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(54) SYSTEM FOR OPERATING AN ELECTRONIC LIGHT ARRANGEMENT

SYSTEM ZUM BETRIEB EINER ELEKTRONISCHEN LEUCHTENANORDNUNG

SYSTÈME DESTINÉ À FAIRE FONCTIONNER UN AGENCEMENT LUMINEUX ÉLECTRONIQUE

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Description

[0001] The present invention is related to a system for operating an electronic light arrangement.

[0002] It is known to offer systems for operating an electronic light arrangement, for instance using LED (light emitting diode) driver circuits or the like. It is important in this regard to ensure a constant voltage for the driver circuit so that a stable operation of the light arrangement is provided. In order to achieve this, it is known to use a constant voltage regulator which is connected to a further electronic device, which serves as a constant current driver for the light arrangement.

[0003] However, such an assembly is often expensive and technically complex. Additionally, it becomes further complex if different groups of LEDs are used in the light arrangement, each group requiring a different current supply.

[0004] Document EP 3 016 478 A1 discloses a generic system for operating an electronic light arrangement.

[0005] It is an object of the present invention to overcome aforesaid problems in systems for operating an electronic light arrangement at least partially. Particularly, it is an object of the present invention to provide an easy and cost-efficient solution for operating an electronic light arrangement, for example a LED arrangement.

[0006] The invention is defined by a system according to claim 1, with further embodiments set out in the dependent claims.

[0007] Particularly, aforesaid object is achieved by a system for operating an electronic light arrangement, for example an arrangement with light-emitting devices, for instance LEDs or laser diodes or the like. The system comprises:

- the light arrangement with (particularly exactly) one primary group of light-emitting devices and at least one secondary group of light-emitting devices,
- an electronic buck-boost-device which is electrically connected to the primary group for providing a first constant (supply) current to the corresponding light-emitting devices of the primary group,
- at least one electronic buck-device which is electrically connected to the at least one secondary group for providing a second constant (supply) current to the corresponding light-emitting devices of the secondary group.

[0008] The buck-boost-device is electrically connected to the at least one buck-device for providing a constant voltage (particularly for operating the buck-device and/or the light-emitting devices of the at least one secondary group) by using a voltage drop across the light-emitting devices of the primary group. In other words, the constant voltage is provided by the voltage drop of the primary group, particularly equals the voltage drop. This has the advantage that a very constant voltage can be provided for operating the buck-device and/or the secondary

groups in an easy and cost-effective manner. Furthermore, it is not necessary to use an additional device for providing a constant supply voltage for the buck device.

[0009] Preferably, the "constant current" and/or "constant voltage" refers to a nearly constant current or voltage respectively, which may vary within a certain range. Particularly, also a current or voltage that varies within a certain tolerance, for instance in a range from 0.01 A (Ampere) to 1 A, especially from 0.1 A to 0.2 A, or in a range from 0.1 V (Volt) to 2 V, especially from 0.5 V to 1 V, is regarded as "constant".

[0010] The buck-boost-device can for example provide the first constant current, which causes the voltage drop across the light-emitting devices of the primary group. Preferably, the constant voltage for operating the at least one buck-device equals and/or depends on the voltage drop, which is supplied to the buck-device by the connection between the buck-boost-device and the buck-device(s). This can be a direct or indirect electrical connection, so that for instance other electronic components can be integrated in a current path of this connection between the buck-boost-device and the buck-device.

[0011] Preferably, it can be provided that the buck-boost-device is configured as DC-DC-buck-boost-converter for operating as constant current driver. Here, "DC-DC" refers to a DC-to-DC converter that converts a source of direct current (DC) from one voltage level to another. The buck-boost converter can be a type of DC-to-DC converter that has an output voltage magnitude that is either greater than or less than the input voltage magnitude. For instance, the buck-boost-device is configured as a buck (step-down) converter combined with a boost (step-up) converter, which refers to a certain topology of a buck-boost-converter (also referred to as "four-switch buck-boost converter"). Particularly, the buck-boost-converter can operate over a wide input range from 4.5 V to 75 V, preferably from 9 V to 60 V, particularly preferably from 20 V to 30 V, and can for example have further functions like an overvoltage protection or thermal shutdown or the like. Therefore, the buck-boost-device can provide a stable and safe operation for the light arrangement.

[0012] It can be another aspect of the invention that the buck-boost-device is electrically connected to a supply input of the at least one buck-device for providing an intermediate circuit voltage to the at least one buck-device, wherein particularly the at least one buck-device is configured to step down the intermediate circuit voltage for providing a supply (operating) voltage for the at least one secondary group (that means the light-emitting devices of the secondary group), wherein particularly preferably the voltage drop depends on the first constant current and the type of light-emitting devices of the primary group, wherein for example the intermediate circuit voltage equals the voltage drop. Surprisingly it has been found that the assembly of light-emitting devices of the primary group can serve as a supplier for a very constant voltage for operating the at least one buck-device. Par-

ticularly, LEDs as light-emitting devices can provide a very constant voltage drop. Therefore, it is not necessary to use an additional regulation device for providing a constant supply voltage for the buck device(s), which can reduce costs and technical complexity.

[0013] According to the invention, it can also be possible that an electrical primary potential is provided by the voltage drop (for instance a potential at the path through the light-emitting devices of the primary group), and the primary potential is electrically connected to a supply input of the at least one buck-device for providing a constant voltage for operating the at least one buck-device, wherein particularly the voltage drop is a voltage drop across a series connection of the light-emitting devices of the primary group. Therefore, it can be provided that the light-emitting devices of the primary and/or the secondary group(s) are connected in series such that the constant current provided by the buck-boost-device or the buck-device respectively is passed through a common current path of the light-emitting devices in series connection. This allows for a simple and cost-effective configuration of the arrangement.

[0014] It is also conceivable that a first buck-device is electrically connected to a first secondary group of the light arrangement for providing a constant current to the first secondary group, and a second buck-device is electrically connected to a second secondary group of the light arrangement for providing a constant current to the second secondary group, wherein both buck-devices are supplied by an intermediate circuit voltage provided by the buck-boost-device. This has the advantage that the buck-boost-device can serve as constant current driver for the primary group as well as intermediate circuit voltage supplier for operating the buck-devices, which reduces costs and complexity. Further, a further loss of efficiency is avoided since a separate constant voltage regulator for providing a constant supply voltage is not necessary.

[0015] Preferably, it can be provided that the at least one buck-device is configured as DC-DC-buck-converter for operating as constant current driver. This can be a DC-to-DC power converter which steps down voltage (while stepping up current) from its input (supply) to its output. However, the buck-device can have a lower complexity than the buck-boost-device. Therefore, costs and technical effort can be reduced when using (only) one buck-boost-converter and the voltage drop of the primary group for supplying downstream buck-devices with operation voltage.

[0016] Preferably, the operation voltage of the buck-device(s) can be regulated by the light-emitting devices of the primary group. Additionally, at least one or at least two or at least three buck-devices can be provided, each connected to a corresponding secondary group. This allows for a highly flexible configuration of the light arrangement.

[0017] It is also conceivable that the secondary group, preferably each of the secondary groups, comprises a

smaller number of light-emitting devices than the primary group, particularly preferably the second secondary group comprises a smaller number of light-emitting devices than the first secondary group. In other words, each secondary group can have lower energy consumption than the primary group. This allows for using the voltage drop of the primary group as supply voltage for each of the buck-devices.

[0018] According to another aspect of the invention, it is provided that the secondary group, particularly each of the secondary groups, comprises light-emitting devices configured to be operated with a current lower than the current for operating the light-emitting devices of the primary group. Particularly, this can be the case if different light intensities are used for the different groups. For instance, the group with the highest energy consumption can serve as primary group for providing a supply (operation) voltage to the buck-devices of the secondary group(s).

[0019] It can be provided that the system is configured as a LED driver circuit for operating the light arrangement, wherein preferably the light arrangement is configured as a LED arrangement, particularly as a projection arrangement for projecting an image onto a surface, particularly preferably used for a vehicle. This has the advantage that a highly efficient system for operation of the LED arrangement can be used since the projection of images onto a surface (for instance in front or behind the vehicle) requires different groups of LED, each requiring different currents for providing different light intensities. This allows for a uniformly projected image on the surface. Particularly, the vehicle can be configured as a fork-lift truck or truck or passenger vehicle or the like.

[0020] Particularly, the primary group as a first group of light-emitting devices requires a supply current (provided by the buck-boost-device) in a range from 500 mA to 1200 mA, preferably from 700 mA to 1000 mA, particularly preferably 820 mA. Preferably, the secondary group (or a first secondary group) as a second group of light-emitting devices requires a supply current (provided by the buck-device or a first buck-device) in a range from 200 mA to 800 mA, preferably from 300 mA to 600 mA, particularly preferably 480 mA. Preferably, a second secondary group as a third group of light-emitting devices requires a supply current (provided by a second buck-device) in a range from 100 mA to 600 mA, preferably from 200 mA to 400 mA, particularly preferably 360 mA.

[0021] It is conceivable that the input voltage for the buck-boost-device is in a range from 9 V to 60 V, wherein the buck-boost-device is configured to step up and step down the input voltage. Therefore, the buck-boost-device can ensure that a constant supply voltage is provided for other buck-devices as well as serving as constant current driver for a set of light-emitting devices. This can have the effect that a highly efficient system for operating a light arrangement can be provided. Also, the buck-devices can work very efficiently since the input voltage provided by the voltage drop is very constant. Additionally,

the operational safety can be enhanced since the number of necessary electrical components can be reduced.

[0022] In the following, preferred embodiments of the invention are described on the basis of supportive figures. It is shown in:

Fig. 1 a schematically block diagram of an assembly for operating a light arrangement,

Fig. 2 a schematically block diagram of an inventive system,

Fig. 3 a further schematically block diagram of an inventive system,

Fig. 4 schematically an exemplary application of the inventive system.

[0023] In the different figures same features always correspond to the same reference signs, therefore generally the features are only described once.

[0024] In figure 1, a further assembly for operating a light arrangement 2 is shown. Particularly, this can be a known system or at least an assembly similar to a known system. It is shown that a main DC DC constant voltage stage 8 is used to provide a constant supply voltage PV. The main DC DC constant voltage stage 8 is operated by an input voltage VCC. In figure 1, the potential designations "VCC" and "PV" are used together with the respective ground potentials "GND DCDC" and "GND LED". (Further ground potentials are "GND NTC" and "GND"). The constant supply voltage ("PV" / "GND LED") is used for a main DC DC controller 9 and for two buck controllers 20a, 20b.

[0025] In figure 2, it is shown that an inventive system 1 can reduce the number of electrical components, and particularly does not necessarily require the usage of an expensive and complex main DC DC constant voltage stage 8. A buck-boost-device 10 is supplied by an input voltage ("VCC", "GNDDCDC") and provides a constant current at the outputs ("LED+" and "VCC"). Furthermore, an optional sensor pin is provided ("CNTC"), which can be connected to at least one of the groups, for instance the primary group 2a and the secondary group(s) 2b, 2c. Each group can comprise several light-emitting devices 30 that together form one light arrangement 2. It is also conceivable that the buck-boost-device 10 supports a temperature control function using the sensor pin CNTC.

[0026] The constant current output "LED+" is connected to the light-emitting devices 30 of the primary group 2a so that a voltage drop across the light-emitting devices 30 is effected (also shown in figure 3). This voltage of the light-emitting devices 30 (or the primary group 2a respectively) can be used to supply a constant voltage for operating at least one buck-device 20. This is achieved by connecting the buck-boost-device 10 with the at least one buck-device 20 (in particular the potential "LED+" and/or "VCC" is connected to each buck-device

20). For example, two buck-devices 20 exist, a first buck-device 20a and a second buck-device 20b. The first buck-device 20a can be electrically connected to a first secondary group 2b by using potentials (or outputs) "LED2+" and "LED2-" and the second buck-device 20b can be connected to a second secondary group 2c by using potentials (or outputs) "LED3+" and "LED3-". By stepping down the input voltage ("LED+", "VCC"), the first buck-device 20a can provide a first secondary potential LED2+ and the second buck-device 20b can provide a second secondary potential LED3+.

[0027] In figure 3, the three groups of light-emitting devices 30 are exemplary shown. The light-emitting devices 30 of each group can be in a series configuration so that the same current flows through the corresponding light-emitting devices 30.

[0028] The different groups can comprise a different number of light-emitting devices 30. This is made clear referring to figure 4, which shows an example application of the system (1), not covered by the claimed invention.

[0029] A vehicle 5 is shown that comprises the inventive system 1. The light arrangement 2 is used to project an image 6 on the ground. As to see, light points having a higher distance from the vehicle 5 require a projection with higher intensity than light points having lower distance. Therefore, each group can be operated with a different supply current.

Reference list

[0030]

- | | |
|-----|---|
| 1 | System |
| 2 | light arrangement, LED arrangement |
| 2a | primary group, first group |
| 2b | secondary group, second group |
| 2c | secondary group, third group |
| 5 | vehicle |
| 6 | image |
| 8 | main DC DC constant voltage stage |
| 9 | main DC DC controller |
| 10 | Buck-boost-device, DC-DC-buck-boost-converter |
| 20 | Buck-device, DC-DC-buck-converter |
| 20a | first buck-device |
| 20b | second buck-device |
| 30 | light-emitting device, light-emitting diode |

Claims

1. System (1) for operating an electronic light arrangement (2), comprising:
 - the electronic light arrangement (2) with one primary group (2a) and at least one secondary group (2b) of light-emitting diodes (30),
 - an electronic buck-boost-device (10) which is

electrically connected to the primary group (2a) of light-emitting diodes for providing a first constant current to the corresponding light-emitting diodes (30) of the primary group (2a),

- at least one electronic buck-device (20) which is electrically connected to the at least one secondary group (2b) for providing a second constant current to the corresponding light-emitting diodes (30) of the secondary group (2b),

characterized in that

the buck-boost-device (10) is electrically connected to the at least one buck-device (20) via a supply input of the at least one buck-device for providing a constant voltage by using a voltage drop across the light-emitting diodes (30) of the primary group (2a) of light-emitting diodes.

2. System (1) according to claim 1, **characterized in that** the buck-boost-device (10) is configured as DC-DC-buck-boost-converter (10) for operating as constant current driver.
3. System (1) according to claim 1 or 2, **characterized in that** the buck-boost-device (10) is electrically connected to the supply input of the at least one buck-device (20) for providing an intermediate circuit voltage to the at least one buck-device (20), wherein the at least one buck-device (20) is configured to step down the intermediate circuit voltage for providing a supply voltage for the at least one secondary group (2b) of light-emitting diodes, wherein the voltage drop depends on the first constant current and the type of light-emitting diodes (30) of the primary group (2a), wherein the intermediate circuit voltage equals the voltage drop.
4. System (1) according to any preceding claim, **characterized in that** an electrical primary potential (LED+) is provided by the voltage drop, and the primary potential (LED+) is electrically connected to the supply input of the at least one buck-device (20) for providing the constant voltage for operating the at least one buck-device (20), wherein the light-emitting diodes of the primary group are connected in series and the voltage drop is across the series connection of the light-emitting diodes (30) of the primary group (2a).
5. System (1) according to any preceding claim, **characterized in that** a first buck-device (20a) of the at least one buck-devices is electrically connected to a first secondary group (2b) of the light arrangement (2) for providing the second constant current to the first secondary group (2b) of the light-emitting diodes and a second

buck-device (20b) of the at least one buck-device is electrically connected to a second secondary group (2c) of the light arrangement (2) for providing a further constant current to the second secondary group (2c), wherein both buck-devices (20) are supplied by the intermediate circuit voltage provided by the buck-boost-device (10).

6. System (1) according to any preceding claim, **characterized in that** each of the at least one buck-device (20) is configured as DC-DC-buck-converter (20) for operating as constant current driver.
7. System (1) according to any preceding claim, **characterized in that** the secondary group (2b) of light-emitting diodes, namely each of the secondary groups (2b, 2c), comprises a smaller number of light-emitting diodes (30) than the primary group (2a) of light-emitting diodes and the second secondary group (2c) of light-emitting diodes comprises a smaller number of light-emitting diodes (30) than the first secondary group (2b).
8. System (1) according to any preceding claim, **characterized in that** the secondary group (2b), namely each of the secondary groups (2b, 2c), comprises light-emitting diodes (30) configured to be operated with a current lower than the current for operating the light-emitting diodes (30) of the primary group (2a).
9. System (1) according to any preceding claim, **characterized in that** the input voltage for the buck-boost-device (10) is in a range from 9 V to 60 V.

Patentansprüche

1. System (1) zum Betreiben einer elektronischen Leuchtenanordnung (2), umfassend:
 - die elektronische Leuchtenanordnung (2) mit einer primären Gruppe (2a) und mindestens einer sekundären Gruppe (2b) lichtemittierender Dioden (30),
 - eine elektronische Abwärts-Aufwärts-Vorrichtung (Buck-Boost-Vorrichtung) (10), die elektrisch mit der primären Gruppe (2a) lichtemittierender Dioden verbunden ist, um den entsprechenden lichtemittierenden Dioden (30) der primären Gruppe (2a) einen ersten Konstantstrom bereitzustellen,
 - mindestens eine elektronische Abwärts-Vorrichtung (Buck-Vorrichtung) (20), die elektrisch mit der mindestens einen sekundären Gruppe (2b) verbunden ist, um den entsprechenden

- lichtemittierenden Dioden (30) der sekundären Gruppe (2b) einen zweiten Konstantstrom bereitzustellen,
- dadurch gekennzeichnet, dass**
- die Abwärts-Aufwärts-Vorrichtung (10) über einen Versorgungseingang der mindestens einen Abwärts-Vorrichtung (20) mit der mindestens einen Abwärts-Vorrichtung verbunden ist, um unter Ausnutzung eines Spannungsabfalls an den lichtemittierenden Dioden (30) der primären Gruppe (2a) lichtemittierender Dioden einen Konstantstrom bereitzustellen.
2. System (1) nach Anspruch 1,
dadurch gekennzeichnet, dass
- die Abwärts-Aufwärts-Vorrichtung (10) als DC-DC-Abwärts-Aufwärts-Wandler (Buck-Boost-Konverter) (10) für einen Betrieb als Konstantstromtreiber konfiguriert ist.
3. System (1) nach Anspruch 1 oder 2,
dadurch gekennzeichnet, dass
- die Abwärts-Aufwärts-Vorrichtung (10) mit dem Versorgungseingang der mindestens einen Abwärts-Vorrichtung (20) elektrisch verbunden ist, um der mindestens einen Abwärts-Vorrichtung (20) eine Zwischenkreisspannung bereitzustellen, wobei die mindestens eine Abwärts-Vorrichtung (20) dazu konfiguriert ist, die Zwischenkreisspannung abwärtszutransformieren, um der mindestens einen sekundären Gruppe (2b) lichtemittierender Dioden eine Versorgungsspannung bereitzustellen, wobei der Spannungsabfall vom ersten Konstantstrom und vom Typ der lichtemittierenden Dioden (30) der primären Gruppe (2a) abhängt, wobei die Zwischenkreisschaltung gleich dem Spannungsabfall ist.
4. System (1) nach einem der vorangehenden Ansprüche,
dadurch gekennzeichnet, dass
- durch den Spannungsabfall ein elektrisches Primärpotential (LED+) bereitgestellt ist und das Primärpotential (LED+) elektrisch mit dem Versorgungseingang der mindestens einen Abwärts-Vorrichtung (20) zum Bereitstellen der Konstantspannung für das Betreiben der mindestens einen Abwärts-Vorrichtung (20) verbunden ist, wobei die lichtemittierenden Dioden der primären Gruppe in Reihe verbunden sind und der Spannungsabfall über die Reihenverbindung der lichtemittierenden Dioden (30) der primären Gruppe (2a) erfolgt.
5. System (1) nach einem der vorangehenden Ansprüche,
dadurch gekennzeichnet, dass
- eine erste Abwärts-Vorrichtung (20a) der mindestens einen Abwärts-Vorrichtung mit einer ersten sekundären Gruppe (2b) der Leuchtenanordnung (2) elektrisch verbunden ist, um der ersten sekundären Gruppe (2b) lichtemittierender Dioden den zweiten Konstantstrom bereitzustellen, und eine zweite Abwärts-Vorrichtung (20b) der mindestens einen Abwärts-Vorrichtung mit einer zweiten sekundären Gruppe (2c) der Leuchtenanordnung (2) elektrisch verbunden ist, um der zweiten sekundären Gruppe (2c) einen weiteren Konstantstrom bereitzustellen, wobei beide Abwärts-Vorrichtungen (20) durch von der Abwärts-Aufwärts-Vorrichtung (10) bereitgestellte Zwischenkreisspannung versorgt werden.
6. System (1) nach einem der vorangehenden Ansprüche,
dadurch gekennzeichnet, dass
- jede der mindestens einen Abwärts-Vorrichtung (20) als DC-DC-Abwärts-Wandler (20) für einen Betrieb als Konstantstromtreiber konfiguriert ist.
7. System (1) nach einem der vorangehenden Ansprüche,
dadurch gekennzeichnet, dass
- die sekundäre Gruppe (2b) von lichtemittierenden Dioden, namentlich jede der sekundären Gruppen (2b, 2c), eine kleinere Anzahl lichtemittierender Dioden (30) als die primäre Gruppe (2a) lichtemittierender Dioden umfasst und die zweite sekundäre Gruppe (2c) lichtemittierender Dioden eine kleinere Anzahl lichtemittierender Dioden (30) als die erste sekundäre Gruppe (2b) umfasst.
8. System (1) nach einem der vorangehenden Ansprüche,
dadurch gekennzeichnet, dass
- die sekundäre Gruppe (2b), namentlich jede der sekundären Gruppen (2b, 2c), lichtemittierende Dioden (30) umfasst, die dazu konfiguriert sind, mit einem Strom, der niedriger als der Strom zum Betreiben der lichtemittierenden Dioden (30) der primären Gruppe (2a) ist, betrieben zu werden.
9. System (1) nach einem der vorangehenden Ansprüche,
dadurch gekennzeichnet, dass
- die Eingangsspannung für die Abwärts-Aufwärts-Vorrichtung (10) in einem Bereich von 9 V bis 60 V liegt.
- Revendications**
1. Système (1) pour utiliser un dispositif d'éclairage électronique (2), comprenant :
- le dispositif d'éclairage électronique (2) avec un groupe primaire (2a) et au moins un groupe secondaire (2b) de diodes électroluminescentes (30),

- un dispositif dévolteur-survolteur électronique (10) connecté électriquement au groupe primaire (2a) de diodes électroluminescentes pour fournir un premier courant constant aux diodes électroluminescentes correspondantes (30) du groupe primaire (2a),
 - au moins un dispositif dévolteur électronique (20) connecté électriquement au moins au groupe secondaire (2b) pour fournir un second courant constant aux diodes électroluminescentes correspondantes (30) du groupe secondaire (2b),
caractérisé en ce que
 le dispositif dévolteur-survolteur (10) est connecté électriquement à au moins un dispositif dévolteur (20) via une entrée d'alimentation du dispositif dévolteur pour fournir une tension constante en utilisant une chute de tension dans les diodes électroluminescentes (30) du groupe primaire (2a) de diodes électroluminescentes.
2. Système (1) selon la revendication 1,
caractérisé en ce que
 le dispositif dévolteur-survolteur (10) est configuré comme un convertisseur dévolteur-survolteur DC-DC (10) pour fonctionner comme conducteur de courant constant.
3. Système (1) selon la revendication 1 ou 2,
caractérisé en ce que
 le dispositif dévolteur-survolteur (10) est connecté électriquement à l'entrée d'alimentation d'au moins un dispositif dévolteur (20) pour fournir une tension de circuit intermédiaire à au moins un dispositif dévolteur (20), sachant qu'au moins un dispositif dévolteur (20) est configuré pour réduire la tension de circuit intermédiaire pour fournir une tension d'alimentation à au moins un groupe secondaire (2b) de diodes électroluminescentes, sachant que la chute de tension dépend du premier courant constant et du type de diodes électroluminescentes (30) du groupe primaire (2a), la tension de circuit intermédiaire étant égale à la chute de tension.
4. Système (1) selon la revendication précédente,
caractérisé en ce que
 un potentiel électrique primaire (LED+) est fourni par la chute de tension et le potentiel primaire (LED+) est électriquement connecté à l'entrée d'alimentation d'au moins un dispositif dévolteur (20) pour fournir la tension constante pour faire fonctionner au moins un dispositif dévolteur (20), sachant que les diodes électroluminescentes du groupe primaire sont connectées en série et que la chute de tension est appliquée aux bornes de la connexion en série des diodes électroluminescentes (30) du groupe primaire (2a).
5. Système (1) selon la revendication précédente,
caractérisé en ce que
 un premier dispositif dévolteur (20a) des dispositifs dévolteurs (au moins un) est connecté électriquement à un premier groupe secondaire (2b) du dispositif d'éclairage (2) pour fournir le deuxième courant constant au premier groupe secondaire (2b), de diodes électroluminescentes et un deuxième dispositif dévolteur (20b) des dispositifs dévolteurs (au moins un) est connecté électriquement à un deuxième groupe secondaire (2c) du dispositif d'éclairage (2) pour fournir un autre courant constant au deuxième groupe secondaire (2c), les deux dispositifs dévolteurs (20) étant alimentés par une tension de circuit intermédiaire fournie par le dispositif dévolteur-survolteur (10).
6. Système (1) selon la revendication précédente,
caractérisé en ce que
 chacun des dispositifs dévolteurs (au moins un) (20) est configuré comme un convertisseur dévolteur DC-DC (20) pour fonctionner comme conducteur de courant constant.
7. Système (1) selon la revendication précédente,
caractérisé en ce que
 le groupe secondaire (2b) de diodes électroluminescentes, resp. des groupes secondaires (2b, 2c), comprend un nombre de diodes électroluminescentes (30) inférieur à celui du groupe primaire (2a) de diodes électroluminescentes et le deuxième groupe secondaire (2c) de diodes électroluminescentes comprend un nombre de diodes électroluminescentes inférieur à celui du premier groupe secondaire (2b).
8. Système (1) selon la revendication précédente,
caractérisé en ce que
 le groupe secondaire (2b), resp. chacun des groupes secondaires (2b, 2c), comprend des diodes électroluminescentes (30) configurés pour fonctionner avec un courant inférieur au courant nécessaire pour le fonctionnement des diodes électroluminescentes (30) du premier groupe (2a).
9. Système (1) selon la revendication précédente,
caractérisé en ce que
 la tension d'alimentation pour le dispositif dévolteur-survolteur (10) se situe dans une plage de 9 V à 60 V.

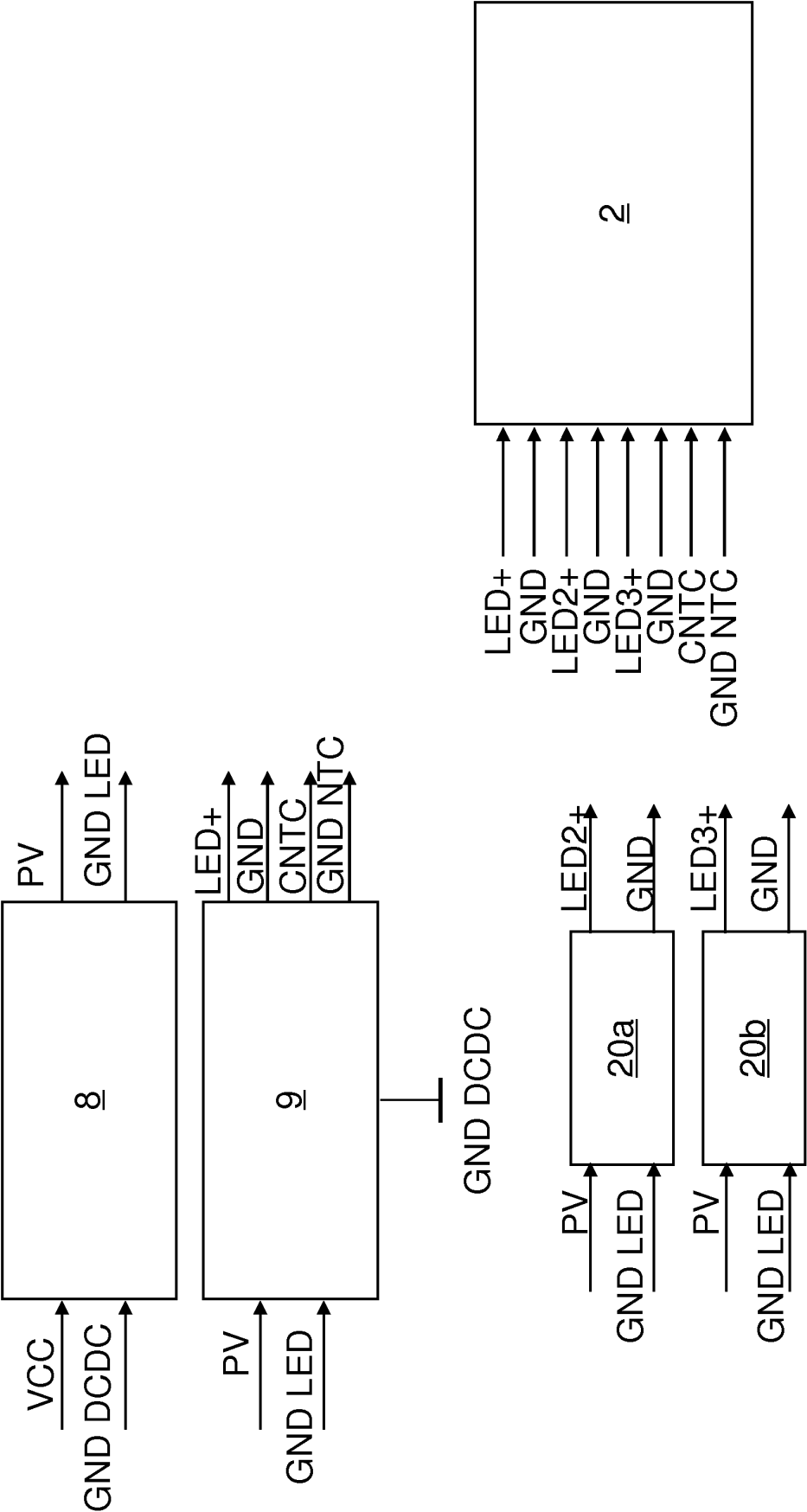


Fig. 1

1 ↗

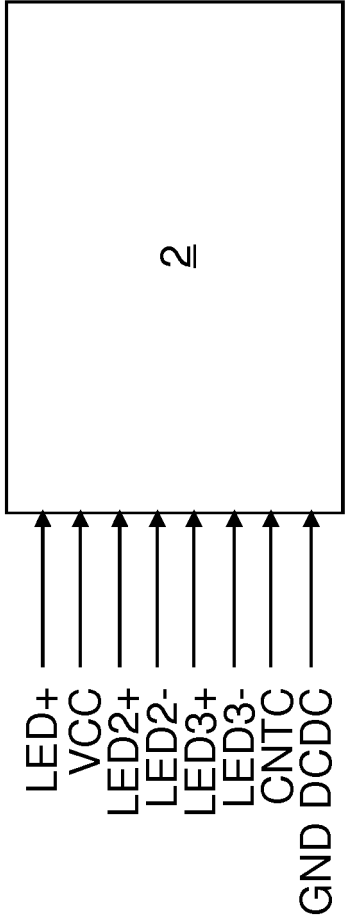
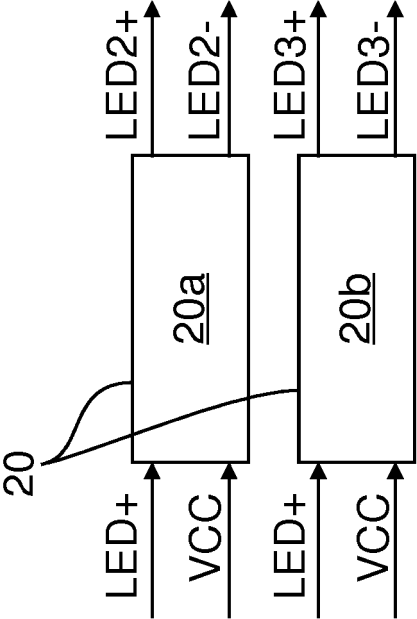
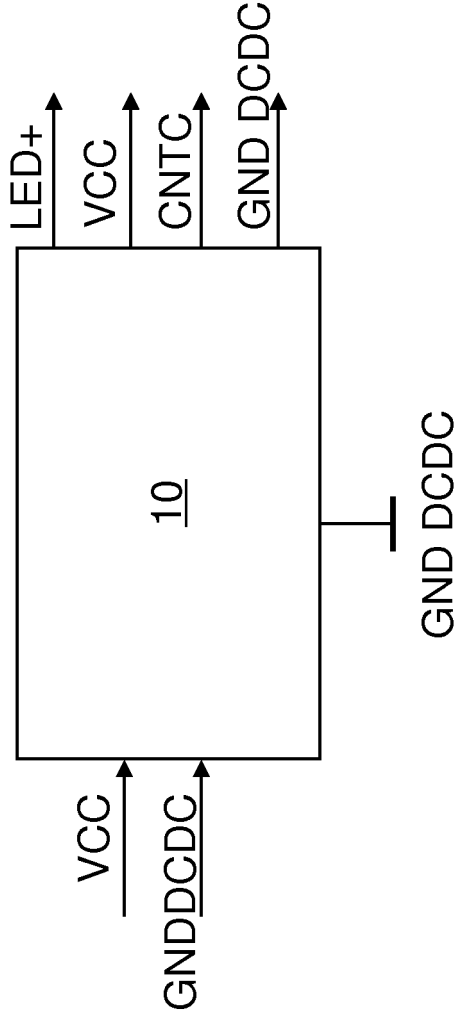


Fig. 2

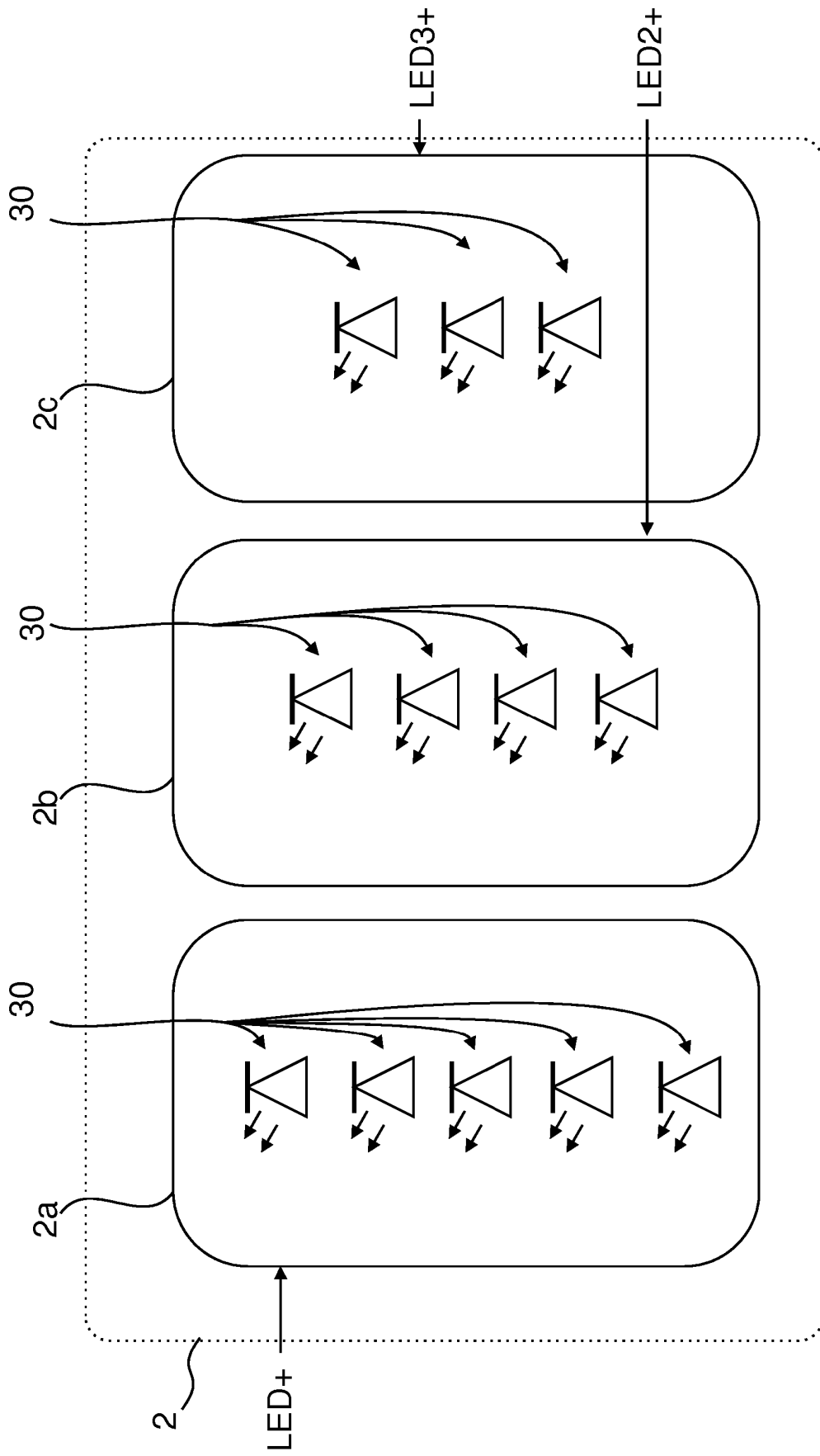


Fig. 3

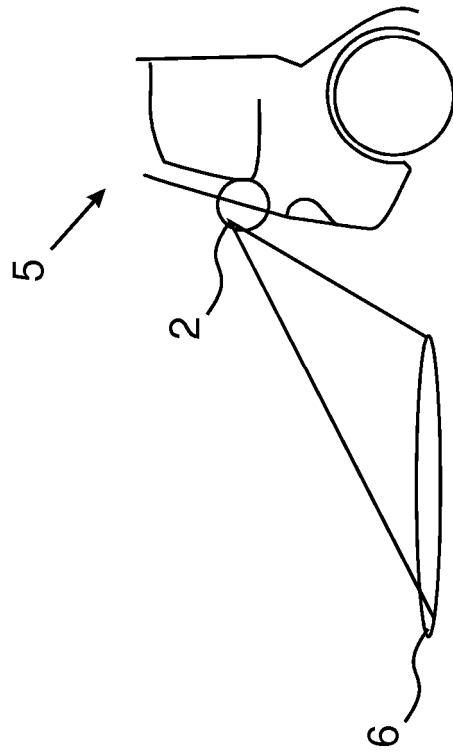


Fig. 4

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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