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(54) PATHWAY LIGHTING SYSTEM

(57) A Luminaire (100) for path lighting, wherein the luminaire (100) comprises an LED module (110) with at least two separately controllable light-generating groups (111, 112), the first light-generating group (111) comprising a plurality of first LEDs (113), and the second light-generating group (112) comprising a plurality of second LEDs (114). A first light beam (L1) is generated by the first light-generating group (111) and is emitted from the luminaire (100) at a first angle for direct illumination of a surrounding ground (200), wherein a second light beam (L2) is generated by the second light-generating group (112)and is emitted from the luminaire (100) at a second angle, for illumination of the surroundings of the luminaire (100), in particular for illumination of a face and body of a person (P), and wherein the second angle is different from the first angle.

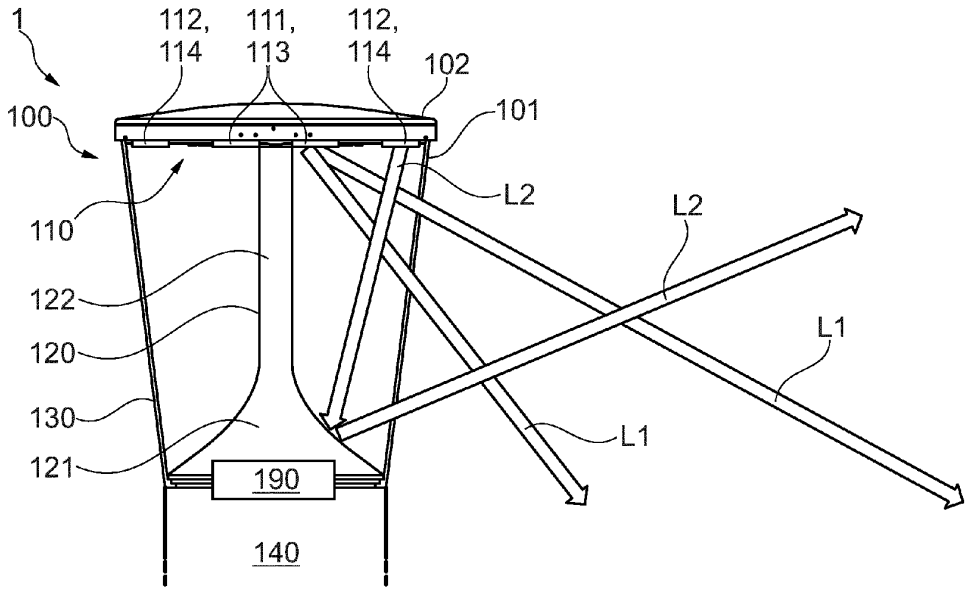

Fig. 3

EP 4 265 958 A1

Description

[0001] The invention relates to a pathway lighting system with a luminaire for illumination of a pathway and for ambient lighting the surrounding of the lighting system.

[0002] Currently known pathway lighting systems mainly illuminate the ground in the vicinity of the luminaire, but also emit a certain amount of light at an angle greater than 90° from the luminaire, so that the surroundings and in particular the body and face of people walking past the luminaire are also illuminated, which is often referred to as an ambient lighting. A light intensity distribution curve of such a known path lighting system is shown in Figure 4. The part of the light which is not directed to the ground - in particular the part which is emitted in the range of approx. 90° up to approx. 120° - leads due to the permanent illumination on the one hand to a so-called light pollution of the environment and on the other hand to a possible glare of a person.

[0003] In particular, the permanent light emission in directions other than the ground to be illuminated will be restricted or prevented for outdoor luminaires in the future by new regulations and recommendations in various countries, in order to reduce light pollution.

[0004] The use of a lighting system that only illuminates the ground would have a positive effect on the aspect of light pollution, but would also have a strong negative effect on the safety perception of people, who are in the vicinity of such lighting. This is because the body and especially the face of oncoming persons would then not be illuminated, so that the oncoming person would not be identifiable, as a facial recognition is not possible. Such a scenario therefore reduces the perceptive safety of a person.

[0005] The document DE 10 2007 057 404 A1 shows a street lighting device for the uniform illumination of a certain area, with a lighting unit of modular design, which is mounted on a pole and can illuminate the road and paths below from above. The individual lighting modules are arranged side by side in a semicircle, with each lighting module covering a different light angle range, and thus illuminating the ground from above.

[0006] The invention is concerned with the task of providing a luminaire for a pathway lighting system, and such a pathway lighting system, with a lighting emission which significantly reduces light pollution, but simultaneously provides an ambient lighting, which suffices for facial recognition of persons in the vicinity of such a luminaire.

[0007] This task is solved by a luminaire for a pathway lighting system according to independent claim 1, respectively by a lighting system according to claim 14. Particular embodiments of the invention are disclosed in the dependent claims.

[0008] According to the invention a luminaire for path lighting, whereby the luminaire comprises an LED module is provided. The LED module hereby comprises at least two separately controllable light-generating groups, whereas the first light-generating group comprises a plurality of first LEDs, and the second light-generating group comprises a plurality of second LEDs, wherein a first light beam generated by the first light-generating group is emitted from the luminaire at a first angle for direct illumination of a surrounding ground. Furthermore, a second light beam generated by the second light-generating group is emitted from the luminaire at a second angle, for illumination of the surroundings of the luminaire, in particular for illumination of a face and body of a person. Hereby, the second angle is different from the first angle.

[0009] Such a luminaire for pathway lighting ensures that the essential ground illumination is decoupled from a situationally desired ambient lighting, i.e. an illumination of, e.g., persons located in the vicinity of the luminaire, in particular their faces, heads or their bodies. Therefore, the light pollution of the environment is reduced for environmental protection, since such ambient lighting can be switched on when there is a need for it. This also increases the safety perception of persons, since the ambient lighting provides sufficient light for facial recognition. Preferably the ambient lighting is emitted to avoid glare of a person being in the surrounding of the luminaire. Furthermore, the energy required by the luminaire is used more efficiently with the situational switching on of the ambient lighting.

[0010] Preferably the luminaire is designed to illuminate areas laterally above the luminaire and against an original light output direction of the second light-generating group with the second light beam. This allows the LEDs of the second light-generating group to be placed e.g. in the same plane as the LEDs of the first light-generating group, whereas the luminaire still is capable of ambient lighting, especially for illuminating a person's torso or face.

[0011] Optionally the luminaire further comprises a reflector, whereas the second light beam is emitted towards the reflector of the luminaire, and wherein the second light beam is reflected at the reflector and emitted from the luminaire at the second angle. With the use of a reflector, the light distribution of the luminaire can be adjusted in a simple way. This makes it possible, in particular, for the light emission angle of the second light beam (second angle) and the light emission angle of the light emitted by the second light-emitting group to be significantly different.

[0012] Another aspect includes that the aforementioned reflector is approximately funnel-shaped, with the second light beam being reflected mainly at a lower cone-shaped section of the reflector. This shape of the reflector favours unidirectional uniform light emission, since the funnel-shaped - and thus also rotationally symmetrical - reflector reflects the light hitting it accordingly. In this respect, the luminous intensity distribution curve for the reflected light can be adapted by appropriate design and configuration of the conical section, so that a luminaire can thus be individually adapted to corresponding specifications or scenarios. Preferably the reflector is diffusely reflecting, which allows the second light beam to be to

be distributed as homogeneously and uniformly as possible, thereby greatly reducing the risk of glaring a person.

[0013] Further preferably the LED module is supplied via cables with power and/or communication data, whereby these cables are routed inside the funnel-shaped reflector to the LED module. This foremost facilitates the assembly of the luminaire, since a cable duct is already intrinsically formed by the structure of the reflector. Furthermore, it also improves the optical appearance of the luminaire, as the components that are considered unsightly - such as the cables - are not visible to a user.

[0014] Preferably the first light-generating group and the second light-generating group are separately controlled depending on a time of day and/or depending on a level of ambient light and/or depending on a person detection. With this embodiment, an individually situational operation of the luminaire can be achieved so that, for example, the luminaire switches on the light for ground illumination, i.e. the first light-emitting group with the first LEDs, as soon as a detected ambient brightness falls below a certain threshold value (e.g. at sunset or cloudy weather) and/or as soon as a certain time of day is reached. Here, it is also possible that the light output of the first light-generating group is only switched on when several conditions are fulfilled simultaneously, for example a certain ambient brightness and a time of day or a detected person in the vicinity of the light. The light for ambient illumination can then be further switched on situationally, for example when a person has been detected in the vicinity of the luminaire, whereby it is also possible that several conditions have to be fulfilled for activating the second light beam. Same applies, vice versa, for switching off the first and/or second light-generating group (e.g. at sunrise, after midnight, when no person is detected).

[0015] Preferably the direction of light emission of the LEDs of the at least two light-generating groups is influenced by an optical element guiding the first light beam in a different general direction compared to the second light beam, whereas preferably each LED is provided with an individual optical element mounted on the respective LED. The use of an optical element for influencing the light path of the respective light-generating groups simplifies the assembly of the LED module and thus of the luminaire, as it decouples the light emission direction of the individual LEDs from the mounting of the LEDs. For example, the LEDs of both light-generating groups can be positioned next to each other in such a way that they would emit light in the same direction without the optical element, although the actual light output of the light-generating groups is individually changed by the optical element and is therefore different.

[0016] Preferably the luminaire further comprises a luminaire housing, which comprises a top cover and a translucent side cover. The luminaire housing protects the internal components from external influences such as dust, stone chips and water, while the translucent side cover provides an appropriate light emission surface for the luminaire. Further preferably the side cover can in particular be diffusely translucent. With such a configuration of the side cover, for example by means of an opaque but translucent coating or structuring of the side cover, the aesthetics of the luminaire are further enhanced and the light emitted by the luminaire is further homogenized, so that glare of persons is further avoided. It is also conceivable that the side covers are only diffuse in respective sections and non-diffuse in respective other sections.

[0017] Even further preferred the side cover is tube shaped, and the top cover is placed on one end of the tube shaped side cover. The lateral surface of the tube shaped side covers serves as the light emission surface. This allows an all-round uniform light emission, while at the same time the luminaire appears particularly aesthetic. Furthermore, one (upper) opening of the side cover is closed off by the top cover, so that unintentional penetration of foreign bodies is prevented.

[0018] Optionally the LED-module is placed inside the top cover of the luminaire housing. With this implementation, the assembly of the luminaire is further facilitated. Preferably, the top cover is made of a durable (especially heat-resistant, waterproof and/or dustproof) material, so that the top cover protects the electronic components particularly well and ensures proper operation in a wide range of weather and climatic conditions. If the cover is made of a non-transparent material, the luminaire appears particularly aesthetic, as the unsightly electronic components inside are then not visible to a user.

[0019] Preferably the LED module comprises a printed circuit board, PCB,
wherein at least the LEDs of the first and second light-generating groups are mounted on the same side of the PCB, and wherein preferably an energy supply unit and/or a control unit is also mounted on the PCB. This further eases assembly of the luminaire. In addition, the space requirement of the luminaire is reduced by the fact that both the LEDs of the first and second light-generating groups are arranged on the same circuit board - although alternatively an embodiment is also conceivable in which individual or each of the light-generating groups is arranged on its own circuit board, which would expand the possibilities of the light emission directions.

[0020] Preferably the LEDs of the first and second light-generating groups are each arranged substantially circularly on the PCB, with one of these light-generating groups being arranged in a smaller radius inside the respective other light-generating group with a larger radius. This implementation makes it particularly easy and advantageous to emit light uniformly in all directions around the luminaire. Furthermore, the arrangement of the LEDs on different radii allows a particularly efficient distribution of the first and second light beams. In embodiments of the luminaire with a reflector, this has the particular advantage that the arrangement of the second LEDs can be synergistically coordinated with the design of the re-

flector.

[0021] Preferably the second light-generating group is only operable during operation of the first light-generating group. This ensures that ambient lighting is only used in practical scenarios, further reducing the luminaire's energy consumption.

[0022] Optionally the luminaire further comprises a sensor module, which in particular has an ambient light sensor and/or a presence sensor, wherein the sensor module sends communication data to the LED module, whereby this communication data is used for control and operation of the luminaire. The sensor module formed in this way enables particularly precise and scenario-specific use of the luminaire, so that a wide range of measured values (such as time, ambient brightness, presence of persons) are recorded and transmitted in the form of communication data to the LED module, where they are received and processed, for example by a control unit. In this respect, the sensor module enables smart use of the luminaire, as it collects data on environmental influences and the control of the luminaire can be based on this.

[0023] Further optionally the first and the second light beam also differ in terms of light brightness and/or light colour and/or light temperature. This may be desirable if, for example, a cold and bright light is to be used for ground lighting (i.e. the first light beam), whereas a rather warmer and less bright light is used for ambient lighting (i.e. the second light beam, which potentially also illuminates a person's body and face).

[0024] In addition to the luminaire already discussed, a lighting system is also provided. The lighting system hereby comprises an aforementioned luminaire and further comprises a pole or bollard, wherein the luminaire is mounted on top of the pole or bollard. Such a system is particularly advantageous, as this allows the luminaire to be mounted at a certain height and thus effectively illuminate a larger area. In addition, electronic components can be arranged inside the pole or bollard, so that the luminaire itself can be designed to be especially compact. In particular, the sensor module can be positioned in the pole or bollard.

[0025] Optionally the that the lighting system with the pole or bollard is in particular between 0,5 and 1,5 metres high, and preferably between 0,8 and 1,0 metres high. These heights have proven to be advantageous for pathway lighting, especially with regard to additional ambient lighting.

[0026] The invention is explained in detail below with reference to examples of embodiments and with reference to the drawing. The figures show:

Figure 1 Illustration of a path lighting scenario with an exemplary embodiment of a lighting system according to the invention with a luminaire according to the invention;

Figure 2 View of an exemplary design of an LED module with two light-generating groups;

Figure 3 Simplified side view of an embodiment of a luminaire according to the invention;

Figure 4 Illustration of a light distribution curve of a path illumination lamp known from the prior art.

[0027] Figure 1 shows an example of an application scenario of a luminaire 100 for path lighting according to the invention, whereby the luminaire 100 is mounted on a pole or bollard 140 forming a lighting system 1. The luminaire 100, respectively the lighting system 1, according to the invention is mainly used to illuminate the ground area 200 in the vicinity of such a luminaire 100, so that a person P can spot the ground 200 and thus walk safely.

[0028] Such ground lighting is particularly relevant whenever natural lighting conditions are insufficient to ensure safe movement outside. As shown in Figure 1, it may be particularly intended to set up several luminaires 100, respectively lighting system 1, in one area.

[0029] According to the invention, it is provided that the luminaire 100 emits a first light beam L1 at a first angle (or, more precisely, at a first angle range) to illuminate the surrounding area of the ground 200, as shown in Figure 1. Furthermore, it is provided that the luminaire 100 also emits a second light beam L2 at a second angle (or, more precisely, at a second angle range), whereby this second light beam L2 does not serve to illuminate the ground 200, but rather to illuminate the surroundings, or ambience, respectively, and thereby illuminates objects or also persons P located in the surroundings, and in particular their bodies and faces. Hereby the first angle (or first angle range) is different from the second angle (or second angle range). However, it is conceivable that the two light emitting angle ranges (i.e., the angle ranges of the first and second light beams L1, L2) at least partially overlap. Preferably, these areas overlap only slightly, e.g. in a range of about 5°, and particularly preferably these areas do not overlap but adjoin each other, whereas it is also possible that there is a gap between the angle ranges of the first and second light beam L1, L2.

[0030] The luminaire 100 for path lighting is ideally only active when there is a need for path lighting, i.e. when the ambient brightness falls below a certain brightness limit or when there is a certain time of day when the ambient brightness is usually at a corresponding low level.

[0031] Hereby, the luminaire 100 comprises a LED module 110, which contains the respective light generating groups 111, 112 that are used for generation of the first and second light beam L1, L2. The first light beam L1 of the luminaire 110 is generated by the first LEDs 113 of the first light-generating group 111 and the second light beam L2 is generated by the second light-generating group 112 with has several second LEDs 114. The two light-generating groups 111, 112 are separately controllable, to have independent control over the light gener-

ation of the first and second light beam L1, L2.

[0032] In order to determine a start time (and also an end time) of the light emission for path illumination, the luminaire 100 is preferably equipped with a control unit 117 which has a clock module in order to determine the current time of day. Alternatively or additionally, the luminaire 100 can also have a sensor module 190, which can contain different sensors, whereby the luminaire 100 then uses the data obtained from the sensor module 190 to control the light emission. Therefore, the light emitted by the luminaire 100 for pathway lighting, which is the first light beam L1 emitted at a first angle (range) is preferably time-controlled and/or ambient brightness-controlled.

[0033] As the first light beam L1 is emitted towards the ground 200, i.e. at an angle below 90° (preferably below 85°), the surroundings and especially persons P being in the surrounding of the luminaire 100 are not illuminated by the first light beam L1. However, while the first light beam L1 increases safety of movement of a person P, the perceived safety of the person P is decreased without the use of a second light beam L2 which also illuminates the surroundings and especially persons P in the surrounding of the luminaire 100, in order to allow for facial recognition of other persons P. This second light beam L2 is therefore preferably emitted at a second angle (range) starting at approximately 85° or 90° and ending at approximately 120° or 125°.

[0034] In order not to constantly pollute the surroundings with the second light beam L2, it is intended that this second light beam L2 is also only generated when required. Various control options are conceivable for this, whereby it is important that the first and second light beams L1, L2 are generated separately from each other.

[0035] Hereby, the second light beam L2 can also be implemented in a time-controlled manner, so that the second light beam L2 is activated during a period when it is usually dark and people are on the move, for example in a certain period of time after sunset. Additionally or alternatively, it can also be provided that the second light beam L2 is ambient brightness controlled, for example for a certain period of time after detection of a certain ambient brightness value (threshold value). Furthermore, in a particularly preferred embodiment, it is provided that the second light beam L2 is active when a person P has been detected in the vicinity of the luminaire 100. Sensor data would be necessary for a brightness-controlled or presence-controlled second light beam L2, which can be provided by the sensor module 190.

[0036] As shown in the embodiment of Figure 1 the luminaire 100, respectively the lighting system 1, displayed on the right side is equipped with a sensor module 190, which contains a presence sensor for detecting persons in the surrounding of the luminaire 100 and an ambient brightness sensor. The so equipped luminaire 100 , and the data generated by this sensor module 190 are then used to control the luminaire 100, respectively the generation of the first and/or second light beam L1, L2.

[0037] In the displayed exemplary embodiment, the luminaire 100 activates its first light beam L1, when the ambient brightness sensor detects that the ambient brightness is below a certain threshold value, indicating that the prevailing light conditions are no longer sufficient to ensure safe movement. Hereby the sensor module 190 sends the respective sensor information via communication data to the control unit 117, which evaluates the sensor information and controls that electrical energy is provided by the energy supply unit 118 of the luminaire 100 to the first light-generating group 111 generating the first light beam L1. As person P is in the surrounding of the right luminaire 100 the presence sensor of the sensor module 190 detects the person P and thus generates a respective sensor information and sends the corresponding communication data to the control unit 117 of the luminaire 100. The control unit 117 then evaluates the sensor information and controls that electrical energy is provided by the energy supply unit 118 of the luminaire 100 to the second light-generating group 112 generating the second light beam L2. Hereby, the presence sensor can, for example, operate by means of electromagnetic waves or ultrasound signals 192 or also by means of infrared radiation detection.

[0038] A further additional condition for the operation of the second light beam L2 could be that the second light beam L2 is only enabled when the first light beam L1 is in operation.

[0039] Figure 2 shows an exemplary embodiment of a LED module 110 comprising a printed circuit board 119, PCB, and the first and second light-generating group 111, 112 which are mounted on the common PCB 119. The different light-generating groups 111, 112 are hereby not only electrically separated from each other - to ensure a separated control of the light generating groups 111, 112 - but also grouped accordingly on the PCB 119. The embodiment of the

that the first light-generating group (111) and the second light-generating group (112) are separately controlled depending on a time of day and/or depending on a level of ambient light and/or depending on a person detection.

[0040] As can be seen in Figure 2, the two light-generating groups 111, 112 are arranged in a circular shape on the PCB 119, as indicated by dash-shaped markings. In the present example the arrangement of the second light-generating group 112 has a larger radius than the radius of the first light-generating group 111. The centre of both circular arrangements of light-generating groups 111, 112 is located substantially at the centre of the PCB 119, such that the arrangement with the smaller radius is located inside the other circular arrangement. In the inner area of the arrangement of the first light-generating group 111, further electronic components, in particular a control unit 117 and an energy supply unit 118, are arranged on the PCB 119. Hereby the control unit 117 . controls the energy supply towards the respective light-generating groups 111, 112, whereas this control and operation may be based on communication data received

by the sensor module 190 as previously discussed. In the present embodiment the first and second LEDs 113, 114 are arranged on the same side of the PCB 119.

[0041] The LEDs 113, 114 may be further supplied with an optical element (not shown in Figure 2), which influences the direction of light emission of the respective LED 113, 114. In this context, it can be provided that each LED 113, 114 is assigned an individual optical element, whereby it is also conceivable that each of the light-generating groups 111, 112 is assigned a common optical element. Furthermore, an optical element can also be provided for each LED module 110, which has different areas for a correspondingly adapted light influence of the different light-generating groups 111, 112. With the use of an optical element the first light beam L1 is guided in a different general direction compared to the second light beam L2. This facilitates the different light emission of the two light beams L1, L2 in the respective different light emission angle ranges.

[0042] Figure 3 shows an exemplary embodiment of a luminaire 100 according to the invention, in which an embodiment of a LED module 110 (e.g. the LED module 110 known from Figure 2) is mounted inside a luminaire housing 101. Specifically, the LED module 110 is mounted inside a top cover 102 of the luminaire housing 102 and is thus oriented essentially horizontally. The luminaire housing 101, which in addition to the top cover 102 also comprises a translucent side cover 130, is mounted on a pole or bollard 140, whereby the combination of luminaire 100 and pole/bollard 140 thus forms an embodiment of a lighting system 1 according to the invention.

[0043] Hereby, the side cover 130 is tube shaped, whereas the top cover 102 covers one end - the top end - of the tube shaped side cover 130. The side cover 130 can also be tapered in a vertical direction, e.g. as shown in Figure 3, tapering downwards, i.e. towards the ground 200. The side wall 130 serves as the light emission surface of the luminaire 100 and, depending on the desired design, can also be diffusely translucent.

[0044] The embodiment shown in Figure 3 further features a reflector 120, which is used for internally reflecting light, in order to adapt a respective light angle (range) of light beams emitted from the luminaire. Hereby, the reflector 120 is arranged centrally in the housing 101 and extends over the length of the side cover 130. In the illustrated preferred embodiment, the reflector is substantially funnel-shaped, with a lower cone-shaped section 121 and a tubular section 122 extending from the cone-shaped section 121 upwards - i.e. towards the LED module 110. The surface of the reflector 120 may be diffusely reflecting.

[0045] In the embodiment shown, the reflector 120 is centred on the LED module 110 so that the longitudinal axis of the reflector 120 runs through the centre of the LED module 110. Since the reflector 120 is rotationally symmetrical and the LEDs 113, 114 of the light-generating groups 111, 112 of the LED module 110 are respectively placed in circles, the light distribution of the luminaire is essentially symmetrical.

[0046] As shown in Figure 3, the reflector 120 - and in particular the cone shaped section 121 of the reflector 120 - is used to reflect the second light beam L2 emitted by the second LEDs, 114, whereby due to the reflection the angle of the second light beam L2 is amended. The such amended second light beam L2 is then emitted from the luminaire 110 via the light emission surfaces of the side cover 130 at the second angle. In the presented embodiment of Figure 3 optical elements, which are not shown, are mounted on top of each of the LEDs 113, 114 influencing the original light output direction of the respective light-emitting groups 111, 1.12, whereas the first light beam L1 is directly emitted towards the side cover 130 in a first angle, whereby this first light beam L1 is used for ground illumination. However, the second light beam L2 is not directly emitted towards the side cover 130 but is first reflected by the reflector 120 before passing through the light emission surface of the luminaire 100 at the second angle, for ambience illumination.

[0047] The sensor module 190 is also indicated in Figure 3, which may comprise an ambient brightness sensor and/or a presence sensor. The sensor module 190 may be part of the luminaire housing 101 but can alternatively also be implemented within or on the pole/bollard 140 of the lighting system 1. The sensor module 190 is connected to the LED module 110 and provides the control unit 117 of the LED module 110, with communication data comprising sensor information, which is used for control of the individual light-generating groups 111, 112 which generate the light beams L1, L2.

[0048] In the embodiment of Figure 3 the LED module 110 is supplied via cables with power and/or communication data, whereby these cables are routed inside the funnel-shaped portion 122 of the reflector 120 to the LED module 110. Hereby the power cables may be routed through the pole or bollard to the luminaire 100, where they are then connected to the energy supply unit 118 of the LED module 110.

[0049] The lighting system with the pole or bollard 140 may be between 0,5 and 1,5 metres high, and preferably between 0,8 and 1,0 metres high.

[0050] As indicated in Figures 1 and 3 with the use of the reflector 120 it is achieved that the luminaire 100 is designed to illuminate areas laterally above the luminaire 100 and against an original light output direction of the second light-generating group 112 with the second light beam L2.

[0051] Alternatively to the reflector 120 it is also possible to achieve the presented light emission angle, respectively the angle range, via special optic elements attached to the second LEDs 114 of the second light-generating group 112.

[0052] Furthermore, it is also possible to form a luminaire 100, respectively a lighting system 1, with more than two light-generating groups 111, 112, whereby such an implementation is compatible with all previously dis-

cussed implementations of the luminaire 100. In particular, it would be possible to divide the second light-generating group 112, i.e. the group that generates the ambient illumination, into several groups, whereby the controller of the luminaire then decides, for example, on the basis of received communication data, which of these light-generating groups for ambience illumination is to be switched on. This can be practicable, for example, if the communication data contains information indicating the direction of a person P in the surroundings of the luminaire 100, so that the luminaire 100 activates the light-generating group for ambient lighting which emits light in the direction of the detected person P.

[0053] The previously described implementations of a luminaire 100 for pathway lighting according to the invention reduce the light component emitted upwards, so that these luminaires 100 contribute to reducing light pollution, while their function as pathway lighting is not restricted. This is achieved by emission of the first light beam L1 in the first angle (range) directed towards the ground 200. Further, an additional ambient lighting is created by a second light beam L2 emitted at a second angle (range), which serves to illuminate the surroundings, especially persons P. Hereby this second light beam L2 is preferably only activated in scenarios to ensure that facial recognition is possible. This second light beam L2 increases the perceived psychological safety of persons P in the surrounding of such a luminaire 100, respect of such a lighting system 1, gravely.

Claims

1. Luminaire (100) for path lighting,

the luminaire (100) comprising an LED module (110),
the LED module (110) comprising at least two separately controllable light-generating groups (111, 112), the first light-generating group (111) comprising a plurality of first LEDs (113), and the second light-generating group (112) comprising a plurality of second LEDs (114),
wherein a first light beam (L1) generated by the first light-generating group (111) is emitted from the luminaire (100) at a first angle for direct illumination of a surrounding ground (200),
and wherein a second light beam (L2) generated by the second light-generating group (112) is emitted from the luminaire (100) at a second angle, for illumination of the surroundings of the luminaire (100), in particular for illumination of a face and body of a person (P),
wherein the second angle is different from the first angle.

2. Luminaire according to claim 1,
characterized in
that the luminaire (100) is designed to illuminate areas laterally above the luminaire (100) and against an original light output direction of the second light-generating group (112) with the second light beam (L2).

3. Luminaire according to claim 1 or 2,

characterized in
that the luminaire (100) further comprises a reflector (120),
whereas the second light beam (L2) is emitted towards the reflector (120),
wherein the second light beam (L2) is reflected at the reflector (120) and emitted from the luminaire (100) at the second angle.

4. Luminaire according to claim 3,

characterized in
that the reflector (120) is approximately funnel-shaped, with the second light beam (L2) being reflected mainly at a lower cone-shaped section (121) of the reflector (120), wherein preferably the reflector (120) is diffusely reflecting,
and wherein further preferably the LED module (110) is supplied via cables with power and/or communication data,
whereby these cables are routed inside the funnel-shaped reflector (120) to the LED module (110).

5. Luminaire according to any one of the preceding claims,
characterized in
that the first light-generating group (111) and the second light-generating group (112) are separately controlled depending on a time of day and/or depending on a level of ambient light and/or depending on a person detection.

6. Luminaire according to any one of the preceding claims,
characterized in
that the direction of light emission of the LEDs (113, 114) of the at least two light-generating groups (111, 112) is influenced by an optical element guiding the first light beam (L1) in a different general direction compared to the second light beam (L2), whereas preferably each LED (113, 114) is provided with an individual optical element mounted on the respective LED (113, 114).

7. Luminaire according to any one of the preceding claims,

characterized in
that the luminaire (100) further comprises a lu-

minaire housing (101), which comprises a top cover (102) and a translucent side cover (130), whereby the side cover (130) can in particular be diffusely translucent,
and wherein preferably the side cover (130) is tube shaped, and the top cover (102) is placed on one end of the tube shaped side cover (130).

8. Luminaire according to claim 7,
characterized in
that the LED-module (110) is placed inside the top cover (102) of the luminaire housing (101).

9. Luminaire according to any one of the preceding claims,

characterized in
that the LED module (110) comprises a printed circuit board (119), PCB,
wherein at least the LEDs (113, 114) of the first and second light-generating groups (111, 112) are mounted on the same side of the PCB (119), and wherein preferably an energy supply unit (118) and/or a control unit (117) is also mounted on the PCB (119).

10. Luminaire according to claim 9,
characterized in
that the LEDs (113, 114) of the first and second light-generating groups (111,112) are each arranged substantially circularly on the PCB (119), with one of these light-generating groups (111, 112) being arranged in a smaller radius inside the respective other light-generating group (111, 112) with a larger radius.

11. Luminaire according to any one of the preceding claims,
characterized in
that the second light-generating group (112) is only operable during operation of the first light-generating group (111).

12. Luminaire according to any one of the preceding claims,

characterized in
that the luminaire (100) further comprises a sensor module (190), which in particular has an ambient brightness sensor and/or a presence sensor,
wherein the sensor module (190) sends communication data to the LED module (110), whereby this communication data is used for control and operation of the luminaire (100).

13. Luminaire according to any one of the preceding claims,
characterized in
that the first and the second light beam (L1, L2) also differ in terms of light brightness and/or light colour and/or light temperature.

14. Lighting system (1) comprising a luminaire (100) according to any one of the preceding claims, and further comprising a pole or bollard (140),
wherein the luminaire (100) is mounted on top of the pole or bollard (140).

15. Lighting system according to claim 14,
characterized in
that the lighting system (1) with the pole or bollard (140) is in particular between 0,5 and 1,5 metres high, and preferably between 0,8 and 1,0 metres high.

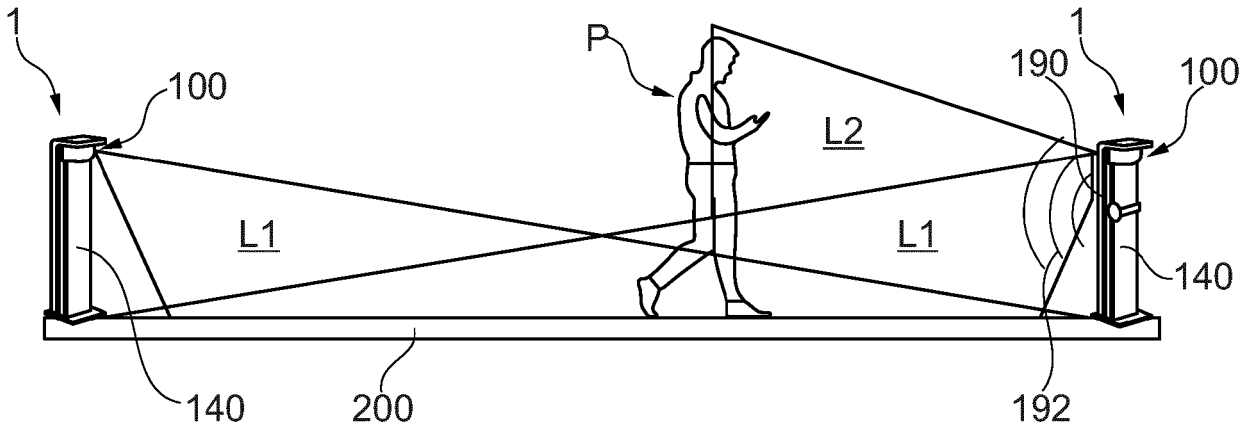
1
100
P
L2
1
190
100
L1
L1
140
140
200
192

Fig. 1

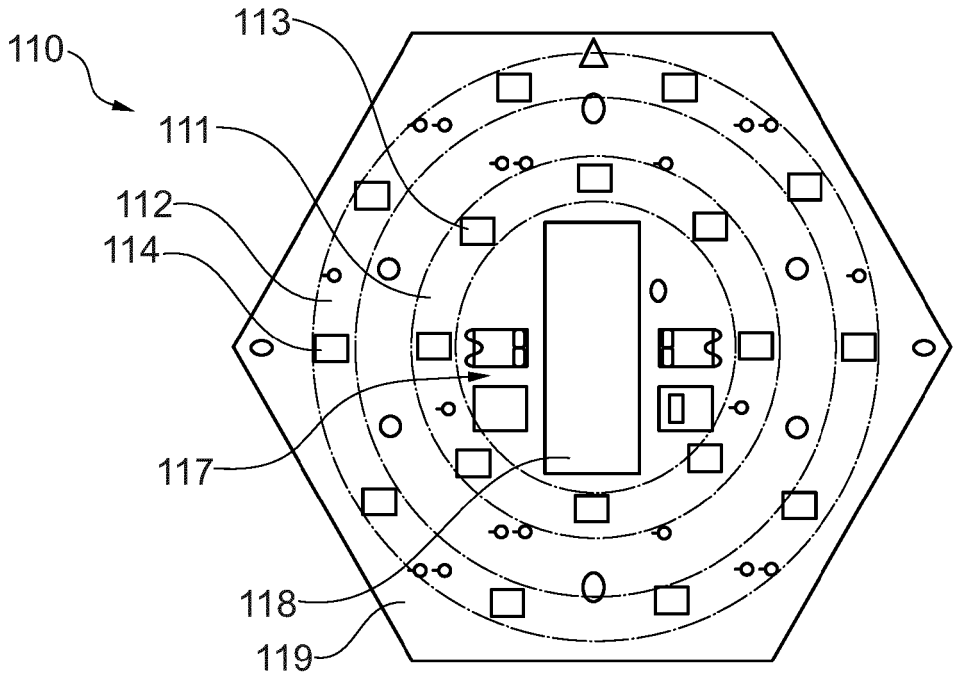
110
113
111
112
114
117
118
119

Fig. 2

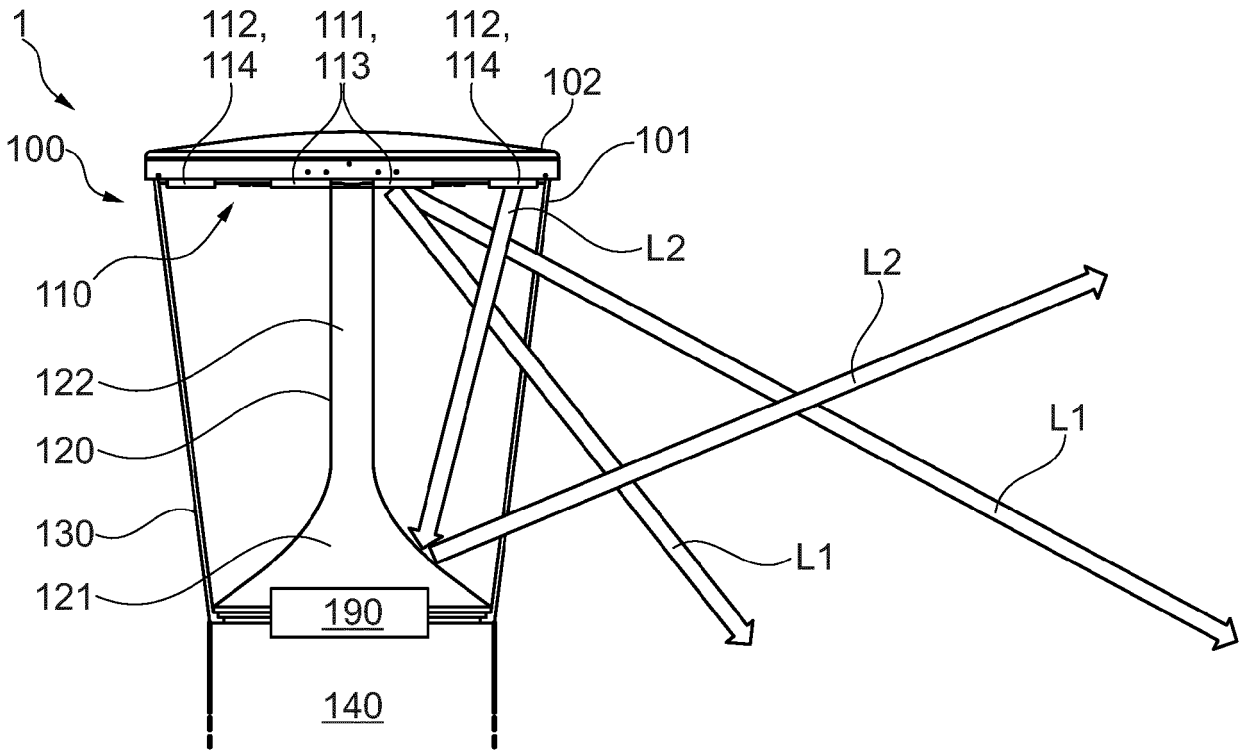

Fig. 3

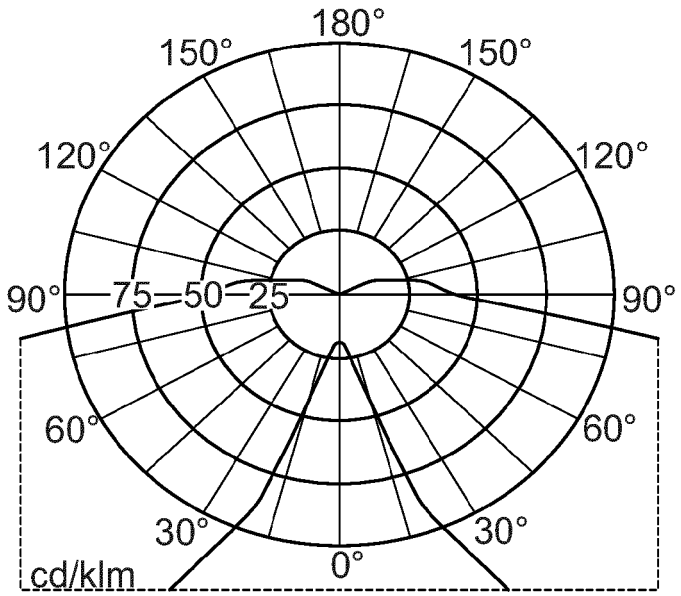

Fig. 4
(prior art)

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EUROPEAN SEARCH REPORT

Application Number
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The Hague	26 September 2022	Allen, Katie

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