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(54) **Current-regulated light emitting device for vehicle use**

Stromregulierte Lichtemissionsvorrichtung zur Verwendung im Fahrzeug

Dispositif luminescent à régulation de courant pour véhicule

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(73) Proprietor: **Quan Mei Technology Co. Ltd**
Yongkang City, Tainan County (TW)

(72) Inventor: **Huang, Kuo-Shien**
Tainan City (TW)

(74) Representative: **Sherrard-Smith, Hugh**
Appleyard Lees
15 Clare Road
Halifax, West Yorkshire HX1 2HY (GB)

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EP 2 200 403 B1

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Description

[0001] The invention relates to a light emitting device, more particularly to a current-regulated light emitting device for vehicle use.

[0002] Generally, a vehicle uses its battery to provide electric power for vehicle lights. Since battery voltage cannot be maintained at a constant level, battery power must undergo voltage stabilization and current rectification before it is supplied to the vehicle lights.

[0003] Referring to Figure 1, a conventional voltage-stabilized light emitting device for vehicle use is shown to be adapted for electrical connection to an electric power source 61 of a vehicle, and includes a rectifier 62 adapted for electrical connection to the electric power source 61, a surge suppressor 63, a light emitting unit 64, and a voltage regulating unit 65 interconnecting the light emitting unit 64 and the rectifier 62. The light emitting unit 64 includes a plurality of light emitting components (D) and a plurality of current limiting resistors (R1). The light emitting components (D) are connected in series-pairs, and all of the series-pairs of the light emitting components (D) are then connected in parallel. The voltage regulating unit 65 includes a voltage stabilizing integrated circuit (IC), two resistors (R2), and a capacitor (C). The voltage regulating unit 65 serves to stabilize a drive voltage from the electric power source 61 before supplying the same to the light emitting unit 64.

[0004] When the electric power source 61 is unstable such that the drive voltage therefrom fluctuates, the voltage regulating unit 65 will operate to adjust the drive voltage to an appropriate value and to supply a stable current for the light emitting unit 64. In view of the need for continuous operation of the voltage regulating unit 65, the operating temperature thereof will increase, and prolonged operation at high temperatures affects operating stability and service life of the voltage regulating unit 65.

[0005] EP 1 860 922 discloses a light emitting diode array powering apparatus including a power supply circuit having input terminals and output terminals. The input terminals of the power supply circuit are coupled to receive a supply voltage. A plurality of loads are coupled between the output terminals. The power supply circuit is coupled to provide an output voltage between the output terminals to be applied across each one of the plurality of loads coupled between the output terminals. A feedback selector circuit is coupled between the power supply circuit and the plurality of loads. The feedback selector circuit is coupled to receive a feedback signal from each one of the plurality of loads. The power supply circuit is coupled to be responsive to only one of the feedback signals at any one time.

[0006] US 6 414 437 discloses a method for controlling illumination devices of motor vehicles, wherein the illumination devices are correlated with different functional areas of a light assembly, and are supplied with current, the illumination devices being cycled with a rated current and the brightness level of the illumination devices being

adjusted with a pulse width modulated signal. A device for performing the method has an electrical power source and illumination devices correlated with at least two functional areas and connected to the electrical power source. Actuating elements are provided for activating the illumination devices. At least one microprocessor is provided, wherein the actuating elements are connected to the at least one microprocessor, wherein the at least one microprocessor converts signals emitted by the actuating elements into pulse width modulated signals supplied to output terminals of the at least one microprocessor. Driver stages are connected to the output terminals of the at least one microprocessor and the illumination devices and configured to transmit the pulse with modulated signals to the illumination devices.

[0007] Therefore, the object of the present invention is to provide a highly stable current-regulated light emitting device for vehicle use with a switching design that permits components thereof to operate at a lower operating temperature.

[0008] Accordingly, a current-regulated light emitting device for vehicle use as defined in the claims. Other features and advantages of the present invention will become apparent in the following detailed description of the preferred embodiment with reference to the accompanying drawings, of which:

Figure 1 is a schematic circuit diagram of a conventional voltage-stabilized light emitting device for vehicle use;

Figure 2 is a functional block diagram of the preferred embodiment of a current-regulated light emitting device according to the present invention; and

Figure 3 is a schematic circuit diagram of the preferred embodiment.

[0009] Referring to Figures 2 and 3, the preferred embodiment of a current-regulated light emitting device for vehicle use according to the present invention is shown to be adapted for electrical connection to an electric power source 4 and a brake device 5 of a vehicle. The electric power source 4 is operable to output a drive voltage (V1), and the brake device 5 is operable to output a braking voltage (V2). The current-regulated light emitting device comprises a light emitting unit 1, a current limiting unit 2, and a brightness increasing unit 3.

[0010] The light emitting unit 1 is used as a vehicle light for illumination, is adapted for electrical connection to the electric power source 4 and the brake device 5, and includes a plurality of light emitting modules 11 connected in parallel, and three protective components 12. Each light emitting module 11 includes a first light emitting component (D1), a second light emitting component (D2), and a pair of current limiting resistors (R). It is noted that, in practice, the number of the light emitting components of each light emitting module 11 is not limited to two. The current limiting resistors (R) of each light emitting module 11 are connected in parallel, and the parallel-connected

current limiting resistors (R) are connected in series between the respective first light emitting component (D1) and the protective components 12.

[0011] In this embodiment, each of the protective components 12 is an ordinary diode, e.g., 1N4007. One of the protective components 12 has an anode connected to the electric power source 4 and a cathode connected to the light emitting modules 11. Another of the protective components 12 has an anode connected to the brake device 5 and a cathode connected to the light emitting modules 11. The last of the protective components 12 has an anode connected to the brake device 5 and a cathode connected to the brightness increasing unit 3. The protective components 12 are used to protect the device of this invention from damage due to reverse polarity connection with the electric power source 4.

[0012] The current limiting unit 2 includes a first switch (Q1), a second switch (Q2), a pair of first resistors (R10) that serve as a second bias unit, second and third resistors (R20, R30) that form a voltage divider of a first bias unit, and a first capacitor (C1).

[0013] In this embodiment, the first switch (Q1) is a n-channel depletion-type metal-oxide-semiconductor field-effect transistor (MOSFET). In practice, other components that can serve the same function may be used. The first switch (Q1) has a first control end (G), a first input end (D), and a first output end (S). The first control end (G) is the gate and is connected electrically to the first bias unit. The first input end (D) is the drain and is connected electrically to the cathodes of the second light emitting components (D2) of the light emitting modules 11 of the light emitting unit 1. The first output end (S) is the source and is connected electrically to the first resistors (R10) of the second bias unit. The first switch (Q1) must be capable of bearing a voltage, which has a value larger than the drive voltage (V1), between the first input end (D) and the first output end (S).

[0014] In this embodiment, the second switch (Q2) is a npn-type bipolar junction transistor (BJT) that has a second control end (B) connected electrically to the first output end (D) and the first resistors (R10) of the second bias unit, a second input end (C) connected electrically to the first control end (G) and the first bias unit, and a second output end (E) that is grounded. The second control end (B) is the base of the bipolar junction transistor, the second input end (C) is the collector, and the second output end (E) is the emitter. In practice, a MOSFET may be used for the second switch (Q2) in other embodiments of this invention. However, since the conduction voltage required by the npn-type bipolar junction transistor is smaller than that of the MOSFET, which has a benefit of reducing power loss attributed to the first resistors (R10), the npn-type bipolar junction transistor is used for the second switch (Q2) in the preferred embodiment of this invention.

[0015] The first resistors (R10) of the second bias unit are connected in parallel, are connected electrically at one end to the first output end (S) and the second control

end (B), and are further connected electrically at another end to the second output end (E), which is grounded. The second resistor (R20) of the voltage divider of the first bias unit is connected electrically at one end to the electric power source 4 via one of the protective components 12 and to the brake device 5 via another of the protective components 12. The second resistor (R20) is further connected electrically in series at another end to one end of the third resistor (R30). The first control end (G) and the second input end (C) are connected electrically to a junction of the second and third resistors (R20, R30). The third resistor (R30) is further connected electrically at another end to the second output end (E), which is grounded. The first capacitor (C1) is shunted to the third resistor (R30) for noise filtering.

[0016] The brightness increasing unit 3 is connected electrically to the brake device 5 and the current limiting unit 2, and includes fourth and fifth resistors (R4, R5) that form a voltage divider of a third bias unit, a second capacitor (C2), a plurality of coupling resistors (R6), and a third switch (Q3).

[0017] The fourth resistor (R4) is connected electrically at one end to the brake device 5 via one of the protective components 12, and is further connected electrically at the other end to the fifth resistor (R5) and the second capacitor (C2). The fifth resistor (R5) is connected in parallel to the second capacitor (C2), and the fifth resistor (R5) and the second capacitor (C2) are grounded at one end. The coupling resistors (R6) are connected in parallel, and the parallel-connected coupling resistors (R6) are connected electrically at one end to the first output end (S) and the second control end (B), and are further connected electrically at another end to the third switch (Q3). In this embodiment, the third switch (Q3) is a n-channel depletion-type MOSFET, and has a third control end (G) connected electrically to a junction of the fourth and fifth resistors (R4, R5), a third input end (D) connected electrically to the coupling resistors (R6), and a third output end (S) connected electrically to the second output end (E), which is grounded. The third control end (G) is the gate, the third input end (D) is the drain, and the third output end (S) is the source of the MOSFET.

[0018] In operation, when the electric power source 4 provides the drive voltage (V1) to the voltage divider of the first bias unit, a voltage sufficient to cause the first switch (Q1) to conduct will be present at the first control end (G), such that the first switch (Q1) makes an electrical circuit between the light emitting unit 1 and the electric power source 4 to result in current flow from the electric power source 4 through the current limiting resistors (R), the first and second light emitting components (D1, D2), the first switch (Q1), and the first resistors (R10) of the second bias unit, thereby activating the first and second light emitting components (D1, D2) of the light emitting modules 11 of the light emitting unit 1 to emit light.

[0019] When the drive voltage (V1) fluctuates such that the amount of current flowing through the first switch (Q1) exceeds a predetermined threshold, the voltage across

the first resistors (R10) reaches 0.7 volt, which is sufficient to cause the second switch (Q2) conduct. Conduction of the second switch (Q2) forces the first switch (Q1) to turn off so as to break the electrical circuit between the light emitting unit 1 and the electric power source 4, thereby interrupting the current flow through the light emitting unit 1 so as to deactivate the first and second light emitting components (D1, D2) of the light emitting modules 11 of the light emitting unit 1.

[0020] When the current flow through the light emitting unit 1 is interrupted, the voltage at the second control end (B) will become lower than the conduction voltage required by the second switch (Q2), thereby turning off the second switch (Q2) so that the voltage at the first control end (G) is once again sufficient to cause the first switch (Q1) to conduct. When the first switch (Q1) conducts, the electrical circuit between the light emitting unit 1 and the electric power source 4 is made so that the first and second light emitting components (D1, D2) of the light emitting modules 11 of the light emitting unit 1 are activated to emit light once more. Therefore, due to alternating switching of the first and second switches (Q1, Q2), the amount of current flowing through the light emitting modules 11 of the light emitting unit 1 can be regulated.

[0021] In this embodiment, when the brake of the vehicle is operated, the brake device 5 outputs the braking voltage (V2) that is received by the third bias unit. The braking voltage (V2) is divided by the fourth and fifth resistors (R4, R5) of the voltage divider of the third bias unit such that the voltage at the third control end (G) is sufficient to cause the third switch (Q3) to conduct. When the third switch (Q3) conducts, the coupling resistors (R6) are connected in parallel to the first resistors (R10) to result in a lower equivalent resistance. As a result, a larger amount of electric current is required to flow through the first output end (S) before the second switch (Q2) conducts. In other words, by connecting the coupling resistors (R6) in parallel to the first resistors (R10), the predetermined threshold is reconfigured so as to allow a larger amount of current to flow through the light emitting unit 1 and the first switch (Q1) before the second switch (Q2) conducts. The larger amount of current flowing through the first and second light emitting components (D1, D2) results in increased brightness in the light emitted thereby. Therefore, when the brake is operated, the brightness increasing unit 3 enables the first and second light emitting components (D1, D2) to emit brighter light for good braking warning indication.

[0022] In sum, when electric current not exceeding the predetermined threshold flows through the first and second light emitting components (D1, D2) of the light emitting modules 11 of the light emitting unit 1, the first switch (Q1) conducts while the second switch (Q2) is turned off. On the other hand, when electric current exceeding the predetermined threshold flows through the first and second light emitting components (D1, D2), the second switch (Q2) conducts so as to turn off the first switch (Q1),

thereby interrupting current flow through the light emitting unit 1. Through alternating switching of the first and second switches (Q1, Q2), the electric current flowing through the light emitting unit 1 can be regulated even when the drive voltage (V1) of the electric power source 4 is unstable and fluctuates wildly. The switching design employed in the present invention can prevent components thereof from operating continuously to prevent overheating. That is, the components of the present invention are permitted to operate at a lower operating temperature to result in advantages of higher stability and a longer service life.

15 Claims

1. A current-regulated light emitting device for vehicle use, said current-regulated light emitting device being adapted to receive a drive voltage (V1) from an electric power source (4) and comprising:

a light emitting unit (1) including at least one light emitting module (11) that has a light emitting component (D1 D2); and

a current limiting unit (2) including
a first switch (Q1) adapted for making and breaking an electrical circuit between said light emitting unit (1) and the electric power source (4),
a first bias unit connected electrically to said first switch (Q1), adapted to be connected electrically to the electric power source (4), and causing said first switch (Q1) to conduct such that said first switch (Q1) makes the electrical circuit between said light emitting unit (1) and the electric power source (4) when the electric power source (4) provides the drive voltage (V1) to said first bias unit, thereby resulting in current flow from the electric power source (4) through said light emitting unit (1) and said first switch (Q1) to activate said light emitting unit (1),
a second switch (Q2) connected electrically to said first switch (Q1), and
a second bias unit connected electrically to said first and second switches (Q1, Q2), and causing said second switch (Q2) to conduct when amount of current flowing through said first switch (Q1) exceeds a predetermined threshold, wherein conduction of said second switch (Q2) forces said first switch (Q1) to turn off so as to break the electrical circuit between said light emitting unit (1) and the electric power source (4), thereby interrupting the current flow through said light emitting unit (1),
said first switch (Q1) having a first control end (G) connected electrically to said first bias unit,
a first input end (D) connected electrically to said light emitting unit (1), and a first output end (S) connected electrically to said second bias unit;

and
 said second switch (Q2) having a second control
 end (B) connected electrically to said first output
 end (S) and said second bias unit, a second input
 end (C) connected electrically to said first control
 end (G) and said first bias unit, and a second
 output end (E) connected electrically to said sec-
 ond bias unit said second bias unit including a
 first resistor (R10) connected electrically at one
 end to said first output end (S) and said second
 control end (B) and further connected electrically
 at another end to said second output end (E),
 and
 said first bias unit includes a voltage divider con-
 nected electrically to said second output end (E)
 and adapted to be connected electrically to the electric
 power source (4), said voltage divider including
 series-connected second and third resistors
 (R20, R30), said first control end (G) and said
 second input end (C) being connected electrically
 to a junction of said second and third resis-
 tors (R20, R30),
characterized in that:

a brightness increasing unit (3) is provided
 that includes a coupling resistor (R6) con-
 nected electrically to said current limiting
 unit (2), a third switch (Q3) connected elec-
 trically to said coupling resistor (R6), and a
 third bias unit connected electrically to said
 third switch (Q3) and adapted to receive a
 braking voltage (V2),
 said coupling resistor (R6) being connected
 electrically at one end to said first output
 end (S) and said second control end (B),
 and being further connected electrically at
 another end to said third switch (Q3),
 said third switch (Q3) having a third control
 end (G) connected electrically to said third
 bias unit, a third input end (D) connected
 electrically to said coupling resistor (R6),
 and a third output end (S) connected elec-
 trically to said second output end (E),
 said third bias unit causing said third switch
 (Q3) to conduct when the braking voltage
 (V2) is provided to said third bias unit such
 that said third switch (Q3) connects said
 coupling resistor (R6) in parallel to said first
 resistor (R10), thereby reconfiguring the
 predetermined threshold so as to allow a
 larger amount of current to flow through said
 light emitting unit (1) and said first switch
 (Q1) before said second switch (Q2) con-
 ducts.

2. The current-regulated light emitting device as
 claimed in claim 1, **characterized in that** said first

switch (Q1) is a metal-oxide-semiconductor field-ef-
 fect transistor with a gate serving as said first control
 end (G), a drain serving as said first input end (D),
 and a source serving as said first output end (S).

3. The current-regulated light emitting device as
 claimed in claims 1 or 2, **characterized in that** said
 second switch (Q2) is a bipolar junction transistor
 with a base serving as said second control end (B),
 a collector serving as said second input end (C), and
 an emitter serving as said second output end (E).
4. The current-regulated light emitting device as
 claimed in any one of the preceding claims, **charac-**
terized in that said light emitting module (11) further
 has a current limiting resistor (R) adapted for con-
 necting electrically said light emitting component
 (D1, D2) to the electric power source (4).

Patentansprüche

1. Stromgeregelte Lichtemissionsvorrichtung zur Ver-
 wendung an einem Fahrzeug, welche dafür einge-
 richtet ist, eine Treiberspannung (V1) von einer
 Stromquelle (4) zu empfangen, und aufweist:

eine Lichtemissionseinheit (1) mit mindestens
 einem Lichtemissionsmodul (11), welches eine
 Lichtemissionskomponente (D1, D2) aufweist,
 und
 eine Strombegrenzungseinheit (2), welche auf-
 weist:

einen ersten Schalter (Q1), der dafür ein-
 gerichtet ist, einen elektrischen Stromkreis
 zwischen der Lichtemissionseinheit (1) und
 der Stromquelle (4) herzustellen und zu un-
 terbrechen,
 eine erste Vorspannungseinheit, die elek-
 trisch mit dem ersten Schalter (Q1) verbun-
 den ist, welche dafür eingerichtet ist, elek-
 trisch mit der Stromquelle (4) verbunden zu
 werden, und bewirkt, dass der erste Schal-
 ter (Q1) leitet, so dass er den elektrischen
 Stromkreis zwischen der Lichtemissions-
 einheit (1) und der Stromquelle (4) herstellt,
 wenn die Stromquelle (4) der ersten Vor-
 spannungseinheit die Treiberspannung
 (V1) zuführt, was zu einem Stromfluss von
 der Stromquelle (4) durch die Lichtemissi-
 onseinheit (1) und den ersten Schalter (Q1)
 führt, wodurch die Lichtemissionseinheit (1)
 aktiviert wird,
 einen zweiten Schalter (Q2), der elektrisch
 mit dem ersten Schalter (Q1) verbunden ist,
 und
 eine zweite Vorspannungseinheit, die elek-

trisch mit dem ersten und dem zweiten Schalter (Q1, Q2) verbunden ist und bewirkt, dass der zweite Schalter (Q2) leitet, wenn die durch den ersten Schalter (Q1) fließende Strommenge eine vorbestimmte Schwelle überschreitet, wobei das Leiten des zweiten Schalters (Q2) den ersten Schalter (Q1) zum Ausschalten zwingt, um den elektrischen Stromkreis zwischen der Lichtemissionseinheit (1) und der Stromquelle (4) zu unterbrechen und dadurch den Stromfluss durch die Lichtemissionseinheit (1) zu unterbrechen, wobei der erste Schalter (Q1) ein erstes Steuerende (G), das elektrisch mit der ersten Vorspannungseinheit verbunden ist, ein erstes Eingangsende (D), das elektrisch mit der Lichtemissionseinheit (1) verbunden ist, und ein erstes Ausgangsende (S), das elektrisch mit der zweiten Vorspannungseinheit verbunden ist, aufweist, und wobei der zweite Schalter (Q2) ein zweites Steuerende (B), das elektrisch mit dem ersten Ausgangsende (S) und der zweiten Vorspannungseinheit verbunden ist, ein zweites Eingangsende (C), das elektrisch mit dem ersten Steuerende (G) und der ersten Vorspannungseinheit verbunden ist, und ein zweites Ausgangsende (E), das elektrisch mit der zweiten Vorspannungseinheit verbunden ist, aufweist, wobei die zweite Vorspannungseinheit einen ersten Widerstand (R10) aufweist, der elektrisch an einem Ende mit dem ersten Ausgangsende (S) und dem zweiten Steuerende (B) verbunden ist und ferner elektrisch an einem Ende mit dem zweiten Ausgangsende (E) verbunden ist, und die erste Vorspannungseinheit einen Spannungsteiler aufweist, der elektrisch mit dem zweiten Ausgangsende (E) verbunden ist und dafür eingerichtet ist, elektrisch mit der Stromquelle (4) verbunden zu werden, wobei der Spannungsteiler einen zweiten und einen dritten Widerstand (R20, R30), die in Reihe geschaltet sind, aufweist, wobei das erste Steuerende (G) und das zweite Eingangsende (C) elektrisch mit einem Übergang zwischen dem zweiten und dem dritten Widerstand (R20, R30) verbunden sind,

dadurch gekennzeichnet, dass:

eine Helligkeitserhöhungseinheit (3) bereitgestellt ist, welche einen Kopplungswiderstand (R6), der elektrisch mit der Strombegrenzungseinheit (2) verbunden ist, einen dritten Schalter (Q3), der elektrisch mit dem

Kopplungswiderstand (R6) verbunden ist, und eine dritte Vorspannungseinheit, die elektrisch mit dem dritten Schalter (Q3) verbunden ist und dafür eingerichtet ist, eine Unterbrechungsspannung (V2) zu empfangen, aufweist, wobei der Kopplungswiderstand (R6) elektrisch an einem Ende mit dem ersten Ausgangsende (S) und dem zweiten Steuerende (B) verbunden ist und ferner elektrisch an einem anderen Ende mit dem dritten Schalter (Q3) verbunden ist, wobei der dritte Schalter (Q3) ein drittes Steuerende (G), das elektrisch mit der dritten Vorspannungseinheit verbunden ist, ein drittes Eingangsende (D), das elektrisch mit dem Kopplungswiderstand (R6) verbunden ist, und ein drittes Ausgangsende (S), das elektrisch mit dem zweiten Ausgangsende (E) verbunden ist, aufweist, wobei die dritte Vorspannungseinheit bewirkt, dass der dritte Schalter (Q3) leitet, wenn die Unterbrechungsspannung (V2) der dritten Vorspannungseinheit zugeführt wird, so dass der dritte Schalter (Q3) den Kopplungswiderstand (R6) parallel zu dem ersten Widerstand (R10) schaltet und dadurch die vorbestimmte Schwelle rekonfiguriert, um zu ermöglichen, dass eine größere Strommenge durch die Lichtemissionseinheit (1) fließt und der erste Schalter (Q1) vor dem zweiten Schalter (Q2) leitet.

2. Stromgeregelter Lichtemissionsvorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** der erste Schalter (Q1) ein MOSFET-Feldeffekttransistor ist, dessen Gate-Elektrode als das erste Steuerende (G) dient, dessen Drain-Elektrode als das erste Eingangsende (D) dient und dessen Source-Elektrode als das erste Ausgangsende (S) dient.
3. Stromgeregelter Lichtemissionsvorrichtung nach Anspruch 1 oder 2, **dadurch gekennzeichnet, dass** der zweite Schalter (Q2) ein Bipolar-Sperrschichttransistor ist, dessen Basis als das zweite Steuerende (B) dient, dessen Kollektor als das zweite Eingangsende (C) dient und dessen Emitter als das zweite Ausgangsende (E) dient.
4. Stromgeregelter Lichtemissionsvorrichtung nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** das Lichtemissionsmodul (11) ferner einen Strombegrenzungswiderstand (R) aufweist, der dafür eingerichtet ist, die Lichtemissionskomponente (D1, D2) elektrisch mit der Stromquelle (4) zu verbinden.

Revendications

1. Dispositif émetteur de lumière à régulation de courant destiné à une utilisation dans un véhicule, ledit dispositif émetteur de lumière à régulation de courant étant apte à recevoir une tension d'alimentation (V1) d'une source d'alimentation électrique (4) et comprenant :

une unité (1) émettrice de lumière comprenant au moins un module émetteur de lumière (11) qui possède un composant émetteur de lumière (D1, D2) ; et

une unité (2) limitatrice de courant comprenant :

un premier commutateur (Q1) apte à établir et ouvrir un circuit électrique entre ladite unité (1) émettrice de lumière et la source d'alimentation électrique (4),

une première unité de polarisation raccordée électriquement audit premier commutateur (Q1), apte à être raccordée électriquement à la source d'alimentation électrique (4), et conduisant ledit premier commutateur (Q1) à conduire de telle manière que ledit premier commutateur (Q1) établisse le circuit électrique entre ladite unité (1) émettrice de lumière et la source d'alimentation électrique (4) lorsque la source d'alimentation électrique (4) délivre la tension d'alimentation (V1) à ladite première unité de polarisation, produisant ainsi un passage de courant depuis la source d'alimentation électrique (4) à travers ladite unité (1) émettrice de lumière et ledit premier commutateur (Q1) pour activer ladite unité (1) émettrice de lumière,

un deuxième commutateur (Q2) raccordé électriquement audit premier commutateur (Q1) et

une deuxième unité de polarisation raccordée électriquement auxdits premier et deuxième commutateurs (Q1, Q2), et conduisant ledit deuxième commutateur (Q2) à conduire lorsque la quantité de courant passant à travers ledit premier commutateur (Q1) dépasse un seuil prédéterminé, dans lequel la conduction dudit deuxième commutateur (Q2) force ledit premier commutateur (Q1) à s'arrêter afin d'ouvrir le circuit électrique entre ladite diode émettrice de lumière (1) et la source d'alimentation électrique (4), interrompant ainsi le passage du courant à travers ladite unité (1) émettrice de lumière,

ledit premier commutateur (Q1) ayant une première extrémité de contrôle (G) raccordée élec-

triquement à ladite première unité de polarisation, une première extrémité d'entrée (D) raccordée électriquement à ladite unité (1) émettrice de lumière, et une première extrémité de sortie (S) raccordée électriquement à ladite deuxième unité de polarisation ; et

ledit deuxième commutateur (Q2) ayant une deuxième extrémité de contrôle (B) raccordée électriquement à ladite première extrémité de sortie (S) et à ladite deuxième unité de polarisation, une deuxième extrémité d'entrée (C) raccordée électriquement à ladite première extrémité de contrôle (G) et à ladite première unité de polarisation, et une deuxième extrémité de sortie (E) raccordée électriquement à ladite deuxième unité de polarisation, ladite deuxième unité de polarisation comprenant une première résistance (R10) raccordée électriquement, à une extrémité, à ladite première extrémité de sortie (S) et à ladite deuxième extrémité de contrôle (B) et raccordée électriquement de plus, à une autre extrémité, à ladite deuxième extrémité de sortie (E), et

ladite première unité de polarisation comprend un diviseur de tension raccordé électriquement à ladite deuxième extrémité de sortie (E) et apte à être raccordé électriquement à la source d'alimentation électrique (4), ledit diviseur de tension comprenant des deuxième et troisième résistances (R20, R30) raccordées en série, ladite première extrémité de contrôle (G) et ladite deuxième extrémité d'entrée (C) étant raccordées électriquement à une jonction desdites deuxième et troisième résistances (R20, R30),

caractérisé en ce que :

une unité (3) amplificatrice de luminosité est prévue, qui comprend une résistance de couplage (R6) raccordée électriquement à ladite unité (2) limitatrice de courant, un troisième commutateur (Q3) raccordé électriquement à ladite résistance de couplage (R6), et une troisième unité de polarisation raccordée électriquement audit troisième commutateur (Q3) et apte à recevoir une tension de freinage (V2),

ladite résistance de couplage (R6) étant raccordée électriquement, à une extrémité, à ladite extrémité de sortie (S) et à ladite deuxième extrémité de contrôle (B), et étant de plus raccordée électriquement, à une autre extrémité, audit troisième commutateur (Q3),

ledit troisième commutateur (Q3) ayant une troisième extrémité de contrôle (G) raccordée électriquement à ladite troisième unité de polarisation, une troisième extrémité d'entrée (D) raccordée électriquement à la-

dite résistance de couplage (R6), et une troisième extrémité de sortie (S) raccordée électriquement à ladite deuxième extrémité de sortie (E),

ladite troisième unité de polarisation conduisant ledit troisième commutateur (Q3) à conduire lorsque la tension de freinage (V2) est délivrée à ladite troisième unité de polarisation de telle sorte que ledit troisième commutateur (Q3) raccorde ladite résistance de couplage (R6) en parallèle à ladite première résistance (R10), reconfigurant ainsi le seuil prédéterminé afin de permettre à une plus grande quantité de courant de passer à travers ladite unité (1) émettrice de lumière et ledit premier commutateur (Q1) avant que ledit deuxième commutateur (Q2) ne conduise.

2. Dispositif émetteur de lumière à régulation de courant selon la revendication 1, **caractérisé en ce que** ledit premier commutateur (Q1) est un transistor à effet de champ métal-oxyde semiconducteur avec une grille servant de première extrémité de contrôle (G), un drain servant de première extrémité d'entrée (D) et une source servant de première extrémité de sortie (S).
3. Dispositif émetteur de lumière à régulation de courant selon les revendications 1 ou 2, **caractérisé en ce que** ledit deuxième commutateur (Q2) est un transistor à jonction bipolaire avec une base servant de deuxième extrémité de contrôle (B), un collecteur servant de deuxième extrémité d'entrée (C) et un émetteur servant de deuxième extrémité de sortie (E).
4. Dispositif émetteur de lumière à régulation de courant selon l'une quelconque des revendications précédentes, **caractérisé en ce que** ledit module émetteur de lumière (11) possède de plus une résistance limitatrice de courant (R) adaptée pour raccorder électriquement ledit composant émetteur de lumière (D1, D2) à la source d'alimentation électrique (4).

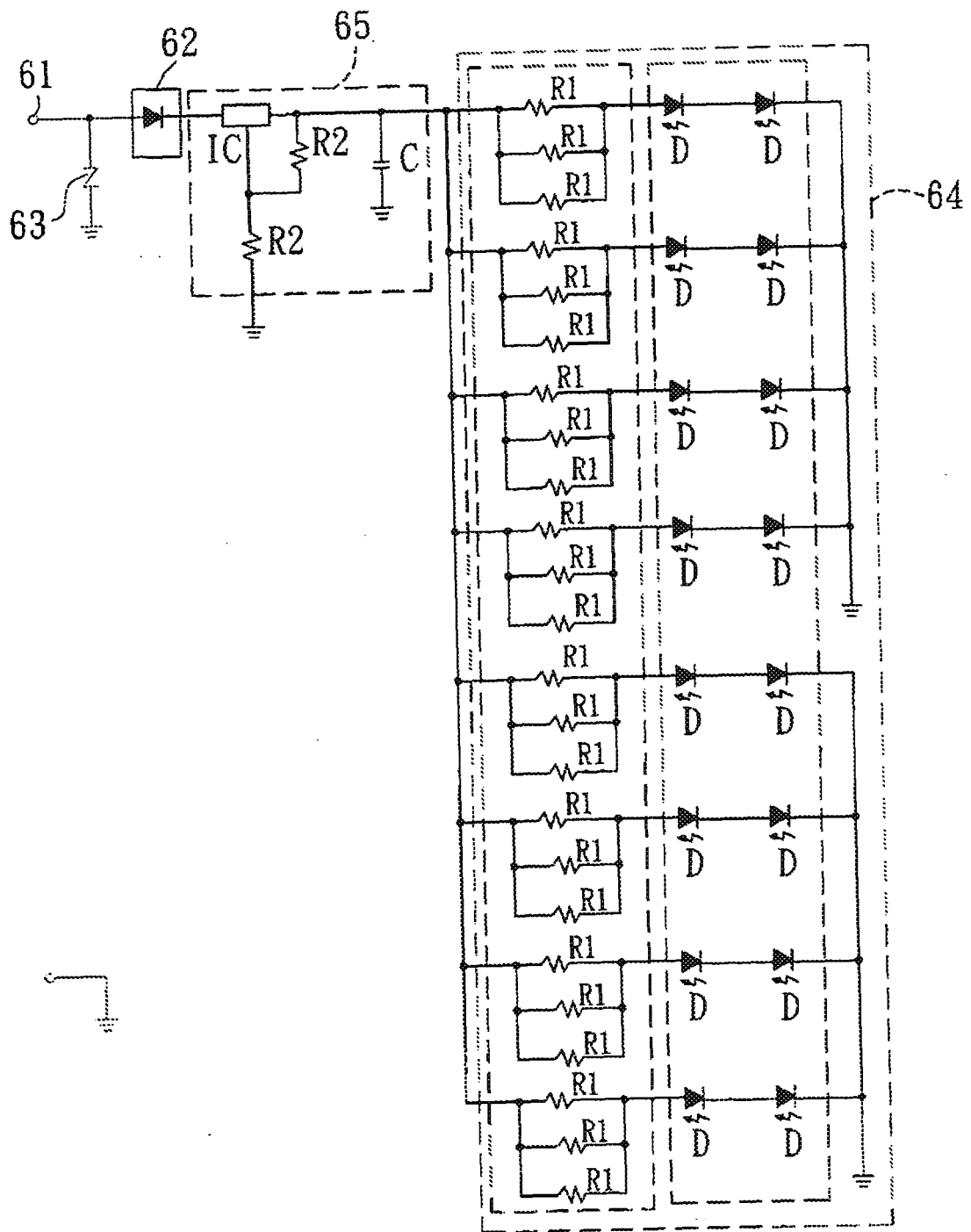


FIG. 1
PRIOR ART

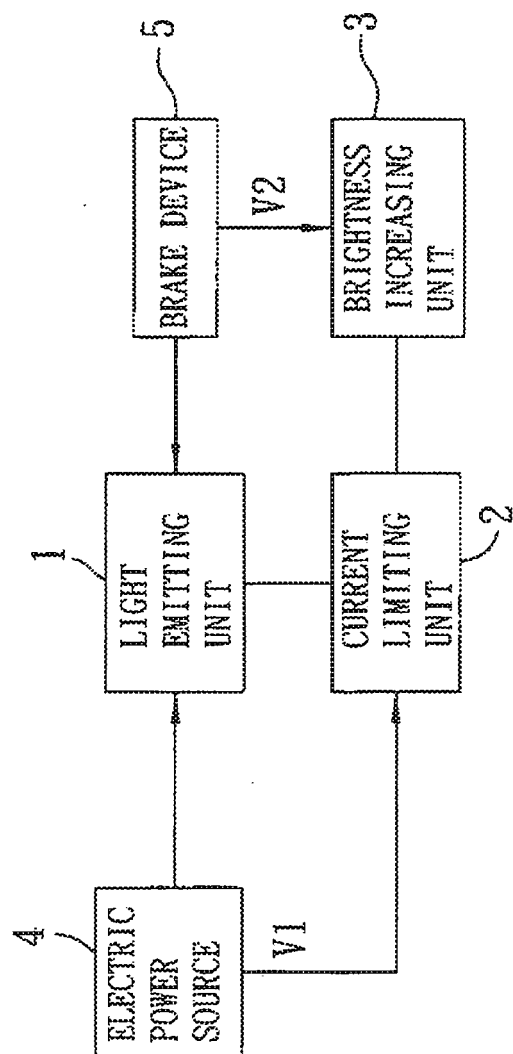


FIG. 2

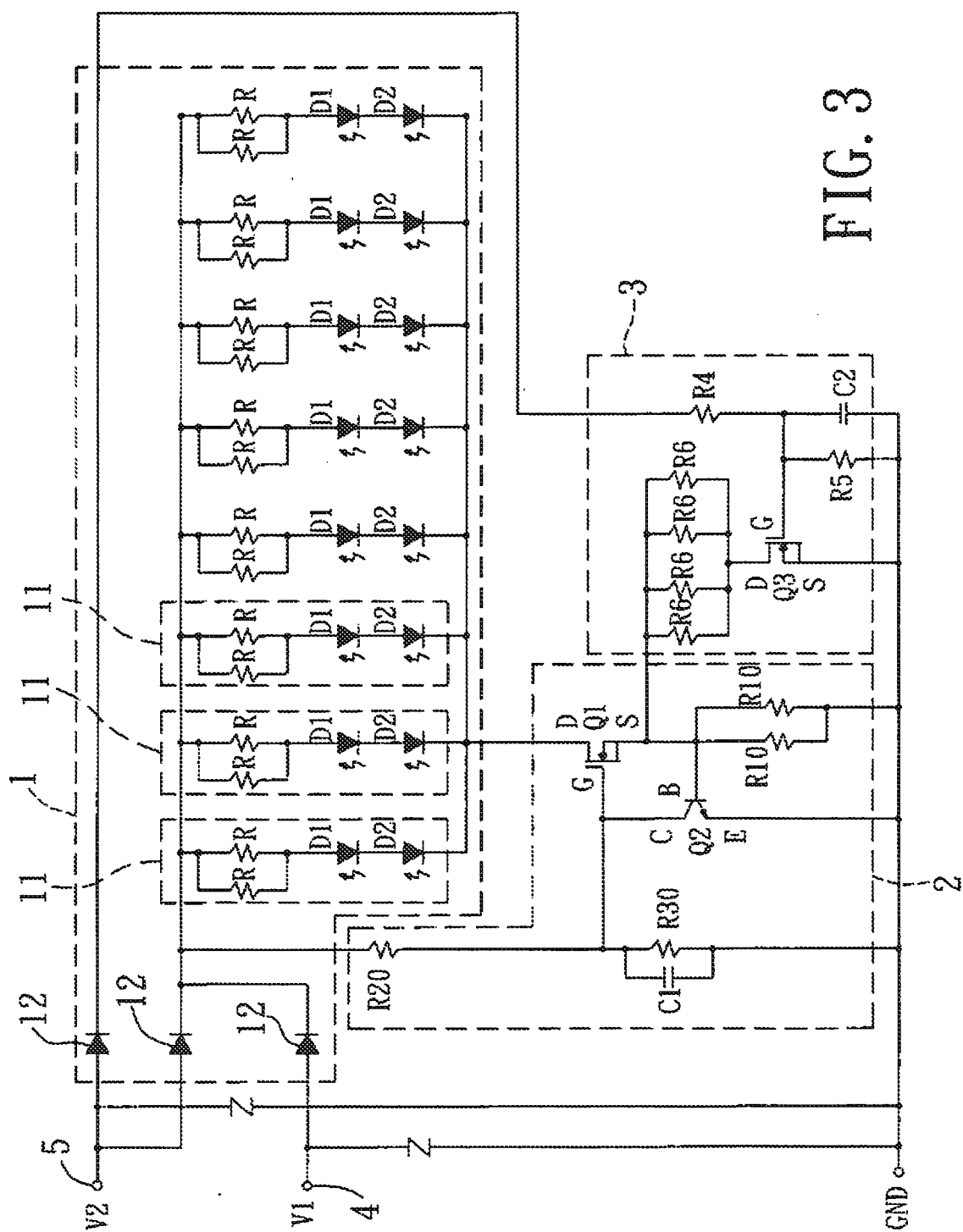


FIG. 3

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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