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Illumination device generating an essentially fan-shaped light beam.

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Description

The present invention relates to an illumination device particularly suitable for illuminating vertical or flat surfaces such as the fronts of buildings, house entrances, ceilings or walls of interiors in general as well as suitable for illuminating any surface (of any spatial inclination) or area of open spaces such as gardens and the like.

Various types of devices for the above-described function are already known. The Conference Record of the 1988 IEEE Industry Applications Society Annual Meeting discloses the use of a combination refracting-reflecting optical assembly, used in conjunction with an asymmetric distribution producing reflector system.

To illuminate the fronts of buildings, for example, powerful reflectors or spotlights are used, arranged at an appropriate distance from the building, which shine their light beams onto the said fronts.

These spotlights generate a light flux which only partly strikes and illuminates the front of the building on which they are positioned; a large part of this flux in fact dissipates into the space surrounding the building.

The obvious consequence of this is minimum use of the power of the spotlights and a great waste of energy with consequently high illumination costs.

Furthermore, these spotlights generate a light beam (usually conical) which dazzles those who find themselves within the beam itself such as the inhabitants of the building who may look out of its windows or the inhabitants of the nearby buildings illuminated, as stated, by the diffusion of the dissipated light.

Also known are spotlights used to illuminate particular areas of buildings such as the exits.

These spotlights are arranged, on supports protruding from the front of the building, at a short distance (at least about ten centimetres away) from the building and generate a light beam which shines on the exit area, entrance or main door.

In this case too, as in the one previously described, the light used for illumination is minimal, whilst the greater part of that generated by the spotlights is dissipated. For these reasons, high-powered spotlights are used and this has a detrimental effect on their cost and on the cost of actual illumination. Arrangement of these spotlights close to the building is also sometimes problematical due to the presence of the above-mentioned protruding supports.

The aim of the present invention is therefore to create an illumination device of the above-mentioned type which has a high performance i.e. in which dissipation of the light generated is very low, which thus enables the desired areas to be illuminated in the optimum way and has very low operating costs as compared to those of similar known devices.

Another aim is to offer a device of the said type

which enables only particular desired areas to be illuminated, such as the fronts, exits or main doors of buildings, without illuminating the areas adjacent to them as well.

A further aim is to offer a device that enables essentially uniform illumination of the desired areas without using high-powered light sources.

Another aim is to create a device which enables the illumination of the fronts, doors or exits of buildings without requiring supports protruding from the said fronts and without requiring supports placed at a distance from the said buildings.

Another aim is to create a device which may be used in an essentially similar way both to illuminate walls, ceilings or floors of the interiors of buildings and to illuminate areas outside such buildings.

These and other aims which will be obvious to the expert within the field are achieved by a device as claimed in Claim 1.

For a better understanding of the present invention, the following drawings are attached, purely by way of example and in no way limiting, in which:

Figure 1 is a perspective view of a preferred form of embodiment of the invention;

Figure 2 is a section along Line II-II of Figure 1; Figure 3 is a section along Line III-III of Figure 2; Figure 4 is a section along Line IV-IV of Figure 3; Figure 5 is a different form of embodiment of the invention;

Figures 6 and 7 are two different forms of embodiment of the invention; and

Figure 8 is a photometric curve of the device shown in Figures 1 to 4.

With particular reference to Figures 1 to 4, an illumination device (or appliance) is shown generally by 1 and comprises two light sources 2 and a refractor element 3 linked to a support element or base 4. This refractor element and the said base form a box body within the compartment 5 of which are arranged the light sources 2, the said refractor element 3 and the said base being linked together by means of at least one screw 6.

Between elements 3 and 4 is a standard sealing element 7.

More particularly, refractor element 3 is a single-axis transparent element, advantageously of a known "ribbed glass", and has an essentially trapezoid cross section.

This refractor element makes it possible to generate, from a standard light beam produced by sources 2, an essentially blade-shaped light beam arranged, in space, in a fan.

On each of the oblique sides 8 of the said refractor element 3 is a light source 2 the axis of which is essentially at right angles to that of the said side 8.

This enables a better illuminating effect of appliance 1 to be achieved and this effect may be changed by varying the distance between each light source

and refractor element 3.

The latter comprises a parabola 9, a standard bulb 10, advantageously a low-powered halogen bulb partially shielded by a reflector element in 11 and a transverse plate 12 arranged at right angles to the said bulb.

Each of the said light sources 2 is linked to a support 13 (bulb socket) and is advantageously supplied by a transformer 14 supported by base 4. This transformer is clearly of a suitable size for both of the said sources.

Figures 2 and 3 also show, linked to the said transformer, an electrical connection element (terminal board) 15 advantageously fitted with a fuse (not shown) to provide electrical protection for device 1.

The presence of transformer 14, which is essential, enables bulbs 10 to be supplied and allows their characteristics to be exploited to the full as well as prolonging their lifetime. This transformer may be inserted in compartment 5 or placed upstream of device 1.

According to another characteristic of device 1, light sources 2 are arranged at an angle to each other: advantageously in relation to a common vertical axis (e.g. coinciding with that of screw 6) these light sources are arranged at angles of between 35° and 50°.

Due to this arrangement and using bulbs 10 whose photometric solids of light emission have sections (usually elliptic) in which the ratio between the greater and smaller axes is equal to or greater than ten, illumination over an arc of at least 120° is achieved.

An example of this is shown in Figure 8, in which the section of the photometric solid of two 50 Watt bulbs arranged at 80° in relation to each other is between points K and W between which is an arc of about 160°.

Advantageously, the distance and reciprocal angulation of the light sources may be varied e.g. by linking each bulb with a rack (not shown) in the form of an arc of a circle and co-operating with gearing which can be operated from the outside of device 1.

Apart from this possibility of varying the distance and reciprocal angulation between the light sources, it is also possible to vary very precisely the angulation of the longitudinal plane of the light beam so as to achieve a more uniform illumination of the illuminated surface.

This may be achieved, for example, from the outside of device 1 by adjusting an appropriate screw 20 which at one end 21, inside compartment 5 of device 1, has gearing 22 onto which at least one threadlike element 23 can wind and unwind, the latter connecting together two elastic plates 24 linked to each support 13 of parabolas 9.

More particularly, the said element 23 co-operates with a fixed pin 25 arranged in front of each plate 24 and linked to base 4 to which the said plates are

also linked.

This enables a more positive action of the said element 23 on such plates and allows precise adjustment of the spatial inclination of the light sources in relation to a longitudinal surface of illumination.

The device in question, illustrated in the Figures, enables a surface such as the front of a building, a garden or suchlike to be illuminated by a usually fan-shaped blade of light.

As stated, the said blade of light may be arranged at different angles in relation to a set longitudinal surface; advantageously, in a device 1 with at least two light sources 2, the latter generate light beams which superimpose upon each other on at least part of the illuminated surface. Figure 5 shows another form of embodiment of the invention. This form has, unlike the embodiment previously described, three light sources arranged at an angle in relation to each other. As for the rest, the characteristics of the embodiment shown in Figures 1 to 4 are the same as those of the embodiment shown in Figure 5 where parts corresponding to those already described bear the same reference numbers.

Lastly, Figures 6 and 7 show illumination systems in which two of the devices described and shown in Figures 1 to 6 are joined together in any known way.

This enables illumination, still achieved by means of a fan-shaped blade of light, at different angles, up to 360°. The said Figures 6 and 7 show parts (bearing the same reference numbers) corresponding to those already described in the description of the previous Figures. No subsequent reference is therefore made to these parts.

An illumination device according to the invention enables any surface such as the fronts of buildings or their parts, gardens or suchlike to be illuminated in an optimum way by a fan-shaped blade of light.

This illumination is achieved by using low-powered bulbs and with the minimum possible dissipation of the light beam generated. This enables maximum results with minimum illumination costs.

Furthermore, a device created according to the invention is compact, light and easy to install; it enables simple replacement of bulbs in the event of failure and easy arrangement in association with the surfaces to be illuminated.

Clearly, different forms of embodiment of the invention may be envisaged (e.g. wherein each light source is linked to its own refractor element) without, however, going beyond the scope of this patent.

Claims

1. An illumination device particularly suitable for illuminating vertical or flat surfaces such as the fronts of buildings, house entrances, ceilings or

walls of interiors in general as well as suitable for illuminating any surface of any angulation or area of open spaces such as gardens and the like, comprising a light source (2) arranged in association with a refractor element (3) with a single axis and projecting a light beam onto the latter, the said beam passing through the said refractor element and leaving it in the form of a light beam with an essentially fan-shaped blade conformation, characterised in that at least two light sources (2) are provided which are set at an angle to each other in relation to a common vertical axis so that the beams generated by said at least two light sources are superimposed on at least one part of an illuminated surface, the said surface being longitudinal to the said light sources (2) arranged in association with the said refractor element (3), which is a transparent element of a ribbed glass, the combination of the said light sources (2) and the said refractor element (3) generating a single fan-shaped blade light beam, extending over an arc of about 160°.

2. A device according to claim 1, characterised in that the ratio between the greater and smaller axes of a section of the photometric solid of light emission of each of said light sources (2) is equal to or greater than ten.
3. A device according to claim 1, characterised in that each light source (2) comprises a bulb (10), advantageously of the type having a built-in reflector element (in 11).
4. A device according to the previous claims, characterised in that each light source (2) comprises a parabola (9), a bulb (10) and a transverse plate (12) arranged at right angles to the said bulb (10), the latter being connected to an electrical supply by means of a transformer (14).
5. A device according to claim 1, characterised in that means (20,23,24) are provided for the fine adjustment of the spatial angulation of the longitudinal plane of said fan of light, said means being operable from the outside of the device.
6. A device according to claims 4 and 5, characterised in that said means of adjustment are a screw (20) operationally connected by a thread like element to an elastic element (24) linked to a support (13) of the parabola (9) of each light source (2).
7. A device according to claim 1, characterised in that it has means that may be operated from the outside of the device capable of enabling the distance between said light sources (2) to be varied.

8. A device according to claim 7, characterised in that said means are racks carrying light sources (2) and at least one gearing mechanism which may be operated by means of a screw from the outside of device (1).
9. A device according to claim 1, characterised in that the plane defined by said refractor element (3) or by one of its parts (8) is at right angles to the axis of the light sources (2).
10. A device according to claim 1, characterised in that it comprises three light sources (2) arranged at an angle in relation to each other and in association with said refractor element (3).
11. A system for the illumination of fronts of buildings or their parts, surfaces at any angle, gardens, walls of rooms or portions thereof, comprising at least one device according to claims 1 or 10 or a combination of such devices.

Patentansprüche

1. Beleuchtungsanordnung, die insbesondere zum Beleuchten von vertikalen oder ebenen Flächen wie beispielsweise von den Vorderseiten von Gebäuden, Hauseingängen, Decken oder Innenwänden im allgemeinen sowie zum Beleuchten einer beliebigen Fläche unter irgendeiner Winkelstellung oder eines Bereiches von Freiflächen wie beispielsweise Gärten und ähnlichem geeignet ist, welche eine Lichtquelle (2), die zusammen mit einem Refraktorelement (3) mit einer einzigen Achse angeordnet ist und einen Lichtstrahl auf dieses Element wirft, welcher Lichtstrahl durch das Refraktorelement hindurchgeht und ihn in Form eines Lichtstrahles mit im wesentlichen der Form eines Fächers verläßt, dadurch gekennzeichnet, daß wenigstens zwei Lichtquellen (2) vorgesehen sind, die unter einem derartigen Winkel zueinander in Bezug auf eine gemeinsame vertikale Achse angeordnet sind, daß die durch die wenigstens zwei Lichtquellen erzeugten Strahlen an wenigstens einem Teil der beleuchteten Fläche einander überlagern, welche Fläche längs zu den Lichtquellen (2) verläuft, die zusammen mit dem Refraktorelement (3) angeordnet sind, das ein transparentes Element aus einem Rillenglas ist, wobei die Kombination aus den Lichtquellen (2) und dem Refraktorelement (3) einen einzigen fächerförmigen Lichtstrahl erzeugt, der sich über einen Bogen von etwa 160 ° erstreckt.
2. Vorrichtung nach Anspruch 1 dadurch gekennzeichnet, daß das Verhältnis zwischen der Größe

ren und der kleineren Achse des Querschnittes des photometrischen Festkörpers der Lichtemission jeder der Lichtquellen (2) gleich oder größer als 10 ist.

3. Vorrichtung nach Anspruch 1 dadurch gekennzeichnet, daß jede Lichtquelle (2) eine Lampe (10) vorzugsweise des Typs umfaßt, der ein eingebautes Reflektorelement (in 11) aufweist.

4. Vorrichtung nach den vorhergehenden Ansprüchen dadurch gekennzeichnet, daß jede Lichtquelle (2) einen Parabolspiegel (9), eine Lampe (10) und eine Querplatte (12) aufweist, die unter rechten Winkeln zur Lampe (10) angeordnet ist, wobei letztere mit einer elektrischen Versorgung über einen Transformator (14) verbunden ist.

5. Vorrichtung nach Anspruch 1 dadurch gekennzeichnet, daß Einrichtungen (20, 23, 24) zur Feineinstellung der räumlichen Winkellage der Längsebene des Lichtfächers vorgesehen sind, welche Einrichtungen von der Außenseite der Vorrichtung her bedienbar sind.

6. Vorrichtung nach den Ansprüchen 4 und 5 dadurch gekennzeichnet, daß die Einrichtungen zur Einstellung aus einer Schraube (20) bestehen, die über ein gewindeartiges Element in Betätigungsverbindung mit einem elastischen Element (24) steht, das an einen Halter (13) des Parabolspiegels (9) jeder Lichtquelle (2) angelenkt ist.

7. Vorrichtung nach Anspruch 1 dadurch gekennzeichnet, daß sie Einrichtungen aufweist, die von der Außenseite der Vorrichtung betätigbar sind und es ermöglichen, den Abstand zwischen den Lichtquellen (2) zu verändern.

8. Vorrichtung nach Anspruch 7 dadurch gekennzeichnet, daß die Einrichtungen Zahnleisten, die die Lichtquellen (2) tragen, und wenigstens ein Getriebemechanismus sind, der mittels einer Schraube von der Außenseite der Vorrichtung (1) aus betätigt werden kann.

9. Vorrichtung nach Anspruch 1 dadurch gekennzeichnet, daß die durch das Refraktorelement (3) oder durch eines seiner Teile (8) aufgespannte Ebene unter rechten Winkeln zur Achse der Lichtquellen (2) verläuft.

10. Vorrichtung nach Anspruch 1 dadurch gekennzeichnet, daß sie drei Lichtquellen (2) umfaßt, die unter einem Winkel zueinander und zusammen mit dem Refraktorelement (3) angeordnet sind.

11. Anordnung zum Beleuchten der Vorderseiten von

Gebäuden oder Teilen davon, Flächen unter irgendeinem Winkel, Gärten, Wänden von Räumen oder Teilen davon, mit wenigstens einer Vorrichtung nach den Ansprüchen 1 oder 10 oder einer Kombination derartiger Vorrichtungen.

Revendications

1. Dispositif d'illumination particulièrement approprié à l'illumination de surfaces planes ou verticales telles que des façades de bâtiments, des entrées de maisons, des plafonds ou des murs d'intérieurs en général et également apte à l'illumination de toute surface de tout profil angulaire ou toute zone d'espaces de plein air, tels que des jardins et similaire, comprenant une source lumineuse (2) disposée en association avec un élément de réfraction (3) selon un axe unique et projetant un faisceau lumineux sur ce dernier, ledit faisceau traversant ledit élément de réfraction et le quittant sous la forme d'un faisceau lumineux ayant une configuration essentiellement en forme d'éventail caractérisé en ce que l'on prévoit au moins deux sources lumineuses (2) qui sont réglées l'une par rapport à l'autre selon un angle, par rapport à un axe vertical commun, qui est tel que des faisceaux générés par lesdites deux sources lumineuses au moins, sont superposés sur une partie au moins d'une surface illuminée, ladite surface étant longitudinale par rapport auxdites sources lumineuses (2) disposées en association avec ledit élément de réfraction (3), qui est un élément transparent d'un verre à côtes, la combinaison desdites sources lumineuses (2) et dudit élément de réfraction (3) générant un faisceau lumineux en forme d'éventail, s'étendant sur un axe d'environ 160°.

2. Dispositif selon la revendication 1, caractérisé en ce que le rapport entre le grand axe et le petit axe d'une section du solide photométrique de l'émission de lumière de chacune desdites sources lumineuses (2) est égal, ou supérieur à dix.

3. Dispositif selon la revendication 1, caractérisé en ce que chaque source lumineuse (2) comprend une ampoule (10), avantageusement du type comportant un élément réflecteur incorporé (dans 11).

4. Dispositif selon les revendications précédentes caractérisé en ce que chaque source lumineuse (2) comprend une parabole (9), une ampoule (10) et une plaque transversale (12) disposée à angle droit par rapport à ladite ampoule (10), cette dernière étant connectée à une alimentation électrique par l'intermédiaire d'un transformateur (14).

5. Dispositif selon la revendication 1, caractérisé en ce que l'on prévoit des moyens (20, 23, 24) pour un réglage fin de l'orientation angulaire spatiale du plan longitudinal dudit éventail de lumière, lesdits moyens étant commandés depuis l'extérieur du dispositif. 5
6. Dispositif selon les revendications 4 et 5, caractérisé en ce que lesdits moyens de réglage sont constitués d'une vis (20) reliée, de façon opérationnelle, par un élément du type filet de vis à un élément élastique (24) articulé sur un support (13) de la parabole (9) de chaque source lumineuse (2). 10
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7. Dispositif selon la revendication 1, caractérisé en ce qu'il comporte des moyens qui sont actionnés depuis l'extérieur du dispositif et qui sont conçus de façon à faire varier la distance entre lesdites sources lumineuses (2). 20
8. Dispositif selon la revendication 7, caractérisé en ce que lesdits moyens sont des crémaillères portant des sources lumineuses (2) et au moins un mécanisme de pignon qui peut être commandé à l'aide d'une vis depuis l'extérieur du dispositif (1). 25
9. Dispositif selon la revendication 1, caractérisé en ce que le plan défini par ledit élément de réfraction (3) ou par l'une de ses parties (8) est à angle droit par rapport à l'axe des sources lumineuses (2). 30
10. Dispositif selon la revendication 1, caractérisé en ce qu'il comprend trois sources lumineuses (2), disposées angulairement les unes par rapport aux autres et en association avec ledit élément de réfraction (3). 35
11. Système pour l'illumination de façades de bâtiments ou de leurs parties constitutives, de surfaces de toute configuration angulaire, de jardins, murs de pièces et de leurs parties constitutives, comprenant au moins un dispositif selon les revendications 1 ou 10 ou une combinaison de tels dispositifs. 40
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