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(72) Inventors:
• **Bratovz, Blaz**
1310 Ribnica (SI)
• **Bratovz, Marko**
1292 IG (SI)

(74) Representative: **Flak, Antonija**
Patentni biro AF d.o.o.,
Kotnikova 32 p.p. 2706
1001 Ljubljana (SI)

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(71) Applicant: **Z-LED SVETLOBA d.o.o.**
1000 Ljubljana (SI)

(54) **MODULAR LED LIGHT**

(57) The present invention belongs to the field of lights, more precisely to the field of lights for outdoor lighting, which can be modularly assembled.

The modular LED light according to the invention comprises a carrier pillar in the shape of a tall cylinder with an inner accessory for mounting the axis of a cover, which is installed through the axis of the cylinder of the basic module with lightning LED diodes in a rotatable manner. The cylinder 1 of the basic module on the axis of the cover can be rotated left or right for preferably 15°, optionally from 10° to 40°.

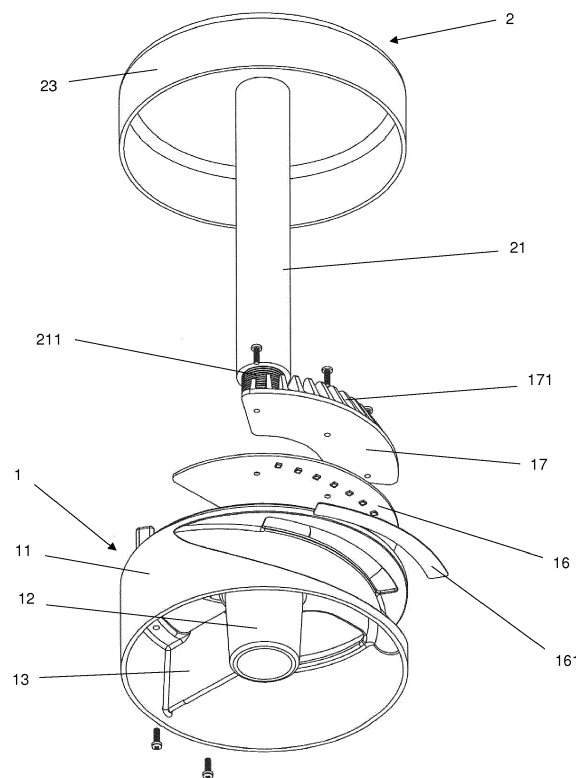


Fig. 1

Description

Field of the invention

[0001] The present invention belongs to the field of lights, more precisely to the field of lights for outdoor lighting, which can be modularly assembled.

The technical problem

[0002] The invention is based on the problem of constructing a basic module of a light, so that it will enable different ways of modular assembly into an assembled light. The basic module must enable different directions or shifts, respectively, of the light beam into left or right, as well as assembling more modules into a pillar.

[0003] The aim of the invention is providing lights for outdoor lighting that have along their vertical axis the basic module or a plurality of said basic modules, so that light bodies of basic modules can be positioned in any way and the basic modules have a unified external appearance.

State of the art

[0004] Slovene patent no. 24259 discloses built-in modular LED lights, wherein light components are shaped in such a way that simple combinations of components into different shapes with various light effects are enabled. Due to universally designed electrical connections, the components can be assembled in different combinations, wherein it is possible to construct different lights for different lighting and incorporating purposes.

[0005] Utility model CN 204387783 describes an LED light having an assembly of modules with LED diodes, which is the lighting body of a known light bulb. This solution differs from the present invention in that the light beam cannot be shifted into left or right as well as in that the utility model solution is not designed as a pillar that can independently stand outside.

[0006] Many different lights based on LED diodes as well as methods of controlling them can be found in patent databases. However, the applicant has not noticed that any of these solutions is similar to the present invention.

Description of the solution of the technical problem

[0007] The modular LED light according to the invention comprises a carrier pillar in the shape of a tall cylinder with an inner accessory for mounting the axis of a cover, which is installed through the axis of the cylinder of the basic module with lightning LED diodes in a rotatable manner. The cylinder 1 of the basic module on the axis of the cover can be rotated left or right for preferably 15°, optionally from 10° to 40°.

[0008] The modular LED light is designed in such a way that the axis of the cover goes through the axis of the basic module with lightning LED diodes into the inner

accessory of the carrier pillar in the shape of a tall cylinder. The basic module is designed as a short cylinder having a housing and in the vertical axis a hollow cylinder, through which the cylindrical axis of the end cover is mounted in a rotatable manner. The axis of the cover is screwed into the accessory of the carrier pillar with a thread at the end of the axis, wherein the bottom part of the carrier pillar is arranged to be fixed onto a surface.

The basic modules or cylinders may be stacked one onto another, wherein the next module covers the plate with a printed circuit for lightning LED diodes installed on the bottom side of the plate as well as the plate with cooling ribs of the previous module. The interior of the short cylinder is equipped with a rib, connected to the cylindrical axis, while the exterior has a surface for emitted light in parabolic shape. The modular LED light according to the invention has different embodiments depending on the position and number of the basic modules with lightning LED diodes, so that lighting of various ambients can be optimized.

[0009] The basic module of the light has at its upper part of the short cylinder an upper plate, to which a first plate with printed circuit for lightning LED diodes and connecting clips for connection with the next basic module.

A semi-circular plate with cooling ribs and a coding strip for positioning the shift of parabolic surface are mounted above the first plate. Electrical contacts on the basic module enable vertical stacking of a larger number of basic modules, which are through the contacts electrically connected with each other.

[0010] The modular LED light according to the invention will be described in further detail in continuation based on embodiments and figures, which show:

- Figure 1 explosion view of the assembly of basic light module
- Figure 2 basic module
- Figure 3 elevation view of the basic module
- Figure 4 bar with cooling ribs
- Figure 5 explosion view of the assembly of the basic light module
- Figure 6 embodiment I
- Figure 7 embodiment II
- Figure 8 embodiment III

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[0011] The modular LED light is designed in such a way, that the axis 21 of the end cover 2 goes through axis of a hollow cylinder 12 of the basic modules 1 with lightning LED diodes into a base 31 of the carrier pillar 3 in the shape of a tall cylinder.

[0012] The basic module of the light is designed as a short cylinder 1, which has a housing 11 (curved surface of the cylinder) and in the vertical axis a hollow cylinder 12, into which the cylindrical axis 21 of the cover 2 is mounted in a rotatable manner. The cover 2 is a short cylinder with a base upper surface 22 in the shape of a circle, surrounded by housing 23 (curved surface of the cylinder). Along the vertical axis of the cover 2 is the

cylindrical axis 21, which has on its free end a thread 211.

[0013] In the interior of the short cylinder 1 a rib 13 connects the housing 11 with the axis of the hollow cylinder 12, the outer surface has a surface 14 (as shown in figures 1 and 2) with a parabolic shape. The upper part of the cylinder 1 has a first plate 15 having symmetric shape with regards to the axis which runs along the rib 13. A larger part 151 of the plate 15 with three round holes 151' is arranged around the axis of the cylinder 12, while a smaller part 152 of the plate 15 with two round holes 152' is arranged on the other side. The second plate 16 with printed circuit for lightning LED diodes is fixed to the larger part 151 through holes 151'. A third plate 17 with cooling ribs 171 is fixed to the smaller part 152 through holes 152'. The second plate 16 is equipped with electrical contacts, which enable vertical stacking of a larger number of basic modules, which are electrically connected one to another with the electrical contacts. The basic module of the light is installed on the vertical carrier pillar 3, of which bottom part or base 31, respectively, is fixed to a surface (Figure 5). The basic module 1 can be rotated left or right around the axis 21 of the cover 2 for preferably 15°, optionally from 10° to 40°. Rotation of the module 1 into left or right enables direction of the light beam to the left or right and lightning adjustment with regards to needs for optimization of lightning in a room or space.

[0014] Figure 6 shows embodiment I, which has only one basic module on the carrier pillar 3. The carrier pillar 3 is mounted onto surface with screws through holes in the base 31 of the carrier pillar 3. The basic module is installed on the carrier pillar 3 so that the cylindrical axis 21 of the cover 2 is mounted through the axis of the hollow cylinder 12 of the short cylinder 1 in a rotatable manner and so that it is fixed with the thread 211 into the inner cylindrical carrier of the pillar 3.

[0015] Figure 7 shows embodiment II, which has two basic modules on the carrier pillar 3. The carrier pillar has a height from 30 to 120 cm, optionally even more.

[0016] Figure 8 shows embodiment III, which has eight basic modules on the carrier pillar 3.

[0017] The basic module of the modular LED light is designed in such a way that it is possible to manufacture different embodiments, in particularly with one to up to ten basic modules installed on the carrier pillar, which is closed with the cover. Variants of the modular light with the carrier pillar made from two parts are possible, so that one basic module is in the upper part and one basic module is in the lower part.

[0018] The modular LED light may have only one basic module on the carrier pillar 3, wherein the carrier pillar 3 is mounted onto a surface with screws through holes in the base 31 of the carrier pillar 3. The basic module is installed on the carrier pillar 3 so that the cylindrical axis 21 of the cover 2 is mounted through the axis of the hollow cylinder 12 of the short cylinder 1 in a rotatable manner and so that it is fixed with the thread 211 into the inner cylindrical carrier of the pillar 3.

[0019] Modular LED light may have one to ten basic modules installed in the upper part of the carrier pillar 3, which is closed by the cover 2.

[0020] Modular LED light may have one to ten basic modules installed in the bottom part of the carrier pillar 3, which has two parts and is closed by the cover 2.

[0021] Modular LED light may have two basic modules installed in the upper part of the carrier pillar 3.

[0022] Modular LED light may have two basic modules installed in the bottom part of the carrier pillar 3.

[0023] Modular LED light may have two basic modules installed in the upper part of the carrier pillar 3 and two basic modules installed in the bottom part of the carrier pillar 3.

[0024] The carrier pillar 3 of the modular LED light according to any of the embodiments may have a height from 30 to 120 cm, optionally even more. The modular LED light is suitable for lighting walking paths in camps, parks, along houses, gardens, marinas, streets, schools, city parks and all other environments where lighting of ways and spaces is required.

[0025] Basic lightning module comprises the cover of the light, coding strip for shifting the module, cooling rib for LED diodes, printed circuit for LED diodes, cover for LED poly(methyl methacrylate) (PMMA) also known as plexiglass or glass, carrier tube with a diameter of 160mm and carrier part for a foundation. The basic assembly of the module is made from aluminium (Al) and is shown in Figure 2. Each module is a separate unit and may be optionally changed or added in each embodiment of the light.

[0026] The essence of the solution is individual equal circular modules with a diameter of 160 mm with indirect positioning system of LED light sources. The module itself emits light asymmetrically, while in combination with more modules higher levels of asymmetric as well as roto-symmetric (rotationally symmetric) distribution of light in the space is achieved. Modules may be vertically stacked to achieve higher electric and lightning power. Such lightning system may be used for lightning walking paths in camps, parks, along houses and similar spaces and comprises at least one basic module installed for example at height from 20 to 60 cm, but can comprise 10 or even more modules for lightning squares, drive ways and similar, wherein the modules are installed at a height from 2 to 8 metres or more, if the construction of the carrier part under module allows such installation.

[0027] Appearance of the cylinder 1 of the basic light module is shown in figure 2. Embodiments of the basic version are possible without or with secondary optics, which further affects exit angles of the light as well as lighting levels. White or RGB LED diodes may be installed in the basic modules, wherein their electrical power is between 3 to 20 W and their lighting power from 250 to 3200 lm per individual module. RGB LED diodes are special diodes, which have in their interior three small diodes. Each of them emits a different colour, red, green and blue.

[0028] LED sources have a constructional option that

they may be additionally protected with milk or partly milk covering tempered glass, such as poly(methyl methacrylate) (PMMA) also known as plexiglass or polycarbonate. Even additional directors of light or lenses may be used. The protecting covering glass is mounted between the larger part 151 and the printed circuit with LED diodes and connecting clips on the second plate 16. The constructional solution is to mechanically process, preferably by milling, the cooling rib 171 for the width of the covering glass. The basic execution enables rotation of individual modules for 15° left and 15° right. The reflecting surface, from which the light is reflected, may have different structures, colours or additional reflexive materials. In this way, a direct impact on the glare factor, final efficiency of the light, spectral distribution of the light as well as architectural appearance with regards to the function of the light in the space can be achieved.

Claims

1. Modular LED light, **characterized in that** it comprises a carrier pillar (3) in the shape of a tall cylinder with a base (31) for mounting an axis (21) of an end cover (2), which is installed through an axis of a hollow cylinder (12) of a cylinder (1) of a basic module with lightning LED diodes in a rotatable manner, wherein the base (31) of the carrier pillar (3) is arranged to be fixed to a surface; that the cylinder (1) of the basic module is arranged to rotate left or right around the axis (21) of the cover (2), preferably for 15°, optionally for 10° to 40°.
2. Modular LED light according to claim 1, **characterized in that** the basic module of the light is designed as a short cylinder (1), having a housing (11) and in the vertical axis the hollow cylinder (12), into which the cylindrical axis (21) of the cover (2) is installed in a rotatable manner; that the cover (2) is a short cylinder with a basic upper surface (22) in the shape of a circle, surrounded by a housing (23); that along the vertical axis of the cover (2) the cylindrical axis (21) is arranged, wherein its free end has a thread (211); that in the interior of the short cylinder (1) a rib (13) connects the housing (11) with the axis of the hollow cylinder (12), while the exterior of the cylinder (1) has a surface (14) with a parabolic shape; that the upper part of the cylinder (1) is equipped with a first plate (15) having a symmetrical shape with regards to the axis which runs along the rib (13); that around the axis of the hollow cylinder (12) a larger part (151) with three round holes (151') is arranged, while a smaller part (152) with two round holes (152') is arranged on the other side; that a second plate (16) with a printed circuit for lightning LED diodes is fixed to the larger part (151) through the holes (151'); that a third plate (17) with cooling ribs (171) is fixed to the smaller part (152) through holes

(152'); that the second plate (16) is equipped with electrical contacts, which enable vertical stacking of a larger number of basic modules, which electrically connect through the contacts; that the basic module is installed on the vertical carrier pillar (3), of which bottom part or the base (31), respectively, is arranged to be fixed to a surface.

3. Modular LED light according to claims 1 and 2, **characterized in that** it has one to ten cylinders (1) of basic modules installed in the upper part of the carrier pillar (3), which is closed with a cover (2).
4. Modular LED light according to claim 1 and 2, **characterized in that** it has one to ten cylinders (1) of basic modules installed in the bottom part of the carrier pillar (3), which is made of two parts and is closed with a cover (2).
5. Modular LED light according to any of the preceding claims, **characterized in that** it has two basic modules installed in the upper part of the carrier pillar (3).
6. Modular LED light according to any of the preceding claims, **characterized in that** it has two basic modules installed in the bottom part of the carrier pillar (3).
7. Modular LED light according to any of the preceding claims, **characterized in that** it has two basic modules installed in the upper part of the carrier pillar (3) and two basic modules installed in the bottom of the carrier pillar (3).
8. Modular LED light according to any of the preceding claims, **characterized in that** the supporting pillar has a height from 20 to 120 cm or optionally more.
9. Modular LED light according to any of the preceding claims, **characterized in that** it has more basic modules in the support, which has a height between 2 and 8 m or more.

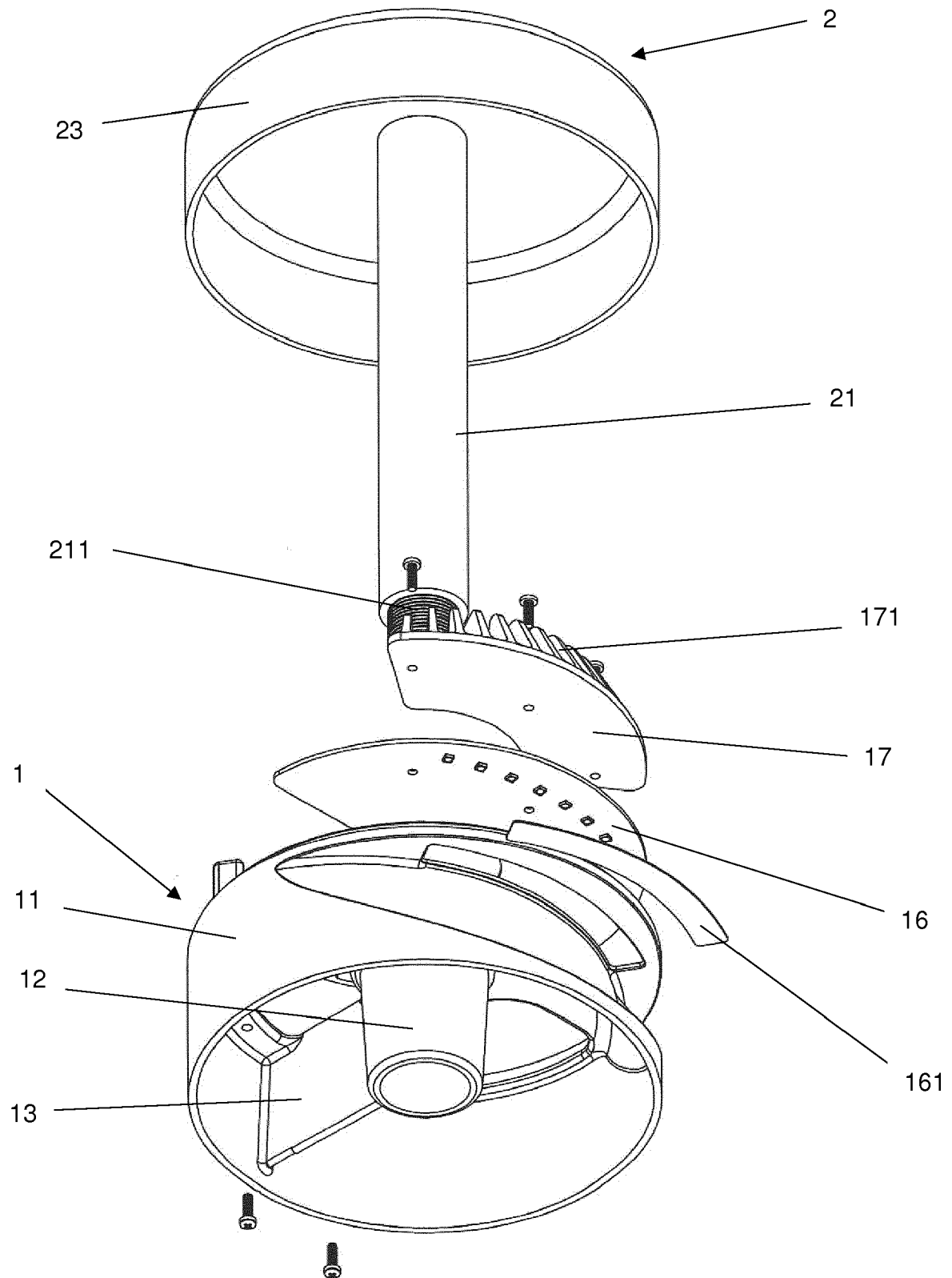


Fig. 1

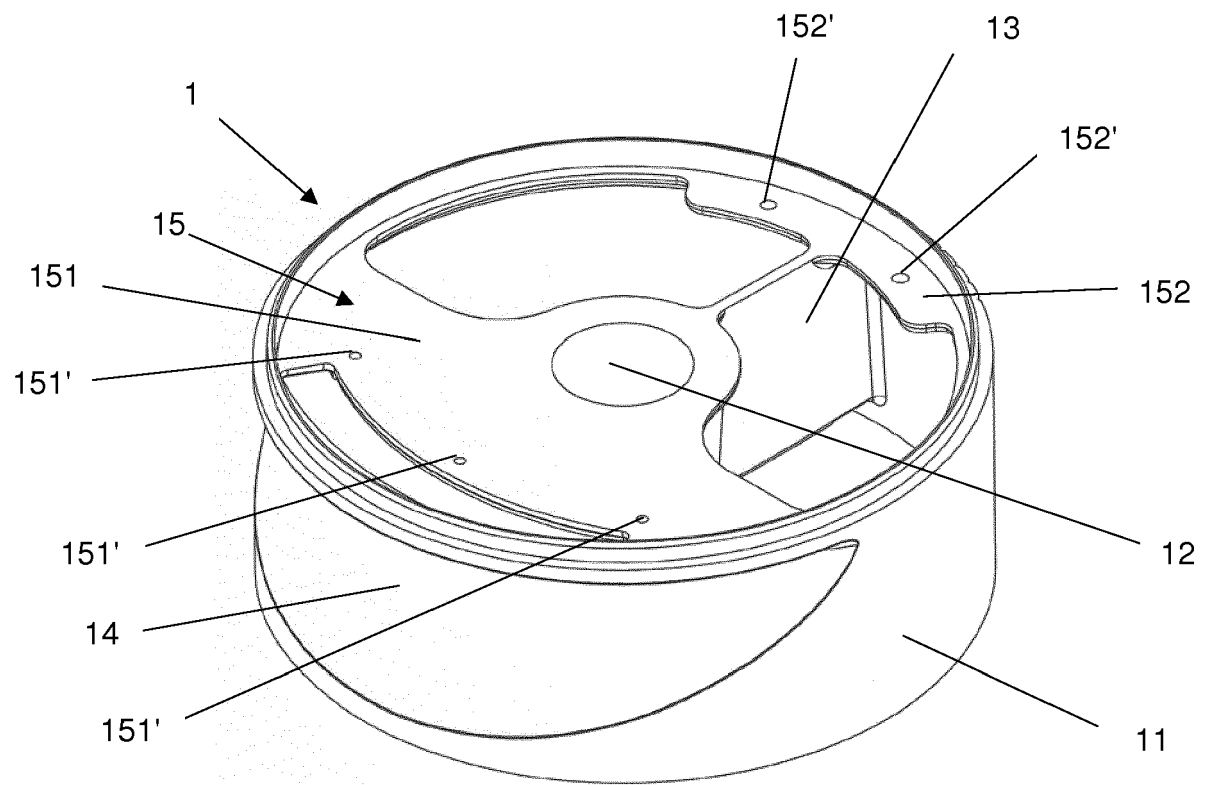


Fig. 2

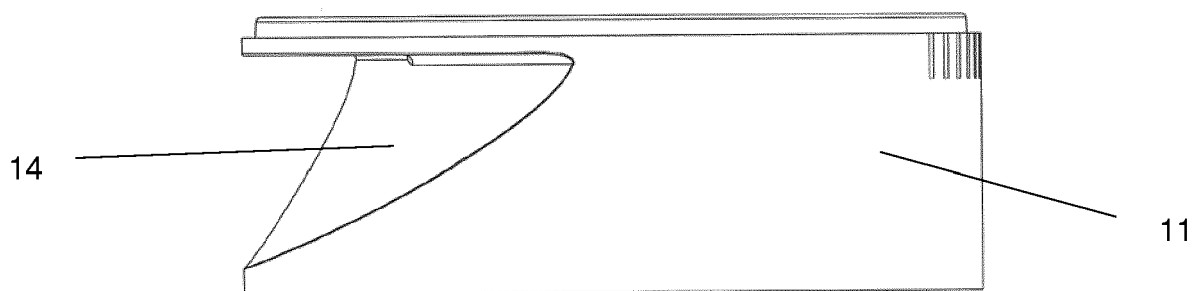


Fig. 3

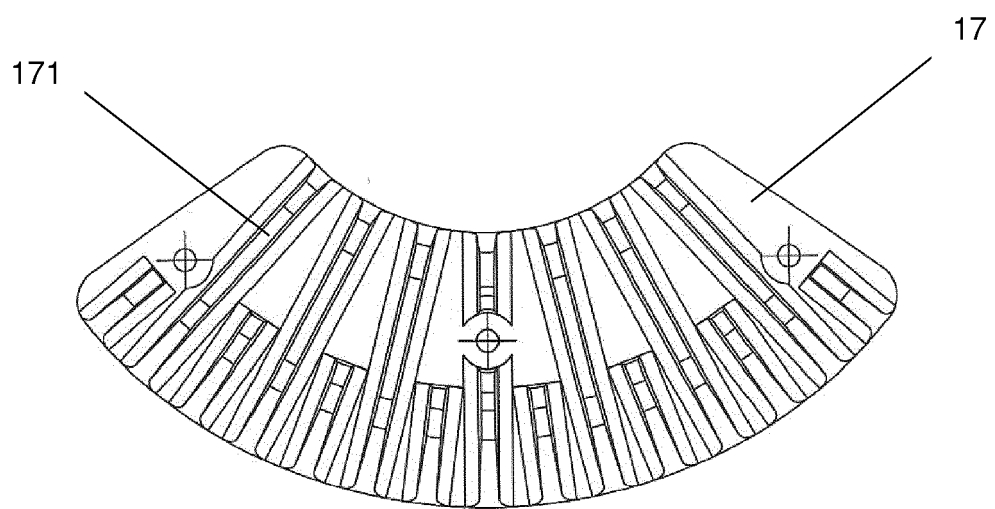


Fig. 4

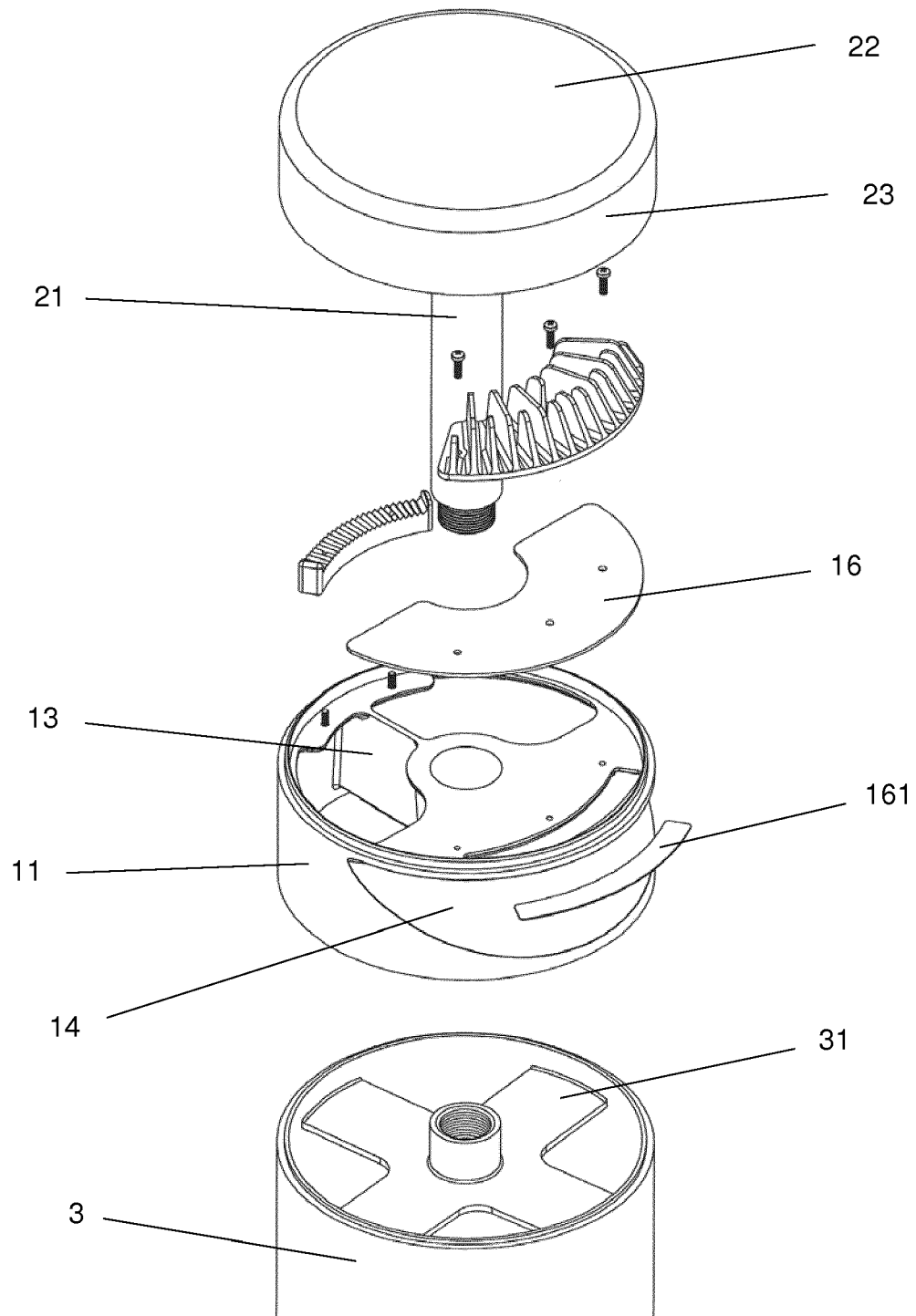


Fig. 5

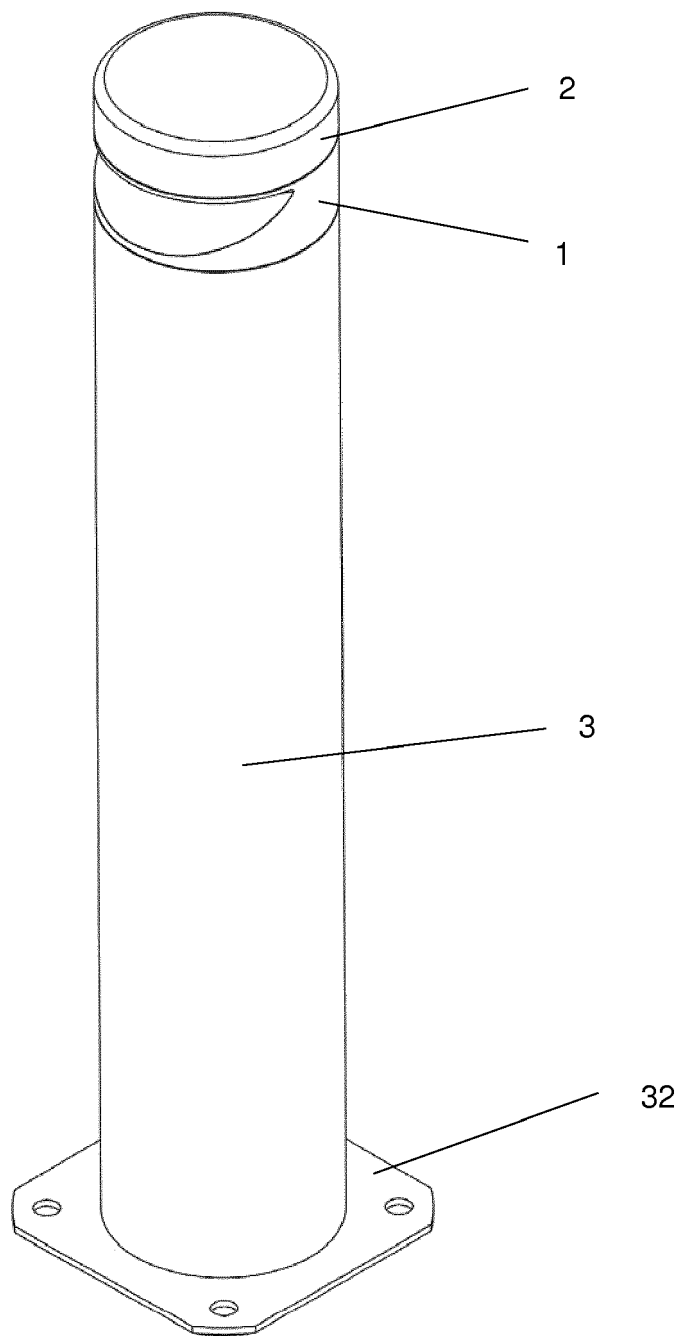


Fig. 6

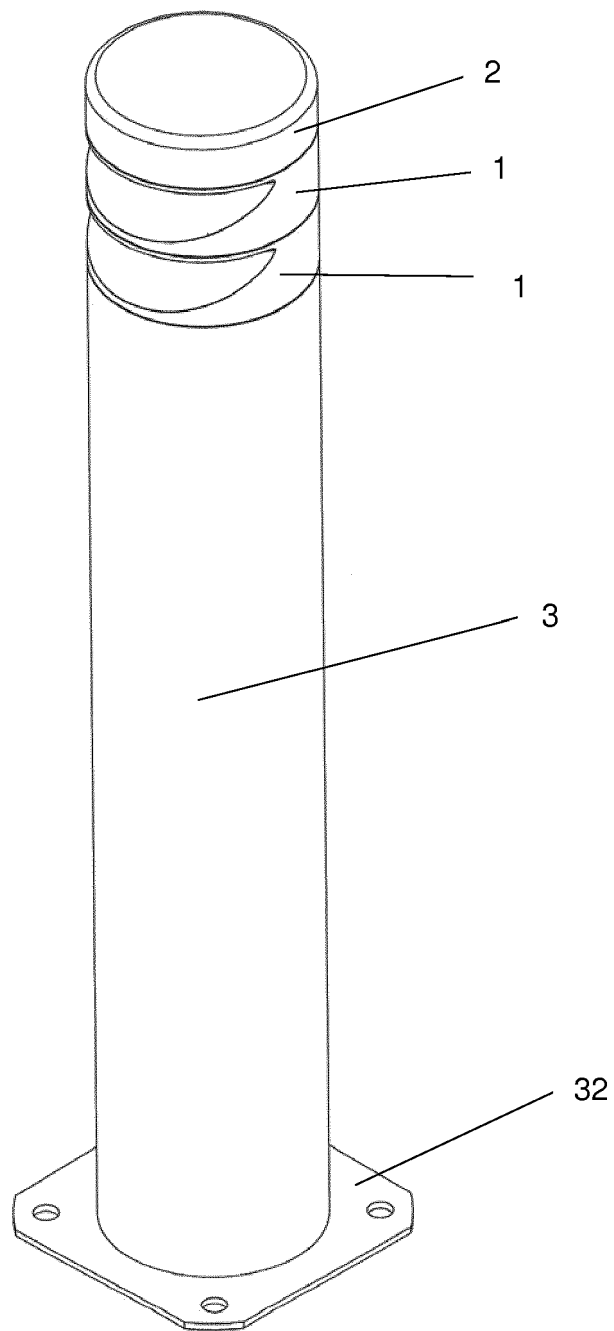


Fig. 7

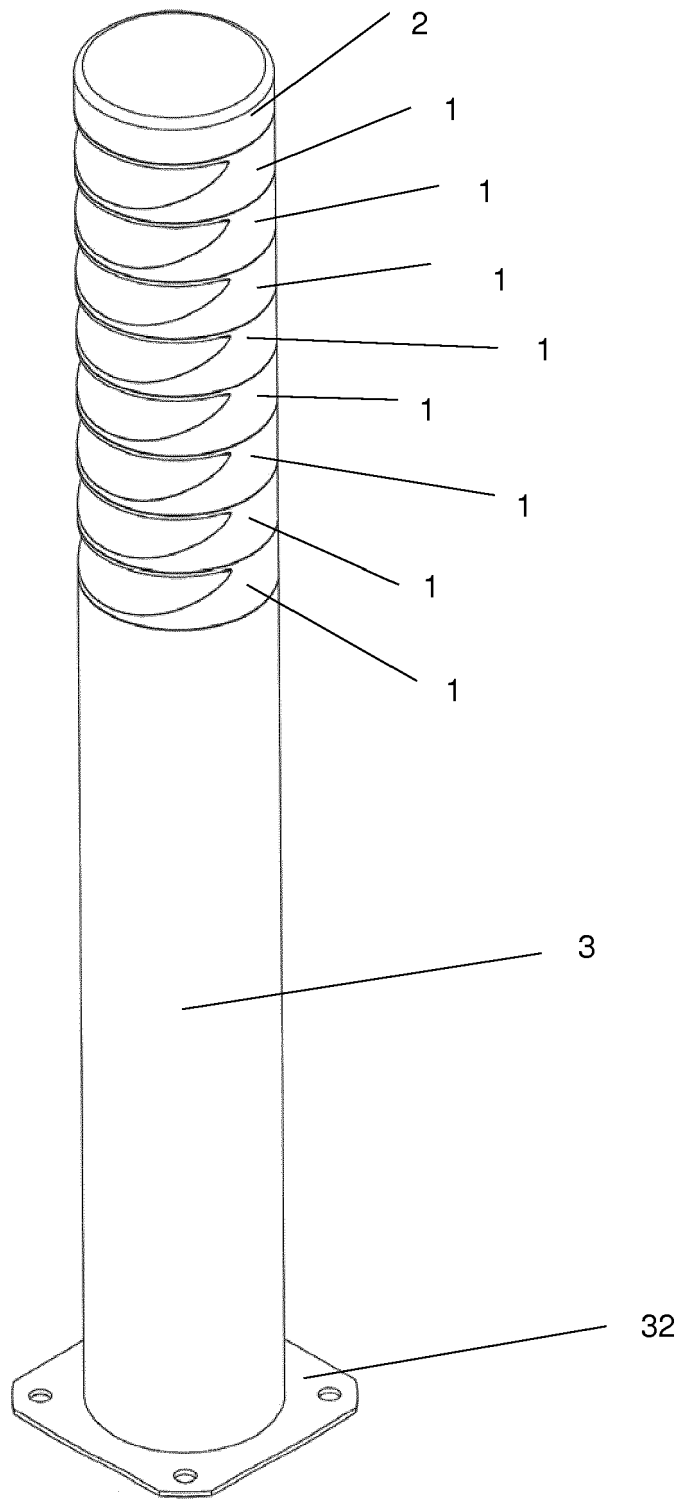


Fig. 8



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Application Number
EP 18 16 3797

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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			TECHNICAL FIELDS SEARCHED (IPC)
			F21S F21V F21W F21Y
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 13 July 2018	Examiner Sacepe, Nicolas
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			

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

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