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(54) **Built-in floor or wall lighting device with a completely glass outer surface**

(57) Built-in lighting device comprising a containment body (1) of one or more light sources, a covering plate (2) of said containment body (1) and an outer casing (3) for the housing of said containment body (1) characterized in that it also comprises a supporting ring (8), with

an external perimeter corresponding to the perimeter of said covering plate (2) and sealed to the lower surface of said covering plate (2), coupling means (10, 11, 12) between said supporting ring (8) and said containment body (1) and coupling means (5, 6) between said containment body (1) and said outer casing (3).

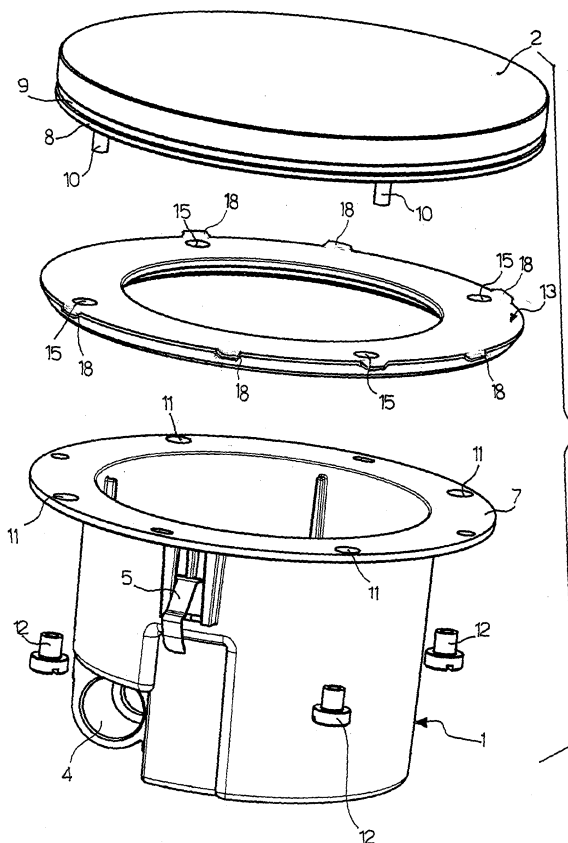


Fig. 2

Description

[0001] The present invention relates to a built-in floor or wall lighting device with a completely glass outer surface.

[0002] It is known that built-in lighting systems are particularly widespread in all applications in which architectural, environmental or other meritable elements are to be highlighted, without modifying the appearance of the surrounding environment with the introduction of a cumbersome lighting device. Built-in lighting devices remain as hidden as possible from sight, below the level of flooring or inside a wall surface, projecting a beam of light, more or less concentrated according to the demands, which allows the desired light effects to be obtained without creating interferences.

[0003] At present, the same type of lighting can be obtained by means of various types of built-in lighting devices and even though these are hardly visible, there is the necessity of giving them a pleasant aesthetical appearance, without jeopardizing, however, their technical-functional aspects.

[0004] Substantially, in the non-visible part, all these lighting devices have reasonably similar fixing devices, which in particular for built-in floor devices, can comprise a fixing outer casing for the laying, which is positioned in the ground in line with the floor surface, surrounded by concrete to give a valid seal and a channel on the bottom for drainage. The actual lighting device, consisting of a containment body which houses the light source and which, in its upper part, is covered with a covering plate made of glass, or other light transparent material, for the protection of the light source, is positioned inside the outer casing.

[0005] In the visible part, on the contrary, various anchoring solutions can be used, which differ in the way in which the glass plate which protects the light source is coupled with the rest of the structure of the lighting device.

[0006] According to a first solution, the glass plate is made integral with a frame made of a metallic material, applied above it, by siliconing. The frame, which is wider than the glass plate, is then fixed to the outer casing of the built-in lighting device by means of visible fixing screws, thus also ensuring the fixing of the containment body of the light source to the outer casing.

[0007] In a second solution, the glass plate is fixed to the containment body of the light source by means of a system consisting of a visible frame and washer. In practice, the glass plate lies on a seat present on the upper part of the containment body and is surrounded by a washer, which is compressed by a frame made of a metallic material, arranged so as to cover the peripheral portion of the glass plate and washer, when the frame is fixed to the outer casing by means of fixing screws, analogously to common "patching" products but with a product which remains in line with the floor. Also in this case, both the metal frame and the fixing screws of the same to the rest of the structure, are visible.

[0008] According to an alternative embodiment of this second solution, the frame can be fixed to the containment body of the light source and said containment body is in turn fixed to the outer casing by separate anchoring means.

[0009] In each of the solutions described, the fixing screws can be substituted by threaded pins which form studs, situated on the surface of the frame facing the outer casing, said threaded pins being coupled with fixing nuts, after passing through the openings envisaged on the structure of the containment body or outer casing.

[0010] According to another known solution, the glass plate is attached to the rest of the structure of the built-in device by producing openings on the plate, which form drafts for clip-on hooking means, present on the containment body of the light source. The solution allows built-in lighting devices to be obtained, whose visible surface almost entirely consists of glass, with the only exception of the hooking means. This solution is preferred from an aesthetic point of view, as it avoids the use of the metallic frame, or in any case makes its presence unnecessary, due to criteria of a purely aesthetic nature.

[0011] A last solution, which aims at obtaining a built-in lighting device whose exposed surface consists of the glass plate only, consists in coupling the glass plate with the containment body of the light source (or with the outer casing) by means of siliconing, or more generically by means of an adhesive. This solution, however, has the disadvantage that, once it has been sealed, the lighting device cannot be easily controlled.

[0012] A main objective of the present invention is to provide a built-in lighting device which is completely in line with the surface of the floor or wall in which it is housed and which externally reveals only the surface of the glass plate which covers it, all the fixing means with the containment body of the light source and/or with the outer casing being hidden, at the same time maintaining extremely simple access to the internal elements of the device for purposes of inspection, maintenance, installation of new accessories.

[0013] A further objective of the present invention is to provide a lighting device of said type which is simple and economical to produce and use.

[0014] These objectives according to the present invention are achieved by providing a built-in lighting device which has the characteristics specified in claim 1.

[0015] Further characteristics of the built-in lighting device of the present invention are envisaged in the subsequent dependent claims.

[0016] The characteristics and advantages of a built-in lighting device according to the present invention will appear more evident from the following illustrative and non-limiting description, referring to the enclosed schematic drawings in which:

- figure 1 shows a perspective view from below the containment body of the light source and its covering components, of a built-in lighting device according

to the present invention,

- figure 2 shows a perspective view from above the containment body and the relative covering components of figure 1,
- figure 3 shows a sectional view of the containment body and relative covering components of figure 1,
- figure 4 shows a sectional view of the lighting device according to the present invention, complete with containment body, covering elements and outer casing, and
- figure 5 shows a second sectional view of the lighting device of figure 4.

[0017] With reference to the figures, the lighting device according to the present invention consists of a containment body 1 of the light source (not shown), having a cylindrical form and closed on the bottom, but which can also have the form of a prism, a covering plate 2 made of glass or another transparent material having the necessary resistance, which covers the containment body 1 and an outer casing 3, whose upper portion reproduces the form and is slightly larger than the containment body 1 and whose lower portion is wider to allow a better distribution of the forces which can burden the structure, for example weight due to the passage of a pedestrian or car over the lighting device.

[0018] Analyzing the components of the lighting device according to the present invention in more detail, the containment body 1 defines a space for the housing of a light source and has an opening 4 for the passage of the electric supply wire. The containment body 1 can be equipped with two openings 4 for the passage of the electric supply wire, to facilitate the cascade wiring of several lighting devices without requiring the preparation of external electric connections. The hydraulic seal in correspondence with the opening 4 is obtained by a wire clip (not shown). In the upper portion of the outer side surface of the containment body 1 there are two elastic tongues 5 which, during the insertion of the containment body 1 in the outer casing 3, are compressed towards the containment body 1 by corresponding reliefs 6 situated on the inner side surface of the outer casing 3 and which, when the insertion has been completed, can reacquire a rest, or slightly compressed position, as they are housed in a seat defined a little below said reliefs 6. The interference which is established between the elastic tongues 5 and the reliefs 6 ensures the necessary security of the coupling between the containment body 1 and the outer casing 3.

[0019] The upper end of the containment body 1 is equipped with a flange 7 which has the function of collaborating with the coupling of the containment body 1 with the covering plate 2.

[0020] In particular, the covering plate 2 is made integral, by means of siliconing or with a suitable adhesive which is capable of ensuring the necessary hydraulic and also mechanical seal, to a supporting ring 8, applied on the lower surface of the covering plate 2 and which substantially reproduces the form of the flange 7 of the con-

tainment body 1 and, at the same time, the perimeter of the covering plate 2. There is consequently a sealing layer 9 between the covering plate 2 and the supporting ring 8. The supporting ring 8 is equipped, on its lower surface, with pins 10, of which at least the end is threaded and which form studs on which, after passing through the holes 11 of the flange 7, nuts or rounded screws 12 are applied, which fix the supporting ring 8, and together with this the covering plate 2, to the containment body 1.

[0021] As a result of the solution adopted, with the application of the supporting ring 8 on the lower surface of the covering plate 2, the upper surface of the covering plate 2 remains completely free from fixing elements and can be produced so that it represents the only part of the lighting device which remains visible from the outside of the floor or wall in which the lighting device is inserted.

[0022] As already described, the coupling between the covering plate 2 and the supporting ring 8 is obtained with adhesive means capable of ensuring the hydraulic seal. In order to guarantee the hydraulic seal also between the supporting ring 8 and the containment body 1, thus preventing water from entering the containment body 1 and damaging the light source contained therein, a washer 13 is arranged between the supporting ring 8 and the flange 7 of the containment body 1, which has the form of a ring and is made of an elastic material with a surface equipped with grooves 14, for improving the sealing effect, and holes 15, for the passage of the pins 10.

[0023] In order to protect the elements of the lighting device from possible stress exerted in lateral directions, which could particularly damage the coupling means between the various parts, a collar 16 is applied on the upper portion of the outer casing 3, which surrounds the upper part of the outer casing 3 but also the flange 7 of the containment body 1, the washer 13, the supporting ring 8, the sealing layer 9 and the covering plate 2. The collar 16 is applied to the upper portion of the outer side surface of the outer casing 3 by means of a series of screws 17.

[0024] In order to prevent the lighting device from moving along directions parallel to the ground and to ensure the centering of its portion with respect to the outer casing 3, perimetric reliefs 18 are situated on the washer 13, which interfere with the inner surface of the collar 16. In the place of the numerous reliefs 18, it is possible to have a single relief on the side surface of the washer 13, which runs along the whole perimeter of the washer 13 and is in contact with interference along the whole inner perimeter of the collar 16.

[0025] The lighting device of the present invention allows, without requiring modifications of its structure, the optional application of known devices such as, for example: means for maintaining the temperature of the surface exposed to the outside at values lower than those prescribed by safety regulations, anti-dazzle means, filters, refractors, pictograms. The covering plate 2 can also be made of anti-slip glass.

[0026] The lighting device, object of the present invention, has the advantage of only having the surface of the covering plate 2 towards the outside, i.e. of having a surface entirely destined for the passage of light, and it allows the surface at the disposal of the lighting device to be exploited in order to obtain the maximum lighting surface. Furthermore, the visible surface of the lighting device is uniform, also responding to criteria of an aesthetic nature.

[0027] The built-in lighting device of the present invention is also exactly in line with the surface of the floor, road paving or wall in which it is inserted, providing further advantages, such as, for example, in applications for road surfaces, the possibility of application in roads in which the use of snowploughs may be necessary, without of the risk of the blade, which moves the snow sideways, striking against any possible protruding portions of the device.

[0028] Furthermore, the built-in lighting device of the present invention can be easily opened for inspections, maintenance or for any necessary requirement.

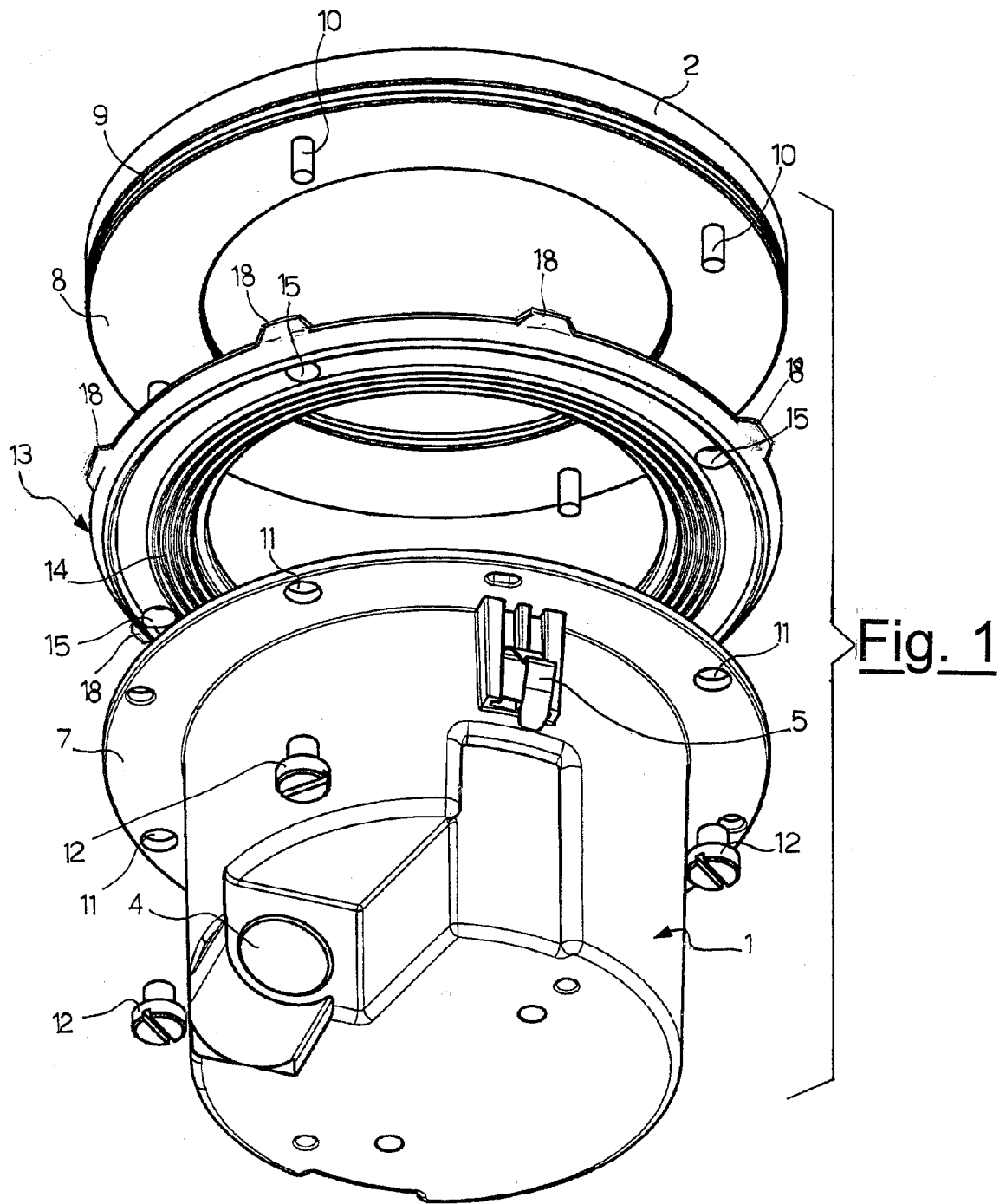
[0029] The present invention is described for illustrative but non-limiting purposes, according to one of its preferred embodiments, but variations and/or modifications can obviously be applied by experts in the field, all included in the protection scope, as defined by the enclosed claims.

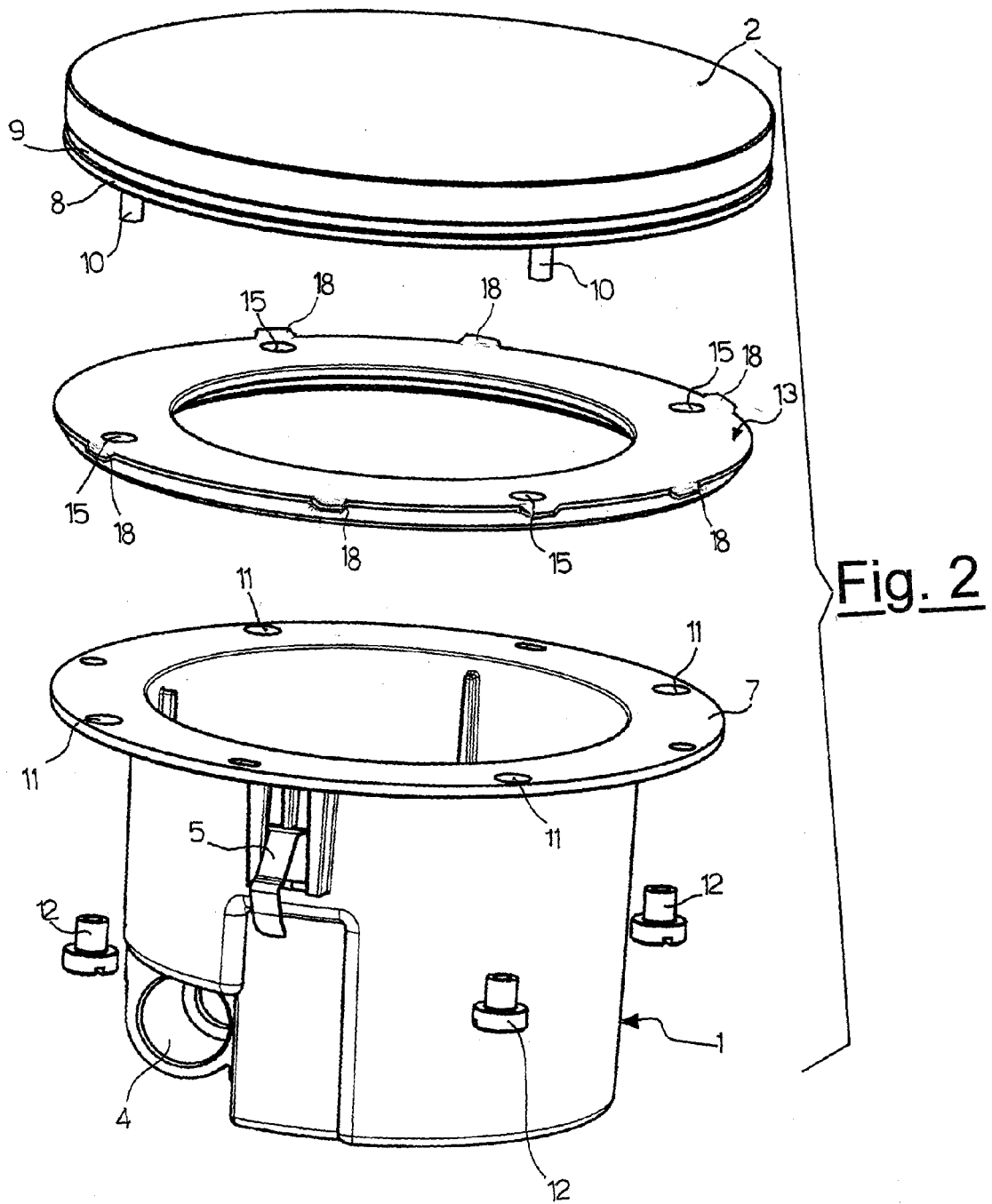
Claims

1. A built-in lighting device comprising a containment body (1) of one or more light sources, a covering plate (2) of said containment body (1) and an outer casing (3) for the housing of said containment body (1) **characterized in that** it also comprises a supporting ring (8), with an external perimeter corresponding to the perimeter of said covering plate (2) and sealed to the lower surface of said covering plate (2), coupling means (10, 11, 12) between said supporting ring (8) and said containment body (1) and coupling means (5, 6) between said containment body (1) and said outer casing (3).
2. The built-in lighting device according to claim 1, **characterized in that** said coupling means (10, 11, 12) between said supporting ring (8) and said containment body (1) comprise a series of threaded pins (10) arranged on the lower surface of said supporting ring (8), a corresponding number of openings (11) on the upper portion of said containment body (1) and nuts or rounded screws (12), which are screwed onto the end of said threaded pins (10) which protrudes from said openings (11).
3. The lighting device according to claim 1 or 2, **characterized in that** said coupling means (5, 6) between said containment body (1) and said outer cas-

ing (3) comprise a series of elastic tongues (5), situated on the outer side surface of the containment body (1), and a seat defined in the space underlying at least one relief (6) on the inner side surface of the outer casing (3).

4. The lighting device according to claim 1, **characterized in that** between said supporting ring (8) and said containment body (1) there is a washer (13).
5. The lighting device according to claim 4, **characterized in that** the side surface of said washer (13) has one or more relief portions (18), which interfere with the inner surface of a collar (16) which surrounds the upper portion of said lighting device, ensuring the positioning with interference of the washer.
6. The lighting device according to claim 1, **characterized in that** the upper surface of said covering plate (2) is in line with the surface of the flooring or wall in which said lighting device is positioned.





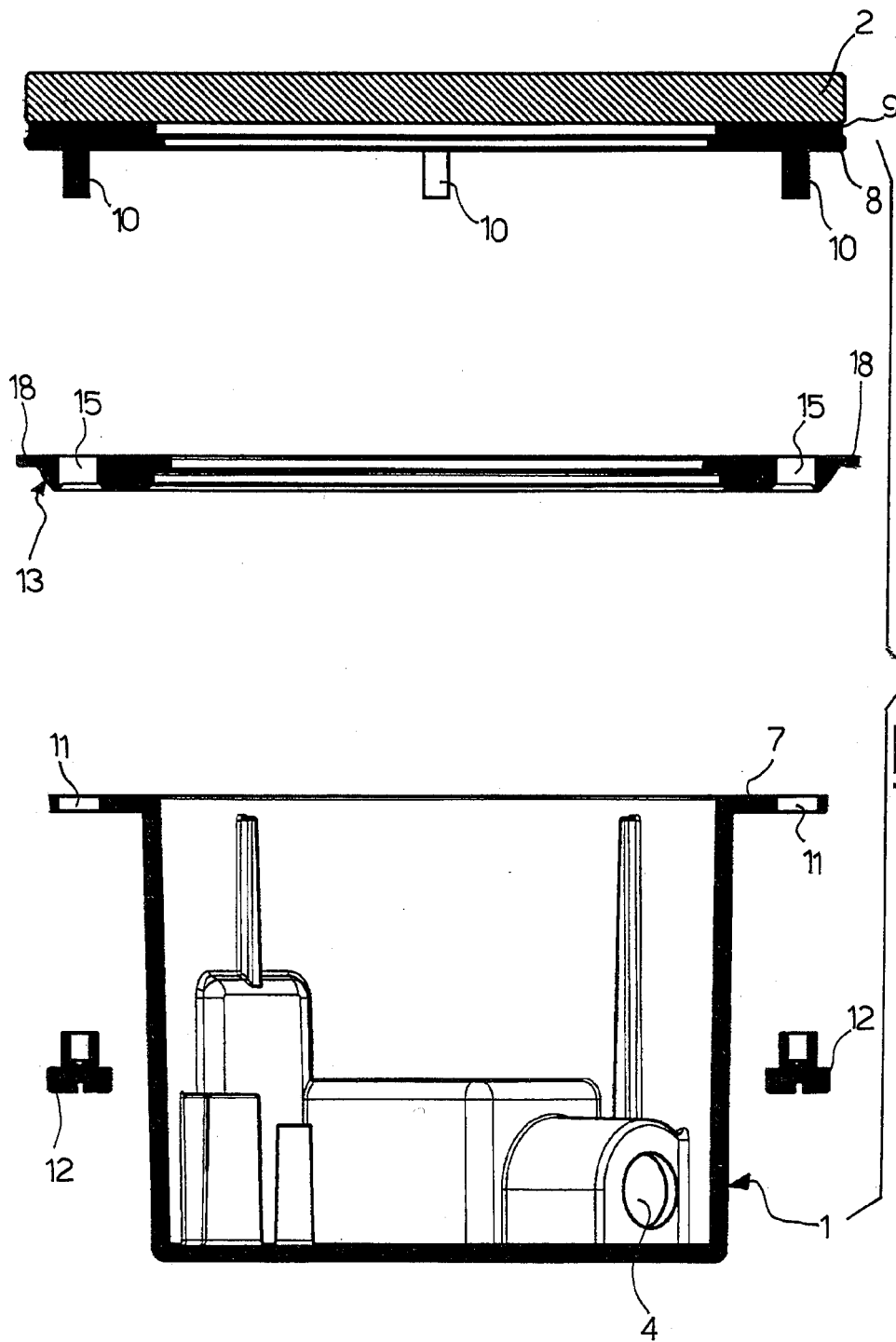
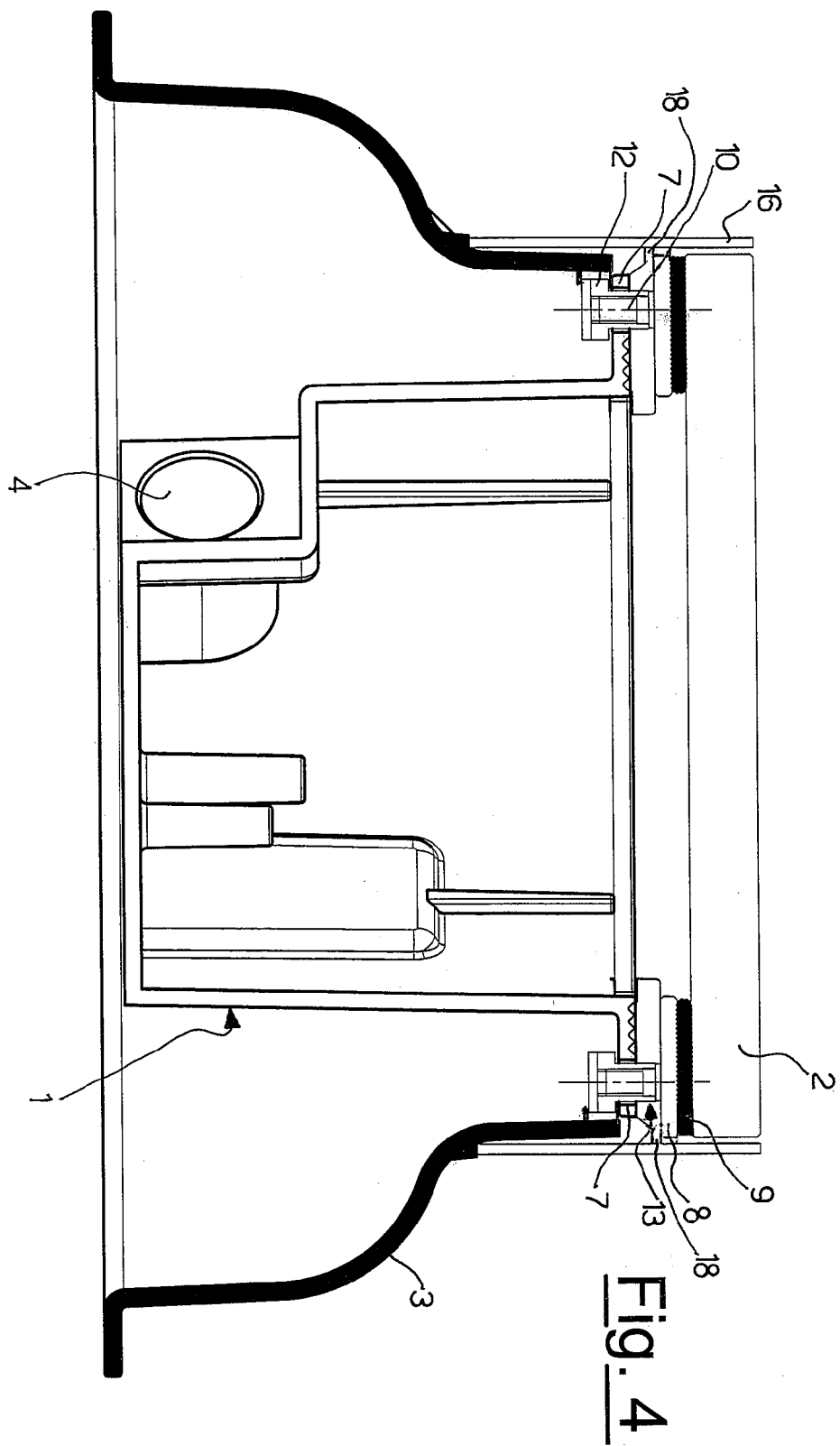


Fig. 3



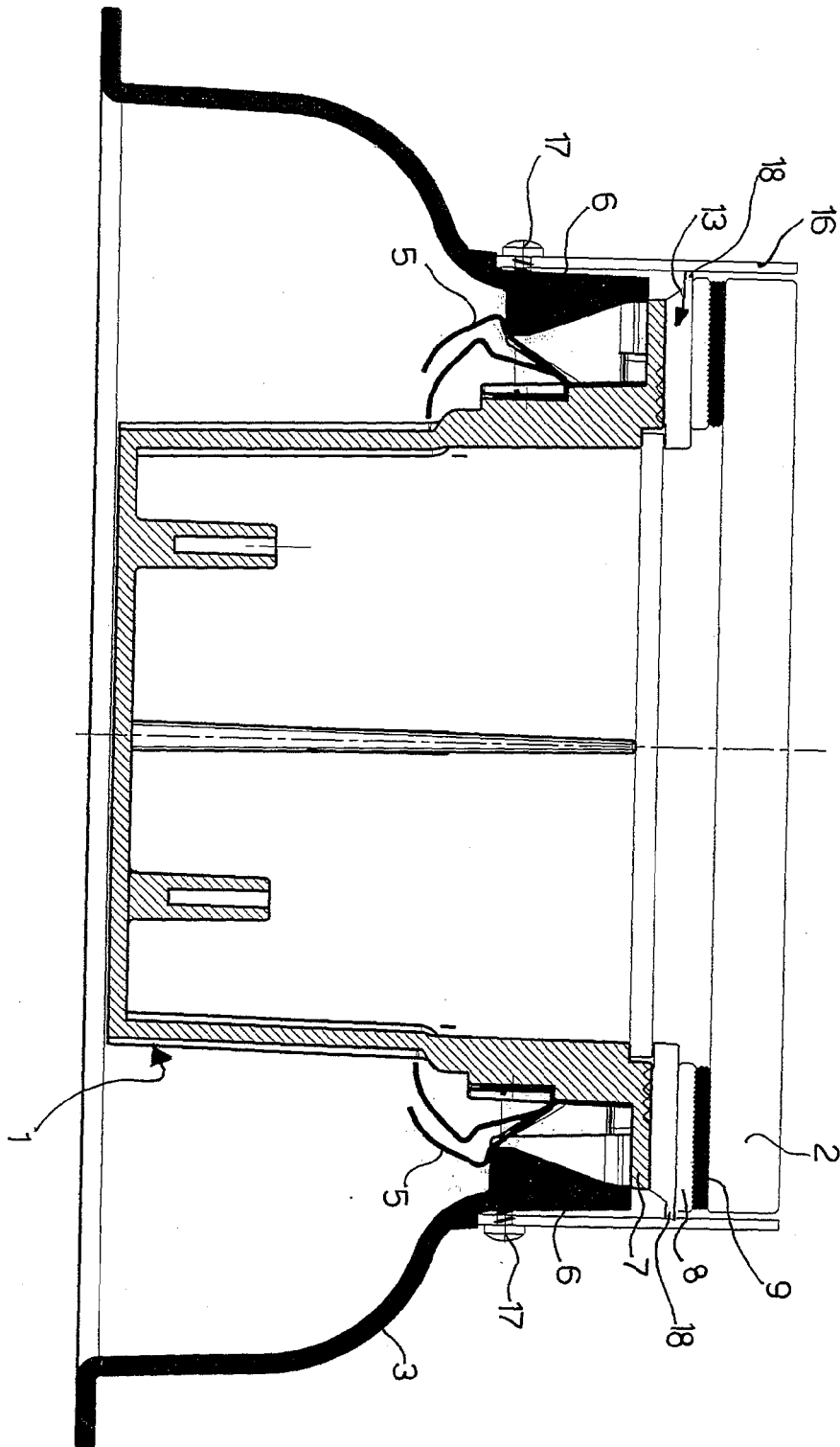


Fig. 5