(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 2 953 118 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
09.12.2015 Bulletin 2015/50

(51) Int Cl.:
G09F 13/18 *(2006.01)* ***G09F 13/04*** *(2006.01)*

(21) Application number: **14001919.1**

(22) Date of filing: **03.06.2014**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME

(71) Applicant: **Wuxi Aleader Intelligent Technology Co., Ltd.**
Wuxi, Jiangsu Province (CN)

(72) Inventors:
- **Wei, Liangzhong**
  Wuxi (CN)
- **Liu, Yan**
  Wuxi (CN)
- **Chen, Liming**
  Wuxi (CN)

(74) Representative: **Von Rohr Patentanwälte Partnerschaft mbB**
Rüttenscheider Straße 62
45130 Essen (DE)

(54) Intelligent active/passive LED surface-emitting traffic sign

(57) The present invention discloses an intelligent active/passive LED surface-emitting traffic sign, comprising an intelligent controller and an LED surface-emitting traffic sign; in the technical scheme of the present invention, the intelligent active/passive LED surface-emitting traffic sign comprises a base plate, an intelligent controller arranged at the rear end of the base plate, an organic light guide plate arranged at the front end of the base plate, a panel arranged at the front end of the organic light guide plate, a traffic sign indication film arranged on the panel, a peripheral protective enclosure arranged on the periphery of the base plate, organic light guide plate, panel, and traffic sign indication film, and several LED light sources arranged on an inner wall of the peripheral protective enclosure facing directly the organic light guide plate. Utilizing an intelligent controller, the traffic sign in the present invention detects the ambient light intensity automatically, and switches on the LED light sources accordingly, the traffic sign employs a FLASHING illuminating manner and attains an excellent illuminating effect, and is low in cost and energy consumption, without glaring phenomenon; in addition, the traffic sign can also provide road traffic indication by means of a reflecting traffic sign indication film in case of power outage of the LED light sources.

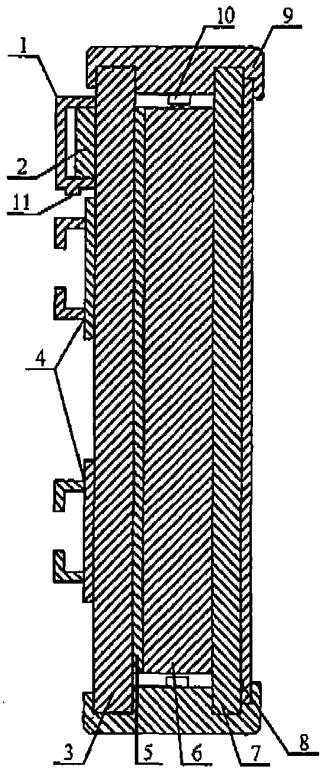

Fig. 2

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Description

Field of the Invention

[0001] The present invention relates to a traffic sign, in particular to a traffic sign that employs active LED surface emission and passive reflection for indication under intelligent control.

Background of the Invention

[0002] Traffic signs are a means for traffic control by transferring specific information to traffic participants with graphics, colors, and texts, including warning signs, prohibitory signs, indicative signs, directional signs, resort signs, road construction safety signs, and supplementary signs, etc.

[0003] Most existing traffic signs used for traffic control employ passive reflecting technique (e.g., reflective film, paint, etc.) or LED spot emitting technique. Traffic signs that employ passive reflecting technique (reflective film or paint) present traffic symbols and marks by means of passive light reflection. Since they cannot emit light actively but only reflect ambient light passively, the reflection effect is poor and the visual range is not long, in case that the ambient light is poor, for example, in foggy days or at night when the light is low; therefore, these traffic signs cannot attain the purpose of traffic indication and are not satisfactory in actual use, and will cause potential traffic safety hazards; the other traffic signs that employ LED spotemitting technique, though they can self-illuminate, they require high production cost and consume a large amount of energy, since LED light sources have to be provided all over the entire traffic sign to present the traffic signs and marks; more-over, when drivers watch the traffic signs that employ LED spot-emitting technique, they have to look at the LED light sources directly and may be glared; consequently, the drivers' visual ability may be degraded, which may cause potential traffic safety hazards; furthermore, in case of power outage of the LED light sources, these traffic signs cannot present traffic symbols and marks.

Summary of the Invention

[0004] In view of the problems of existing traffic signs in the prior art, the present invention provides an intelligently controlled active/passive LED surface-emitting traffic sign. The technical problem to be solved in the present invention is: provide an intelligent LED surface-emitting traffic sign, which, under the control of an intelligent controller, can judge the intensity of the ambient light automatically, and can switch on the LED light sources automatically according to a preset light intensity, so as to emit light actively.

[0005] In addition, the traffic sign can emit light in a FLASHING manner, attaining an excellent indication effect; since the traffic sign employs surface-emitting technique, it is low in cost, and has low energy consumption, without glaring phenomenon; thus, the traffic sign is helpful for significantly decreasing the probability of traffic accidents.

[0006] In addition, in case of power outage of the LED light sources, the traffic sign can also provide a LED surface-emitting traffic sign with road traffic indication by means of passive light reflection, since it employs a specially designed translucent and reflective traffic sign indication film.

[0007] To solve the above problem, the present invention mainly comprises two parts: an intelligent controller, and an LED surface-emitting traffic sign.

[0008] The present invention employs the following technical scheme: an intelligent active/passive LED surface-emitting traffic sign, comprising a base plate, an intelligent controller arranged at the rear end of the base plate, an organic light guide plate arranged at the front end of the base plate, a panel arranged at the front end of the organic light guide plate, a traffic sign indication film arranged on the panel, a peripheral protective enclosure arranged on the periphery of the base plate, whereby organic light guide plate, panel, and traffic sign indication film, and several LED light sources arranged on an inner wall of the peripheral protective enclosure facing directly the organic light guide plate.

[0009] A reflective film is arranged between the base plate and the organic light guide plate.

[0010] An aluminum rolling groove is arranged at the rear end of the base plate.

[0011] The panel is a polycarbonate panel.

[0012] The traffic sign indication film has light reflective and translucent performance.

[0013] The intelligent controller has a waterproof case.

[0014] The waterproof case of the intelligent controller has a photosensitive sensor window thereon.

[0015] The intelligent controller has LED light source driving and control function.

[0016] The intelligent controller has a photosensitive sensor and a photosensitive sensor enabling and control circuit.

[0017] The intelligent controller has a LED operation mode control switch and a LED flashing frequency control function.

[0018] The intelligent controller has a function for synchronized or cascaded operation of a plurality of traffic signs, which are connected through a wired connection or wireless connection.

[0019] The power input of the intelligent controller can be AC power supply or solar power system power supply.

[0020] The present invention has the following beneficial effects: the present invention employs intelligently controlled active/passive LED surface-emitting technique, wherein, a photosensitive sensor detects the ambient light automatically, and the LEDs will be switched on to emit light actively in case that the ambient light is poor, and the illumination effect is excellent.

[0021] In addition, compared with the LED spot-emit-

ting technique in the prior art, since the LED light sources in the present invention are mounted on the inner wall of the peripheral protective enclosure, the quantity of required LED light sources is greatly reduced, the production cost is lower, and there is no glaring phenomenon; since the traffic sign in the present invention employs surface-emitting technique and a FLASHING mode, the energy consumption is low, and the indication effect is excellent; therefore, the probability of traffic accidents is decreased,

[0022] In case of power outage of the LED light sources, the traffic sign in the present invention can also provide road traffic indication by means of passive light reflection, similar to the conventional reflecting traffic signs, since it employs a specially designed translucent and reflective traffic sign indication film.

[0023] Moreover, the intelligent controller has a variety of intelligent control functions, for example, it supports selection of ALWAYS ON or FLASHING operation mode, supports synchronized or cascaded operation of a plurality of traffic signs, and supports selection of flashing frequency for power consumption control of the LEDs, and supports selection of AC power supply or solar power supply, etc.

[0024] Therefore, the present invention discloses an intelligent active/passive LED surface-emitting traffic sign, comprising an intelligent controller and an LED surface-emitting traffic sign; in the technical scheme of the present invention, the intelligent active/passive LED surface-emitting traffic sign comprises a base plate, an intelligent controller arranged at the rear end of the base plate, an organic light guide plate arranged at the front end of the base plate, a panel arranged at the front end of the organic light guide plate, a traffic sign indication film arranged on the panel, a peripheral protective enclosure arranged on the periphery of the base plate, organic light guide plate, whereby panel, and traffic sign indication film, and several LED light sources arranged on an inner wall of the peripheral protective enclosure facing directly the organic light guide plate. Utilizing an intelligent controller, the traffic sign in the present invention detects the ambient light intensity automatically, and switches on the LED light sources accordingly, the traffic sign employs a FLASHING illuminating manner and attains an excellent illuminating effect, and is low in cost and energy consumption, without glaring phenomenon. In addition, the traffic sign can also provide road traffic indication by means of a reflecting traffic sign indication film in case of power outage of the LED light sources.

Description of the Drawings

[0025]

Fig.1 is a front view of the intelligent active/passive LED surface-emitting traffic sign in the present invention;

Fig.2 is a A-A sectional view of the traffic sign shown in Fig.1;

[0026] In Fig.2: 1 - waterproof case of intelligent controller, 2 - intelligent controller, 3 - base plate, 4 - aluminum rolling groove, 5 - reflecting film, 6 - organic light guide plate, 7 - polycarbonate panel, 8 - traffic sign indication film, 9 - peripheral protective enclosure, 10 - LED light source, 11 - photosensitive sensor window.

[0027] Fig.3 is a functional block diagram of the intelligent controller;

[0028] In Fig.3: 12 - main control circuit of controller, 13 - power transformation and control circuit, 14 - power input interface circuit, 15 - power output interface circuit, 16 - photosensitive sensor enabling switch, 17 - photosensitive sensor control circuit, 18 - combined control circuit, 19 - combined control switch, 20 - LED operation mode control switch, 21 - LED flashing frequency control circuit.

Detailed Description of the Embodiments

[0029] Hereunder the intelligent active/passive LED surface-emitting traffic sign in the present invention will be further detailed, with reference to the accompanying drawings.

[0030] As shown in Fig.1 and Fig.2, in this embodiment, the intelligent active/passive LED surface-emitting traffic sign comprises: a base plate 3, a waterproof case of intelligent controller 1 arranged at the rear end of the base plate 3, and an intelligent controller 2 arranged in the waterproof case of intelligent controller 1, which is designed to control the traffic sign part in the present invention in different operation modes (detailed below); an aluminum rolling groove 4 arranged at the rear end of the base plate 3, which is used to fix the traffic sign in the present invention to a traffic sign post; and a reflecting film 5 arranged at the front end of the base plate 3; an organic light guide plate 6 arranged at the front end of the reflecting film 5, a panel arranged at the front end of the organic light guide plate 6, which can be a transparent panel or a color translucent panel; in this embodiment, the panel is a polycarbonate panel 7, with a traffic sign indication film 8 that is light translucent and reflective arranged on the polycarbonate panel 7; a peripheral protective enclosure 9 arranged on the periphery of the base plate 3, reflecting film 5, organic light guide plate 6, polycarbonate panel 7, and traffic sign indication film 8, wherein the peripheral protective enclosure 9 can fix the base plate 3, reflecting film 5, organic light guide plate 6, polycarbonate panel 7, and traffic sign indication film 8 and attain waterproof and anti-fog purpose; several LED light sources 10 are arranged on an inner wall of the peripheral protective enclosure 9 facing directly the organic light guide plate 6.

[0031] The working principle of the present invention is: a photosensitive sensor 11 detects the ambient light automatically, and makes the LED light sources 10 on

the inner wall of the peripheral protective enclosure 9 facing directly the organic light guide plate 6 emits light into the organic light guide plate 6 under the control of the intelligent controller 2; wherein, the organic light guide plate 6 is entirely illuminating owing to its specially designed structure, so as to attain a surface-emitting effect, and then, the light reflected by the reflecting film 5 through the polycarbonate panel 7, the traffic symbols and marks on the traffic sign indication film 8 is presented. The present invention employs active LED surface-emitting technique and attains an excellent illuminating effect in a case that the ambient light is poor; in addition, compared with the LED spot-emitting technique in the prior art, since the LED light sources 10 in the present invention are mounted on the inner wall of the peripheral protective enclosure 9, the quantity of required LED light sources 10 is greatly decreased and the production cost is lower; moreover, since a FLASHING mode is used, the required consumption of energy is low, and the illuminating is mild, without glaring phenomenon, and thus, the probability of traffic accidents can be decreased effectively; in case of power outage of the LED light sources 10, the traffic sign can also provide road traffic indication by means of passive reflection from the traffic sign indication film 8, similar to conventional traffic signs, since the traffic sign employs a specially designed light translucent and reflective traffic sign indication film.

[0032] The functions of the intelligent controller in the present invention are shown in Fig.3, and will be detailed hereunder.

[0033] The main control circuit of the controller 12 is the core module of the intelligent controller, which controls the power transformation and control circuit 13 in different operation mode according to the signals from other modules.

1. Power transformation part: the power transformation and control circuit 13 transforms AC power input (AC85V-265V) or DC power input (solar power system, DC10V-24V) into power output that can drive the LED light sources 10, so as to control the LED light sources 10 to operate as per the design requirement; the power input interface circuit 14 protects the internal power transformation and control circuit 13 and reduces disturbances from external power supply for the internal power transformation and control circuit 13; the power output interface circuit 15 protects the internal power transformation and control circuit 13 in case of short circuit, open circuit, or no-load of the LED light sources 10.

2. Photosensitive sensor control part: The main control circuit of controller 12 detects the photosensitive sensor enabling switch 16; if the photosensitive sensor enabling switch 16 is in ON state, the main control circuit of controller 12 will detect the photosensitive sensor control circuit 17, and send a control signal to the power transformation and control circuit 13 to decide whether switch on the LED light sources 10 to emit light according to the output of the photosensitive sensor control circuit 17. The output of the photosensitive sensor control circuit 17 is depend on the compare result between the detected light intensity and the preset light intensity threshold, i.e. when the light intensity detected by the photosensitive sensor 11 is higher than the preset light intensity threshold, the photosensitive sensor control circuit 17 will output a signal that do not switch on the LED light sources 10; when the light intensity detected by the photosensitive sensor 11 is lower than the preset light intensity threshold, the photosensitive sensor control circuit 17 will output a signal that switch on the LED light sources 10 to emit light.

If the main control circuit of controller 12 detects that the photosensitive sensor enabling switch 16 is in OFF state, the intelligent active/passive LED surface-emitting traffic sign in the present invention will enter into a Demo mode, i.e., as long as the power input for the intelligent controller is connected, the power transformation and control circuit 13 will directly enter into working state and control the LED light sources 10 to emit light, regardless of the intensity of the ambient light. That mode is mainly used for test, experiment and field demonstration for customers.

3. LED flashing control part:

The main control circuit of controller 12 detects the LED operation mode control switch 20; if the LED operation mode control switch 20 is in ON state, the main control circuit of controller 12 will send a control signal to the power transformation and control circuit 13, to instruct the power transformation and control circuit 13 to switch the LED light sources 10 into FLASHING operation mode; if the LED operation mode control switch 20 is in OFF state, the main control circuit of controller 12 will send a control signal to the power transformation and control circuit 13, to instruct the power transformation and control circuit 13 to switch the LED light sources 10 into ALWAYS ON operation mode, The LED operation mode decides the final operation mode of the intelligent active/passive LED surface-emitting traffic sign in the present invention, and can be set as per the requirement of the customer; usually, a flashing operation mode is recommended, in which the indication effect is better and the power consumption is lower.

When the main control circuit of controller 12 detects the LED operation mode control switch 20 is in ON state, it will detect the LED flashing frequency control circuit 21 additionally; the LED flashing frequency control circuit 21 consists of two-digit switch codes, which supports 4 sets of

frequency input options; according to the input value from the LED flashing frequency control circuit 21, the main control circuit of controller 12 sends a control signal to the power transformation and control circuit 13, to instruct the power transformation and control circuit 13 to control the flashing frequency of the LED light sources 10. The flashing frequencies of the LED light sources 10 can be preset 4 sets flashing frequency value in the LED flashing frequency control circuit 21 as per the requirement of the customers and be selected the state of ON or OFF in the field by the customers as per the specific situation. Usually, the flashing frequency is 0.5Hz (ON for 1s, OFF for 1s).

4. Combined operation control part for a plurality of traffic signs:

The main control circuit of controller 12 detects a combined control switch 19; if the combined control switch 19 is in OFF state, the intelligent active/passive LED surface-emitting traffic sign will operate in a standalone mode.

If the combined control switch 19 is in ON state, the main control circuit of controller 12 will detect a combined control circuit 18, which has the following functions: master/slave flags, address IDs, signal transmission and receiving, as well as wireless and wired transmission, etc. In case that the main control circuit of controller 12 detects that the master/slave flag of the combined control circuit 18 is the master traffic sign of intelligent active/passive LED surface-emitting traffic signs in the group, it will sends a control signal via the combined control circuit 18 to the intelligent active/passive LED surface-emitting traffic signs in the group, to instruct the intelligent active/passive LED surface-emitting traffic signs in the group to operate in synchronized, cascaded mode according to preset requirement; in case that the main control circuit of controller 12 detects that the master/slave flag of the combined control circuit 18 is a slave traffic sign of the intelligent active/passive LED surface-emitting traffic signs in the group, it will receive data from the master traffic sign via the combined control circuit 18 and act accordingly.

The combined control circuit 18 supports wireless connection and wired connection, and can be selected by the customer as required in the field.

Claims

1. An intelligent active/passive LED surface-emitting traffic sign, comprising an intelligent controller and a LED surface-emitting traffic sign, wherein, an intelligent controller is arranged at the rear end of a base plate, and an organic light guide plate is arranged at the front end of the base plate, and a panel is arranged at the front end of the organic light guide plate, and a traffic sign indication film is arranged on the panel, and a peripheral protective enclosure is arranged on the periphery of the base plate, organic light guide plate, panel, and traffic sign indication film, and several LED light sources are arranged on an inner wall of the peripheral protective enclosure facing directly the organic light guide plate.

2. The intelligent active/passive LED surface-emitting traffic sign according to claim 1, wherein, a reflecting film is arranged between the base plate and the organic light guide plate.

3. The intelligent active/passive LED surface-emitting traffic sign according to claim 1 or 2, wherein, an aluminum rolling groove is arranged at the rear end of the base plate.

4. The intelligent active/passive LED surface-emitting traffic sign according to one of the preceding claims, wherein, the panel is a polycarbonate panel.

5. The intelligent active/passive LED surface-emitting traffic sign according to one of the preceding claims, wherein, the traffic sign indication film has light reflective and translucent performance.

6. The intelligent active/passive LED surface-emitting traffic sign according one of the preceding claims, wherein, the intelligent controller has a waterproof case.

7. The intelligent active/passive LED surface-emitting traffic sign according to one of the preceding claims, wherein, the waterproof case of the intelligent controller has a photosensitive sensor window thereon.

8. The intelligent active/passive LED surface-emitting traffic sign according to one of the preceding claims, wherein, the intelligent controller has a LED light source driving and control function.

9. The intelligent active/passive LED surface-emitting traffic sign according to one of the preceding claims, wherein, the intelligent controller has a photosensitive sensor and a photosensitive sensor enabling and photosensitive control circuit.

10. The intelligent active/passive LED surface-emitting

traffic sign according to one of the preceding claims, wherein, the intelligent controller has LED FLASHING or ALWAYS ON function for selection and a LED flashing frequency control function.

11. The intelligent active/passive LED surface-emitting traffic sign according to one of the preceding claims, wherein, the intelligent controller has a function of synchronized, cascaded operation of a plurality of traffic signs, which can be connected through wireless connection or wired connection.

12. The intelligent active/passive LED surface-emitting traffic sign according to one of the preceding claims, wherein, the power input of the intelligent controller is AC power supply or solar power system power supply.

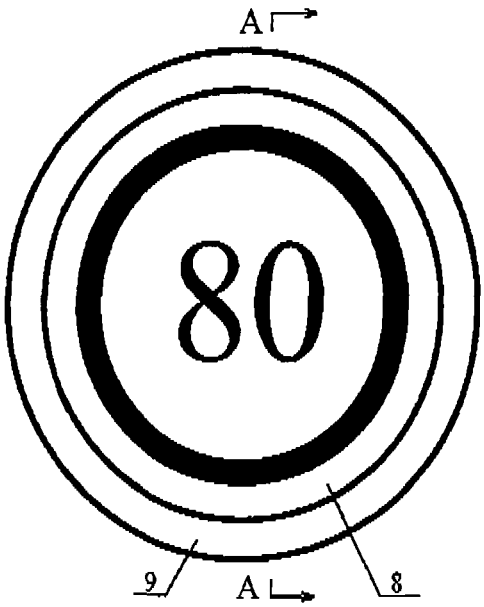

Fig. 1

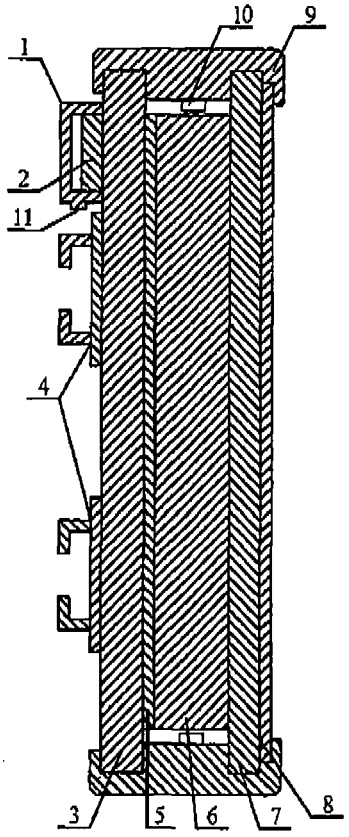

Fig. 2

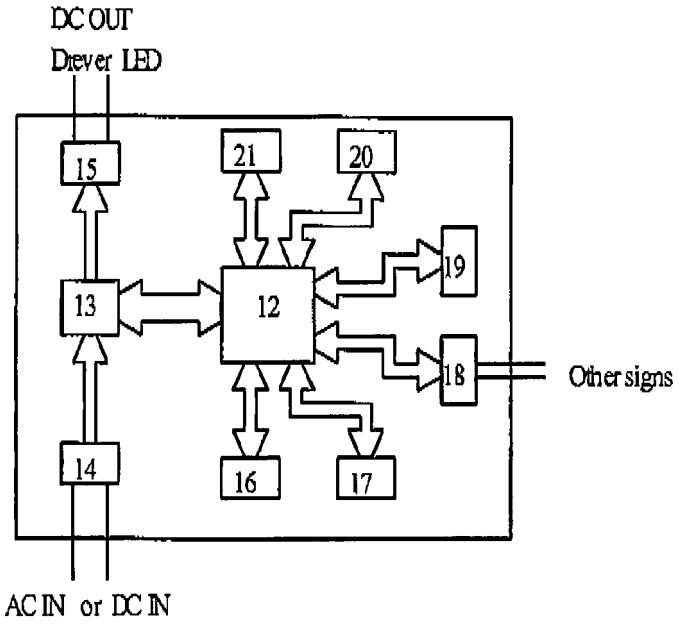
DC OUT
Drever LED
15
21
20
19
13
12
18
Other signs
14
16
17
AC IN or DC IN

Fig. 3

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EUROPEAN SEARCH REPORT

Application Number
EP 14 00 1919

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	27 August 2014	Husselin, Stephane

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