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TITLE OF THE INVENTION

A DISPLAY SYSTEM FOR A TRAFFIC SIGNAL AND A TRAFFIC SIGNAL

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a display system for a traffic signal and a traffic signal, and more particularly to a display system and a traffic signal which displays information including traffic information, traffic slogans, advertisements, and the like.

2. Description of the Related Art

A traffic signal aims at making the smooth flow of cars and people and at preventing traffic accidents. Accordingly, in an usual traffic signal, as shown in Fig. 14, three lights (green, yellow and red lights) are time-controlled to light one by one. Moreover, a display board, which displays a place where a traffic signal is installed and an advertisement, is installed on the top, bottom or side portion of the traffic signal.

Now, in said display board, the display contents are confirmed easily at daytime by the sun light. However, there is a problem such that the confirmation of the contents becomes difficult when it gets dark such as at nighttime. Moreover, there is a problem in that it is hard for drivers and pedestrians to confirm a signal light with only the traffic signal because of the sun light at daytime.

Further, as shown in Fig. 15, another type of traffic signal. In this traffic signal, for example, a green arrow mark is provided below a red lamp. The signal can turn on the green arrow mark and the red lamp at the same time. As a result, drivers and pedestrians understand that they are able to go ahead in the direction indicated by the green arrow mark.



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However, the above-mentioned conventional traffic signal has a problem in that it is not easy for drivers and pedestrians to confirm the signal light because of the influence of the sun light occasionally. Moreover, the traffic signal shown in Fig. 18 has disadvantages in that the judgement becomes complex since the green arrow mark must be judged together with green, yellow and red signal lights, and it is not easy to see the arrow mark and the direction which the arrow mark indicates.

SUMMARY OF THE INVENTION

It is an object of the present invention to provide a display system for a traffic signal wherein drivers and pedestrians can confirm a signal color easily, traffic information can be confirmed and an advertisement function by traffic slogans and advertisements is provided.

It is another object of the present invention to provide a traffic signal wherein the complex display of the conventional traffic signal using arrow marks can be made simple and seen easily, and visibility and safety can be improved.

It is yet another object of the present invention to provide a traffic signal wherein the complex display of the conventional traffic signal using arrow marks can be made simple and seen easily, and visibility and safety can be improved.

To achieve the above-mentioned objects, according to this invention, a display system for a traffic signal, comprises: a display means provided at an easy-to-observe position simultaneously with the traffic signal, for displaying information including traffic information, traffic slogans, advertisement and the like, and capable of displaying information on a display screen and/or luminescent colors of the backgrounds of said information as changed over to the same colors as respective colors of said traffic signal; a detecting means provided

on respective color lamps of said traffic signal, for detecting the states of the respective lamps which are turned on or turned off without changing an electric circuit of said traffic signal; and a control means for controlling the luminescent colors in said display means to be changed over to the same colors as those of said traffic signal in response to an output detected by said detecting means. Furthermore, the control means sequentially changes over information which is displayed synchronizing with a changeover of a turned-on color of the traffic signal.

That is, the states of the respective lamps which are turned on or turned off are detected without changing an electric circuit of the traffic signal. And, the luminescent colors in the display means are changed over to the same colors as those of the traffic signal in response to an output detected by the detecting means. Therefore, the signal color can be confirmed not only by the signal lamp but also by the display color of the display means and various information displayed in the display means can be confirmed simultaneously. Moreover, the states of the respective lamps which are turned on or turned off are detected without changing the electric circuit of the traffic signal, that is, the electric circuit is not modified, so that the safety of the traffic signal can be secured. Furthermore, plural pieces of information are changed over to be displayed while synchronizing with a changeover of a turned-on color, so that the amount of information displayed on the display means can be increased.

According to the other mode of the present invention, a changeover means which changes over from turn-on to turn-off or vice versa of said display means in synchronism with the red lamp is provided. That is, the display means is turned on to be red only when the red lamp is turned on, and the display means is turned off when the other lamps are turned on. Therefore,

the signal color can be confirmed not only by the signal lamp but also by the display color of the display means.

To achieve the above-mentioned objects, a traffic signal of the present invention comprises: a surface luminescent means, in which the surface as a whole is changed over to at least three colors including green, yellow and red to be luminescent; and a luminescence control means for changing the luminescent surface as a whole of said surface luminescent means over to green, yellow and red successively in a predetermined timing for luminescence, and a surface luminescent means, in which the whole luminescent surface is divided into a plurality of surfaces, at the center portions of the respective luminescent surfaces, there are displayed an arrow mark indicating a left-turn, another arrow mark indicating a straight advance and a further arrow mark indicating a right--turn, and the backgrounds of said arrow marks are changed over to three colors including green, yellow and red for the respective luminescent surfaces for luminescence; and a luminescence control means for successively changing the luminescent colors of the backgrounds of the respective luminescent surfaces over to green, yellow and red for luminescence. As a result, even in the case of a traffic signal which has the same size as that of the conventional traffic signal, a luminescent area is increased and a visibility is improved.

Moreover, according to another mode of the present invention, the luminescent surface of the surface luminescent means is divided into the number of the lanes on the road or into three surfaces for a left-turn, a straight ahead and a right--turn, at the respective luminescent surfaces, there is displayed an arrow mark indicating a left-turn, another arrow mark indicating a straight ahead and a further arrow mark indicating a right-turn, and the backgrounds of the arrows can be changed

over to three colors including green, yellow and red for the respective luminescent surfaces for luminescence. And, the backgrounds of the respective luminescent surfaces divided into a plurality of the surface luminescent means are changed over to green, yellow and red successively in a predetermined timing for luminescence. Therefore, when it is displayed that only a specific lane or a specific direction can be proceeded, the luminescent surface which corresponds to the lane or the direction is made green and another luminescent surfaces which correspond to other lanes or directions are made red, so that this kind of display is made to be simple and easy to see.

According to the other mode of the present invention, a surface luminescence means which displays information including traffic information, traffic slogans, advertisements, etc. on the display surface and changes over the backgrounds of the above-mentioned information to green, yellow, red or green, and red, and a control means which successively changes the background color to green, yellow, red or green, blinking green and red in a predetermined timing and change over information displayed on the surface luminescence means in the predetermined timing. As a result, for example, in the case of the traffic signal for pedestrians, "WALK", "STOP" or pedestrian marks indicating them, etc. are changed over to be displayed in accordance with the color of the background, and the displayed contents of the traffic signal can be correctly recognized.

BRIEF DESCRIPTION OF THE DRAWINGS

The exact nature of this invention, as well as other objects and advantages thereof, will be readily apparent from consideration of the following specification relating to the accompanying drawings, in which like reference characters designate the same or similar parts throughout the figures

thereof and wherein:

Fig. 1 is an external view showing the state that the display system for the traffic signal according this invention is installed in the traffic signal.

Fig. 2 is a view showing the arrangement example of the Traffic Safety panel and the controller at the crossroad intersection.

Fig. 3 is a block diagram showing a composition example of the TS panel and the controller.

Fig. 4 is a view showing an detector shown in Fig. 3.

Fig. 5 is another example of the synchronous detector.

Figs. 6 (A), 6 (B) and 6 (C) are views showing a turned-on color of a traffic signal and a display information on a Traffic Safety panel.

Fig.7 is an external view showing an embodiment of the traffic signal according to this invention.

Fig.8 is a block diagram in a traffic signal according to the present invention.

Fig. 9 is an external view showing another embodiment of the traffic signal according to this invention.

Fig. 10 is a timing chart showing an example of the change-over timing of the green, yellow and red of the traffic signal shown in Figure 9.

Fig. 11 is a plane view showing essential portions of the other embodiment of a traffic signal according to the present invention.

Figs. 12 (A) and 12 (B) are external views showing an example of a display in a traffic signal according to the present invention.

Figs. 13 (A) and (B) are external views illustrating another example of a display in a traffic signal according to the present invention.

Fig. 14 is an external view of the conventional traffic

signal.

Fig. 15 is an external view of the conventional traffic signal including arrows.

DETAILED DESCRIPTION OF THE INVENTION

A detailed description will hereunder be given of the preferred embodiment of a traffic signal, a display system therefor and a hood for a lamp thereof according to the present invention with reference to the accompanying drawings.

Fig. 1 is an external view showing the state that a Traffic Safety panel (hereafter, it is called the TS panel) which composes the display system for the traffic signal according to this invention is installed in the traffic signal. In Fig. 1, 10 is a well-known traffic signal which consists of three colors including green, yellow and red and attached to a support pole 12 from an electric pole not shown downward through a bracket 14.

20 is a TS panel, to be concrete, a color plasma display panel. This TS panel 20 is installed in the upper part of the traffic signal 10 through the bracket 14 and observed simultaneously with the traffic signal 10.

At an intersection of a crossroad shown in Fig. 2, for instance, 4 TS panels 20A attached to traffic signals for driveways and 8 TS panels 20B attached to traffic signals for pavements, that is, 12 TS panels are installed. And, the 12 TS panels 20A and 20B are controlled simultaneously by a controller 30 through optical communication cables 35 about display patterns of panel surfaces.

Fig. 3 is a block diagram showing one embodiment of an internal composition of a TS panel and a controller. The TS panel 20 consists of mainly a synchronism detector 21, a central processing unit (CPU) 23, a memory 24, a video signal

producer 25, a display control circuit 26 and a luminescent panel 27 and the controller 30 is mainly composed of a 16--channel multiplexor 31, a RS-232C circuit 32 for optical communication, a memory card unit 33 and a power source units 34 as shown in Fig. 3.

The controller 30 is operated when the display patterns such as traffic information, the traffic slogan and the advertisements displayed on the TS panel 20 are changed and memory cards for the memory card unit 33 are replaced. Thus, display pattern data recorded in the memory card is read and is transmitted to the respective TS panels 20 through the RS-232C circuit 32, the 16-channel multiplexor 31 and a optical communication cable 35.

The display pattern data transmitted from the controller 30 is memorized in the memory 24 through an interface not shown for the optical communication of the TS panel 20 and through the CPU 23.

Synchronism signals are transferred from the synchronism detector 21 to the CPU 23 of the TS panel 20 through a signal interface 22. This synchronism detector 21 is a detector which is disposed each color lamp of the traffic signal 10, outputs the synchronism signals indicating the state of each lamp which is turned on or turned off, and is not connected in electricity to an electric circuit of the traffic signal 10.

For instance, as this kind of synchronism detector 21, there is a detector, as shown in Fig. 4, wherein a coil 21A is wound on to each lead 10B to light each lamp 10A of the traffic signal and the magnetic field produced by electric current flowing when the lamp is turned on is converted into an electric signal and another detector, as shown in Fig. 5, comprising a photo sensor 21B which is disposed opposite to each lamp 10A of the traffic signal and converts the light when the lamp is turned on into an electric signal. 10B is a

sunshade cover of the lamp in Fig. 5.

In Fig. 3, the CPU 23 outputs video signals to the display control circuit 26 through the video signal producer 25 to make, for instance, advertisement characters and patterns luminescent in white color and the background luminescent in the same color as the signal based on the synchronism signal which can be added through the display pattern data memorized in the memory 24 and the signal interface 22 and shows the color of the lamp which is turned on at that time. A thermo heater and a fan heater 29 are driven by the power source 28 to keep the temperature range for using the TS panel 20 in 0° C - 45° C. Moreover, the power source 28 supplies the power to respective circuits of the TS panel 20.

Incidentally, in this embodiment, the whole surface of the TS panel is changed over synchronizing with a changeover of the signal in order to be the same luminescent color as that of the traffic signal. However, the present invention is not limited to this. The TS panel can be turned on and off synchronizing with the red lamp. Moreover, the TS panel can be turned on and off synchronizing with the green or yellow lamp. Furthermore, a piece of information among traffic information, traffic slogans, advertisements, etc. is displayed on the TS panel 20 in accordance with the display pattern data memorized in the memory 24. However, the present invention is not limited to this. The plural display pattern data are memorized in the memory 24, and the CPU 23 reads out display pattern data which is memorized in accordance with a turned-on color of the lamp, from the display pattern data memorized in the memory 24 on the basis of the synchronism signal, which is input via a signal interface 22 and indicates a color of a lamp which is currently turned-on, so that each type of information can be sequentially displayed in accordance with the display pattern data.

That is, in the case when a green lamp 10G of the traffic

signal 10 is turned on as shown in Fig. 6 (A), the information corresponding to the green color is displayed on the TS panel, and its background color is made to be green. Likewise, in the case when a yellow lamp 10Y of the traffic signal 10 is turned on as shown in Fig. 6 (B), the information corresponding to the yellow color is displayed on the TS panel 20, and the background color is made to be yellow. In the case when a red lamp 10R of the traffic signal 10 is turned on as shown in Fig. 6 (C), the information corresponding to the red color is displayed on the TS panel 20, and the background color is made to be red. Incidentally, in this embodiment, the information displayed on the TS panel 20 is changed over in accordance with the turned-on color of the traffic signal. However, the present invention is not limited to this. For example, more than three kinds of information are memorized and the information is sequentially changed over to be displayed while synchronizing with the changeover of the traffic signal.

According to the above-described structure, the information such as characters of advertisements, patterns, etc. is illuminated white on the panel surface of the TS panel 20, and the background color is changed over to be the same luminescent color as that of the traffic signal while synchronizing with the changeover of the traffic signal. The TS panel 20 can provide various kinds of information with drivers and pedestrians, and the entire panel surface is changed over to be the same luminescent color as that of the traffic signal, so the TS panel surface can serve as an auxiliary traffic signal which can be easily seen from a distance. Moreover, the TS panel 20 is completely separated from an electric system of the traffic signal, so the reliability of the traffic signal cannot be damaged. Furthermore, the information displayed on the TS panel 20 is changed over while synchronizing with the turned-on color of the traffic signal, so that much information can be

displayed.

Incidentally, the description has been given of the case which the TS panel is composed of the color plasma display panel which is able to change display patterns properly in the above embodiment, however, the present invention should not necessarily be limited to this, for example, the TS panel may be composed of the display board formed with materials having the light permeability and draw characters, figures and the like thereon to illuminate it simultaneously with three color lights including a green, yellow and red light.

As has been described hereinbefore, in the display system for the traffic signal according to the present invention, the display means which displays information including traffic information, traffic slogans and advertisements and the like is changed over to the same colors as the lamps of the traffic signal or turned on in synchronism with the red lamp thereof. Therefore, the display system can function as an auxiliary signal in which the signal color can be observed easily by driver and pedestrians. Moreover, the display system is positioned at easy-to-observe position simultaneously with the traffic signal. Therefore, a display system with effective advertisements can be provided when various information is communicated to drivers and pedestrians. Further, in the display system for the traffic signal, the display means separates completely from the electrical system of the traffic signal, that is, any electric circuits of the traffic signal need not be changed. Therefore, the safety of the traffic signal can be secured.

Next, a detailed description will be given of one embodiment of a traffic signal according to this invention.

In Fig. 7, 110 is a luminescence panel which shows the display part of the traffic signal according to this invention. It is a color plasma display panel. This luminescent panel 110

is supported by a supporting pole 112 of a electric pole not shown.

The luminescent panel 110, as shown in Fig. 8, is controlled by a controller 114 and a panel drive circuit 116 for luminescence. That is, the controller 114 contains a timer and outputs control signals which change the luminescent panel 110 over to green, yellow and red at every predetermined time successively to a panel drive circuit 116. The panel drive circuit 116 makes the luminescence surface as a whole of the luminescent panel 110 in the luminescent color specified by the control signals luminescent in response to the input control signals.

With this arrangement, the luminescence surface as a whole of the luminescent panel 110 is made luminescent in one color. Therefore, when the above-mentioned traffic signal is compared with the conventional one in the same size, the luminescent area will become three times bigger, so that the visibility is improved. Further, the description has been given of the case which the color plasma display panel is used as a luminescence panel in the above embodiment, however, the present invention should not necessarily be limited to this, and a fluorescent display tube, a luminescent diode panel or a liquid crystal display may be used.

Fig. 9 is another embodiment of the traffic signal.

The luminescent panel 110 is divided into a the display part 110A for a left-turn, another display part 110B for a right-turn and a further display part 110C for a straight ahead as shown in Fig. 9, and these display parts 110A, 110B and 110C are controlled independently. At the center portions of the respective display parts 110A, 110B and 110C, there are always made an arrow mark 111A indicating a left-turn, another arrow mark 111B indicating a straight ahead and a further arrow mark 111C indicating a right-turn luminescent in white color to

display, and in between the respective display parts 110A, 110B and 110C, white lines 111D and 111E are displayed always.

And, the back colors of the respective display parts 110A, 110B and 110C are changed over to green, yellow and red independently according to the respective traveling directions which the arrow marks 111A, 111B and 111C indicate.

For instance, when all of a left-turn, a straight ahead, and a right-turn are allowed "Advance", all back colors of display parts 110A, 110B and 110C are made luminescent in green color, and when a left-turn and a straight ahead are instructed "Stop" and a right-turn is only allowed "Advance", the back colors of the display parts 110A and 110B are made luminescent in red color and that of display parts 110C is made luminescent in green color.

Fig. 10 is a timing chart which shows the change-over timing of the green, yellow and red in the above-mentioned case.

A green luminescent period for the right-turn is longer than that for the left-turn and the straight ahead shown in Fig. 9. For instance, at time t1, the left-turn and the straight ahead are indicated in red and only the right-turn is indicated in green.

Incidentally, the change control for the back colors of the respective display parts 110A, 110B and 110C in the above-mentioned luminescent panel 110 can be performed by the controller 114 and the panel drive circuit 116 shown in Fig.8. Moreover, the description has been given of the case which one luminescent panel 110 is divided into three display parts 110A, 110B and 110C and the respective display parts 110A, 110B and 110C are controlled independently in the above embodiment, however, the present invention should not necessarily be limited to this, and three luminescence panels, which correspond to the respective display parts, may be arranged.

Fig. 11 is a view showing another display example of the luminescent panel 110 of the traffic signal. As shown in Fig. 10, the luminescent surface of this luminescent panel 110 is divided into two parts including a display part 110D specialized for pedestrians and a display part 110E specialized for cars, and the respective display parts 110D and 110E are controlled independently of each other.

Incidentally, the display part 110E specialized for cars is controlled similarly to the display part shown in Fig. 9, so that detailed description thereof will be omitted here.

In the display part 110D which is specialized for pedestrians, there is displayed pedestrian marks showing a state where the pedestrian is walking and state where the pedestrian is standing still which is indicated by white lights, and a back color of the display part 110D is changed over to a green color or a red color in accordance with the pedestrian marks displayed. Incidentally, when the background color changes over to the red color, the green background color flickers for a predetermined time before it changes-over.

As described above, the provision of the display part 110D specialized for pedestrians and the display part 110E specialized for the cars on the single luminescent panel 110 makes it possible to make the traffic signal inexpensive as compared with the case where these display parts are provided separately of each other. Furthermore, since a driver can watch the pedestrian mark at the same time, whereby the attention to pedestrians is aroused, so that the number of accidents of cars and pedestrians can be reduced.

Next, an explanation will be given of the other embodiment of the traffic signal according to the present invention.

In Figs. 12 (A) and 12 (B), 210A and 210B are light-emitting panels which show display parts of the traffic signal according to the present invention. More concretely, the

light-emitting panel is a color plasma display panel. The light-emitting panel 210 is used as a traffic signal for pedestrians, and is attached at a supporting rod 212 which is extended from an electric pole which is not shown in the drawing.

The controller 114 of Fig. 8 and the panel drive circuit 116 controls a light emission and displayed contents of the light-emitting panel 210. That is, the controller 114 includes a timer, and outputs a control signal for sequentially changing over the luminescent color of the light-emitting panel 210 among green, blinking green and red. It also outputs a white pattern signal indicating letters "WALK" (refer to Fig. 12 (A)) when the light-emitting panel 21 is green, and outputs a white pattern signal indicating letters "STOP" (refer to Fig. 12 (B)) to the panel drive circuit 116. The panel drive circuit 116 makes the entire emitting surface of the light-emitting panel 210 emit in a color designated by the control signal, and displays letters designated by the pattern signal in accordance with the input control signal and the pattern signal.

Incidentally, as information displayed on the traffic signal for pedestrians, a pedestrian mark which indicates information that pedestrian walk and stop as shown in Figs. 13 (A) and (B) can be displayed.

According to the above-mentioned structure, the information as to letters and the like can be changed over to be displayed in accordance with a changeover of the luminescent color of the light-emitting panel 210, so that the visibility can be improved.

As has been described hereinbefore, in the traffic signal according to the present invention, the luminescence surface as a whole of the luminescent means is changed over to green, yellow and red successively in a predetermined timing. Therefore, the luminescent area is larger than that of the same-size

conventional traffic signal, and drivers and pedestrians can understand the signal color easily. Moreover, in another embodiment according to the present invention, the surface luminescence means is divided into the number of the lanes on the road or into three portions for a left-turn, a straight ahead and a right-turn, there are displayed an arrow mark indicating a left-turn, another arrow mark indicating a straight ahead and a further arrow mark indicating a right-turn in the respective luminescent surfaces, and the backgrounds of the arrow marks are successively changed over to green, yellow and red colors for the respective luminescent surfaces for luminescent in respective predetermined timing. Therefore, it can be judged that a specific lane or a specific direction is only proceed by seeing one luminescent surface, and the display of the conventional signal using arrow marks can be made simple and easy-to-see.

It should be understood, however, that there is no intention to limit the invention to the specific forms disclosed, but on the contrary, the invention is to cover all modifications, alternate constructions and equivalents falling within the spirit and scope of the invention as expressed in the appended claims.

WHAT IS CLAIMED IS:

1. A display system for a traffic signal comprising:
display means provided at an easy-to-observe position and simultaneously used with a traffic signal for displaying plural pieces of information such as traffic information, traffic slogans, advertisements, and the like, which changes over said plural pieces of information on a display surface and changes over and displays a luminescent color among three colors, green, yellow and red and;
detecting means provided on each lamp of said traffic signal, for detecting whether said lamp is turned on or turned off without changing an electric circuit of said traffic signal:
control means which successively changes over said plural pieces of information to display them on said display means by synchronizing with a changeover of a turned-on color of each lamp of said traffic signal in accordance with an output detected by said detecting means and controls a luminescent color in said display means to be changed over to the same colors as those of said traffic signal.