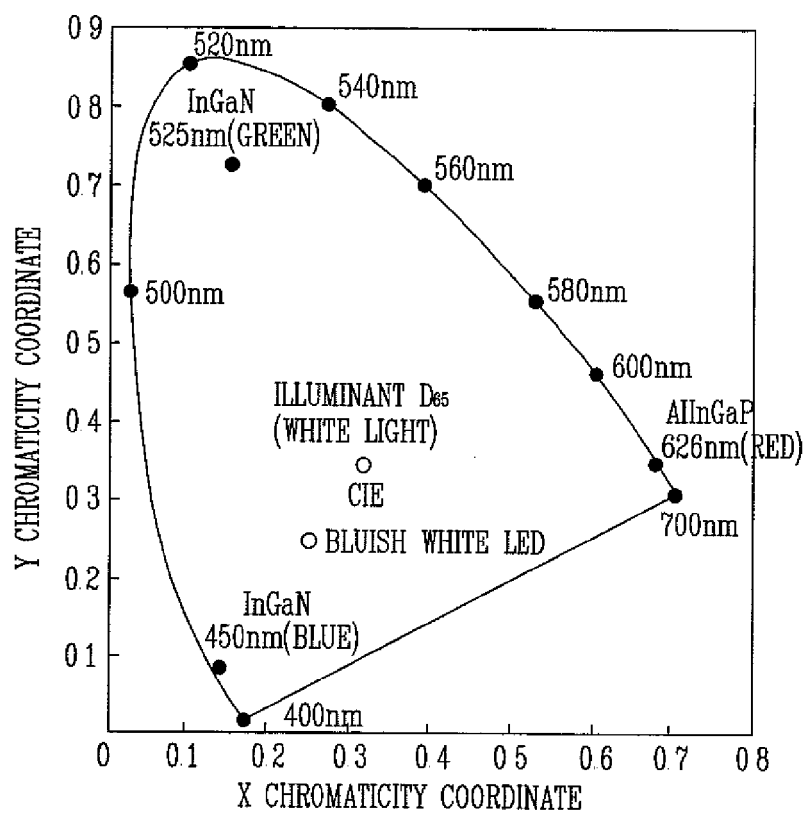


FIG. 3

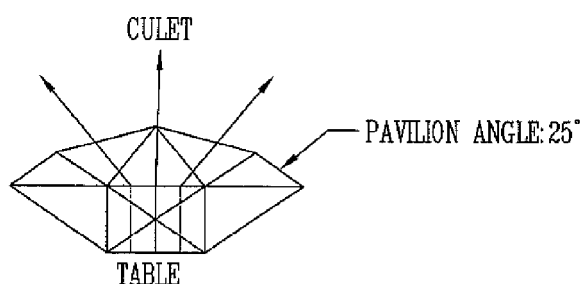
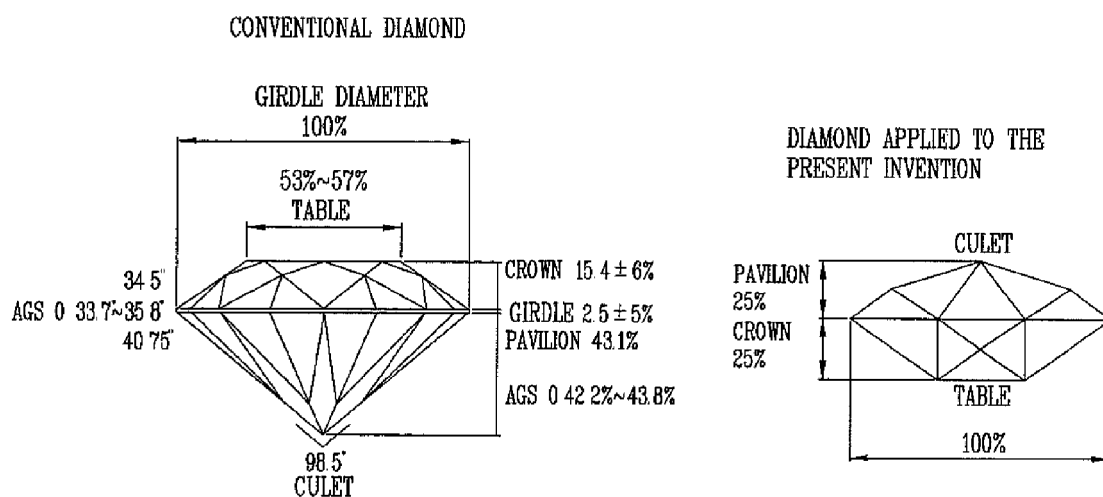


FIG. 4



	GENERAL DIAMOND CUTTING	NEW CUTTING
TOTAL DEPTH	58.7~62.3%	80.0~82.0%
TABLE DIAMETER	53.0~58.0%	BASE ON LED
GIRDLE THICKNESS	MEDIUM to SLIGHTLY THICK	VERY THIN to MEDIUM
CULET SIZE	NONE to MEDIUM	NONE to MEDIUM
CROWN ANGLES	34.3° to 34.7°	25°
PAVILION DEPTH	43.1%	25%
FINISH	VERY GOOD to EXCELLENT	VERY GOOD to EXCELLENT
CROWN HEIGHT	16.2%	TOTAL DEPTH

FIG. 5

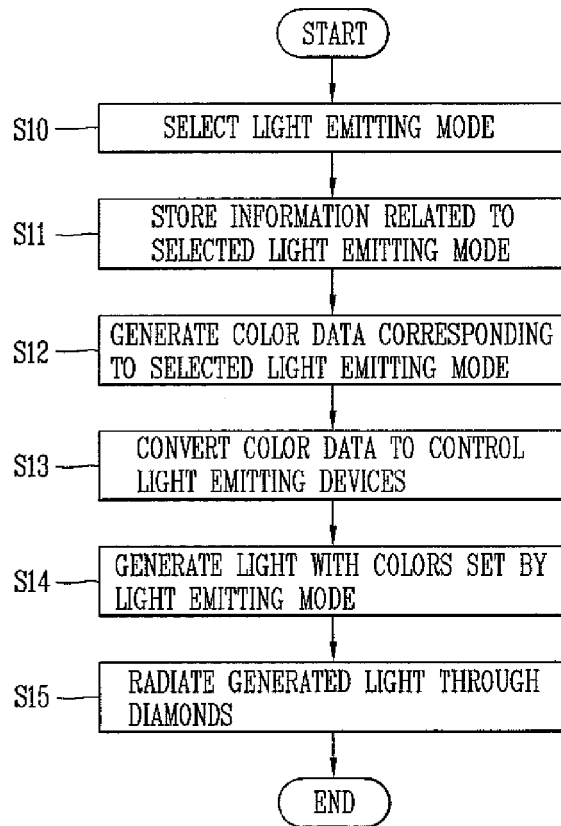
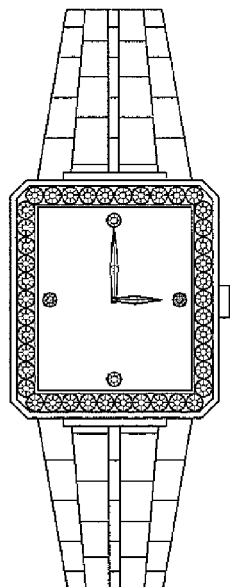


FIG. 6



REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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