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(54) **VAPORIZER FOR A SMOKING ARTICLE**

(57) An electronic cigarette (2) comprising a vaporizer (1) having a first portion (9), which is provided with a resistor (10) and a connector (6) electrically connected to the resistor (5) and a support (11) comprising insulating material; and a second portion (12), which is provided with an additional electrical connector (13) and a base element (14) comprising an insulating material on which

the further electrical connector (13) is mounted; the support (11) and the base element (14) are different one with respect to the other; the connectors (10, 13) are connected together by means of a male-female coupling so as to keep together the first and the second portion (9, 12) and establishing a continuous connection.

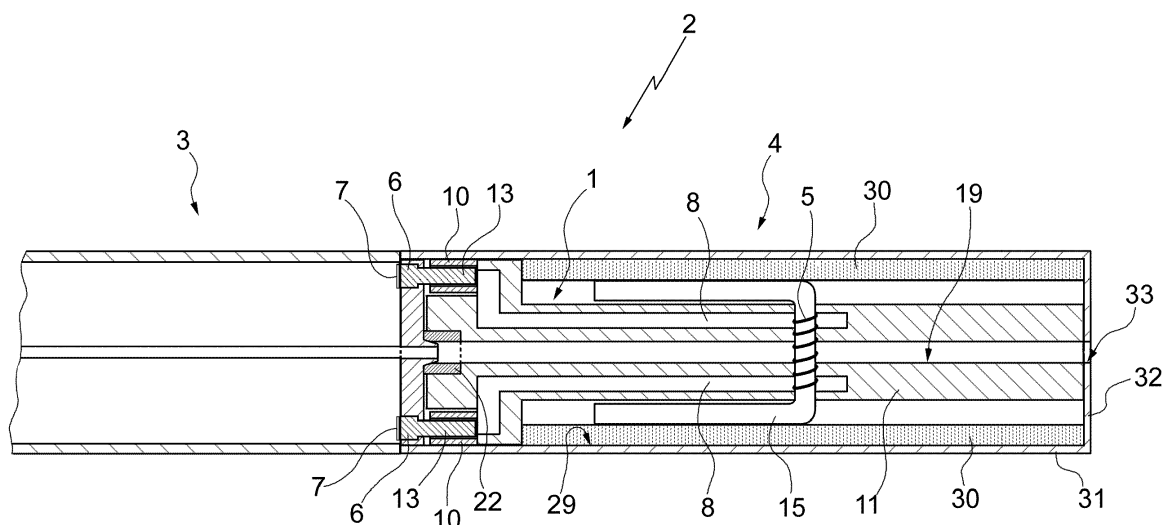


FIG.8

Description

[0001] The present invention relates to a vaporizer, a cartridge and a smoking article.

[0002] Tobacco articles are known (commonly called electronic cigarettes), which are electrically powered and comprise a reusable main body provided with a battery and a cartridge containing a vaporizable substance. The vaporizer comprises an electrical resistor which is designed to generate heat, one first electrical connector which is designed to come into contact with a second electrical connector of the main body, at least one electrical connection for supplying electrical energy to the electrical resistor from the first electrical connector.

[0003] The smoking articles of this type have various drawbacks among which the following should be considered: they are normally assembled manually by specialized operators; it is not possible to change their size in a simple manner; the production of the vaporizers and/or of the cartridges and the vaporizers and/or the cartridges themselves are difficult to be adapted to different main bodies.

[0004] The object of the present invention is to provide a vaporizer, a cartridge and a smoking article, which allow to overcome, at least partially, the drawbacks of the prior art and are, at the same time, easy and inexpensive to manufacture.

[0005] According to the present invention, a vaporizer, a cartridge and a smoking article are provided, as claimed in the independent claims below, and, preferably, in any one of the claims depending directly or indirectly on the aforementioned independent claims.

[0006] The present invention will now be described with reference to the accompanying drawings, which illustrate examples of nonlimiting embodiments, wherein:

- Figure 1 is a section of a vaporizer according to the present invention;
- Figure 2 is a schematic and perspective view of a component of the vaporizer of Figure 1;
- Figure 3 illustrates an exploded view of the component of Figure 2;
- Figure 4 is a schematic and perspective view of a further embodiment of the component of Figure 2;
- Figure 5 illustrates an exploded view of the component of Figure 4;
- Figure 6 illustrates a detail of the component of Figure 2 according to a different embodiment;
- Figure 7 is a perspective view of a detail of the component of Figure 6; and
- Figure 8 is a section of a smoking article comprising the vaporizer of Figure 1.

[0007] In Figure 1, number 1 denotes in its entirety a vaporizer 1 for a smoking article 2 (shown in Figure 8), which is electrically powered and comprises a main body 3 (reusable) and a cartridge 4 containing a vaporizable (volatile) substance (typically flavoured and/or containing

active substances such as nicotine). Normally, the cartridge 4 is of the "disposable" type; alternatively it may be used several times if necessary after being recharged, e.g. by inserting (again) the vaporizable substance.

[0008] The vaporizer 1 comprises (at least) one electrical resistor 5 which is designed to generate heat, at least one electrical connector 6 (which is designed to come into contact with a respective electrical connector 7 of the main body 3) and (at least) one electrical connection 8 for supplying electrical energy to the electrical resistor 5 (from the electrical connector 6). More precisely, the vaporizer 1 comprises (at least) two electrical connectors 6, and (at least) two electrical connections 8 (each designed to electrically connect a respective connector 6 to the resistor 5). Each electrical connector 6 is designed to be coupled with a respective electrical connector 7 of the main body 3.

[0009] In particular, the connections 8 are in contact with opposite ends of the resistor 5.

[0010] The vaporizer 1 has a portion 9, which comprises the electrical connection 8, the electrical resistor 5, (at least) one electrical connector 10 electrically connected to the connection 8 and a support 11, on which the connector 10 is arranged (mounted). More specifically, the connector 10 projects from the support 11.

[0011] In particular, the support 11 comprises (more precisely, consists of) a substantially electrically non-conductive material (more specifically, an electrical insulator).

[0012] The vaporizer 1 has, furthermore, a portion 12, which comprises the electrical connector 6, an electrical connector 13 electrically connected to the electrical connector 6 and a base element 14, on which the connectors 6 and 13 are arranged (mounted). In particular, the base element 14 comprises (more precisely, consists of) a substantially electrically non-conductive material (more precisely, an electrical insulator).

[0013] The support 11 and the base element 14 are distinct (and separated) one from the other. More precisely, the support 11 and the base element 14 are obtained, each one, by means of a respective die-casting process independently one from the other.

[0014] In particular, the connectors 10 and 13 are connected one to the other by means of an interlock coupling so as to keep together the portions 9 and 12 and to establish a continuous connection from the connector 6 to the electrical resistor 5.

[0015] More precisely, the connectors 10 and 13 are connected together by means of a male female coupling (being one of these connectors the male and the other the female) so as to keep together the portions 9 and 12 and to establish a continuous connection from the connector 6 to the electrical resistor 5.

[0016] Advantageously, the connector 10 is a female connector and the connector 13 is a male one. This allows, among other things, to have a particularly simple structure.

[0017] More precisely, the vaporizer comprises (at

least) two electrical connectors 10, (at least) two electrical connectors 13 (each coupled to a respective connector 10). Each electrical connection 8 is electrically connected to a respective connector 10 and to a respective end of the resistor 5.

[0018] Advantageously, the electrical connection 8 is (at least partially) covered by a substantially electrically insulating material.

[0019] In particular, the electrical connection 8 is (at least partially) embedded in the support 11. More precisely, the connection 8 is incorporated in the support 11 whereas the support 11 itself is made (by die-casting).

[0020] The electrically insulating materials (or electrical insulators) are known and may be selected among all those available such as glass, porcelain (e.g. clays, quartz, alumina, feldspar), polymeric materials (possibly composite). Preferably, the electrically insulating materials (or electrical insulators) comprise (are) polymers.

[0021] According to the advantageous embodiments, the vaporizer 1 comprises, in addition, the fibrous material 15 (for example cotton or glass fibre), arranged so as to extend in the area of (more precisely, through) the resistor 5. In particular, the fibrous material 15 has a central portion arranged in the area of the resistor 5 (more precisely inside the space enclosed by the coils of the resistor 5) and two end portions, which extend from the resistor 5 on opposite sides of the resistor 5 itself.

[0022] Usually, the fibrous material 15 comprises (is) cotton and/or glass fibre.

[0023] According to some embodiments, the support 11 has a segment 16, in the area of which the connector 10 and the electrical connection 8 are arranged; a seat 17 (in particular, a depression); and a segment 18 arranged on the opposite side of the seat 17 relative to the segment 16. In particular, the segment 16 extends from the electrical connector 10 to the electrical resistor 5.

[0024] In particular, the fibrous material 15 is located in the area of the seat 17.

[0025] In some cases, the electrical resistor 5 is located (lodged) in the area of the seat 17.

[0026] According to some embodiments (such as those illustrated), the vaporizer 1 comprises an inner channel 19 through which the gas passes (in particular, the air containing the vaporizable substance) that is inhaled by the user. The channel 19 is formed through the support 11. More precisely, the channel 19 extends longitudinally along the support 11, between two opposite ends of the support 11 itself.

[0027] In particular, the channel 19 has two stretches, between which the fibrous material 15 is located (extends). In other words, the two stretches of the channel 19 are separated by the fibrous material 15.

According to some embodiments, the support 11 is a single piece (i.e. is made of a single piece).

[0028] Also the base element 14 has a through channel 20 arranged facing one end 21 of the channel 19. In particular, the channels 20 and 19 are coaxial one with the other.

[0029] Advantageously, in the area of the end 21 a ring 22 is arranged made of elastically deformable material (in particular, rubber), which is mounted in a fixed manner on the support 11 so as to have its internal lumen facing the end 21. In particular, the lumen of the ring 22 is substantially coaxial to the channel 19.

[0030] The ring 22 allows to have a tight sealing connection between the channels 19 and 20.

[0031] Advantageously, the base element 14 comprises a protruding portion 23 (Figure 8) which projects from the base element 14 itself towards the support 11. In particular, the protruding portion 23 is coupled in an interlocking manner with the ring 22. More specifically, the protruding portion 23 extends (at least) partially into the lumen of the ring 22.

[0032] The portion 23 allows to further improve the gas passage between the channels 19 and 20 which takes place in a particularly efficient manner (no dissipation).

[0033] In some cases, the projecting portion 23 has a shape tapered towards the support 11.

[0034] According to some embodiments, the vaporizer 1 comprises a covering element 24 (Figures 6 and 7), which is mounted in the area of the seat 17 so as to cover, at least partially, the seat 17 and to partially define two side openings 25 (of which only one is illustrated in Figure 6). In particular, the fibrous material 15 extends through the side openings 20.

[0035] Figures 4 illustrate an alternative of the vaporizer 1. According to said alternative, the support 11 comprises a bearing element 26, in which is housed (at least partially) the electrical connection 8 and on which the electrical connector 10 is arranged, and a tubular element 27, which is designed to allow the passage of air and is mounted (in an interlocking manner) on the bearing element 26. The tubular element 27 has two side openings through which extends the fibrous material 15.

[0036] In particular, the bearing element 26 has a housing 28 (Figure 5) which extends between the two electrical connections 8 and in which the tubular element 27 is arranged.

[0037] It should be noted that the bearing element 26 acts as (at least a part of) the segment 16. The seat 17 is located (defined) between the lateral openings of the tubular element 27. The stretch of the tubular element 27 beyond the openings acts as the segment 18.

[0038] According to some embodiments, the resistor 5 comprises (more precisely is) Nichrome (60 or 80), Kanthal (FeCrAl), molybdenum silicide (MoSi_2 and/or MoSi possibly doped with aluminum - $\text{Mo}(\text{Si}, \text{Al})_2$).

[0039] Typically, the connection 8 and the connectors 6, 7, 10 and 13 are made of electrically conductive materials such as metals (for example copper, aluminum and alloys thereof).

[0040] The vaporizer 1 according to the present invention has several advantages with respect to the state of the art. Among these should be considered: the fact that the particular structure allows manufacturing by means of automatic machines (thus significantly reducing the

labour need); that the size of the vaporizer, made in this way, can be easily modified being possible to maintain unaltered the parts of the automatic machine which is used only by adjusting the stroke of some components; that the vaporizer 1 is easily adaptable to different main bodies 3 (which differ in the type of interface - for example type and/or shape of the connector 7) being modifiable only the portion 12.

[0041] With particular reference to Figure 8, according to a further aspect of the present invention, the cartridge 4 containing the vaporizable substance and comprising the vaporizer 1 as described above is provided.

[0042] In particular, the cartridge 4 has a chamber 29, inside which the vaporizer 1 is housed and a material 30 (absorbent - for example cotton) wetted with the vaporizable substance. Typically, the cartridge 4 has a substantially cylindrical shape.

[0043] More precisely, the chamber 29 is laterally bounded by a wall 31 and, at the ends, by the base element 14 and by a further wall 32, which is in contact (tight sealed) with one end of the support 11 opposite to the end 21 and has an opening 33 facing the channel 19.

[0044] In use, the resistor 5 heats the inside of the chamber 29 so as to obtain a (partial) evaporation of the vaporizable substance while the user inhales the gas through the opening 33.

[0045] In accordance with a further aspect of the present invention, a smoking article 2, which comprises the main body 3 (reusable) and the cartridge 4 as defined above is also provided.

[0046] In particular, the main body 3 comprises at least one electrical connector 7 in contact with the connector 6. More precisely, the main body 3 comprises two connectors 7, each in contact with a respective connector 6.

[0047] The main body 3 comprises, furthermore, a source of electricity (in particular a battery - of a type known per se and not illustrated) electrically connected to the connector/s 7.

[0048] Typically, the main body 3 and the cartridge 4 are connected by a mechanical connection system (of a type known per se and not illustrated) of releasable type (e.g. a screwing system).

Claims

1. A vaporizer for a smoking article (2), which is electrically powered and comprises a reusable main body (3) and a cartridge (4) containing a vaporizable substance; the vaporizer (1) comprises at least one electrical resistor (5), which is designed to generate heat, at least one first electrical connector (6), which is designed to come into contact with at least one second electrical connector (7) of the main body, and at least one electrical connection (8) to supply the electrical resistor (5) with power; the vaporizer (1) being **characterized in that** it has a first portion (9), which comprises the electrical con-

nection (8), the electrical resistor (5), at least one third electrical connector (10), which is electrically connected to the electrical connection (8), and a support (11) comprising a material that is substantially electrically non-conductive, on which the third electrical connector (10) is arranged; and a second portion (12), which comprises the first electrical connector (6), a fourth electrical connector (13), which is electrically connected to the first electrical connector (6), and a base element (14) comprising a material that is substantially electrically non-conductive, on which the first and the fourth connectors (6, 13) are arranged; said support (11) and said base element (14) being distinct from one another; the third and the fourth electrical connectors (10, 13) being connected to one another by means of a male-female coupling, so as to keep the first and the second portions (9, 12) together and to have a continuity in the electrical connection from the first electrical connector (6) to the electrical resistor (5).

2. A vaporizer according to claim 1, wherein said electrical connection (8) is at least partially covered by a material that is substantially electrically insulating.
3. A vaporizer according to claim 1 or 2, wherein the electrical connection (8) is at least partially embedded in the support (11); said third electrical connector (10) projecting from the support (11).
4. A vaporizer according to any one of the previous claims, and comprising a fibrous material (15) (e.g. cotton or glass fibre), which is arranged so as to extend in the area of the electrical resistor (5).
5. A vaporizer according to any one of the previous claims, wherein the support (11) has a first segment (16), where the third electrical connector (11) and the electrical connection (8) are arranged; a seat (17) (a depression); and a second segment (18), which is arranged on the opposite side of the seat (17) relative to the first segment (16); in particular, the first segment (16) extending from the third electrical connector (10) to the electrical resistor (5).
6. A vaporizer according to claim 5, and comprising a covering element (24), which is mounted in the area of the seat (17), so as to at least partially cover the seat (17) and partially define two side openings (25); in particular, the fibrous material (15) extending through the side openings (25).
7. A vaporizer according to claim 5 or 6, and comprising a fibrous material (15) (e.g. cotton or glass fibre), located (lodged) in the area of said seat (17).
8. A vaporizer according to any one of claims 5 to 7, wherein the electrical resistor (5) is located (lodged)

in the area of said seat (17).

9. A vaporizer according to any one of previous claims, wherein the support (11) comprises a bearing element (26), where the electrical connection (8) is at least partially housed and on which the third electrical connector (10) is arranged, and a tubular element (27), which is designed to allow the passage of gas and is mounted (in an interlocking manner) on the bearing element (26). 5 10
10. A vaporizer according to any one of the previous claims, and comprising at least two first electrical connectors (6) (each designed to be coupled to a respective second electrical connector (7) of the main body), at least two third electrical connectors (10), at least two fourth connectors (13) (each coupled to a respective third connector), and at least two electrical connections (8) (each electrically connected to a respective third connector (10) and to a respective end of the resistor). 15 20
11. A cartridge for a smoking article, which is electrically powered and comprises a reusable main body (3) and the cartridge (4); the cartridge (4) contains a substance to be vaporized and comprises a vaporizer (1) according to any one of the previous claims. 25
12. A cartridge according to claim 11, and comprising an absorbent material (30) wetted with the vaporizable substance. 30
13. A smoking article, which is electrically powered and comprises a reusable main body (3) and a cartridge (4) according to claim 11 or 12. 35
14. A smoking article, which is electrically powered and comprises a reusable main body (3), a cartridge (4) containing a vaporizable substance and a vaporizer (1) according to any one of claims 1 to 10. 40

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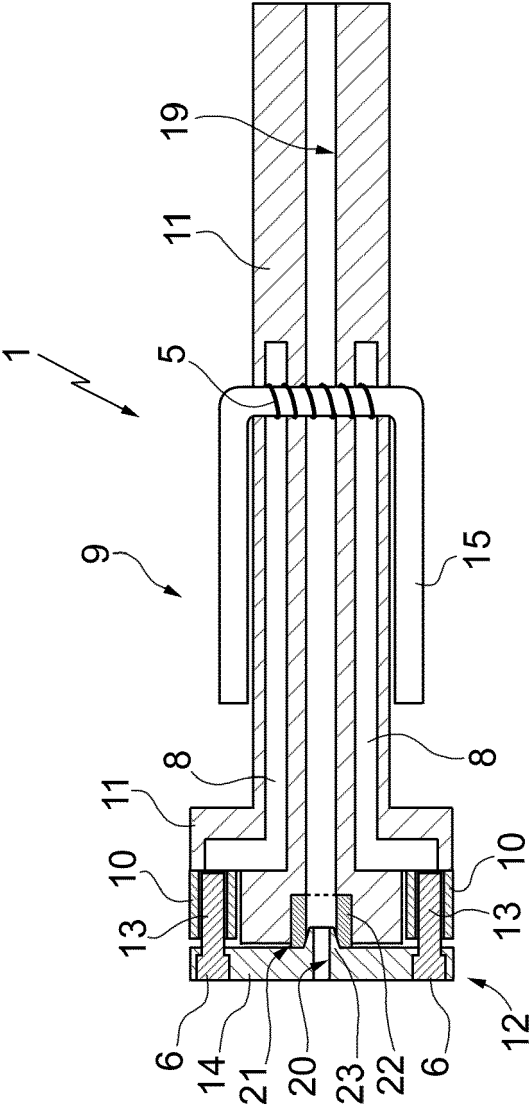


FIG.1

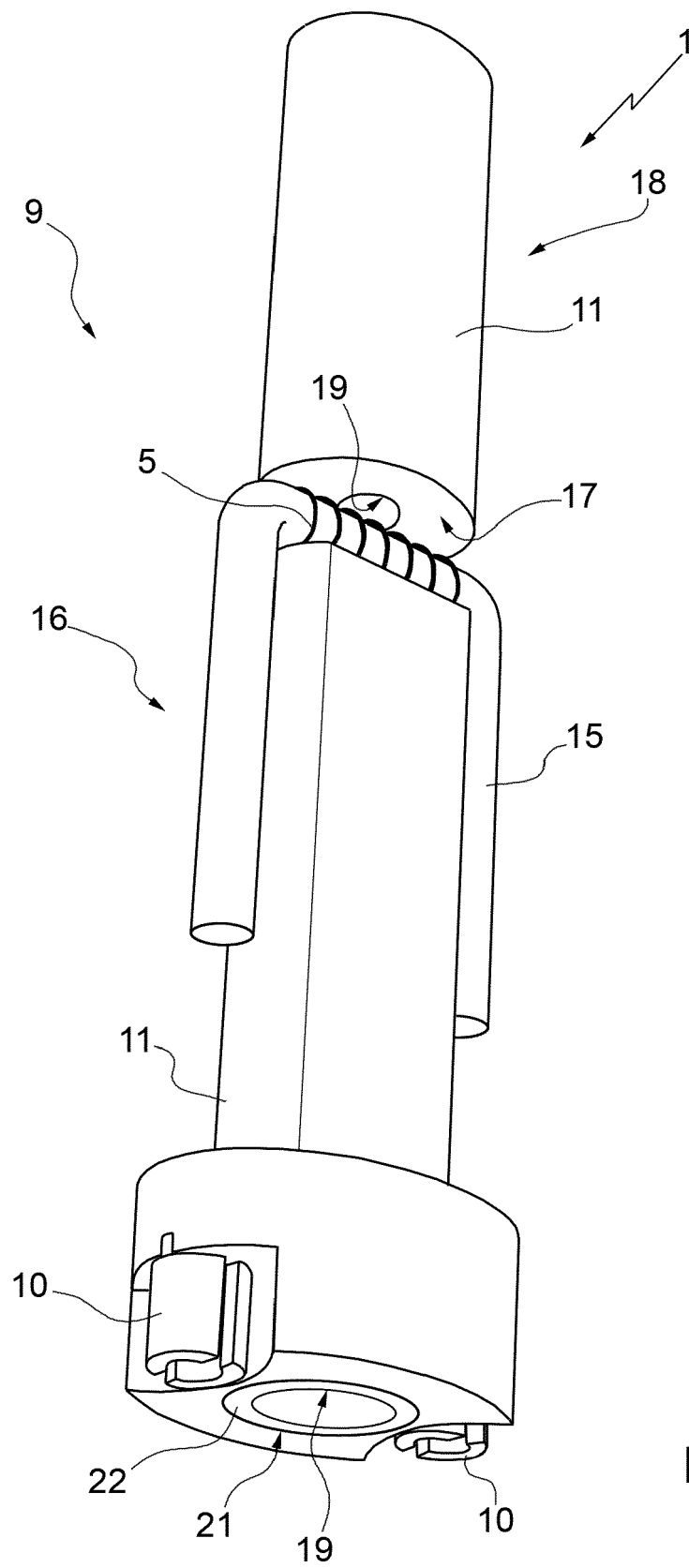


FIG.2

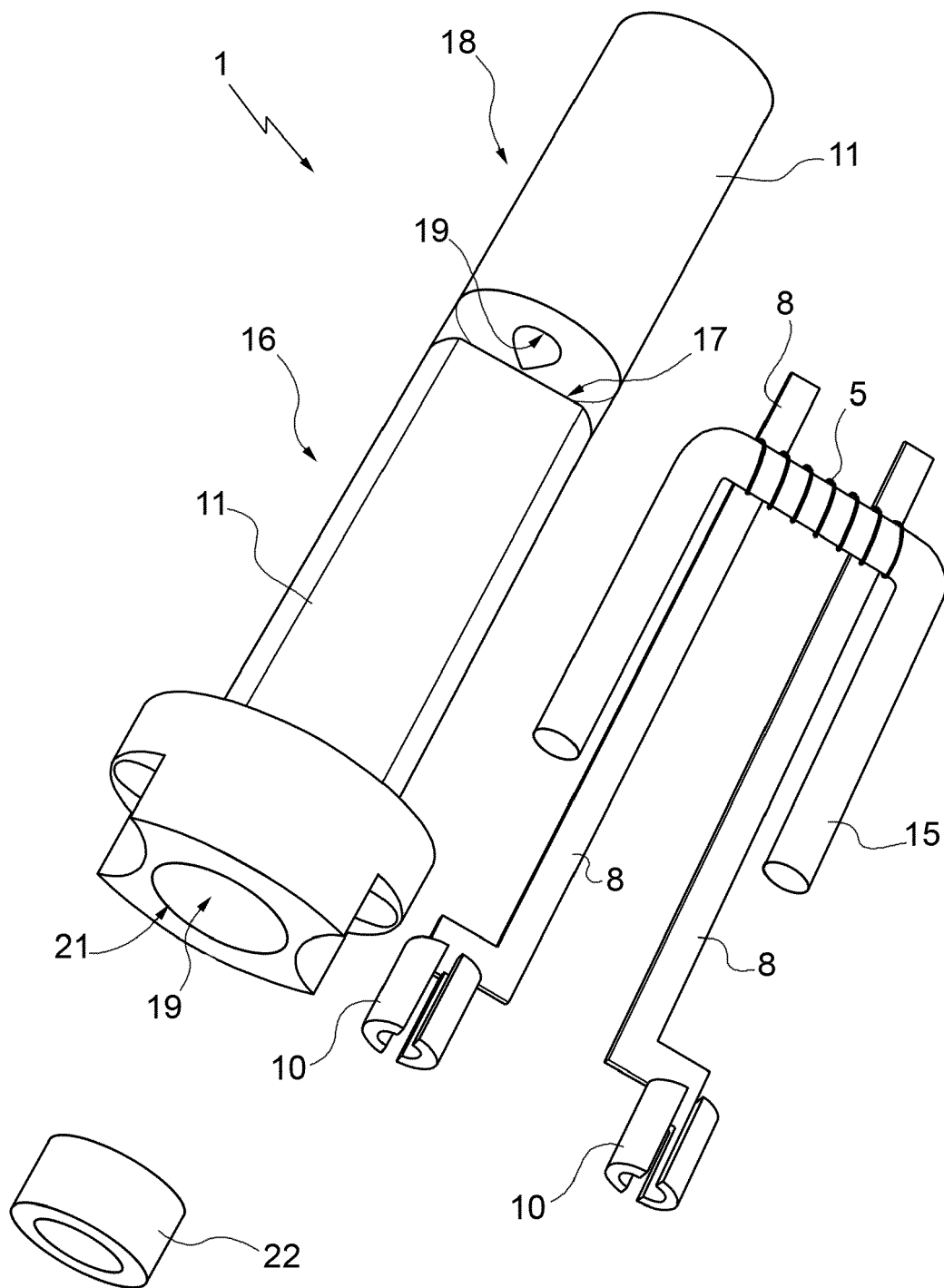
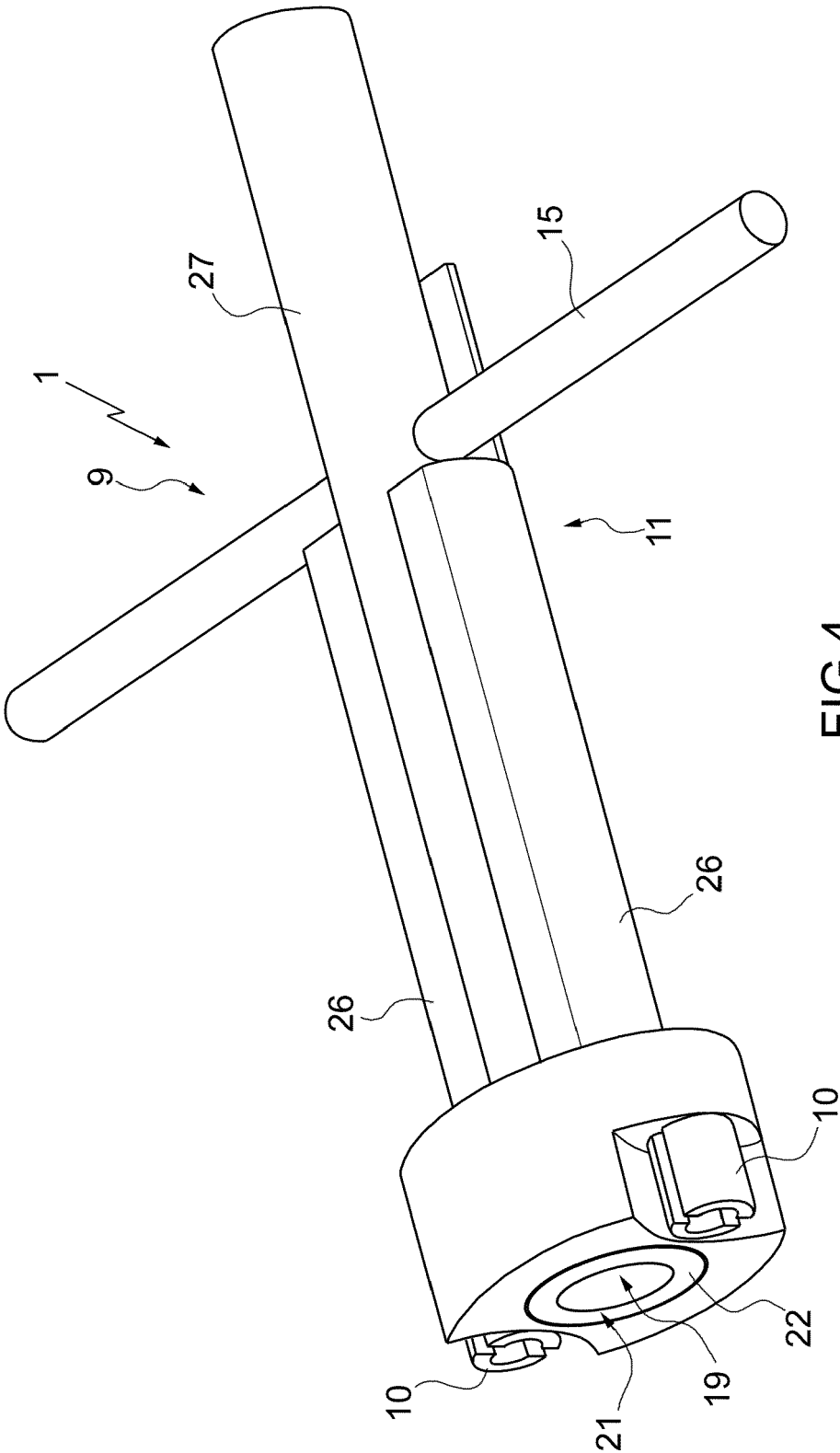


FIG.3



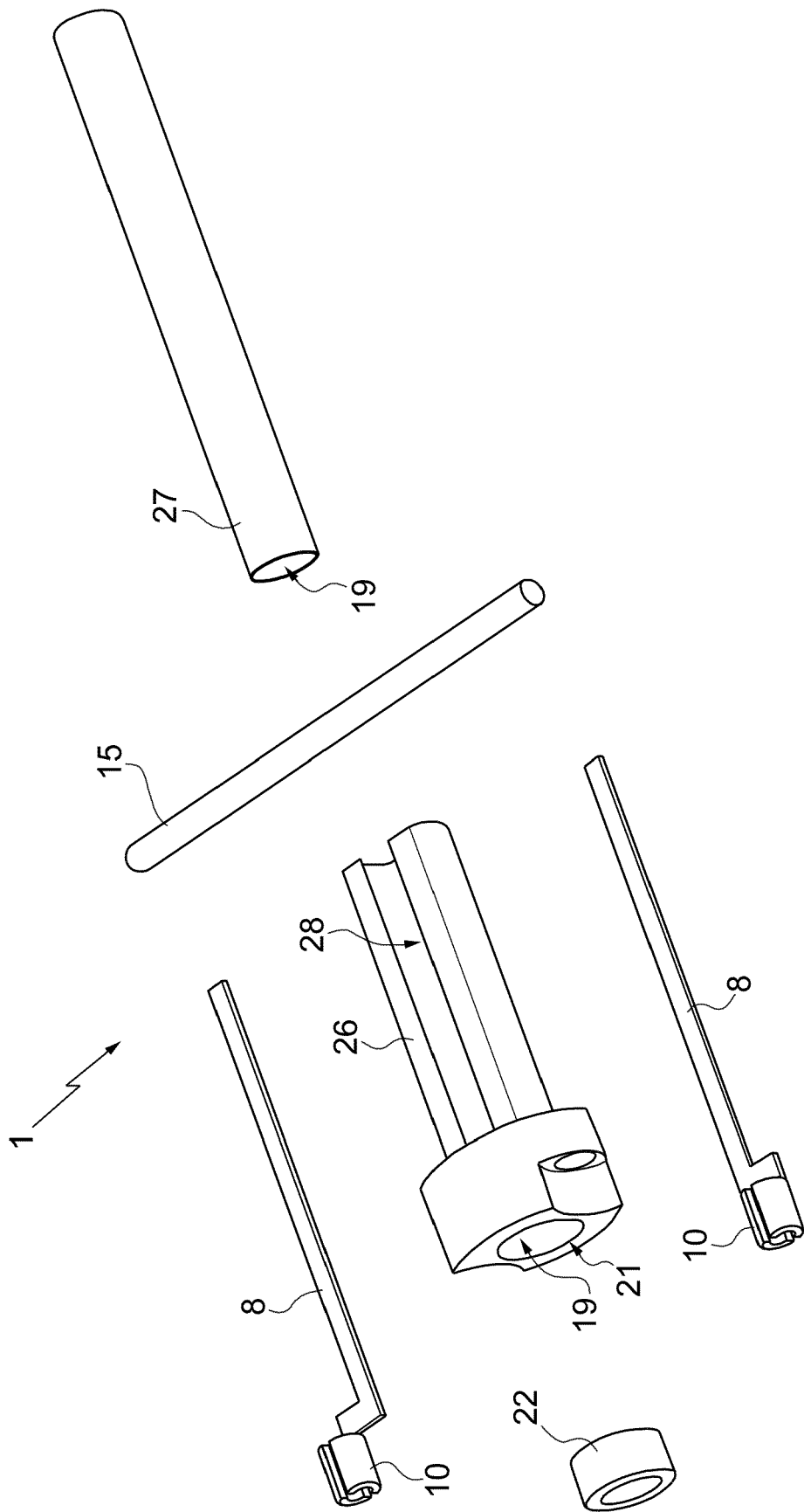


FIG.5

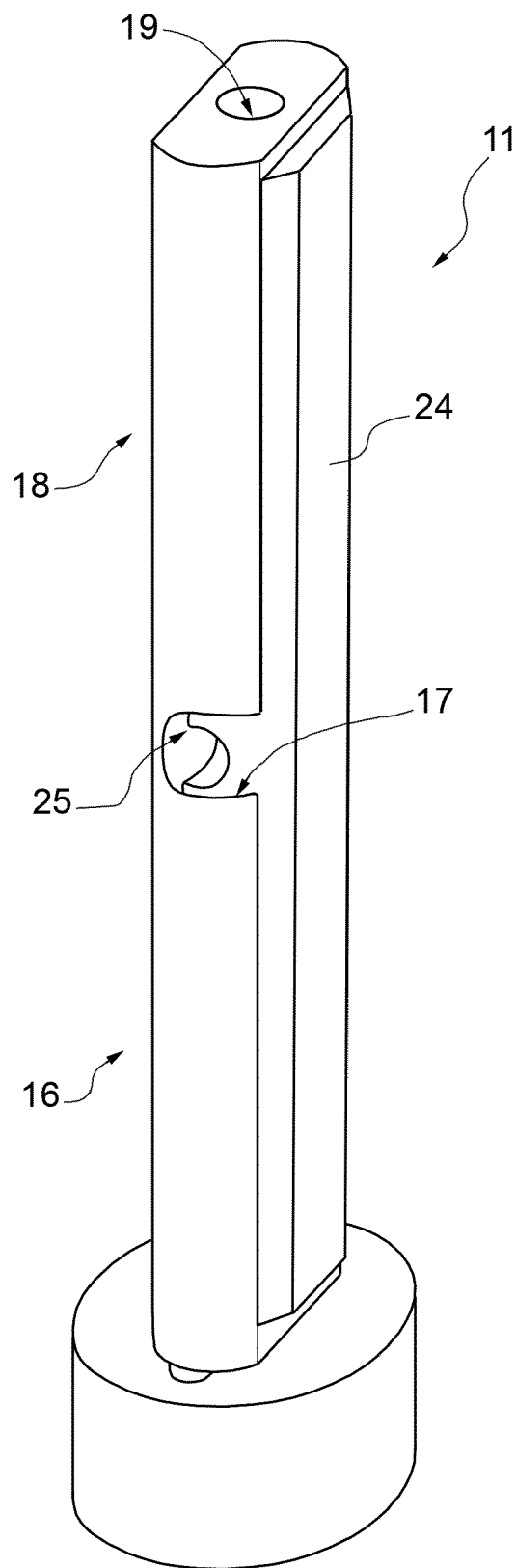


FIG.6

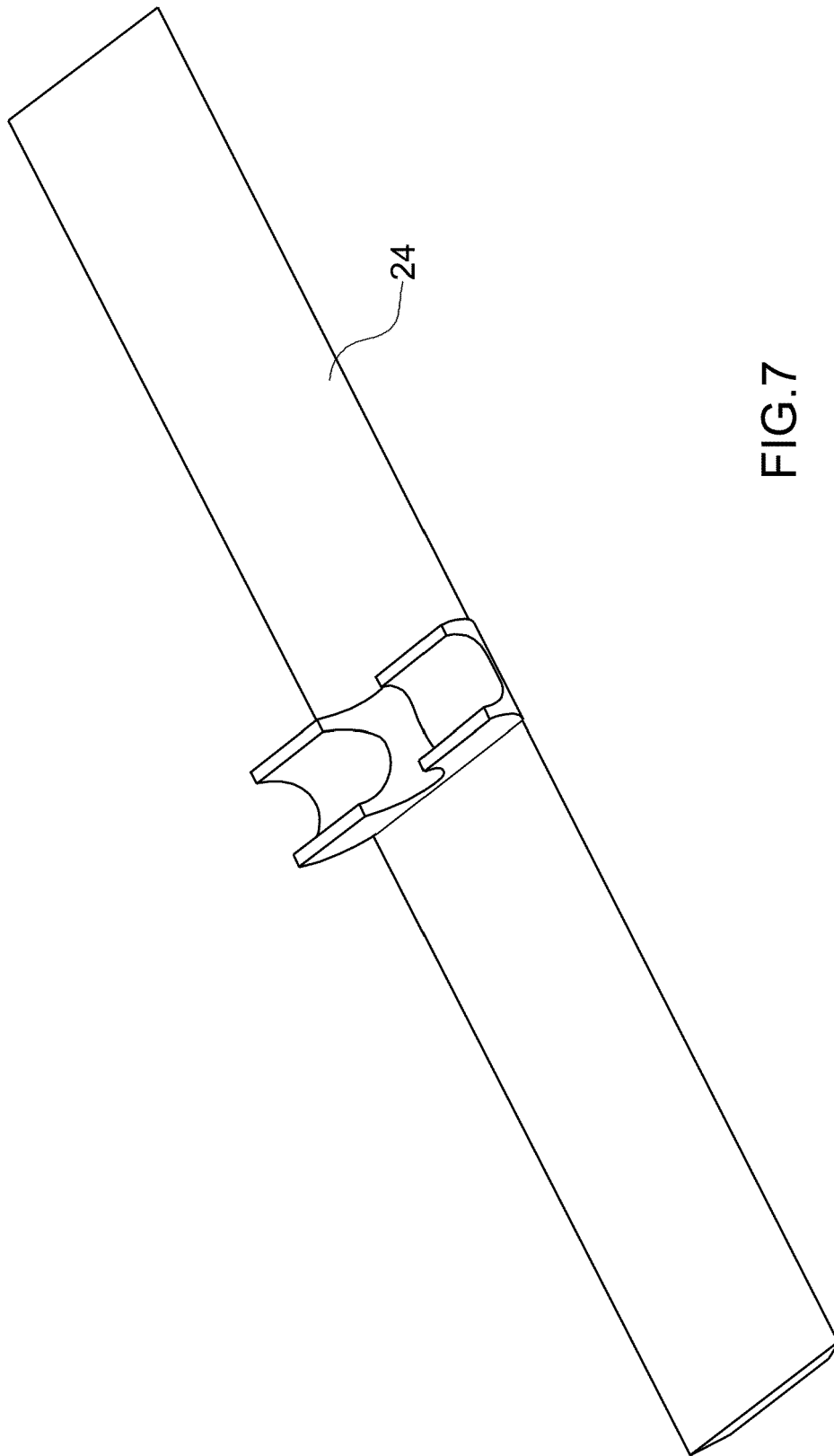


FIG. 7

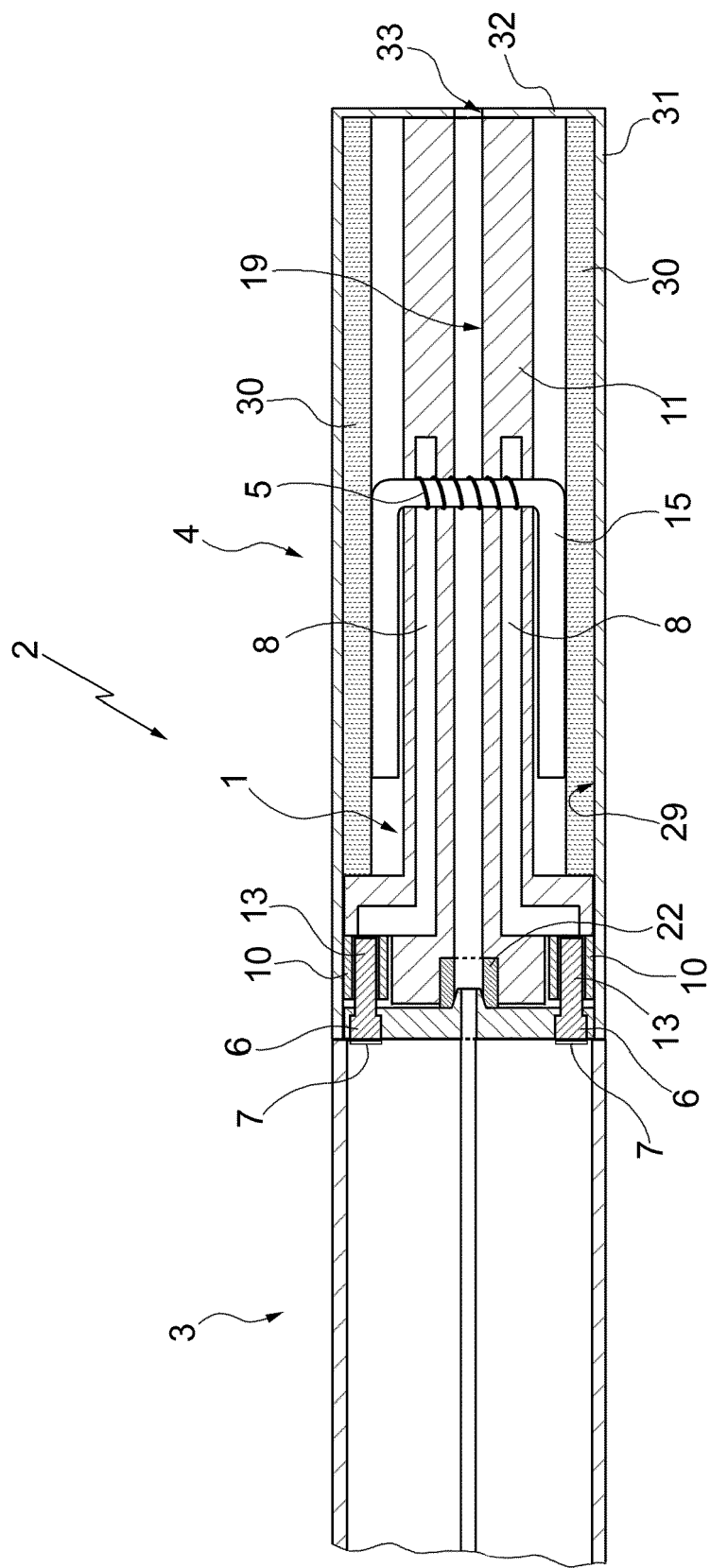


FIG.8



EUROPEAN SEARCH REPORT

 Application Number
 EP 16 20 3324

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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 5 May 2017	Examiner Marzano Monterosso
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 16 20 3324

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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