(19) Europäisches Patentamt
European Patent Office
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(11) **EP 3 575 681 A1**

# (12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
**04.12.2019 Bulletin 2019/49**

(21) Application number: **19177771.3**

(22) Date of filing: **31.05.2019**

(51) Int Cl.:
***F21V 7/06*** *(2006.01)* ***F21V 7/00*** *(2006.01)*
***F21V 31/00*** *(2006.01)* *F21W 111/00* *(2006.01)*
*F21Y 103/33* *(2016.01)* *F21Y 115/10* *(2016.01)*
*F21V 23/00* *(2015.01)*

(84) Designated Contracting States:
**AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR**
Designated Extension States:
**BA ME**
Designated Validation States:
**KH MA MD TN**

(30) Priority: **31.05.2018 IT 201800005921**

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## (54) LIGHT SIGNALER

(57) Light signaler comprising a support body (11), a light source (12) associated with the support body (11), and provided with a plurality of LEDs (16), and a deflector (19) attached to the support body (11) and provided with a shaped deflection surface (23) facing, during use, toward the light source (12) in order to deflect the light beam emitted by the LEDs (16). The light source also comprises a closing body (24) made of a transparent material.

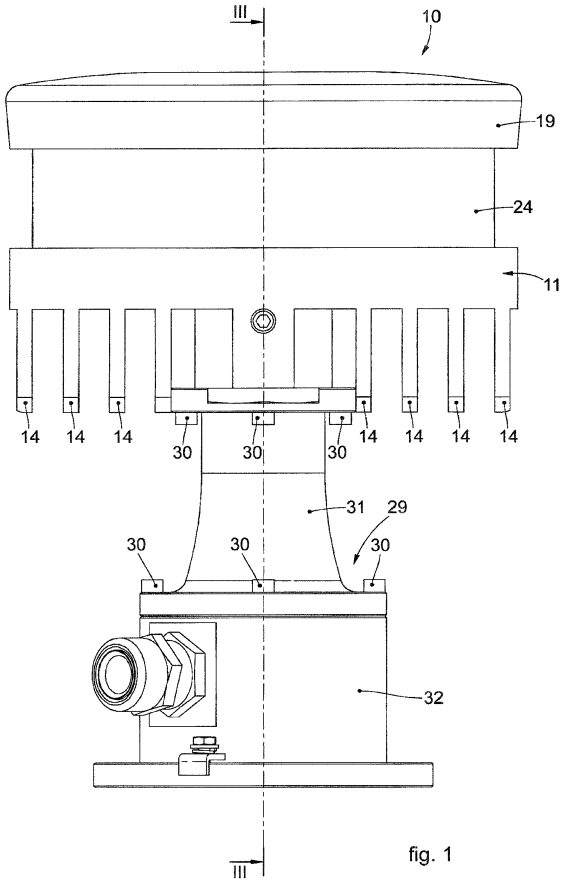


fig. 1

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## Description

### FIELD OF THE INVENTION

**[0001]** The present invention concerns a light signaler usable to signal obstacles.

**[0002]** In particular, the present invention is applied for example to signal obstacles in airports, towers, tall buildings, chimneys, smokestacks, torches, bell towers and similar and comparable obstacles.

### BACKGROUND OF THE INVENTION

**[0003]** Light signalers are known which comprise a tubular-shaped support body extending in a longitudinal direction and a light source associated with the support body.

**[0004]** The light source usually comprises a support plate on which a plurality of LEDs are attached.

**[0005]** The support body, in turn, is provided with heat dispersion elements, usually fins, provided to dissipate the heat generated by the light source. The heat dispersion elements can be made in a single body with the support body, or integrally attached thereto.

**[0006]** It is also known that the light signalers comprise a deflector attached to the support body and configured to deflect the light beam emitted by the LEDs.

**[0007]** In particular, the deflector usually has the function of collimating the light emitted by the LEDs into light beams with a direction parallel to the desired emission plane, that is, in a direction perpendicular to the longitudinal axis of extension of the light signaler. In particular, one of the characteristics of the deflector is that it has a high ability to collimate the light, that is, to direct the rays in the desired direction, avoiding as much as possible dispersion and optical diffusion phenomena. In this way, the light emitted is visible at a greater distance and allows to avoid distortions that would not make the position of the obstacle precisely definable.

**[0008]** Furthermore, known light signalers comprise a closing body attached to the support body, having a globe shape and made of transparent material to allow the passage of the light beam deflected by the deflector.

**[0009]** This configuration of the closing body, however, causes phenomena of aberration of the light beams. The curvilinear surface of the closing body, in fact, diverts the light rays in an undesired way, with consequent loss of effectiveness of the light signal itself. Furthermore, the shape of the closing body makes its manufacturing operations particularly complex and expensive.

**[0010]** The closing body defines with the support body a chamber closed toward the outside in which the light source and the deflector are positioned, protecting them from the external environment.

**[0011]** Usually, sealing elements are provided between the closing body and the support body, with the function of isolating the chamber with respect to the outside. This makes the light signaler particularly suitable to be applied in operating environments where explosive atmospheres can be present, or more generally deflagrating or explosive powders or substances, such as can be found on oil platforms, or other similar structures.

**[0012]** In these cases, the light signalers have to guarantee an adequate degree of safety and in particular prevent accidental formation of discharges between the electrical components of the power supply body from acting as a detonator for the deflagrating powders or substances present in the environment, with consequent accidents or explosions.

**[0013]** The known solution described above, due to the particular conformation of the closing body, does not allow to optimize heat dissipation.

**[0014]** Furthermore, the known light signalers described above are very bulky.

**[0015]** Another disadvantage of known light signalers is the difficulty in assembling and manufacturing the various components of which they consist.

**[0016]** One purpose of the present invention is to provide a more economical light signaler.

**[0017]** Another purpose of the present invention is to provide a light signaler able to significantly reduce light aberrations with respect to the state of the art.

**[0018]** It is also a purpose of the present invention to provide a light signaler which has a shape which allows a more effective dispersion of heat.

**[0019]** It is also a purpose of the present invention to provide a light signaler more compact in size.

**[0020]** The Applicant has devised, tested and embodied the present invention to overcome the shortcomings of the state of the art and to obtain these and other purposes and advantages.

### SUMMARY OF THE INVENTION

**[0021]** The present invention is set forth and characterized in the independent claims, while the dependent claims describe other characteristics of the invention or variants to the main inventive idea.

**[0022]** In accordance with the above purposes, a light signaler according to the present invention, comprises:

- a support body,
- a light source associated with the support body, and provided with a plurality of LEDs,
- a deflector attached to the support body and provided with a shaped deflection surface facing, during use, toward the light source in order to deflect the light beam emitted by the LEDs.

**[0023]** According to one aspect of the present invention, the light signaler comprises a closing body made of a transparent material, having a tubular shape, attached to the support body and to the deflector and defining with the latter two a closed chamber, insulated from the external environment, in which the light source is positioned.

**[0024]** In this way it is possible to obtain a light signaler that, with respect to known solutions, is extremely easy and economical to produce.

**[0025]** The presence of a tubular-shaped closing body, advantageously cylindrical in shape, allows to avoid the phenomena of optical aberration, thus increasing the efficiency of the light signaler.

**[0026]** The present invention therefore provides a light signaler with high deflagration-proof characteristics.

**[0027]** According to the present invention, therefore, the support body, the closing body and the deflector are connected to each other defining structural components of the light signaler that insulate, with respect to the outside, the chamber in which the light source is housed.

## BRIEF DESCRIPTION OF THE DRAWINGS

**[0028]** These and other characteristics of the present invention will become apparent from the following description of some embodiments, given as a non-restrictive example with reference to the attached drawings wherein:

- fig. 1 is a perspective view of a light signaler according to the present invention;
- fig. 2 is an exploded view of the light signaler of fig. 1;
- fig. 3 is a section view obtained with respect to the section line III-III of fig. 1.

**[0029]** To facilitate comprehension, the same reference numbers have been used, where possible, to identify identical common elements in the drawings. It is understood that elements and characteristics of one embodiment can conveniently be incorporated into other embodiments without further clarifications.

## DETAILED DESCRIPTION OF SOME EMBODIMENTS

**[0030]** We will now refer in detail to the various embodiments of the present invention, of which one or more examples are shown in the attached drawings. Each example is supplied by way of illustration of the invention and shall not be understood as a limitation thereof. For example, the characteristics shown or described insomuch as they are part of one embodiment can be adopted on, or in association with, other embodiments to produce another embodiment. It is understood that the present invention shall include all such modifications and variants.

**[0031]** With reference to the attached drawings, a light signaler according to the present invention is indicated as a whole with the reference number 10.

**[0032]** In particular, the light signaler 10 is usable to signal obstacles, for example, in airports, towers, high buildings, chimneys, smokestacks, torches, bell towers and similar and comparable obstacles. Furthermore, the light signaler 10, as described below, has structural characteristics which make it particularly suitable to be applied in deflagration proof fields.

**[0033]** With reference to fig. 1, the light signaler 10 comprises a support body 11 and a light source 12 (fig. 3) associated with the support body 11.

**[0034]** The light source 12 comprises a support plate 15 and a plurality of LEDs 16 associated with the support plate 15.

**[0035]** The support plate 15 is attached to the support body 11.

**[0036]** The support plate 15 can be attached to the support body 11 by means of threaded elements 17, as shown in fig. 2.

**[0037]** According to variant embodiments, the support plate 15 can be attached to the support body 11 by means of adhesives.

**[0038]** The LEDs 16 can be attached on the support plate 15 according to a pattern on the perimeter of a geometric figure, comprising at least a polygon or a circumference.

**[0039]** By way of example only, in fig. 2, the LEDs 16 are disposed according to a pattern on the sides of a polygon, in this case a hexagon.

**[0040]** The support body 11 can be provided with a support surface 13 (fig. 3) on which the light source 12 is positioned.

**[0041]** The support surface 13 can have a substantially flat shape.

**[0042]** The support plate 15 of the LEDs 16 can be attached to the support surface 13.

**[0043]** According to some solutions, the support surface 13 is provided with a groove to house the support plate 15.

**[0044]** The support body 11 can be provided with heat dispersion elements 14, usually fins, provided to dissipate the heat generated by the light source 12.

**[0045]** According to variant embodiments, the heat dispersion elements 14 can be made in a single body with the support body 11, or integrally attached to the latter.

**[0046]** According to some embodiments, the heat dispersion elements 14 can extend from the support body 11 and be directly in contact with the external environment.

**[0047]** According to a further aspect of the present invention, the light signaler 10 also comprises a deflector 19 and a closing body 24.

**[0048]** The deflector 19 can be made with a thermally conductive material to increase the heat dissipation action of the energy generated by the light source 12.

**[0049]** The deflector 19 is attached to the support body 11 and is provided with a deflection surface 23 shaped to reflect the light beam emitted by the LEDs 16.

**[0050]** The deflection surface 23 can have a profile of the cross section in a parabola shape (fig. 3).

**[0051]** According to possible solutions, the LEDs 16 are positioned in correspondence with the focus of the parabola.

**[0052]** According to variant embodiments, the deflection surface 23 can have a profile of the cross section in

an elliptical arc shape, or similar or comparable curvatures.

**[0053]** According to a possible solution, the deflection surface 23 can be axial-symmetrical with respect to a longitudinal axis Z.

**[0054]** The longitudinal axis Z can be substantially orthogonal to the support surface 13.

**[0055]** The deflection surface 23 is facing, during use, toward the light source 12 to reflect the light beams emitted by the latter.

**[0056]** In particular, it can be provided that the deflection surface 23 is configured to deflect the light beams emitted by the LEDs 16 in a transverse direction, for example orthogonal, with respect to the longitudinal axis Z.

**[0057]** In particular, it can be provided that the LEDs 16 are configured to emit light beams in a direction substantially orthogonal to the support surface 13 of the support body 11. The light beams, in turn, incident on the deflection surface 23 are deflected in a direction substantially parallel to the support surface 13.

**[0058]** In particular, the light beams incident on the deflection surface 23 are deflected in a direction inclined upward with respect to the support surface 13, at an angle comprised between about 1° and about 6°, preferably between about 1° and about 3°. In this way, the light signaler 10 is configured to emit light rays which can reach quite significant heights from the ground.

**[0059]** According to a possible solution, the deflection surface 23 is configured to respond to industry standards, such as the ICAO Annex 14 standard for the signaling model Medium-Intensity, Type B.

**[0060]** The deflection surface 23 can be made of a reflective material, to define a mirror surface.

**[0061]** According to a possible solution, the deflection surface 23 can be made of chrome-plated aluminum, to define said mirror finish.

**[0062]** According to possible solutions, the support body 11 is provided with a coupling part 18 configured to couple with a respective coupling portion 20 of the deflector 19.

**[0063]** In particular, it can be provided that the coupling part 18 and the coupling portion 20 are defined by a protruding portion and respectively by a housing seating configured to accommodate the protruding portion. According to a variant, the coupling part 18 and the coupling portion 20 are defined by a housing seating and respectively by a protruding portion configured to position itself in the housing seating.

**[0064]** According to a possible solution, the coupling part 18 of the support body 11 is provided in a central zone of the support surface 13.

**[0065]** According to this embodiment, the LEDs 16 are disposed around the coupling part 18.

**[0066]** The deflector 19 can be attached to the support body 11 by means of attachment elements 21, such as threaded elements.

**[0067]** In particular, the deflector 19 can be attached to the support body 11 by means of attachment elements 21 which anchor to the coupling part 18 of the support body 11.

**[0068]** According to further variant embodiments, the attachment of the support body 11 and the deflector 19 can be achieved by gluing.

**[0069]** According to one aspect of the present invention, the closing body 24 is made of a material transparent to visible light, so as to allow the passage of the light beams deflected by the deflector 19.

**[0070]** The closing body 24 can be made of glass, for example borosilicate.

**[0071]** Furthermore, the closing body 24 has a tubular shape so as to surround the light source 12 during use.

**[0072]** According to further embodiments, the closing body 24 is defined by an annular wall, that is, cylindrical and internally hollow, and axial-symmetrical. In this way, the light beams pass through the closing body 24 according to an incident direction, that is, orthogonal to the annular wall, limiting the phenomena of optical aberration.

**[0073]** The closing body 24 can have an axial-symmetrical shape with respect to the longitudinal axis Z.

**[0074]** According to a further aspect of the invention, the closing body 24 is attached to the support body 11 and to the deflector 19, and defines together with the latter two a closed chamber 25, insulated from the external environment, and in which the light source 12 is positioned. In this way, it is possible to obtain a light signaler 10 that is extremely compact and of low cost with respect to known solutions.

**[0075]** Furthermore, the particular conformation of the components of the light signaler makes it particularly suitable to be applied in deflagration proof fields. For example, the closing body 24 can be made of glass that is particularly resistant to impacts and has a thickness suitable to contain possible explosions that can occur inside the chamber 25, up to pressures of about 20 bar and more.

**[0076]** Furthermore, with respect to known solutions, the deflector 19 therefore contributes to defining the chamber 25 closed with respect to the outside, becoming itself a structural component of the light signaler 10.

**[0077]** According to a possible solution, the closing body 24 is attached directly to the support body 11 and to the deflector 19.

**[0078]** According to a further embodiment of the present invention, the attachment elements 21 are configured to close the closing body 24 pack-wise between the deflector 19 and the support body 11, to contribute in conferring deflagration proof properties on the assembly. Advantageously, the pack-wise configuration allows a greater resistance to a possible deflagration inside the chamber 25, guaranteeing and maintaining at the same time the structural solidity of the light signaler, its optical functionalities for a correct lighting, and the safety of the surrounding environment.

**[0079]** According to a possible solution, at least one of either the support body 11 or the deflector 19, in this case both, is provided with a housing throat 22 in which, during

use, the closing body 24 is positioned.

**[0080]** According to a possible solution, the housing throat 22 can have sizes suitable to accommodate the thickness of the closing body 24.

**[0081]** According to a possible solution, the light signaler 10 can be provided with sealing elements 26 interposed between the deflector 19 and the closing body 24, and between the support body 11 and the closing body 24, in order to insulate the chamber 25 with respect to the outside.

**[0082]** This solution makes the light signaler 10 suitable for deflagration proof applications.

**[0083]** According to a possible solution, the sealing elements 26 can be chosen from a group comprising cemented joints, or gaskets.

**[0084]** According to a further embodiment, the sealing elements 26 can be provided in the housing throats 22.

**[0085]** According to a possible solution, the support body 11 is provided, in its thickness, with a channel 27 which extends toward the inside of the chamber 25 to allow the passage of cables to power the light source 12.

**[0086]** According to a possible solution, the channel 27 can be provided with a sealing body 28 provided in order to allow the passage of power supply cables, not shown, toward the chamber 25, and in any case guaranteeing the insulation of the chamber 25 from the outside, possibly also explosion proof with particular reference to applications intended for zones with dangerous atmospheres.

**[0087]** The sealing body 28 can be chosen from a group comprising a cable gland, a sealed joint, or similar and comparable elements.

**[0088]** According to possible solutions, the light signaler 10 can be provided with power supply components 34, connected to the light source 12 through said power supply cables disposed through the channel 27 and configured to supply electric energy to the light source 12.

**[0089]** The power supply components 34 can be chosen from a group comprising a terminal board, as shown in fig. 3, a power supply, a transformer, or other electrical components.

**[0090]** According to a possible solution, not shown, the power supply components 34 can be associated with the support body 11, for example positioned in a housing seating made in the latter.

**[0091]** According to some embodiments, shown in figs. 1-3, the light signaler 10 comprises a support base 29 on which the support body 11 is attached and provided to allow the attachment of the latter with respect to a fixed wall of the final usage seating.

**[0092]** The support base 29 can be provided with a housing compartment 33 in which the power supply components 34 are positioned to protect them from the outside.

**[0093]** The housing compartment 33 is put in communication with the channel 27 of the support body 11 to allow the passage of the power supply cables.

**[0094]** According to a variant embodiment, the support base 29 comprises, in this case, a connection component 31 and an attachment component 32 connected to each other, for example by means of threaded elements 30.

**[0095]** The connection component 31 and the attachment component 32 can define between them the housing compartment 33.

**[0096]** It is clear that modifications and/or additions of parts may be made to the light signaler as described heretofore, without departing from the field and scope of the present invention.

**[0097]** It is also clear that, although the present invention has been described with reference to some specific examples, a person of skill in the art shall certainly be able to achieve many other equivalent forms of light signaler, having the characteristics as set forth in the claims and hence all coming within the field of protection defined thereby.

## Claims

1. Light signaler comprising a support body (11), a light source (12) associated with the support body (11), and provided with a plurality of LEDs (16), a deflector (19) attached to the support body (11), and provided with a shaped deflection surface (23) facing, during use, toward the light source (12) in order to deflect the light beam emitted by the LEDs (16), **characterized in that** it comprises a closing body (24) made of a transparent material, having a tubular shape, attached to the support body (11) and to the deflector (19) and defining with the latter two a closed chamber (25), insulated from the external environment, in which said light source (12) is positioned.

2. Light signaler as in claim 1, **characterized in that** said closing body (24) is directly attached to said support body (11) and to said deflector (19).

3. Light signaler as in claim 1 or 2, **characterized in that** the deflector (19) is attached to the support body (11) by means of attachment elements (21), **and in that** the attachment elements (21) are configured to close the closing body (24) pack-wise between the deflector (19) and the support body (11), in order to confer explosion proof properties on the assembly.

4. Light signaler as in claim 1 or 2, **characterized in that** at least one of either the support body (11) or the deflector (19) is provided with a housing throat (22) in which, during use, the closing body (24) is positioned.

5. Light signaler as in any claim hereinbefore, **characterized in that** it is provided with sealing elements (26) interposed between said deflector (19) and the closing body (24), and between the support body (11) and the closing body (24) in order to insulate

the chamber (25) with respect to the outside.

**6.** Light signaler as in claims 4 and 5, **characterized in that** the sealing elements (26) are provided in the housing throats (22).

**7.** Light signaler as in any claim hereinbefore, **characterized in that** the support body (11) is provided with a coupling part (18) configured to couple with a respective coupling portion (20) of the deflector (19).

**8.** Light signaler as in claim 7, **characterized in that** the coupling part (18) of the support body (11) is provided in a central zone of the support surface (13), **and in that** the LEDs (16) are disposed around the coupling part (18).

**9.** Light signaler as in any claim hereinbefore, **characterized in that** said support body (11) is provided with a support surface (13) on which the light source (12) is positioned, **in that** the deflection surface (23) can be axial-symmetrical with respect to a longitudinal axis (Z), **and in that** said longitudinal axis (Z) is orthogonal to the support surface (13).

**10.** Light signaler as in any claim hereinbefore, **characterized in that** said deflection surface (23) has a profile of the cross section in a parabola shape, **and in that** the LEDs (16) are positioned in correspondence to the focus of the parabola.

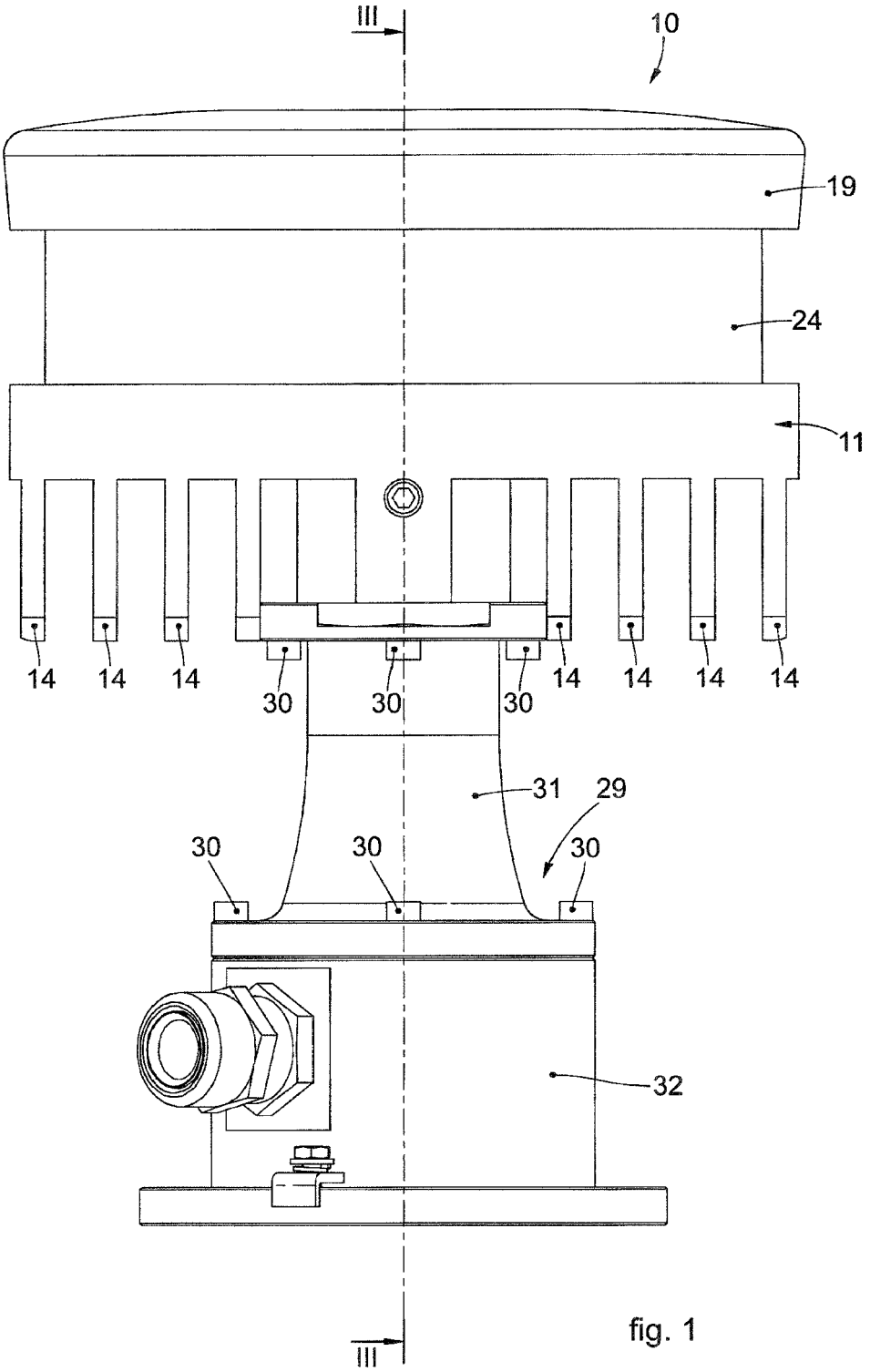


fig. 1

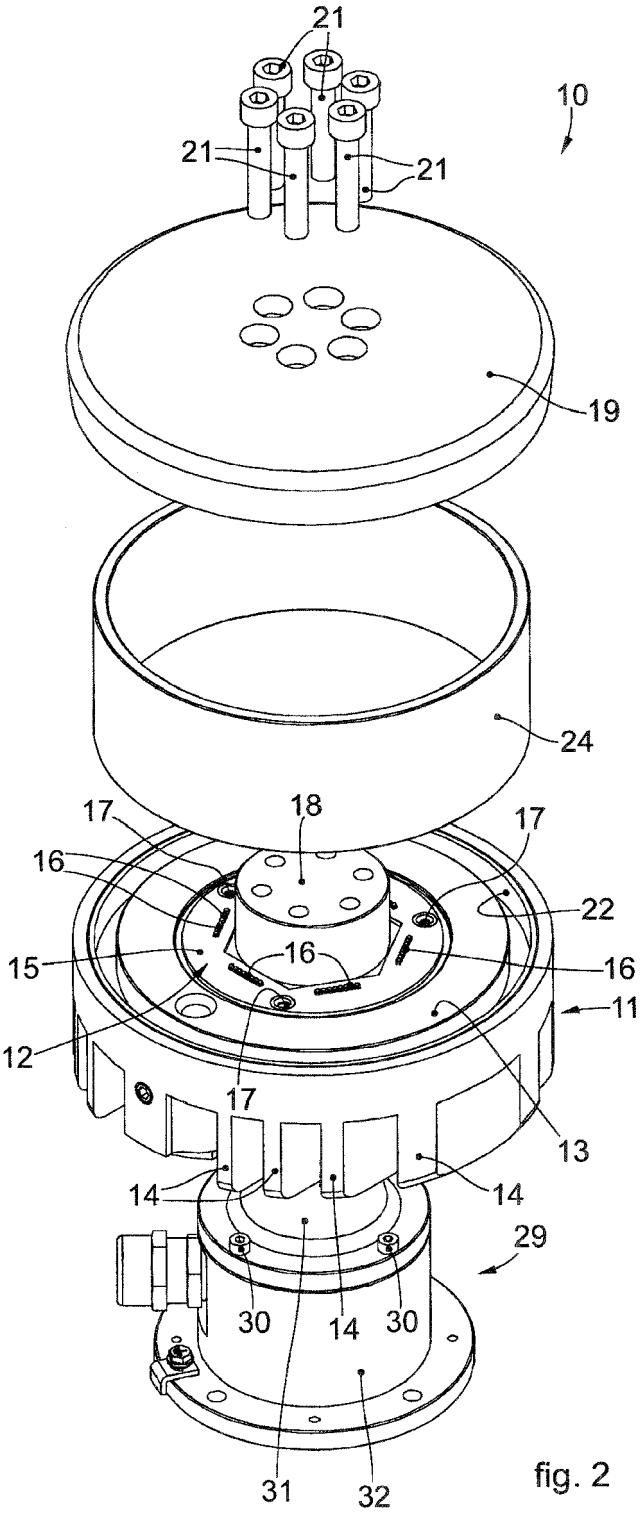
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fig. 2

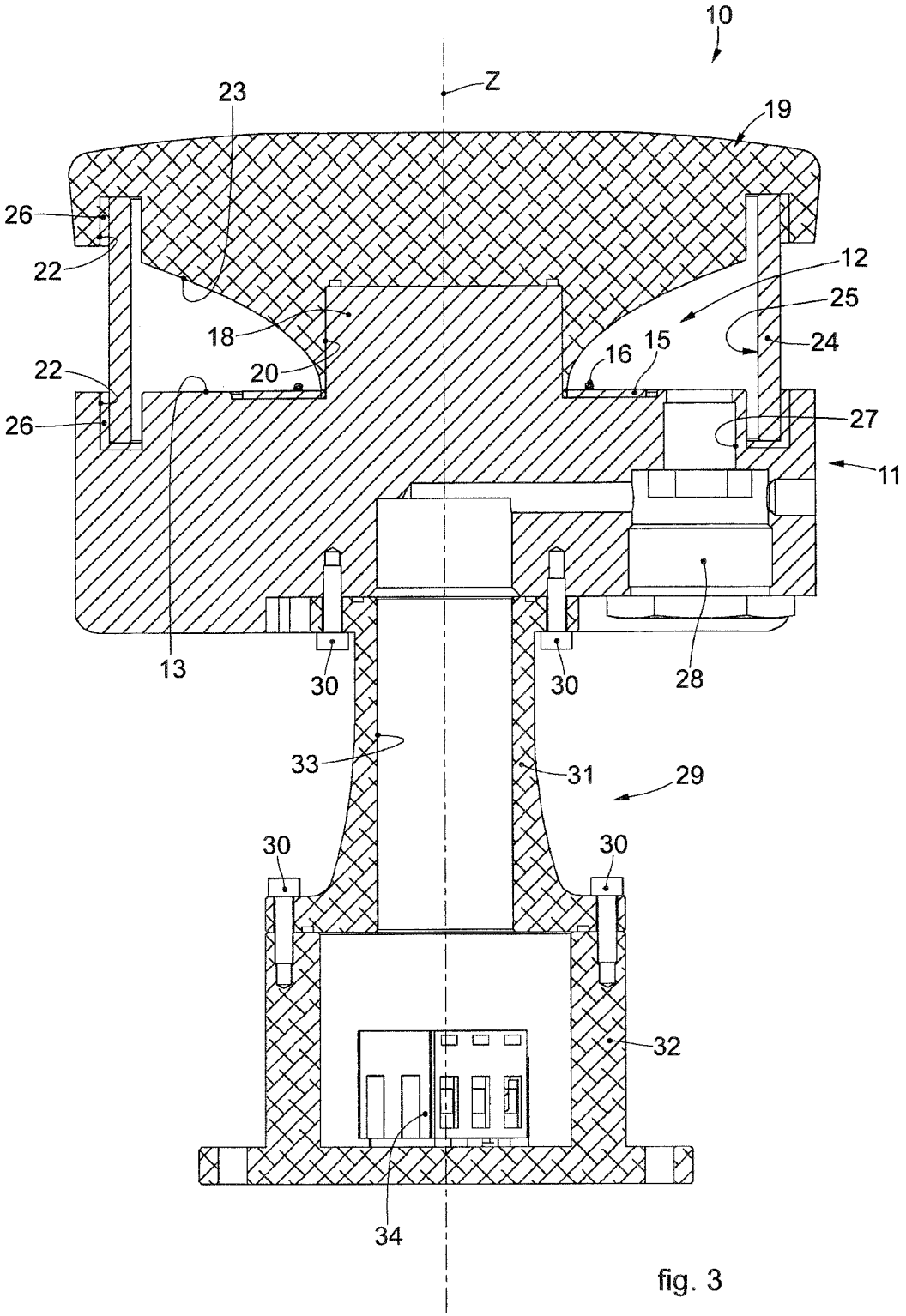
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fig. 3

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Application Number
EP 19 17 7771

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The present search report has been drawn up for all claims

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CATEGORY OF CITED DOCUMENTS

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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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