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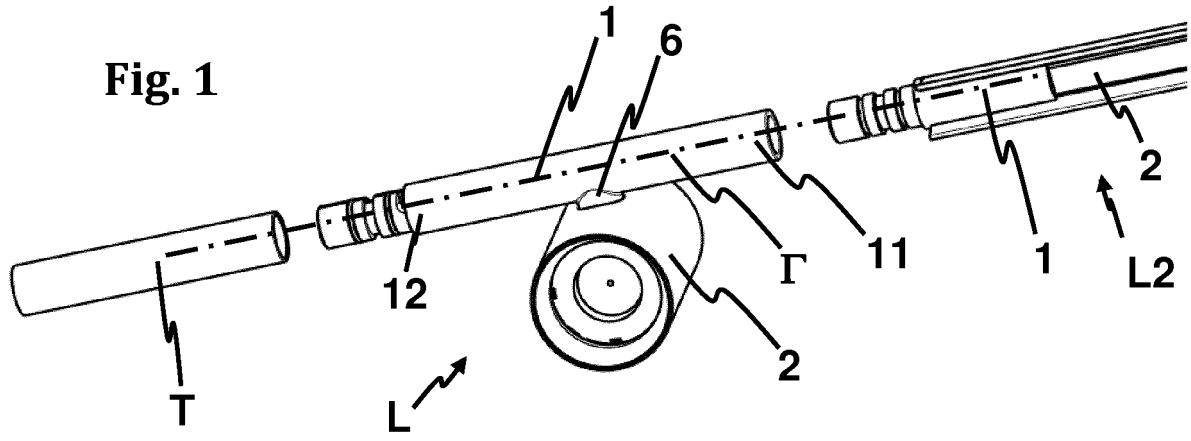
(54) **LAMP**

(57) A lighting unit L that comprises a tubular support 1, in which there are defined first 11 and second 12 ends and an axis Γ, a lamp 2 joined to the tubular support 1 and power connection means 3, wherein the power connection means 3 comprise a first cylindrical female or male connector 31 arranged at the first end 11 of the tubular support 1, a second cylindrical male or female connector 32 arranged at the second end 12 of the tubular support 1, the first and second connectors 31, 32 having four poles such that power and control signals can be transmitted between the two lighting units L. The invention also relates to a lighting system that comprises at least two of these lighting units.

Fig. 1



EP 3 540 303 A1

Description

TECHNICAL FIELD

[0001] The present invention relates to a modular type lighting unit that allows mechanical and power connections to be made, as well as connections for transmitting control signals, in a comfortable, fast and reliable way. It also relates to a lighting system that comprises at least two of these lighting units and optionally other assembly fittings.

BACKGROUND

[0002] Lighting units that comprise a lamp, the ends of which have quick connectors for the transmission of electric energy to the lamp, are known.

[0003] One commercial variant of these units consists of an elongated support provided with LEDs, the ends of which each comprise male and female jack type connectors, in particular TRS (tip-ring-sleeve) type connectors. This way it is possible to successively connect these units.

[0004] Another commercial variant consists of elongated lamps, covered by a cylindrical section, the ends of which have two divergent elongated screens. The ends comprise cylindrical, square or rectangular profiles, the ends of which have cylindrical connectors that allow power to be transmitted between successively connected units.

[0005] One drawback of these types of lighting units is that it is not possible to individually regulate the units connected in series.

[0006] Another drawback is that the connectors have the function of power transmission, as well as a structural function, which could affect the connection capacity over time. This is a significant drawback since, given that the units are assembled in series, the interruption of one single connection causes the rest of the connections to turn off as well.

DESCRIPTION OF THE INVENTION

[0007] In order to overcome the drawbacks of the state of the art, the following invention proposes a lamp unit that comprises a tubular support, defined in which are first and second ends and an axis, as well as a lamp joined to the tubular support and power connection means, wherein the power connection means comprise:

- a first cylindrical female or male connector arranged at the first end of the tubular support;
- a second cylindrical female or male connector arranged at the second end of the tubular support;
- the first and second connectors being 4-pole connectors, such that both power and control signals can be transmitted between the two lighting units;
- the first and second connectors being connected to each other by four conductors, the lamp being connected to the four conductors, such that power and control signals can be transmitted to the lamp as well as to the other lighting unit.

[0008] In some embodiments, the first cylindrical connector is arranged with the axis thereof coinciding with the axis of the tubular support and the second cylindrical connector is arranged with the axis thereof coinciding with the axis of the tubular support.

[0009] In some embodiments, the lighting unit comprises a first bushing partially fitted in the first end, such that it projects a predetermined distance and can be fitted into another tubular support, the first bushing being provided in the section that projects from the tubular support of a cylindrical female or male connector.

[0010] In some embodiments, the lighting unit comprises a second bushing completely fitted in the second end, the second connector being a male or female connector fastened to the second bushing such that it extends from an exposed surface of the second bushing, said exposed surface being arranged at the predetermined distance from the second end.

[0011] In some embodiments, the first connector is female and the second connector is male.

[0012] In some embodiments, the first and second connectors are TRRS (tip-ring-ring-sleeve) type jacks.

[0013] In some embodiments, the first and second connectors have a diameter of 2.5 mm.

[0014] The conductive metal parts of the connectors are preferably copper.

[0015] In some embodiments, the first and second connectors have a diameter of 3.5 mm.

[0016] In some embodiments the lamp is joined to the tubular support by means of an articulation, the articulation being rotational according to an axis perpendicular to the axis of the tubular support.

[0017] In some embodiments, the first bushing comprises two semi-cylindrical shells, between which at least one insulating ring is arranged, the first cylindrical connector being arranged in the insulating ring.

[0018] In some embodiments the first bushing comprises at least two first perimeter grooves and a seal arranged in each first perimeter groove.

[0019] In some embodiments, the first bushing comprises at least a second perimeter groove to support a fastening screw.

[0020] In some embodiments the lamp is elongated and extends the tubular support.

[0021] The invention also relates to a lighting system that comprises at least two lighting units according to any of the preceding claims, the units embedded within each other.

[0022] In addition to the lighting units, the lighting system preferably comprises:

- a joining tube; and/or
- an elbow; and/or

- a stop; and/or
- a flush-mountable stop, which can constitute the cover or final element; and/or a T,

all of them being provided, when necessary, with 4-pole connection means to guarantee power connection and data transmission.

[0023] This way, a system is provided with all of the necessary elements to allow one to quickly assemble the same through simple connections.

BRIEF DESCRIPTION OF THE DRAWINGS

[0024] To complete the description, and for the purpose of helping to make the characteristics of the invention more readily understandable, in accordance with various practical embodiments of the lighting unit and the lighting system according to the invention, said description is accompanied by a set of figures constituting an integral part thereof, which by way of illustration and not limitation represent the following:

Figure 1 is a perspective view and prior to the assembly of the lighting system according to the invention in an embodiment that comprises a tube, a first lighting unit provided with a spotlight and a second linear type lighting.

Figure 2 is a perspective view of the mounted assembly.

Figure 3 shows two coupled tubular supports.

Figure 4 is a cross section of an assembly of the tubular support, fastening bushings and female and male connectors.

Figure 5 is a cross section of two lighting units coupled together.

Figure 6 is a perspective view of a lighting unit in an embodiment in which the lamp is a cylindrical light articulated according to an axis perpendicular to the axis of the tubular support.

Figure 7 is a perspective view of the mounted bushing.

Figure 8 is an exploded perspective view of the bushing.

DESCRIPTION OF A PREFERRED EMBODIMENT OF THE INVENTION

[0025] As illustrated for example in figure 6, the invention relates to a lighting unit L that comprises a tubular support 1, defined in which are a first end 11 and a second end 12 and an axis Г, a lamp 2 joined to the tubular support 1 and power connection means 3, characterized in that the power connection means 3 comprise:

- a first cylindrical female or male connector 31 arranged at the first end 11 of the tubular support 1;
- a second cylindrical female or male connector 32 arranged at the second end 12 of the tubular support 1;
- the first and second connectors 31, 32 being 4-pole connectors such that power and control signals can be transmitted between the two lighting units L;
- the first and second connectors 31, 32 being connected to each other by four conductors 33, the lamp being 2 connected to the four conductors 33, such that power and control signals can be transmitted to the lamp 2 as well as to another lighting unit 1.

[0026] Thus, a lighting unit is provided which is easy and comfortable to connect to another similar lighting unit or to an accessory provided with complementary connections that allow for the simultaneous transmission of power and signals.

[0027] This is especially advantageous given that the light emitted can be individually adjusted for each lighting unit. Obviously for this to be possible, it is necessary to provide the lamps with the necessary electronics to be able to process the signals and identify them within the system in which they are integrated, for the purpose of adjusting the lighting intensity.

[0028] In the illustrated embodiments, the first cylindrical connector 31 is arranged with the axis thereof coinciding with the axis Г of the tubular support 1 and the second cylindrical connector 32 is arranged with the axis thereof coinciding with the axis Г of the tubular support 1.

[0029] This makes it so it is not necessary to depend on the fitting angle or, put differently, it allows the tubular support to be oriented and, as such, the lamp as well, according to a first degree of freedom on the axis Г.

[0030] As shown in figures 1, 3, 4, 5 and 6, the lighting unit further comprises a first bushing 4 partially fitted in the first end 11.

[0031] As shown in figure 4, the bushing is arranged such that it protrudes a predetermined distance d and can be fitted into another tubular support 1, T. In the embodiment illustrated, the first bushing 4 is provided in the section that protrudes from the tubular support 1 of a cylindrical female connector 31.

[0032] On the other hand, as can also be seen in the cross sections of figures 4 and 5, the lighting unit comprises a second bushing 5 completely fitted in the second end 12, the second connector 32 being a male connector fastened to the second bushing 5 such that it extends from an exposed surface 51 of the second bushing 5, said exposed surface 51 being arranged at the predetermined distance d of the second end 12.

[0033] As can be seen in the cross sections of figures 4 and 5, the first connector 31 is female and the second connector 32 is male. This way the female connector is protected by the bushing and the male connector, which is more susceptible to damage due to impacts, is protected by the tubular support 1. Moreover, possible deformations of the male connector are prevented, since when coupled, the bushing inserted, which has the female connector, is guided with precision by the hollow end of the tubular support 1.

[0034] As can be seen in the figures, the first and second connectors 31, 32 are Jack TRRS tip-ring-ring-sleeve type connectors. As was previously mentioned, these types of connectors are often used for voice and audio transmission. However, the inventors have verified that they are well adapted for transmitting both power and control signals through different circuits. Moreover, they are widely marketed, reliable and low cost connectors.

[0035] Of these connectors, it has been verified that those with diameters of 2.5 and 3.5 mm and preferably made of copper adapt perfectly to the power and data requirements of the lamps of the lighting unit of the present invention.

[0036] As shown in figures 1, 2 and 6, the lamp 2 is joined to the tubular support by means of an articulation 6, the articulation 6 being rotational according to an axis Г2 perpendicular to the axis Г of the tubular support 1.

[0037] Thus, a second degree of freedom is added which allows the light to be oriented according to any direction in the space. It is noteworthy that the aforementioned articulation could also consist of a TRRS connector, just like the connection between the lighting units, complemented by a cylindrical mechanical joint if needed. This increases the modularity of the lighting system.

[0038] As shown in figure 7, a bushing 4 is also herein described which comprises two semi-cylindrical shells 41, 42, preferably metalic, for example zamak, among which at least one insulating ring 43 is arranged, the first cylindrical connector 31 being arranged in the insulating ring 43. This bushing constitutes an invention by itself.

[0039] In particular, it is a bushing that can perform both structural functions and functions of power and data transmission. The bushing can also have a female connection at each end, although male-female or male-male arrangements can be conceived according to specific needs. In the embodiment illustrated, only one of the ends needs a connector, since the other end is open to allow the four connection cables 33 to pass through.

[0040] The bushing 4 comprises at least two first perimeter grooves 44 and a seal 45 arranged in each first perimeter groove 44. The seals are conceived to guarantee a friction with the tubular support 1 that guarantees a correct concentricity, stability and at the same time a comfortable press fit.

[0041] It is also envisaged that the bushing 4 comprises two second perimeter grooves 46 to support fastening screws. These fastening screws T1, with allen type heads, for example, are screwed from the outside in a hole 13 of the tubular support 1 to fasten both components 1, 4 to each other.

[0042] The lighting unit can have a spotlight type light 2, such as the one shown in figure 2 or figure 6, or can be an elongated lamp L2, such as the one shown at one end of the assemblies shown in figures 1 and 2.

[0043] The figures also show a lighting system that comprises at least two lighting units L, L2 according to any of the previously described variants, the units embedded within each other.

[0044] In this text, the word "comprises" and its variants (such as "comprising", etc.) should not be understood in an exclusive sense, i.e. they do not exclude the possibility of that which is described including other elements, steps, etc.

[0045] Also, the invention is not limited to the specific embodiments described herein, but rather encompasses the variations that one skilled in the art could make (e.g. in terms of choice of materials, dimensions, components, design, etc.), within the scope of what may be deduced from the claims.

Claims

1. A lighting unit (L) that comprises a tubular support (1), in which first (11) and second (12) ends and an axis (Г) are defined, a lamp (2) joined to the tubular support (1) and power connection means (3), **characterized in that** the power connection means (3) comprise:

   - a first cylindrical female or male connector (31) arranged at the first end (11) of the tubular support (1);
   - a second cylindrical female or male connector (32) arranged at the second end (12) of the tubular support (1);
   - the first and second connectors (31, 32) having four poles, such that power and control signals can be transmitted between the two lighting units (L);
   - the first and second connectors (31, 32) being connected to each other by four conductors (33), the lamp being (2) connected to the four conductors (33), such that power and control signals can be transmitted to the lamp (2) as well as to another lighting unit (1).

2. The lighting unit (L) according to claim 1, wherein the first cylindrical connector (31) is arranged with the axis thereof coinciding with the axis (Г) of the tubular support (1) and the second cylindrical connector (32) is arranged with the axis thereof coinciding with the axis (Г) of the tubular support (1).

3. The lighting unit (L) according to claim 1, comprising a first bushing (4) partially fitted in the first end (11), such that it protrudes a predetermined distance (d) and can be fitted into another tubular support (1, T), the first bushing (4) being provided in the section that projects from the tubular support (1) of a cylindrical female or male connector (31).

4. The lighting unit (L) according to any of the preceding claims, which comprises a second bushing (5) completely fitted in the first end (12), the second connec-

tor (32) being a male or female connector fastened to the second bushing (5) such that it extends from an exposed surface (51) of the second bushing (5), said exposed surface (51) being arranged at the predetermined distance (d) of the second end (12).

5. The lighting unit (L) according to claims 3 and 4, in which the first connector (31) is female and the second connector (32) is male.

6. The lighting unit (L), according to any of the preceding claims, in which the first and second connectors (31, 32) are Jack TRRS (tip-ring-ring-sleeve) type connectors.

7. The lighting unit (L), according to claim 6, in which the first and second connectors (31, 32) have a diameter of 2.5 mm.

8. The lighting unit (L), according to claim 6, in which the first and second connectors (31, 32) have a diameter of 3.5 mm.

9. The lighting unit (L) according to any of the preceding claims, in which the lamp (2) is joined to the tubular support by means of an articulation (6), the articulation (6) being rotational according to an axis (Г2) perpendicular to the axis (Г) of the tubular support (1).

10. The lighting unit (L) according to claim 2 or any of the dependent claims thereof, in which the first bushing (4) comprises two semi-cylindrical shells (41, 42), between which at least one insulating ring (43) is arranged, the first cylindrical connector (31) being arranged in the insulating ring (43).

11. The lighting unit (L) according to claim 10, in which the first bushing (4) comprises at least two first perimeter grooves (44) and a seal (45) arranged in each first perimeter groove (44).

12. The lighting unit (L) according to claim 10 or claim 11, in which the first bushing (4) comprises at least a second perimeter groove (46) to support a fastening screw.

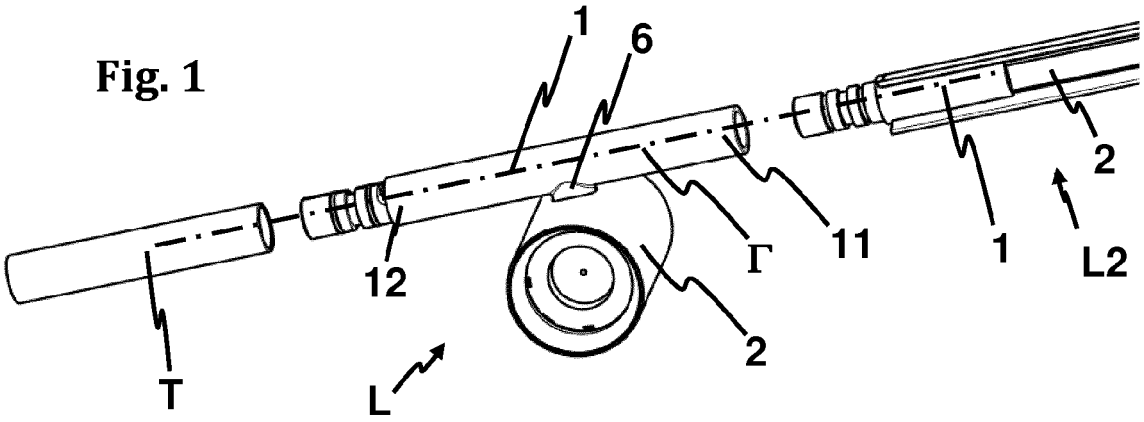
13. The lighting unit (L) according to claim 1, in which the lamp (L2) is elongated and extends the tubular support (1).

14. A lighting system that comprises at least two lighting units (L, L2) according to any of the preceding claims, the units being coupled to each other.

15. The lighting system, according to claim 14, which comprises:

- a joining tube; and/or
- an elbow; and/or
- a stop; and/or
- a flush-mountable stop; and/or (final element cover);
- a T.

Fig. 1



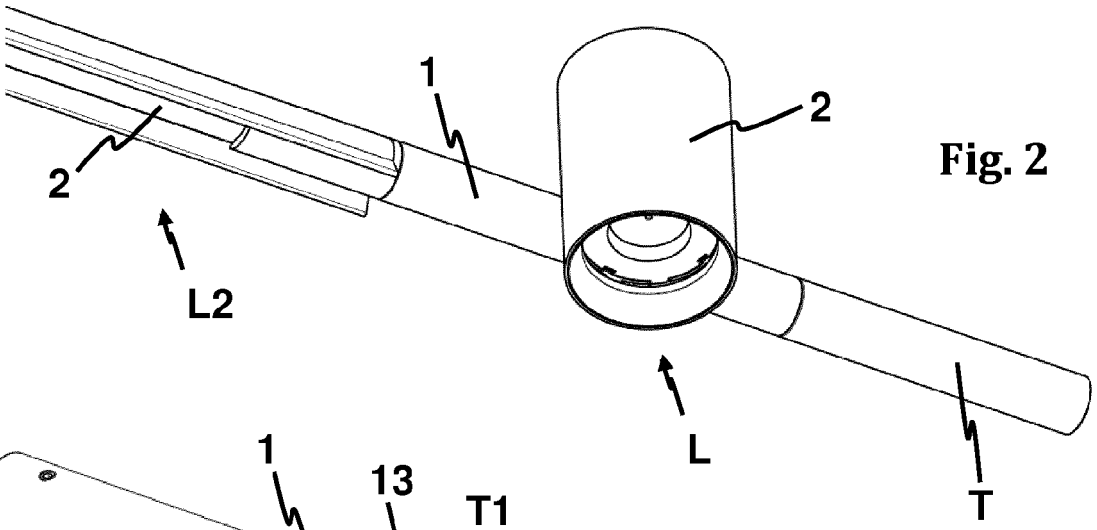


Fig. 2

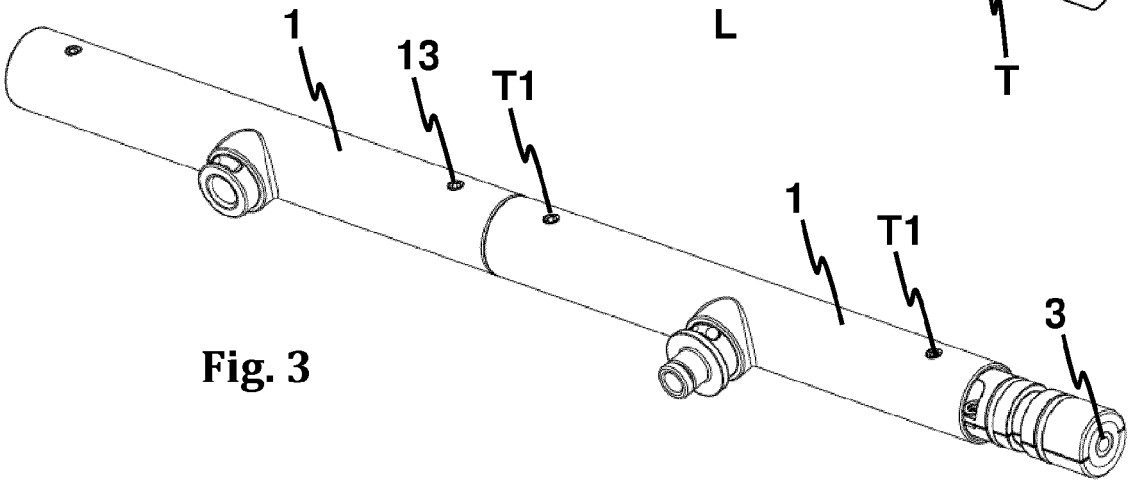


Fig. 3

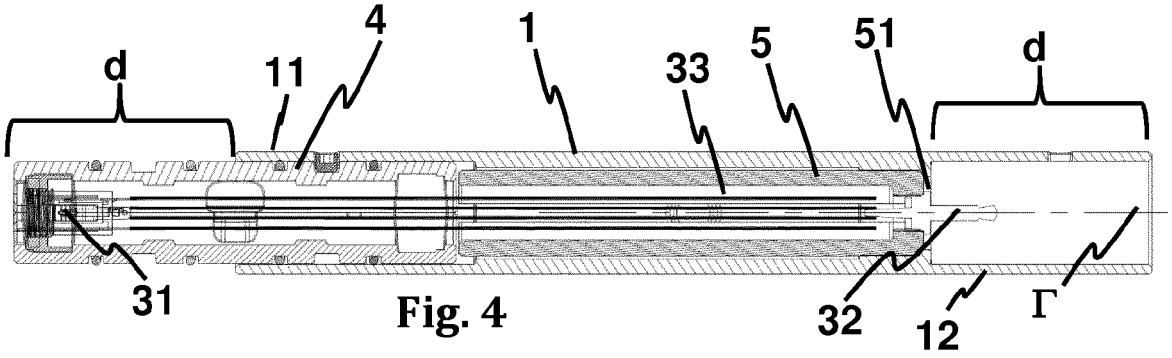


Fig. 4

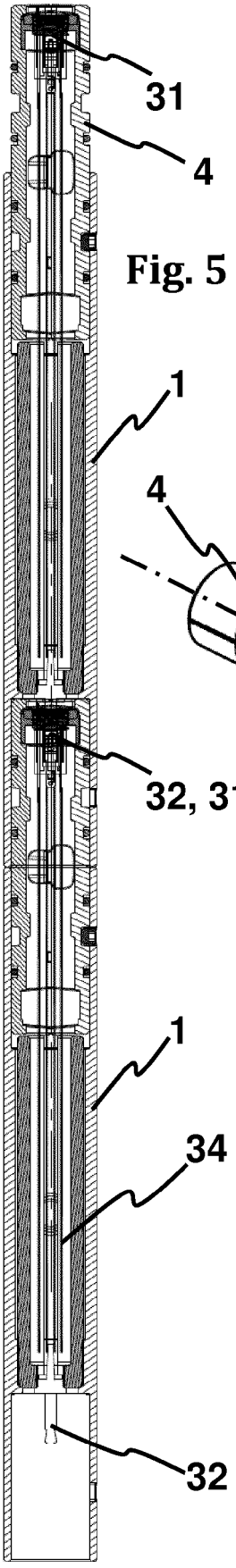


Fig. 5

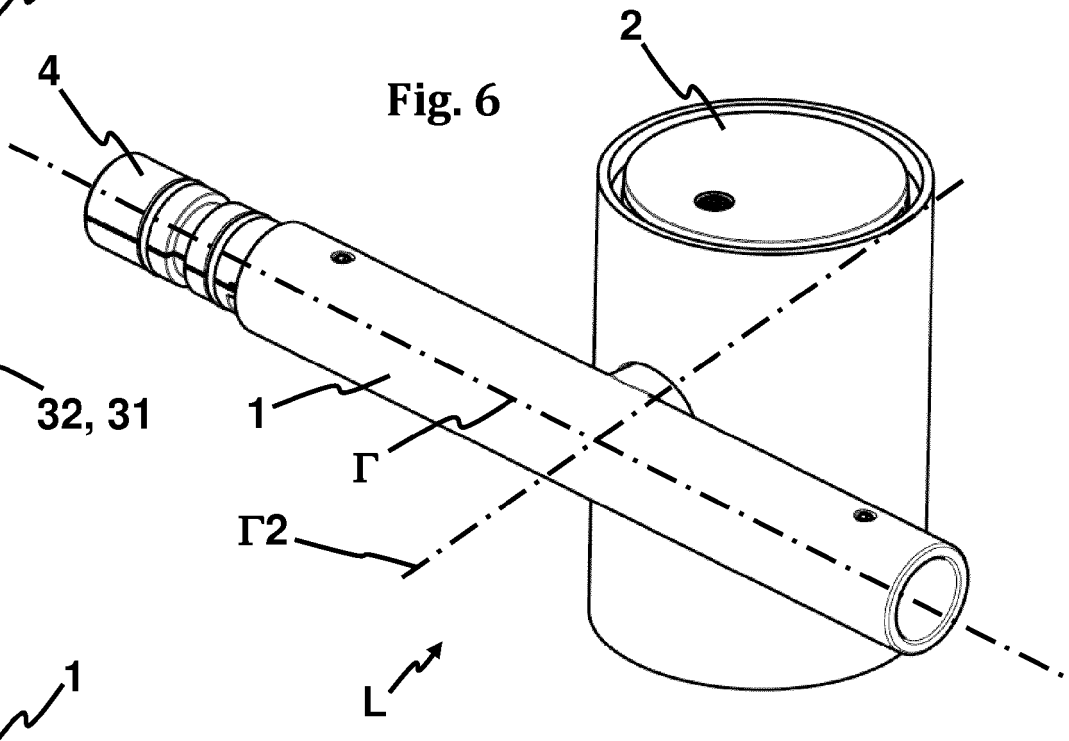


Fig. 6

Fig. 7

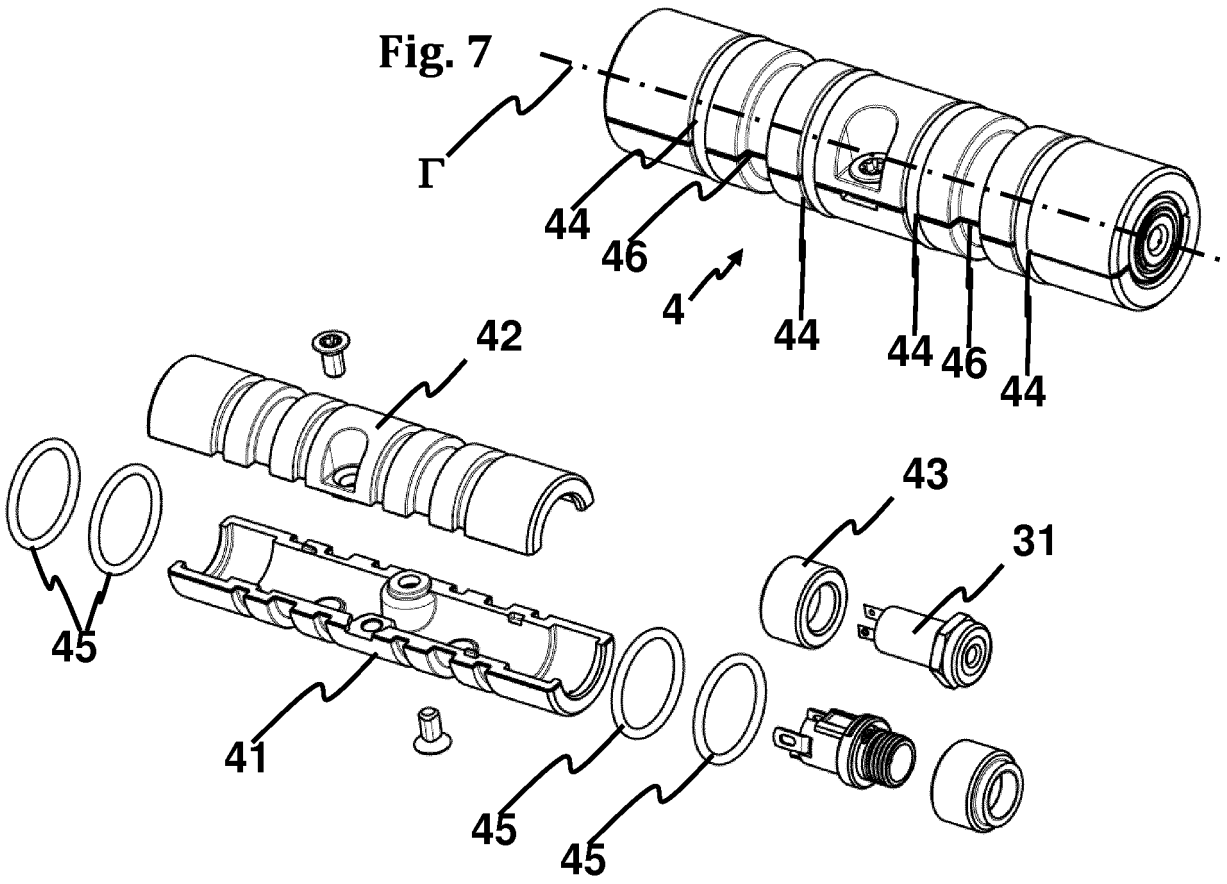


Fig. 8

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EUROPEAN SEARCH REPORT

Application Number
EP 18 38 2179

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	6 June 2018	Soto Salvador, Jesús

CATEGORY OF CITED DOCUMENTS

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