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(54) **A MODULE AND LAMP COMPRISING SAID MODULE, A METHOD OF CHARGING THE LAMP, AND A METHOD OF SEPARATING SAID MODULE**

(57) The present invention relates to a module (1) with a water-resistant housing (2) comprising a transparent member (3). Inside said housing (2) the module comprises a light source (10) arranged to emit light through said transparent member (3), a rechargeable battery (20) for powering said light source (10), a controller (30) for controlling the light intensity of the light source (10), and a charging coil (40) connected to and configured for charging the rechargeable battery (20) when exposed to an external charger unit (45).

Module (1) comprises a solar panel (50) arranged adjacent to the charging coil (40) and defining an exterior face of the module (1). The solar panel (50) is connected to and configured for charging the rechargeable battery (20).

The invention further relates to a lamp (60) comprising said module (1), a part (5) of the module (1), a method (100) of recharging said lamp (60), and a method (500) of replacing wearing components of the module (1).

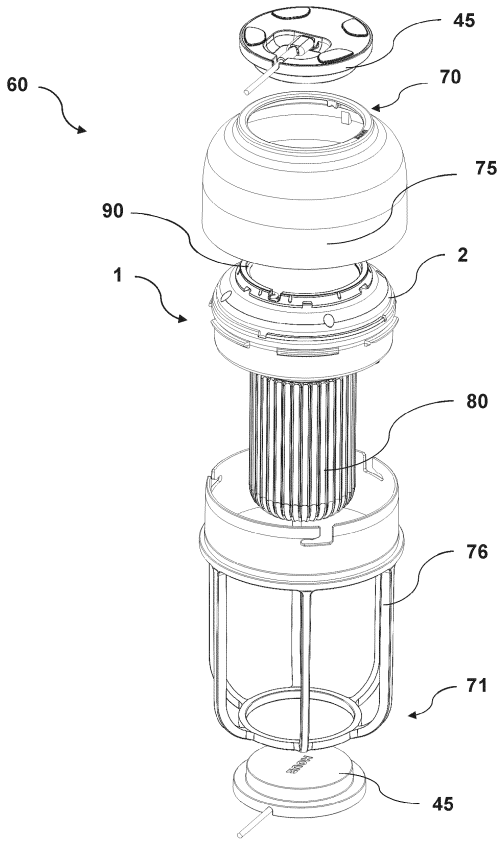

Fig 2

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Description

Field of the Invention

[0001] The present invention relates to a module with a water-resistant housing comprising a transparent member. Inside said housing the module comprises a light source arranged to emit light through said transparent member, a rechargeable battery for powering said light source, a controller for controlling the light intensity of the light source, and a charging coil connected to and configured for charging the rechargeable battery when exposed to an external charger unit.

[0002] Module comprises a solar panel arranged adjacent to the charging coil and defining an exterior face of the module. The solar panel is connected to and configured for charging the rechargeable battery.

[0003] The invention further relates to a lamp comprising said module, a part of the module, a method of recharging said lamp, and a method of replacing wearing components of the module.

Background of the Invention

[0004] Consumer products today are not designed for longevity, instead they are cheaply constructed and only meant for a few years of operation. However, with the current environmental challenges, there is a need for this culture to end and instead focus on how to increase the operational lifetime of the products.

[0005] Devices, such as lamps, chargeable by both solar power and wireless induction charging require the solar panel to be arranged in different parts of the device, e.g. in opposite ends as both requires a large surface to enable charging efficiently. This may lead to multiple batteries and/or and uneven weight distribution causing an unstable device. Today, devices instead use plug-in chargers to minimize the size and weight of the device, however this causes a problem when used outside and/or in humid environments. Often, the device needs to comprise a plug with a removable seal to achieve a water-resistant device.

[0006] By enabling wireless charging interacting with the charging coil through the solar panel, the size of module may be minimized as both solar and wireless charging is performed from the same external face of the module, and thus be chargeable without compromising the water-resistance.

Object of the Invention

[0007] One objective of the present disclosure is to achieve a module, with a water-resistant housing, configured for charging using both solar and inductive charging through the solar panel to achieve a compact module.

[0008] Another object of the present disclosure is to achieve a lamp comprising said module for use both indoors and outdoors.

[0009] Further objects of the invention are to achieve a method of recharging a lamp according to the invention, and a method of replacing wearing components of the module and the lamp.

Description of the Invention

[0010] One objective of the invention is achieved by a module with a water-resistant housing comprising a transparent member.

[0011] Inside said housing, the module comprises:

- a light source arranged to emit light through said transparent member;
- a rechargeable battery configured for powering said light source;
- controller configured for controlling the light intensity of the light source; and
- a charging coil connected to and configured for charging the rechargeable battery when exposed to an external charger unit.

[0012] The module comprises a solar panel arranged adjacent to the charging coil and defines an exterior face of the module.

[0013] The solar panel is connected to and configured for charging the rechargeable battery.

[0014] The term transparent, in regard to the transparent member, is used to describe any material which permits light from the light source to emit through. Thus, the transparent member may be constructed in transparent or semi-transparent materials. Furthermore, the transparent member may be coloured.

[0015] At least one gasket may be used to ensure a water-resistant seal with the housing.

[0016] The housing may have an Ingress Protection Rating of at least IP65.

[0017] An advantage of the water-resistant housing is that the module is suitable for use indoors in wet as well as dry

rooms, and outdoors.

[0018] The light source may be one or more LEDs. Alternatively, the light source may be a light bulb such as an incandescent light bulb, fluorescent light bulb, halogen light bulb, LED light bulb, etc.

[0019] The light source may be configured for emitting coloured light. The light source may be configured for emitting uncoloured light. The appearance of the warmth and colour of the light source may be adjustable.

[0020] The controller is configured for controlling the light intensity of the light source and switching the light on and off. The controller may control the light intensity between one or more light mode. One mode may be 100% light intensity and the additional modes may be predefined percentages of the first mode, thereby specifying how much the light is dimmed.

[0021] In an aspect, the controller may be configured for adjusting the light intensity between three modes: 100%, 50%, and 10%.

[0022] In another aspect, the controller may be configured for adjusting the light intensity between four modes: 100%, 75%, 50%, and 25%.

[0023] In yet another aspect, the controller may be configured for adjusting the light intensity non-incrementally between 100% and 0%, 100% and 10%, or 100% and 25%.

[0024] One advantage of adjusting the light intensity is achieving a light source adaptable for different situations and adaptable for different amounts of ambient light. The light source being adaptable means, it can be used both for creating cosy lighting at the dinner table at nighttime and for providing a reading light for both daytime and nighttime.

[0025] In one aspect, the controller may comprise a swich pin configured for controlling the light intensity between the light modes and for switching the light source on and off. The switch may be used to toggle between the different light modes by pressing the switch multiple times or by turning a swich turn knob incrementally or non-incrementally. A short press on switch may toggle between the modes and a longer press, for instance 1.5 seconds, may turn the light off in any mode. The light modes may comprise an off mode, for instance 0% light, used to turn off the light source.

[0026] In another aspect, the controller may be controlled remotely using a device such as a remote control, smart phone, or a tablet. The device may use technology such as infrared, Bluetooth, or radiofrequency, to communicate with the controller and thus control the light intensity between the light modes and switching the light source on and off.

[0027] In yet another aspect, the controller may be controlled by a switch and by remote control.

[0028] When the rechargeable battery has run out of battery, the light source may not switch on until the controller, either by pressing a switch or by remote control, switches the light source on.

[0029] When fully recharged, the rechargeable battery may have a minimum of eight hours battery life with 100% light.

[0030] The solar panel is arranged substantially on the outside of the water-resistant housing.

[0031] Wires may connect the solar panel with the rechargeable battery inside the housing. Said wires may lead through an opening in the housing and the opening may comprise one or more sealing means, such as a gasket, or a sealing ring, or by wire wrapping, or gluing the wires, used alone or in combination. The sealing means may be configured for providing a water-resistant connection between the wires and the opening.

[0032] The charging coil is arranged inside the housing and arranged adjacent to the solar panel.

[0033] In an aspect, the solar panel and the charging coil may be arranged back-to-back.

[0034] In another aspect, the solar panel is arranged substantially outside the housing wherein the face of the housing that the solar panel is arranged on, is between 0.5 and 5 mm, preferably about 0.8 and 1.5 mm. The face may comprise a material suitable for not interfering with the magnetic flux from the external charger unit, such as a plastic material. If the face comprises a metal such as aluminum, at least part of the face may be in a non-interfering material to avoid heating the face and/or minimize the effectiveness of the wireless charging.

[0035] An advantage of the face of the housing in the specified range, is minimizing interference from housing when charging wirelessly using an external charger unit.

[0036] The solar panel may have a thickness of maximum 15mm, but preferably have a thickness less than 2.5mm to minimize interference from the solar panel when charging wirelessly using an external charger unit.

[0037] An advantage of minimizing the thickness of the face and the solar panel, is minimize interference and thereby loss of energy from the thickness and material of the face and the solar panel, when charging wirelessly using an external charger unit.

[0038] The term adjacent is defined as the distance between the solar panel and the charging coil is less than 10 mm, preferably between 0 and 1.5 mm.

[0039] An advantage of the charging coil being arranged adjacent to the solar panel is that an external charger unit can be arranged adjacent to or on top of the solar panel, and be in wireless communication with the charging coil, thus enabling wireless charging using the external charger unit interacting with the charging coil, through the solar panel.

[0040] As both the solar panel and the charging coil need a considerable surface area, enabling wireless charging through the solar panel make it possible to decrease the size of module as both solar and wireless charging is performed from the same external face of the module.

[0041] If mainly used indoors or in a dark room such as a garage or attic, the solar panel may be obsolete and can be removed from the module.

[0042] In one embodiment of the module, the housing may comprise at least a first releasably attached part and/or a second releasably attached part.

[0043] The first and/or second releasably attached part may be configured for providing the water-resistant housing when in an attached state, and for providing access to internal and external components of the housing when in a detached state.

[0044] In an aspect of the housing, the first and second releasably attached parts may comprise complementary shaped indentations and protrusions. At least the first or the second releasably attached part may comprise one or more gaskets or sealing rings to ensure the housing is water-resistant in the attached state.

[0045] The first and/or second releasably attached parts may be attached by using fastening means such as screws, bolts and nuts, snap fits, etc.

[0046] An advantage of the first and second part of the housing being releasably attached to one another is achieving water-resistant housing in the attached state and thus making the module suitable for use both outdoors and indoors.

[0047] Another advantage of the first and second part of the housing being releasably attached to one another is achieving easy access to the wearing components inside the housing when in the detached state. Said wearing components inside the housing may be the rechargeable battery, the controller, the light source, the charging coil, and if present, connectors, such as wires, connecting the rechargeable battery with the solar panel arranged substantially outside the housing.

[0048] By creating easy access to the components inside the housing, the wearing components may easily be serviced, repaired, and/or replaced. This ensures that the entire module does not have to be replaced if one or more of the wearing components is defective, and further ensures that the module is easily disassembled such that the individual components can be removed and correctly disposed of or recycled.

[0049] The internal and external components of the housing may be wearing components such as the light source, the rechargeable battery, the charging coil, and the solar panel. If present, the wearing components may include connectors, such as wires, connecting the rechargeable battery with the solar panel arranged substantially outside the housing.

[0050] In one embodiment, the module may comprise a main PCB. The rechargeable battery, the charging coil, the solar panel, and optionally, the light source may each be configured for being releasably attached to the main PCB (35).

[0051] The light source may be arranged on the main PCB and/or arranged on a second PCB arranged releasably connected to the main PCB.

[0052] In an aspect one or more of: the rechargeable battery, the charging coil, the solar panel, the light source, and second PCB, may be releasably attached to the main PCB. Thus, some of the components may be releasably attached to the main PCB, while others are fixed to the main PCB and/or not attached to the main PCB.

[0053] The main PCB may be flexible with print on both sides.

[0054] The rechargeable battery, the charging coil, and the solar panel may each be connected to the main PCB using a plug. The light source may be arranged directly on the main and/or arranged on a second PCB arranged connected to the main PCB using a plug.

[0055] An advantage of releasably attaching the wearing components to the main PCB, for instance by using plugs, is achieving easy removal and replacement of the wearing components inside and/or outside the housing. Another advantage is creating an easily accessible modular main PCB ensuring not only that the components can be removed and replaced, but furthermore ensuring that the different components can be replaced by upgraded components or a different type of component. A yet further advantage is enabling the end consumer to either remove components on their own or to have the manufacturer or a service center remove the components.

[0056] In one embodiment, the module may comprise a battery indicator for indicating a status of the rechargeable battery.

[0057] The battery indicator may comprise one or more LEDs.

[0058] In an aspect of the battery indicator, a different number of LEDs may light up depending on the status of the rechargeable battery, for instance one LED for running low, two LEDs for half full, and three LEDs for battery fully charged.

[0059] In another aspect of the battery indicator, the one or more LEDs may change colour depending on the status of the rechargeable battery, for instance red for running low, yellow for half full, and green for battery fully charged.

[0060] In use, the battery indicator may show the status of the rechargeable battery for a few seconds, for instance 4 seconds, when the light source is switched on or if the light intensity is adjusted using the controller.

[0061] In use, the battery indicator may show the status of the rechargeable battery for a few seconds, for instance 4 seconds, initially when the charging coil is charged by wireless charging using an external charger unit interacting with the charging coil through the solar panel.

[0062] In use, the battery indicator may show the status of the rechargeable battery for a few seconds, for instance 4 seconds, initially when the solar panel is recharging the battery by use of solar power.

[0063] In one embodiment of the module, the controller may be configured for automatically controlling the light intensity of the light source.

[0064] The controller may be configured for automatically changing the light intensity after a predefined time period or

sensor input from a sensor, for instance a light sensor detecting a change in the ambient light.

[0065] In an aspect of the controller, 100% or 50% initial light may be dimmed to 10% after six hours of uninterrupted use and switched off after one additional hour of uninterrupted use at 10%. Additionally, 10% of initial light may be switched off after ten hours of uninterrupted use.

[0066] In another aspect of the controller, 100%, 75%, or 50% initial light may be dimmed to 25% after five hours of uninterrupted use and switched off after two additional hours of uninterrupted use at 25%. Additionally, 25% of initial light may be switched off after nine hours of uninterrupted use.

[0067] In one embodiment of the module, the transparent member may be a light disperser.

[0068] The light disperser may be coloured or clear, and transparent or semi-transparent. The light disperser may be a light dispersing dome. The disperser may be configured for dispersing light and/or colour from the light source.

[0069] In one embodiment of the module, the charging coil may be compatible with an external charger unit adapted for wireless charging.

[0070] The external charger unit may comprise a plug for a power cord or comprise a power cord. The external charger unit may comprise a rechargeable battery such that external charger unit may be used to charge the module when it is not connected to a power outlet.

[0071] The external charger unit may comprise support feet for providing a slip-resistant and/or scratch-preventing contact with the surface on which the external charger unit is arranged. The support feet may comprise material such as rubber, silicone, or felt.

[0072] In an aspect, the external charger unit may comply with the Qi standard of wireless charging or other means of inductive charging. The external charger unit may be a standard wireless charger configured for wirelessly charging smart phones, tablets, smart watches etc.

[0073] In use, the external charger unit may be arranged centred on or adjacent to the solar panel and wirelessly charging by interacting with the charging coil through the solar panel.

[0074] The housing may comprise a protrusion adjacent to the solar panel, wherein the protrusion and the external charger is complementary shaped to assist in centering the external charger with the charging coil arranged adjacent to the solar panel. An advantage of assisting in centering the external charger is to increase the effectiveness of the wireless charging. A further advantage of the protrusion is to provide a stable base when the solar panel is arranged on the external charger unit and when the external charger is arranged on top of the solar panel.

[0075] A further objective of the invention is achieved by a part of the module, according to the invention.

[0076] The part of the module comprises the first releasably attached part, the charging coil, and the solar panel.

[0077] Each of the charging coil and the solar panel is configured for being in wired communication with a rechargeable battery.

[0078] The part of the module may be configured for use in a variety of application benefitting from being powered and charged by both an external charger unit and solar panel. Such applications may be power banks, sound equipment, outdoor equipment such as cooking ware, flashlight, etc.

[0079] An advantage of the part of the module, is the possibility to achieve any module benefitting from double charging enabling both solar and wireless charging and being suitable for comprising internal components in a limited amount of space.

[0080] The part of the module may be the corner stone of a product platform for achieving a variety of products and options for product variations.

[0081] Another objective of the invention is achieved by a lamp.

[0082] The lamp comprises:

- a top base;
- a bottom base;
- a light dome arranged at a position between the top base and the bottom base; and
- a module according to the invention, wherein the module is connected to one end of the light dome and arranged between said light dome and the top base.

[0083] The light dome may be constructed in glass or in a plastic material such as acrylic.

[0084] The light dome may be transparent or semi-transparent. The light dome may be clear or coloured.

[0085] The light dome may be configured for spreading and/or deflecting light from the light source.

[0086] The light dome may be cylindrical with an open or closed end opposite from the module. The cylindrical part of the light dome may comprise bevels to create light patterns from the light being deflected.

[0087] The top base may provide a stable base when the lamp is arranged on top of the external charger unit interacting with the charging coil and thereby charge through the solar panel.

[0088] The top base may provide a stable base when the lamp is arranged on the top base on a surface, such as on a table, on a pathway, on grass, etc. In this position, the light source is arranged facing substantially upwards.

[0089] The bottom base may provide a stable base when the lamp is arranged on top of the external charger unit, thus using the external charger unit to add stability to the lamp. This may further add stability to the lamp when the solar panel is used to recharge the rechargeable battery.

[0090] The bottom base may provide a stable base when the lamp is arranged on the bottom base on a surface, such as on a table, on a pathway, on grass, etc. In this position, the light source is arranged facing substantially downwards.

[0091] The top and bottom base, and the external charger unit may be complementary shaped to ensure that the external charger unit can be used as a stand when the lamp is arranged on the top base and the bottom base.

[0092] When the lamp, with the top base facing downwards, is arranged on the external charger unit, the lamp may appear as a regular lamp with a plinth, that optionally is connected to a power outlet.

[0093] When the lamp, with the bottom base facing downwards, is arranged on the external charger unit, the lamp may appear as a regular lamp with a plinth.

[0094] The external charger unit may increase the stability of the lamp when used as a plinth.

[0095] In an aspect of the light dome, the bottom base may be an end of the light dome opposite the module.

[0096] In one embodiment, the lamp may comprise a protective structure for covering the module at least partly, leaving at least the solar panel fully or partly uncovered.

[0097] The protective structure may comprise at least two parts. The protective structure parts may be constructed in a material such as aluminium, wood, a plastic material, etc.

[0098] The protective structure may be made in a variety of different designs and be used with the same module. The protective structure may be interchangeable to achieve different appearances and to be easily replaced when damaged.

[0099] The protective structure may comprise a protrusion adjacent to the opening for the solar panel, wherein the protrusion and the external charger is complementary shaped. The protrusion may assist with centering the external charger with the charging coil arranged adjacent to the externally facing solar panel. An advantage of assisting in centering the external charger is to increase the effectiveness of the wireless charging. A further advantage of the protrusion is to provide a stable base when the top base of lamp is arranged on the external charger unit and when the external charger is arranged on top of the top base of the lamp.

[0100] The module is protected by the two halves assembled to hold the module in place and protect if being dropped. This is especially important as the lamp can easily be moved around and used at different positions and at different locations both inside and outside. Outside use further makes the lamp susceptible to gusts of wind as well as being arranged on uneven surfaces.

[0101] In one embodiment, the lamp may comprise a frame structure comprising the bottom base.

[0102] An advantage of the frame structure is increasing the distance between the surface on which the bottom base is arranged and the light source. A further advantage is achieving a reading light with the light source substantially facing downwards.

[0103] The bottom base and the external charger unit may be complementary shaped to increase stability when arranged on the external charger.

[0104] The frame structure may be removably attached to the lamp. The frame structure may be interchangeable to achieve different appearances and to be easily replaced when damaged. Furthermore, the damaged frame structure may subsequently be recycled or correctly disposed of.

[0105] The frame structure may be the combined with the cover structure or the light dome.

[0106] In one embodiment of the lamp, the light dome may be removably attached to the module.

[0107] In an aspect, the light dome may be removably attached to the module using complementary shaped threads, snap fits, magnets etc.

[0108] An advantage of the light dome being releasably attached to the module is that the light dome is easily interchangeable with another light dome, for instance in a different colour and/or a different bevel pattern to achieve different appearance. Furthermore, being releasably attached ensures that the light dome may be easily interchanged if damaged and the damaged component can be recycled or correctly disposed of.

[0109] In one embodiment, the lamp may comprise hanging means for suspending the lamp from an anchoring object.

[0110] The term hanging means may be used interchangeably with the term hanger.

[0111] The anchoring object may be a branch from a tree, a planting rack, a fixture in a celling or a pergola, etc.

[0112] The lamp can stand in two positions, either on the bottom base or on the top base, or hang from the build in hanger.

[0113] The hanging means may be in a hanging position configured for being used when the lamp is hanging from an anchoring object. The hanging means may further be used as a handle for carrying the lamp. The hanging means may further be used to create a stand for positioning the lamp in a position between a substantially vertical and horizontal position, for instance partially lying down leaning on the hanger.

[0114] The hanging means may be in a dormant position when the hanger is not in use.

[0115] In an aspect of the hanger, in the dormant position, the hanger may be substantially visually hidden by the module or the protective structure. Visually hidden meaning both hidden and not apparent when looking at the lamp, for instance by being flush up against a protrusion or edge.

[0116] In another aspect of the hanger, in the dormant position, the hanger may be visible on the lamp, for instance be in a contrasting colour, texture or material, or blend in with existing features.

[0117] Yet another aspect of the invention is achieved by a method of charging a lamp.

[0118] The method comprises acts of:

- providing the lamp according to an aspect of the invention;
- arranging the lamp on the bottom base with the uncovered solar panel facing upwards, or arranging the external charger unit adjacent to the solar panel and in wireless communication with the charging coil; and
- recharging the rechargeable battery by:
    - exposing the solar panel to the sun; or
    - wireless charging using an external charger unit interacting with the charging coil through the solar panel.

[0119] In an aspect, the advantages achieved by the method of charging the lamp is substantially similar to the advantages achieved by the module and the lamp of the invention.

[0120] A yet further aspect of the invention is achieved by a method of replacing wearing components of the module according to the invention.

[0121] The method comprises one or more acts of:

- accessing the inside of the housing, optionally by separating two releasably attached parts;
- releasing from the main PCB one or more wearing components such as:
    - the light source and/or the second PCB;
    - the rechargeable battery;
    - the controller;
    - the charging coil;
    - the solar panel,
- removing one or more components from the module; and
- reattaching one or more wearing components, being a replacement component, repaired component, and/or upgraded component in the module and reattaching said component to the main PCB.

[0122] In an aspect, the advantages achieved by the method of charging the lamp is substantially similar to the advantages achieved by the module and the lamp of the invention.

[0123] The act of releasing and reattaching may further comprise an act of unfastening and fastening the wearing component from/to the housing. For instance, the battery may be fastened to the housing using screws or other fastening means, thus the rechargeable battery may need to be unfasted before it can be removed. The same may apply to one or more of the other wearing components.

[0124] An advantage of the invention is that the module is modular in terms of the ability to interchange and replace the different components when needed, either due to damage, repair, or upgrade. This ensures that the module can be kept in operation for many years, since damaged or broken components can be repaired and/or replaced, and further, that the same components can be upgraded when needed, thereby preventing the module becoming outdated.

[0125] Similarly, another advantage of the invention is that the lamp is modular in terms of the ability to interchange and replace the different components when needed, either due to damage, repair, upgrade, or to change the visual appearance of the lamp. This ensures lamp can withstand changing decoration trends and thereby be kept in relevant for many years. Additionally, the lamp may change its appearance by removing or adding components, for instance remove/add the frame structure. The lamp thereby may be component of a product platform comprising different components.

Description of the Drawings

[0126] Various examples are described hereinafter with reference to the figures. Like reference numerals refer to like elements throughout. Like elements will, thus, not be described in detail with respect to the description of each figure. It should also be noted that the figures are only intended to facilitate the description of the examples. They are not intended as an exhaustive description of the claimed invention or as a limitation on the scope of the claimed invention. In addition, an illustrated example need not have all the aspects or advantages shown. An aspect or an advantage described in conjunction with a particular example is not necessarily limited to that example and can be practiced in any other examples even if not so illustrated, or if not so explicitly described.

[0127] Exemplary embodiments of the invention are described in the figures, whereon:

Fig. 1 illustrates the lamp according to the invention;
Fig. 2 illustrates an exploded view of the lamp;
Fig. 3 illustrates a cross section (A-A) of the lamp;
Fig. 4 illustrates the lamp according to the invention;
Fig. 5 illustrates hanging means;
Fig. 6 illustrates cross sections (A-A) of the module;
Fig. 7 illustrates a cross section (A-A) of the module and light dome;
Fig. 8 illustrates a part of the module;
Fig. 9 illustrates examples of automatic adjustment of the light intensity;
Fig. 10 illustrates a method of charging the module and a method of replacing components in the module.

Detailed Description of the Invention

[0128] Exemplary examples will now be described more fully hereinafter with reference to the accompanying drawings. In this regard, the present examples may have different forms and should not be construed as being limited to the descriptions set forth herein. Accordingly, the examples are merely described below, by referring to the figures, to explain aspects.

[0129] Throughout the specification, when an element is referred to as being "connected" to another element, the element is "directly connected" to the other element, "electrically connected", "fluidic connected" or "communicatively connected" to the other element with one or more intervening elements interposed there between.

[0130] The terminology used herein is for the purpose of describing particular examples only and is not intended to be limiting. As used herein, the terms "comprises" "comprising" "includes" and/or "including" when used in this specification specify the presence of stated features, integers, steps, operations, elements, and/or components, but do not preclude the presence or addition of one or more other features, integers, steps, operations, elements, components, and/or groups thereof.

[0131] Unless otherwise defined, all terms used herein (including technical and scientific terms) have the same meaning as commonly understood by those skilled in the art to which this invention pertains. It will be further understood that terms, such as those defined in commonly used dictionaries, should be interpreted as having a meaning that is consistent with their meaning in the context of the relevant art and will not be interpreted in an idealized or overly formal sense unless expressly so defined in the present specification.

No	Item
1	Module
2	Housing
3	Transparent member
4a	First releasably attached part
4b	Second releasably attached part
5	Part of module
10	Light source
20	Rechargeable battery
30	Controller
35	Main PCB
36	Second PCB
40	Charging coil
45	External charger unit
50	Solar panel
60	Lamp
70	Top base
71	Bottom base
75	Protective structure
76	Frame structure
80	Light dome
90	Hanging means
100	Method of charging
200	Providing

(continued)

No	Item
300	Arranging
400	Recharging
500	Method of replacing
600	Accessing
700	Releasing
800	Removing
900	Reattaching component in the module
950	Reattaching component to the main PCB

[0132] Figures 1-5 illustrate an embodiment of the lamp 60.

[0133] The lamp 60 comprises a top base 70 and a bottom base 71.

[0134] The lamp 60 comprises a light dome 80 arranged at a position between the top base 70 and the bottom base 71. In the illustrated embodiments, the end of the light dome 80 nearest to the bottom base 71 is rounded. In other embodiments (not shown) the end of the light dome 80 may be bottom base 71 and be configured for being used as a stand when the solar panel 50 is facing upwards, for instance when charging the rechargeable battery 20 using solar power, or simply when used as a lamp with the light source arranged facing substantially downwards and optionally to the sides and/or mainly used in a hanging position.

[0135] The lamp 60 comprises a module 1 connected to one end of the light dome 80 and arranged between said light dome 80 and the top base 70.

[0136] The module 1 comprises a light source 10, a rechargeable battery 20, a controller 30, a charging coil 40, and a solar panel 50. The module 1 is further described in relation to figures 6-8.

[0137] Figure 2 further illustrates the external charger unit 45 and its position near the top base 70 during wireless charging, and its position near the bottom base 71 when used as a stand.

[0138] The lamp 60 further comprises a protective structure 75 covering at least partly the module 1, leaving at least the solar panel 50 fully or partly uncovered.

[0139] The lamp 60 further comprises a frame structure 76 comprising the bottom base 71. In figure 2, means for releasably connecting the frame structure 76 to the protective structure 75 is visible as slots configured for engaging complementary shaped pins in the protective structure 75. Alternatively, the slots are configured for engaging complementary shaped pins on the housing 2.

[0140] The lamp 60 further comprises a light dome 80 removably attached to the module 1.

[0141] Figures 4a-b, figures 4c-d, and figures 4e-f illustrate three lamps with different configurations, to exemplify lamps of different shapes and components.

[0142] The lamp 60 further comprises hanging means 90 for suspending the lamp 60 from an anchoring object. In figures 3 and 5a, the hanging means 90 is in a hanging position for use when the lamp is hanging from an anchoring object, be used as a handle for carrying the lamp, and be used to create a stand for positioning the lamp in a position between a substantially vertical and horizontal position, for instance partially lying down leaning on the hanger. In figure 5b, the hanging means 90 is in a dormant position configured for being used when the hanger is not in use, for instance when standing on the top base 70 or bottom base 71 and optionally being used to charge the rechargeable battery 20 or used as a light.

[0143] In an aspect of the hanger, in the dormant position, the hanger may be substantially visually hidden by the module or the protective structure. Visually hidden meaning both hidden and not apparent when looking at the lamp, for instance by being flush up against a protrusion or edge.

[0144] In another aspect of the hanger, in the dormant position, the hanger may be visible on the lamp, for instance be in a contrasting colour, texture or material, or blend in with existing features.

[0145] Figures 6 and 7 illustrate an embodiment of the module 1, with a cross section of the module 1 taken along lines A-A in figure 1b.

[0146] The module 1 has a water-resistant housing 2 comprising a transparent member 3. The transparent member 3 may be a light disperser or permit the light to pass through uninterrupted.

[0147] Inside the housing 2, the module 1 comprises a light source 10 arranged to emit light through said transparent member 3 and a rechargeable battery 20 configured for powering said light source 10. In the illustrated embodiment, the light source 10 comprises LEDs. In other embodiments (not illustrated) the light source may be a light bulb such as an incandescent light bulb, fluorescent light bulb, halogen light bulb, LED light bulb, etc.

[0148] Inside the housing 2, the module 1 comprises controller 30 configured for controlling the light intensity of the light source 10. As best illustrated in figures 6b and 7, the controller comprises a swich pin for controlling the light intensity

between the light modes and for switching the light source on and off. The switch may be used to toggle between the different light modes by pressing the switch multiple times or by turning a swich turn knob incrementally or non-incrementally. A short press on switch may toggle between the modes and a longer press, may turn the light off in any mode. In another embodiment (not illustrated), the controller may be controlled remotely using a control device such as a remote control, smart phone, or a tablet to communicate with the controller 30, and thus, control the light intensity between the light modes and switching the light source 10 on and off. In a further embodiment, the controller 30 may be used both manually with a switch and remotely using a control device.

[0149] Inside the housing 2, the module 1 comprises a charging coil 40 connected to and configured for charging the rechargeable battery 20 when exposed to an external charger unit 45 as best seen in figure 2. In the illustrated embodiment, the external charger unit comprises a plug with a power cord inserted.

[0150] The module 1 comprises a solar panel 50 arranged adjacent to the charging coil 40. The solar panel 50 defines an exterior face of the module 1. The solar panel 50 is connected to and configured for charging the rechargeable battery 20.

[0151] As illustrated in figures 6a and 6b, the solar panel 50 is arranged on an outside face of the housing 2 with the charging coil 40 arranged on the opposite of the face inside the housing 2. In another embodiment (not illustrated) the solar panel and the charging coil is arranged back-to-back.

[0152] The housing 2 further comprises a first releasably attached part 4a and a second releasably attached part 4b. The first and second releasably attached part 4a,4b is configured for providing a water-resistant housing, when in an attached state, and for providing access to internal and external components of the housing 2, when in a detached state. The internal and external components of the housing 2 may be wearing components such as the light source 10, the rechargeable battery 20, the charging coil 40, and the solar panel 50.

[0153] As illustrated in figure 6a and 6b, the first and second releasably attached parts 4a,4b comprise complementary shaped indentations and protrusions. The first and/or the second releasably attached parts 4a,4b comprises gaskets to ensure the housing 2 is water-resistant in the attached state.

[0154] The module 1 further comprises a main PCB 35. In the illustrated embodiment, the rechargeable battery 20, the charging coil 40, the solar panel 50, and the light source 10, which is arranged on a second PCB 36 are releasably attached to the main PCB 35 using plugs. In other embodiments (not illustrated) the light source 10 is arranged directly on the main PCB 35.

[0155] The module 1 further comprises a battery indicator for indicating the status of the rechargeable battery 20. The battery indicator is illustrated in figure 1c as four micro-LEDs. Figure 1c illustrates the lamp as seen from the bottom along section B-B in figure 1b.

[0156] In the illustrated embodiments, the controller 30 is configured for automatically controlling the light intensity of the light source 10. Figures 9a and 9b illustrate two examples of the controller adjusting the light intensity and switches the light source off after a predetermined amount has passed.

[0157] As exemplified in figure 9a, after six hours of uninterrupted use, the controller 30 automatically dims the light from the starting point of 100% or 50% light intensity, to 10%. After one additional hour of uninterrupted use at 10%, the light source 10 is automatically switched off. Additionally, after ten hours of uninterrupted use at 10% light intensity, the light source 10 is automatically switched off.

[0158] As exemplified in figure 9b, after five hours of uninterrupted use, the controller 30 automatically dims the light from the starting point of 100%, 75%, or 50% light intensity, to 25%. After two additional hours of uninterrupted use at 25%, the light source 10 is automatically switched off. Additionally, after nine hours of uninterrupted use at 25% light intensity, the light source 10 is automatically switched off.

[0159] In the illustrated embodiment, the charging coil 40 is compatible with an external charger unit 45 adapted for wireless charging, for instance inductive charging such as the Qi standard.

[0160] Figure 8 illustrates an embodiment of a part 5 of the module 1, with a cross section of the part 5 of the module 1, taken along lines A-A in figure 1b.

[0161] The part 5 of the module 1 comprises the first releasably attached part 4a, the charging coil 40, and the solar panel 50. Both the charging coil 40 and the solar panel 50 is configured for being in wired communication with the rechargeable battery 20.

[0162] Figure 10a illustrates a method 100 of charging a lamp 60.

[0163] The method 100 comprises an act of providing 200 the lamp 60.

[0164] The method 100 comprises an act of arranging 300 the lamp 60 on the bottom base 71 with the uncovered solar panel 50 facing upwards or arranging 300 the external charger unit 45 adjacent to the solar panel 50 and in wireless communication with the charging coil 40.

[0165] The method 100 comprise an act of recharging 400 the rechargeable battery 20 by exposing the solar panel 50 to the sun, or by wireless charging using the external charger unit 45 interacting with the charging coil 40 through the solar panel 50.

[0166] Figure 10b illustrates a method 500 of replacing wearing component of the module 1.

[0167] The method 500 comprises an act of accessing 600 the inside of the housing 2, optionally by separating two

releasably attached parts 4a,4b.

[0168] The method 500 comprises an act of releasing 700 from the main PCB 35 one or more wearing components such as:

- the light source 10 and/or the second PCB 36;
- the rechargeable battery 20;
- the controller 30;
- the charging coil 40;
- the solar panel 50.

[0169] The method 500 comprises an act of removing 800 one or more components from the module 1.

[0170] The method 500 comprises an act of reattaching 900 one or more wearing components being a replacement component, a repaired component, and/or an upgraded component in the module 1 and reattaching 950 said component to the main PCB 35.

Claims

1. A module (1) with a water-resistant housing (2) comprising a transparent member (3), wherein inside said housing (2) the module comprises:

- a light source (10) arranged to emit light through said transparent member (3);
- a rechargeable battery (20) configured for powering said light source (10);
- controller (30) configured for controlling the light intensity of the light source (10); and
- a charging coil (40) connected to and configured for charging the rechargeable battery (20) when exposed to an external charger unit (45),

wherein the module (1) comprises a solar panel (50) arranged adjacent to the charging coil (40) and defines an exterior face of the module (1), wherein the solar panel (50) is connected to and configured for charging the rechargeable battery (20).

2. The module (1) according to claim 1, wherein the housing (2) comprises at least a first releasably attached part (4a) and/or a second releasably attached part (4b), wherein the first and/or second releasably attached part (4a,4b) is configured for providing the water-resistant housing when in an attached state, and configured for providing access to internal and external components of the housing (2) when in a detached state.

3. The module (1) according to any of the preceding claims, comprises a main PCB (35), wherein the rechargeable battery (20), the charging coil (40), the solar panel (50), and optionally, the light source (10) each is configured for being releasably attached to the main PCB (35), wherein the light source is arranged on the main PCB (35) and/or arranged on a second PCB (36) arranged releasably connected to the main PCB (35).

4. The module (1) according to any of the preceding claims, comprises a battery indicator for indicating a status of the rechargeable battery (20).

5. The module (1) according to any of the preceding claims, wherein the controller (30) is configured for automatically controlling the light intensity of the light source (10).

6. The module (1) according to any of the preceding claims, wherein the transparent member (3) is a light disperser.

7. The module (1) according to any of the preceding claims, wherein the charging coil (40) is compatible with an external charger unit (45) adapted for wireless charging.

8. A part (5) of the of the module (1) according to any of the preceding claims, comprising the first releasably attached part (4a), the charging coil (40), and the solar panel (50), wherein each of the charging coil (40) and the solar panel (50) is configured for being in wired communication with the rechargeable battery.

9. A lamp (60) comprising:

- a top base (70);
- a bottom base (71);
- a second light dome (80) arranged at a position between the top base (70) and the bottom base (71), and
- a module (1) according to any of the preceding claims, wherein the module (1) is connected to one end of the light dome (80) and arranged between said light dome (80) and the top base (70).

10. The lamp (60) according to claim 9, comprising a protective structure (75) for covering the module (1) at least partly, leaving at least the solar panel (50) fully or partly uncovered.

11. The lamp (60) according to claim 9 or 10, comprises a frame structure (76) comprising the bottom base (71).

12. The lamp (60) according to any of claims 9-11, wherein the light dome (80) is removably attached to the module (1).

13. The lamp (60) according to any of claims 9-12, comprises hanging means (90) for suspending the lamp (60) from an anchoring object.

14. A method (100) of charging a lamp (60) according to any of claims 9-13, wherein the method comprises acts of:

- providing (200) the lamp (60);
- arranging (300) the lamp (60) on the bottom base (71) with the uncovered solar panel (50) facing upwards, or arranging (300) the external charger unit (45) adjacent to the solar panel (50) and in wireless communication with the charging coil (40); and
- recharging (400) the rechargeable battery (20) by:

    - exposing the solar panel (50) to the sun; or
    - wireless charging using an external charger unit (45) interacting with the charging coil (40) through the solar panel (50).

15. A Method (500) of replacing wearing components of the module (1) according to any of claims 1-8, wherein the method comprises one or more acts of:

- accessing (600) the inside of the housing (2), optionally by separating two releasably attached parts (4a,4b);
- releasing (700) from the main PCB (35) one or more wearing components such as:

    - the light source (10) and/or the second PCB (36);
    - the rechargeable battery (20);
    - the controller (30);
    - the charging coil (40);
    - the solar panel (50),

- removing (800) one or more wearing components from the module (1); and
- reattaching (900) one or more wearing component being a replacement component, a repaired component, and/or an upgraded component in the module (1) and reattaching (950) said component to the main PCB (35).

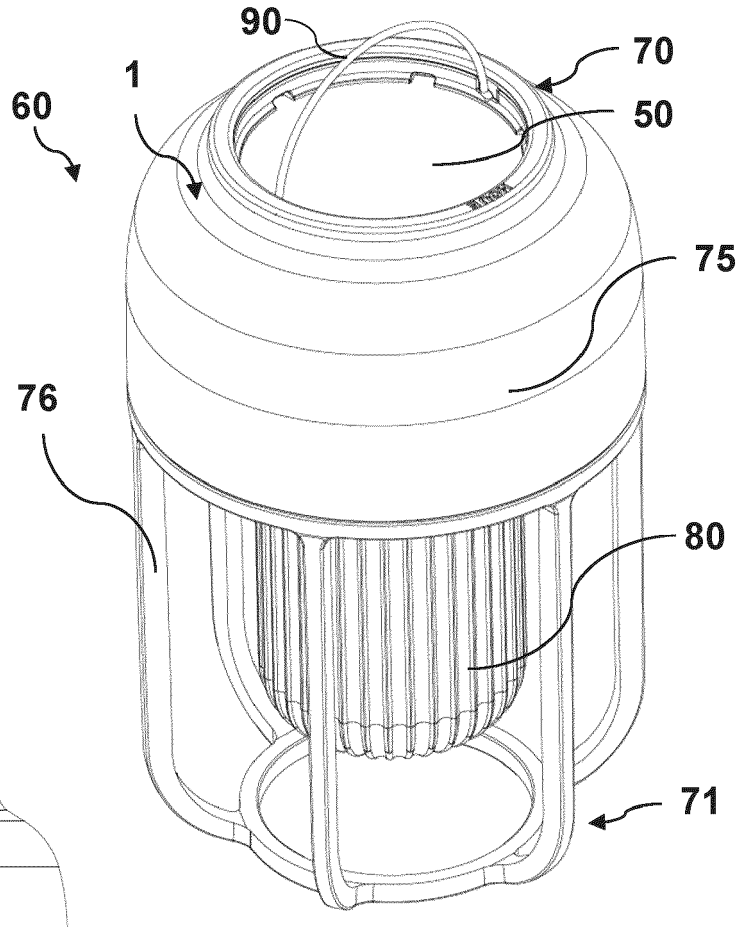


Fig 1a

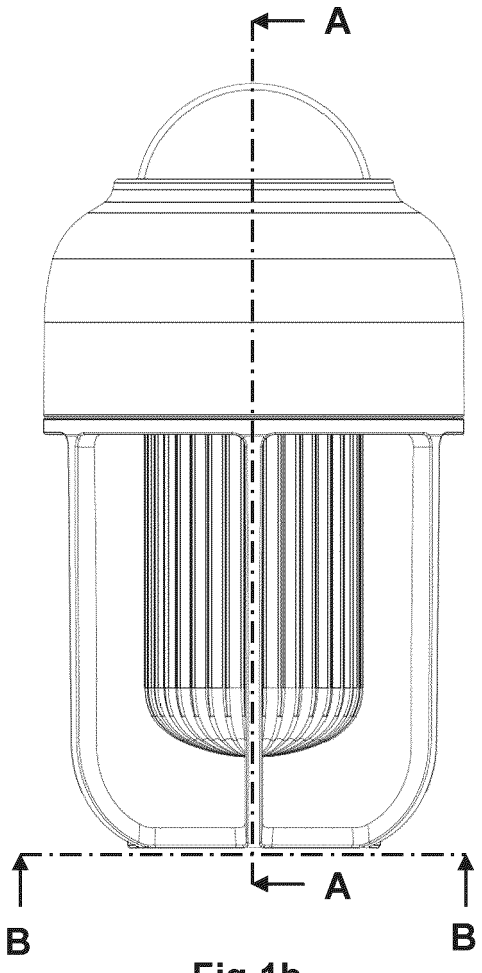
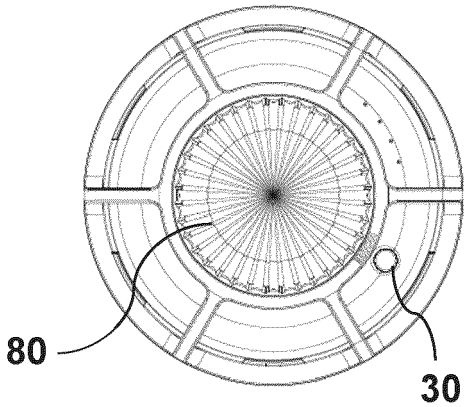


Fig 1b



B-B

Fig 1c

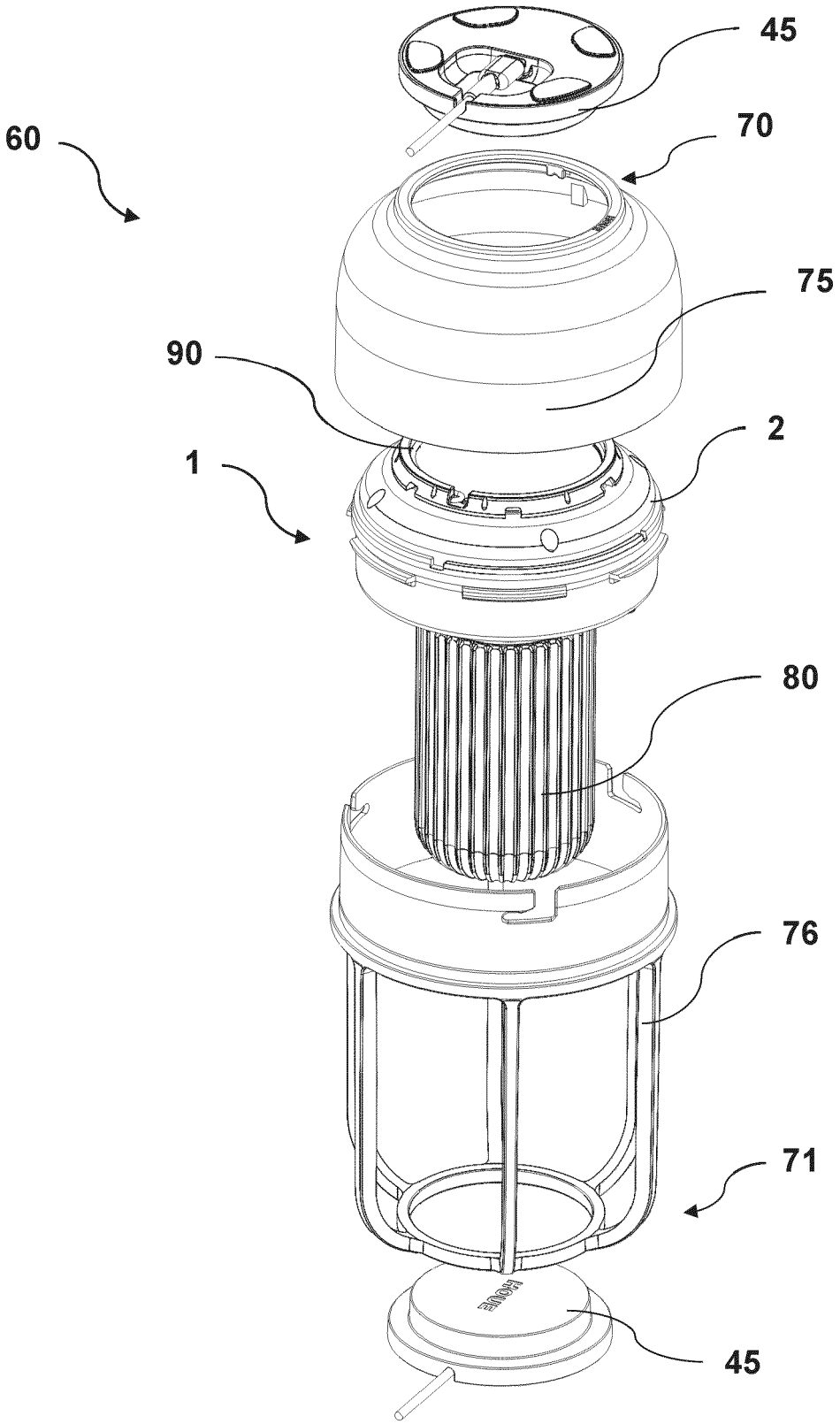


Fig 2

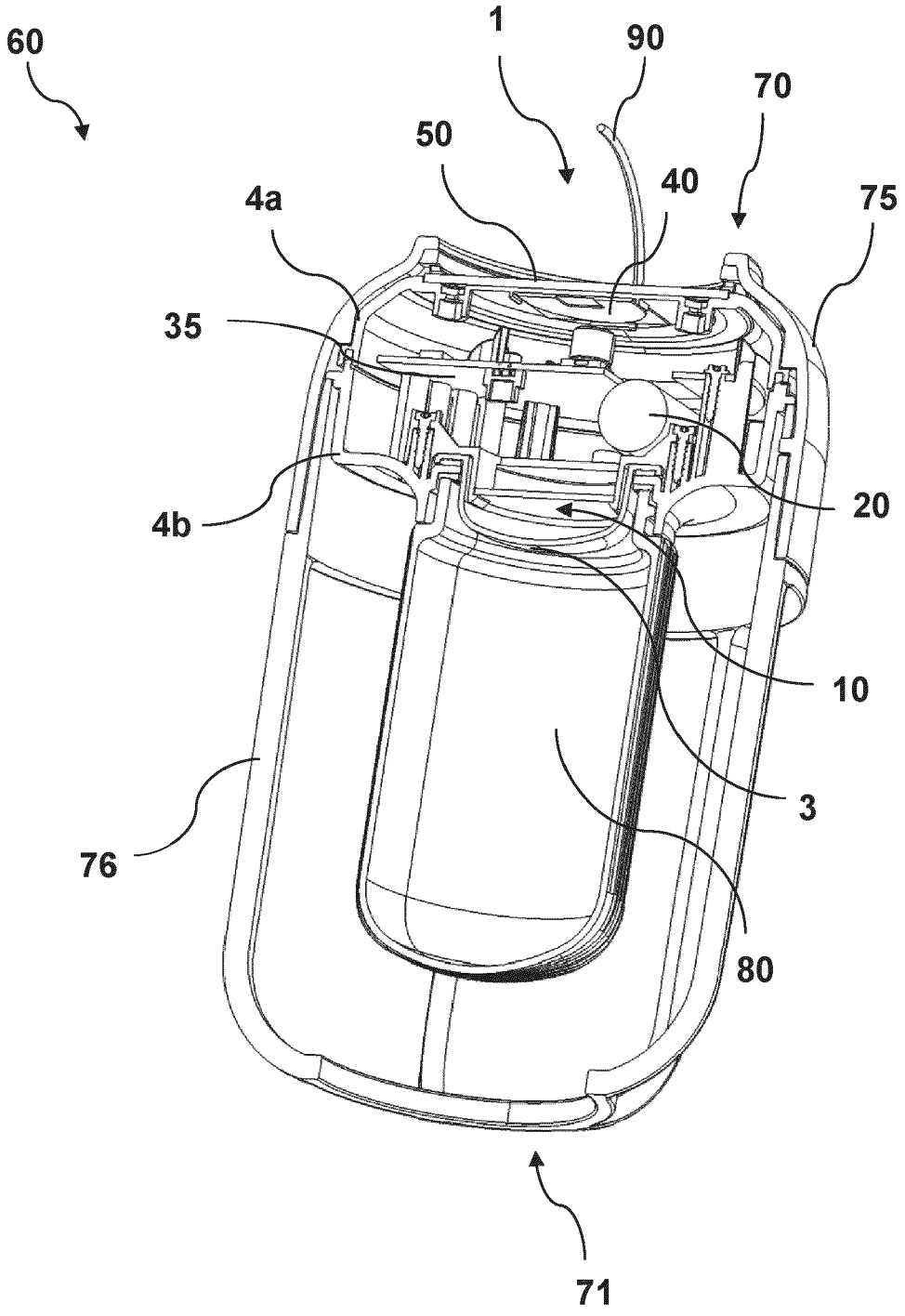


Fig 3

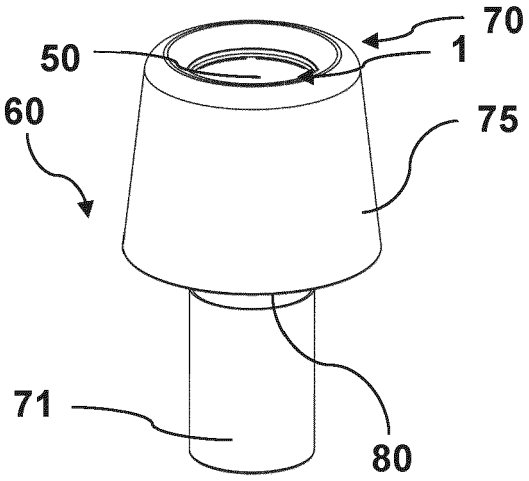


Fig 4a

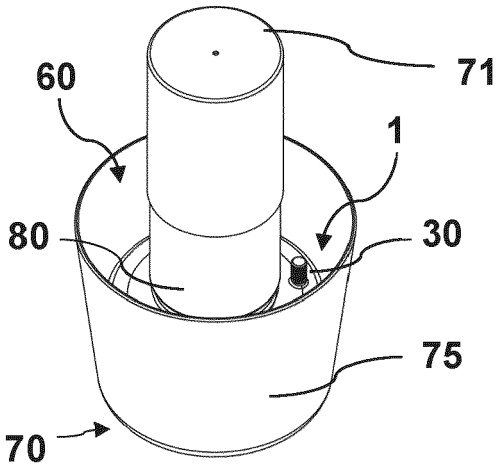


Fig 4b

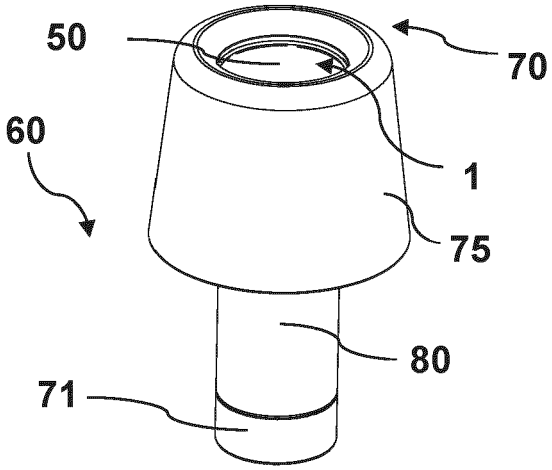


Fig 4c

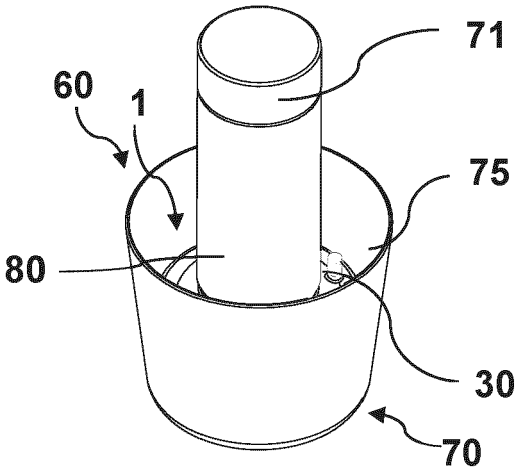


Fig 4d

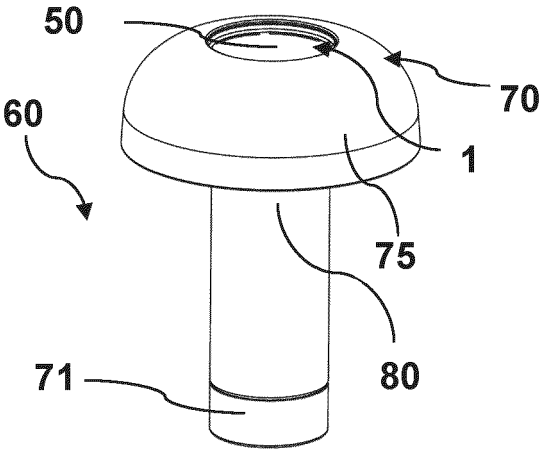


Fig 4e

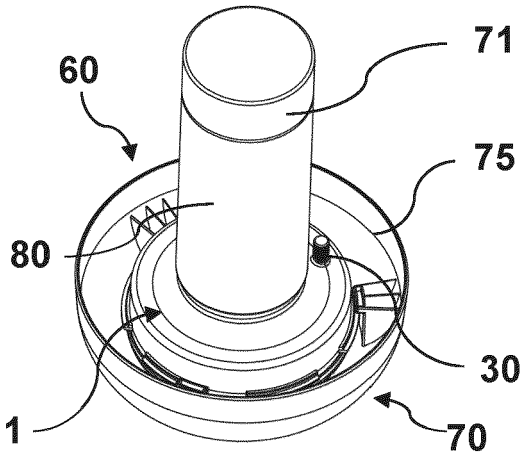


Fig 4f

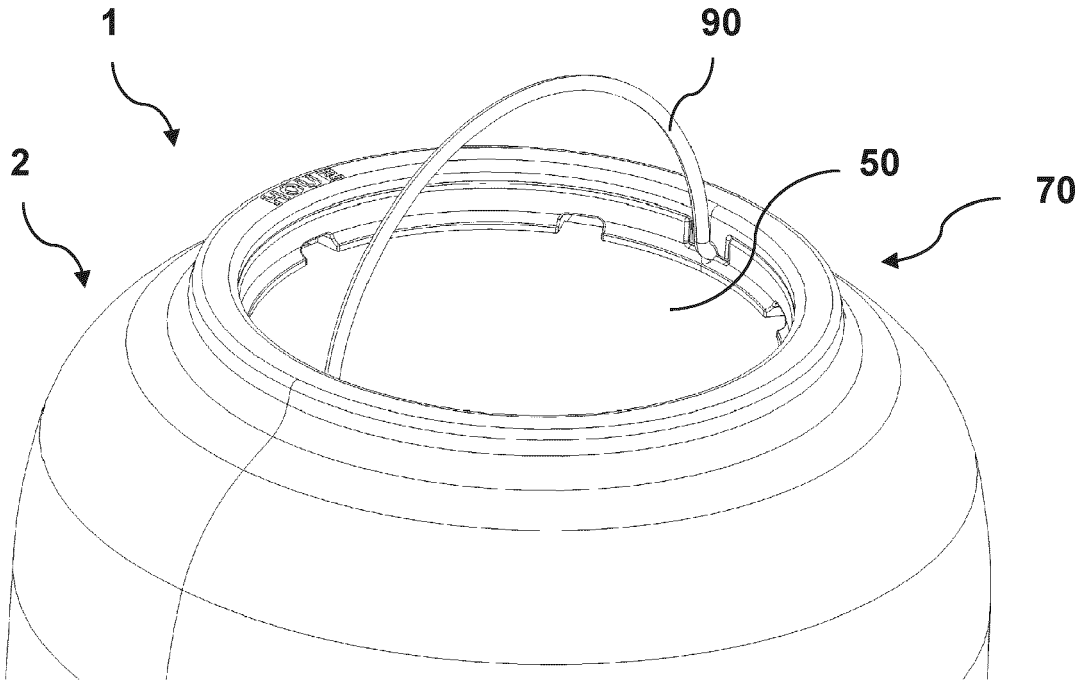


Fig 5a

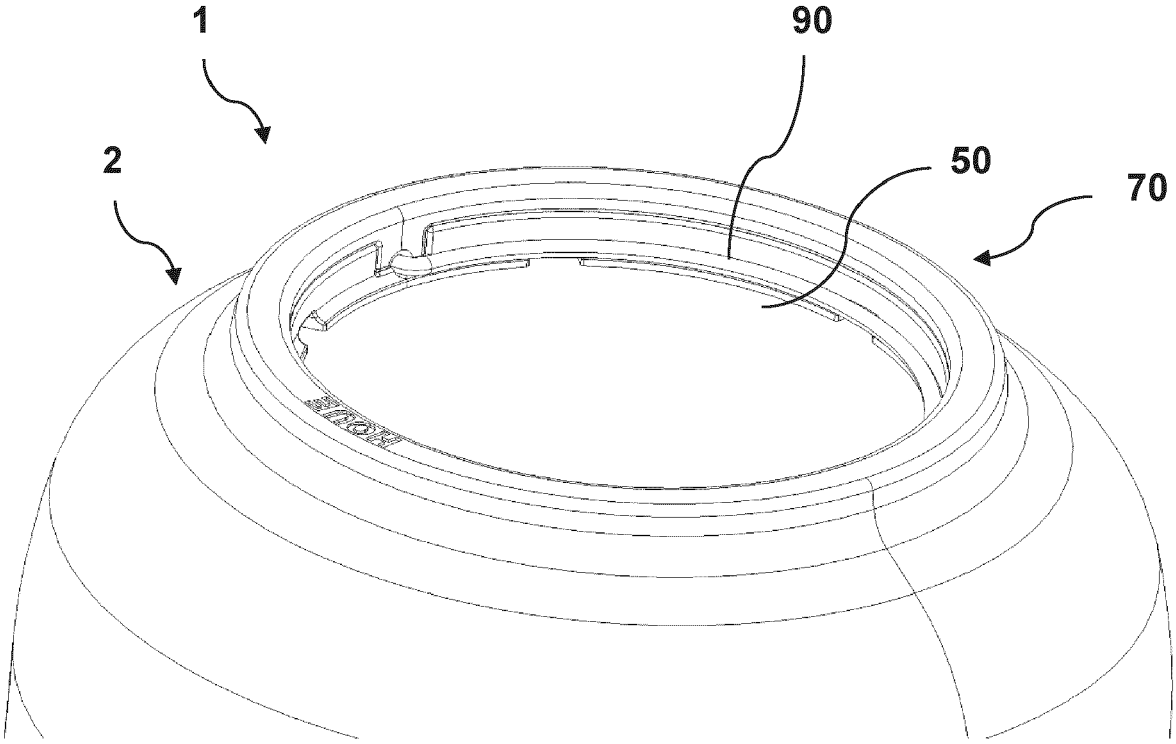


Fig 5b

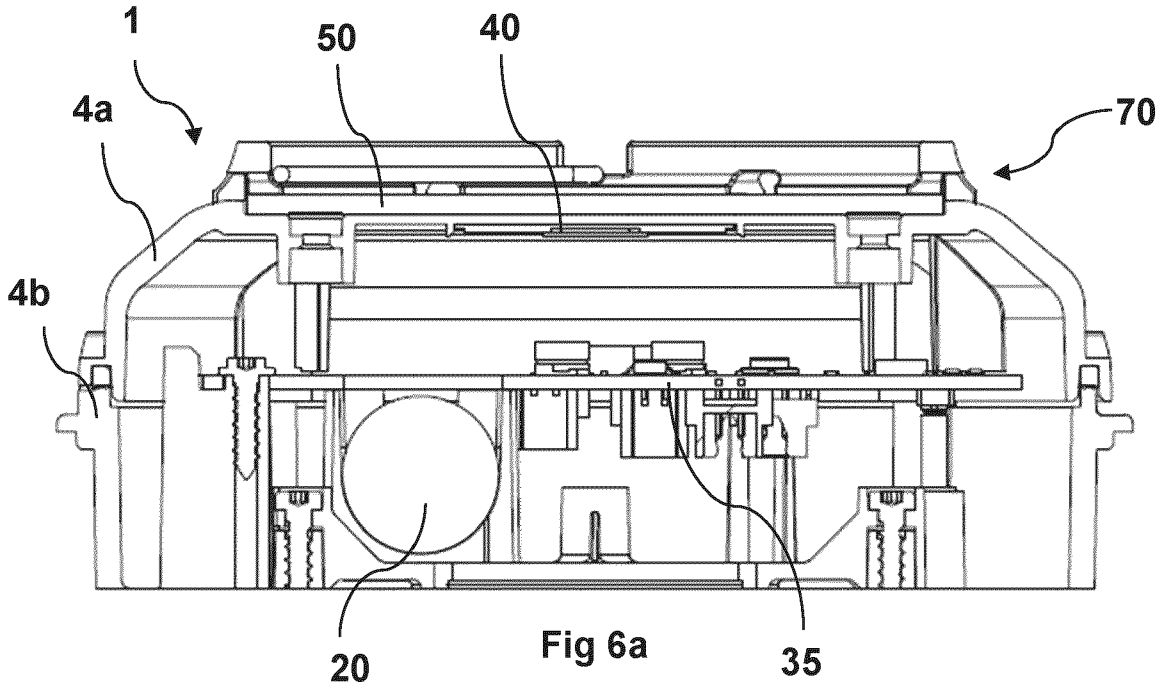


Fig 6a

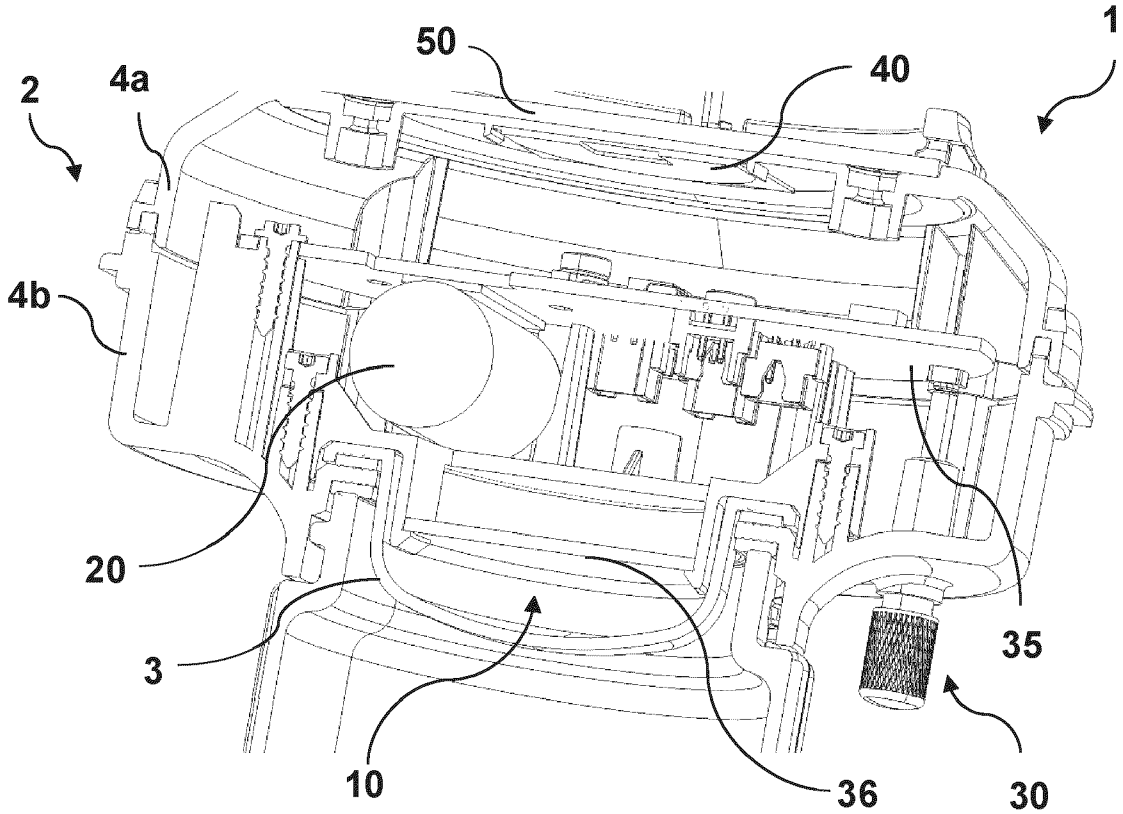


Fig 6b

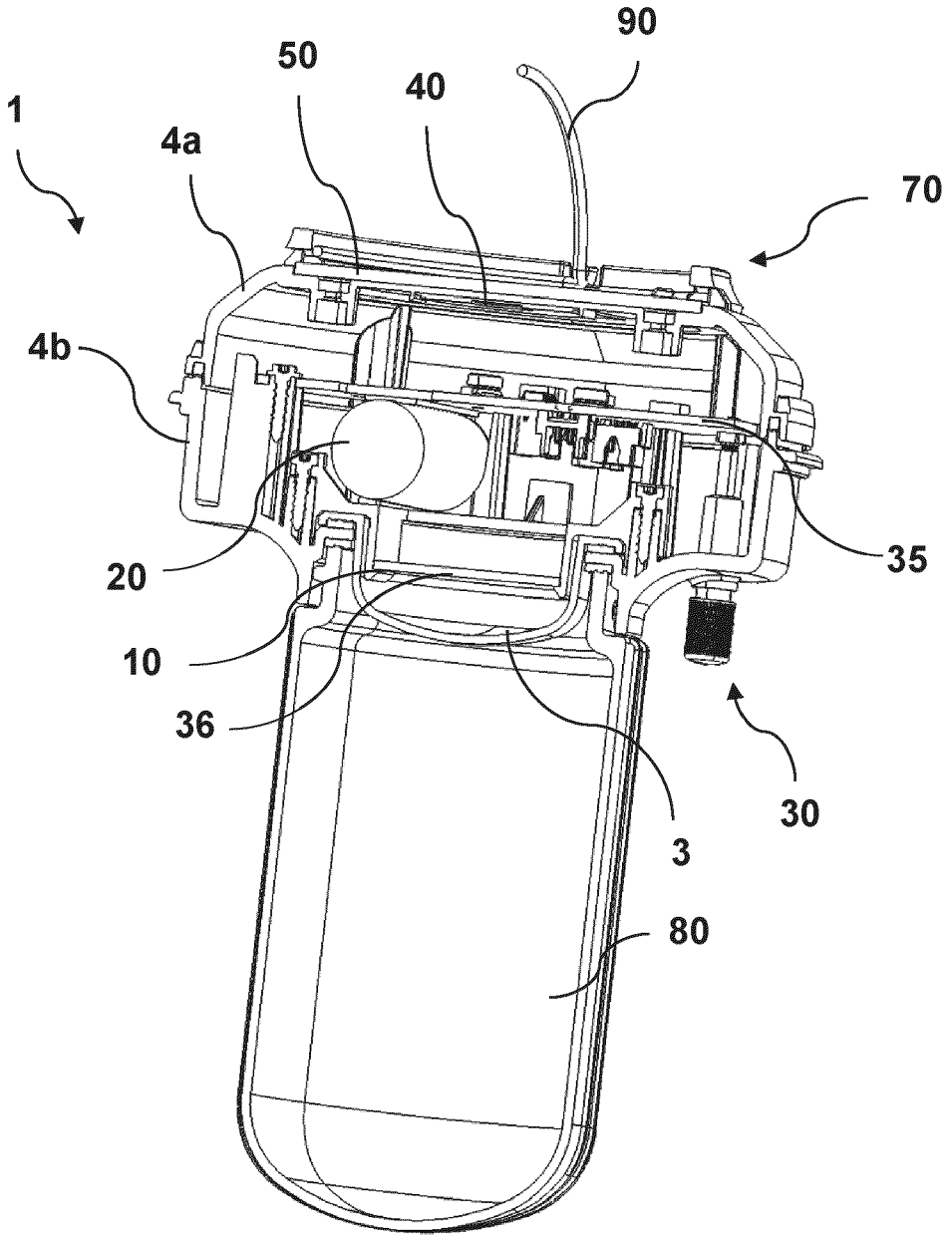


Fig 7

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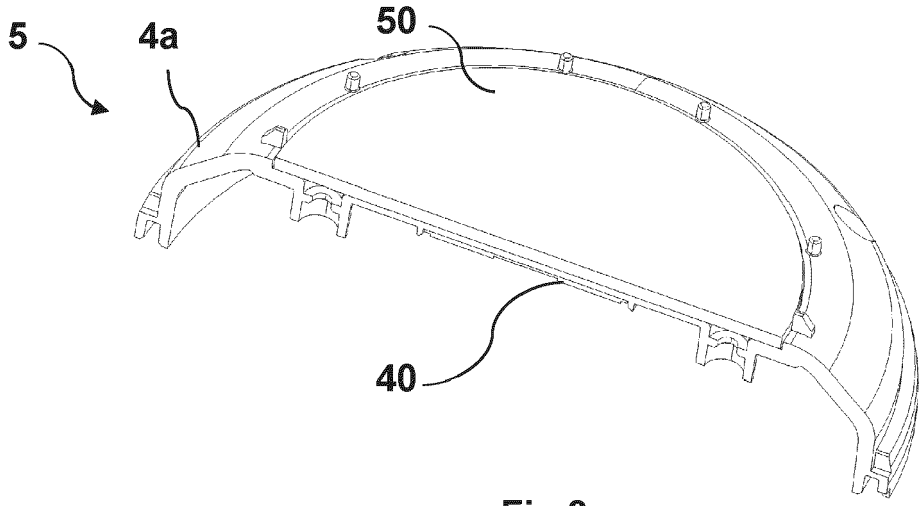

Fig 8a

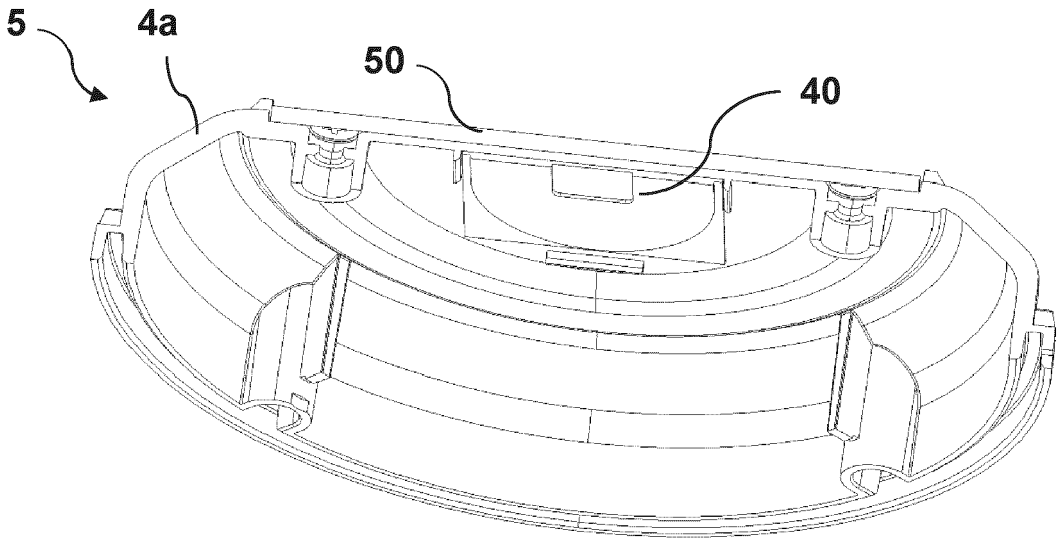

Fig 8b

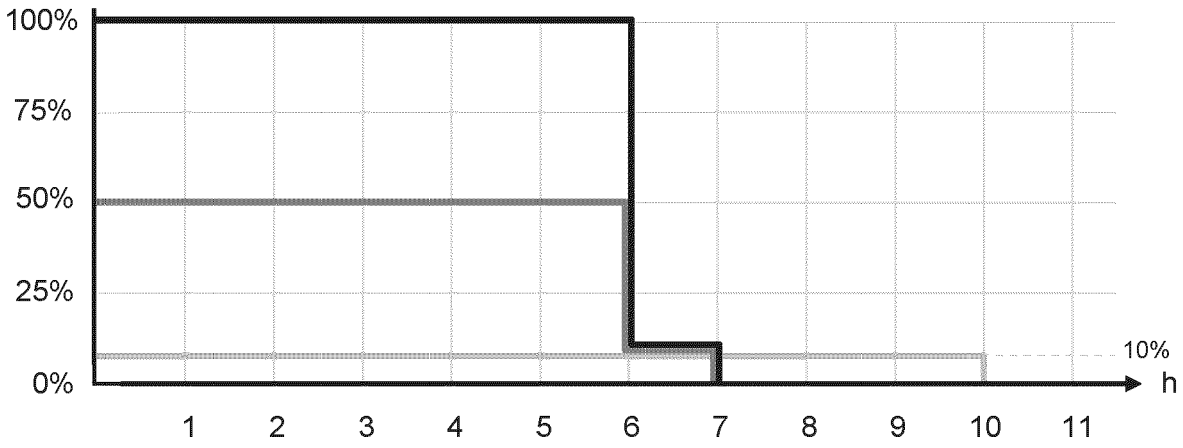
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Fig 9a

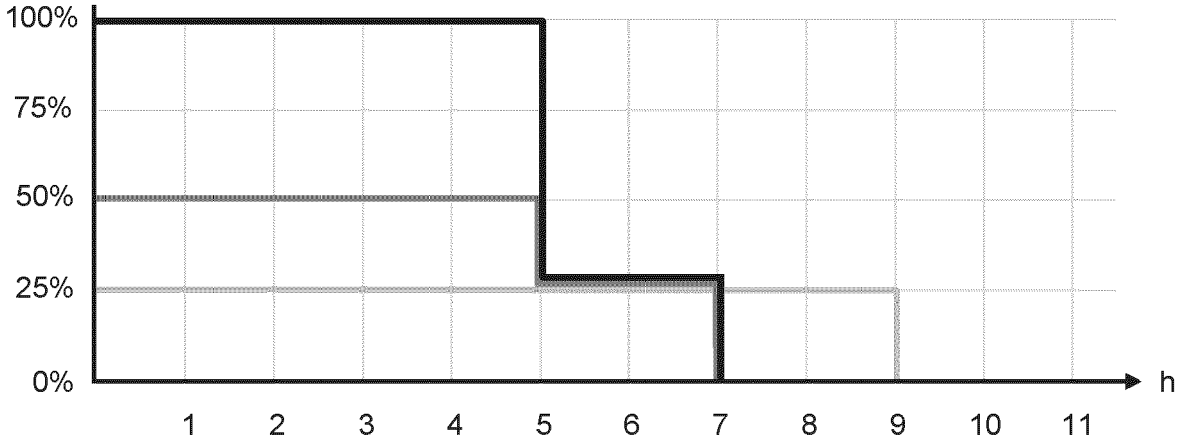
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Fig 9b

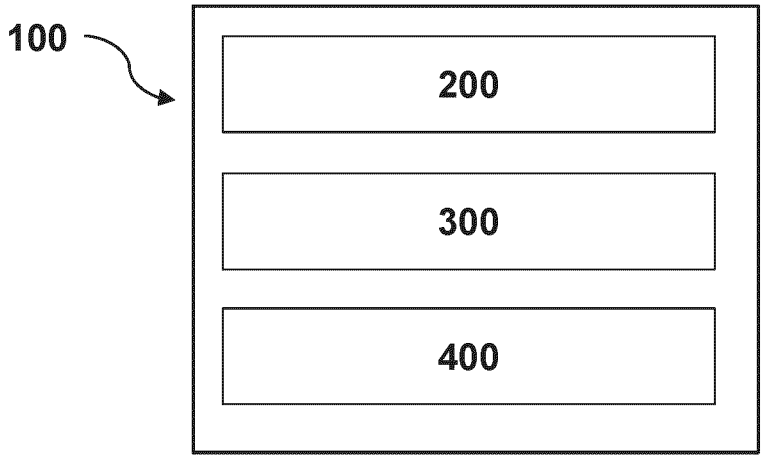

Fig 10a

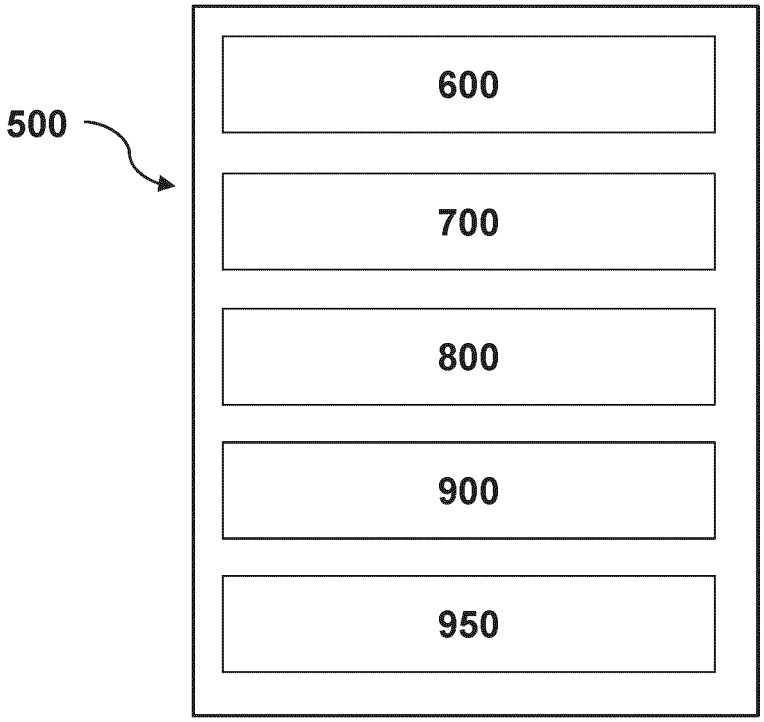

Fig 10b

Europäisches Patentamt
European Patent Office
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EUROPEAN SEARCH REPORT

Application Number
EP 24 15 1634

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	CN 216 203 039 U (SHENZHEN SHENDEREN SCIENCE AND TECH CO LTD) 5 April 2022 (2022-04-05)	1-8,15	INV. F21S6/00 F21S9/03
Y	* figures 1-8 *	9-14	F21V17/00 F21V23/06
Y	US 2015/338040 A1 (SWOPE KARL T [US]) 26 November 2015 (2015-11-26) * figure 1 *	9-14	
X	CN 219 372 100 U (DONGGUAN ZILAN ENERGY TECH CO LTD) 18 July 2023 (2023-07-18) * figures 1-4 *	1-8,14	

TECHNICAL FIELDS SEARCHED (IPC)

F21S

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	25 June 2024	Dinkla, Remko

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 24 15 1634

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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25-06-2024

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
CN 216203039 U	05-04-2022	NONE	
US 2015338040 A1	26-11-2015	NONE	
CN 219372100 U	18-07-2023	NONE	

EPO FORM P0459

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