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(71) Applicant: **AB Tecno S.r.l.**
40068 San Lazzaro Di Savena (BO) (IT)

(72) Inventor: **PAGANI, Ulisse**
40068 SAN LAZZARO DI SAVENA BO (IT)

(74) Representative: **Modiano, Micaela Nadia et al**
Modiano & Partners
Via Meravigli, 16
20123 Milano (IT)

(54) **CONTROL AND SIGNALING UNIT FOR BEACON LIGHTS**

(57) A control and signaling unit (1) for beacon lights that comprises: a base body (2) of encumbrances not greater than the dimensions of the base (B) of a conventional beacon light to be modified; a printed circuit board (3) which is integral with the base body (2) and provided with at least one power supply stage (4), at least one stage (5) for connection to an antenna, and at least one illumination stage (6) constituted by a plurality of LEDs (7) which have at least partially overlapping emission cones so as to define a distributed illumination around the board (3).

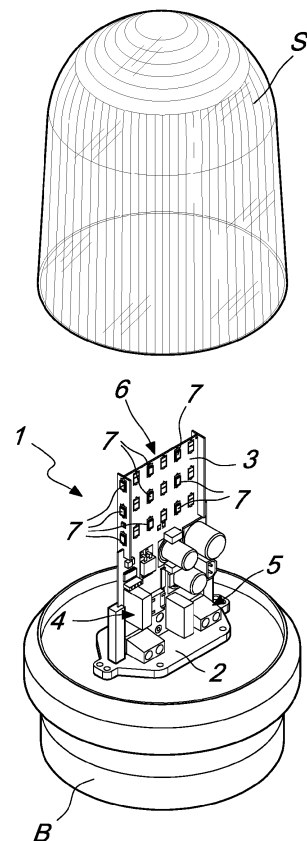


Fig. 3

Description

[0001] The present invention relates to a control and signaling unit for beacon lights, i.e. devices for signaling with intermittent light.

[0002] The use of beacon lights is very frequent in a great many applications and is used for signaling, in general, potentially hazardous situations.

[0003] In particular, when accessible mechanical elements are in motion, a beacon light is always installed that signals very clearly every motion condition of each mechanical element: in this manner the persons present are alerted to the potential danger, warning them against imprudently approaching the component in motion, thus exposing themselves to the risk of being injured.

[0004] The light sources arranged inside beacon lights are of various types: recently, for the purposes of reducing energy consumption, increasing lighting efficiency and ensuring a longer service life, the installation of lighting LEDs as light sources inside beacon lights is increasingly frequent.

[0005] Unfortunately, however, existing beacon lights do not allow the straightforward substitution of the light sources (incandescent lamps, halogen lamps, fluorescent lamps, metal halide lamps, magnetic induction lamps etc.) with LEDs.

[0006] Therefore it is necessary to substitute the entire electrical/electronic circuit, in order to be able to adopt LED sources, and this entails numerous problems in terms of compatibility of the new circuit with the existing system.

[0007] Furthermore, the directionality of emission of the beam of LEDs does not lend itself well to the function of signaling, which must be clearly visible from any point around it (in an angular spectrum of 360°) with respect to the beacon light.

[0008] The aim of the present invention is to solve the above mentioned drawbacks, by providing a control and signaling unit for beacon lights that permits an illumination that is effectively visible from any observation point.

[0009] Within this aim, an object of the invention is to provide a control and signaling unit for beacon lights that can be easily installed in any conventional beacon light.

[0010] Another object of the invention is to provide a control and signaling unit for beacon lights with very low running and maintenance costs.

[0011] Another object of the invention is to provide a control and signaling unit for beacon lights that is resistant to malfunctions.

[0012] Another object of the invention is to provide a control and signaling unit for beacon lights that is also adapted to be associated with further signaling means.

[0013] Another object of the present invention is to provide a control and signaling unit for beacon lights which is low-cost, easily and practically implemented and safely applied.

[0014] This aim and these and other objects which will become more apparent hereinafter are achieved by a

control and signaling unit for beacon lights, characterized in that it comprises:

- a base body of encumbrances not greater than the dimensions of the base of a conventional beacon light to be modified;
- a printed circuit board which is integral with said base body and provided with at least one power supply stage, at least one stage for connection to an antenna, and at least one illumination stage constituted by a plurality of LEDs which have at least partially overlapping emission cones so as to define a distributed illumination around said board.

[0015] Further characteristics and advantages of the invention will become more apparent from the detailed description that follows of a preferred, but not exclusive, embodiment of the control and signaling unit for beacon lights, which is illustrated by way of non-limiting example in the accompanying drawings, wherein:

Figure 1 is a front schematic perspective view of a possible embodiment of a control and signaling unit for beacon lights according to the invention;

Figure 2 is a front schematic perspective view of the unit of Figure 1;

Figure 3 is an exploded front schematic perspective view of a beacon light provided with the unit according to the invention;

Figure 4 is a front schematic perspective view of the beacon light of Figure 3.

[0016] With reference to the figures, the reference numeral 1 generally designates a control and signaling unit for beacon lights A.

[0017] The unit 1 according to the invention comprises a base body 2 of encumbrances not greater than the dimensions of the base B of a conventional beacon light to be modified.

[0018] Every beacon light on the market comprises a base B (generally coupled to a respective pillar or post) and an upper screen S, made of an at least partially transparent material, through which the light signal of the light sources of the beacon light are visible to external observers.

[0019] The unit 1 according to the invention further comprises a printed circuit board 3 which is integral with the base body 2 and provided with at least one power supply stage 4, at least one stage 5 for connection to an antenna, and at least one illumination stage 6 constituted by a plurality of LEDs 7 which have at least partially overlapping emission cones so as to define a distributed illumination around the board 3.

[0020] With particular reference to a possible implementation solution of undoubted practical and applicative interest, it should be noted that the board 3 could advantageously comprise at least one end laminar element 8 integral with an edge thereof and perpendicular thereto.

[0021] The at least one laminar element 8 will conveniently support, in such case, respective LEDs 7 arranged along an installation direction that is at right angles to that of the LEDs 7 present on the mutually opposite faces of the board 3. In this configuration, the emission of light beams ascribed to the LEDs 7 arranged on the bezels 8 will be in a direction at right angles to the light emitted by the LEDs 7 present on the board 3.

[0022] In more detail, it should be noted that there can conveniently be at least two end bezels 8 (mutually opposite in a symmetrical configuration with respect to the board 3), for supporting respective LEDs 7 having a beam emission direction in directions at right angles to the beam emitted by the LEDs 7 present on the board 3.

[0023] With particular reference to this implementation solution, it should be noted that profitably there can be a plurality of LEDs 7: at least two LEDs 7 will be distributed on each one of the mutually opposite faces of the board 3, while at least one LED 7 will be arranged on each one of the end bezels 8. It should be noted that in the example shown in the accompanying figures, six LEDs 7 will be distributed on each face of the board 3 and three LEDs 7 will be distributed on each laminar element 8, thus arriving at having eighteen LEDs 7 overall on the unit 1.

[0024] The possibility is not ruled out of applying at least one end laminar element 8 also on the top of the board 3, so that an emission of light upward (via the respective LEDs 7 installed on such additional end laminar element 8) is also obtained, for the purpose of maximizing the visibility of the beacon light.

[0025] It is important to highlight that the at least one power supply stage 4 of the unit 1 according to the invention can usefully comprise a module for conditioning the input energy and consequent conversion of the voltage, of the frequency, of the type i.e. DC or AC, of the input energy into an output flow with predefined electrical parameters.

[0026] In practice, therefore, it will be possible to provide, at the input terminals of the power supply stage 4, a direct current (DC) voltage of a value chosen between 6 V and 48 V, or an alternating current (AC) voltage of a value chosen between 6 V and 230 V.

[0027] The unit 1 according to the invention has an extended power supply range (which can vary from a minimum of 6 V to a maximum of 230 V, both in AC and in DC) with a single power supply terminal strip and no selection to carry out during wiring: this enormous simplification in terms of wiring and mounting increases the safety of connection and the adaptability to different types of installation, in accordance with standards that are significantly higher than the background art (which in no case offers such versatility and simplification).

[0028] Automatically, the conditioning module will adapt and modify the parameters of the power supply voltage in input in order to convert it into a voltage with specific parameters adapted to the correct power supply of the unit 1.

[0029] The at least one stage 5 for connection to an

antenna comprises a connector for coupling a coaxial cable leading to the controller of the device to which the signaler is slaved to an antenna adapted to receive command pulses from an adapted remote command.

[0030] The antenna to which the unit 1 according to the invention is to be connected can preferably be multi-frequency, so as to ensure a greater versatility of use for the unit 1. The antenna associated with the unit 1 could profitably be adapted to operate on two separate frequencies (for example 433 MHz and 868 MHz): such an antenna can be connectable by coupling on the unit 1 according to the invention, ensuring the simplification of the mounting/installation (also simplifying any maintenance operations).

[0031] According to a possible different embodiment, the board 3 can advantageously have a shape preferably chosen from among plates intersecting in a cross, prismatic, cylindrical, conical, frustum-shaped and the like.

[0032] In this case too, the LEDs 7 will profitably be distributed on the external surface of the board 3.

[0033] In particular, in an arrangement with two plates in a "cross", the LEDs 7 will be arranged on both the faces of each plate, so as to ensure the emission of the light beam is distributed over the complete circumference (360°) around the board 3.

[0034] If the shape of the board 3 is prismatic (with any polygonal base) or cylindrical (with a circular or elliptical base) or conical (with a circular or elliptical base) or frustum-shaped (with a circular or elliptical base), the LEDs 7 will be distributed solely on the external face of the board 3 so as to ensure a total angular cover of the light emission.

[0035] In this case, the various electronic components can be installed inside the volume delimited by the board 3 (prismatic, cylindrical, conical or frustum-shaped), therefore on the internal face(s) thereof, and the LEDs 7 on the respective external face(s).

[0036] It should be noted that in a particular version, the printed circuit board 3 can usefully also comprise at least one stage 9, 10 for selecting the type of light beam emitted, in terms of its intermittence, continuity and intensity.

[0037] In practice, via the stage 9 it will be possible to choose whether the unit 1 will emit a flashing or continuous light beam, also in relation to the power supply voltage parameters.

[0038] Furthermore, the possibility is not ruled out of an additional stage 10 through which to select the intensity of the beam emitted between two or more options, which will correspond to a different energy consumption and a different brightness.

[0039] Similarly, it should furthermore be noted that the printed circuit board 3 can conveniently comprise an output stage 11 adapted for the connection of further signaling means of type preferably chosen from acoustic alarms 12, signal transceivers via air interface, auxiliary lighting apparatuses and the like.

[0040] In the accompanying Figure 1 it is possible to

identify the presence of an acoustic signaler 12 (a buzzer) the emissions of which will commence upon the flashing of the LEDs 7, so as to further increase the evidence of the signaling.

[0041] This option is not normally offered in conventional signalers.

[0042] In order to optimize the operation of the entire unit 1 according to the invention, it should be noted that the acoustic signaler 12 can be provided in such a way as to guard against the accidental ingress of liquids or of dust: in particular a buzzer can be adopted with a degree of protection specified by the CEI EN 60529/1997 standard, which classifies the degrees of protection of housings for electrical equipment, equal to or higher than IP67.

[0043] The possibility is not ruled out that further parts of the unit 1 can also be conveniently characterized by a high level of protection specified by the above mentioned standard.

[0044] It should be noted that the base body 2 and the printed circuit board 3 will overall (when coupled in the configuration of use) have dimensions that overall are complementary to those of the internal compartment delimited by the base B and by the optical screen S of a conventional beacon light to be modified.

[0045] In this manner, the unit 1 effectively can be installed inside any conventional beacon light in order to replace the original components, thus obtaining a beacon light that operates by using LEDs 7 as light sources.

[0046] It should furthermore be noted that the unit 1 can conveniently be equipped with a circuit that is capable of eliminating the negative effects induced by the inevitable presence of a snubber.

[0047] A snubber is an electrical circuit used to suppress electrical transients (and therefore harmonic waves). Snubbers are frequently used with an inductive load in which the sudden discontinuity in the current leads to an abrupt increase in the voltage at the terminals of the device that causes the discontinuity. This peak in the voltage could lead to a transitory or permanent malfunction of the control device.

[0048] The unit 1 is generally driven through relays, and on the contacts of the relays there are snubbers (in general a resistor and a capacitor to limit the transients deriving from the opening of the electrical contact, which often is also used to drive the automation motor). The presence of the capacitive reactance (owing to the capacitor) can allow, even when the contacts are open, the flow of a current sufficient to power the unit 1. The presence of the circuit for eliminating the negative effects induced by the snubber prevents the unit 1 from being powered with residual voltages.

[0049] Advantageously the present invention solves the above mentioned problems, by providing a control and signaling unit 1 for beacon lights that permits an illumination that is effectively visible from any observation point.

[0050] In fact the LEDs 7 are distributed in such a manner as to emit the light in all directions, around the unit 1

itself.

[0051] Conveniently the unit 1 according to the invention can be easily installed in any conventional beacon light, since it offers encumbrances complementary to and in any case not larger than those of the internal compartment of the various existing conventional beacon lights.

[0052] Profitably the unit 1 has very low running and maintenance costs, since the LEDs 7 have a low energy consumption and an extremely long working life.

[0053] Advantageously the unit 1 according to the invention is resistant to malfunctions, since it is constituted by robust components and because the power supply stage 4 conditions its power supply, thus preventing electricity with incorrect parameters from reaching the circuits.

[0054] Positively the unit 1 according to the invention is also adapted to be associated with further signaling means, such as for example the acoustic signaler 12.

[0055] Positively the control and signaling unit for beacon lights according to the invention is easily and practically implemented and is low-cost: such characteristics make the unit according to the invention an innovation that is safe to use.

[0056] The invention, thus conceived, is susceptible of numerous modifications and variations, all of which are within the scope of the appended claims. Moreover, all the details may be substituted by other, technically equivalent elements.

[0057] In the embodiments illustrated, individual characteristics shown in relation to specific examples may in reality be interchanged with other, different characteristics, existing in other embodiments.

[0058] In practice, the materials employed, as well as the dimensions, may be any according to requirements and to the state of the art.

[0059] The disclosures in Italian Utility Model Application No. 202021000000134 from which this application claims priority are incorporated herein by reference.

[0060] Where the technical features mentioned in any claim are followed by reference numerals and/or signs, those reference numerals and/or signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly, such reference numerals and/or signs do not have any limiting effect on the interpretation of each element identified by way of example by such reference numerals and/or signs.

Claims

1. A control and signaling unit for beacon lights, **characterized in that** it comprises:

- a base body (2) of encumbrances not greater than the dimensions of the base (B) of a conventional beacon light to be modified;
- a printed circuit board (3) which is integral with said base body (2) and provided with at least

- one power supply stage (4), at least one stage (5) for connection to an antenna, and at least one illumination stage (6) constituted by a plurality of LEDs (7) which have at least partially overlapping emission cones so as to define a distributed illumination around said board (3). 5
2. The unit according to claim 1, **characterized in that** said board (3) comprises at least one end laminar element (8) integral with an edge thereof and perpendicular thereto, said laminar element (8) supporting LEDs (7) at right angles to those on the mutually opposite faces of said board (3), for the emission of light beams in a direction perpendicular to the light emitted by the LEDs (7) on said board (3). 10 15
3. The unit according to claim 2, **characterized in that** there are at least two of said end bezels (8), for supporting respective LEDs (7) having a beam emission direction in directions at right angles to the beam emitted by the LEDs (7) present on said board (3). 20
4. The unit according to one or more of claims 2 and 3, **characterized in that** said LEDs (7) are a plurality, at least two distributed on each one of the said mutually opposite faces of said board (3) and at least one arranged on each one of said end bezels (8). 25
5. The unit according to claim 1, **characterized in that** said at least one power supply stage (4) comprises a module for conditioning the input energy for the consequent conversion of the voltage, of the frequency, of the type, i.e. DC or AC, of the input energy into an output flow with predefined electrical parameters. 30 35
6. The unit according to claim 1, **characterized in that** said at least one stage (5) for connection to an antenna comprises a connector for coupling a coaxial cable leading to a device to which said signaler is slaved to an antenna for receiving command pulses originating from a remote command. 40
7. The unit according to claim 1, **characterized in that** said board (3) has a shape preferably chosen from among plates intersecting in a cross, prismatic, cylindrical, conical, frustum shape and the like, said LEDs being distributed on the external surface of said board. 45 50
8. The unit according to claim 1, **characterized in that** said printed circuit board (3) comprises at least one stage (9, 10) for selecting the type of light beam emitted, in terms of its intermittence, continuity and intensity. 55
9. The unit according to claim 1, **characterized in that** said printed circuit board (3) comprises an output stage (11) adapted for the connection of further signaling means of type preferably chosen from acoustic alarms (12), signal transceivers via air interface, auxiliary lighting apparatuses and the like.
10. The unit according to one or more of the preceding claims, **characterized in that** said base body (2) and said printed circuit board (3) have dimensions that overall are complementary to those of the internal compartment delimited by the base (B) and by the optical screen (S) of a conventional beacon light to be modified.

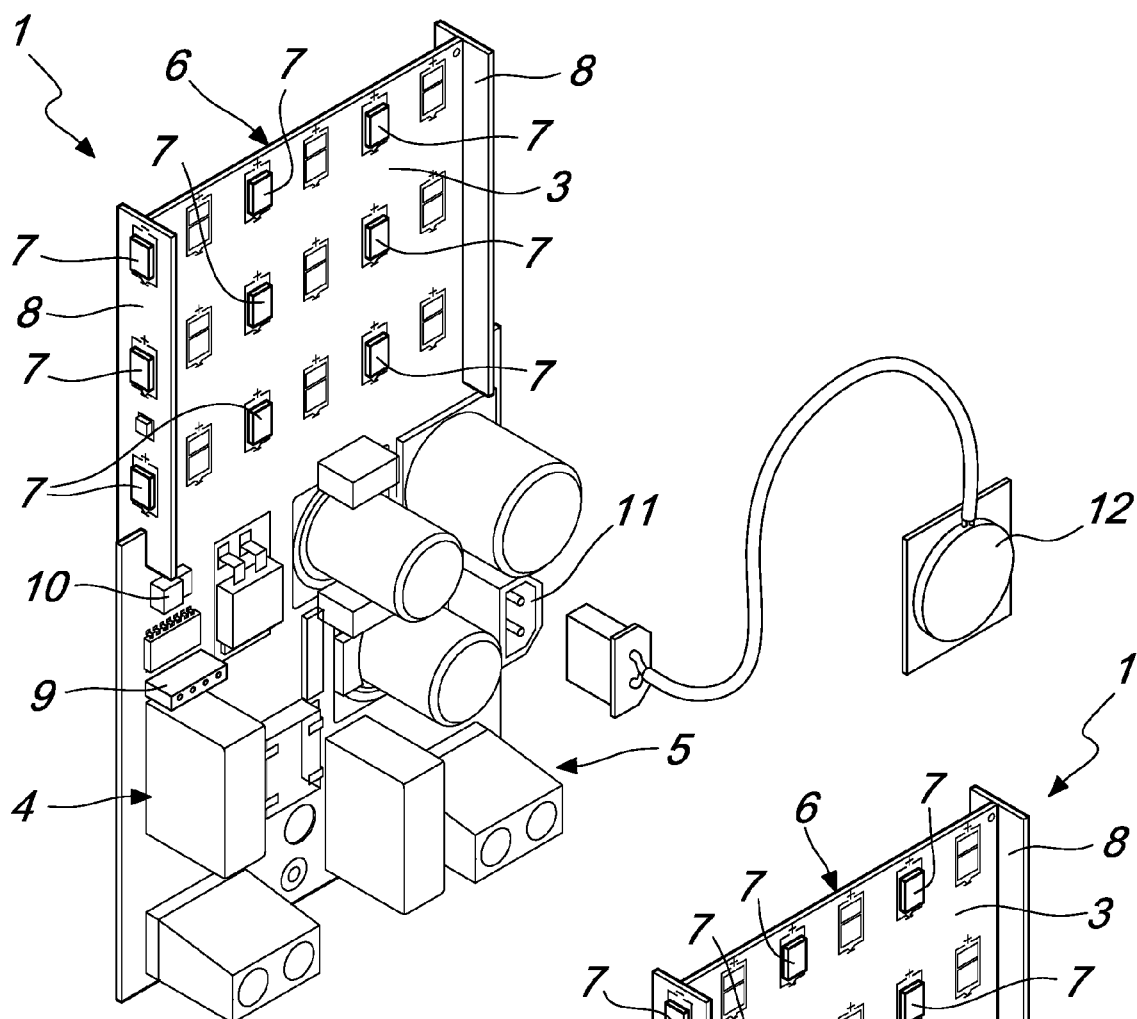


Fig. 1

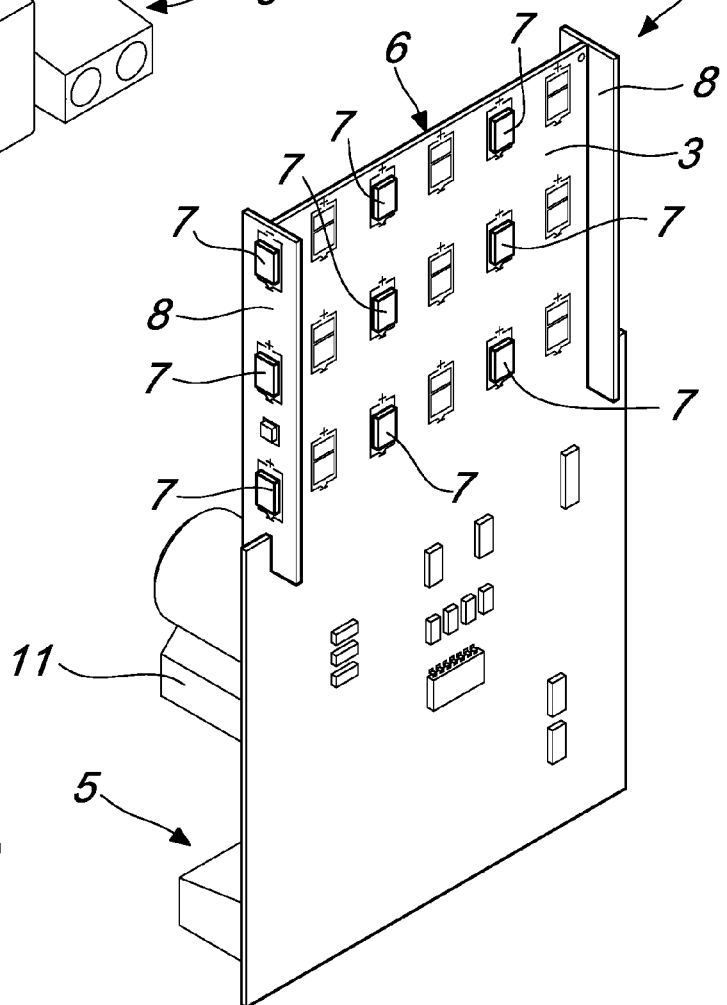


Fig. 2

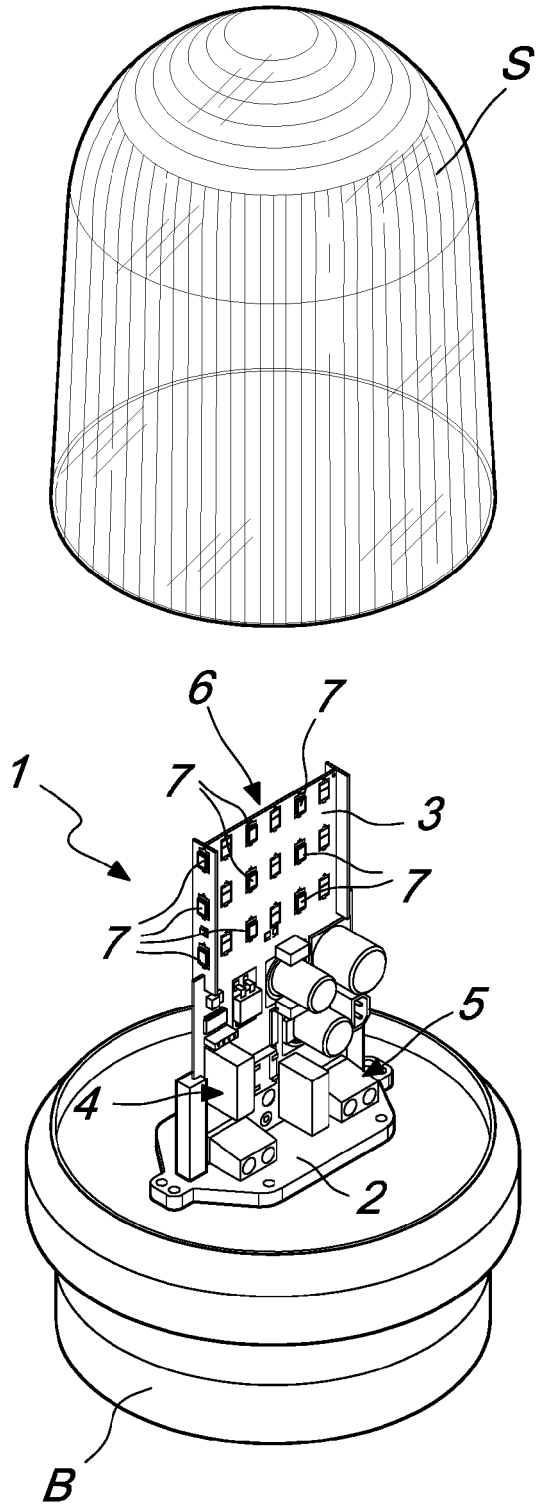


Fig. 3

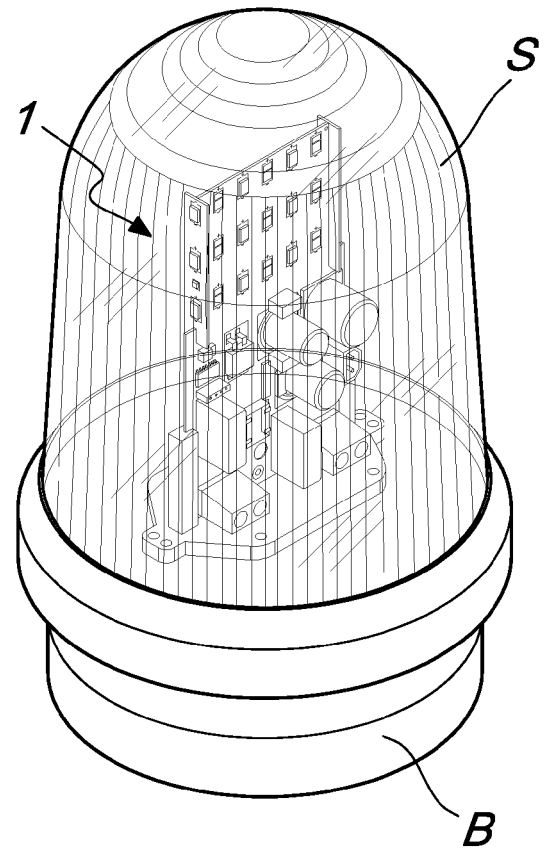


Fig. 4



EUROPEAN SEARCH REPORT

Application Number

EP 22 15 1435

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EPO FORM 1503 03.82 (P04C01)

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	Abexo Generale N: "CATALOGO", / 31 May 2019 (2019-05-31), XP055917369, Retrieved from the Internet: URL:https://www.abexo.tech/wp-content/uploads/2019/11/catalogo-n8-ABEXO-2019-IT_C_no price.pdf [retrieved on 2022-05-03]	1,5-10	INV. F21V23/00 F21V23/04 F21K9/232
Y	* pages 12-15,64 *	2,4	ADD. F21W111/00 F21Y105/16 F21Y107/50 F21Y107/90
Y	CN 102 434 807 A (DEQING DING HUI LIGHT CO LTD) 2 May 2012 (2012-05-02) * figures 1-3 *	2,4	
X	Abexo: "Volt Retrofit Assembly and Use Instructions", / 30 April 2019 (2019-04-30), XP055917316, Retrieved from the Internet: URL:https://www.abexo.tech/wp-content/uploads/2021/09/istruzioni-RETROFIT-2-2019-it-uk-fr-es-ted-AGGIORNATE-PER-STAMPA.pdf [retrieved on 2022-05-03] * the whole document *	1,5-10	
A	DE 100 29 069 A1 (OSRAM OPTO SEMICONDUCTORS GMBH [DE]) 10 January 2002 (2002-01-10) * figure 2 * * paragraphs [0003], [0034] *	1-10	TECHNICAL FIELDS SEARCHED (IPC) F21K F21V F21W F21Y
A	CN 207 648 497 U (ZHEJIANG SHUANGKE ELECTRIC CO LTD) 24 July 2018 (2018-07-24) * figure 2 *	1-10	
A	US 2012/032577 A1 (HUANG DAVID [TW]) 9 February 2012 (2012-02-09) * figures 6,9 *	1-10	
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 4 May 2022	Examiner Dinkla, Remko
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO.

EP 22 15 1435

5 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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04-05-2022

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
CN 102434807 A	02-05-2012	NONE	
DE 10029069 A1	10-01-2002	NONE	
CN 207648497 U	24-07-2018	NONE	
US 2012032577 A1	09-02-2012	NONE	

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- IT 202021000000134 [0059]