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(54) LIGHTING ASSEMBLY AND METHOD TO INSTALL IT

(57) Lighting assembly (10) configured to be embedded in a containing seating (13) in a floor (11), comprising a support member (12) configured to be inserted into said containing seating (13), a lighting unit (27) provided with clamping means (52) to clamp said lighting unit (27) with respect to said support member (12) and anti-rotation means configured to prevent the rotation of said lighting unit (27) with respect to said support member (12), wherein said support member (12) comprises a contin-

uous clamping surface (21), and wherein said clamping means (52) comprise at least one clamping element (61) and wherein said anti-rotation means comprise at least one pointed tooth (64) on said at least one clamping element (61) and configured to cooperate with said clamping surface (21) of said support member (12) in order to clamp said lighting unit (27) in any desired angular position on said support member (12).

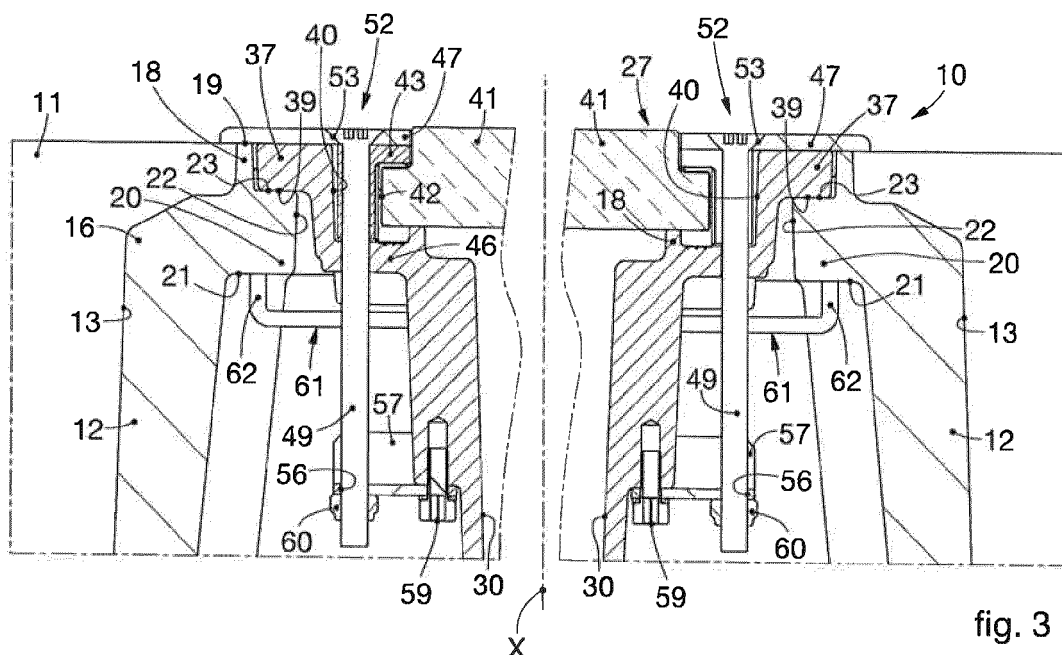


fig. 3

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Description

FIELD OF THE INVENTION

[0001] The present invention concerns a lighting assembly or system, configured to be preferably embedded in a floor, intended here and hereafter as any surface that can be walked on, not necessarily flat, such as for example a road paving, a sidewalk, or any other walkable and/or drivable area, possibly even inside a building.

[0002] Therefore, one field of application of the present invention is that of lighting assemblies or systems in general and, in particular, those intended to illuminate, from below, streets, squares, monuments, archaeological sites, as well as any public or private building, both inside and outside it, and which therefore can be walked on and driven over even by heavy means of transport, with loads even greater than 2 tons, and which are impermeable to atmospheric agents, including water and dust, with a protection level up to IP68. It is not excluded that the lighting assembly according to the present invention can be used for embedded installation on a wall or ceiling. The present invention also concerns a method to install the lighting assembly.

BACKGROUND OF THE INVENTION

[0003] Various lighting assemblies are known, including those configured to be embedded in suitable seatings, or niches, in a floor, in the sense set out above.

[0004] Each known lighting assembly of the type described above normally comprises essentially a support member, known in the field by the term "outer casing", suitable to be permanently attached inside a suitable containing seating made in the floor, substantially flush with the floor, and a lighting unit, or spotlight, configured to be inserted, preferably in a removable manner, into the outer casing and provided inside it with lighting means, for example LEDs.

[0005] Known lighting assemblies are provided with elements to attach the spotlight to the outer casing, which provide that the installer, or the maintenance technician, first positions the outer casing with a certain orientation with respect to the containing seating made on the floor, according to the desired direction of the light to be emitted and then he mounts the spotlight or some parts of it, or remounts it after it has been disassembled, in a determinate and unique position with respect to the outer casing.

[0006] This entails considerable disadvantages, for example, in the event that the installation of the spotlight for attaching it to the outer casing requires the disassembly of some components of the lighting unit, there is a risk that during the re-assembly step thereof it is not possible to 100% guarantee that a sealing with the IP protection level, which is generally IP67 or IP68, will be held.

[0007] In fact, in known lighting assemblies a single precise positioning of the outer casing is provided with respect to the object to be illuminated, since the attach-

ment of the spotlight on the same outer casing takes place in a single precise position.

[0008] Lighting assemblies are also known in which the spotlight and the outer casing are coupled by means of springs, with a double flange, with an independent rotating central element, or with other clutch systems. However, these known lighting assemblies neither allow a subsequent autonomous orientation of the spotlight, nor do they guarantee that the same lighting assemblies are able to support a high load, in the order of a few tons, while maintaining the IP protection level; even less do they guarantee that the spotlight cannot be rotated with respect to the outer casing, in an undesirable manner, if the wheel of a vehicle that is located above the spotlight itself were to swerve.

[0009] Document DE-A-40 13 457 describes a known type of lighting assembly to be installed in a ceiling, comprising a support member, that is, an outer casing and a lighting unit, which is inserted inside the outer casing and clamped in place by means of clamping means. The clamping means comprise elastic elements in the form of fins which are inserted into suitable apertures made through in a wall of the outer casing. This solution allows the spotlight to be positioned with respect to the outer casing only in one or at most two positions rotated by 180° with respect to each other, and therefore has the disadvantages described above regarding the need to orientate the outer casing in a suitable manner with respect to the containing seating. The lighting assembly described in DE-A-40 13 457, moreover, is not suitable to be used embedded in floors.

[0010] Therefore, one of the problems that the person of skill in the art has to solve in the design and construction of lighting assemblies of the above type, is to guarantee for each lighting assembly the possibility of attaching the spotlight to the outer casing without having to disassemble the elements that guarantee the watertight seal, for a quick and safe installation of the spotlight, which does not compromise the IP protection level of the lighting assembly as a whole. By installation we mean both the first installation of the lighting assembly in the floor, and also each subsequent installation, for example of the spotlight only, after a temporary removal of the latter to carry out any maintenance work whatsoever on the lighting assembly itself, or in a part of it, for example the lighting unit.

[0011] Furthermore, another of the technical problems to be solved is to have the possibility of orienting the lighting unit toward the object or building to be illuminated, or a part of it, irrespective of the positioning of the outer casing, above all, but not only, in the case of non-symmetrical optics and light beams; all while guaranteeing that the lighting assembly can be walked and driven on with loads even higher than a few tons, and providing it with adequate resistance to the swerving of a wheel of a means of transport that is above it.

[0012] One purpose of the present invention is to provide a lighting assembly, preferably to be embedded into

a floor, which is simple to make, compact, reliable, inexpensive and which at the same time guarantees a high IP protection level.

[0013] Another purpose of the present invention is to provide a lighting assembly, preferably to be embedded into a floor, which can be walked on and driven over with loads even greater than a few tons, and which has adequate resistance to the swerving of a wheel of a vehicle located above it.

[0014] Another purpose of the present invention is to perfect a method to install, simply and quickly, a lighting assembly, preferably to be embedded into a floor.

[0015] 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

[0016] The present invention is set forth and characterized in the independent claims. The dependent claims describe other characteristics of the present invention or variants to the main inventive idea.

[0017] In accordance with the above purposes, a lighting assembly, preferably to be embedded in a floor, according to the present invention, comprises a support member configured to be inserted, preferably permanently, in a containing seating made in the floor, a lighting unit provided with clamping means to selectively and preferably removably clamp the lighting unit with respect to the support member, and anti-rotation means configured to prevent the rotation of the lighting unit with respect to the support member.

[0018] In accordance with one characteristic aspect of the present invention, the support member comprises a clamping surface, the clamping means comprise at least one clamping element and the anti-rotation means comprise at least one pointed tooth, preferably a plurality of pointed teeth, present on the at least one clamping element and configured to cooperate, during use, with the clamping surface of the support member.

[0019] In accordance with another characteristic aspect of the present invention, the clamping surface of the support member is continuous, that is, substantially without holes or apertures.

[0020] Preferably, the clamping surface is smooth and uniform.

[0021] According to one variant, the clamping surface can be rough, jagged, or indented in order to improve the anti-rotational grip on it of the at least one pointed tooth, or of the plurality of pointed teeth.

[0022] The pointed teeth are configured to incise the clamping surface and produce a mechanical coupling by interference.

[0023] The fact that the clamping surface is continuous has the advantage that, in this way, the at least one pointed tooth, or the plurality of pointed teeth, can go and incise in any desired angular position whatsoever, with-

out any limit, so that the lighting unit can be clamped in any desired angular position whatsoever on the support member and therefore it is no longer necessary to position the support member with a determinate orientation with respect to the containing seating.

[0024] The anti-rotation means, that is, the pointed teeth are independent from the clamping means, that is, they act on different components. In particular, while the clamping means cooperate with the lighting unit, the anti-rotation means cooperate with the support member.

[0025] In accordance with another characteristic aspect of the present invention, the at least one clamping element is configured to assume both an assembly position, in which it does not interfere with the support member, and also a clamping position, in which it cooperates with the clamping surface of the support member.

[0026] In accordance with another characteristic aspect of the present invention, the support member comprises at least one internal circular rib in the lower part of which the clamping surface is present, which is positioned so as to be substantially perpendicular to a central axis of the support member.

[0027] In accordance with another characteristic aspect of the present invention, the clamping means also comprise at least one threaded element disposed substantially parallel to a longitudinal axis of a containing body of the lighting unit and rotatable with respect thereto, onto which the at least one clamping element can be screwed, which is able to both partly rotate together with the threaded element, in order to move from the assembly position to the clamping position, and vice versa, and also to move axially with respect to the threaded element in order to selectively go with the at least one pointed tooth, or with the plurality of pointed teeth, against the clamping surface of the support member when then at least one clamping element is in its clamping position.

[0028] In accordance with another characteristic aspect of the present invention, the at least one clamping element is provided with a stop element configured to selectively cooperate with a guide element present on the periphery of the above said containing body in order to limit, to a determinate angle, the rotation of the above said at least one clamping element with respect to the above said at least one threaded element.

[0029] In accordance with another characteristic aspect of the present invention, the determinate angle is of about 90°.

[0030] In accordance with another characteristic aspect of the present invention, the at least one clamping element substantially has the shape of an L and comprises a first part in which the at least one pointed tooth, or the plurality of pointed teeth, are present, and a second part having a threaded hole into which the threaded element is inserted.

[0031] In accordance with another characteristic aspect of the present invention, the support member comprises at least an upper part with a substantially cylindrical or truncated cone shape, coaxial to a central axis,

and the anti-rotation means optionally also comprise a plurality of first radial teeth disposed on the upper part, substantially equidistant from the central axis.

[0032] In accordance with another characteristic aspect of the present invention, the first radial teeth form a toothed crown disposed on a plane substantially but not univocally perpendicular to the central axis.

[0033] In accordance with another characteristic aspect of the present invention, the anti-rotation means optionally also comprise one or several second radial teeth present in an annular portion of the containing body of the lighting unit and configured to cooperate, during use, with the first radial teeth.

[0034] In accordance with another characteristic aspect of the present invention, there is provided a method to install a lighting assembly, preferably embedded in a floor, wherein the lighting assembly has a support member configured to be inserted, preferably permanently, into a containing seating present in the floor, a lighting unit provided with clamping means to selectively and preferably removably clamp the lighting unit with respect to the support member, and anti-rotation means configured to prevent the rotation of the lighting unit with respect to the support member; the method comprises a preparation step, in which a clamping surface is made in the support member, while in the clamping means at least one clamping element is made, provided with at least one pointed tooth, preferably a plurality of pointed teeth, which defines the anti-rotation means; an insertion step, in which the support member is inserted into the containing seating; an assembly step, in which the lighting unit is inserted into the support member in a desired angular position with respect thereto; and a clamping step, in which the clamping means are driven so that the at least one pointed tooth, or the plurality of pointed teeth, cooperates with the clamping surface of the support member in order to clamp the lighting unit in the desired angular position with respect to the support member.

[0035] According to some embodiments, in the clamping step the pointed teeth incise the clamping surface and produce a mechanical coupling by interference with it.

BRIEF DESCRIPTION OF THE DRAWINGS

[0036] These and other aspects, characteristics and advantages of the present invention will become apparent from the following description of one embodiment, given as a non-restrictive example with reference to the attached drawings wherein:

- fig. 1 is a schematic top view of a lighting assembly according to the present invention, installed in a floor;
- fig. 2 is a top view of the lighting assembly of fig. 1 shown schematically in an assembly position;
- fig. 3 is a partial section of the lighting assembly according to the present invention taken along line III-III of fig. 1;

- fig. 4 is a three-dimensional view of a support member of the lighting assembly of fig. 1;
- fig. 5 is a three-dimensional view of a lighting unit of the assembly of fig. 1;
- fig. 6 is a median cross-section, in a three-dimensional view, of the lighting unit of the lighting assembly of fig. 5;
- fig. 7 shows a first enlarged detail, seen from below, of the lighting unit of fig. 5;
- fig. 8 shows a second enlarged detail of the lighting unit of fig. 5, from which some components have been removed in order to make some details easier to understand;
- fig. 9 shows a third enlarged detail of the lighting unit of fig. 5;
- fig. 10 is a three-dimensional view of some components of the lighting unit of fig. 5;
- fig. 11 is a three-dimensional view, on an enlarged scale, of one of the components shown in fig. 10;
- fig. 12 is a three-dimensional view of a variant of the support member of fig. 4;
- fig. 13 shows an enlarged detail of the support member of fig. 12;
- fig. 14 shows the first enlarged detail of the lighting unit of fig. 7, according to a variant, in order to cooperate with the support member of fig. 12.

[0037] We must clarify that in the present description and in the claims the terms vertical, lower, upper, high and low, with their declinations, have the sole function of better illustrating the present invention with reference to the drawings and must not be in any way used to limit the scope of the invention itself, or the field of protection defined by the attached claims.

[0038] Furthermore, the people of skill in the art will recognize that certain sizes, or characteristics, in the drawings may have been enlarged, deformed, or shown in an unconventional or non-proportional manner, in order to provide a version of the present invention that is easier to understand. When sizes and/or values are specified in the following description, these sizes and/or values are provided for illustrative purposes only and must not be construed as limiting the scope of protection of the present invention, unless such sizes and/or values are present in the attached claims.

DETAILED DESCRIPTION OF SOME EMBODIMENTS

[0039] We will now refer in detail to the possible embodiments of the invention, of which one or more non-limiting examples are shown in the attached drawings. The phraseology and terminology used here is also for the purposes of providing non-limiting examples.

[0040] Fig. 1 schematically shows a lighting assembly, or system, 10 according to the present invention, configured to be inserted preferably embedded in a floor 11 (fig. 3), as defined above.

[0041] The lighting assembly 10 comprises a support

member 12, also referred to here as outer casing, which is configured to be inserted, preferably permanently, in a containing seating 13 made in the floor 11 in order to then be clamped there with any suitable clamping mean whatsoever, for example cementing it. In the example provided here, the outer casing 12 is preferably made of plastic or metal material, and has a substantially truncated cone shape, internally hollow and coaxial to a central axis X, with a base 15 (fig. 4) that is wider than an upper part 16 and is provided with slots 17 which allow a possible further attachment of the outer casing 12, for example by means of screws.

[0042] More specifically, the upper part 16 of the outer casing 12 has a substantially cylindrical, or truncated cone shape, and is shaped so as to comprise both a ring 18 (figs. 3 and 4), which defines an upper circular surface 19 (fig. 3), perpendicular to the central axis X, and also an internal circular rib 20 having a clamping surface 21 in the lower part and a smooth and regular support surface 23 in the upper part (figs. 3 and 4), both surfaces also being perpendicular to the central axis X.

[0043] The clamping surface 21 is advantageously continuous, that is, solid, without holes or through apertures.

[0044] The clamping surface 21 (fig. 3) can be either flat, smooth and uniform, or alternatively rough or jagged, for example provided with a tiny indentation.

[0045] An internal surface 22 of the internal circular rib 20 (figs. 1 and 3) is parallel to the central axis X and defines the internal diameter D (fig. 1) of the outer casing 12.

[0046] The lighting assembly 10 also comprises a lighting unit 27 (figs. 1, 2, 3 and from 5 to 9), also referred to here as spotlight, or lighting apparatus, configured to be inserted embedded inside the outer casing 12, as will be described in detail below.

[0047] More specifically, the spotlight 27 comprises a containing body 29 (figs. 3, 5 and 6) preferably metallic, for example made of aluminum, substantially having the shape of a cup which defines a cavity 30 (figs. 3 and 6) open upward, in which lighting means 31 (fig. 6) of a known type are disposed, which, for example, comprise a light source 32, for example LEDs, an electronic control circuit, or driver, 33 and an optical unit 35, which can be preferably oriented from the outside of the spotlight 27 without needing to open it. In the proximity of the bottom of the containing body 29 there is a power cable 36 (figs. 5 and 6), which can be connected to an external source of electrical energy, in order to power the electronic control circuit 33 and the light source 32.

[0048] The upper part of the containing body 29 is shaped so as to comprise an external annular protrusion 37 (figs. 3, 6, 7, 8 and 9), having a lower surface 39 and defining an internal housing 40 (figs. 3, 6, 8 and 9) in which a transparent element 41, for example made of glass, is disposed which allows the light to escape toward the outside.

[0049] The transparent element 41 substantially has a

substantially cylindrical shape with a step and is thick enough to support a considerable load, even greater than 2 t, and is shaped on its periphery in order to cooperate with a mating packing 42 which guarantees the hermetic seal of the cavity 30 of the spotlight 27.

[0050] In particular, the transparent element 41 and the packing 42 are clamped with respect to the containing body 29 of the spotlight 27 by means of a clamping ring 43, preferably metallic, for example made of aluminum, which is attached in a removable manner to the containing body 29, by means of a plurality of first screws 45 (fig. 6), for example ten, angularly equidistant from each other and screwable on corresponding self-clamping nuts 44 (fig. 7) inserted in suitable seatings 48 made on the upper part 16 of the containing body 29.

[0051] According to a variant not shown in the drawings, but easily understandable for a person of skill in the art, the first screws 45 could be screwed into corresponding threaded holes present on a flat wall 46 (fig. 3) of the same containing body 29.

[0052] In this way, the packing 42, the clamping ring 43 and the first screws 45 allow the lighting unit 27 to have a high degree of IP protection, up to IP68.

[0053] Above the clamping ring 43 there is positioned a flange 47, preferably made of stainless steel, which is attached to the containing body 29, also in a removable manner, by means of second screws, or long screws 49 (figs. from 1 to 3, 9 and 10), for example three, angularly equidistant from each other, which are much longer than the first screws 45 (fig. 5) and have a clamping function which will be described in detail below, with the possible addition of another series of screws, not shown in the drawings, for example three, screwed onto corresponding pointed threaded bushings on the same flange 47.

[0054] The lighting assembly 10 also comprises clamping means 52 (fig. 3), configured to allow the selective clamping, in a removable manner, of the spotlight 27 inside the outer casing 12.

[0055] According to an advantageous aspect of the present invention, the clamping means 52 comprise the long screws 49, each of which can be inserted, in order, into a corresponding first through hole 53 made on the flange 47, into a corresponding second through hole 55 (fig. 8) made on the clamping ring 43, and into a corresponding third through hole 56 (fig. 3) made on a first bracket 57 having substantially the shape of a U (figs. 3 and 10) and which is attached to the containing body 29 by means of a screw 59 (figs. 3 and 9).

[0056] The internal end of each long screw 49 can be clamped longitudinally to the corresponding first bracket 57 by means of a self-clamping nut 60 (figs. 3, 9 and 10), so that, however, the same long screw 49, together with the self-clamping nut 60, can both rotate about to their longitudinal axis with respect to the first bracket 57.

[0057] On the threaded stem of each long screw 49, between the flat wall 46 of the containing body 29 and the first bracket 57, a clamping element 61 is screwed (figs. 3, 9, 10 and 11), which in the example provided

here consists of a second bracket having substantially the shape of an L, which comprises both a first part, or short part, 62, and also a second part, or long part, 63 (figs. 9, 10 and 11).

[0058] According to some embodiments, the short part 62 of the clamping element 61 is shaped so as to have at least one pointed tooth 64 and, advantageously, a plurality of pointed teeth 64, configured to cooperate with the clamping surface 21 in any desired angular position thereof whatsoever.

[0059] In particular, these pointed teeth 64, cooperating during use with the clamping surface 21 (fig. 3) of the internal circular rib 20 of the outer casing 12, can act as anti-rotation means, in order to prevent the rotation of the spotlight 27 with respect to the outer casing 12, as will be described in detail below.

[0060] The anti-rotation means, that is, the clamping element 62 and the pointed teeth 64, although they are driven by means of the same long screw 49 of the clamping means 52, are independent from them, that is, they act on different components. In particular, while the clamping means 52 with the first bracket 57 cooperate with the spotlight 27, the anti-rotation means 61, 64 cooperate with the outer casing 12.

[0061] In particular, the pointed tooth or teeth 64 are configured to incise the clamping surface 21 of the outer casing 12 and produce a mechanical coupling by interference with it.

[0062] According to some embodiments, the pointed teeth 64 can substantially have a triangular shape, and be disposed one adjacent to the other forming a substantially zig-zag shaped profile.

[0063] In this way, several points of interference are obtained between the clamping element 61 and the clamping surface 21, guaranteeing a stable reciprocal coupling.

[0064] The long part 63 of the clamping element 61 is shaped so as to define a curved edge 65 (figs. 10 and 11), coaxial to the axis of the threaded hole 66 into which the long screw 49 is screwed, and a stop tooth 67, configured to cooperate with the internal surface of a peripheral groove 69 (fig. 9) of the containing body 29, which acts as a guide element, said peripheral groove 69 being parallel to the longitudinal axis of the containing body 29, which during use coincides with the central axis X of the outer casing 12.

[0065] According to another variant, shown in figs. 12, 13 and 14, the upper part 16 of the outer casing 12 also comprises possible other anti-rotation means 70, which in this specific case comprise a toothed crown 71 (figs. 12 and 13) disposed on the inside with respect to the ring 18 and having the heads of its teeth 72 facing toward the outside, that is, upward in fig. 12, and lying on a plane perpendicular to the central axis X. Each tooth 72 is angularly distanced from the adjacent one by a determinate constant angular pitch α (fig. 13). In the example provided here, and purely by way of a non-limiting indication, the teeth 72 of the toothed crown 71 are one hundred and

twenty, so the angular pitch α is 3° . The function of the possible other anti-rotation means 70 is explained below.

[0066] In the context of this other variant, the containing body 29 of the spotlight 27 can possibly comprise at least one lower tooth 73, advantageously a plurality of lower teeth 73, made integral on the lower surface 39 of the external annular protrusion 37 and angularly positioned so as to be inserted, during use, between the teeth 72 (figs. 12 and 13) of the toothed crown 71 of the outer casing 12. In particular, the angular distance between the lower teeth 73 is equal to an integer multiple of the angular pitch α of the teeth 72 of the toothed crown 71.

[0067] According to another variant, not shown in the drawings but easy to understand for a person of skill in the art, the toothed crown 71 could also be disposed in another position of the outer casing 12, for example on the internal surface 22 (figs. 1 and 3) of the internal circular rib 20. Correspondingly, the lower tooth 73, or the plurality of lower teeth 73, should be positioned on the containing body 29 of the spotlight 27 so as to in any case cooperate, during use, with the teeth 72 of the toothed crown 71.

[0068] The functioning of the lighting assembly 10 described so far, which also corresponds to the method to install it in the floor 11 according to the present invention, is as follows.

[0069] With an insertion step, the outer casing 12 is inserted inside the containing seating 13 in the floor 11 (fig. 3), positioning it correctly so that its central axis X is vertical, and it is permanently clamped in this position.

[0070] Separately, advantageously in a production site, the spotlight 27 is assembled, inclusive of the lighting means 31 (fig. 6), the transparent element 41, the packing 42, the clamping ring 43 and the flange 47 (fig. 3), the long screws 49, the first brackets 57 and the clamping elements 61. In particular, each long screw 49 is clamped longitudinally by means of the corresponding self-clamping nut 60 against the lower surface of the corresponding first bracket 57. Furthermore, each clamping element 61 is taken into a mounting position, schematically shown in fig. 2, in which it does not interfere with the internal circular rib 20 of the outer casing 12.

[0071] The fact that the spotlight 27 is assembled in a production site, and not at the installation site, although this is still possible, has the advantage of allowing the installer to simplify the assembly step of the entire lighting assembly 10 in the floor 11 and its absolute guarantee of IP68 hermetic seal.

[0072] Then, with an assembly, or installation, step the spotlight 27, already assembled, is inserted from above (fig. 3) into the outer casing 12, also positioning it angularly with respect thereto, in any desired angular position whatsoever. In this position, the lower surface 39 of the annular protrusion of the spotlight 27 comes into contact with the support surface 23 of the internal circular rib 20 of the outer casing 12; moreover, in this position, consequently the flange 47 of the spotlight 27 is substantially against the upper circular surface 19 of the ring 18 of the

outer casing 12, it being understood that a possible load on the spotlight 27 will be mainly or exclusively supported by the internal circular rib 20 of the outer casing 12.

[0073] Then, in order to clamp the spotlight 27 in the desired angular position, the long screws 49 are rotated, for example in a clockwise direction. In particular, with a first rotation of each long screw 49 by a determinate angle β (fig. 1), for example of about 90° , the corresponding clamping element 61 also performs a similar rotation, until its stop tooth 67 goes against the peripheral groove 69 (fig. 9) of the containing body 29 and, at the same time, its short part 62 is positioned below the internal circular rib 20 of the outer casing 12 (figs. 1 and 3). By continuing to rotate each long screw 49, the corresponding clamping element 61, since it is now prevented from rotating further by its stop tooth 67, will move upward until it goes with the pointed teeth 64 against the clamping surface 21 of the internal circular rib 20 of the outer casing 12.

[0074] When the pointed teeth 64 come into contact with the clamping surface 21, they advantageously incise the latter, so as to create a mechanical coupling by interference.

[0075] Therefore, in a very advantageous manner, by simply rotating the long screws 49, the clamping of the spotlight 27 inside the outer casing 12 is performed and, at the same time, thanks to the presence of the pointed teeth 64, the spotlight 27 is prevented from rotating with respect to the outer casing 12, even in the event that a possible torque were to be applied to the same spotlight 27, for example by a wheel of a vehicle, or any means of transport whatsoever, even with very heavy weight, which performs a turn while on top of it.

[0076] Furthermore, in the event the lighting assembly 10 also comprises the other anti-rotation means 70, the lower teeth 73 (fig. 14) of the containing body 29 will be inserted simultaneously between the teeth 72 (figs. 12 and 13) of the toothed crown 71 of the outer casing 12, therefore the rotation of the spotlight 27 with respect thereto is prevented further.

[0077] In this alternative solution, it will not be the lower surface 39 of the annular protrusion of the spotlight 27 that will come into contact with the support surface 23 of the internal circular rib 20 of the outer casing 12, but it will be the lower teeth 73 (fig. 14) of the containing body 29 that will be inserted between the teeth 72 of the toothed crown 71 (figs. 12 and 13), so that a possible load on the spotlight 27 will be mainly or exclusively supported by the toothed crown 71 and therefore, in any case, by the internal circular rib 20 of the outer casing 12.

[0078] The disassembly of the spotlight 27 from the outer casing 12 is also very simple. In fact, when required, it is sufficient to rotate the long screws 49 in the opposite direction to the previous one in order to cause first the lowering of the clamping elements 61 and then their rotation toward the initial assembly position (fig. 2), when their short parts 62 no longer interfere with the clamping surface 21 of the internal circular rib 20 of the outer casing 12.

[0079] From the previous description it is clear that the lighting assembly 10 described so far is very simple and compact, and that the steps of the method to install it are also few, simple and easy to perform.

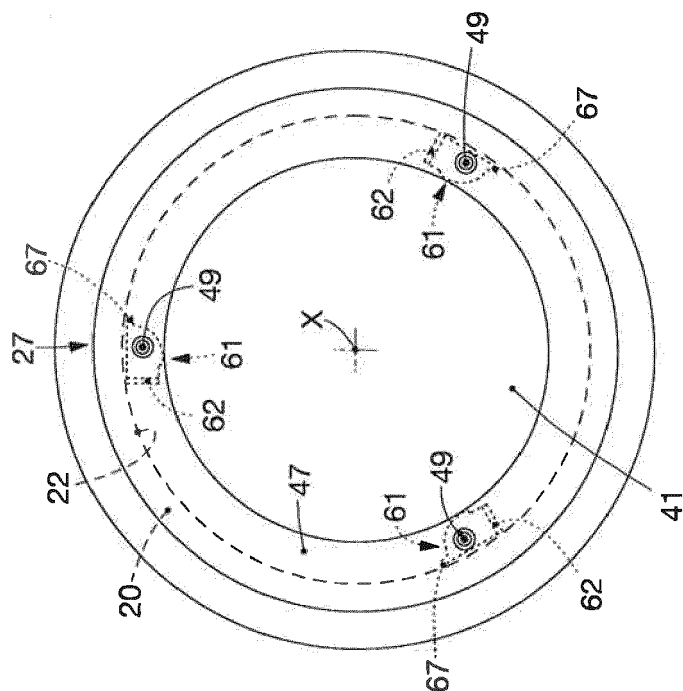
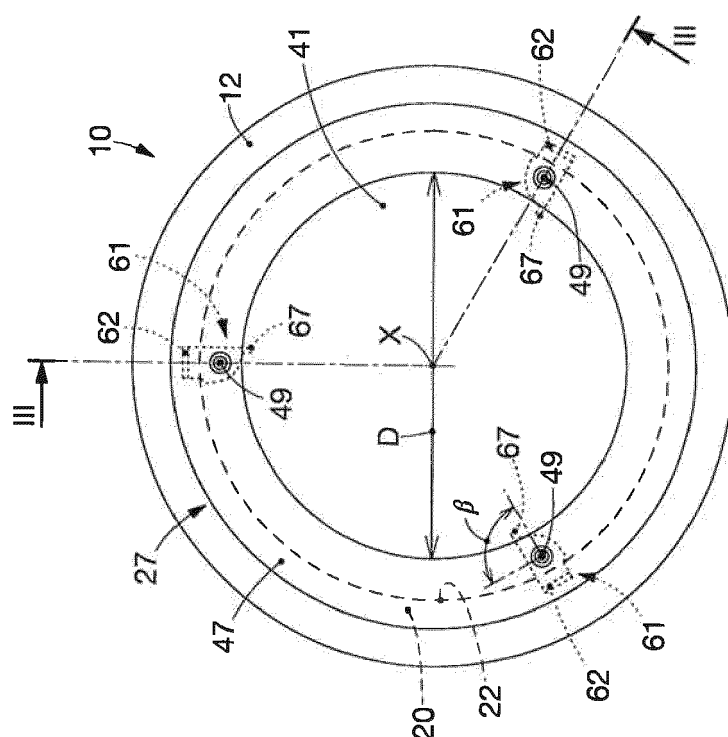
[0080] It is also clear that modifications and/or additions of parts or of steps may be made to the lighting assembly 10 and to the corresponding method to install it as described heretofore, without departing from the field and scope of the present invention as defined by the attached claims.

[0081] In the following claims, the sole purpose of the references in brackets is to facilitate reading: they must not be considered as restrictive factors with regard to the field of protection claimed in the specific claims.

Claims

1. Lighting assembly (10) configured to be embedded preferably in a floor (11), in which there is a containing seating (13), comprising a support member (12) configured to be inserted, preferably permanently, into said containing seating (13), a lighting unit (27) provided with clamping means (52) to selectively and preferably removably clamp said lighting unit (27) with respect to said support member (12) and anti-rotation means configured to prevent the rotation of said lighting unit (27) with respect to said support member (12), **characterized in that** said support member (12) comprises a continuous clamping surface (21), **in that** said clamping means (52) comprise at least one clamping element (61) and **in that** said anti-rotation means comprise at least one pointed tooth (64), preferably a plurality of pointed teeth (64), present on said at least one clamping element (61) and configured to cooperate, during use, with said clamping surface (21) of said support member (12) in order to clamp said lighting unit (27) in any desired angular position whatsoever on said support member (12).
2. Lighting assembly (10) as in claim 1, **characterized in that** said clamping surface (21) of said support member (12) is smooth and uniform, and said at least one pointed tooth (64), or said plurality of pointed teeth (64) is configured to incise said clamping surface (21) in any desired angular position whatsoever, without any limit, producing a mechanical coupling by interference.
3. Lighting assembly (10) as in claim 1 or 2, **characterized in that** said at least one clamping element (61) is configured to assume both an assembly position, in which it does not interfere with said support member (12), and also a clamping position, in which it cooperates with said clamping surface (21) of said support member (12).

4. Lighting assembly (10) as in any claim hereinbefore, **characterized in that** said support member (12) comprises at least one internal circular rib (20) in the lower part of which said clamping surface (21) is present, which is positioned so as to be substantially perpendicular to a central axis (X) of said support member (12). 5
5. Lighting assembly (10) as in claim 3 or 4, **characterized in that** said clamping means (52) also comprise at least one threaded element (49) disposed substantially parallel to a longitudinal axis of a containing body (29) of said lighting unit (27) and rotatable with respect thereto, on which said at least one clamping element (61) can be screwed, which is able both to rotate partly together with said threaded element (49), in order to move from said assembly position to said clamping position, and vice versa, and also to move axially with respect to said threaded element (49) to selectively go with said at least one pointed tooth (64), or with said plurality of pointed teeth (64), against said clamping surface (21) of said support member (12) when said at least one clamping element (61) is in its clamping position. 10 15 20 25
6. Lighting assembly (10) as in claim 5, **characterized in that** said at least one clamping element (61) is provided with a stop element (67) configured to selectively cooperate with a guide element (69) present on the periphery of said containing body (29) in order to limit, to a determinate angle (β), the rotation of said at least one clamping element (61) with respect to said at least one threaded element (49). 30 35
7. Lighting assembly (10) as in claim 4 or 5, **characterized in that** said at least one clamping element (61) is substantially L-shaped and comprises a first part (62) in which said at least one pointed tooth (64), or said plurality of pointed teeth (64), is present, and a second part (63) having a threaded hole (66) into which said threaded element (49) is inserted. 40 45
8. Lighting assembly (10) as in any claim hereinbefore, **characterized in that** said plurality of pointed teeth (64) have a triangular shape and are disposed one adjacent to the other forming a substantially zig-zag shaped profile. 50
9. Lighting assembly (10) as in claim 3, **characterized in that** said support member (12) comprises at least an upper part (16) with a substantially cylindrical, or truncated cone shape, coaxial to a central axis (X), **and in that** said anti-rotation means comprise a plurality of first radial teeth (72) disposed on said upper part (16), substantially equidistant from said central axis (X). 55
10. Lighting assembly (10) as in claims 5 and 9, **characterized in that** said anti-rotation means also comprise one or more second radial teeth (73) present in an annular portion (37) of said containing body (29) of said lighting unit (27) and configured to cooperate, during use, with said first radial teeth (72).
11. Method to install a lighting assembly (10), preferably embedded, in a floor (11), wherein said lighting assembly (10) has a support member (12) configured to be inserted, preferably permanently, into a containing seating (13) present in said floor (11), a lighting unit (27) provided with clamping means (52) to selectively and preferably removably clamp said lighting unit (27) with respect to said support member (12), and anti-rotation means configured to prevent the rotation of said lighting unit (27) with respect to said support member (12), the method being **characterized in that** it comprises a preparation step, in which a continuous clamping surface (21) is made in said support member (12), while in said clamping means (52) at least one clamping element (61) is made, provided with at least one pointed tooth (64), preferably a plurality of pointed teeth (64), which defines said anti-rotation means; an insertion step, in which said support member (12) is inserted into said containing seating (13); an assembly step in which said lighting unit (27) is inserted into said support member (12) in a desired angular position with respect thereto; and a clamping step, in which said clamping means (52) are driven so that said at least one pointed tooth (64), or said plurality of pointed teeth (64), cooperates with said clamping surface (21) of said support member (12), in order to clamp said lighting unit (27) in said desired angular position with respect to said support member (12).
12. Method as in claim 11, **characterized in that**, in said clamping step, said pointed teeth (64) incise said clamping surface (21) producing a mechanical coupling by interference.



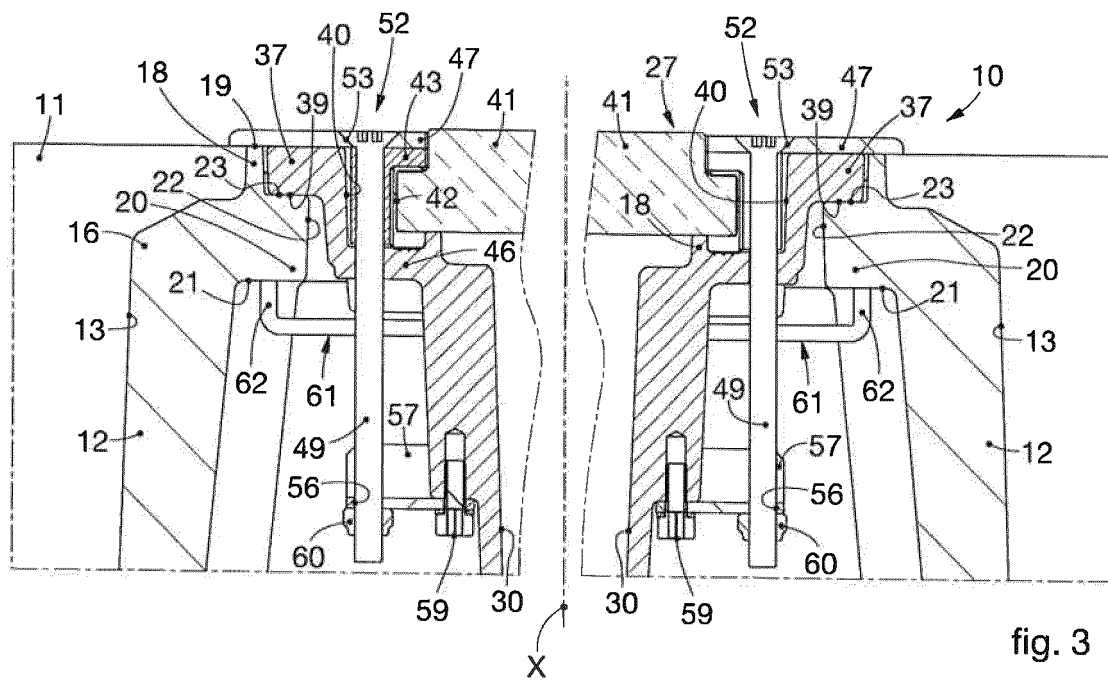


fig. 3

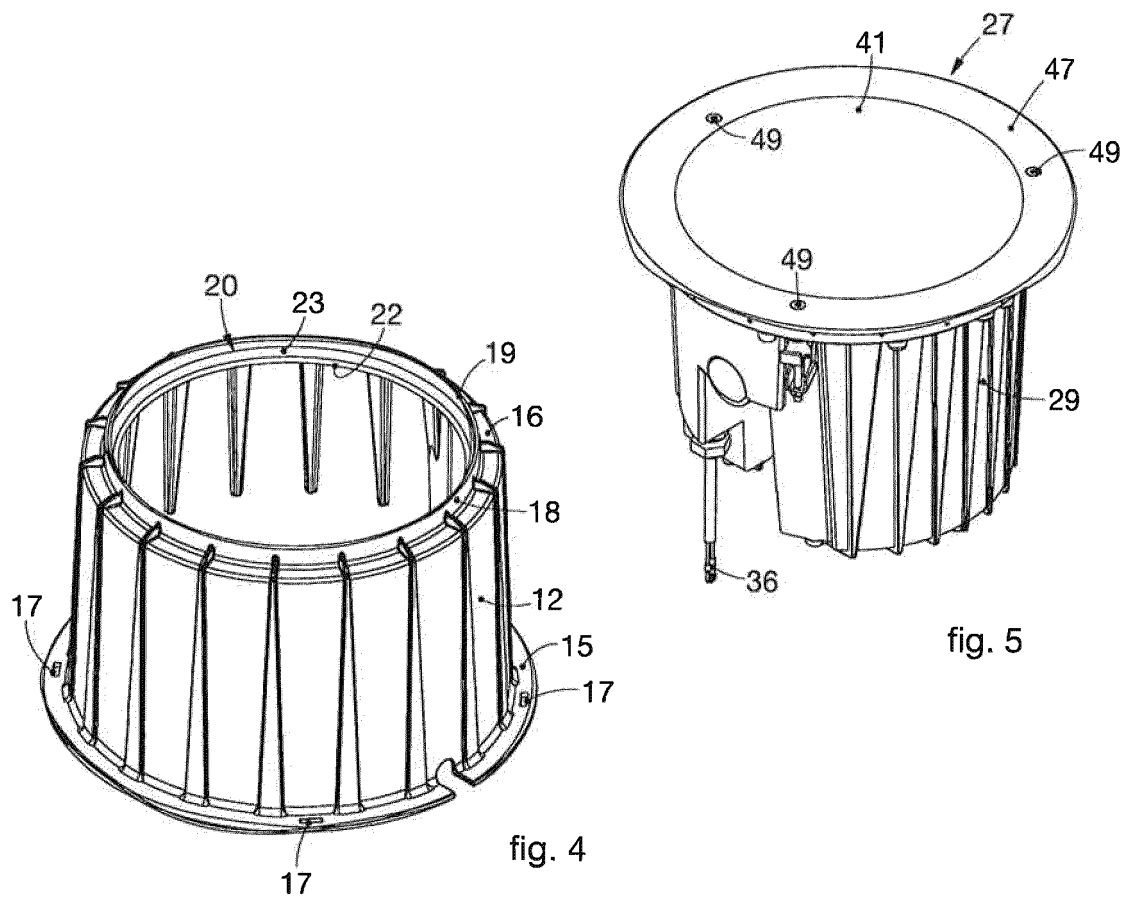


fig. 5

fig. 4

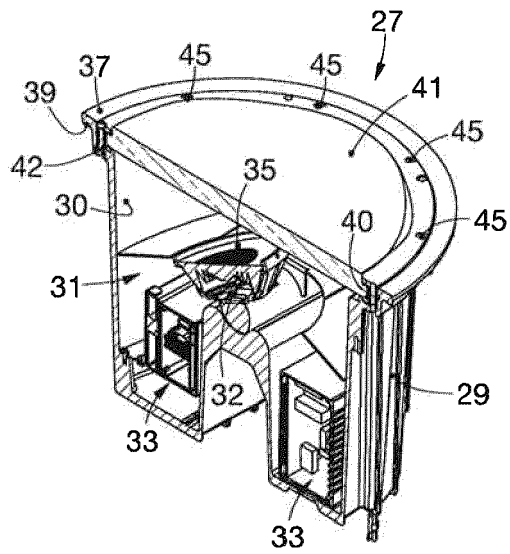


fig. 6

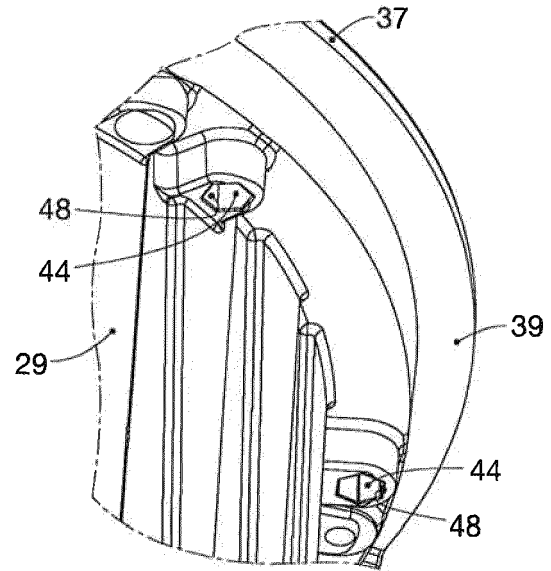


fig. 7

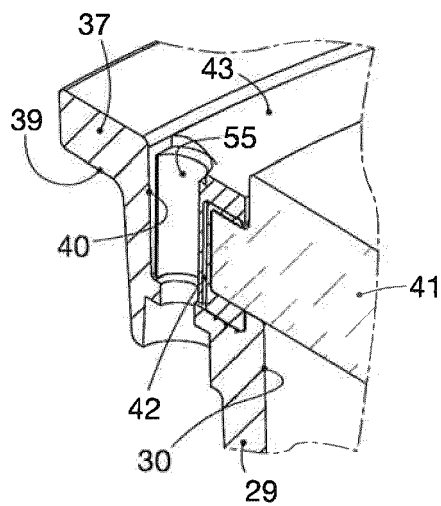


fig. 8

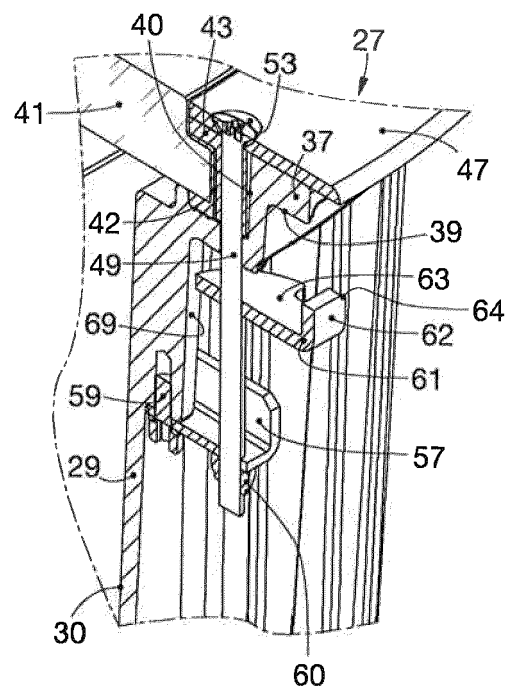


fig. 9

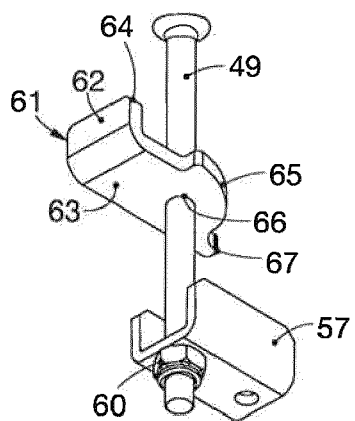


fig. 10

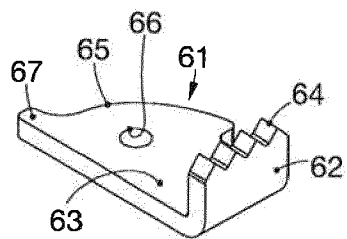


fig. 11

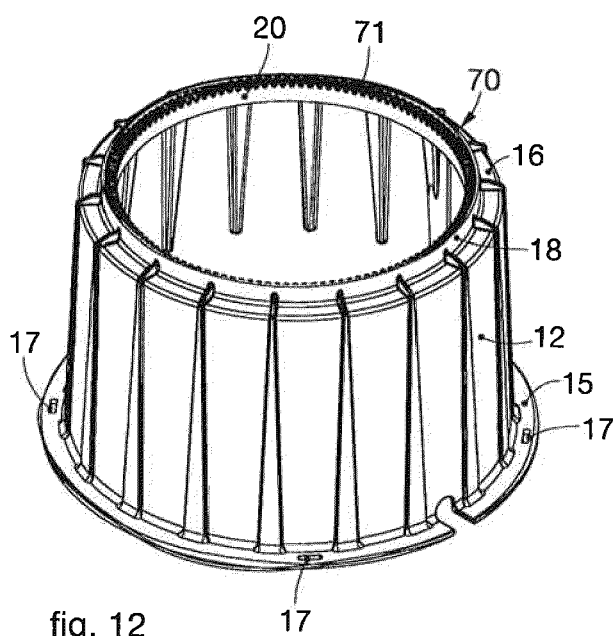


fig. 12

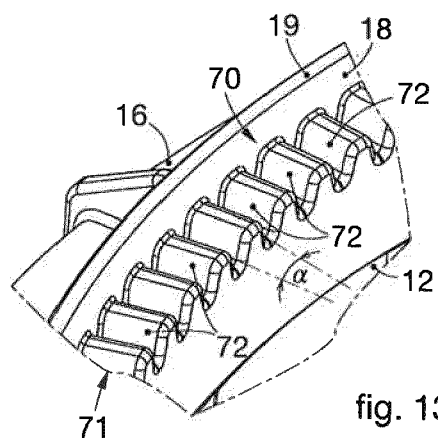


fig. 13

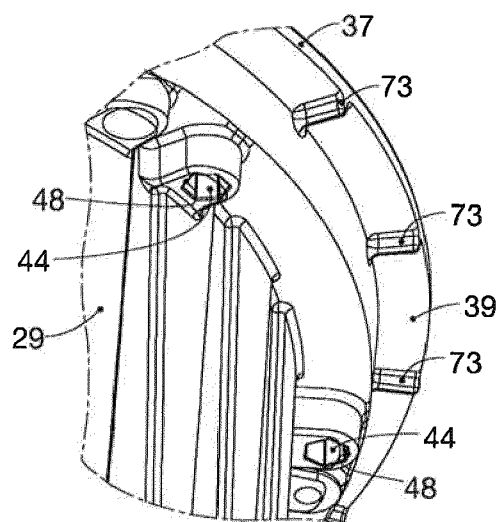


fig. 14



EUROPEAN SEARCH REPORT

Application Number
EP 21 17 1363

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A,D	DE 40 13 457 A1 (HALLOFORM GMBH & CO KG [DE]) 31 October 1991 (1991-10-31) * column 3, lines 46-53; figure 7 *	1-12	INV. F21S8/02 F21V21/04 F21V31/00
A	GB 928 004 A (GEN ELECTRIC CO LTD) 6 June 1963 (1963-06-06) * page 1, line 62 - page 2, line 47; figures 1,2 *	1-12	ADD. F21W131/10
A	EP 1 936 257 A1 (BEGA GANTENBRINK LEUCHTEN KG [DE]) 25 June 2008 (2008-06-25) * paragraphs [0030] - [0037]; figures 1-3 *	1-12	
			TECHNICAL FIELDS SEARCHED (IPC)
			F21S F21V F21W
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 17 September 2021	Examiner Menn, Patrick
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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The members are as contained in the European Patent Office EDP file on
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17-09-2021

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