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(54) LED MODULE AND LUMINAIRE

(57) The invention relates to a luminaire. The luminaire comprises a housing, a support that is at least partly encompassed by the housing, and first mounting means for arranging a light source on a surface of the support when the light source is mounted to the first mounting means. In addition, the luminaire comprises second mounting means encompassed by the housing for arranging a module in the housing such that the support is arranged between the module and the light source when the light source is mounted to the first mounting means and the module is mounted to the second mounting means. The support comprises one or more through-holes, and the second mounting means is configured to arrange the module with regard to the support such that the module is associated with at least one through-hole of the one or more through-holes when the module is mounted to the second mounting means.

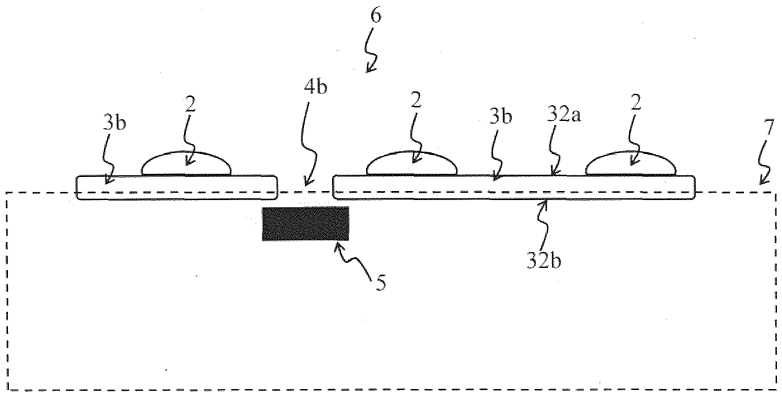


Figure 1

EP 4 269 871 A1

Description

[0001] The invention relates to a luminaire.

[0002] An LED module may be used as light source of a luminaire. For this, the LED module may comprises one or more LEDs (i.e. at least one LED). The surface of the LED module on which the one or more LEDs are arranged may be referred to as light emitting surface of the LED module, because this is the surface from which light is emitted by the one or more LEDs. Modules, such as wireless communication modules, sensor modules and an indicator modules (e.g. an indicator LED), for providing additional functions (besides light emission) for the luminaire may also be arranged on the light emitting surface of the LED module. The terms "light emission surface" and "light emitting surface" may be used as synonyms.

[0003] In this case, the structural requirements of the luminaire for the light emission by the one or more LEDs of the LED module may also be advantageous for the functions of the modules. For example, when the LED module is arranged in a housing of the luminaire, then the part of the housing, to which the light emitting surface of the LED module and, thus, the one or more LEDs of the LED module are directed to, needs to allow passing through of the light emission. For this, the part of the housing may correspond to an opening of the housing or may be made of material allowing light to pass through.

[0004] In this case, arranging a wireless communication module configured to emit electromagnetic waves on the light emitting surface of the LED module allows the electromagnetic waves to be transmitted through the aforementioned part of the housing to the outside of the housing. As a result, the electromagnetic waves are not disturbed or shielded by the housing and, thus, wireless communication between inside the housing and outside the housing may take place. The same applies for an indicator module using light for indicating information, wherein the light emitted by the indicator module may pass through the aforementioned part of the housing to the outside.

[0005] However, arranging modules on the light emitting surface of the LED module leads to the disadvantage that the light emitted by the one or more LEDs of the LED module may be shielded or disturbed by the module. Thus, this has a negative effect on the light emission of the LED module and, thus, of the luminaire. This may result in an inhomogeneous light emission.

[0006] In the light of the above, it is an object of the invention to provide a luminaire that allows overcoming the above described disadvantage. It is in particular an object of the invention to provide a luminaire that achieves the above described advantage without providing the above described drawback. An object of the invention may be providing a luminaire that allows or improves function of modules for a luminaire, such as wireless communication modules, sensor modules or indicator modules.

[0007] These and other objects, which become apparent upon reading the following description, are solved by the subject-matter of the independent claims. The dependent claims refer to preferred embodiments of the invention.

[0008] According to an aspect of the invention, a luminaire is provided. The luminaire comprises a housing, a support that is at least partly encompassed by the housing, and first mounting means for arranging a light source on a surface of the support when the light source is mounted to the first mounting means. In addition, the luminaire comprises second mounting means encompassed by the housing for arranging a module in the housing such that the support is arranged between the module and the light source when the light source is mounted to the first mounting means and the module is mounted to the second mounting means. The support comprises one or more through-holes, and the second mounting means is configured to arrange the module with regard to the support such that the module is associated with at least one through-hole of the one or more through-holes when the module is mounted to the second mounting means.

[0009] In other words, the aspect of the invention proposes a luminaire comprising a support with one or more through-holes for one or more modules and first mounting means for arranging a light source on a surface of the support. The luminaire comprises second mounting means encompassed by a housing of the luminaire that may arrange the one or more modules in the housing such that the support is arranged between the one or more modules and the light source when the light source is mounted to the first mounting means and the one or more modules are mounted to the second mounting means.. The second mounting means may be configured to arrange the one or more modules with regard to the support such that the one or more modules are associated with the one or more through-holes when the one or more modules are mounted to the second mounting means. This allows modules for the luminaire to perform their respective function via a respective through-hole of the support when the modules are arranged in the housing of the luminaire. That is, the function of a module is not disturbed or prevented by the support of the luminaire when the module is arranged in the housing of the luminaire.

[0010] For example, in case the module of the luminaire is a wireless communication module, the wireless communication module may be configured to transmit and/or receive electromagnetic waves (e.g. radio waves, visible light, infrared waves, ultraviolet waves etc.) through the at least one through-hole, with which the module is associated when the module is mounted to the second mounting means. As a result, the electromagnetic waves are not shielded (prevented) or attenuated by the support in case the material of the support is shielding (preventing) or attenuating the electromagnetic waves (e.g. the material being metal). At the same time, when mounted to the second mounting means, the one or more

modules of the luminaire do not disturb or shield (prevent) the light emission of the light source arrangeable at the surface of the support. This allows a homogenous light emission by the light source. Namely, the one or more modules for the luminaire may be provided in the housing of the luminaire and are not arranged on the surface of the support on which the light source may be arranged.

[0011] Therefore, the luminaire is advantageous because it allows positioning or arranging of one or more modules for the luminaire in the luminaire's housing for achieving the respective function of the one or more modules. There is no need for the one or more modules to be arranged on the surface of the support on which the light source is to be arranged, i.e. on the surface of the support directed in a direction of light emission of the luminaire. That is, the one or more modules maybe arranged in the housing at the side of the support that is opposite to the side of the surface on which the light source for the luminaire may be arranged by the first mounting means of the luminaire. Namely, the one or more through-holes of the support allow the function of the one or more modules to be performed through the respective one or more through-holes. At the same time, the light quality of the light emission of the light source is not shielded (prevented) or disturbed by modules of the luminaire, when the light source is mounted to the first mounting means and the modules are mounted to the second mounting means of the luminaire. Thus, an unequal light emission over an area of the light source due to disturbance of the light emission by modules of the luminaire may be prevent. In other words, a homogenous light emission may be achieved.

[0012] Furthermore, it is advantageous that the luminaire allows the light source to be limited to the components for the light emission so that the light source does not need to comprise additional modules for providing additional function(s) (e.g. sensing function, wireless communication function, information indication function etc.) to the luminaire when the light source is mounted to the first mounting means of the luminaire. This allows, using conventional (e.g. simple and cost-effective) light sources for providing the light source of the luminaire

[0013] The surface of the support, on which the light source may be arranged by the first mounting means, is directed in a direction of light emission of the luminaire. That is, the light source may be arranged on a surface of the support directed in a direction opposite to an inside of the housing. Optionally, the surface of the support is directed in a direction of an opening of the housing and/or a part of the housing allowing light to pass through.

[0014] The support may comprise, in a longitudinal direction of the support, two areas adjacent to each other. The first mounting means may be configured to arrange the light source on the surface of the support in a first area of the two areas of the support. The support may comprise the one or more through-holes in the second area of the two areas of the support.

[0015] Optionally, the support may be encompassed by the housing. In addition, the first mounting means may arrange the light source on the surface of the support such that the light source is encompassed by the housing. In the aforementioned two optional cases, the housing may comprise an opening or may be made of material allowing light to pass through at least partly in an area of the housing corresponding to an area of the surface of the support in which the light source may be arranged by the first mounting means on the surface of the support. This allows light emission of the light source to be emitted to outside the housing when the light source is arranged on the surface of the support.

[0016] Optionally, the second mounting means may be configured to arrange the module on a second surface of the support that is opposite to the surface of the support on which the light source may be arranged by the first mounting means. The second mounting means may be configured to arrange the module on the second surface of the support such that the module is associated with the at least one through-hole when the module is mounted to the second mounting means. Assuming that the surface of the support on which the light source may be arranged by the first mounting means corresponds to the front side of the support, the second surface of the support corresponds to the backside of the support.

[0017] The module may be arranged on the second surface of the support such that the module or a part of the module (e.g. at least one antenna in case of a wireless communication module) does not protrude out of the at least one through-hole (with which the module is associated) at the surface of the support.

[0018] The module may be configured to be mounted to the second mounting means of the luminaire such that the module or a part of the module (e.g. at least one antenna in case of a wireless communication module) does not protrude out of the at least one through-hole (with which the module is associated) at the surface of the support when the module is mounted to the second mounting means. That is, the module maybe arranged by the second mounting means in the housing such that the module or a part of the module (e.g. at least one antenna in case of a wireless communication module) does not protrude out of the at least one through-hole at the surface of the support.

[0019] The second mounting means may be configured to arrange more than one module, i.e. two or more modules, in the housing of the luminaire. In other words, more than one module, i.e. two or more modules, may be mounted to the second mounting means for being associated with the one or more through-holes of the support. The description with regard to the module is correspondingly valid for the case of two or more modules. The two or more modules may be associated with the one or more through-holes of the support when the two or more modules are mounted to the second mounting means. Optionally, the two or more modules each may be associated with at least one through-hole of the support, when the two or more modules are mounted to the second mounting means.

[0020] The first mounting means maybe arranged on the housing (e.g. an inside surface and/or outside surface of the

housing) of the luminaire and/or another structure (e.g. the support) of the luminaire. The second mounting means maybe arranged on the housing (e.g. an inside surface of the housing) of the luminaire and/or another structure (e.g. the support) of the luminaire.

[0021] The housing maybe made of electrical conducting material (e.g. metal) and/or insulator material (electrical non-conducting material e.g. plastic). Any known housing may be used.

[0022] The support maybe a planar or flat support. The terms "planar" and "flat" maybe understood as "substantially planar" respectively "substantially flat". In other words, a planar or flat support may be understood as a support that elongates substantially in a plane. The support may be a plate or a sheet. The support may be made of electrical conducting material and/or an insulator material (electrical non-conducting material). For example, the electrical conducting material may be a metal, such as aluminum, sheet metal etc.

[0023] The term "through-opening" maybe used as a synonym of the term "through-hole". The terms "through-hole" and "through-opening" maybe abbreviated by the term "hole" respectively "opening". A through-hole of an entity (e.g. a support) is a hole or opening through the entity. That is, the through-hole correspond to a passage from one side or surface of the entity through the entity to the opposite side or surface of the entity.

[0024] When the light source is mounted to the first mounting means of the luminaire then the light source is configured to be a light source of the luminaire, i.e. the light source is configured to provide light emission of the luminaire.

[0025] The phrase "a module is associated with at least one through-hole" may mean that the module is arranged in the housing at least partly in an area of the at least one-through hole. With other words, the module and the at least one-through hole at least partly overlap. Optionally, the module may be associated with the at least one through-hole in that the module is at least partly aligned with the at least one through-hole. When the module is associated with the at least one through-hole, the module or a part of the module (e.g. at least one antenna of a wireless communication module) does not protrude out of the at least one through-hole at the surface of the support. From a functional point of view the module being associated with the at least one though-hole may mean that the module is configured to use the at least one through-hole for its function. For example, a wireless communication module associated with the at least one through-hole may be configured to transmit electromagnetic waves (e.g. radio signals) through the at least one through-hole. For this, the wireless communication module, in particular at least one antenna of the module, may be arranged at least partly in the area of the at least one through-hole.

[0026] The term "supporting structure" maybe used as a synonym for the term "support".

[0027] The first mounting means may be configured to detachably mount the light source. That is, the light source may be detachably mounted to the first mounting means for being arranged on the surface of the support. The phrase "detachably mounted" is to be understood such that an entity being detachably mounted is an entity that is mounted such that the mounted state may be resolved again. Optionally, the light source may be arranged on the surface of the support by being mounted (optionally detachably mounted) to the first mounting means of the luminaire. That is, the light source may be a part (e.g. a removable part) of the luminaire.

[0028] The first mounting means may be implemented by any known mounting means for mounting a light source. The first mounting means may be configured for a force-locking, form-locking and/or material-locking connection with the light source. That is, the light source maybe mounted to the first mounting means by a force-locking, form-locking and/or material-locking connection. The passage "force-locking, form-locking and/or material-locking connection" has in German the following meaning frictional connection, positive connection and/or substance to substance bond. The first mounting means may be configured for a mechanical connection with the light source. For example, the first mounting means maybe configured for a snap-in connection, a latch connection, a click connection etc. In addition or alternatively, the first mounting means may be configured for a magnetic connection.

[0029] Optionally, the first mounting means may be configured to provide an electrical contact or electrical connection with the light source when the light source is mounted to the first mounting means. This allows an electrical supply and/or control of the light source from the luminaire (e.g. an electrical supply circuit of the luminaire) via the electrical contact or electrical connection.

[0030] The second mounting means may be configured to detachably mount the module. That is, the module may be detachably mounted to the second mounting means for being arranged in the housing with regard to the support. Optionally, the module may be arranged in the housing such that it is associated with the at least one through-hole by being mounted (optionally detachably mounted) to the second mounting means of the luminaire. That is, the module maybe a part (e.g. a removable part) of the luminaire.

[0031] The second mounting means may be implemented by any known mounting means for mounting a module. The second mounting means may be configured for a force-locking, form-locking and/or material-locking connection with the module. That is, the module may be mounted to the first mounting means by a force-locking, form-locking and/or material-locking connection. The second mounting means may be configured for a mechanical connection with the module. For example, the second mounting means may be configured for a snap-in connection, a latch connection, a click connection etc. In addition or alternatively, the second mounting means may be configured for a magnetic connection.

[0032] Optionally, the second mounting means may be configured to provide an electrical contact or electrical con-

nection with the module when the module is mounted to the second mounting means. This allows an electrical supply and/or control of the module from the luminaire (e.g. an electrical supply circuit of the luminaire) via the electrical contact or electrical connection.

[0033] The luminaire may comprise one or more electrical components for electrically supplying and/or controlling the module when the module is mounted to the second mounting means. For example, the luminaire may comprise an electrical supply module for electrically supplying the module and/or a control module for controlling the module, i.e. the function of the module. The aforementioned one or more electrical components (e.g. the electrical supply module and/or the control module) may be arranged at the side of a second surface of the support opposite to the surface of the support and encompassed by the housing of the luminaire. That is, the aforementioned one or more electrical components may be encompassed by the housing of the luminaire such that the support is arranged between them and the light source when the light source is mounted to the first mounting means. The one or more electrical components may be arranged in line with the module of the luminaire. The one or more electrical components may be arranged on the second surface of the support.

[0034] The luminaire may comprise one or more electrical components for electrically supplying and/or controlling the light source when the light source is mounted to the first mounting means. For example, the luminaire may comprise an electrical supply module for electrically supplying the module and/or a control module for controlling the light source, i.e. light emission of the light source. The aforementioned one or more electrical components (e.g. the electrical supply module and/or the control module) may be arranged at the side of the second surface of the support opposite to the surface of the support and encompassed by the housing of the luminaire. That is, the aforementioned one or more electrical components may be encompassed by the housing of the luminaire such that the support is arranged between them and the light source when the light source is mounted to the first mounting means. The one or more electrical components may be arranged on the second surface of the support. The light source may be electrically connected to the one or more electrical components for electrically supplying and/or controlling the light source via at least one of the one or more through-holes.

[0035] Optionally, the one or more components for electrically supplying and/or controlling the light source may be the one or more components for electrically supplying and/or controlling the module.

[0036] The light source may be at least one light emitting diode (LED). Alternatively, the light source may be a LED module. The LED module comprises at least one LED and a printed circuit board (PCB), on which the at least one LED is arranged.

[0037] The at least one LED of the LED module may be arranged on a surface of the PCB. The first mounting means may be configured to arrange the LED module on the surface of the support such that a second surface of the PCB opposite to the surface of the PCB is arranged on the surface of the support when the LED module is mounted to the first mounting means. The surface of the PCB on which the at least one LED of the LED module may be arranged is directed in a direction of light emission of the LED module.

[0038] The at least one LED or the at least one LED of the LED module may be or may comprise any known LED type (e.g. organic LED(s), inorganic LED(s), phosphor converted LED(s) etc.).

[0039] The PCB may comprise or be a substrate and electrical conducting parts for at least electrically contacting the at least one LED of the LED module. The electrical conductors may be arranged on and/or be part of the substrate. The substrate may be a primary layer or ground layer of the PCB.

[0040] The substrate may be a planar or flat substrate. The terms "planar" and "flat" may be understood as "substantially planar" respectively "substantially flat". In other words, a planar or flat substrate may be understood as a substrate that elongates substantially in a plane. The substrate may be a plate or a sheet. The substrate may be made of electrical conducting material and/or an insulator material (electrical non-conducting material). For example, the electrical conducting material may be a metal, such as aluminum.

[0041] The PCB (e.g. a primary layer or ground layer of the PCB) may comprise or be made of glass fiber and/or epoxy resin (e.g. FR_4, CEM etc.). In addition or alternatively, the PCB (e.g. primary layer or ground layer of the PCB) may comprise or be made of metal, such as aluminum. For example, the PCB may comprise a metal insulated substrate (IMS), wherein the metal may optionally be aluminum. Optionally, the PCB may be made of additional material. The electrical conducting parts of the PCB for providing current paths and connecting electrical components may be made of electrical conducting material, such as metal (e.g. copper).

[0042] Optionally, the PCB maybe a metal PCB (e.g. comprising an IMS). In an area of the metal PCB, which is associated or aligned with the at least one of the support (optionally with one or more of the one or more through-holes of the support) when the LED module is arranged by the first mounting means on the surface of the support, the metal of the PCB may be omitted/left out or removed, such that an insulator layer (e.g. isolation foil) of the PCB remains in this area. The insulator layer may not allow visible light to pass through. The insulator layer may allow electromagnetic waves, except visible light, (e.g. radio waves, infrared waves, ultraviolet waves etc.) to pass through. The aforementioned case may be true for a glass fiber and/or epoxy resin PCB, wherein a metal layer, optional metal surface, (e.g. the metal being copper) is removed or left out in the area of the PCB that is associated or aligned with the at least one through-

hole of the support when the LED module is arranged by the first mounting means on the surface of the support.

[0043] Optionally, the PCB comprises one or more through-holes. The first mounting means may be configured to arrange the LED module on the surface of the support such that at least one through-hole of the one or more through-holes of the PCB is aligned with the at least one through-hole of the support forming at least one through-hole through the support and the PCB when the LED module is mounted to the first mounting means.

[0044] The description of the at least one through-hole and through-holes of the support of the luminaire is correspondingly valid for the one or more through holes and, thus, the at least one through-hole of the PCB. The description of the at least one through-hole of the support is correspondingly valid for the at least one through-hole of the PCB and, thus, the at least one through-hole through in the support and the PCB.

[0045] The module for the luminaire may be arranged by the second mounting means in the housing with regard to the support such that the module or a part of the module (e.g. at least one antenna in case of a wireless communication module) does not protrude out of the at least one through-hole of the support and the PCB at the surface of the PCB.

[0046] Each through-hole of the PCB may be aligned with one or more through-holes of the support when the LED module is mounted to the first mounting means and, thus, arranged on the surface of the support.

[0047] The at least one through-hole of the support, optionally of the support and the PCB, may be configured according to a module type of the module. The module type comprises at least one of a sensor module, a wireless communication module, and an indicator module.

[0048] In other words, the at least one through-hole of the support, optionally of the support and the PCB, may be adapted to the respective purpose. For example, a through-hole adapted for transmitting electromagnetic waves (e.g. radio waves, visible light, infrared waves, ultraviolet waves etc.) from a wireless communication module through it, may be different to a through-hole for providing an access (through it) to a sensor module or a through-hole for allowing light emission of an indicator module to be visible through it. The electromagnetic waves being radio waves may typically be in a range between 1 GHz and 25 GHz, optionally between 2 GHz and 5 GHz.

[0049] The support, optionally the support and the PCB, may comprises two or more through-holes that are different to each other. The two or more through-holes may be adapted for two or more different module types. That is, the two or more through-holes each may be adapted to a function of a respective module of the two or more different modules that are different to each other with regard to the module's function. This allows supporting different function(s) of different module types. For example, the support, optionally the support and the PCB, may comprise at least one set of two through-holes (grouped as a set), wherein each of the two through-holes may be configured for a different module type. The at least one set of two through-holes may be configured for at least two of the following module types: sensor module, a wireless communication module, and an indicator module. The at least one set may comprise three through-holes (grouped as a set), wherein each of the three through-holes may be configured for a different module type. For example, the at least one set of three through-holes may be configured for a sensor module, a wireless communication module, and an indicator module.

[0050] The support, optionally the support and the PCB, may comprise two or more of the set comprising two through-holes and/or two or more of the set comprising three through-holes.

[0051] For example, a set of through-holes may comprise a first through-hole allowing a gas to access through the first through-hole a sensor module configured for detecting the gas (e.g. measuring a concentration of the gas). Further, the set of through holes may comprise a second through-hole allowing a light emission of an indicator module to be visible through the second through-hole. Furthermore, the set of through holes may comprise a third through-hole that is configured to support (e.g. amplify) and/or direct transmission and emission of electromagnetic waves (e.g. radio signals, visible light, infrared waves, ultraviolet waves etc.) through the third through-hole from a wireless communication module. In addition or alternatively, the third-hole may be configured to support receiving of electromagnetic waves through the third-hole by a wireless communication module. In addition or alternatively to the first through-hole, the set of through-holes may comprise one or more through-holes that are adapted to one or more different sensor modules. For example, in addition or alternatively to the first through-hole, the set of through-holes may comprise a through-hole allowing light (e.g. ambient light) to access through the through-hole a sensor module configured for detecting light (e.g. measuring light intensity) and/or a further through-hole allowing air to access through the further through-hole a sensor module configured for detecting temperature and/or humidity of the air.

[0052] The support, optionally the support and the PCB, may comprise two or more of the aforementioned sets of through-holes. This increases flexibility for a user of the luminaire, because a module may be arranged by the second mounting means in the housing of the luminaire at different positions at which a through-hole adapted for the module type of the module is present.

[0053] A set of through-holes may be referred to as a cluster of through-holes. A respective set of through-holes, such as the aforementioned examples, may be repeated one or more times according to a grid spacing.

[0054] The wireless communication module may be configured for wireless communication. It may be configured to transmit and/or receive wireless signals e.g. in the form of electromagnetic waves. The wireless communication module may be configured to transmit and/or receive wireless signals through the at least one through-hole of the support,

optionally of the support and the PCB. The wireless signals may be radio signals (i.e. radio waves). Alternatively, the wireless signals may be light signals (i.e. visible light). Alternatively, the wireless signals may be infrared signals (i.e. infrared waves) or ultraviolet waves (i.e. ultraviolet waves). The wireless communication module may be configured to communicate according to the Bluetooth standard (e.g. 2,4 GHz Bluetooth), Near Field Communication (NFC) standard, Wireless Local Area Network (WLAN) standard and/or any other known standard for wireless communication. The wireless communication module may comprise or may be at least one antenna. The electromagnetic waves being radio waves may be in a range between 1 GHz and 25 GHz, optionally between 2 GHz and 5 GHz.

[0055] The sensor module may be configured to detect or measure temperature, light intensity, presence and/or movement of an entity (e.g. a person, vehicle etc.), humidity, moisture, air pressure, gases (e.g. carbon dioxide, volatile organic compounds (VOC), smoke etc.), sound etc. The sensor module may be any other known module configured to measure physical quantities. The sensor module may comprise or may be at least one sensor for measuring the respective physical quantity. The sensor module may optionally comprise at least one radar sensor e.g. for measuring distance to an entity (e.g. person, vehicle etc.) and/or detecting presence of the entity. For example, the sensor module may comprise a 5,8 GHz radar sensor and/or a 24GHz radar sensor. The sensor module may be configured to wirelessly communicate e.g. its detection results. For this case, the description of the wireless communication module may be correspondingly valid for the sensor module.

[0056] The indicator module may be or may comprise lighting means, e.g. at least one LED, at least one laser etc., for indicating information such as a state or condition. The indicator module may be configured to emit visible light, infrared waves or ultraviolet waves. For example, the indicator module may be configured to indicate information by light fidelity (Li-Fi) wireless communication. The information may be indicated by a color of the emission of the indicator module. In addition or alternatively, the information may be indicated by an on-state and/or off-state of the indicator module. For example, assuming the information to be indicated by the indicator module (e.g. an indicator LED) is presence of a component failure, then the indicator module being on (i.e. emitting visible light, infrared waves or ultraviolet waves) may indicate presence of the component failure and the indicator module being off (i.e. not emitting visible light, infrared waves or ultraviolet waves) may indicate absence of a component failure.

[0057] As outlined above, the second mounting means of the luminaire may be configured to arrange more than one module, i.e. two or more modules, in the housing of the luminaire. At least two different module types may be arranged in the housing. That is, the luminaire may comprise at least two different module types. For example, a wireless communication module, at least one sensor module and an indicator module may be arranged in the housing of the luminaire. Optionally, only two of the aforementioned three modules types may be arranged by the second mounting means in the housing of the luminaire. That is, the luminaire may comprise only two of the aforementioned three module types. The luminaire may comprise at least two different sensor module types.

[0058] The support, optionally the support and the PCB, may comprise one or more sets of through holes. The number of through-holes of the one or more sets may correspond to the number of modules or number of different module types arrangeable by the second mounting means in the housing of the luminaire and each through-hole of the set may be adapted to the module type of a respective module arrangeable in the housing of the luminaire. A respective set of through-holes may be repeated one or more times according to a grid spacing. The information with regard to a set of through-holes described above is correspondingly valid.

[0059] Optionally, the module is a wireless communication module or sensor module configured to communicate using electromagnetic waves. At least one dimension, a shape and/or a position of the at least one through-hole of the support, optionally of the support and the PCB, may be adapted to a wavelength of the electromagnetic waves.

[0060] The wireless communication module or sensor module may be configured to emit and/or receive electromagnetic waves.

[0061] The at least one through-hole may be geometrically configured or outlined such that it supports (e.g. amplifies) and/or directs transmission and optionally emission of the electromagnetic waves (e.g. radio waves, visible light, infrared waves, ultraviolet waves etc.) emittable and/or receivable by the wireless communication module or sensor module.

[0062] A shape of the at least one through-hole may be elongate or circular. The at least one through-hole may have the shape of a slot or slit. The shape of a slot or slit may be configured such that the at least one through-hole supports (e.g. amplifies) and/or directs transmission and optionally emission of the electromagnetic waves emittable and/or receivable by the wireless communication module or sensor module. The at least one through-hole having the shape of a slit or slot may be arranged in an area of the support, optionally of the support and the PCB, that is made of insulator material (i.e. electrically non-conducting material).

[0063] Optionally, the at least one through-hole (of the support) adapted for the wireless communication module or sensor module configured for wireless communication may be arranged in an area of the support that does not comprise metal. The at least one through-hole (of the support) adapted for the wireless communication module or sensor module may be arranged in an area of the PCB in which the PCB comprises or is made of a material that allows the electromagnetic waves (e.g. radio waves, visible light, infrared waves and/or ultraviolet waves) emittable and/or receivable by the wireless communication module or sensor module to pass through.

[0064] Optionally, when the module is a wireless communication module or sensor module (e.g. temperature measuring sensor module) and the PCB of the LED module is made of material allowing electromagnetic waves (e.g. radio waves, visible light, infrared waves and/or ultraviolet waves) to pass through, the support may comprise the at least one through-hole for the module, wherein the PCB does not comprise the at least one through-hole for the module.

[0065] For example, the PCB may be made of material that allows radio waves (radio signals) to pass through. The PCB may be made of material (e.g. translucent or transparent material) allowing visible light, infrared waves and ultraviolet waves to pass through. The PCB not comprising the at least one through-hole may seal the at least one through-hole of the support. This may be advantageous for IP protection and prevention of flies from passing through the at least one through-hole of the support.

[0066] Optionally, the at least one through-hole of the support and the PCB adapted for the wireless communication module or sensor module configured for wireless communication may be arranged in an area of the support that does not comprise metal. The at least one through-hole of the support and the PCB adapted for the wireless communication module or sensor module may be arranged in an area of the PCB that does not comprise metal.

[0067] At least one dimension of the at least one through-hole of the support, optionally of the support and the PCB, may equal to half the wavelength of the electromagnetic waves, or a multiple of half the wavelength smaller than two wavelengths of the electromagnetic waves.

[0068] That is, the at least one dimension may equal to multiple of half the wavelength of the electromagnetic waves as long as the at least one dimension is smaller than two wavelength of the electromagnetic waves. In other words, the at least one dimension may be equal to half the wavelength (0.5 λ), one wavelength (λ) or one and a half of the wavelength (1.5 λ) of the electromagnetic waves. The aforementioned may be true in case the electromagnetic waves are radio signals or radio waves. For example, the at least one dimension may be in a range between 15 to 100 nm.

[0069] For example, in case the at least one through-hole is a slot or slit, the length (longitudinal extension) of the slot respectively slit may be equal to half the wavelength of the electromagnetic waves. Alternatively, the length of the slot respectively slit may be equal to multiple of half the wavelength of the electromagnetic waves as long as the length is smaller than two wavelength. In case the at least one through-hole has a circular shape, a radius or dimension of the through-hole may be equal to the above mentioned at least one dimension of the at least one through-hole.

[0070] Therefore, at least one dimension and, thus, the size of the at least one through-hole may be adapted to the wavelength of the electromagnetic waves that may be emitted or received by the wireless communication module or sensor module. This supports (e.g. amplifies) and directs a transmission and optionally emission of the electromagnetic waves emittable and/or receivable by the wireless communication module or sensor module through the at least one through-hole. With other words, the at least one dimension of the at least one through-hole of the support, optionally of the support and the PCB, equaling to half the wavelength of the electromagnetic waves, or a multiple of half the wavelength smaller than two wavelengths of the electromagnetic waves is beneficial for transmission of the electromagnetic waves.

[0071] The module may be a wireless communication module or sensor module configured to communicate using electromagnetic waves. The second mounting means may be configured to arrange the module with regard to the at least one through-hole of the support such that the distance between the module and the support is smaller than or equal to two wavelengths of the electromagnetic waves when the module is mounted to the second mounting means.

[0072] The wireless communication module or sensor module may comprise at least one antenna for transmitting and/or receiving radio signals (as electromagnetic waves). The second mounting means may be configured to arrange the wireless communication module or sensor module such that the at least one antenna may be arranged in the housing of the luminaire and optionally on the second surface of the support. The second mounting means may be configured to arrange the wireless communication module or sensor module such that the at least one antenna is arranged at a distance to the at least one through-hole of the support. The distance may be smaller than or equal to two wavelengths of the electromagnetic waves (i.e. the radio signals) emittable and/or receivable by the at least one antenna. This ensures operation of the wireless communication module, in particular of the at least one antenna, in the near field, i.e. under near field conditions, with regard to the at least one through-hole.

[0073] In near field configuration, the shape of the at least one through-hole affects a direct radiation (emission) of the module's antenna. Suitable adjustment of the geometry of the at least one through-hole may positively affect the radiation (emission) by the antenna.

[0074] The shape of the at least one through-hole may be adapted to the emission of electromagnetic waves (e.g. radio signals) by at least one antenna of the wireless communication module or sensor module. For example, the at least one through-hole may be a slit or slot in case the at least one antenna is a dipole antenna or monopole antenna.

[0075] The shape of the at least one through-hole may be adapted to a desired polarization of electromagnetic waves (e.g. radio signals) emittable by the wireless communication module or sensor module. For example, the at least one through-hole may have a circular shape in order to achieve non-polarized electromagnetic waves (e.g. radio signals) to be emitted from the at least one through-hole after emitted from the wireless communication module or sensor module (e.g. at least one antenna of the module) and passed through the at least one through-hole. The at least one through-hole may have an elongate shape (e.g. in the form of a slit or slot) in order to achieve polarized electromagnetic waves

(e.g. radio signals) to be emitted from the at least one through-hole after emitted from the wireless communication module or sensor module (e.g. at least one antenna of the module) and passed through the at least one through-hole.

[0076] Optionally, the module is a wireless communication module or sensor module configured to communicate using electromagnetic waves. The second mounting means may be configured to arrange the module with regard to the at least one through-hole of the support such that a longitudinal axis of the at least one through hole and a longitudinal axis of at least one antenna of the module form an angle greater than 0° and smaller than 90, optionally of 45°, when the module is mounted to the second mounting means.

[0077] In other words, the longitudinal axis of the at least one antenna may be rotated by an angle greater than 0° and smaller than 90° (e.g. the angle equals 45°) with regard to the longitudinal axis of the at least one through-hole, when the module is mounted to the second mounting means. The at least one antenna may be a dipole antenna or monopole antenna. The at least one through-hole may have the shape of a slit or a slot.

[0078] The at least one antenna of the wireless communication module or sensor module may be at least partly arranged in an area of the at least one through-hole when the wireless communication module or sensor module is mounted to the second mounting means.

[0079] At least one antenna of the wireless communication module or sensor module (arrangeable by the second mounting means in the housing and optionally on the second surface of the support) may be at least partly arranged in the area of the at least one through-hole such that a longitudinal axis of the at least one through hole and a longitudinal axis of the at least one antenna form an angle greater than 0° and smaller than 90°. For example, the angle may be 45°.

[0080] The at least one through-hole may at least partly be arranged in an area of the support, optionally of the support and the PCB, comprising metal. In this case, one or more edges of the at least one through-hole arranged in an area of metal may form metal edges. This may improve emission and transmission of electromagnetic waves from the wireless communication module or sensor module through the at least one through-hole due to a conductivity and microstructure of the one or more metal edges. This may provide meta-material-characteristics at the surface of the support, optionally of the support and PCB, next to the at least one through-hole.

[0081] In addition or alternatively, the at least one through-hole may at least partly be arranged in an area of the support, optionally of the support and the PCB, comprising an insulator material or being an insulator. This may improve emission and transmission of electromagnetic waves from the wireless communication module through the at least one through-hole due to the dielectric characteristics of insulator.

[0082] Optionally, the wireless communication module or sensor module is configured to emit visible light or infrared. At least one dimension of the at least one through-hole of the support, optionally of the support and the PCB, may equal to a multiple of half the wavelength greater than two wavelengths of the visible light or infrared.

[0083] For example, in case the at least one through-hole is a slot or slit, the length of the slot respectively slit may be equal to a multiple of half the wavelength greater than two wavelengths of the visible light or infrared. In case the at least one through-hole has a circular shape, a radius or dimension of the through-hole may be equal to the above mentioned at least one dimension of the at least one through-hole.

[0084] Thus, at least one dimension and, thus, the size of the at least one through-hole may be adapted to the wavelength of visible light or infrared that may be emitted by the wireless communication module or sensor module. This supports (e.g. amplifies) and directs a transmission and emission of the visible light or infrared by the wireless communication module or sensor module through the at least one through-hole.

[0085] The at least one through-hole of the support may be arranged in an area of the PCB that comprises a material (e.g. translucent or transparent material) allowing visible light or infrared to pass through. Alternatively, the at least one through-hole is a through-hole of the support and the PCB.

[0086] Optionally, the module is a wireless communication module or sensor module configured to emit electromagnetic waves. The module may be arranged with regard to the at least one through-hole of the support such that the distance between the module and the support is smaller than or equal to two wavelengths of the electromagnetic waves.

[0087] Optionally, the module is a sensor module for measuring one or more physical quantities of an environment outside the housing. The at least one through-hole of the support, optionally of the support and the PCB, may be configured to allow the module to measure the one or more physical quantities.

[0088] For example, the sensor module may be configured to measure gases (e.g. carbon dioxide, volatile organic compounds (VOC), smoke etc.). In this case, the at least one through-hole may be configured to allow the gases to enter from outside the luminaire via the at least one through-hole to the inside of the housing so that the sensor module encompassed by the housing may measure the gases.

[0089] The at least one through-hole of the support, optionally of the support and the PCB, may be sealed by a cover that is arranged on the surface of the support, on a second surface of the support opposite to the surface of the support, or in the at least one through-hole of the support, optionally of the support and the PCB. Optionally, the at least one through-hole of the support and the PCB may be sealed by a cover that is arranged on the surface of the PCB, on which the at least one LED of the LED module is arranged. Optionally, every through-hole of the support, optionally of the support and the PCB, may be sealed by a cover that is arranged on the surface of the support, on a second surface of

the support opposite to the surface of the support, or in the respective through-hole of the support, optionally of the support and the PCB. Optionally, every through-hole of the support and the PCB may be sealed by a cover that is arranged on the surface of the PCB, on which the at least one LED of the LED module is arranged.

[0090] This may prevent scattered light through the respective through-hole (sealed by the cover) in both directions.

[0091] The cover may be configured to prevent water and/or dust from passing through the at least one through-hole.

[0092] For example, the cover may be arranged on the second surface of the support such that the module and the at least one through-hole, with which the module is associated, are encompassed or covered by the cover, when the module is mounted to the second mounting means. In case the module is a wireless communication module or sensor module configured for wireless communication, the cover may be made of metal or may comprise a metal layer. This may increase the power or intensity of electromagnetic waves (e.g. radio signals) emittable by the wireless communication module or sensor module. That is, this may prevent unwanted transmission of the electromagnetic waves emittable by the wireless communication module or sensor module and, thus, prevent a power or energy loss of the emitted electromagnetic waves.

[0093] Optionally, the cover made of metal or comprising the metal layer is arranged with regard to the wireless communication module or sensor module, in particular at least one antenna of the module, by a distance that is not a multiple of half the wavelength emittable by the module. This prevents unwanted reflection effects on the cover when the module emits the electromagnetic waves (e.g. radio signals). The cover may be reflective or comprise a reflective layer.

[0094] The cover may be translucent, optionally transparent, for example in case the cover is made of a sealing film and/or arranged on the surface of the support or the PCB. The cover may be of a material that prevents light from passing through. This may be the case for example, when the cover covers the module. Alternatively, this may be the case when the case is arranged on the surface of the support for sealing the at least one through-hole of the support or on the surface of the PCB for sealing the at least one through-hole of the PCB.

[0095] The cover may optionally be arranged on a respective surface of the support or PCB such that it is removable or replaceable. In other words, the cover may be removably or replaceably arranged on a respective surface of the support or PCB.

[0096] Optionally, the module is a wireless communication module or sensor module configured to communicate using electromagnetic waves. The luminaire may comprise a cover that is configured to prevent the electromagnetic waves from passing through. The cover may be configured to be arranged on a second surface of the support opposite to the surface of the support such that, when the module is mounted to the second mounting means, the module and the at least one through-hole of the support, optionally of the support and the PCB, are covered by the cover, and the cover is arranged with regard to the module, optionally at least one antenna of the module, by a distance that is not a multiple of half the wavelength emittable by the module.

[0097] The cover may be made of metal or comprising the metal layer. The cover may be reflective or comprise a reflective layer for visible light. The cover may be configured to prevent visible light from passing through.

[0098] Optionally, the module is a wireless communication module or sensor module configured to communicate using electromagnetic waves. The luminaire may comprises a cover that is configured to allow the electromagnetic waves passing through and prevent visible light from passing through. The cover may be arranged on the surface of the support, and/or in the at least one through-hole of the support, optionally of the support and the PCB.

[0099] Optionally, the luminaire may comprise a cover in the form of a sealing film configured to prevent water and/or dust from passing through. The cover may be arranged on a second surface of the support opposite to the surface of the support such that the cover encompasses the at least one through-hole. The second mounting means may be configured to arrange the module with regard to the support such that the module pushes through the cover when the module is mounted to the second mounting means, wherein the cover and the module are configured to prevent water and/or dust from passing through when the module has pushed through the cover.

[0100] This may provide an IP protection and protection against flies entering through the through-hole. Namely, the sealing film pushed through by the module and the module may provide a sealing of the at least one through-hole that is sufficient for IP protection and prevent flies from passing through the at least one through-hole.

[0101] Optionally, the luminaire comprises an optic arrangement. The at least one through-hole of the support, optionally of the support and the PCB, may be arranged in an area of the optic arrangement.

[0102] The optic arrangement may be translucent or transparent. The optic arrangement of the luminaire may be arranged on the surface of the support and may encompass the light source, when the light source is mounted to the first mounting means and, thus, arranged on the surface of the support. Optionally, the optic arrangement partly encompasses the light source. In case the light source is the LED-module, the optic arrangement may be arranged on the surface of the PCB of the LED module, on which the at least LED of the LED module is arranged, and may encompass the at least one LED of the LED module. The optic arrangement may be detachable or removable, that is detachably or removably arranged on a respective surface of the luminaire. The optic arrangement may comprise one or more lenses. In case the light source is the LED module, the optic arrangement may comprise for each LED of the LED module one or more lenses. In case the light source is the at least one LED, the optic arrangement may comprise for each LED of

the at least one LED one or more lenses.

[0103] Optionally, the optic arrangement may comprise a reflective layer (i.e. one or more reflectors) For example, at the border or edges of the optic arrangement the reflective layer may be present. The reflective layer may be made of metal or comprise a metal layer. The reflective layer may be arranged at the optic arrangement such that light emission of the light (when arranged by the first mounting means on the surface of the support) via the optic arrangement is improved. The at least one through-hole of the support, optionally of the support and the PCB, may be arranged such that it is aligned with the optical arrangement in an area of the optical arrangement, which does not comprise the reflective layer. Thus, electromagnetic waves emitted through the at least one through-hole are not affected by the reflective layer and may pass through the optic arrangement to the outside of the luminaire. Electromagnetic waves may also pass from outside the luminaire via the optic arrangement and the at least one through-hole to the inside of the housing of the luminaire.

[0104] The optic arrangement may comprise a light guide configured to guide or transfer light (from outside the optic arrangement, e.g. outside the luminaire) to the at least one through-hole of the support, optionally of the support and the PCB. At the side of the second surface of the support (opposite to the surface of the support directed in direction of light emission of the luminaire) an optical module (an example of a module for the luminaire) may be arranged in the housing and associated with the at least one through-hole of the support (optionally of the support and PCB). For this, the second mounting means may be configured to mount the optical module.

[0105] The light guide may be configured such that the optical module is configured to receive light from outside the luminaire within an angle range. That is, the optical module may be configured to receive the light from outside the luminaire within the angle range, wherein the angle range is determined by the optical characteristics of the light guide. In addition or alternatively, the light guide may be configured such that the optical module is configured to transmit light through the at least through-hole and the light guide to outside the luminaire within an angle range. That is, the optical module may be configured to transmit the light via the at least one through-hole and the light guide to outside the luminaire within the angle range, wherein the angle range is determined by the optical characteristics of the light guide.

[0106] The optical module may be a sensor module configured to detect or measure light (e.g. daylight, ambient light). Due to the light guide, the sensor module may be configured to detect or measure light from outside the luminaire within an angle range. The angle range depends on the optical characteristics of the light guide.

[0107] Optionally, the optical module may be a wireless communication module or sensor module that is configured to wirelessly communicate using visible light, infrared waves and/or ultraviolet waves. For example, the wireless communication module may be configured for optical wireless communication (OWC), for example for communication according to the Li-Fi standard. The wireless communication module or sensor module may be configured to receive light, infrared waves and/or ultraviolet waves via the at least one through-hole and the light guide from outside the luminaire within an angle range. The wireless communication module or sensor module may be configured to transmit light, infrared waves and/or ultraviolet waves via the at least one through-hole and the light guide to outside the luminaire within an angle range.

[0108] The optical module may be an indicator module configured to emit visible light, infrared waves or ultraviolet waves. The indicator module may be configured to emit visible light, infrared waves or ultraviolet waves via the at least one through-hole and the light guide to outside the luminaire within an angle range.

[0109] Optionally, the second mounting means is configured to arrange at least two different modules with regard to the support. The support, optionally the support and the PCB, may comprise a plurality of through-holes. The second mounting means may be configured to arrange a first module of the at least two different modules with regard to the support such that, when the first module is mounted to the second mounting means, the first module is associated with at least one through-hole of the plurality of through-holes that is configured for the first module. The second mounting means may be configured to arrange a second module of the at least two different modules, different to the first module, with regard to the support such that, when the second module is mounted to the second mounting means, the second module is associated with at least one further through-hole of the plurality of through-holes that is configured for the second module. The at least one through-hole and the at least one further through-hole are different to each other.

[0110] The description with regard to the module arrangeable by the second mounting means in the housing of the luminaire may be correspondingly valid for the case that the luminaire comprises two or more modules. The description with regard to the at least one through-hole of the support and optional PCB may be correspondingly valid for the plurality of through-holes of the support and optional PCB.

[0111] In order to achieve the luminaire according to the aspect of the invention, some or all of the above-described optional features of the luminaire may be combined with each other.

[0112] It has to be noted that all devices, elements, units and means described in the present application could be implemented in software or hardware elements or any kind of combination thereof. All steps which are performed by the various entities described in the present application as well as the functionalities described to be performed by the various entities are intended to mean that the respective entity is adapted to or configured to perform the respective steps and functionalities.

[0113] In the following, the invention is described exemplarily with reference to the enclosed Figures, in which

Figure 1 shows a schematic side view of a part of an example of a luminaire according to an embodiment of the invention;

Figure 2 shows a schematic top view of a part of an example of a luminaire according to an embodiment of the invention;

Figures 3 to 6 each show a schematic side view of a part of an example of a luminaire according to an embodiment of the invention;

Figures 7 (A) and (B) exemplarily show the impact of difference size of a through-hole of a support on transmission of electromagnetic waves through the through-hole;

Figure 8 (A) shows a schematic side view of an example of an arrangement of a support, printed circuit board (PCB) and antenna according to an embodiment of the invention; and

Figure 8 (B) shows a schematic top view of the arrangement of a support, printed circuit board (PCB) and antenna of Figure 8 (A).

[0114] In the Figures, corresponding elements have the same reference signs. The size of elements in the Figures is not to scale and may be different compared to a real life implementation in order to highlight details of the embodiments.

[0115] **Figure 1** shows a schematic side view of a part of an example of a luminaire according to an embodiment of the invention.

[0116] The luminaire of Figure 1 is an example of the luminaire according to the above-described aspect of the invention. Thus, the description of the luminaire according to the above-described aspect is correspondingly valid for the luminaire 6 of Figure 1. In the example of Figure 1, the light source for the luminaire 6 is a least one light emitting diode 2 (LED), i.e. one or more light emitting diodes (LEDs). The number of LEDs 2 shown in Figure 1 is three and is only by way of example not limiting the present disclosure.

[0117] The luminaire 6 of Figure 1 comprises a housing 7 and a support 3b that is at least partly encompassed by the housing 7. Further, the luminaire 6 comprises first mounting means (not shown in Figure 1) for arranging a light source (e.g. the at least one LED 2) on a surface 32a of the support 3b when the light source is mounted to the first mounting means. Furthermore, the luminaire 6 comprises second mounting means (not shown in Figure 1) encompassed by the housing 7 for arranging a module 5 in the housing 7 such that the support 3b is arranged between the module 5 and the light source when the light source is mounted to the first mounting means and the module 5 is mounted to the second mounting means. The support 3b comprises one or more through-holes 4b (in Figure 1 only one through-hole is shown). The second mounting means is configured to arrange the module 5 with regard to the support 3b such that the module 5 is associated with at least one through-hole of the one or more through-holes (e.g. the through-hole 4b shown in Figure 1) when the module 5 is mounted to the second mounting means.

[0118] In Figure 1 a state of the luminaire 6 is shown, in which the light source (e.g. the at least one LED 2) is mounted to the first mounting means and, thus, is arranged on the surface 32a of the support 3b and the module 5 is mounted to the second mounting means and, thus, arranged in the housing 7 such that the module 5 is associated with the at least one through-hole 4b of the one or more through-holes. This is only by way of example. That is, the light source may not be already mounted to first mounting means and/or the module 5 may not be already mounted to the second mounting means. The following description is valid irrespective of whether the light source (e.g. the at least one LED 2) and the module 5 are already mounted to the first mounting means respectively second mounting means. This is correspondingly valid for the other Figures.

[0119] The first mounting means may be configured to detachably mount the light source. That is, the light source may be detachably mounted to the first mounting means for being detachably or removably arranged on the surface 32a of the support 3b. The second mounting means may be configured to detachably mount the module 5. That is, the module 5 may be detachably mounted to the second mounting means 2 for being detachably or removably arranged in the housing 7.

[0120] For further details, on the first mounting means and second mounting means reference is made to the description of the luminaire according to the above-described aspect of the invention.

[0121] Optionally, the second mounting means may be configured to arrange the module 5 on a second surface 32b of the support 3b opposite to the surface 32a of the support 3b on which the light source (e.g. the at least one LED 2) may be arranged. The surface 32a of the support 3b is directed in a direction of light emission of the luminaire 6. The second mounting means may be configured to arrange the module 5 on the second surface 32b of the support 3b such

that the module 5 is associated with at least one of the one or more through-holes (e.g. the through-hole 4b shown in Figure 1) of the support 3b.

[0122] For further information on the luminaire 6 of Figure 1, e.g. the module 5, the one or more through-holes 4b and the housing 7, reference is made to the description of the luminaire according to the above-described aspect of the invention and the description of Figures 2 to 8.

[0123] **Figure 2** shows a schematic top view of a part of an example of a luminaire according to an embodiment of the invention. The luminaire of Figure 2 may be the luminaire of Figure 1. The description of the luminaire according to the above-described aspect of the invention and the description of Figure 1 is correspondingly valid for the luminaire of Figure 2. In the following mainly additional optional feature(s) or difference(s) of the luminaire of Figure 2 with regard to the luminaire of Figure 1 are described.

[0124] As shown in Figure 2, as the light source of the luminaire 6, LEDs 2 may be arranged (by the first mounting means) on the surface 32a of the support 3b of the luminaire 6, wherein the number of LEDs of Figure 2 is only by way of example. The support 3b may comprise three sets of three different through-holes 41, 42, 43, wherein one through-hole type 43 is double per set. The number of sets and the number of through-holes is only by way of example and may be different. The three different through-holes 41, 42 and 43 may be configured according to three different module types, respectively. For example, a first through-hole type 41 may be adapted or configured for a wireless communication module that may be arranged (by the second mounting means) in the housing of the luminaire 6, a second through-hole type 42 may be configured for an indicator module that may be arranged (by the second mounting means) in the housing of the luminaire 6, and a third through-hole type 43 may be configured for a respective sensor module that may be arranged (by the second mounting means) in the housing of the luminaire 6. As shown in Figure 2, there may be two through-holes 43 of the third through-hole type 43. The two through-holes 43 of the third type may be configured for two different sensor modules (e.g. one for a light detection module and the other for a gas detection module).

[0125] Thus, in the housing of the luminaire 6 modules 5 for the luminaire may be arranged such that each of them is associated with a respective through-hole of a through-hole type configured for the module type of the respective module. For example, the luminaire 6 may comprise a wireless communication module at the area at which the first through-hole type 41 is arranged (when the wireless communication module is mounted to the second mounting means of the luminaire 6). The same applies for an optional indicator module and optional one or more sensor modules.

[0126] For further information on the luminaire 6 of Figure 2 reference is made to the description of the luminaire according to the above-described aspect and the description of Figure 1.

[0127] **Figures 3 to** 6 each show a schematic side view of a part of an example of a luminaire according to an embodiment of the invention.

[0128] Figures 3 to 6 each show an example of the luminaire according to the above -aspect of the invention. Thus, the description of the luminaire according to the above-described aspect of the invention is correspondingly valid for the luminaires of Figures 3 to 6. In the examples of Figures 3 to 6, the light source for the luminaire 6 is a LED module 1 comprising a least one light emitting diode (LED) 2. That is, the luminaires of Figures 3 to 6 differs from the luminaires of Figures 1 and 2 with regard to the type of light source. The above description of the luminaires of Figures 1 and 2 may be correspondingly valid for the luminaires of Figures 3 to 6. The description of the luminaires of Figures 3 to 6 may be correspondingly valid for the luminaires of Figures 1 and 2.

[0129] As shown in **Figure 3,** the luminaire 6 comprises a housing 7 and a support 3b that is at least partly encompassed by the housing 7. According to the example of Figure 3, the support 3b is encompassed by the housing 7, which is only by way of example and may be different. Further, the luminaire 6 comprises first mounting means (not shown in Figure 3) for arranging a light source (e.g. an LED module 1 comprising at least one LED 2) on a surface 32a of the support 3b when the light source is mounted to the first mounting means. The surface 32a of the support 3b is directed in a direction of light emission of the luminaire 6 (indicated by an arrow in Figure 3). Furthermore, the luminaire 6 comprises second mounting means (not shown in Figure 3) encompassed by the housing 7 for arranging a module 5 in the housing 7 such that the support 3b is arranged between the module 5 and the light source (e.g. LED module 1) when the light source is mounted to the first mounting means and the module 5 is mounted to the second mounting means. The support 3b comprises one or more through-holes 4b (in Figure 3 only one through-hole is shown). The second mounting means is configured to arrange the module 5 with regard to the support 3b such that the module 5 is associated with at least one through-hole (e.g. the through-hole 4b shown in Figure 3) of the one or more through-holes when the module 5 is mounted to the second mounting means.

[0130] As shown, in Figure 3, the LED module 1 comprises at least one LED 2 and a printed circuit board 3a (PCB) on which the at least one LED 2 is arranged. The PCB 3a may be arranged on the surface 32a of the support 3b and the at least one LED 2 is arranged on a surface 31a of the PCB 3a that is directed in a direction opposite to the support 3b. That is, the surface 31a of the PCB 3a is directed in a direction of light emission of the luminaire 6. The first mounting means may be configured to arrange the LED module 1 on the surface 32a of the support 3b such that a second surface 31b of the PCB 3a opposite to the surface 31a of the PCB 3a is arranged on the surface 32a of the support 3b when the LED module 1 is mounted to the first mounting means.

[0131] The LED module 1, e.g. the PCB 3a, may be arranged at or may form a light emitting surface of the housing 7. The LED module 1, e.g. the PCB 3a, may be of the same size as the light emitting surface of the housing 7.

[0132] The PCB 3a may be made of, at least in an area that matches or aligns with the through-hole 4b of the support 3b, a material that allows radio waves to pass through it. In this case, the module 5 may be a wireless communication module or sensor module configured to transmit and/or receive radio signals via the through-hole 4b of the support 3b. This allows the support 3b to comprise or be made of material (e.g. metal) that does not allow radio signals to pass through it.

[0133] Optionally, the PCB 3a may be made of, at least in an area that matches or aligns with the through-hole 4b of the support 3b, a material that allows visible light, infrared waves and/or ultraviolet waves to pass through it. For example, the material may be translucent or transparent. In this case, the module 5 may be a wireless communication module or sensor module configured to transmit and/or receive visible light, infrared waves and/or ultraviolet light. That is the wireless communication module or sensor module may be configured for optical wireless communication (OWC). The module 5 may be an indicator module configured to transmit visible light, infrared waves and/or ultraviolet light. The module 5 may be a sensor module configured to detect or measure temperature (e.g. ambient temperature) or electromagnetic waves (e.g. daylight sensor module, ambient light sensor module, presence and/or movement sensor module using at least one infrared sensor).

[0134] The example of Figure 3 has the advantage that it allows a wireless communication module, a sensor module or an indicator module to be arranged in the housing 7 behind the support 3b with regard to the surface 32a of the support 3b (i.e. on the side of the second surface 32b opposite to the surface 32a of the support 3). At the same time, the function of the module 5 is not disturbed or prevented by the support 3b and the LED module 1. Further, since the module 5 is arranged in the housing 7 behind the support 3b, the module 5 does not disturb a light emission by the LED module 1.

[0135] The number of through-holes 4b shown in Figure 3 is only by way of example and, thus, the support 3b may comprise more than one through-hole. The number of modules 5 of the luminaire shown in Figure 3 is only by way of example and, thus, the luminaire 6 may comprise more than one module 5. At least two of a plurality of through-holes of the support 3b may be configured for different module types. Optionally, the support 3b comprises at least one through-hole 4b for each module 5 of the luminaire 6, wherein the respective at least one through-hole 4b is configured according to the module type of the respective module 5.

[0136] For further information on the luminaire of Figure 3, in particular the one or more through-holes 4b of the support 3b, reference is made to the description of through-holes of the support of the luminaire according to the above-described aspect of the invention as well as the description of Figures 1 and 2.

[0137] The luminaire 6 of **Figure 4** corresponds to the luminaire of Figure 3. The description of Figure 3 is correspondingly valid for the luminaire 6 of Figure 4 and in the following mainly additional optional feature(s) or difference(s) of the luminaire of Figure 4 with regard to the luminaire of Figure 3 are described.

[0138] As shown in Figure 4, the PCB 3a comprises a through-hole 4a that is aligned with the through-hole 4b of the support 3b forming a through-hole 8 through the support 3b and the PCB 3a. Optionally, the PCB 3a may comprise more than one through-hole 4a and the support 3b may comprise more than one through-hole 4b, wherein each through-hole 4a of the PCB 3a may be aligned with a respective through-hole 4b of the support 3b forming a respective through-hole 8 through the support 3b and the PCB 3a.

[0139] The module 5 arrangeable (by the second mounting means) in the housing 7 of the luminaire 6 may be a wireless communication module or sensor module configured to emit or transmit electromagnetic waves (radio waves, visible light, infrared waves, ultraviolet waves etc.) via the through-hole 8 of the support 3b and the PCB 3a. In addition or alternatively, the wireless communication module or sensor module 5 may be configured to receive the electromagnetic waves via the through-hole 8. The module 5 may be an indicator module configured to transmit visible light, infrared waves and/or ultraviolet light. The module 5 may be a sensor module configured to measure one or more physical quantities of an environment outside the luminaire 6 and, thus, outside the housing 7. The module 5 may be a sensor module as outlined with regard to Figure 3. Alternatively, the sensor module 5 may be a module configured to detect or measure gases (e.g. carbon dioxide, volatile organic compounds (VOC), smoke etc.) or sound. Namely, the gases and the sound may enter the inside of the housing 7 via the through-hole 8 from outside.

[0140] For further information on the luminaire 6 of Figure 4, in particular the one or more through-holes 8 of the support 3b and the PCB 3a, reference is made to the description of through-holes of the luminaire according to the above-described aspect as well as the description of Figures 1 to 3.

[0141] The luminaire 6 of **Figure 5** corresponds to the luminaire of Figure 4. The description of Figures 3 and 4 is correspondingly valid for the luminaire 6 of Figure 5 and in the following mainly additional feature(s) or difference(s) of the luminaire of Figure 5 with regard to the luminaire of Figure 4 are described.

[0142] As shown in Figure 5, the LED module 1 comprises three LEDs 2. This number is only by way of example and may be different. The luminaire 6 comprises an optic arrangement 10. The through-hole 8 of the support 3b and the PCB 3a may be arranged in an area of the optic arrangement 10, as shown in Figure 5. The optic arrangement 10 may

comprise one or more lenses. The optic arrangement 10 may be translucent or transparent.

[0143] As indicated in Figure 5, the optic arrangement 10 may comprise for each LED 2 of the LED module 1 one or more lenses. Optionally, at the border or edges of the optic arrangement 10 a reflective layer 9 (i.e. one or more reflectors) may be present. The reflective layer 9 may be made of metal or comprise a metal layer. The reflective layer 9 may be arranged at the optic arrangement 10 such that light emission of the LEDs 2 via the optic arrangement 10 is improved. The through-hole 8 of the support 3b and the PCB 3a is arranged such that it is aligned with the optical arrangement 10 in an area of the optical arrangement 10, which does not comprise the reflective layer 9. Thus, electromagnetic waves emitted through the through-hole 8 are not affected by the reflective layer 9 and may pass through the optic arrangement 10 to the outside of the luminaire 6. Electromagnetic waves may also pass from outside the luminaire via the optic arrangement 10 and the through-hole 8 to the inside of the housing 7 and, thus, may be received by the module 5.

[0144] The above feature regarding the optic arrangement 10 may be correspondingly valid for the example of Figure 3, wherein the PCB 2 does not comprise through-holes.

[0145] For further information on the luminaire 6 of Figure 5, in particular the through-hole 8 of the support 3b and the PCB 3a, reference is made to the description of through-holes of the luminaire according to the above-described aspect as well as the description of Figures 1 to 4.

[0146] The luminaire 6 of **Figure 6** corresponds to the luminaire of Figure 4. The description of Figures 3 and 4 is correspondingly valid for the luminaire 6 of Figure 6 and in the following mainly additional feature(s) or difference(s) of the luminaire of Figure 6 with regard to the luminaire of Figure 4 are described. The additional feature of Figure 5 may also be implemented in the luminaire according to Figure 6 and, thus, the description of Figure 5 may be correspondingly valid for the luminaire of Figure 6.

[0147] As shown in Figure 6, the through-hole 8 of the support 3b and the PCB 3a may be covered by a cover 11 that is arranged on a second surface 32b of the support 3b opposite to the surface 32a of the support 3b. This may prevent scattered light through the through-hole 8, covered by the cover 11, in both directions.

[0148] For example, as shown in Figure 6, the cover 11 may be arranged on the second surface 32b of the support 3b such that the module 5 and the through-hole 8, with which the module 5 is associated, are encompassed or covered by the cover 11. In case the module 5 is a wireless communication module or a sensor module configured for wireless communication, the cover 11 may be made of metal or may comprise a metal layer. This may increase the power or intensity of electromagnetic waves (e.g. radio signals) emittable by the wireless communication module or sensor module. That is, this may prevent unwanted transmission of the electromagnetic waves emittable by the wireless communication module or sensor module and, thus, prevent a power or energy loss of the emitted electromagnetic waves.

[0149] Optionally, the cover 11 made of metal or comprising the metal layer is arranged with regard to the wireless communication module or sensor module 5, in particular at least one antenna of the module 5, by a distance that is not a multiple of half the wavelength emittable by the module 5 (not shown in Figure 6). This prevents unwanted reflection effects on the cover 11 when the module 5 emits the electromagnetic waves (e.g. radio signals). The cover 11 may be reflective or comprise a reflective layer.

[0150] The cover 11 may be of a material that prevents light from passing through. This may be the case for example, when the cover covers the module 5, as shown in Figure 6. Alternatively, this may be the case when the cover (or case) 11 is arranged on the light emitting surface 31a of the PCB 3a for covering or sealing the through-hole 4a of the PCB 3a and, thus, the through-hole 8 of the support 3b and the PCB 3a.

[0151] Alternatively, the through-hole 8 of the support 3b and the PCB 3a may be covered or sealed by the cover 11 that is arranged on the surface 31a of the PCB 3a (not shown in Figure 6). The cover 11 may be translucent, optionally transparent.

[0152] The cover 11 may optionally be arranged on a respective surface of the support 3b or PCB 3a such that it is removable or replaceable. In other words, the cover may be removably or replaceably arranged on a respective surface of the support 3b or PCB 3a.

[0153] The above feature regarding the cover 11 may be correspondingly valid for the example of Figure 3, wherein the PCB 2 does not comprise through-holes.

[0154] For further information on the luminaire 6 of Figure 6, in particular the through-hole 8 of the support 3b and the PCB 3a, reference is made to the description of through-holes of the luminaire according to the above-described aspect as well as the description of Figures 1 to 5.

[0155] The above description of the luminaires according to Figures 3 to 6 using a LED module as a light source may be correspondingly valid for the luminaires according to Figures 1 to 2 using at least one LED as a light source. The above description of the luminaires according to Figures 1 and 2 using at least one LED as a light source may be correspondingly valid for the luminaires according to Figures 3 to 6 using a LED module as a light source.

[0156] **Figures 7 (A) and (B)** exemplarily show the impact of difference size of a through-hole of a support on transmission of electromagnetic waves through the through-hole.

[0157] In Figures 7 (A) and (B) a through-hole 4b of a support 3b in the form of a slit or slot is exemplarily shown. The through-hole 4b of Figure 7 (A) has a length or longitudinal extension D1 that equals to multiple of half the wavelength

of electromagnetic waves emittable through the through-hole 4b, wherein the length or longitudinal extension is smaller than two wavelength of the electromagnetic waves. In contrast, thereto, the through-hole 4b of Figure 7 (B) has a length or longitudinal extension smaller than half the wavelength of the electromagnetic waves.

[0158] As shown in Figure 7 (A), the dimension (length) of the through-hole 4b supports and directs a transmission and emission of the electromagnetic waves through the at least one through-hole 4b compared to the through-hole 4b of Figure 7 (B). Namely, according to Figure 7 (A) the electromagnetic waves are directed in a direction perpendicular to a surface (e.g. light emitting surface) of the support 3b. According to Figure 7 (B), the electromagnetic waves are not directed in a specific direction but extend in a circular fashion.

[0159] **Figure 8 (A)** shows a schematic side view of an example of an arrangement of a support, printed circuit board (PCB) and antenna according to an embodiment of the invention. **Figure 8 (B)** shows a schematic top view of the arrangement of a support, printed circuit board (PCB) and antenna of Figure 8 (A).

[0160] Figures 8 (A) and 8 (B) show an example of an arrangement of an antenna 12 of the module 5 that may be arranged (by the second mounting means) in the housing of the luminaire of Figures 3 to 6 with regard to a through-hole 4b of the support 3b of the luminaire 6, in case the module 5 of the luminaire 6 is a wireless communication module or a sensor module configured for wireless communication. The description of Figures 8 (A) and 8 (B) is correspondingly valid for the luminaires of Figures 1 and 2. As shown in Figure 6 (B), the antenna of the module 5 may be at least partly arranged in the area of the through-hole 4b such that a longitudinal axis LA1 of the through hole 4b and a longitudinal axis LA2 of the antenna 12 form an angle α or β greater than 0° and smaller than 90°. The aforementioned is true, irrespective of whether the PCB 3a has a through-hole aligned with the through-hole 4b of the support 3b (as shown in Figures 4 to 6) or not (as shown in Figure 3). For example, the angle may be 45° (i.e. $\alpha = \beta = 45°$). In other words, the longitudinal axis LA2 of the antenna 12 may be rotated by an angle α or β greater than 0° and smaller than 90° (e.g. the angle equals 45°) with regard to the longitudinal axis LA1 of the through-hole 4b. The antenna 12 may be a dipole antenna or monopole antenna. As shown in Figure 8 (B), the through-hole 4b may have the shape of a slit or a slot.

[0161] As shown in Figure 8 (A), the wireless communication module or sensor module 5, in particular its antenna 12, may be arranged at a distance D2 to the support 3b and, thus, the through-hole 4b of the support 3b (not shown in Figure 8 (A)). This optional feature may be in addition or alternatively to the optional feature described above with regard to Figure 8 (B), i.e. rotation of the antenna. In particular, the module 5 (antenna 12) may be arranged at the distance D2 to the surface 32b of the support 3b opposite to the surface 32a of the support 3b. The distance D2 may be smaller than two wavelengths of the electromagnetic waves (i.e. the radio signals) emittable by the wireless communication module or sensor module 5. This ensures operation of the wireless communication module or sensor module 5, in particular of the antenna 1, in the near field, i.e. under near field conditions, with regard to the through-hole 4b of the support 3b. The aforementioned is true, irrespective of whether the PCB 3a has a through-hole aligned with the through-hole 4b of the support 3b (as shown in Figures 4 to 6) or not (as shown in Figure 3).

[0162] The description of Figures 8 (A) and (B) may be correspondingly valid for the luminaires of Figures 1 to 2, which use at least one LED as a light source instead of a LED module.

[0163] In the claims as well as in the description the word "comprising" does not exclude other elements or steps and the indefinite article "a" or "an" does not exclude a plurality. A single element or other unit may fulfill the functions of several entities or items recited in the claims. The mere fact that certain measures are recited in the mutual different dependent claims does not indicate that a combination of these measures cannot be used in an advantageous implementation.

List of reference signs:

[0164]

1	light emitting diode module (LED module)
2	light emitting diode (LED)
3a	printed circuit board (PCB)
31a	surface of PCB 3a (directed in a direction of light emission of luminaire)
31b	second surface of PCB 3a opposite to the surface 31a of PCB 3a
3b	support
32a	surface of support 3b (directed in a direction of light emission of luminaire)
32b	second surface of support 3b opposite to surface 32a of support 3b
4a	through-hole of PCB 3a
4b	through-hole of support 3b
41, 42, 43	different through-holes
5	module
6	luminaire

7	housing
8	through-hole of support 3b and PCB 3a
9	reflective layer
10	optic arrangement
11	cover
12	antenna

Claims

1. A luminaire (6) comprising

- a housing (7),
- a support (3b) that is at least partly encompassed by the housing (7),
- first mounting means for arranging a light source on a surface (32a) of the support (3b) when the light source is mounted to the first mounting means, and
- second mounting means encompassed by the housing (7) for arranging a module (5) in the housing (7) such that the support (3b) is arranged between the module (5) and the light source when the light source is mounted to the first mounting means and the module is mounted to the second mounting means; wherein
- the support (3b) comprises one or more through-holes (4b), and
- the second mounting means is configured to arrange the module (5) with regard to the support (3b) such that the module (5) is associated with at least one through-hole of the one or more through-holes (4b) when the module is mounted to the second mounting means.

2. The luminaire (6) according to claim 1, wherein the light source is

- at least one light emitting diode (2), LED; or
- a LED module (1) comprising at least one LED (2) and a printed circuit board (3a), PCB, on which the at least one LED (2) is arranged.

3. The luminaire (6) according to claim 2, wherein

- the PCB (3a) comprises one or more through-holes (4a), and
- the first mounting means is configured to arrange the LED module (1) on the surface (32a) of the support (3b) such that at least one through-hole (4a) of the one or more through-holes (4a) of the PCB (3a) is aligned with the at least one through-hole (4b) of the support (3b) forming at least one through-hole (8) through the support (3b) and the PCB (3a) when the LED module is mounted to the first mounting means.

4. The luminaire (6) according to any one of the preceding claims, wherein

- the at least one through-hole (4b, 8) of the support (3b), optionally of the support (3b) and the PCB (3a), is configured according to a module type of the module (5), and
- the module type comprises at least one of

  - a sensor module,
  - a wireless communication module, and
  - an indicator module.

5. The luminaire (6) according to any one of the preceding claims, wherein

- the module (5) is a wireless communication module configured to communicate using electromagnetic waves or a sensor module, and
- at least one dimension, a shape and/or a position of the at least one through-hole (4b, 8) of the support (3b), optionally of the support (3b) and the PCB (3a), are adapted to a wavelength of the electromagnetic waves or, respectively, the at least one through-hole (4b, 8) of the support (3b), optionally of the support (3b) and the PCB (3a), is configured to allow the module (5) to measure the one or more physical quantities.

6. The luminaire (6) according to claim 5, wherein

- at least one dimension of the at least one through-hole (4b, 8) of the support (3b), optionally of the support (3b) and the PCB (3a), equals to

  - half the wavelength of the electromagnetic waves, or
  - a multiple of half the wavelength smaller than two wavelengths of the electromagnetic waves.

7. The luminaire (6) according to any one of the preceding claims, wherein

- the module (5) is a wireless communication module configured to communicate using electromagnetic waves, and
- the second mounting means is configured to arrange the module (5) with regard to the at least one through-hole (4b) of the support (3b) such that the distance (D2) between the module (5) and the support (3b) is smaller than or equal to two wavelengths of the electromagnetic waves when the module is mounted to the second mounting means.

8. The luminaire (6) according to any one of the preceding claims, wherein

- the module (5) is a wireless communication module configured to communicate using electromagnetic waves,
- the second mounting means is configured to arrange the module (5) with regard to the at least one through-hole (4b) of the support (3b) such that a longitudinal axis (LAi) of the at least one through hole (4b) and a longitudinal axis (LA2) of at least one antenna (12) of the module (5) form an angle greater than 0° and smaller than 90, optionally of 45°, when the module (5) is mounted to the second mounting means.

9. The luminaire (6) according to any one of the preceding claims, wherein

- the at least one through-hole (4b, 8) of the support (3b), optionally of the support (3b) and the PCB (3a), is sealed by a cover (11) that is arranged

  - on the surface (32a) of the support (3b),
  - on a second surface (32b) of the support (3b) opposite to the surface (32a) of the support (3b), or
  - in the at least one through-hole (4b, 8) of the support, optionally of the support (3b) and the PCB (3a).

10. The luminaire (6) according to claim 9, wherein

- the cover (11) is configured to prevent water and/or dust from passing through the at least one through-hole (4b, 8).

11. The luminaire (6) according to any one of claims 1 to 8, wherein

- the module (5) is a wireless communication module or sensor module configured to communicate using electromagnetic waves,
- the luminaire comprises (6) a cover (11) that is configured to prevent the electromagnetic waves from passing through,
- the cover (11) is configured to be arranged on a second surface (32b) of the support (3b) opposite to the surface (32a) of the support (3b) such that, when the module (5) is mounted to the second mounting means,

  - the module (5) and the at least one through-hole (4b, 8) of the support (3b), optionally of the support (3b) and the PCB (3a), are covered by the cover (11), and
  - the cover (11) is arranged with regard to the module (5), optionally at least one antenna (12) of the module (5), by a distance that is not a multiple of half the wavelength emittable by the module (5).

12. The luminaire (6) according to claim any one of claims 1 to 8, wherein

- the module (5) is a wireless communication module or sensor module configured to communicate using electromagnetic waves,
- the luminaire (6) comprises a cover (11) that is configured to allow the electromagnetic waves passing through and prevent visible light from passing through, and
- the cover (11) is arranged

- on the surface (32a) of the support (3b), and/or
- in the at least one through-hole (4b, 8) of the support (3b), optionally of the support (3b) and the PCB (3a).

13. The luminaire (6) according to claim any one of claims 1 to 8, wherein

- the luminaire (6) may comprise a cover (11) in the form of a sealing film configured to prevent water and/or dust from passing through,
- the cover (11) is arranged on a second surface (32b) of the support (3b) opposite to the surface (32a) of the support (3b) such that the cover (11) encompasses the at least one through-hole (4b, 8),
- the second mounting means is configured to arrange the module (5) with regard to the support (3b) such that the module (5) pushes through the cover (11) when the module (5) is mounted to the second mounting means, wherein the cover (11) and the module(5) are configured to prevent water and/or dust from passing through when the module (5) has pushed through the cover (11).

14. The luminaire (6) according to any one of the preceding claims, wherein

- the luminaire (6) comprises an optic arrangement (10), and
- the at least one through-hole (4b, 8) of the support (3b), optionally of the support (3b) and the PCB (3a), is arranged in an area of the optic arrangement (10).

15. The luminaire (6) according to any one of the preceding claims, wherein

- the second mounting means is configured to arrange at least two different modules (5) with regard to the support (3b),
- the support (3b), optionally the support (3b) and the PCB (3a), comprises a plurality of through-holes (4b, 8),
- the second mounting means is configured to arrange a first module of the at least two different modules (5) with regard to the support (3b) such that, when the first module is mounted to the second mounting means, the first module is associated with at least one through-hole of the plurality of through-holes (4b, 8) that is configured for the first module,
- the second mounting means is configured to arrange a second module of the at least two different modules (5), different to the first module, with regard to the support (3b) such that, when the second module is mounted to the second mounting means, the second module is associated with at least one further through-hole of the plurality of through-holes (4b, 8) that is configured for the second module, and
- the at least one through-hole and the at least one further through-hole are different to each other.

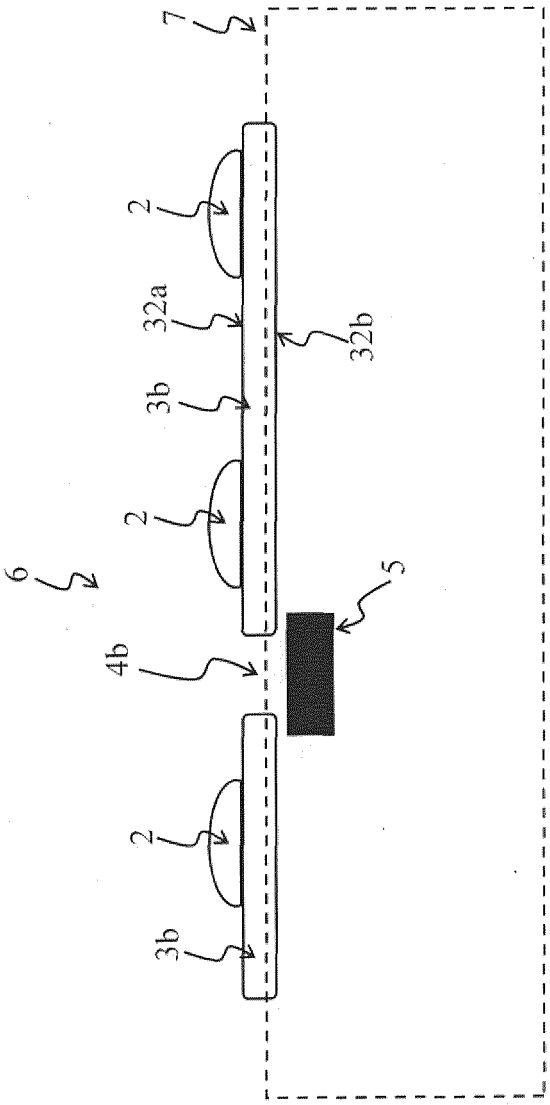


Figure 1

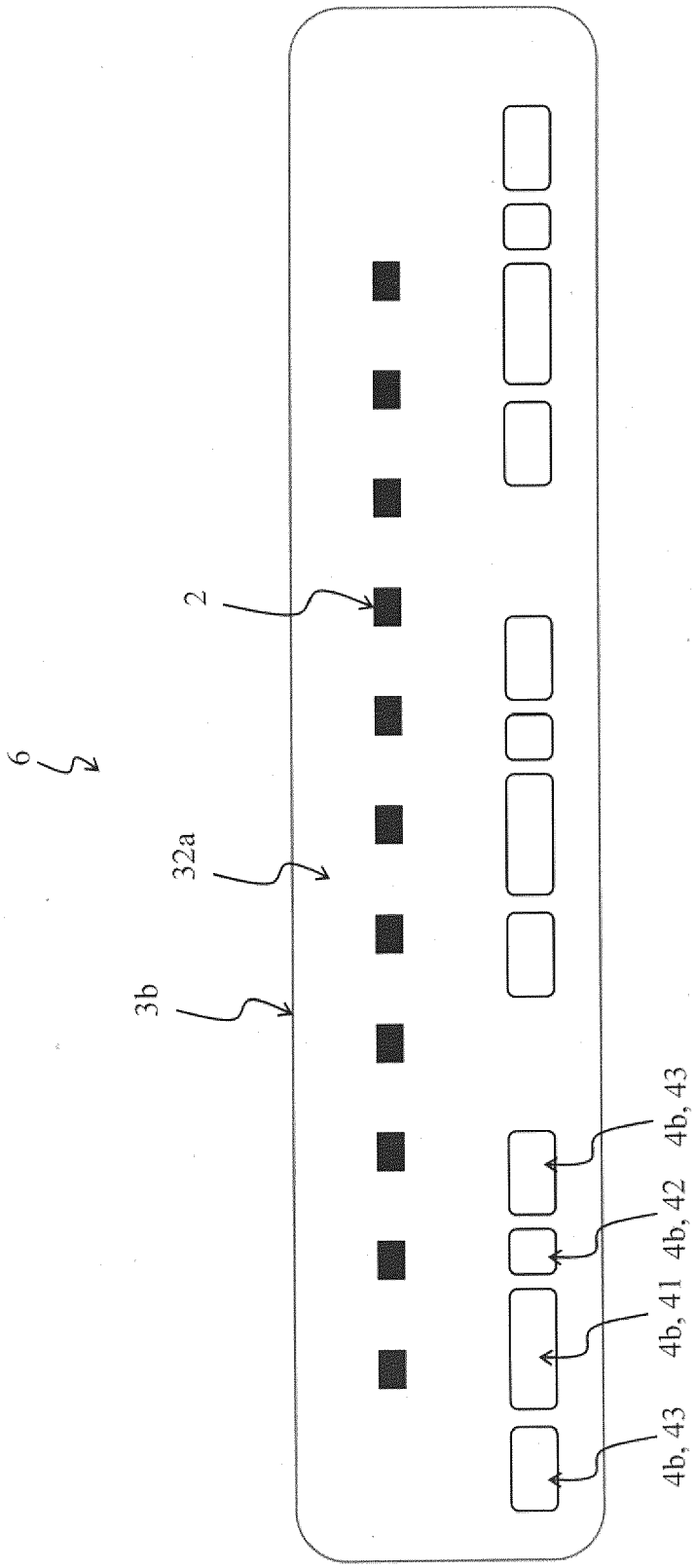


Figure 2

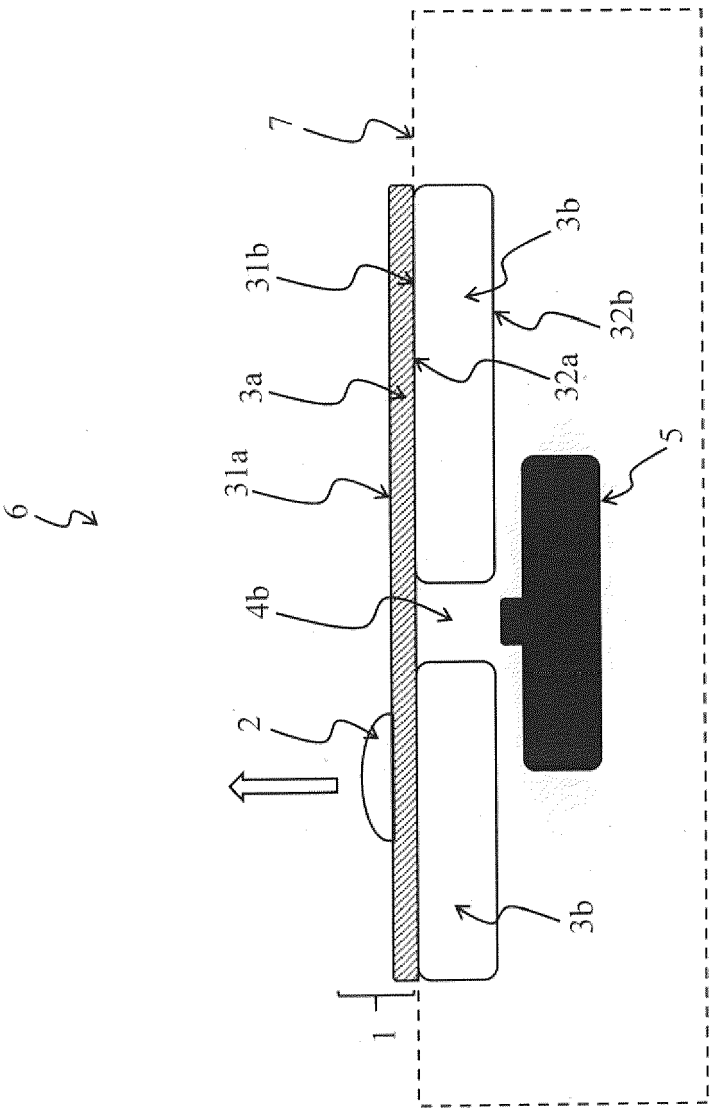


Figure 3

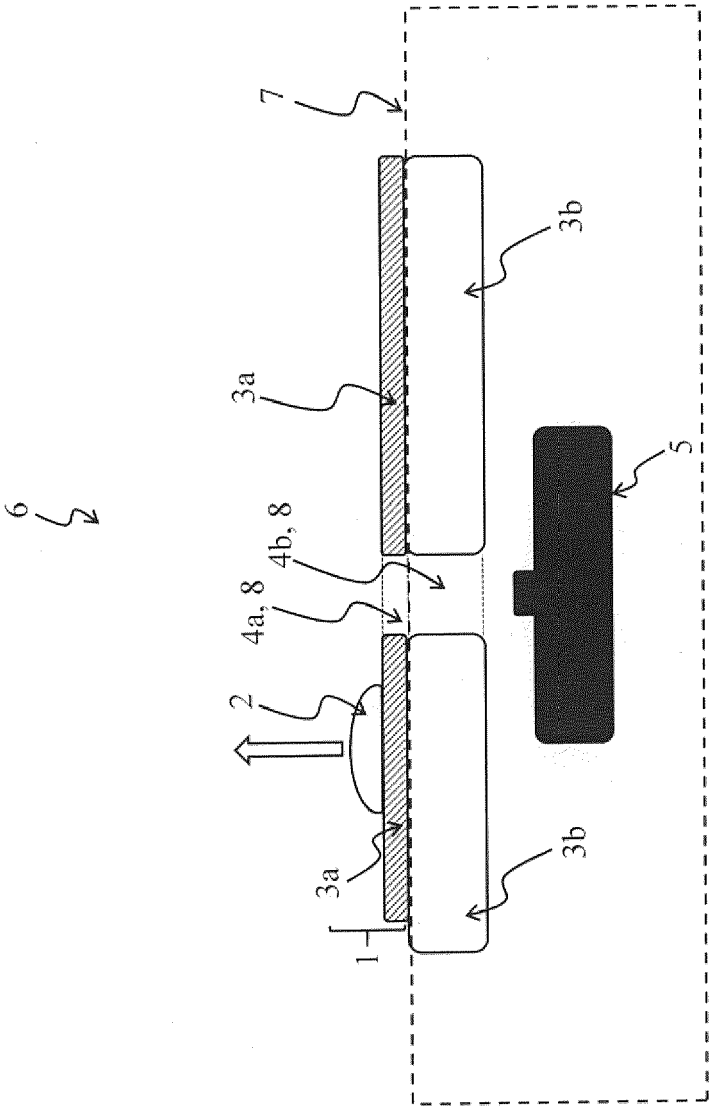


Figure 4

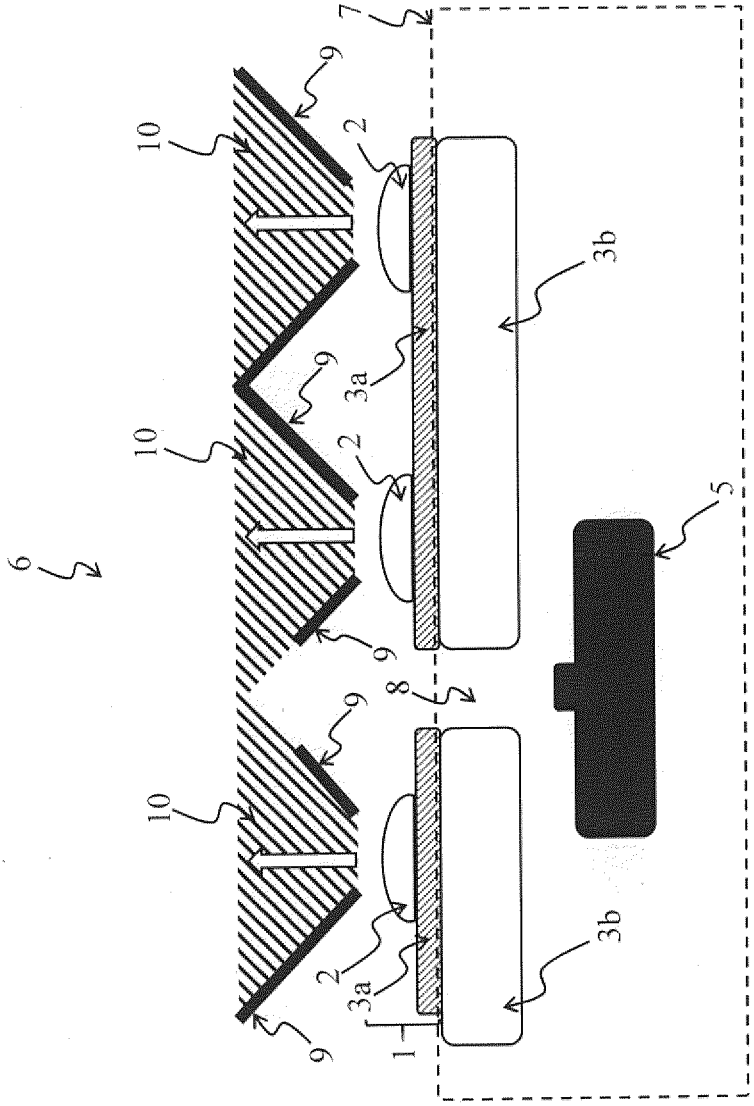


Figure 5

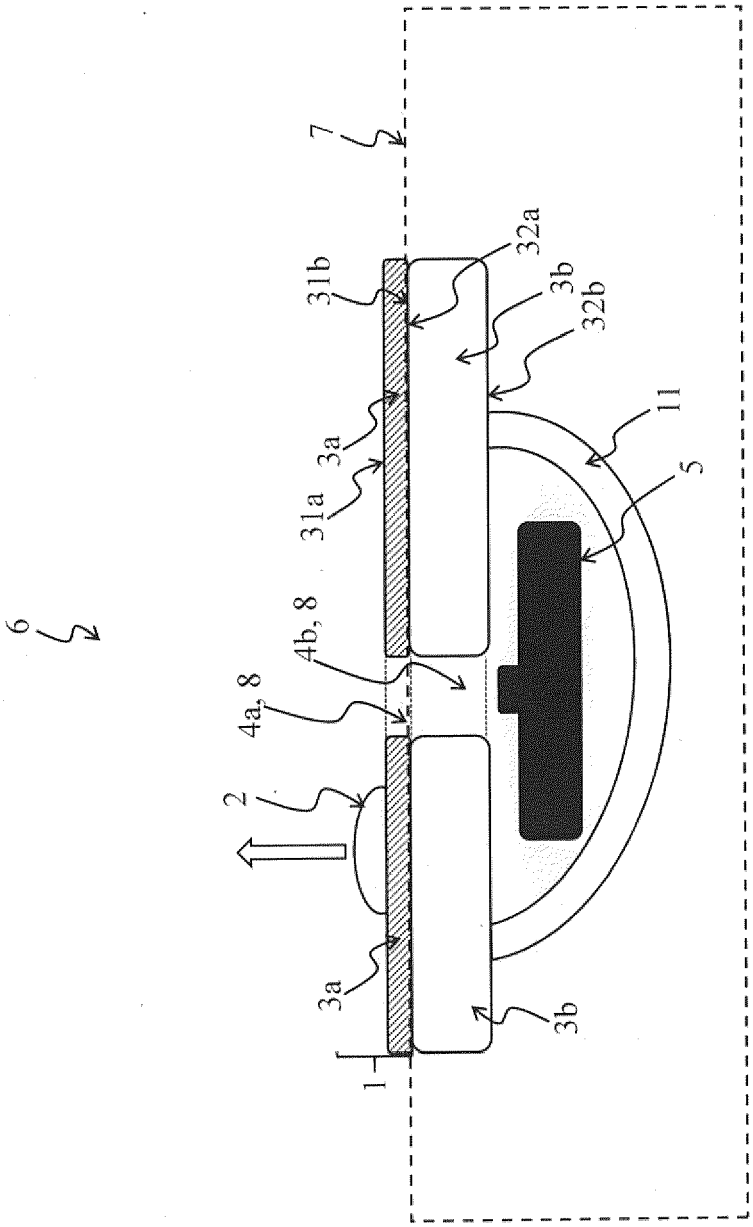
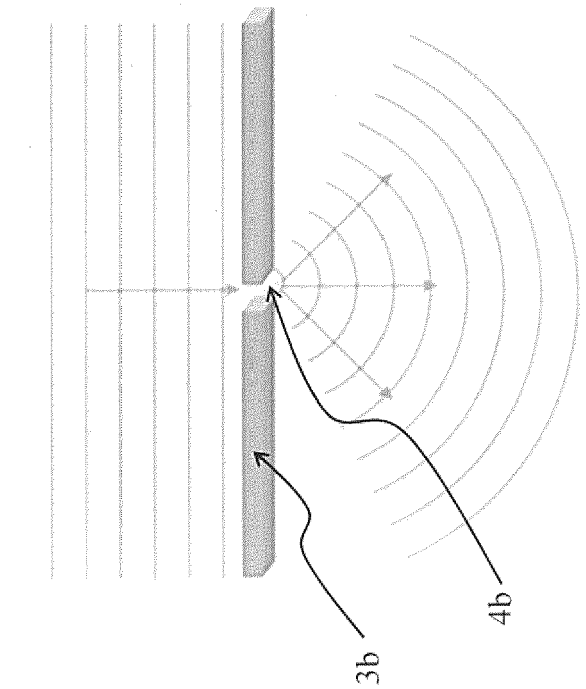


Figure 6



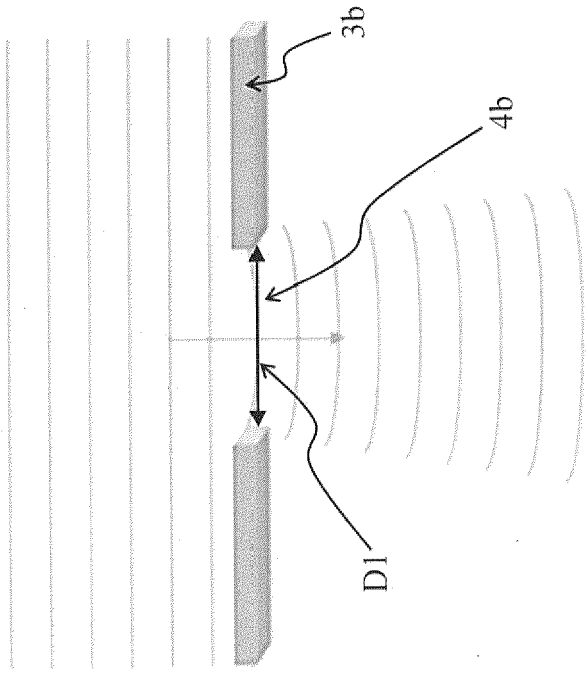


Figure 7

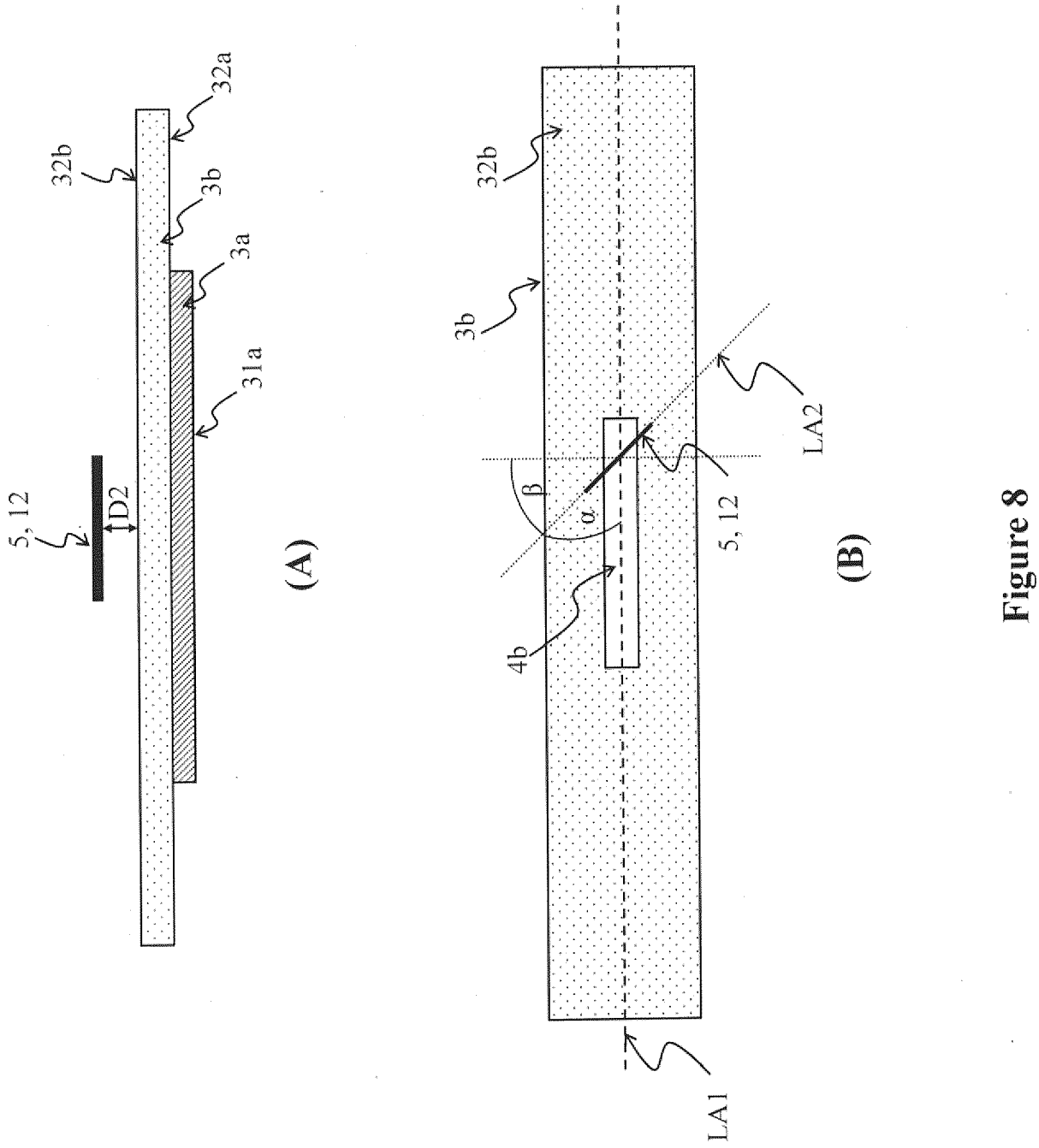


Figure 8

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EUROPEAN SEARCH REPORT

Application Number
EP 22 17 0575

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F21V
F21Y

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	11 October 2022	Dinkla, Remko

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