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(54) **LUMINAIRE ASSEMBLY ADAPTABLE TO SUBMERGED CAVITIES**

(57) Luminaire assembly adaptable to submerged cavities comprising a threaded adapter (3), which can be inserted into the cavity (1) of a wall (2); a support element (4) with a circular geometry, which can be linked by means of threading to the threaded adapter (3) for immobilisation on the wall (2); and a light-emitting device (5) which can be coupled to the support element (4). The support element (4) comprises a first coupling (13), and the light-emitting device (5) comprises a second coupling (17), which can be linked to the first coupling (13), for biunivocal positioning of the light-emitting device (5) on the support element (4). An additional third coupling (18) and fourth coupling (19) can be provided to reinforce the biunivocal positioning of the light-emitting device (5) on the support element (4).

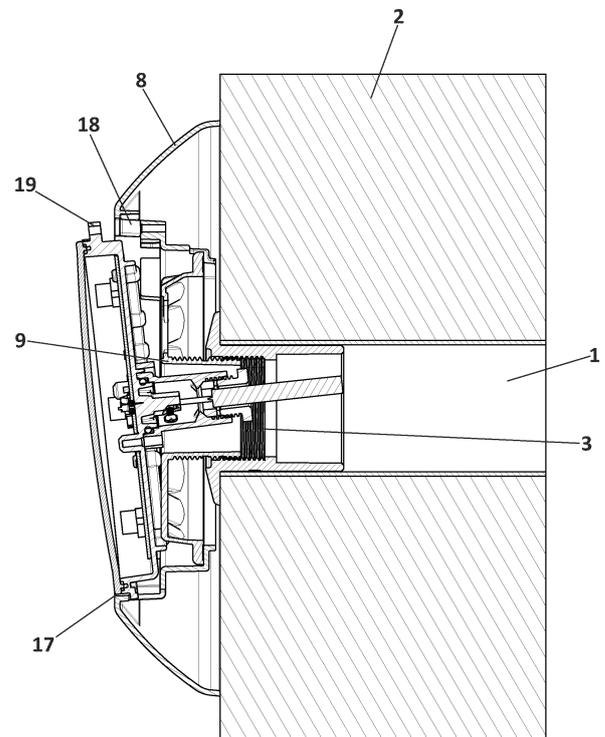


FIG. 7

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Description

Object of the invention

[0001] The present invention falls within the technical field of submerged lighting elements, such as swimming pools, fountains, etc., as well as in the field of lighting devices intended for a fixed installation, especially designed to be installed inside previously submerged cavities and housings existing in walls, such as those initially intended to house water drive nozzles.

Background of the invention

[0002] Within the technical field of lighting for submerged spaces such as fountains or swimming pools, submerged lighting sources are known and common for enabling the inside of the water and the bottom to be seen at night or when there is low natural light. These lighting sources usually consist of a light-emitting element, typically a light bulb, a light-emitting diode or LED, etc., coupled to a base, known as a "niche", housed inside a cavity formed in the wall from the pool, slightly below the water level.

[0003] The aim of said cavity is to prevent the light-emitting element, which usually has a certain length, from extending into the pool and creating an obstacle for the users. The niche also has an exterior lens or screen, which usually protrudes slightly into the pool.

[0004] It is common that sometimes holes, ducts and cavities previously defined as a place for housing are also used to thus avoid needing to make new holes in the wall of the pool, which implies a considerable increase in costs, in addition to the possible damage that said wall can suffer.

[0005] As in other fields of lighting, in recent years there has been a tendency to replace existing luminaires with LED light sources, due to the numerous advantages they provide, among which it is worth mentioning energy savings and the best intensity and quality of the light obtained. In the specific case of submerged pool lighting, the fact that LEDs are capable of providing colours of light which can vary over time is also noteworthy, which positively affects the final aesthetic appearance.

[0006] However, the coupling of LED light sources for underwater lighting in pre-existing housings, which is usually performed by means of elements which are threaded together due to the simplicity of assembly they enable, depends on certain aspects related to the requirements of the installation thereof for correct operation.

[0007] It should be noted first that it is essential to achieve an optimal placement and orientation of the diverging lens, in order for the projected beams of light to reach the desired angle on all the internal surfaces of the pool, thus causing the desired effect. Incorrect threading between the elements of the luminaire, which improperly positions the lens, can therefore result in an unwanted

final effect.

[0008] Likewise, as indicated above, LEDs are capable of providing variable colours of light, thus creating optical effects which favour the aesthetic appearance of the pool wherein they are inserted. Said variation of colours can be controlled by a user by means of radio frequency (RF) signals sent from an external mobile device to an RF receiver located in the luminaire, which receives the orders transmitted from the emitter and acts on the very control circuit of the luminaire.

[0009] In the case of submerged LED luminaires, and due to the fact that the RF wave transmission is hindered by the features of the aquatic environment wherein they are inserted, it is essential for correct operation that the RF receiver is arranged such that it is as close as possible to the surface of the water, in order to prevent interference. For this reason, in submersible LED luminaires, said receiver must be arranged such that, once installed, it is oriented towards the surface of the water.

[0010] Since these luminaires are, as already indicated, elements threaded to each other, an incorrect positioning and threading between those elements causes the receiver to be incorrectly oriented, and can make it so the signal is not received clearly.

[0011] Also, the threaded coupling of the different elements of the luminaire implies a torque force applied to the power cables, which in the case of LED lighting, usually have a very small cross section due to the low amount of power that they consume. Thus, an excess of turning on the threads can cause the cables to twist and end up breaking, thus rendering the luminaire useless.

[0012] Patent documents are known in the current state of the art relating to submersible lighting devices which take advantage of housings designed for elements of the water circulation circuit of the pool, such as the drive nozzles, but which suffer from some of the aforementioned problems.

[0013] Thus, for example, the Spanish patent with publication number ES2586690 describes a pool luminaire assembly which can be connected to a pool wall which includes a light adapter and a return accessory, wherein at least two channels, a water channel and an electrical channel, cross through the assembly, both channels being parallel and separated from each other. An adapter includes a lamp for connecting to a light, such that the lamp is inside and/or adjacent to the electrical channel.

[0014] On the other hand, international PCT application with publication number WO2014170862 describes a lighting assembly comprising a casing, a transparent lens mounted on the casing and a light source behind the lens. The light source is located in the space between a front wall of the lens and the rearward facing free edge of a rim. The assembly may further include an air/water mixing element inside the housing, which includes a channel connected to a water inlet.

[0015] Finally, the British patent with publication number GB2418876 discloses a fluid jet nozzle for discharging, wherein a light emitter is adapted to emit a white

or coloured light such that when the pressurised fluid is discharged as a fluid jet through the surrounding liquid, the emitted light is substantially entrained within the fluid jet because of the principle of total internal reflection. The nozzle is designed to be used instead of conventional fluid jet nozzles in whirlpool baths, swimming pools and the like to create a pleasing visual effect.

[0016] Therefore, there is still a need for submersible LED luminaires which can be adapted to pre-existing cavities in a pool, which can be easily inserted by means of threading into said cavities, but incorporating elements which ensure proper coupling and orientation between the elements thereof, in order to thereby prevent the aforementioned problems.

Description of the invention

[0017] The object of the invention consists of a lighting assembly, preferably LED but which can be of any type, especially designed for submerged pool lighting, said assembly being able to be installed in previously existing housings in the side walls of a pool.

[0018] To do so, the luminaire assembly of the invention comprises a plurality of elements coupled to each other such that they enable easy assembly and adaptation to a housing previously defined in a side wall of a pool, such as the ones constituted to house the drive nozzles, this installation being able to be performed by any user, without needing special knowledge or tools.

[0019] Since the coupling between the elements of the luminaire is produced manually, and since it is essential to ensure the correct positioning between said elements, both to ensure the correct lighting pattern and to ensure correct radiofrequency reception, the luminaire of the invention incorporates coupling means corresponding to each other such that they ensure biunivocal coupling between them, such that they are correctly positioned, in order to thus prevent the aforementioned problems.

[0020] Said coupling means are also simple to assemble, without adding weight or increasing the dimensions of the resulting luminaire, and it is foreseen that they preferably consist of tongue-and-groove joints and easy coupling, which fasten the position of the elements of the luminaire in the optimal position.

Description of the drawings

[0021] As a complement to the description provided herein, and for the purpose of helping to make the features of the invention more readily understandable, in accordance with a preferred practical exemplary embodiment thereof, said description is accompanied by a set of drawings which, by way of illustration and not limitation, represent the following:

Figure 1 shows a top perspective view of the assembly of the invention inserted into a cavity of a wall of a pool.

Figure 2 shows a front perspective view of an exploded view of the assembly of the invention.

Figure 3 shows a detail view of Figure 2 wherein the light-emitting device only shows the base.

Figures 4a and 4b show perspective views of the coupling of the luminaire to the assembly of the invention.

Figure 5 shows a rear perspective view of an exploded view of the assembly of the invention.

Figure 6 shows a cross-sectional view of the luminaire assembly inserted in the cavity.

Figure 7 shows another cross-sectional view of a first phase of the sequence of inserting the luminaire assembly into the cavity.

Figure 8 shows a side cross-sectional view of a second phase of the sequence of inserting the luminaire into the cavity.

Preferred embodiment of the invention

[0022] A detailed explanation of a preferred exemplary embodiment of the object of the present invention is provided below with the help of the figures referred to above.

[0023] The luminaire assembly adaptable to submerged cavities of the invention is intended to be coupled to a cavity (1) previously defined in the wall (2) of a pool. In the preferred exemplary embodiment shown in the attached figures, said cavity (1) is of the type configured to house a water drive nozzle therein, for which reason it has a cylindrical geometry.

[0024] The figures illustrate that the luminaire assembly comprises a threaded adapter (3) which can be inserted into the inside of the cavity (1), a support element (4), intended to be located on the wall (2) and which can be linked by means of threading to the threaded adapter (3), and a light-emitting device (5) or luminaire, which can be coupled to the support element (4) which in the example shown is LED.

[0025] The threaded adapter (3) is made up of a hollow tubular body equipped with an internal thread, along the inside of which a power cable (6) runs in order to electrically power the light-emitting device (5). In the preferred embodiment described herein, said threaded adapter (3) likewise incorporates a jacket (7) which can be inserted farther into the inside of the cylindrical cavity (1), at the outer end of which the threaded tubular body is coupled.

[0026] Moreover, the support element (4) comprises an external frame (8), with a ring-shaped geometry, with a large central cavity, and a threaded coupling (9), coaxially linked to the external frame (8) and able to be threaded into the threaded adapter (3) in order to establish a threaded joining of the luminaire on the wall (2).

[0027] The external frame (8) has a front face (10), intended to stay oriented towards the pool, and a rear face (11), intended to stay facing the wall (2). From a central sector of the threaded coupling (9) starts a hollow lug (12), equipped with a threaded outer surface, which extends in the direction of the rear face (11) and along

the inside of which the power cable (6) is introduced.

[0028] Thus, said hollow lug (12) acts as a male thread which can be inserted into the threaded adapter (3), which acts as a female thread, in order to establish the threaded coupling between the support element (4) and the threaded adapter (3), thus staying fastened on the wall (2).

[0029] The external frame (8) of the support element (4) likewise comprises a first coupling (13), located on the front face (10) thereof, which in this preferred embodiment consists of a recess.

[0030] Moreover, as seen in Figures 6 to 8, the light-emitting device (5) in turn comprises a diffuser lens (16) and a base (14), in this embodiment with a circular geometry, which is able to be coupled in the central cavity of the support element (4). Said base (14) has an external face to which an electronic board is fastened which in turn comprises the LEDs (15), and an internal face, able to face the support element (4), wherein a control circuit and a connection with the power cable (6) are located.

[0031] This light-emitting device (5) likewise comprises, located on the internal face of the base (14) thereof, a second coupling (17), which can be linked to the first coupling (13), for biunivocal positioning of the light-emitting device (5) on the support element (4). In this preferred embodiment, the second coupling (17) consists of a flange which extends from the perimeter edge of the base (16) in the direction of the external face thereof in order to be inserted into the recess.

[0032] In the preferred embodiment described herein, the outer frame (8) of the support element (4) additionally comprises a third coupling (18) located on the front face (10) in a position diametrically opposite from the first coupling (13) and, correspondingly, the light-emitting device (5) additionally comprises a fourth coupling (19), located on the internal face of the base (14) thereof and diametrically opposite from the second coupling (17), which can be linked to the third coupling (18) in order to reinforce the biunivocal positioning of the light-emitting device (5) on the support element (4).

[0033] As seen in the embodiment shown in the figures, the third coupling (18) consists of a slit with a hole, while the fourth coupling (19) consists, in this case, of a prominent sector which extends from the perimeter edge of the base (14), a sector which comprises a through hole, able to face the hole defined in the slit of the support element (4), in order to insert a fastening screw (20) which immobilises the light-emitting device (5) in the support element (4) in the desired position. A platen (21) which can be coupled on the diffuser lens (16) finally covers said prominent sector.

[0034] Finally, Figures 7 and 8 partially illustrate the assembly sequence of the luminaire thus described in the cavity (1) belonging to a drive nozzle of a wall of a pool. Thus, after inserting the threaded adapter (3) into said cavity (1), it is fastened to the support element (4) on the wall (2), threading the threaded coupling (9) into the threaded adapter (3).

[0035] Once the support element (4) is immobilised on the wall (2), the power cable (6) is connected to the light-emitting device (5), which is rotated slightly until it is correctly positioned at the first (13) and second couplings (17), respectively, and in this case third (18) and fourth couplings (19). The flange is inserted into the recess, and the through hole of the prominent sector is facing the hole in the slit, thus ensuring correct positioning which ensures, among other advantages, that beams of light with the desired orientation are obtained.

[0036] In an alternative embodiment, not shown in the attached figures, the couplings (13, 17, 18, 19) are respective bayonet connections.

Claims

1. A luminaire assembly adaptable to submerged cavities comprising:

- a threaded adapter (3), which can be inserted into the cavity (1) of a wall (2);
- a support element (4) with a circular geometry, which can be linked by means of threading to the threaded adapter (3) for immobilisation on the wall (2); and
- a light-emitting device (5) which can be coupled to the support element (4),

characterised in that:

- the support element (4) comprises a first coupling (13), and
- the light-emitting device (5) comprises a second coupling (17), which can be linked to the first coupling (13), for biunivocal positioning of the light-emitting device (5) on the support element (4).

2. The luminaire assembly adaptable to submerged cavities according to claim 1, **characterised in that:**

- the support element (4) comprises a third coupling (18), and
- the light-emitting device (5) comprises a fourth coupling (19) which can be linked to the third coupling (18) in order to reinforce the biunivocal positioning of the light-emitting device (5) on the support element (4).

3. The luminaire assembly adaptable to submerged cavities according to claim 2, **characterised in that:**

- the third coupling (18) is located in a position diametrically opposite from the first coupling (13), and
- the fourth coupling (19) is located in a position diametrically opposite from that of the second

coupling (17).

4. The luminaire assembly adaptable to submerged cavities according to any of the preceding claims, **characterised in that:** 5
- the first coupling (13) is a recess defined in the support element (4), and
 - the second coupling (17) is a flange which extends from the light-emitting device (5). 10
5. The luminaire assembly adaptable to submerged cavities according to any of preceding claims 1 to 3, **characterised in that:** 15
- the third coupling (18) is a slit with a hole, and
 - the fourth coupling (19) is a prominent sector which extends from a perimeter edge of the light-emitting device (5) and comprises a through hole able to face the hole in order to insert a fastening screw (20). 20
6. The luminaire assembly adaptable to submerged cavities according to claim 5, **characterised in that** it additionally comprises a platen (21) for covering the prominent sector. 25
7. The luminaire assembly adaptable to submerged cavities according to any of claims 1 to 3, **characterised in that** the first coupling (13) and the second coupling (17) are respective bayonet connections, corresponding to each other. 30
8. The luminaire assembly adaptable to submerged cavities according to any of claims 2 or 3, **characterised in that** the third coupling (18) and the fourth coupling (19) are respective bayonet connections, corresponding to each other. 35

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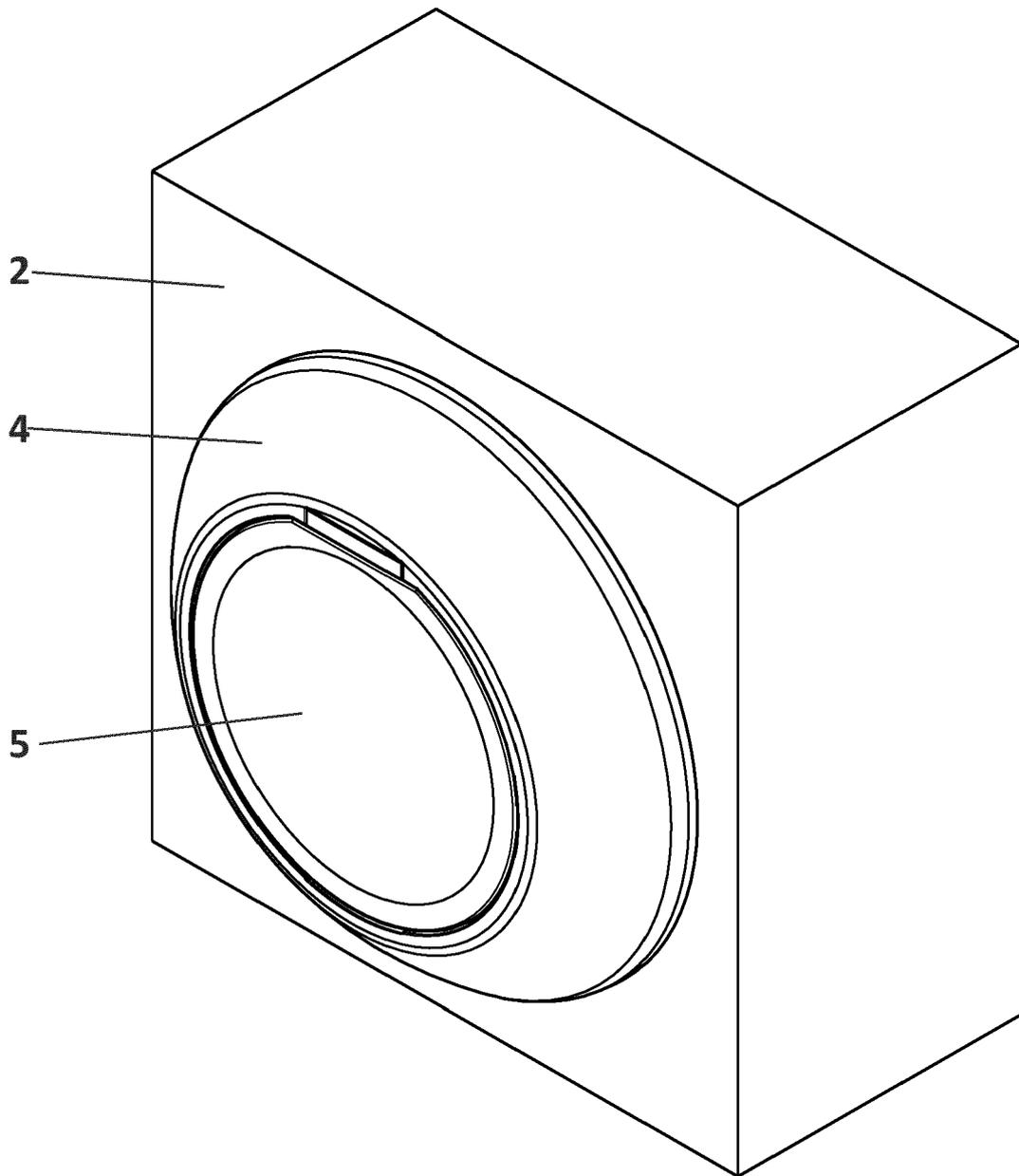


FIG. 1

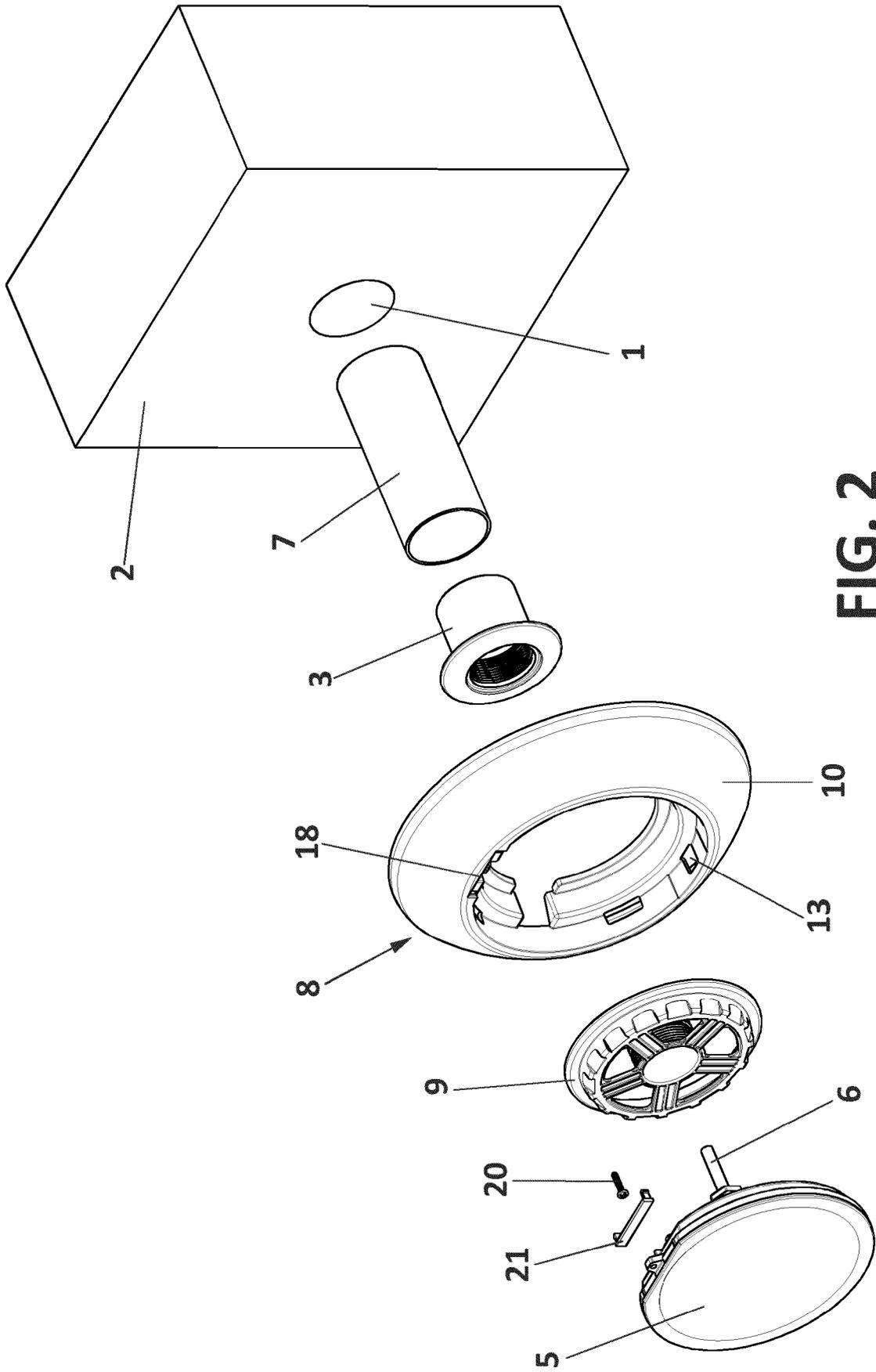


FIG. 2

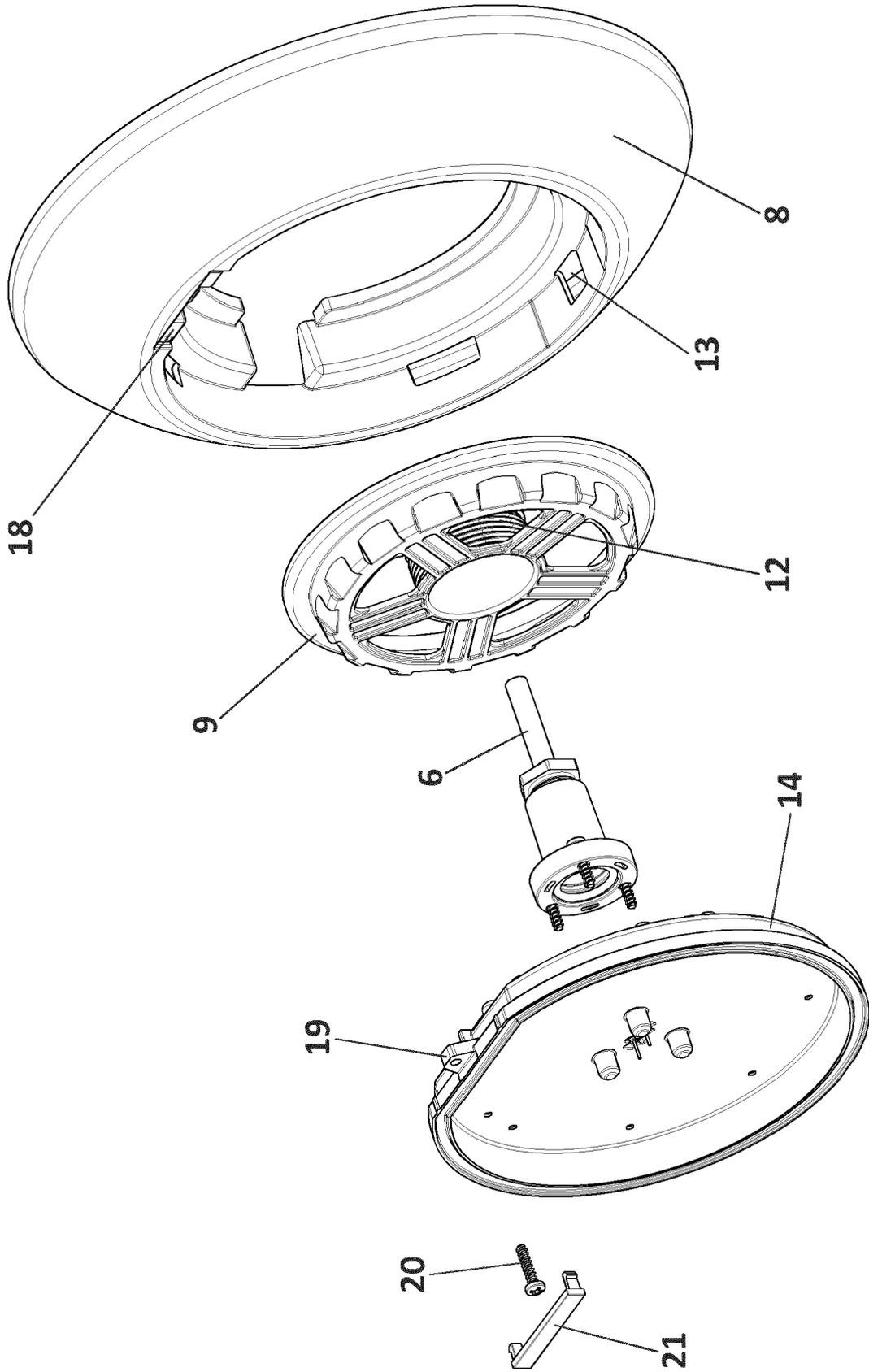


FIG. 3

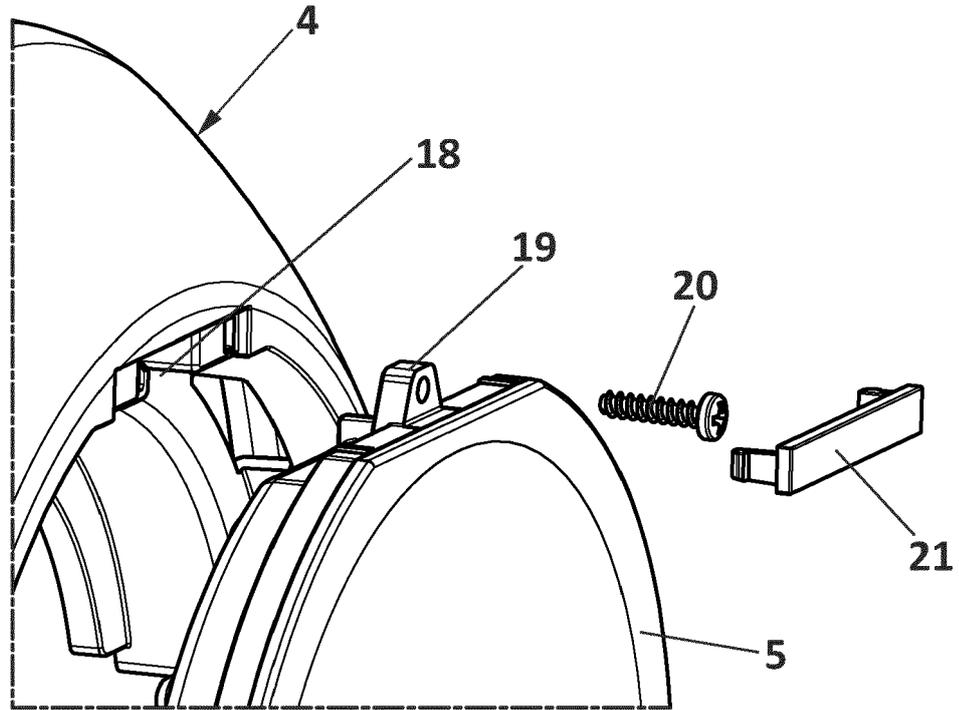


FIG. 4a

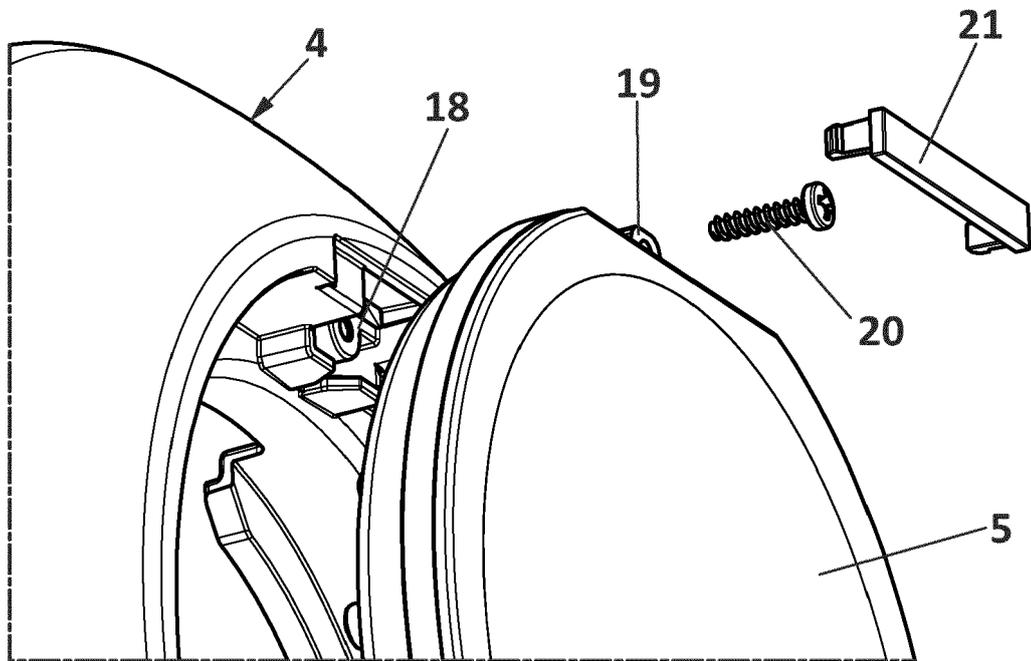


FIG. 4b

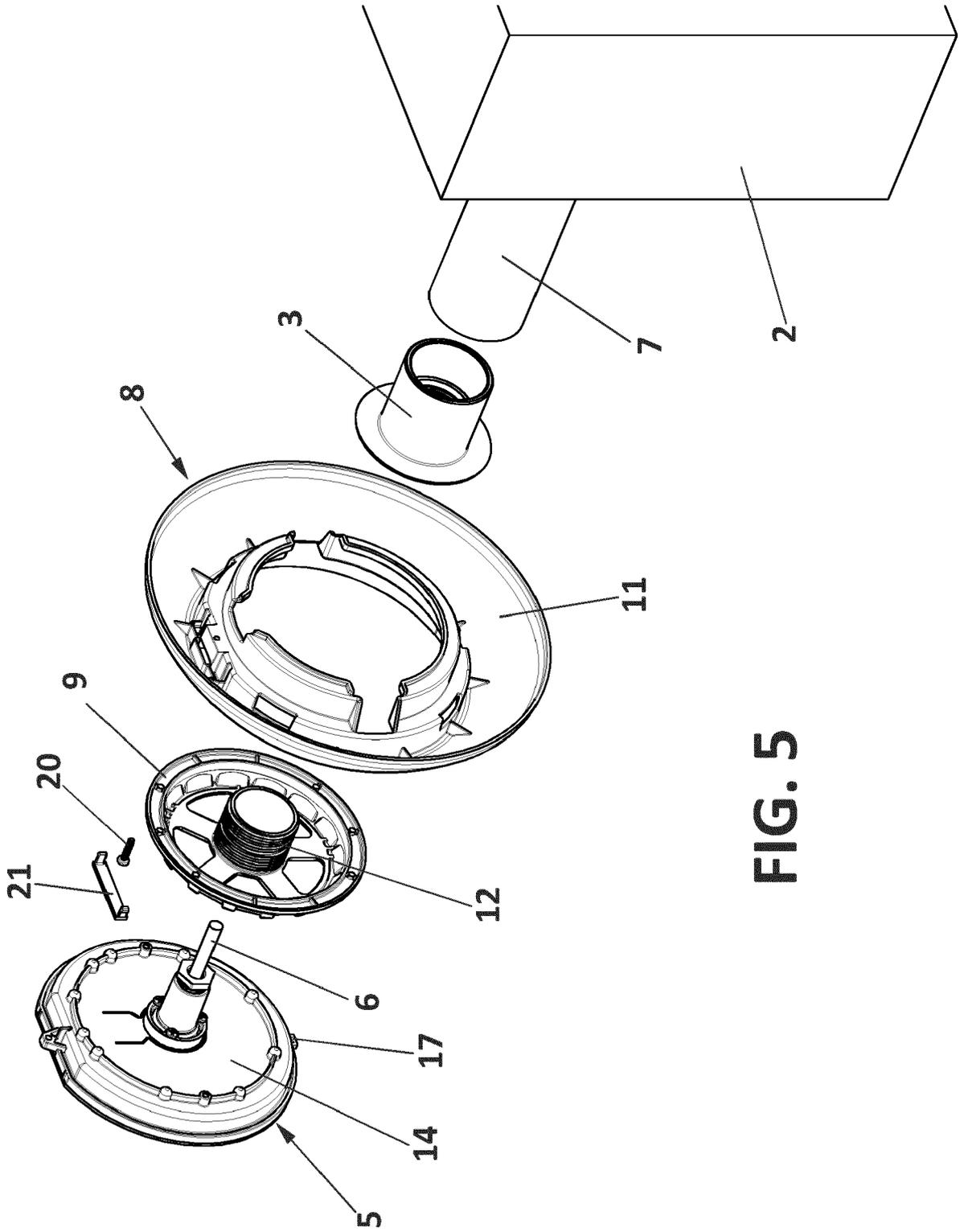


FIG. 5

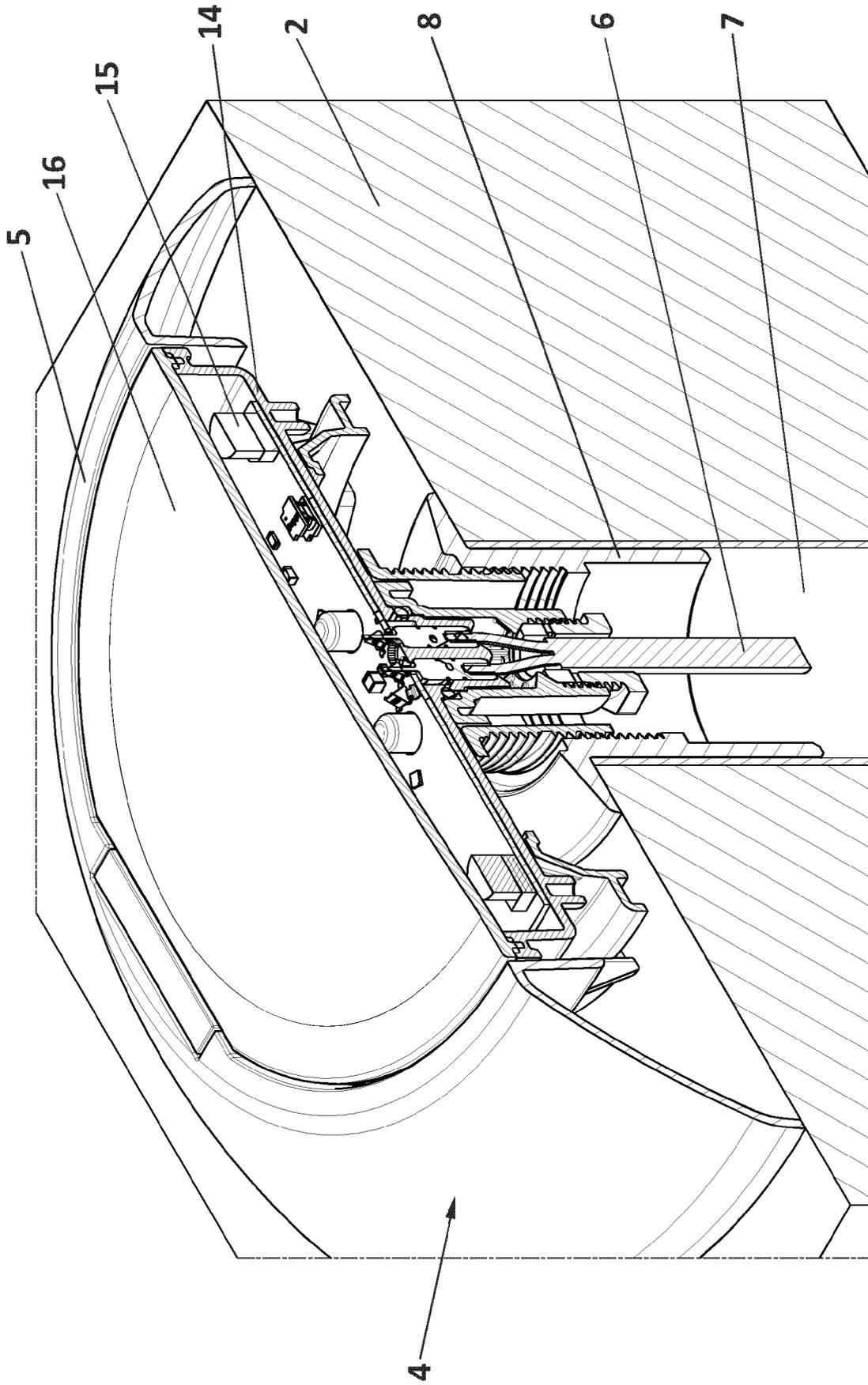


FIG. 6

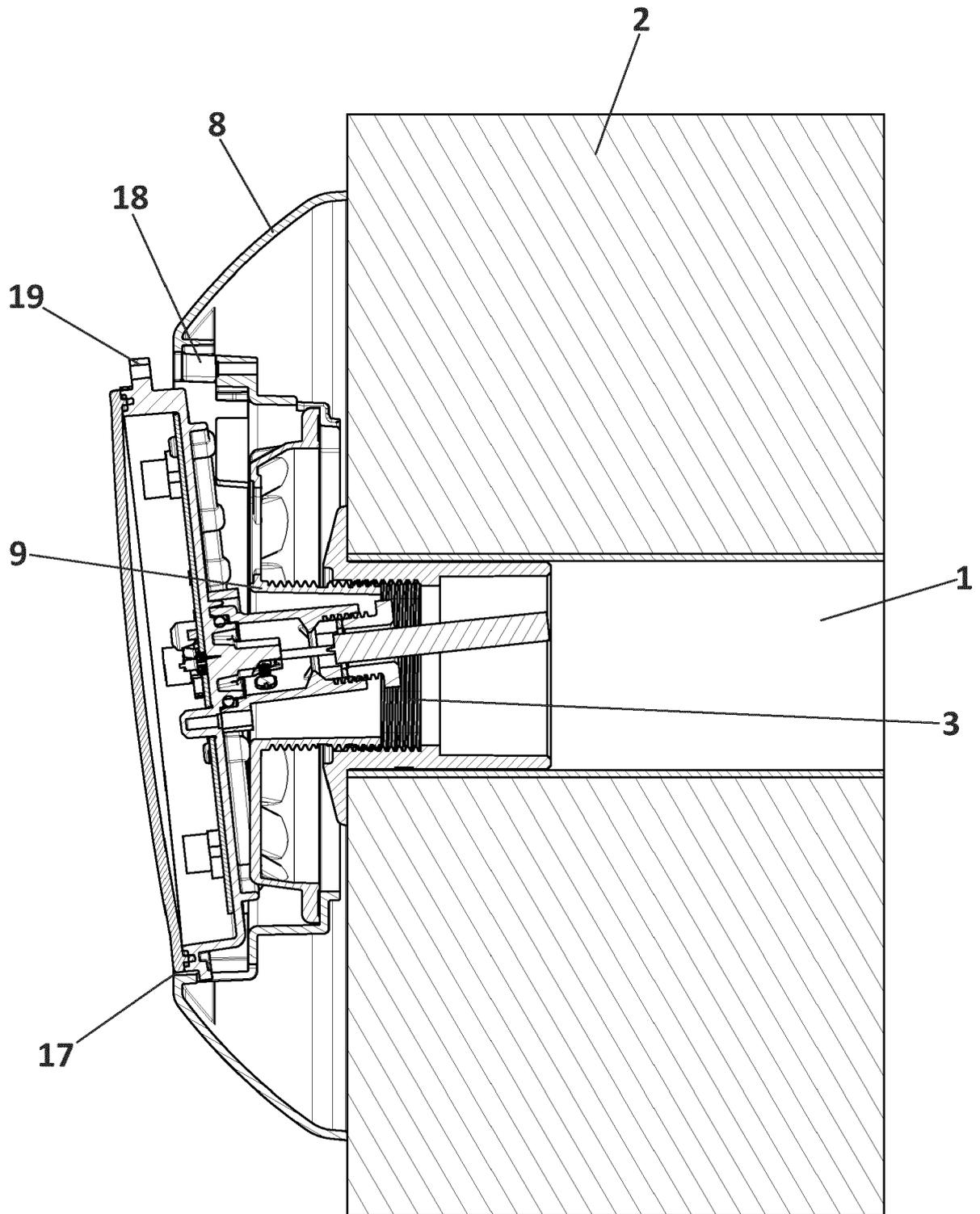


FIG. 7

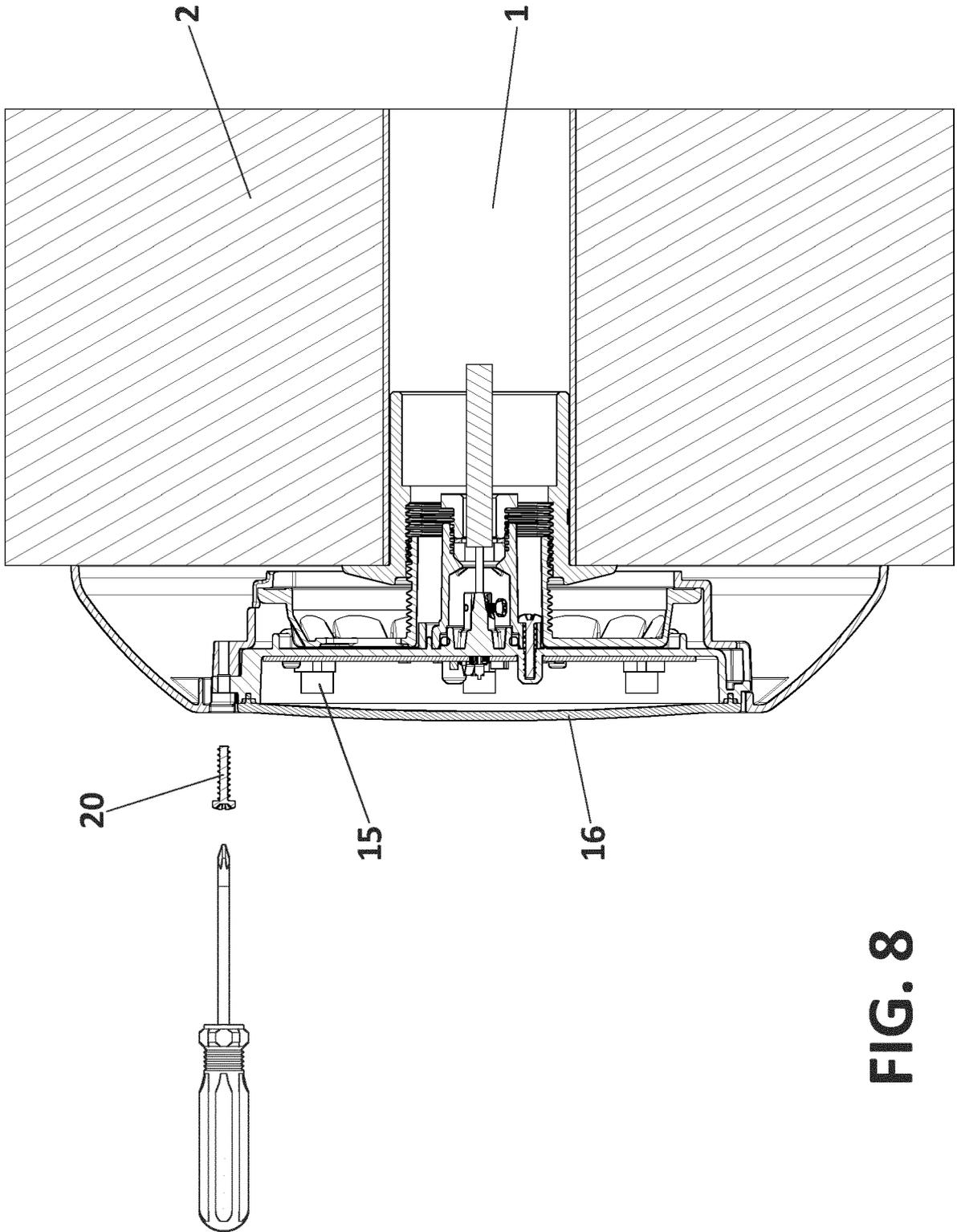


FIG. 8



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Application Number
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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 24 March 2020	Examiner Rosborough, John
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ON EUROPEAN PATENT APPLICATION NO.

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