



(11)

EP 4 818 576 A1

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
07.10.2026 Bulletin 2026/41

(21) Application number: **25382348.8**

(22) Date of filing: **05.04.2025**

(51) International Patent Classification (IPC):
F21S 8/00 ^(2006.01) **F21V 21/30** ^(2006.01)
F21V 21/35 ^(2006.01) **F21V 23/06** ^(2006.01)
H01R 25/14 ^(2006.01) **F21Y 115/10** ^(2016.01)

(52) Cooperative Patent Classification (CPC):
F21V 23/06; F21S 8/038; F21V 21/30; F21V 21/35;
H01R 25/142; F21Y 2115/10

(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 ME MK MT NL
NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA
Designated Validation States:
GE KH LA MA MD TN

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(54) **LIGHTING SYSTEM**

(57) The present invention relates to a lighting system (1) comprising a bar (2) with two electrical conductors (3), a lamp (4), a sleeve (5) which is removably coupled to the bar (2) moving transversely with respect to the bar (2), and a coupling device (10) attached to the lamp (4). The sleeve (5) has two electrically conductive tracks (6) on its outer surface (7), extending along a track arc, and two connectors (9) which are in contact with the two electrical conductors (3). The coupling device (10) comprises a coupling body (12) which is removably coupled to an outer surface of the bar (3) and/or of the sleeve (5), moving transversely with respect to the bar (2), at different angular positions, and contact terminals (11) connected to the lamp (4), which are in contact with the tracks (6) at any of the angular positions.

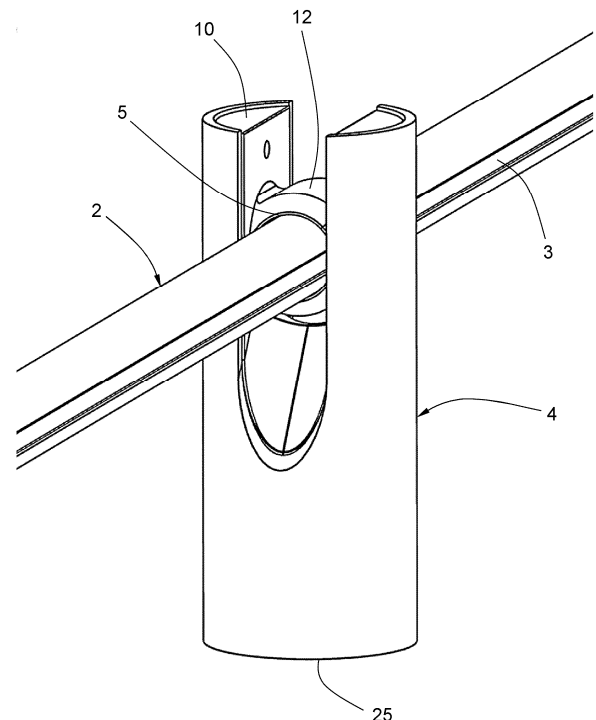


FIG. 2

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Description

Field of the Invention

[0001] The invention is comprised in the field of lighting.

[0002] More specifically, the invention relates to a lighting system of the type comprising:

- a bar comprising two electrical conductors extending along at least one segment of said bar;
- a lamp for providing light when it is electrically powered;
- and a coupling and connection assembly for removably coupling said lamp to said bar at any position along said segment of the bar, configured such that when said lamp is coupled to said bar, an electrical connection of said lamp to said two electrical conductors is established.

State of the Art

[0003] The lighting systems of the type to which the invention relates are, for example, those known as track lighting, in which the bar is hung from or fixed to a ceiling and acts as a track along which the user can fix and connect one or more lamps, which can be of different types. In the known systems of this type, the two electrical conductors are arranged in an interior space of the bar forming a track, which is accessed through a slot in which a part of the coupling and connection assembly of the lamp is inserted to fix the lamp to the bar and to electrically connect the bar to the electrical conductors arranged in the bar. WO2016132361A1 and US20110051433A1 disclose different solutions for lighting systems of this type, in which the lamp is fixed to the bar at a single specific angular position. CN220135388U discloses a solution which allows the lamp to be fixed to the bar at different angular positions. To that end, the system described in this document comprises a closed ring into which the bar is inserted at one of its ends, such that the ring is arranged externally surrounding the bar and can slide along same. The ring comprises circular conductor tracks on its outer surface and a pin on its inner face which is inserted into a slot of the bar and has side prolongations that contact the electrical conductors, which are concealed in a central empty space of the bar in which the slot opens up, such that they are not visible from the outside through the slot. The lamp has a coupling device which is coupled to the ring, such that an electrical connection between the lamp and the conductor tracks is established, and the lamp can rotate with respect to the ring without losing the electrical connection.

Description of the Invention

[0004] The purpose of the invention is to provide a lighting system of the type indicated above, which allows

the lamps to be mounted on the bar in an easier manner and with greater versatility.

[0005] This purpose is achieved by means of a lighting system of the type indicated above, characterised in that the coupling and connection assembly comprises:

- a sleeve shaped such that it is removably coupled, moving transversely with respect to the bar from a lateral position with respect to said bar, to an outer surface of the segment of the bar, said sleeve comprising two electrically conductive tracks arranged on an outer surface of said sleeve, each of said tracks extending along a track arc in the form of a circular arc in a plane orthogonal to said bar, and two electrically conductive connectors, each of them being electrically connected to each of said tracks, said two connectors being arranged on an inner surface of said sleeve such that when said sleeve is coupled to said segment of the bar, each of said two connectors is in electrical contact with one of said two electrical conductors of the bar;
- and a coupling device attached to said lamp, said coupling device comprising electrically conductive contact terminals electrically connected to said lamp, and a coupling body shaped such that it is removably coupled, moving transversely with respect to said bar from a lateral position with respect to said bar, to an outer surface of the assembly formed by said segment of the bar and said sleeve coupled to the latter at different angular positions in a coupling arc in the form of a circular arc in a plane orthogonal to said bar, such that at each of said angular positions said contact terminals are in electrical contact with said two tracks of the sleeve.

[0006] This configuration according to the invention allows a lamp to be mounted at different angular positions and at any position along the segment of the bar, without this possibility being affected by other elements present in the bar such as, for example, other lamps, suspension cables for the bar or other securing elements for the bar, electrical connection terminals for the bar, and caps at the ends of the bar. Nor does it affect the fact that the ends of the bar are not accessible or are difficult to access, since it is only necessary for an area of the bar along the segment to be accessible and free in order to couple the lamp to the bar. Firstly, this is possible as a result of the fact that the sleeve is removably coupled, moving transversely with respect to the bar from a lateral position with respect to the bar, to an outer surface of the segment of the bar; and secondly, as a result of the fact that the coupling body attached to the lamp is also removably coupled, moving transversely with respect to the bar from a lateral position with respect to the bar, to an outer surface of the assembly formed by the segment of the bar and the sleeve coupled to the latter. As will be seen below in the description of the embodiments, to mount the lamp in a chosen location along the segment of the bar, the user first

couples the sleeve to the bar in this location, moving the sleeve transversely with respect to the bar, and then couples the coupling body of the lamp to the bar and/or to the sleeve in the same location, moving the coupling body transversely with respect to the bar, and with the possibility of orienting the coupling body, and therefore the lamp, at different angular positions, with the certainty that the lamp will be in electrical contact with the two electrical conductors at all of said positions.

[0007] Embodiments in which the sleeve is a single piece, with an opening for the lateral insertion of the bar, are possible. For example, the sleeve can be a piece with a C-shaped cross-section which is laterally coupled to the bar. In that case, when the sleeve is a single piece with a C-shaped cross-section, the coupling arc for coupling the coupling body to the bar and/or to the sleeve is limited by the arc formed by the C-shaped piece.

[0008] In preferred embodiments, the sleeve is formed by two separable half-sleeves, shaped such that they are removably coupled to one another and to an outer surface of the segment of the bar, each of the half-sleeves moving transversely with respect to the bar from a lateral position with respect to the bar, such that the two half-sleeves are arranged on opposite sides with respect to the bar. This solution provides a more robust fixing of the sleeve to the bar and allows the coupling arc to be enlarged.

[0009] Preferably, the two half-sleeves have a C-shaped cross-section and are elastically deformable, such that they are press-fit, by form fitting, on an outer surface of the bar in the segment. As a result of this configuration, the mounting of the sleeve on the bar is particularly easy. The user must simply push each half-sleeve laterally towards the bar to perform the press-fitting. Preferably, the C-shaped cross-section of the half-sleeves is such that the opening of the C has a smaller dimension than the cross-section of the bar, such that to couple each half-sleeve to the bar, the opening opens up by elastic deformation of the half-sleeve for the bar to laterally enter through this opening. In preferred embodiments, the bar has an outer perimeter with a circular cross-section, and the half-sleeves have an inner perimeter with a circular arc cross-section, having a diameter corresponding to that of the outer perimeter of the bar.

[0010] Preferably, the two half-sleeves are identical to one another. This facilitates the mounting operation performed by the user, since the user does not have to choose between different pieces.

[0011] In preferred embodiments, each of the two tracks is arranged in one of the half-sleeves and extends along a track arc in a plane orthogonal to the bar. The track arc of one of the tracks extends in a first angle greater than or equal to 180° , and the track arc of the other one of the tracks extends in a second angle greater than or equal to a complementary angle that is complementary to the first angle, such that when the two half-sleeves are coupled to one another, the assembly formed by the track arcs of the two tracks covers a full 360°

circumference. This solution provides the possibility of establishing contact with the two tracks, through the contact terminals, on the entire full circumference.

[0012] Preferably, the coupling body is configured such that the coupling arc extends in a circular arc greater than or equal to 180° . More preferably, the coupling arc extends in a full 360° circle. This allows the coupling of the coupling body, and therefore the lamp attached to same through the coupling device, at different angular positions along the entire circumference with respect to an axial direction of the bar in the coupling area.

[0013] Embodiments in which the tracks are not continuous along the track arc are possible. In preferred embodiments, each of the two tracks extends continuously along its track arc, and when the coupling body is coupled to an outer surface of the assembly formed by the segment of the bar and the sleeve coupled to the latter, at any angular position in the coupling arc, the two contact terminals are in electrical contact with the two tracks at any of these angular positions. This allows the coupling of the coupling body, and therefore the lamp attached to same through the coupling device, at any angular position along the coupling arc with respect to an axial direction of the bar in the coupling area. When the coupling arc extends in a full 360° circle, the coupling body and the lamp can be coupled at any angular position along the entire circumference.

[0014] In preferred embodiments, the coupling device comprises a first pair of contact terminals and a second pair of contact terminals, with a contact terminal of the first pair being electrically connected to a contact terminal of the second pair, thereby forming a first pole of contact terminals connected to one another, and with the other contact terminal of the first pair being electrically connected to the other contact terminal of the second pair, thereby forming a second pole of contact terminals connected to one another. The first pair and the second pair of contact terminals are arranged at different angular positions, such that when the coupling body is coupled to an outer surface of the assembly formed by the segment of the bar and the sleeve coupled to the latter, at least one of the two contact terminals of the first pole is in electrical contact with one of the tracks, and at least one of the two contact terminals of the second pole is in electrical contact with the other track. This configuration is a simple and effective solution to ensure that the two contact terminals are in electrical contact with the two tracks at all times and, therefore, that the lamp is connected to the electrical conductors of the bar at all times.

[0015] Different embodiments in which the coupling body is removably coupled to the segment of the bar, to the sleeve, or to both, are possible. In preferred embodiments, the coupling body is removably coupled to an outer surface of the segment of the bar when the sleeve is removably coupled to an outer surface of the segment of the bar. A robust coupling is thereby obtained, and the sleeve is not stressed and interference in the coupling thereof with the segment of the bar is prevented.

[0016] Embodiments in which the coupling body can be coupled to the segment of the bar and/or to sleeve at several angular positions and in a fixed manner, such that the coupling does not allow relative movement of the coupling body, are possible. In preferred embodiments, the coupling body is shaped such that when it is removably coupled to an outer surface of the assembly formed by the segment of the bar and the sleeve coupled to the latter, the coupling body can rotate with respect to the assembly along the coupling arc. This allows a readjustment of the angular position of the coupling body, and therefore of the lamp, after they have been coupled to an outer surface of the assembly. Preferably, the bar and/or the sleeve have an outer perimeter with a circular cross-section, and the coupling body has an inner perimeter with a circular cross-section, having a diameter corresponding to that of the outer perimeter of the bar, such that when the coupling body is coupled to an outer surface of the assembly, its circular inner surface slides over the circular outer surface of the sleeve if it is coupled to same, or over the circular outer surface of the bar if it is coupled to same.

[0017] Preferably, the coupling body covers the two tracks when it is removably coupled to an outer surface of the assembly formed by the segment of the bar and the sleeve coupled to the latter. The tracks are thereby protected by the coupling body, and any accidental contact of an outer body with the tracks is thereby prevented.

[0018] Preferably, the coupling body covers the sleeve when it is removably coupled to an outer surface of the assembly formed by the segment of the bar and the sleeve coupled to the latter. The sleeve is thereby protected by the coupling body, and a possible uncoupling of the latter due to an accidental interaction with an outer body is prevented.

[0019] Preferably, the lamp is attached to the coupling body such that it can rotate relatively with respect to the latter. More preferably, the lamp can rotate relatively with respect to the coupling body with an axis of rotation which is not parallel to the axial direction of the bar in the coupling area. Even more preferably, the lamp can rotate relatively with respect to the coupling body with an axis of rotation orthogonal to the axial direction of the bar in the coupling area. This configuration provides the user with many possibilities of orienting the lamp with respect to the bar.

[0020] In preferred embodiments, the two electrical conductors are each arranged in a slot extending along at least the segment of the bar, and each of the two electrical conductors is formed by an electrically conductive cable and an insulating sheath covering the cable. Each of the two connectors is in the form of a spike which pierces and goes through the insulating sheath and contacts the cable. This solution provides total safety to prevent an outer body from accidentally contacting the cables of the electrical conductors. Furthermore, it makes it unnecessary to conceal the electrical conductors inside the bar and thereby allows them to be ar-

ranged close to the outer surface of the bar, where they are more accessible for the connectors to readily establish electrical contact. Moreover, this solution allows the uncoupling of the sleeve and the re-coupling thereof in another position along the segment of the bar to change the position of the lamp, without this involving a deterioration of the electrical conductors. In fact, when a connector in the form of a spike is removed from its position in which it pierces and goes through the insulating sheath and is in contact with the cable, the insulating sheath recovers its shape and covers the cable at the point where it was pierced by the spike, such that the cable is not exposed.

[0021] In advantageous embodiments, the coupling device comprises a fork-shaped clamp with two arms that are facing and separated from one another by a space. The two arms are attached by an elastic part such that they can be separated from one another against a return force exerted by the elastic part. The coupling body is formed by two separable parts, each of them being attached to one of the two arms. This solution facilitates the operation to be performed by a user for coupling the lamp to the bar.

[0022] The bar can be straight, like in the embodiments described below, or can have a curvature. For example, the bar can be in the form of a circular arc or a full or almost full circumference. In these cases, the sleeve is shaped such that it is coupled to the outer surface of the bar with a curvature. For example, when the sleeve is formed by two half-sleeves as described above, the inner surface of the half-sleeves can have a curvature corresponding to that of the bar.

[0023] The invention also comprises other detail features shown in the following detailed description of an embodiment of the invention and in the attached figures.

Brief Description of the Drawings

[0024] The advantages and features of the invention will become apparent from the following description in which in relation to the figures, preferred embodiments of the invention are described in a non-limiting manner with respect to the scope of the main claim.

Figure 1 is a perspective view of a lighting system according to a first embodiment.

Figure 2 is an enlarged partial view of Figure 1, showing the area in which the lamp is coupled.

Figures 3 and 4 are, respectively, a front view and a perspective view of the bar without the electrical conductors.

Figure 5 is a perspective view of the bar with the electrical conductors.

Figure 6 is a perspective view showing the sleeve coupled to the bar.

Figures 7 and 8 are two perspective views from different angles, showing the bar and the sleeve which is uncoupled.

Figures 9, 10, and 11 show three perspective views, from different angles, of one of the two identical half-sleeves forming the sleeve.

Figures 12 and 13 are, respectively, a front view and a side view of the half-sleeve.

Figures 14 and 15 are two perspective views, from different angles, of the lamp integrated with the coupling device.

Figure 16 is a perspective view of an outer cover of the lamp.

Figure 17 is a perspective view of the lamp without the outer cover.

Figure 18 is a view corresponding to Figure 17, in which the two arms have been removed from the coupling device so as to allow a view of the coupling body, the contact terminals, and the elastic part in the form of a spring.

Figure 19 is a perspective view of the coupling body.

Figure 20 is an exploded view corresponding to Figure 19.

Figures 21 and 22 are two perspective views, from different angles, of one of the two identical parts forming the coupling body.

Figures 23 and 24 are, respectively, a front view and a side view of the part shown in Figures 21 and 22.

Figure 25 is a perspective view of a lighting system according to a second embodiment, differing from the previous embodiment only in the design of the lamp and of the coupling device.

Figures 26 and 27 are two perspective views, from different angles, of the lighting system of Figure 25, in which a lampshade has been removed from the lamp so as to allow a view of the inside.

Figure 28 is a perspective view corresponding to Figure 26, with a part of the coupling body being separated.

Figure 29 is a perspective view of a lighting system according to a third embodiment, differing from the previous embodiments only in the design of the lamp and of the coupling device.

Figure 30 is a perspective view corresponding to Figure 29, showing an area of a lamp end, in which an outer cover of the lamp has been removed so as to allow a view of the inside.

Figure 31 is a perspective view corresponding to Figure 30, with the coupling body being uncoupled.

Detailed Description of Embodiments of the Invention

[0025] The lighting system 1 shown in Figure 1 comprises a bar 2 and at least one lamp 4 which is coupled to the bar 2 at any position along the bar 2. In this example, the lamp 4 is a spotlight-type lamp. Figure 1 only shows a lamp coupled to the bar 2, but there may be more lamps coupled to the same bar 2, which may be like lamp 4 or be different lamps, such as, for example, lamp 4' shown in Figures 25-28 or lamp 4" shown in Figures 29-31.

[0026] In the lighting system 1 shown in Figure 1, the bar 2 is suspended from a ceiling by means of suspension cables 20 which are fixed to the bar 2. A first end cap 21 is arranged at one end of the bar 2. A second end cap 22 is arranged at the other end of the bar 2, through which there enters an external electrical power cable 23 which is connected to the two electrical conductors 3 of the bar 2 (shown in Figure 5). This configuration is shown by way of non-limiting example. In other possible configurations, the bar 2 may have another orientation such as, for example, a vertical orientation. The bar 2 can be secured by other means such as, for example, a support in which an end of the vertical bar 2 is fixed; and the bar 2 may have another external electrical power path such as, for example, a power cable which enters through the support and is connected to the two electrical conductors 3.

[0027] The bar 2, shown in greater detail in Figures 3 to 5, is a hollow profile with an outer perimeter with a circular cross-section and comprises on its outer surface two opposite slots 14 extending along the entire length of the bar 2. An electrical conductor 3 formed by an electrically conductive cable 15 covered with an insulating sheath 16 is arranged in each of these two slots 14. The bar 2 can be, for example, an extruded aluminium profile. Other configurations in which the bar 2 has a shape other than that shown in Figures 3 to 5 are possible.

[0028] In the example shown in the figures, the two electrical conductors 3 arranged in the slots 14 extend along the entire length of the bar 2, so the entire bar 2 can be considered to be a single segment. Therefore, and for the sake of simplicity, the following description makes no reference to a segment of the bar 2 like in the claims, but rather makes reference directly to the bar 2, which is understood to be a single segment of the bar.

[0029] Figure 2 shows the lamp 4 coupled to the bar 2. The lamp 4 is attached to the coupling device 10, which will be described below. In this figure, the bar 2 is in a horizontal position and the lamp 4 is oriented in a vertical direction and with its light source 25 facing downwards. As will be seen below, as a result of the solution according

to the invention it is possible to orient the lamp 4 at any other angular position with respect to the axial direction of the bar 2. The lighting system 1 comprises a coupling and connection assembly for removably coupling the lamp 4 to the bar 2 at any position along same, such that when the lamp 4 is coupled to the bar 2, an electrical connection of the lamp 4 to the electrical conductor 3 is established. The lamp 4 has a light source 25, preferably made up of LEDs, emitting light when it is electrically powered.

[0030] In the solution according to the invention, the coupling and connection assembly comprises two parts: a sleeve 5 which is removably coupled to the outer surface of the bar 2, and a coupling device 10 attached to the lamp 4 and comprising a coupling body 12 which is removably coupled to an outer surface of the sleeve 5 and/or of the bar 2. As will be seen below, in the example shown in the figures the coupling body 12 is removably coupled to an outer surface of the bar 2 next to the sleeve 5.

[0031] Figures 6 to 13 show the sleeve 5. In the preferred embodiment shown in these figures, the sleeve 5 is made up of two half-sleeves 5a, 5b identical to one another. The two half-sleeves 5a, 5b are removably coupled to one another and to the outer surface of the bar 2. To perform this coupling, the two half-sleeves 5a, 5b are arranged in a lateral position with respect to the bar 2 and on opposite sides with respect to the bar 2, as shown in Figures 7 and 8, and each half-sleeve 5a, 5b moves transversely with respect to the bar 2. In practice, first a half-sleeve 5a is coupled to the bar 2 and then the other half-sleeve 5b is coupled to the same bar 2, with the two half-sleeves 5a, 5b being coupled to one another and holding the bar 2 between them, as shown in Figure 6. Each half-sleeve 5a, 5b has a C-shaped cross-section and is elastically deformable, such that it is press-fit, by form fitting, on the outer surface of the bar 2. As can be seen in Figures 10 to 13, each half-sleeve 5a, 5b has a circular band extending in a circular arc of more than 180°. An electrically conductive track 6 is arranged in this band on the outer surface 7 of the half-sleeve 5a, 5b. The track 6 extends along the entire circular arc of the band. This arc is a track arc in the form of a circular arc, which is in a plane orthogonal to the bar 2 when the sleeve 5 is coupled to the bar 2. In the example depicted in the figures, the two half-sleeves 5a, 5b, including the track 6, are identical to one another. Therefore, the rule that the track 6 of one of the half-sleeves 5a, 5b extends in a first angle greater than or equal to 180°, and the track 6 of the other one of the half-sleeves 5a, 5b extends in a second angle greater than or equal to a complementary angle that is complementary to said first angle, is fulfilled. In the example, the first angle and the second angle are equal to one another and greater than 180°. When the two half-sleeves 5a, 5b are coupled to one another, as shown in Figure 6, the assembly formed by the track arcs of the two tracks 6 covers a full 360° circumference. In the example, the two track arcs partially overlap. Other embodiments in which the two half-sleeves 5a, 5b are not identical, or the

two tracks 6 are not identical, such that the first angle is different from the second angle, are possible.

[0032] The body of each half-sleeve 5a, 5b is made of an electrical insulating material such as, for example, a polymer material. The tracks 6 are strips made of an electrically conductive material such as, for example, copper. The track 6 of each half-sleeve 5a, 5b is electrically connected to an electrically conductive connector 9. As can be seen in Figures 9 and 12, the connector 9 is in the form of a spike extending from the inner surface 8 of the half-sleeve 5a, 5b. When the half-sleeve 5a, 5b is coupled to the bar 2, as in Figure 6, the spike constituting the connector 9 pierces and goes through the insulating sheath 16 of the electrical conductors 3 and electrically contacts the cable 15. Although the embodiment described is the preferred embodiment, other embodiments in which the electrical conductors 3 do not have an insulating sheath are possible; for example, the electrical conductors 3 can be copper rods, and the connectors 9 can have other shapes such as, for example, a tongue shape.

[0033] The coupling device 10 and the lamp 4 attached to same are depicted in Figures 14 to 24. The coupling device 10 comprises electrically conductive contact terminals 11 electrically connected to the light source 25 of the lamp 4, and a coupling body 12 which is removably coupled to the outer surface of the bar 2, on both sides of the sleeve 5, when the sleeve 5 is coupled to the bar 2.

[0034] The coupling body 12 is formed by two identical separable parts 12a, 12b, as can be seen in Figure 20. These two parts 12a, 12b are coupled between them and to the outer surface of the bar 2, on both sides of the sleeve 5. To perform this coupling, the two parts 12a, 12b are arranged in a lateral position with respect to the bar 2 and on opposite sides with respect to the bar 2, and each part 12a, 12b moves transversely with respect to the bar 2. The coupling body 12 formed by the two parts has two opposite circular windows 26 which are adjusted to the outer diameter of the bar 2, and where the bar 2 goes through the coupling body 12. The central part of the coupling body 12 forms a dome that creates a space for the sleeve 5 coupled to the bar 2. The sleeve 5 is arranged on the inside of the coupling body 12. The coupling body 12 thereby covers the sleeve 5, coupled to the outer surface of the bar 2, and the two tracks 6 of the sleeve 5. The coupling body 12 can be coupled to the bar 2, covering the sleeve 5, at any angular position in a coupling arc in the form of a circular arc in a plane orthogonal to the bar 2. In the depicted example, the coupling arc extends in a full 360° circle.

[0035] As can be seen in Figure 18, the contact terminals 11 are grouped in a first pair 13a of contact terminals 11 arranged on one side of the coupling body 12, and a second pair 13b of contact terminals 11 arranged on the other side of the coupling body 12. The first pair 13a and the second pair 13b of contact terminals 11 are therefore arranged at opposite angular positions. A contact terminal 11 of the first pair 13a is electrically connected to a

contact terminal 11 of the second pair 13b, thereby forming a first pole of contact terminals 11 connected to one another. This first pole is connected to a post of the light source 25 of the lamp 4. The other contact terminal 11 of the first pair 13a is electrically connected to the other contact terminal 11 of the second pair 13b, thereby forming a second pole of contact terminals 11 connected to one another. This second pole is connected to another post of the light source 25. As can also be seen in Figure 18, each contact terminal 11 forms a V-shaped protrusion which is inserted through a lateral window 27 of the coupling body 12, shown in Figure 19, to contact one of the tracks 6. When the coupling body 12 is coupled to the outer surface of the bar 2 at any angular position in the coupling arc, covering the sleeve 5 coupled to the bar 2, at least one of the two contact terminals 11 of the first pole is in electrical contact with a track 6 of the sleeve 5, and at least one of the two contact terminals 11 of the second pole is in electrical contact with the other track 6 of the sleeve 5. The coupling body 12 thus coupled to the bar 2, covering the sleeve 5 coupled to the bar 2, can rotate with respect to the bar 2 along the coupling arc. When performing this rotation along the entire coupling arc, the fact that at least one of the two contact terminals 11 of the first pole is in electrical contact with a track 6 of the sleeve 5, and at least one of the two contact terminals 11 of the second pole is in electrical contact with the other track 6 of the sleeve 5, is still fulfilled. The light source 25 of the lamp 4 is thereby in electrical contact with the two electrical conductors 3 of the bar 2 at all times, regardless of the angular position of the coupling body 12 with respect to the bar 2.

[0036] The coupling device 10 comprises a fork-shaped clamp with two arms 17 that are facing and separated from one another by a space 18. The two arms 17 are attached by an elastic part 19 such that they can be separated from one another against a return force exerted by the elastic part 19. In the depicted example, the elastic part 19 is a spring attached at its ends to each of the arms 17 (this attachment is not seen in Figure 18 because the arms 18 have been removed so as to allow a view of the spring).

[0037] Each part 12a, 12b of the coupling body 12 forms a flange 28 around the window 27. When the two parts 12a, 12b are coupled forming the coupling body 12, coupled to the surface of the bar 2, the two flanges 28 are facing one another and are in planes parallel to the axial direction of the bar 2. Each arm 17 is rotationally attached to one of the flanges 28, such that the lamp 4 can rotate relatively with respect to the coupling body 12 with an axis of rotation orthogonal to the axial direction of the bar 2. In this rotational movement, the space 18 between the two facing arms 17 allows the relative movement of the bar 2 with respect to the coupling device 10.

[0038] The lamp 4 comprises a fork-shaped cover 24, shown in Figures 14-16, covering the arms 17 and the contact terminals 11. To perform the coupling of the lamp 4 to the bar 2 in the place where the user previously

coupled the sleeve 5 to the bar 2 as described above, the user removes the cover 24 and separates the arms 17, thereby causing a separation between the two parts 12a, 12b of the coupling body 12 that is sufficient to insert between same the bar 2 and the sleeve 5 coupled to same. Then, the user releases the arms 17, which return to their initial position due to the effect of the return force exerted by the elastic part 19, so the coupling body 12 is coupled to the outer surface of the bar 2, on both sides of the sleeve 5 and covering the sleeve 5. This coupling establishes an electrical contact between the contact terminals 11 and the tracks 6, as explained above. Once this coupling has been performed, the user 11 places the cover 24 back on the lamp 4. As explained above, the lamp 4 thus coupled to the bar 2 can be rotated about a first axis corresponding to the axial direction of the bar, and about a second axis orthogonal to this axial direction, and without losing the electrical contact between the contact terminals 11 and the tracks 6.

[0039] Figures 25-27 show a lighting system 1' according to a second embodiment, which differs from the first embodiment only in the design of the lamp 4' and of the coupling device 10'. The bar 2 and the sleeve 5 are the same as in the first embodiment. The lamp 4' has a spherical lampshade on the inside of which the coupling device 10' and the light source 25' attached to same are arranged. The coupling body 12' has two separable parts 12a', 12b' as shown in Figure 28. The contact terminals (not shown in detail in the figures) go through the lower part 12b' to contact the tracks 6 of the sleeve 5. The lamp 4' rotates only with respect to the bar 2 with an axis of rotation corresponding to the axial direction of the bar 2.

[0040] Figures 29-31 show a lighting system 1" according to a third embodiment, which differs from the first embodiment only in the design of the lamp 4" and of the coupling device 10". The bar 2 and the sleeve 5 are the same as in the first and second embodiments. The lamp 4" is elongated in the longitudinal direction of the bar 2 and comprises two identical coupling devices 12", one at each end of the lamp 4". The coupling body 12" has two separable parts 12a", 12b" as shown in Figure 31. The contact terminals (not shown in detail in the figures) go through the lower part 12b" to contact the tracks 6 of the sleeve. The lamp 4" rotates only with respect to the bar 2 with an axis of rotation corresponding to the axial direction of the bar 2.

Claims

1. A lighting system (1) comprising:

- a bar (2) comprising two electrical conductors (3) extending along at least one segment of said bar (2);
- a lamp (4) for providing light when it is electrically powered;
- and a coupling and connection assembly for

removably coupling said lamp (4) to said bar (2) at any position along said segment of the bar (2), configured such that when said lamp (4) is coupled to said bar (2), an electrical connection of said lamp (4) to said two electrical conductors (3) is established;

characterised in that said coupling and connection assembly comprises:

- a sleeve (5) shaped such that it is removably coupled, moving transversely with respect to said bar (2) from a lateral position with respect to said bar (2), to an outer surface of said segment of the bar (2), said sleeve (5) comprising two electrically conductive tracks (6) arranged on an outer surface (7) of said sleeve (5), each of said tracks (6) extending along a track arc in the form of a circular arc in a plane orthogonal to said bar (2), and two electrically conductive connectors (9), each of them being electrically connected to each of said tracks (6), said two connectors (9) being arranged on an inner surface (8) of said sleeve (5) such that when said sleeve (5) is coupled to said segment of the bar (2), each of said two connectors (9) is in electrical contact with one of said two electrical conductors (3) of the bar (3);
 - and a coupling device (10) attached to said lamp (4), said coupling device (10) comprising electrically conductive contact terminals (11) electrically connected to said lamp (4), and a coupling body (12) shaped such that it is removably coupled, moving transversely with respect to said bar (2) from a lateral position with respect to said bar (2), to an outer surface of the assembly formed by said segment of the bar (2) and said sleeve (5) coupled to the latter at different angular positions in a coupling arc in the form of a circular arc in a plane orthogonal to said bar (2), such that at each of said angular positions, said contact terminals (11) are in electrical contact with said two tracks (6) of the sleeve (5).
2. The lighting system (1) according to claim 1, wherein said sleeve (5) is formed by two separable half-sleeves (5a, 5b), said half-sleeves (5a, 5b) being shaped such that they are removably coupled to one another and to an outer surface of said segment of the bar (2), each of said half-sleeves (5a, 5b) moving transversely with respect to said bar (2) from a lateral position with respect to said bar (2) and said half-sleeves (5a, 5b) being arranged on opposite sides with respect to said bar (2).
 3. The lighting system (1) according to claim 2, wherein said half-sleeves (5a, 5b) have a C-shaped cross-section and are elastically deformable, such that

they are press-fit, by form fitting, on an outer surface of said bar (2) in said segment.

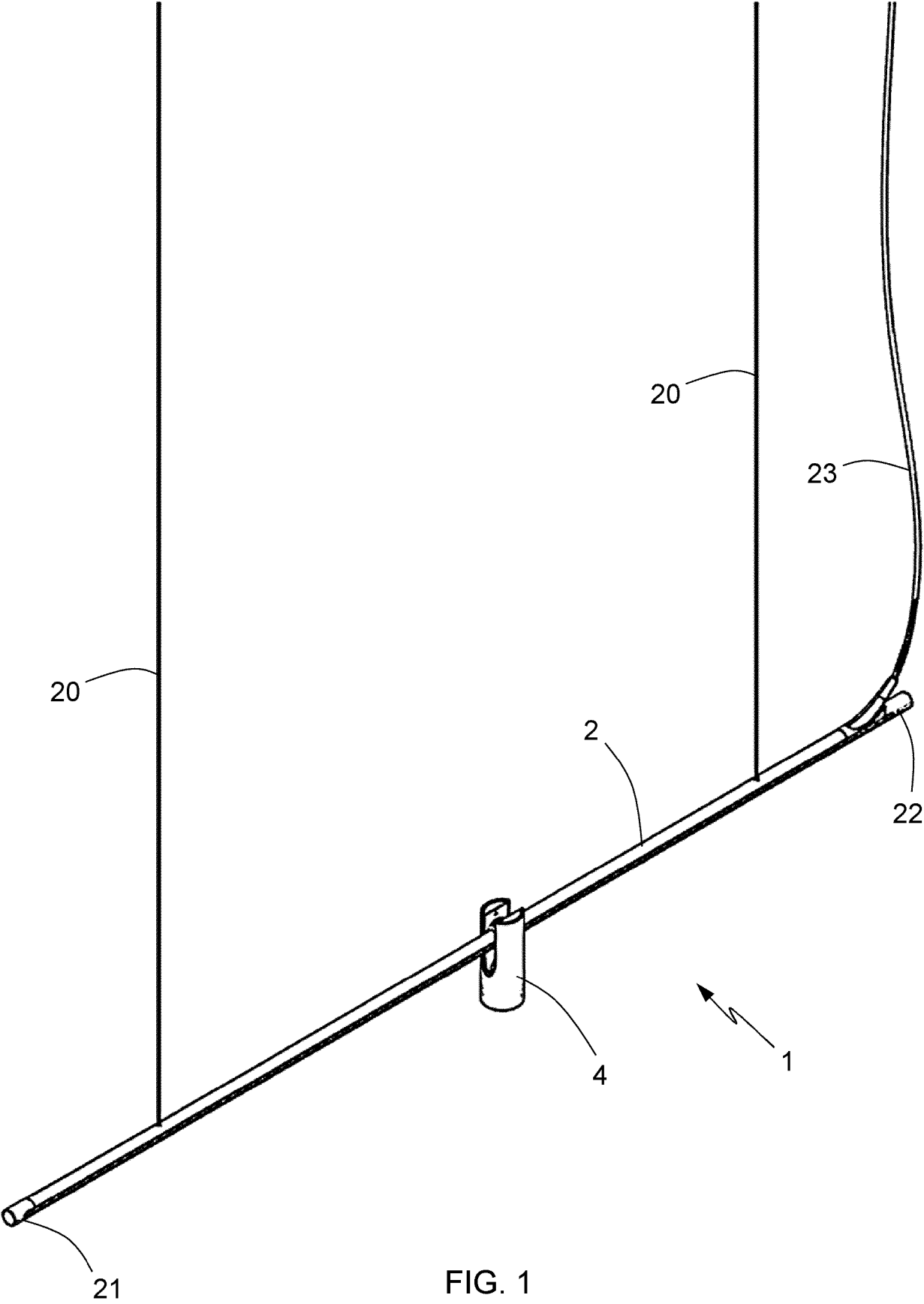
4. The lighting system (1) according to any one of claims 2 or 3, wherein said half-sleeves (5a, 5b) are identical to one another.
5. The lighting system (1) according to any one of claims 2 to 4, wherein each of said two tracks (6) is arranged on one of said half-sleeves (5a, 5b) and extends along a track arc in a plane orthogonal to said bar (2), and wherein the track arc of one of said tracks (6) extends in a first angle greater than or equal to 180°, and the track arc of the other one of said tracks (6) extends in a second angle greater than or equal to a complementary angle that is complementary to said first angle, such that when the two half-sleeves (5a, 5b) are coupled to one another, the assembly formed by the track arcs of the two tracks (6) covers a full 360° circumference.
6. The lighting system (1) according to claim 5, wherein said coupling body (12) is configured such that said coupling arc extends in a circular arc greater than or equal to 180°.
7. The lighting system (1) according to claim 5, wherein said coupling body (12) is configured such that said coupling arc extends in a full 360° circle.
8. The lighting system (1) according to any one of claims 1 to 7, wherein each of said two tracks (6) extends continuously along its track arc; and wherein when said coupling body (12) is coupled to an outer surface of the assembly formed by said segment of the bar (2) and said sleeve (5) coupled to the latter, at any angular position in the coupling arc, said two contact terminals (11) are in electrical contact with said two tracks (6) at any of these angular positions.
9. The lighting system (1) according to any one of claims 1 to 8, wherein said coupling device (10) comprises a first pair (13a) of said contact terminals (11) and a second pair (13b) of said contact terminals (11), with a contact terminal (11) of said first pair (13a) being electrically connected to a contact terminal (11) of said second pair (13b), thereby forming a first pole of contact terminals (11) connected to one another, and with the other contact terminal (11) of said first pair (13a) being electrically connected to the other contact terminal (11) of said second pair (13b), thereby forming a second pole of contact terminals (11) connected to one another, said first pair (13a) and second pair (13b) of contact terminals (11) being arranged at different angular positions, such that when said coupling body (12) is coupled to an outer surface of the assembly formed by said segment of the bar (2) and said sleeve (5) coupled

to the latter, at least one of the two contact terminals (11) of the first pole is in electrical contact with one of said tracks (6), and at least one of the two contact terminals (11) of the second pole is in electrical contact with the other one of said tracks (6).

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separated from one another against a return force exerted by said elastic part (19); and wherein said coupling body (12) is formed by two separable parts (12a, 12b), each of said two parts (12a, 12b) being attached to one of said two arms (17).

10. The lighting system (1) according to any one of claims 1 to 9, wherein said coupling body (12) is removably coupled to an outer surface of said segment of the bar (2) when said sleeve (5) is removably coupled to an outer surface of said segment of the bar (2). 10
11. The lighting system (1) according to any one of claims 1 to 10, wherein said coupling body (12) is shaped such that when it is removably coupled to an outer surface of the assembly formed by said segment of the bar (2) and said sleeve (5) coupled to the latter, said coupling body (12) can rotate with respect to the segment of the bar (2) along said coupling arc. 20
12. The lighting system (1) according to any one of claims 1 to 11, wherein said coupling body (12) covers said two tracks (6) when said coupling body (12) is removably coupled to an outer surface of the assembly formed by said segment of the bar (2) and said sleeve (5) coupled to the latter. 25
13. The lighting system (1) according to any one of claims 1 to 12, wherein said coupling body (12) covers said sleeve (5) when said coupling body (12) is removably coupled to an outer surface of the assembly formed by said segment of the bar (2) and said sleeve (5) coupled to the latter. 30
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14. The lighting system (1) according to any one of claims 1 to 13, wherein said lamp (4) is attached to said coupling body (12) such that said lamp (4) can rotate relatively with respect to said coupling body (12). 40
15. The lighting system (1) according to any one of claims 1 to 14, wherein said two electrical conductors (3) are each arranged in a slot (14) extending along at least said segment of the bar (2), and each of said two electrical conductors (3) is formed by an electrically conductive cable (15) and an insulating sheath (16) covering said cable (15); and wherein each of said two connectors (9) is in the form of a spike which pierces and goes through said insulating sheath (16) and contacts said cable (15). 45
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16. The lighting system (1) according to any one of claims 1 to 15, wherein said coupling device (10) comprises a fork-shaped clamp with two arms (17) that are facing and separated from one another by a space (18), said two arms (17) being attached to one another by an elastic part (19) such that they can be 55



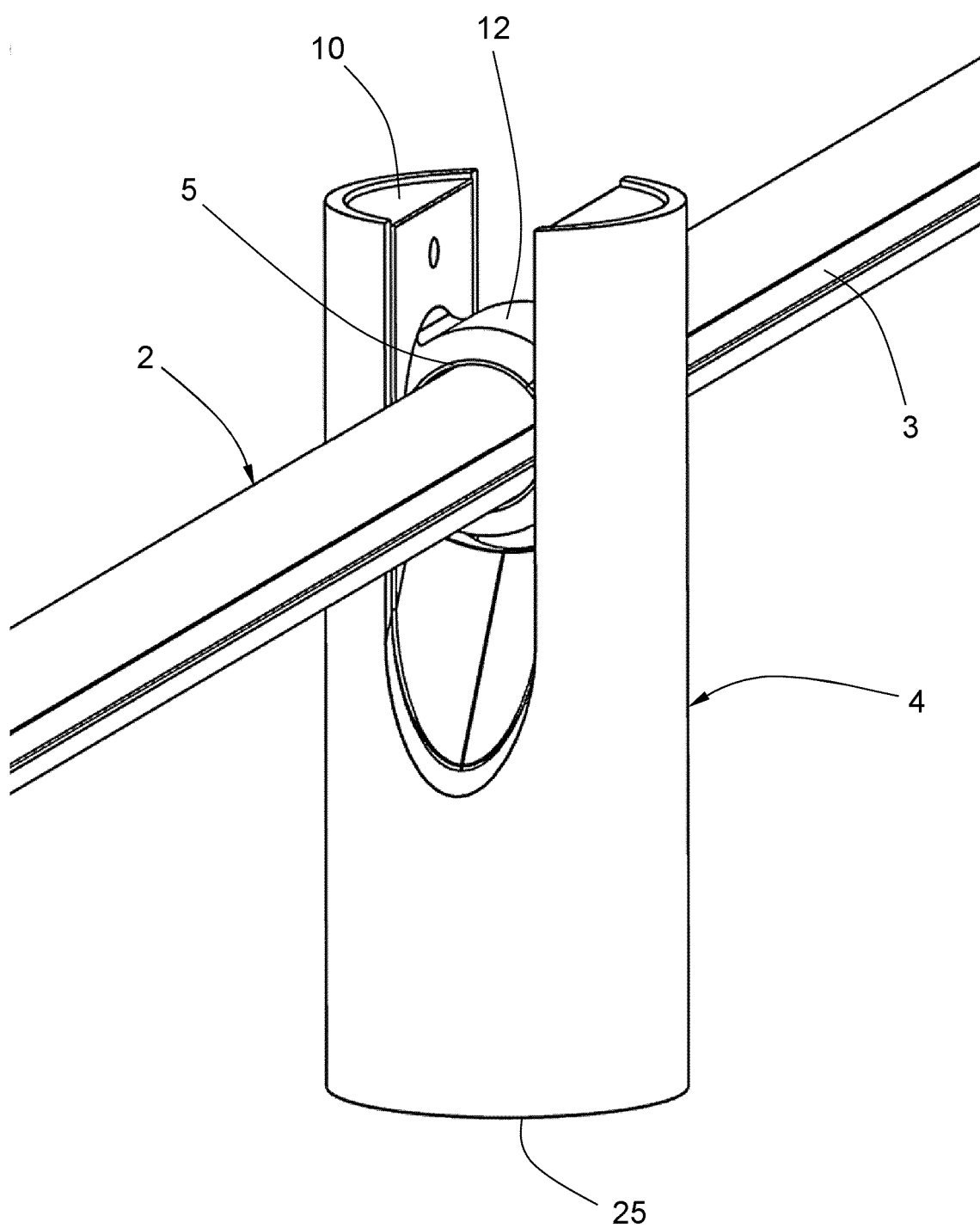


FIG. 2

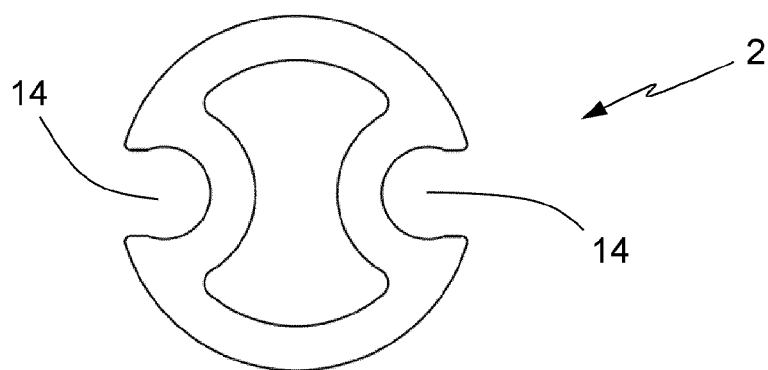


FIG. 3

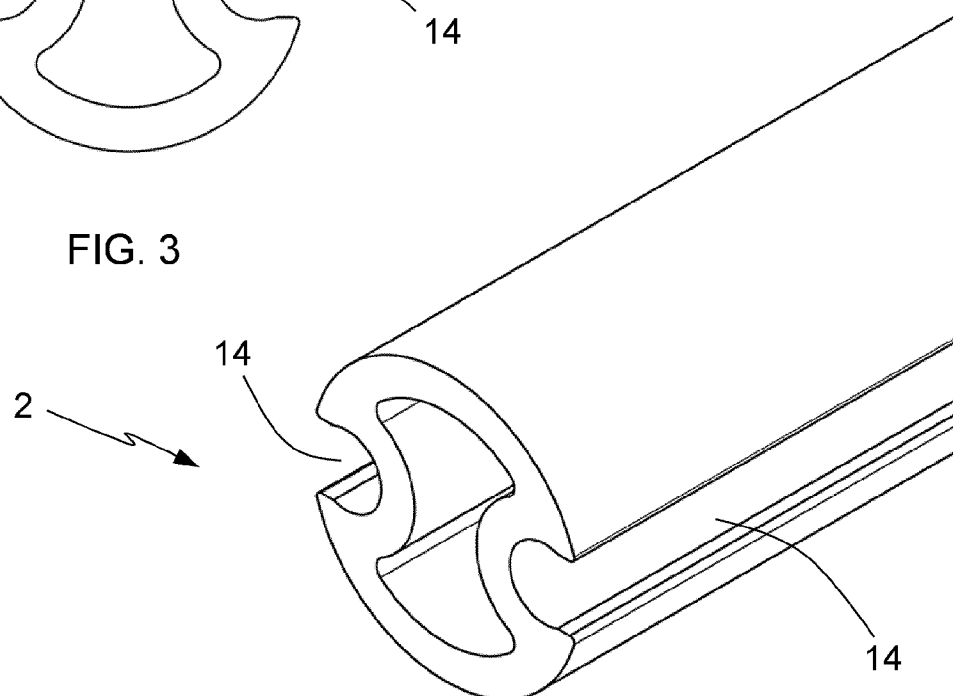


FIG. 4

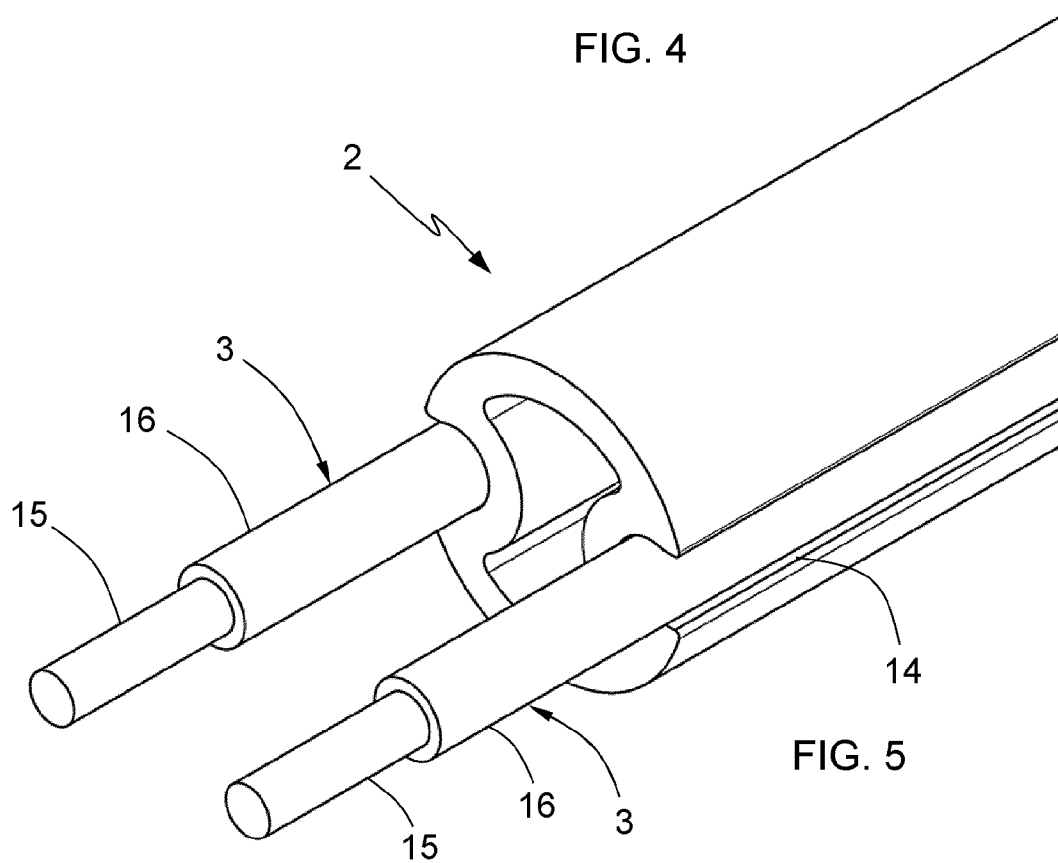


FIG. 5

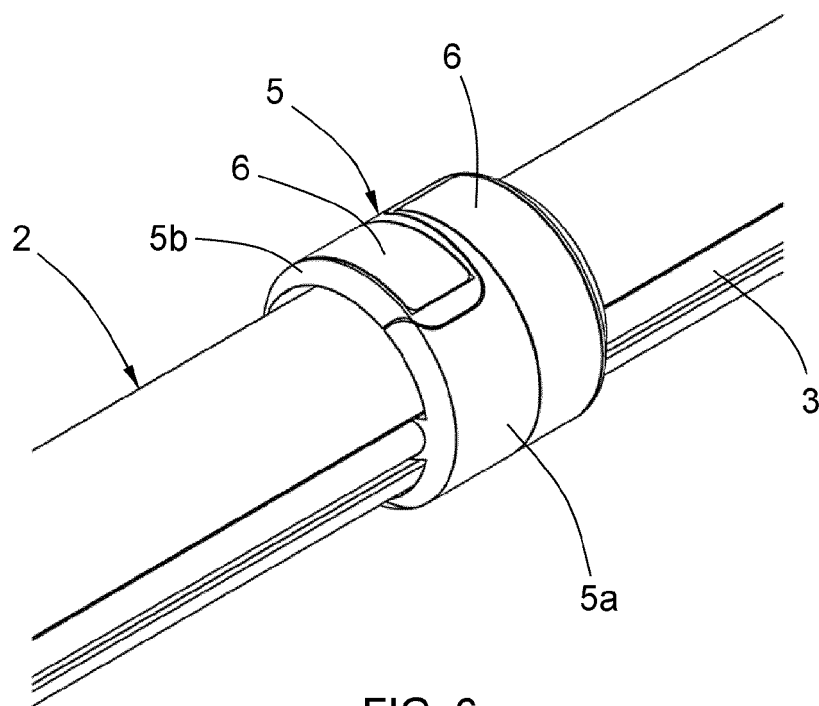


FIG. 6

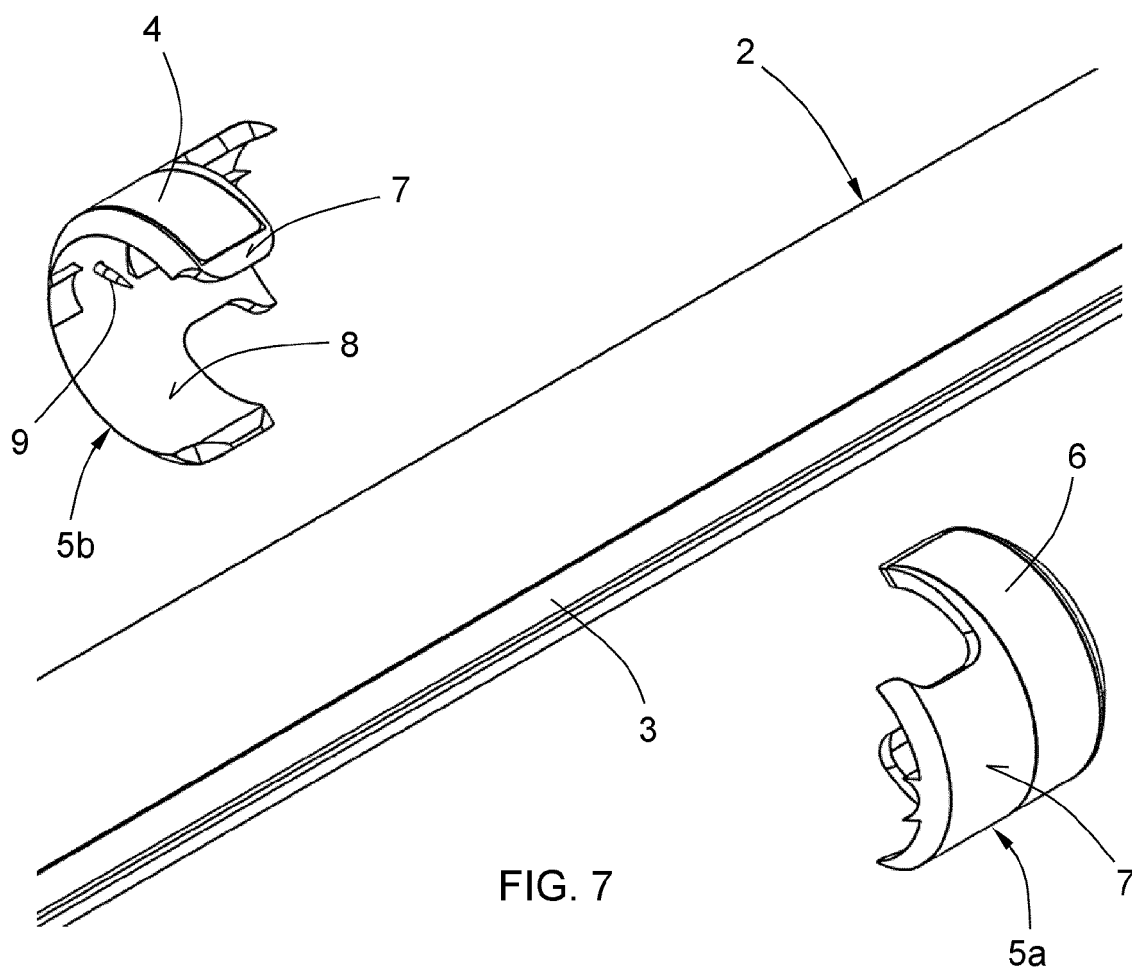


FIG. 7

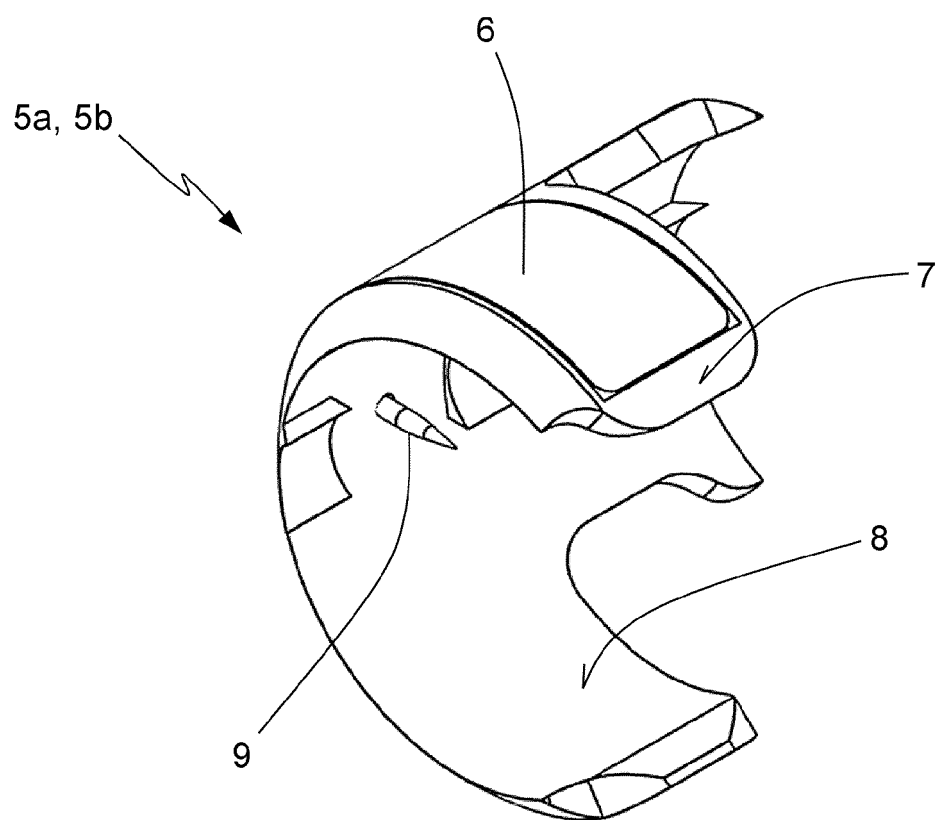
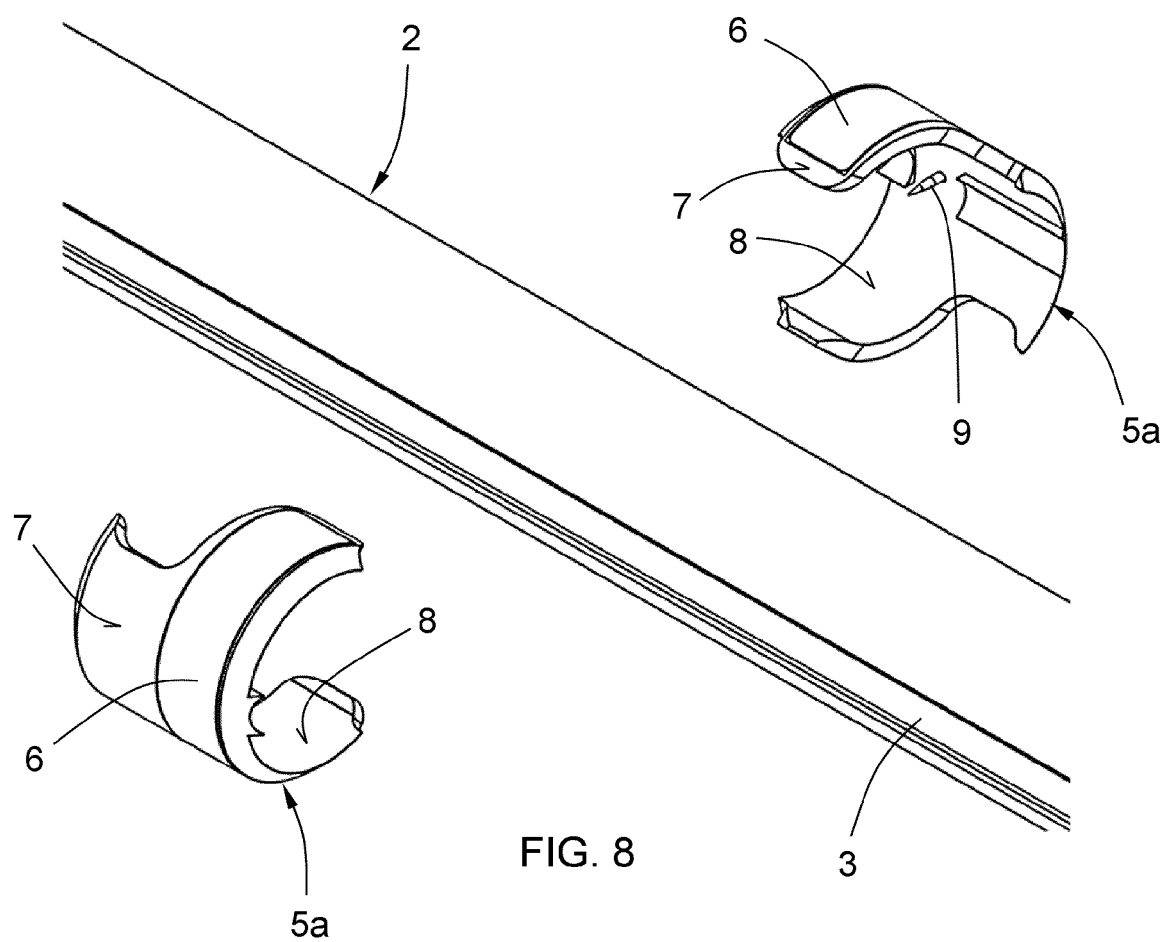
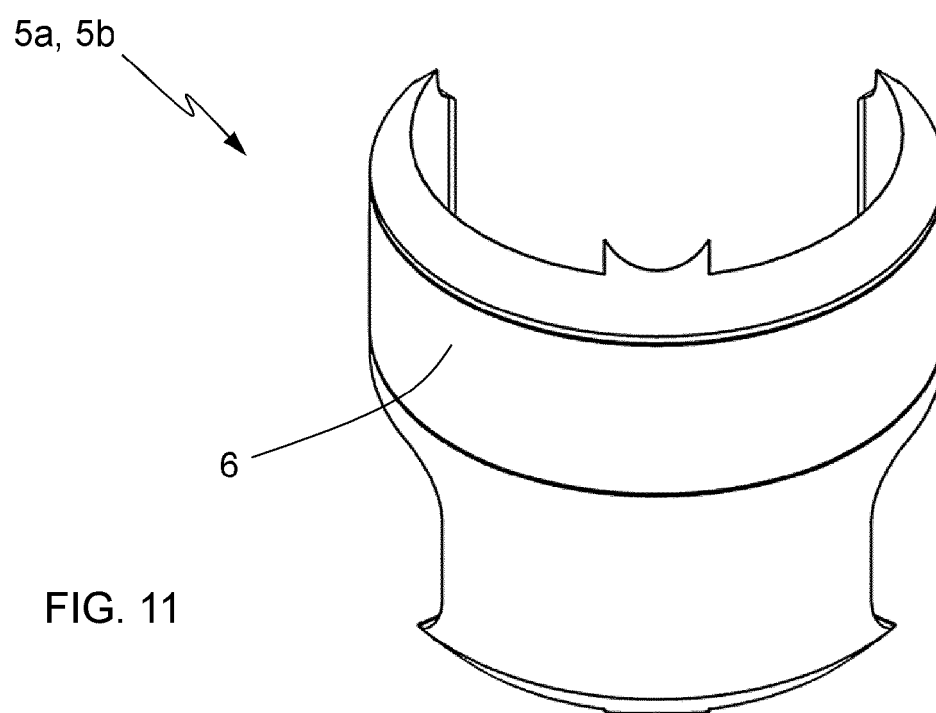
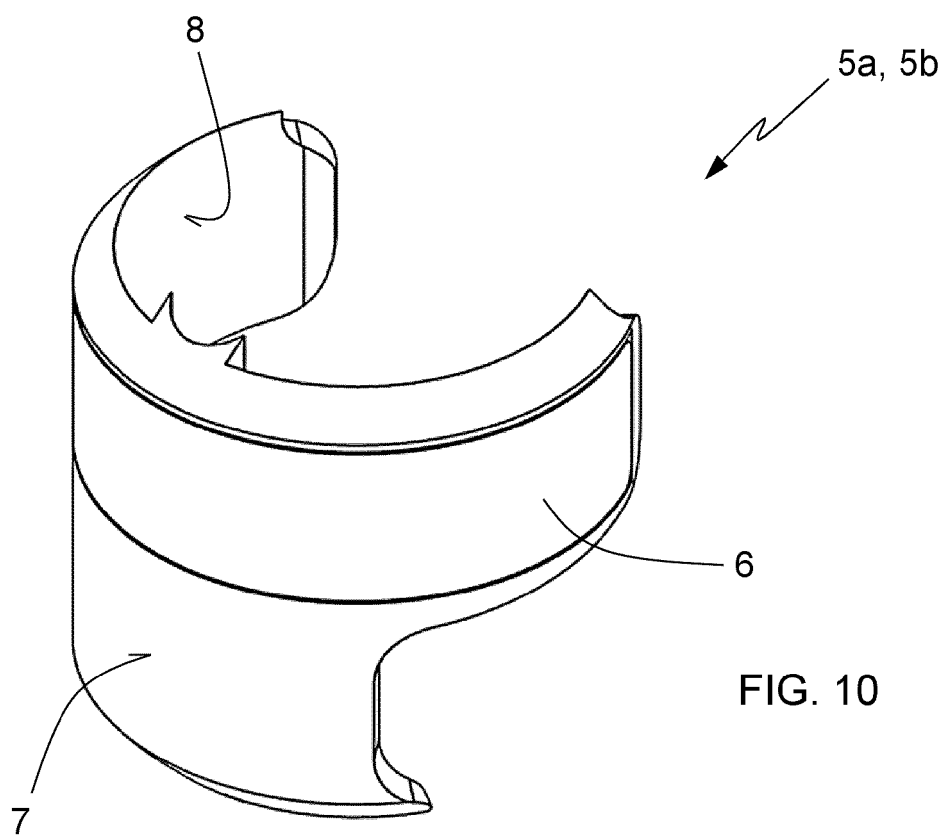


FIG. 9



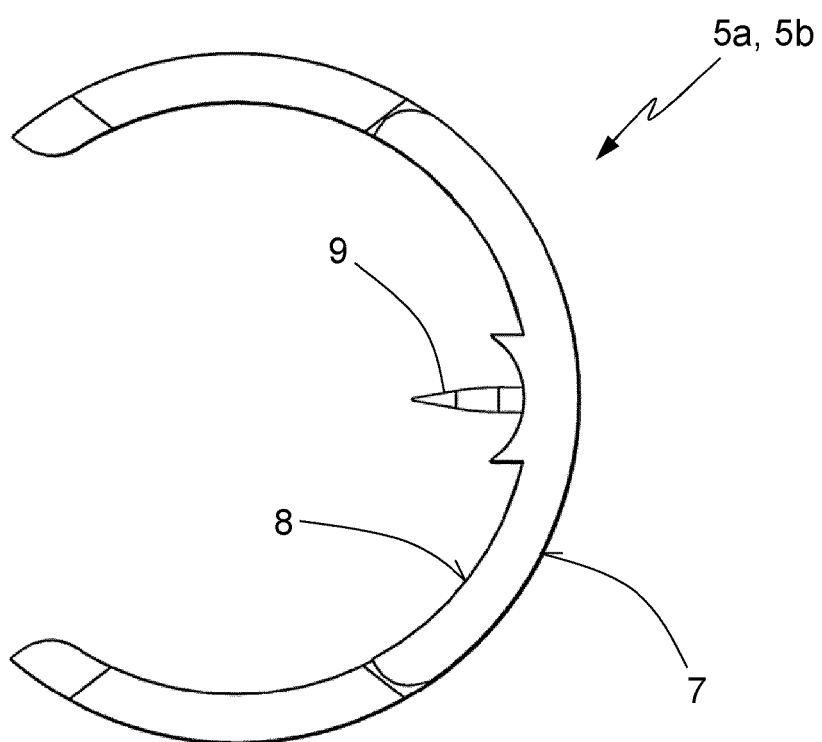


FIG. 12

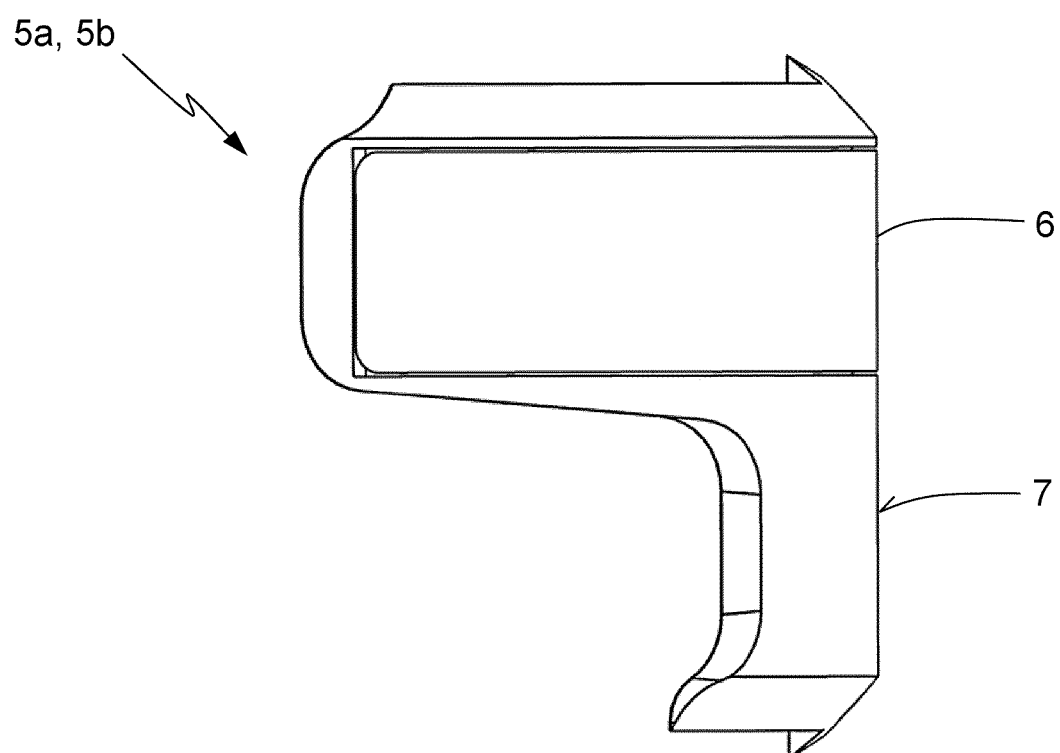


FIG. 13

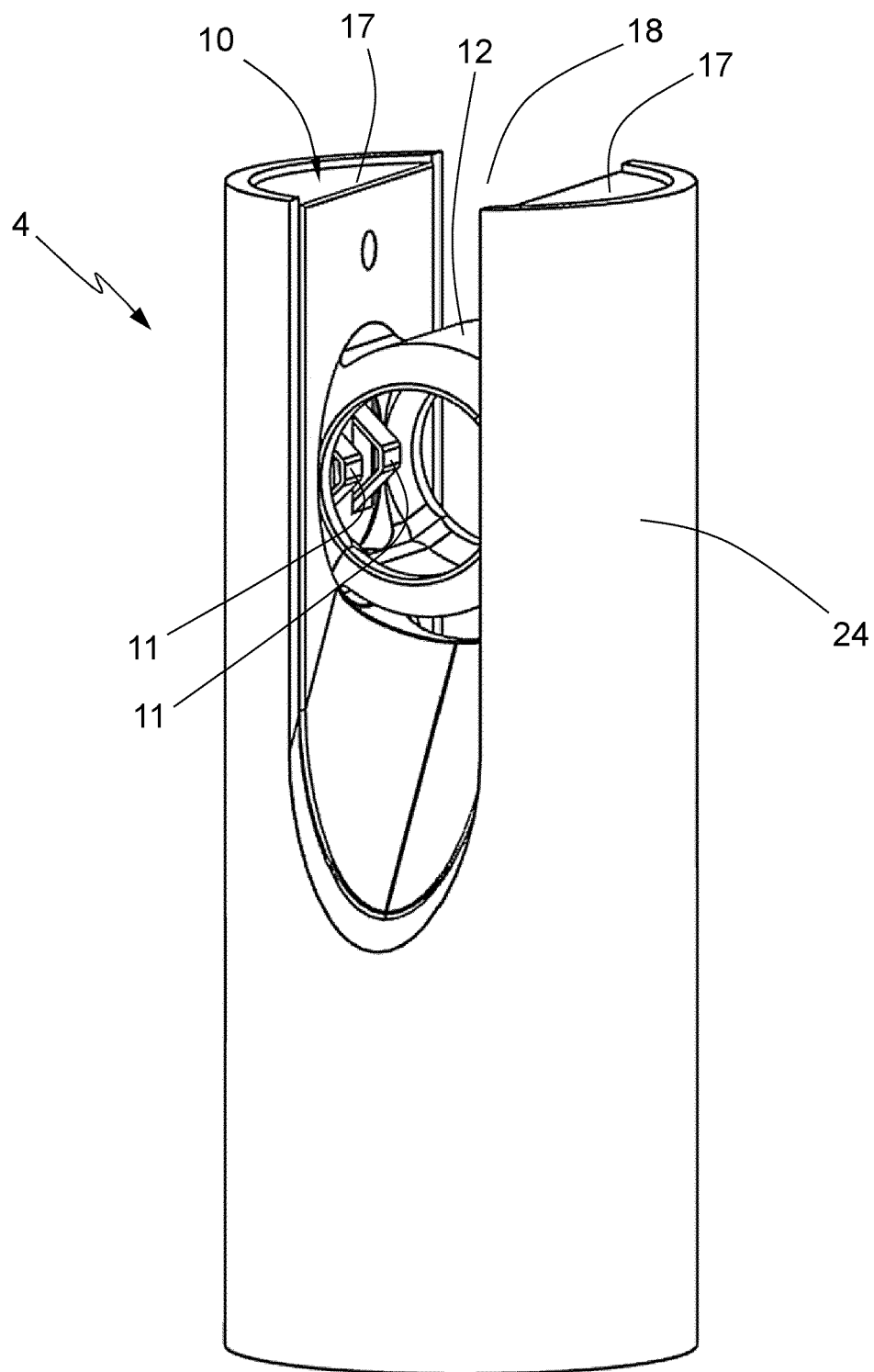


FIG. 14

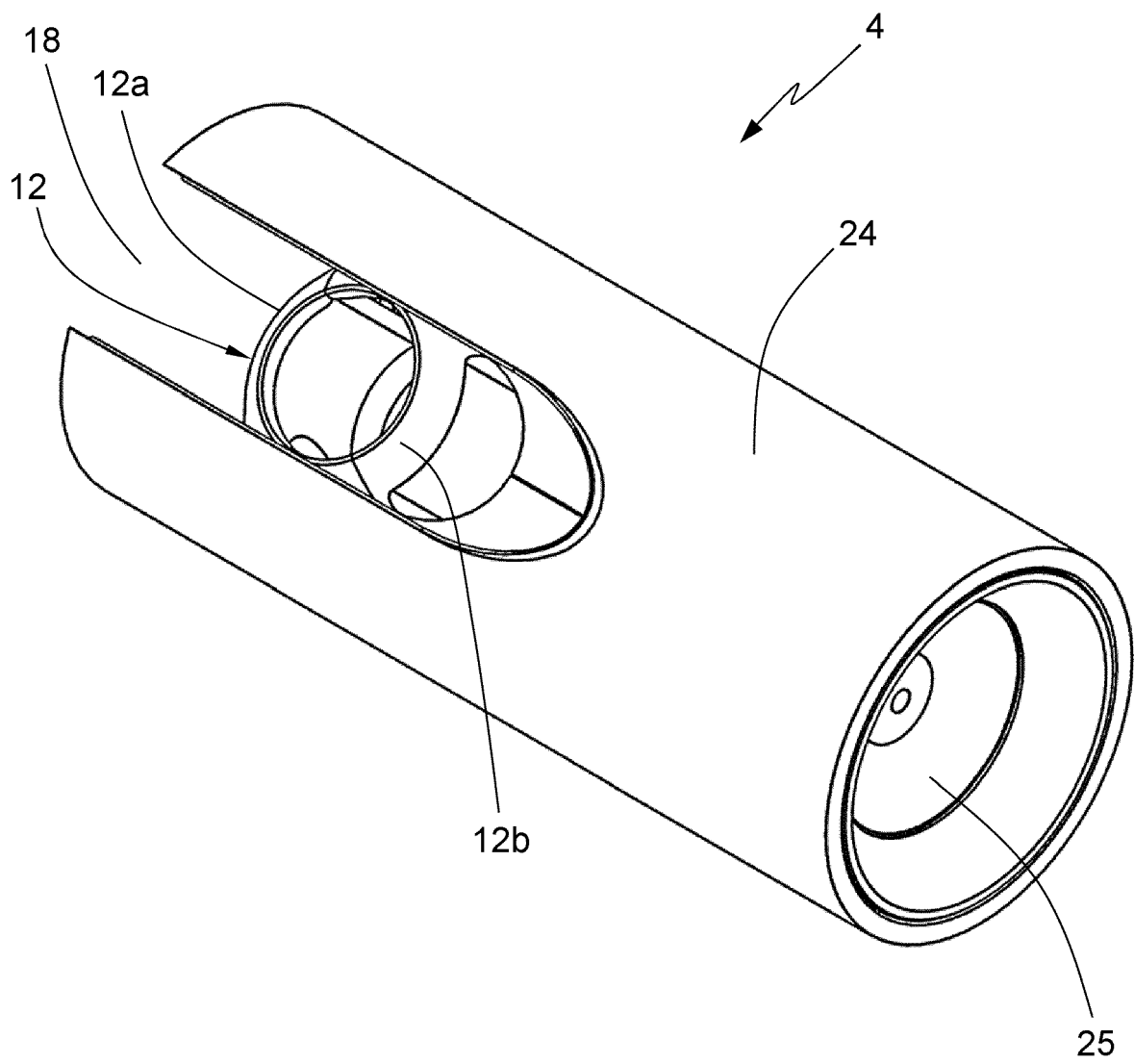


FIG. 15

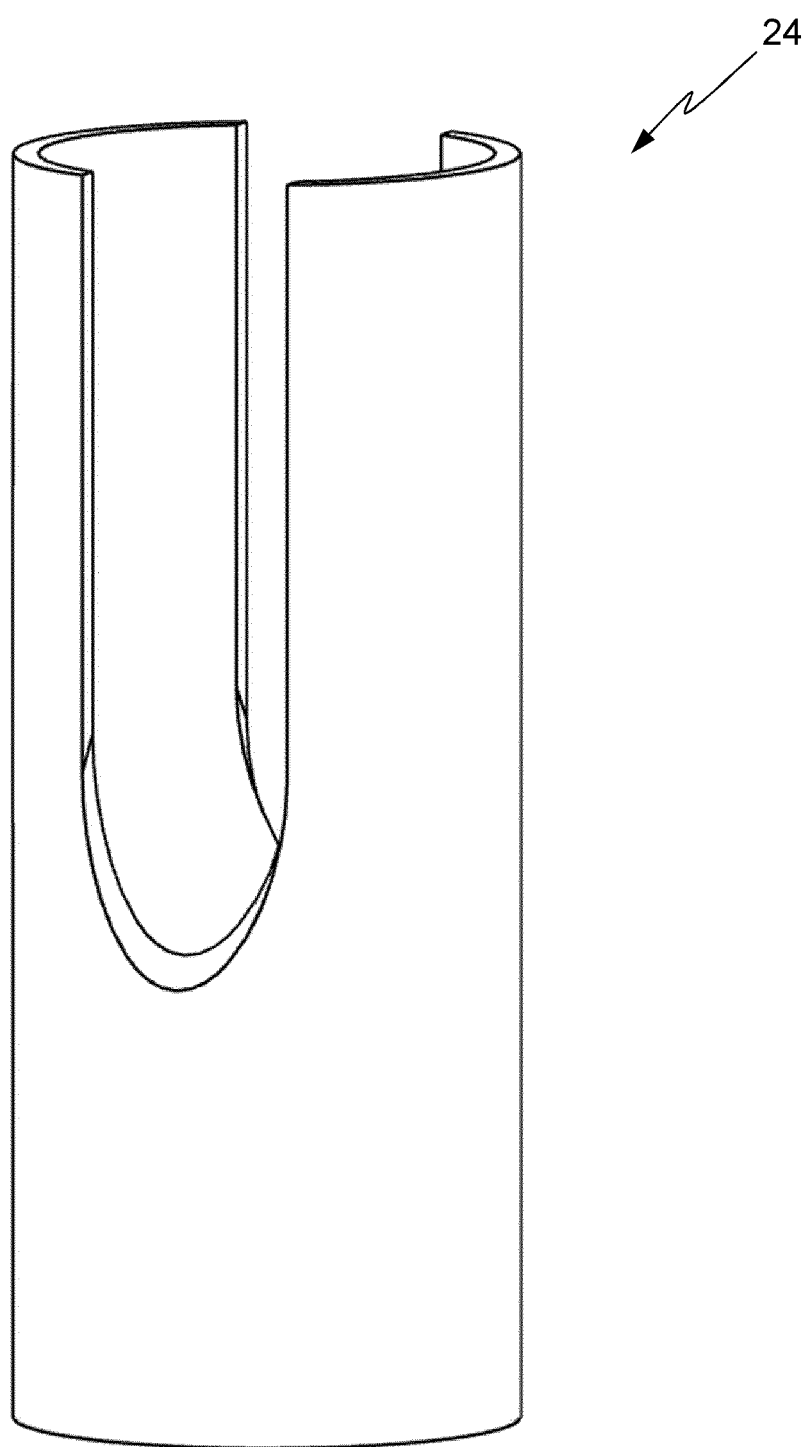


FIG. 16

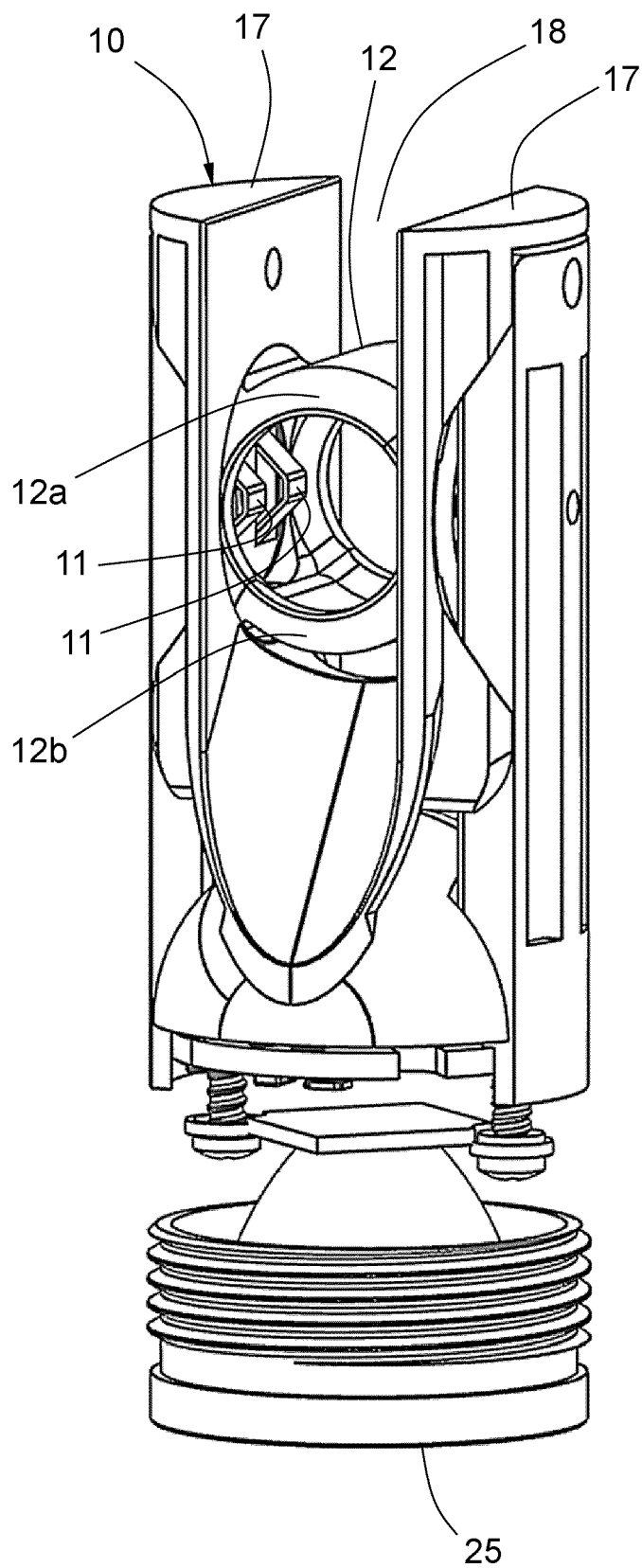


FIG. 17

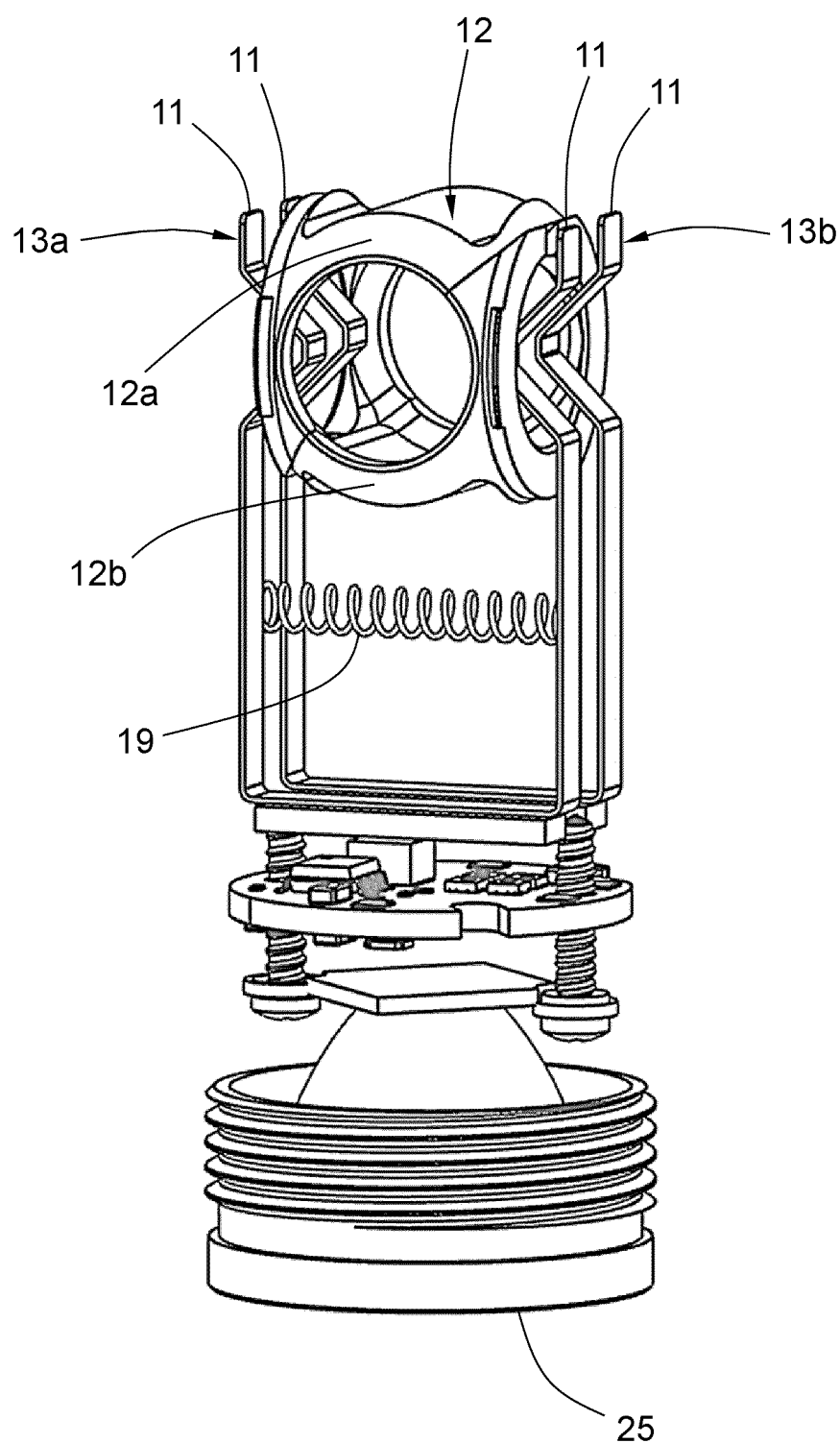
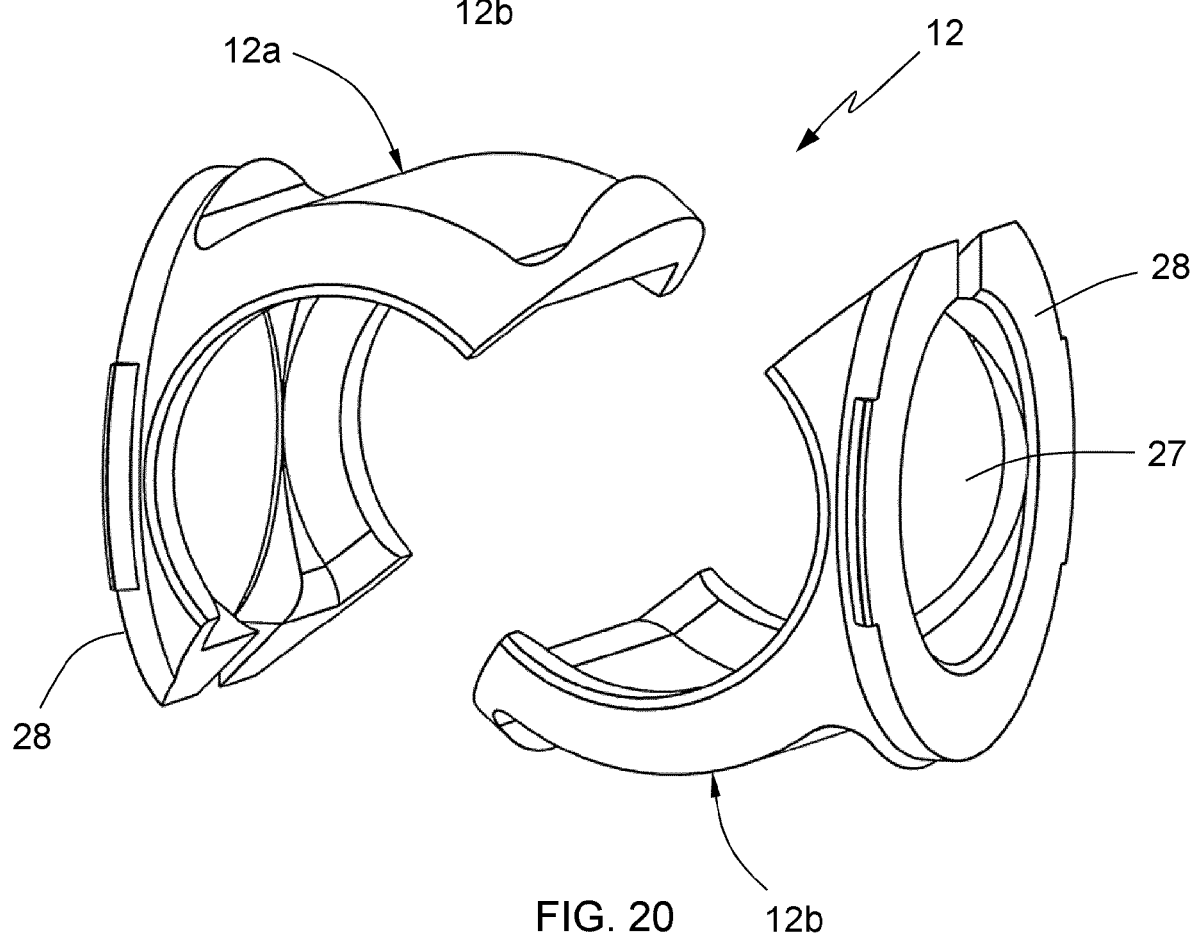
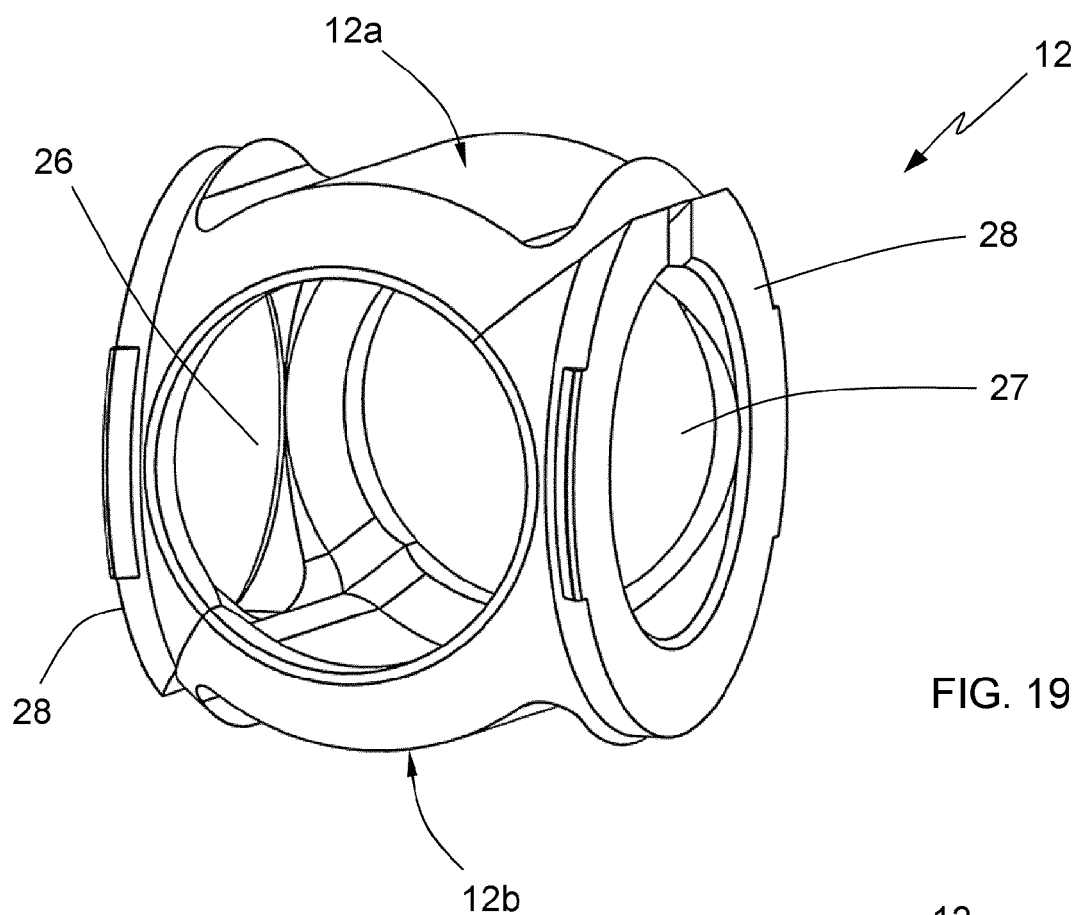


FIG. 18



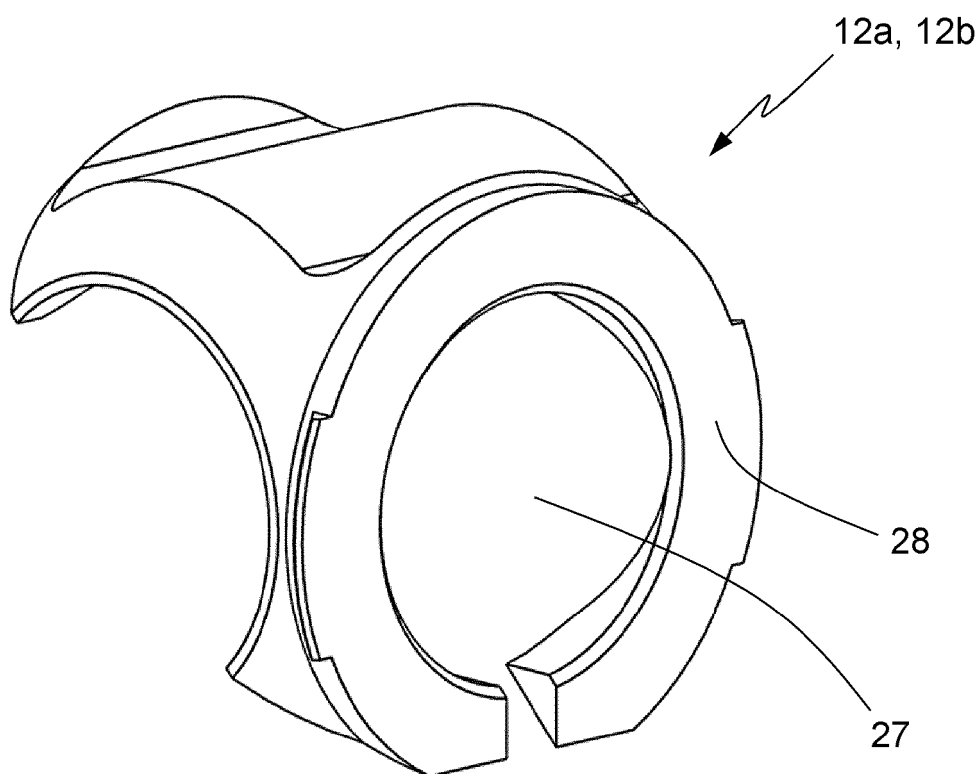


FIG. 21

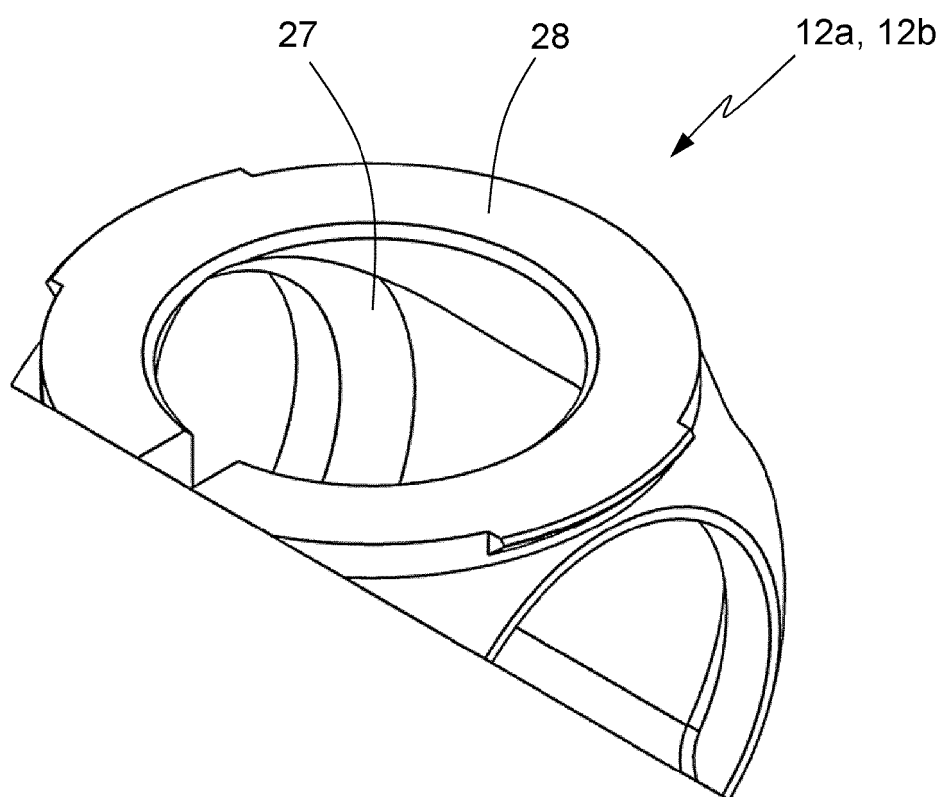
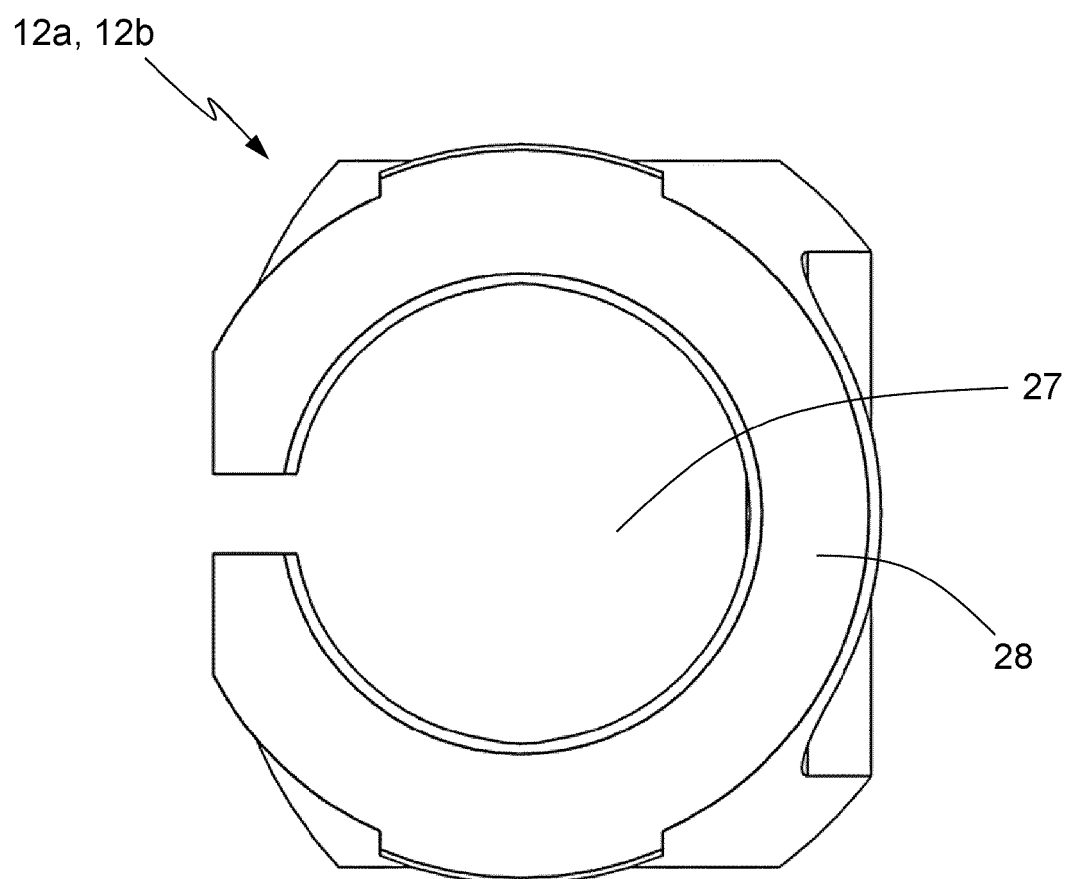
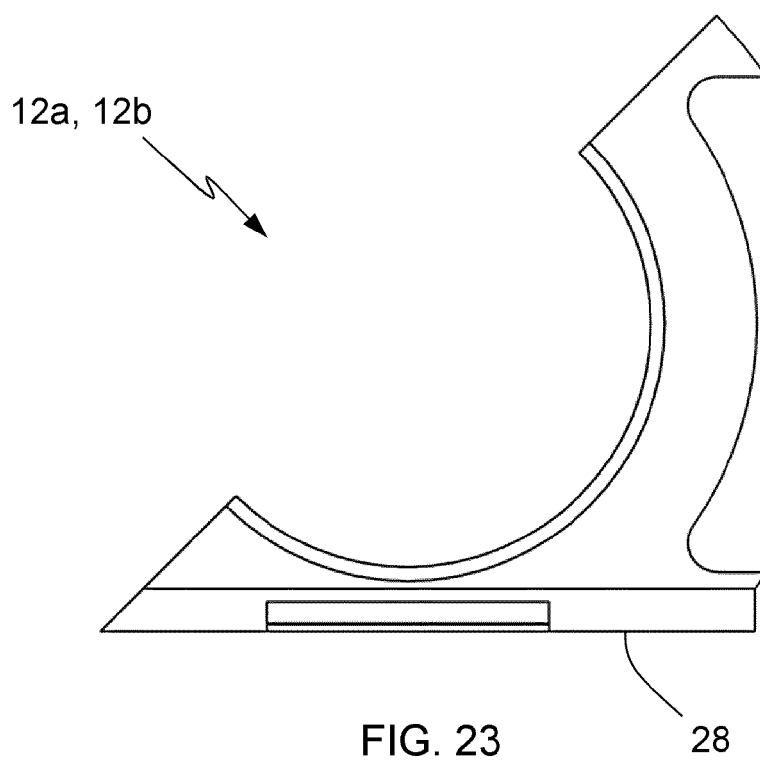


FIG. 22



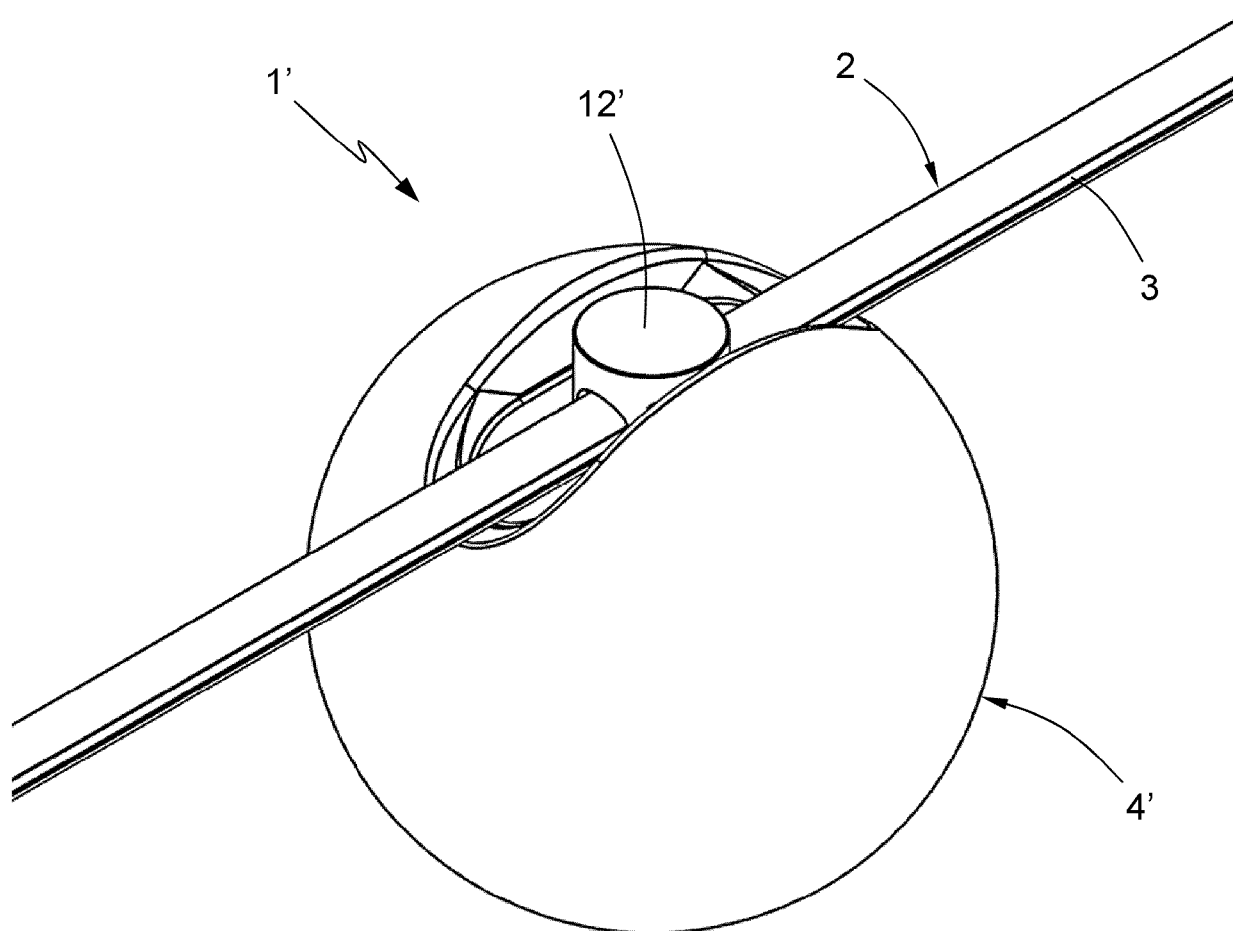
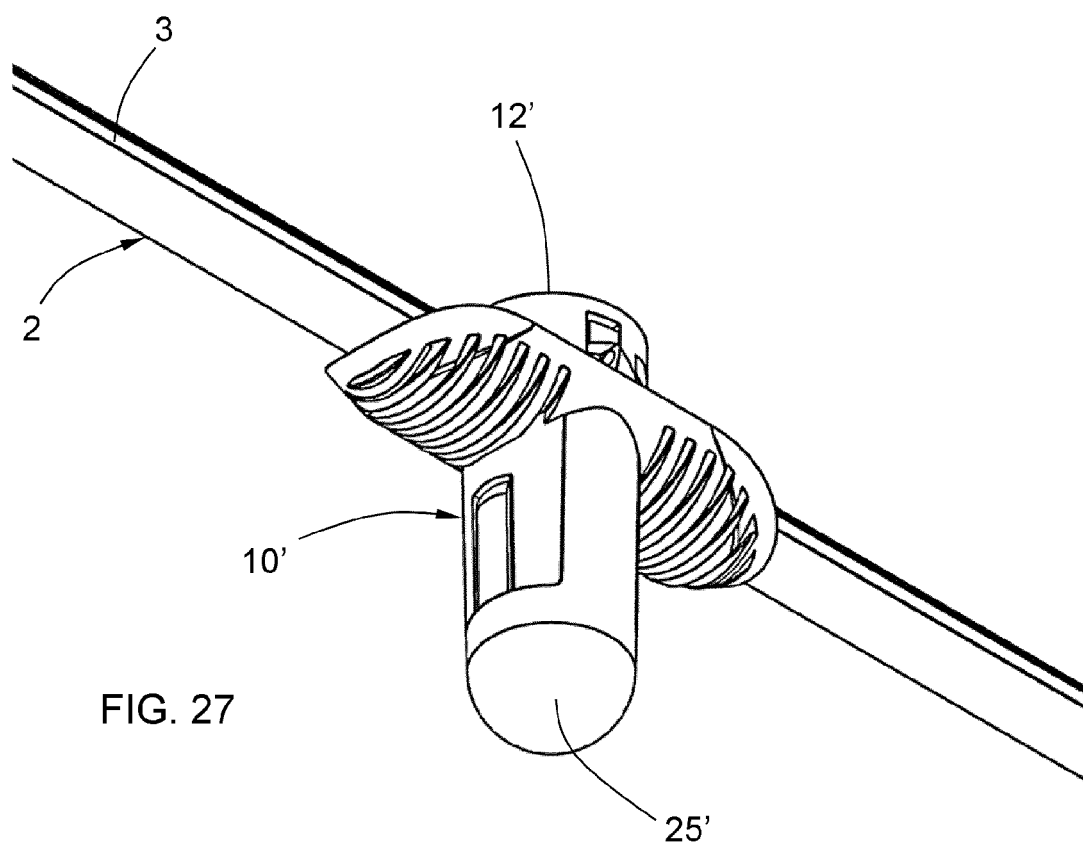
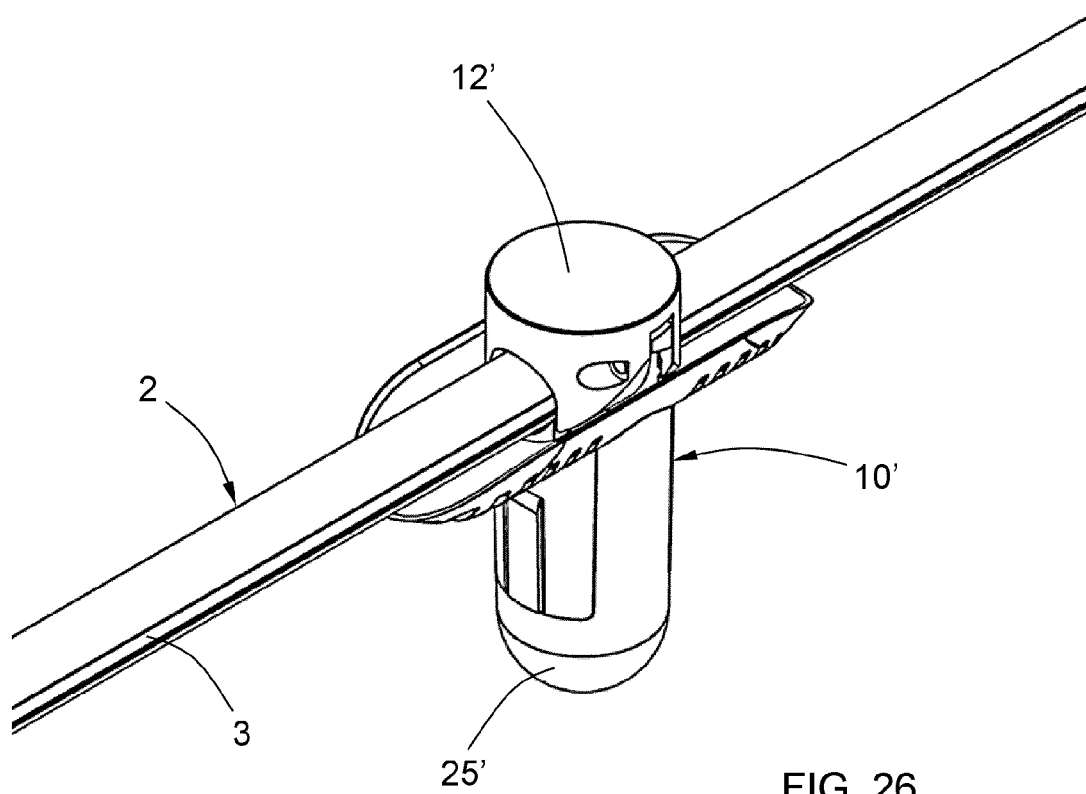


FIG. 25



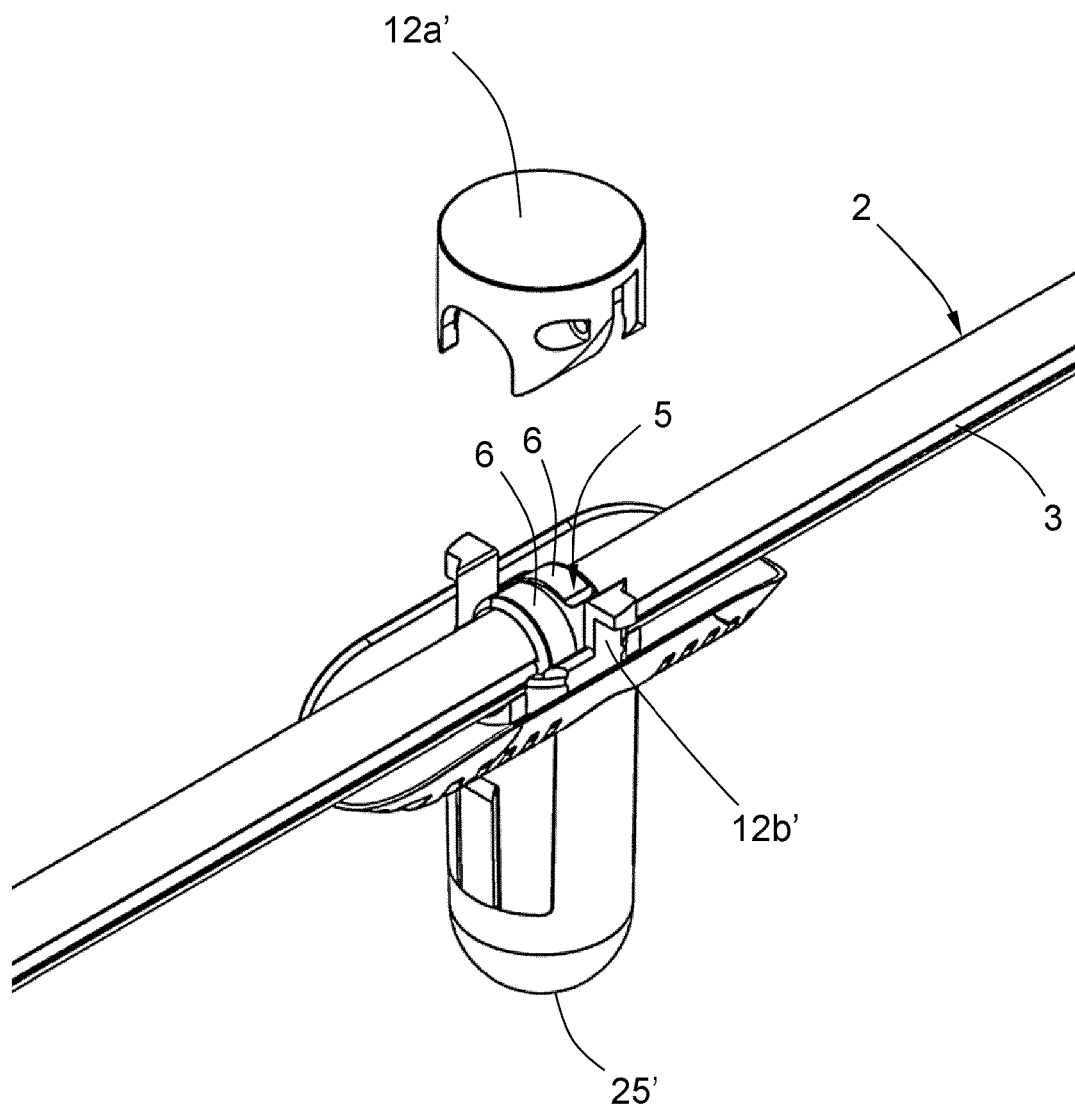


FIG. 28

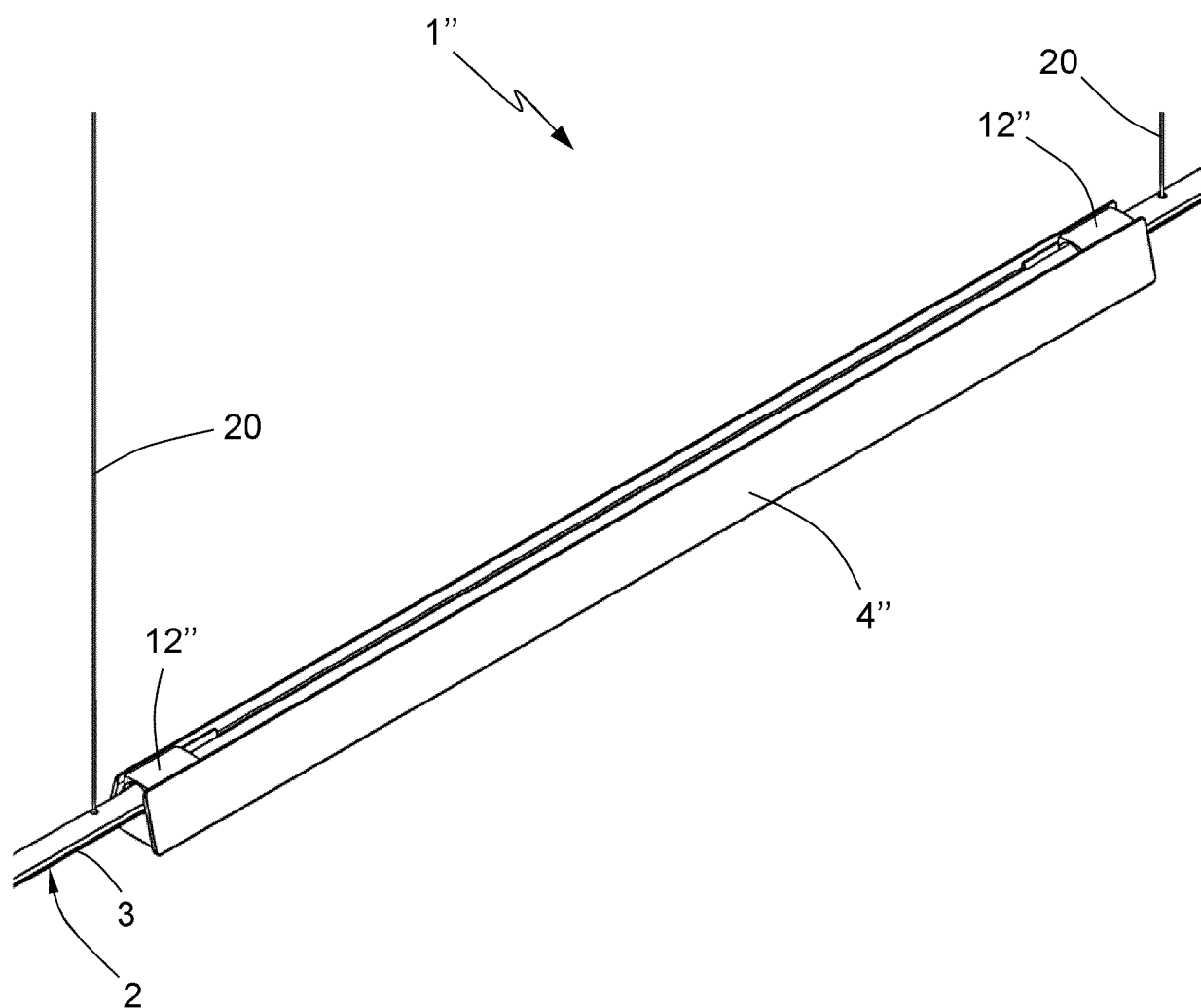


FIG. 29

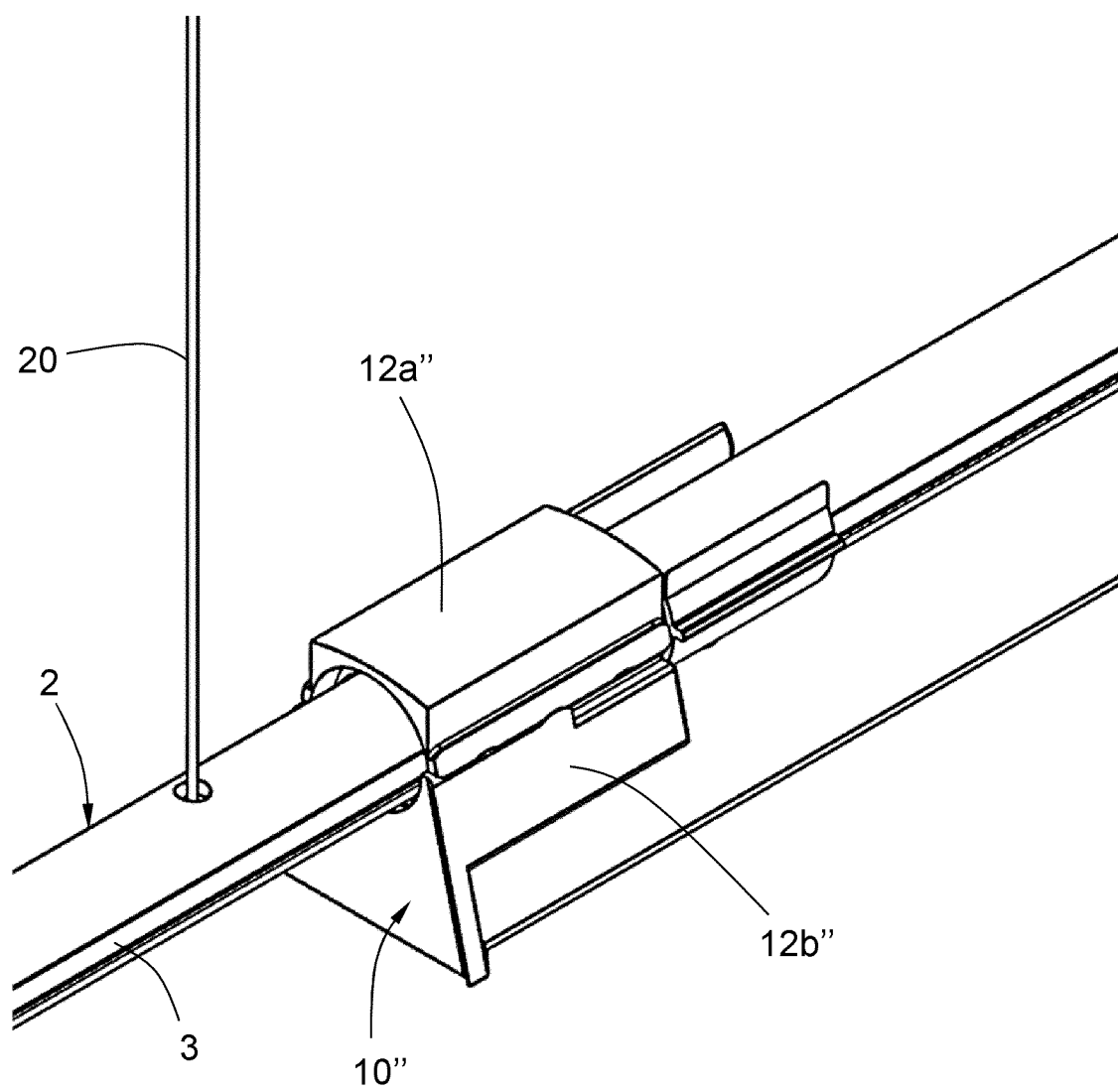


FIG. 30

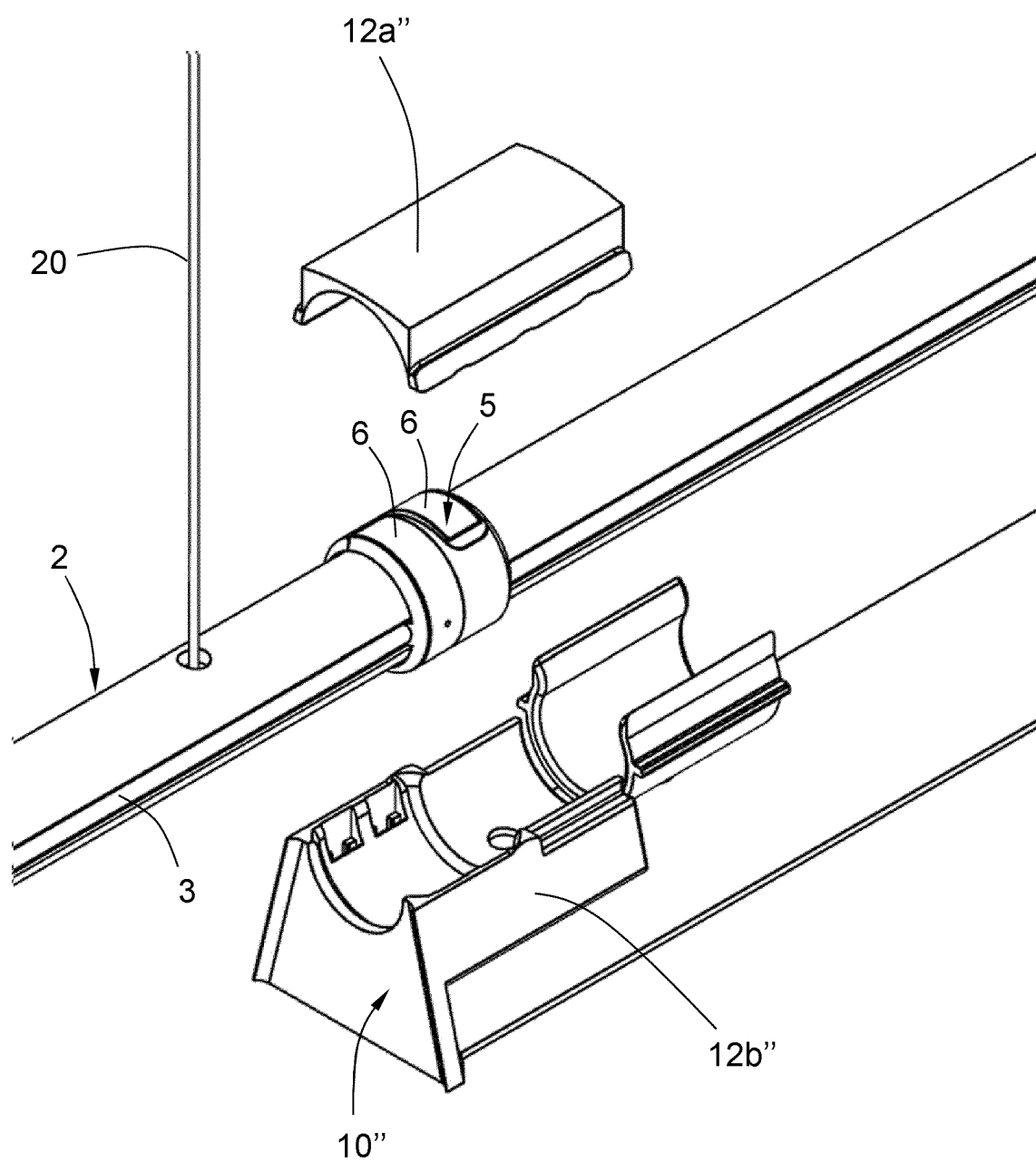


FIG. 31



EUROPEAN SEARCH REPORT

Application Number

EP 25 38 2348

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 4 979 081 A (LEACH DENNIS [GB] ET AL) 18 December 1990 (1990-12-18) * column 2, line 62 - column 4, line 61 * * figures 1-8 *	1,8, 10-12, 14,15	INV. F21S8/00 F21V21/30 F21V21/35 F21V23/06 H01R25/14
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Y,D	CN 220 135 388 U (ZHONGSHAN YANFENG ILLUMINATION TECH CO LTD) 5 December 2023 (2023-12-05) * paragraph [0027] - paragraph [0038] * * figures 1-9 *	1,8, 10-14	
Y	US 2014/268835 A1 (RUDISILL CHARLES ALBERT [US] ET AL) 18 September 2014 (2014-09-18) * the whole document *	1,8, 10-14	
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A	BE 1 028 025 A1 (KREON [BE]) 27 August 2021 (2021-08-27) * the whole document *	1-16	
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
The Hague		12 August 2025	Soto Salvador, Jesús
CATEGORY OF CITED DOCUMENTS		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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12-08-2025

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