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(54) **Luminaire**

(57) A luminaire comprising a support (1) to which at least one holder (2) for housing a LED light source (3) is connected, which support and which holder comprise a thermally conductive material for dissipating the heat generated by the LED(s) during operation, which holder is provided with an optical element (4) which cooperates with the LED light source for generating a light beam during operation, wherein a user can set various directions of the optical element relative to the holder with the LED light source as desired.

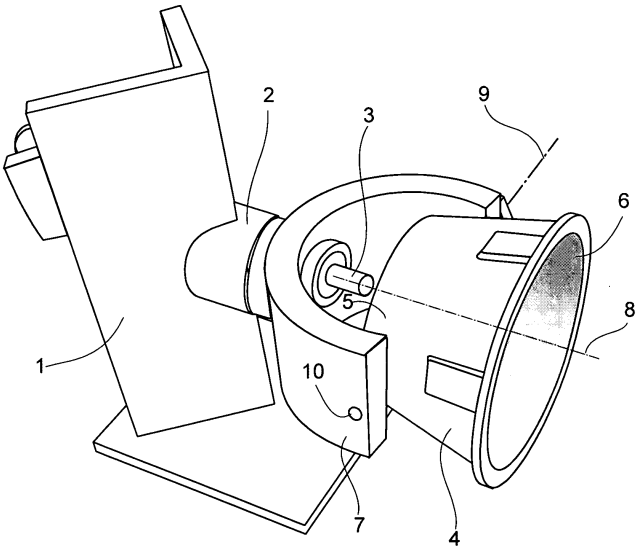

Fig. 1

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Description

[0001] The invention relates to a luminaire comprising a support to which at least one holder for housing a LED light source is connected, which support and which holder comprise a thermally conductive material and which are thermally interconnected for dissipating the heat generated by the LED(s) during operation, which holder is provided with an optical element which cooperates with the LED light source for generating a light beam during operation.

[0002] The term "LED light source" as used herein is understood to mean a light source which comprises one or more light-emitting diodes (LEDs).

[0003] Such luminaries comprising LED light sources are used in various places. The use of LED lighting has increased enormously in recent years. LEDs have a high luminous efficacy and a long operational life, they are energy-efficient and they are compact. Furthermore, it is possible to adjust the colour of the emitted light when several ("RGB") LEDs are used.

[0004] Thus, it is now possible to realise applications that were hitherto less interesting when conventional light sources, such as lamps, were used. Not only light applications with colour effects are conceivable in this connection, but the use of LEDs also makes it possible to realise applications in which in particular the compactness of the LED light source is utilised. In that case use is made of the fact that LEDS are pointed light sources. Using optical means, this makes it possible to realise effects that were difficult to realise when lamps were used, for example creating light beams in small spaces.

[0005] LEDs generate relatively much heat during operation. To prevent overheating of the LED or the printed circuit board on which the LED is provided (for example together with a supply circuit provided thereon), it is necessary to take measures to ensure that the heat is dissipated rapidly. This is all the more necessary in order to prevent a loss of efficacy of the LEDs and to prevent damage. The LEDs are to that end mounted to a support or in a holder made of a thermally conductive material, such as a metal.

[0006] Published patent application EP 1 898 146 A1 describes a luminaire comprising a light source provided with one or more LEDs and an optical system comprising a reflector and a lens, whilst the heat generated by the LEDs during operation is adequately dissipated by a support made of a thermally conductive material. The light source described in said application is not very suitable for use in compact luminaires when a user also wishes to influence the direction of the light beam emitted by the LED. Generally, a user must move the entire housing of the luminaire in a selected direction. This is problematic.

[0007] US 2005/0,281,047 A1 describes a lighting unit with an LED light source and a reflector, which comprises a thermally conductive material. In the lighting unit described in said US application, the light source takes up a fixed position relative to the reflector. It is difficult for the user to adjust the light beam from the light source himself or herself.

[0008] The object of the invention is to provide a luminaire comprising a support for an LED light source which efficiently provides adequate cooling of the LEDs by dissipating the heat generated by the LEDS, whilst the direction of the light beam generated by said LEDs is furthermore easy to adjust by a user.

[0009] In order to accomplish that object, a luminaire of the kind referred to in the introduction is characterised in that a user can set various directions of the optical element relative to the holder with the LED light source as desired.

[0010] With a luminaire according to the invention, a user can set a desired direction of the light beam himself or herself in a simple manner. The holder with the light source remains in place while the direction is being set.

[0011] The holder consists of a thermally conductive material and is in thermal contact with the LED light source, so that heat from the light source can be dissipated in an adequate manner.

[0012] The holder functions as a heat sink, therefore. To that end, the holder is connected to the support over a relatively large contact area. The heat resistance between the support and the holder is small (less than 10K per Watt) in that case.

[0013] A luminaire according to the invention comprises of an extruded aluminium bar configured as a support, for example, to which aluminium holders with the LEDs are mounted. The LEDs are mounted in the holders in a manner which is known per se, for example by means of printed circuit boards comprising a power supply circuit. The heat dissipation of the LEDs is ensured by thermally conductive connections between the LEDs and/or the printed circuit board. The printed circuit board and the support are also in intense thermal contract with each other, preferably with a heat resistance of less than 10K/Watt.

[0014] The optical element is for example configured as a collimator lens or a reflector. The optical element is preferably a parabolic, spherical, elliptical or hyperbolic reflector having an inlet opening and an outlet opening, wherein the inlet opening is spaced from the holder with the LED light source by some distance, which reflector can be set in various orientations to the holder, and wherein the LED light source is located in or near the focal point of the reflector.

[0015] When a user wishes to direct a light beam emitted by the LEDs, he or she only needs to adjust the orientation of the reflector rather than that of the entire housing of the luminaire with the light source and the reflector.

[0016] In a practical embodiment, the outer wall of the reflector is mounted between the ends of a U-shaped element, which is rotatable about its axis of symmetry relative to the holder, whilst the reflector is rotatable about an axis between the attachment points of the reflector to the U-shaped ends.

[0017] The luminaire according to the invention can be

used in various places.

[0018] In one embodiment, the luminaire according to the invention is provided with an elongated support configured as a conductor rail. One or more holders with LEDs are mounted to the support. In one embodiment, the holders are detachable and can be mounted to the support at a selected location by a user. The rail comprises power supply wires for the LEDs. Such conductor rails are frequently used for lighting display windows and shops.

[0019] In a special embodiment of the luminaire according to the invention, the support is mounted in a rib of a display case. Such display cases have walls made of glass or a transparent plastic material, which are oriented perpendicular to each other, for example. In this way the objects to be presented in the display case can be illuminated in an efficient manner and with a high degree of flexibility for a user by the light source that is mounted to a rib. The reflectors can be directed at the objects present in the case in a simple manner by a user. An adequate heat dissipation is realised during operation of the LEDs. Preferably, high-power LEDs are used in such a display case. High standards are set for the heat dissipation in that case.

[0020] Embodiments of a luminaire according to the invention will now be explained in more detail with reference to the drawing. In the drawing:

Figure 1 is an elevation view of a preferred embodiment of a luminaire; and
Figure 2 is a view of a display case provided with a luminaire according to the invention.

[0021] The luminaire shown in figure 1 comprises an elongated aluminium support 1, to which a holder 2, likewise made of aluminium, is attached, in which holder an LED light source 3 is mounted. Aluminium is a suitable thermally conductive material for dissipating the heat that is generated by the LED (or several LEDs, such as RGD LEDs) during operation.

[0022] The holder 2 is connected to a reflector 4 (for example a parabolic reflector), which cooperates with the LED light source 3 for generating a light beam during operation.

[0023] The reflector is provided with an inlet opening 5 and an outlet opening 6, which inlet opening 5 is spaced from the LED light source 3 by some distance. The reflector can be placed in various orientations relative to the holder 2, with the LED light source 3 being located in the focal point of the reflector 4.

[0024] The outer wall of the reflector 4 is mounted between the ends of a U-shaped element 7, which is rotatable about its axis of symmetry 8 relative to the holder 2, whilst the reflector is also rotatable about an axis 9 between the attachment points of the reflector to the ends of the U-shaped element 7. One of said attachment points is indicated at 10 in the drawing.

[0025] Figure 2 schematically shows a display case. Products can be presented in such a glass case. The case is provided with four glass walls 11 - 14, which are oriented perpendicular to each other and which are interconnected by means of ribs (such as the ribs 16). The glass shelves (such as the shelves 15) for the objects to be presented make the case look transparent. This effect is further enhanced by the lighting that is realised by means of aluminium supports provided with LED light sources and reflectors according to the invention, which are mounted in the ribs. Said units are indicated at 17, 18 and 19, respectively. The ribs are formed and dimensioned such that the electric supply wires for the power supply of the LEDs are arranged within the ribs, electrically insulated therefrom, such that they are hidden from the users' view. The LEDs are Lumileds K2 high-power LEDs, for example. In a practical embodiment, the thermal contacts between the high-power LED light source (for example 5 W), the aluminium printed circuit board and the aluminium support are such that the thermal resistance is at most 3L/Watt. An acceptable temperature difference of 15 degrees is realised in that case.

[0026] The reflectors attached to the holders of the LEDs can be directed at the objects to be presented on the shelves in a simple manner by a user. Consequently there is no need to mount the light sources to the upper side of the display case, as is necessary with known display cases.

[0027] In one embodiment, the holders with the reflectors can be detached from the support. A holder forms part of an adapter in that case, which adapter is provided with means that are known per se for cooperation with the support, which forms part of a conductor rail, for example.

Claims

1. A luminaire comprising a support to which at least one holder for housing a LED light source is connected, which support and which holder comprise a thermally conductive material and which are thermally interconnected for dissipating the heat generated by the LED(s) during operation, which holder is provided with an optical element which cooperates with the LED light source for generating a light beam during operation, **characterised in that** a user can set various directions of the optical element relative to the holder with the LED light source as desired.

2. A luminaire according to claim 1, **characterised in that** the optical element is a reflector having an inlet opening and an outlet opening, wherein the inlet opening is spaced from the holder with the LED light source by some distance, which reflector can be set in various orientations relative to the holder, and wherein the LED light source is located in or near the focal point of the reflector.

3. A luminaire according to claim 2, **characterised in that** the outer side of the reflector is mounted between the ends of a U-shaped element, which is rotatable about its axis of symmetry relative to the holder, whilst the reflector is rotatable about an axis between the attachment points of the reflector to the U-shaped ends.

4. A conductor rail provided with a luminaire according to claim 1, claim 2 or claim 3.

5. A conductor rail according to claim 4, **characterised in that** the holders can be detached from the support.

6. A display case provided with one or more ribs, in at least one of which ribs a luminaire or conductor rail according to claim 1, 2, 3, 4 or 5 is housed.

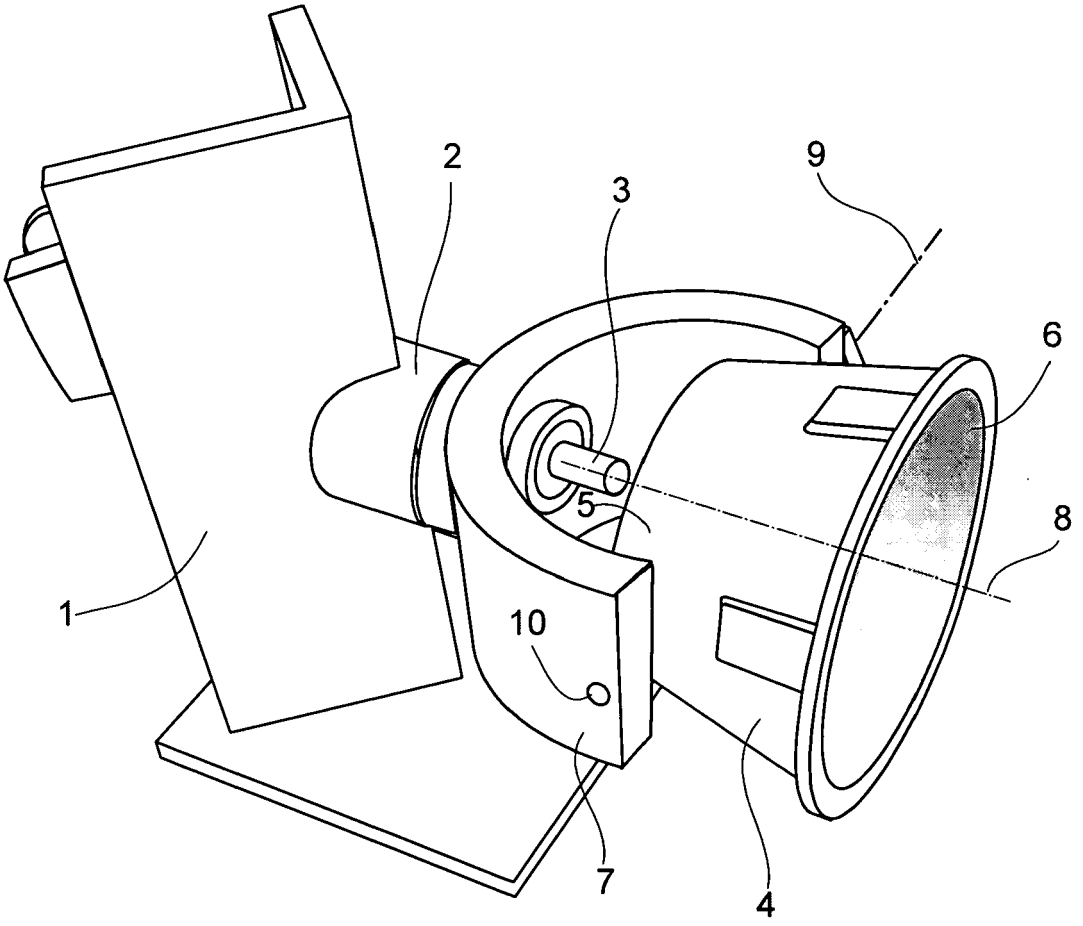

Fig. 1

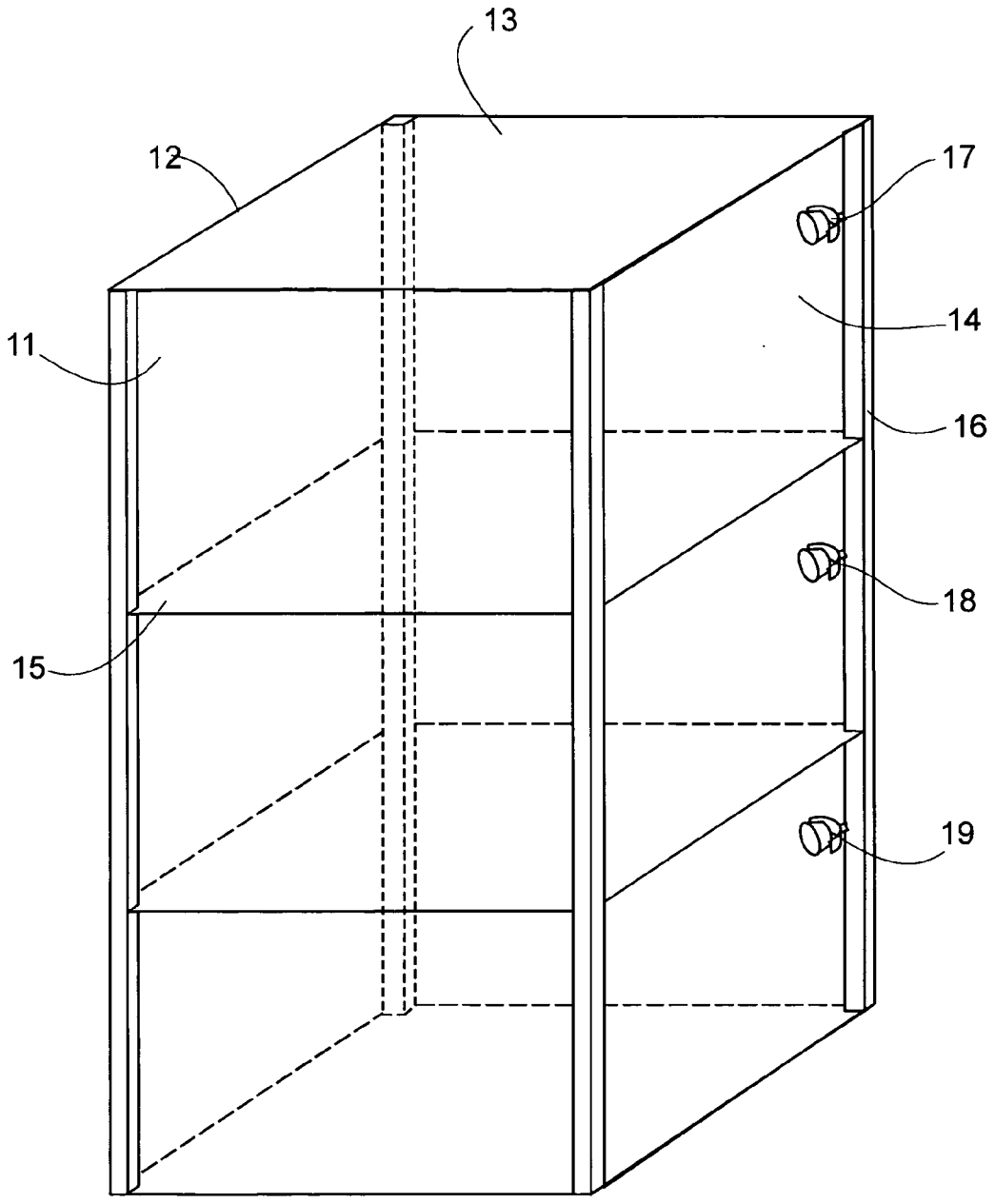

Fig. 2

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EUROPEAN SEARCH REPORT

Application Number
EP 09 00 7109

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X Y	EP 0 420 364 A (SK LICHTTECHNIK GMBH [DE]) 3 April 1991 (1991-04-03) * column 1, line 51 - column 3, line 21 * * figures 1-6 *	1-2 4-6	INV. F21V21/00 F21V29/00
Y A	WO 98/51963 A (HAYS G ALAN [US]) 19 November 1998 (1998-11-19) * page 4, line 17 - page 10, line 17 * * figures 1,2,6,7 *	4-6 1	ADD. F21Y101/02
X	WO 94/23243 A1 (RAY O VAC CORP [US]) 13 October 1994 (1994-10-13) * page 28, line 6 - line 27 * * figures 14,15 *	1-2	
A	US 5 161 883 A (GORDIN MYRON K [US] ET AL) 10 November 1992 (1992-11-10) * column 16, line 5 - line 28 * * figures 22,23 *	1	

TECHNICAL FIELDS SEARCHED (IPC)
F21V F21K

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	3 December 2009	Blokland, Russell

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 09 00 7109

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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03-12-2009

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

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- EP 1898146 A1 **[0006]**
- US 20050281047 A1 **[0007]**