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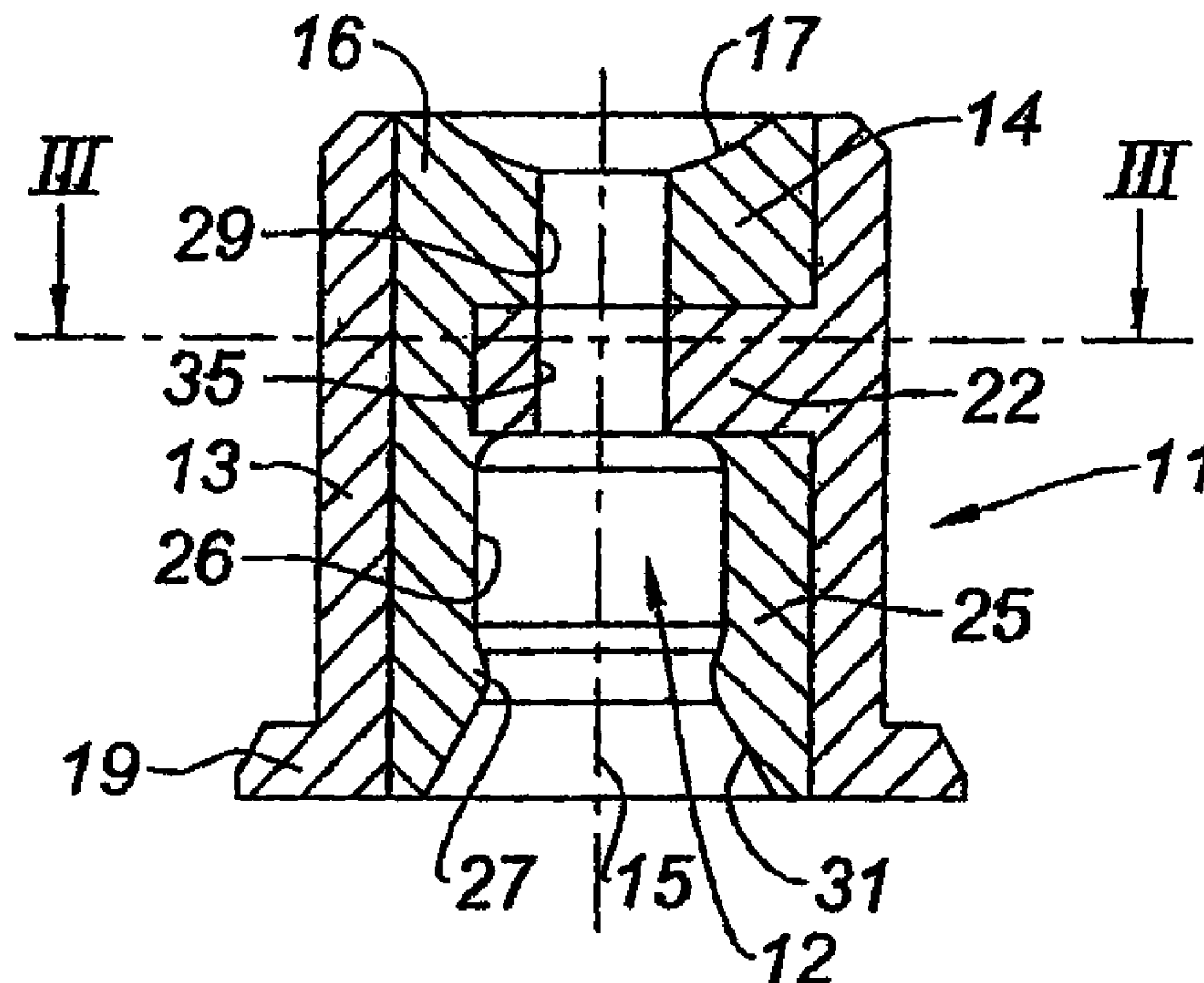
(72) Inventeur/Inventor:
HERELIER, PATRICK, FR

(73) Propriétaire/Owner:
SOCIETE DE PROSPECTION ET D'INVENTIONS
TECHNIQUES SPIT, FR

(74) Agent: FINLAYSON & SINGLEHURST

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(54) Title: SEALING CONNECTOR AND ASSEMBLY CONSISTING OF A TRANSMISSION MEMBER, A GAS
CARTRIDGE AND AN ADAPTER COMPRISING THE CONNECTOR



(57) Abrégé/Abstract:

The sealing connector ensures sealing between a gas cartridge having an outlet fitting and a transmission member for filling a combustion chamber of a gas fastening device having an inlet -fitting with gas and includes two internal sealing sleeves (12) for receiving the two fittings, at least one (16) of which is made of flexible material, with, at the bottom- of this sleeve (16), a flexible transverse annular partition (14) for dimensional adjustment, and an external slide (13). A rigid transverse annular partition (22) is provided at the bottom of the other (25) of the two sleeves to serve as a support for a fitting. The invention also relates to an assembly comprising the cartridge, a transmission member and an adapter comprising the connector.

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(71) Applicant (for all designated States except US): **SOCIETE DE PROSPECTION ET D'INVENTIONS TECHNIQUES SPIT** [FR/FR]; 150 Route de Lyon, F-26501 Bourg-les-Valence (FR).

(72) Inventor; and

(75) Inventor/Applicant (for US only): **HERELIER, Patrick** [FR/FR]; 7, rue du Vignau, F-07500 Saint-Jean-De-Muzols (FR).

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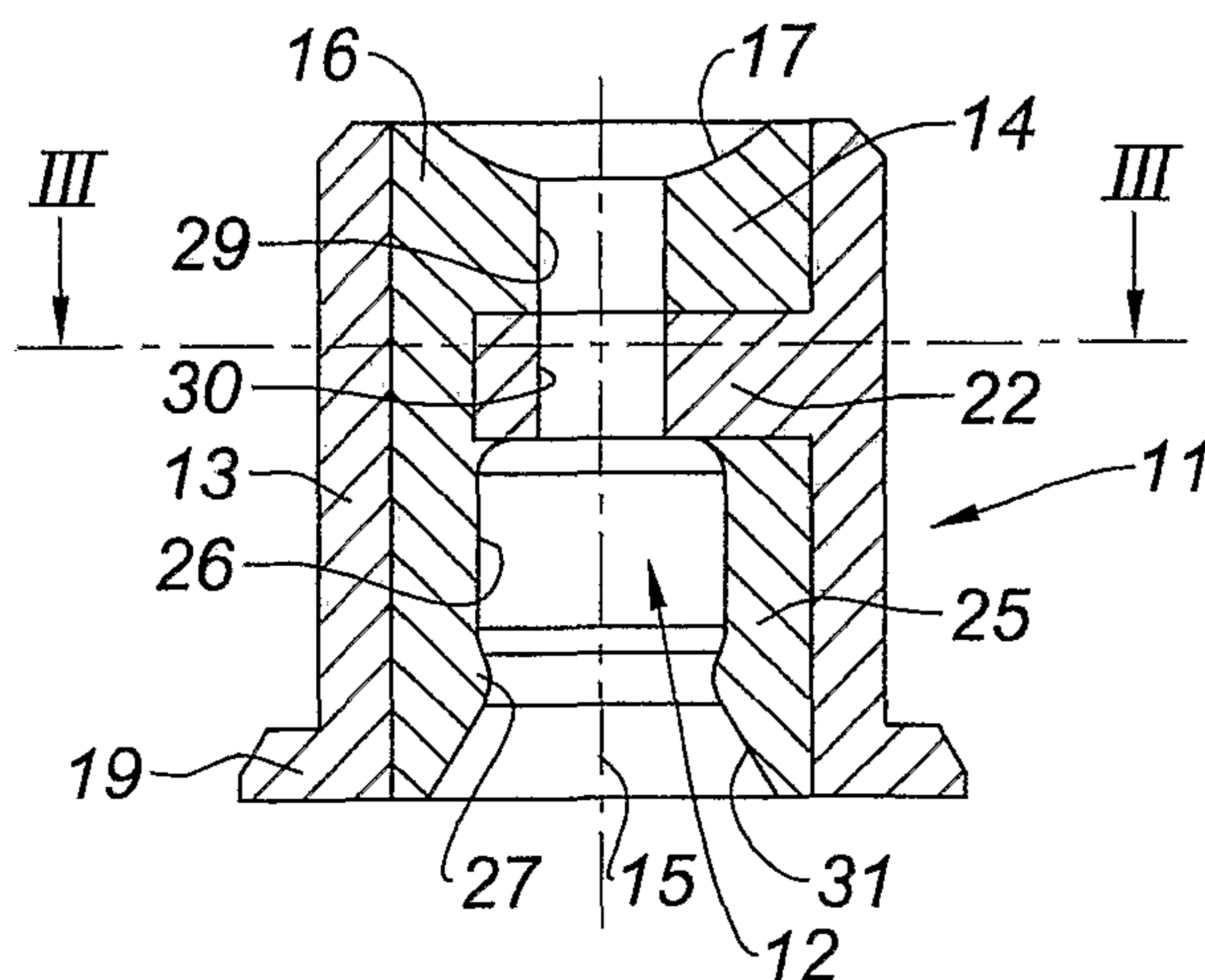
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(54) Title: SEALING CONNECTOR AND ASSEMBLY CONSISTING OF A TRANSMISSION MEMBER, A GAS CARTRIDGE AND AN ADAPTER COMPRISING THE CONNECTOR



(57) Abstract: The sealing connector ensures sealing between a gas cartridge having an outlet fitting and a transmission member for filling a combustion chamber of a gas fastening device having an inlet-fitting with gas and includes two internal sealing sleeves (12) for receiving the two fittings, at least one (16) of which is made of flexible material, with, at the bottom- of this sleeve (16), a flexible transverse annular partition (14) for dimensional adjustment, and an external slide (13). A rigid transverse annular partition (22) is provided at the bottom of the other (25) of the two sleeves to serve as a support for a fitting. The invention also relates to an assembly comprising the cartridge, a transmission member and an adapter comprising the connector.

**SEALING CONNECTOR AND ASSEMBLY CONSISTING OF A
TRANSMISSION MEMBER, A GAS CARTRIDGE AND AN ADAPTER
COMPRISING THE CONNECTOR**

The invention arises from a problem encountered with sealing connectors in gas fastening devices, mounted between the gas cartridge and the solenoid valve for filling the combustion chambers of these devices in order to ensure sealing of the duct extending through the outlet and filling fittings of the cartridge and the solenoid valve. The term "solenoid valve" is used here for the sake of simplicity, although it could also be a simple mechanical valve and, more generally, any other member for transmitting the gas from the cartridge towards the combustion chamber.

Possible fastening devices are, e.g. nail drivers for applications with wood.

The connectors in question that are described in U.S. Patent 6,217,085 include a double internal sealing sleeve for receiving the two fittings made of flexible material with a generally central transverse annular partition for dimensional adjustment and an external slide in which the double sleeve is mounted.

The slide ensures that the shape or morphology of the flexible double sleeve is maintained and allows the connector to slide in the adapter of the cartridge, by virtue of which, when the cartridge is removed from the device, the sleeve made of flexible material does not remain "stuck" against the adapter and does not hold the fitting of the cartridge in the gas exhaust position.

The problem encountered by the Applicant is linked to the risk, on the one hand, that the fitting of the cartridge will pierce the central partition for dimensional adjustment made of flexible material and, on the other hand, that this central partition will be deformed to such an extent that it will obstruct the duct for the passage of gas.

In the end, the ideal solution would be to propose a sealing connector made of one single material sufficiently flexible to ensure sealing between the two fittings, but sufficiently rigid to prevent the central partition from being damaged or deformed and blocking one of the fittings for the passage of gas:

Because no material of this kind is available today, at least at an acceptable cost, the Applicant proposes his invention.

In a broad aspect, the invention provides a sealing connector for ensuring sealing between a gas cartridge having an outlet fitting and a transmission member for filling a combustion chamber of a gas fastening device having an inlet fitting with gas. There are internal sealing sleeves for receiving the outlet fitting and the inlet fitting, one of the sleeves being of flexible material, and having at a bottom of the one sleeve a flexible transverse annular partition for dimensional adjustment. The connector has an external slide, wherein the connector further has adjacent a bottom of the other of the two sleeves a rigid transverse annular partition to serve as a support for one of the fittings.

When the outlet fitting of the cartridge is engaged in the sleeve on the side of the rigid partition, there is no risk that it will pierce the flexible partition for dimensional adjustment, by virtue of the rigid partition inserted between it and the flexible partition and against which it bears.

In the preferred embodiment of the connector of the invention, the rigid partition is integral with the slide.

The two flexible and rigid partitions are advantageously contiguous.

In a first embodiment, the two sleeves for receiving the two fittings are joined together to form a double internal sealing sleeve formed in one piece from flexible material.

In this case, it is advantageous that the double sleeve made of flexible material is an injection-moulded part and the rigid supporting partition is provided with orifices for the passage of the injection-moulded material of the double sleeve.

In a variant embodiment, the sleeve at the bottom of which the rigid transverse annular partition is situated forms one single piece made of rigid material with the external slide, the internal sleeve extending inside the external slide with play.

The invention also relates to an assembly consisting of a transmission member for filling the combustion chamber of a gas fastening device with gas, a gas cartridge, an adapter and, mounted in the adapter, a connector for providing sealing between the transmission member and the cartridge, the sealing connector being the connector of the invention.

The invention will be more readily understood with the aid of the following description of the preferred embodiment of the connector of the invention and a variant, with reference to the accompanying drawings, in which:

Figure 1 is a perspective view of an assembly consisting of the solenoid valve of a fastening device, a gas cartridge and the connector of the invention;

Figure 2 is an axial section of the connector of the assembly of Figure 1;

Figure 3 is a transverse section of the connector of Figure 2 along the line III-III;

Figure 4 is a diagrammatic axial section of a first variant embodiment of the connector of the invention, and

Figure 5 is a diagrammatic axial section of a second variant embodiment of the connector of the invention.

The connector which will now be described with reference to Figures 1 to 3 is intended to ensure sealing between a propellant cartridge 20 and a transmission member which is a solenoid valve 30 for filling the combustion chamber of a gas fastening device. The reference numeral 30 does not in fact designate the solenoid valve itself in the drawings, but hooking legs for the adapter, which will be described hereinafter, for connecting the solenoid valve and the cartridge.

A fastening device for fastening fastening elements by means of a piston driven by compressed gas comprises an internal combustion engine comprising a combustion chamber intended to be supplied with compressed gas from a gas cartridge 20 in order to drive the piston itself intended to drive the fastening elements.

In this particular example, a connecting adapter 1 intended to connect the solenoid valve 30 for the admission of the compressed gas into the combustion chamber of the fastening device and the compressed gas cartridge 20 is provided.

The cartridge 20 of generally cylindrical shape is provided in an internal casing with the compressed gas in the liquid state and between the internal casing and an external casing with a propellant. A circular edge 21 forms a continuation of the external cylindrical wall of the cartridge 20, at one of the ends of the latter. A male outlet

fitting 23 connected to the internal casing projects from the cartridge by means of a base 24 situated in the centre of the dish formed in the interior of the edge 21.

The solenoid valve 30 of generally cylindrical shape is provided at one of its ends with an inlet fitting 32 connected in the interior of the solenoid valve to an outlet fitting (not shown). This is in reality not exactly the inlet fitting of the solenoid valve, but an intermediate inlet fitting. The inlet fitting 32 is in this case a male fitting.

The adapter 1 serves as a support for the sealing connector 11 intended to receive the male outlet fitting 23 of the cartridge 20 and the male inlet fitting 32 of the solenoid valve 30.

The adapter 1, in this case formed in one piece from plastic, includes a flat, in this case, circular supporting base 2 supporting the chamber 3 for housing the sealing connector 11 open at both ends and extending along an axis 15 perpendicular to the supporting base 2 on one side of the latter.

A cylindrical skirt 5 having an axis 15 is connected to the supporting base 2 perpendicularly to the supporting base 2 on the side opposite that of the chamber 3. The external diameter of the skirt 5 is substantially equal to the internal diameter of the edge 21 of the fuel cartridge 20. The skirt 5 is moreover provided with a circumferential rib forming a boss 6 intended to engage with the internal wall of the edge 21.

The sealing connector 11 includes an internal sealing component 12 and an external slide component 13. The internal sealing component 12 is in this case a double sleeve formed in one piece intended to receive two sides of the two male fittings 23, namely the outlet fitting 23 of the cartridge and the inlet fitting 32 of the solenoid valve. The double sleeve 12 includes a transverse annular partition 14 for dimensional adjustment in fact disposed at the bottom of one of the two sleeves of the double sleeve, the latter 16 being intended to receive the inlet fitting 32 of the solenoid valve. The partition 14 is designed as a dish 17 on the side of the opening of the sleeve 16 in order to receive a spherical hooking portion 18 for the inlet fitting (intermediate fitting) 32.

The double sleeve 12 with its partition 14 for dimensional adjustment is made of flexible material, e.g. a thermoplastic material which can be vulcanised and injected and, more generally, an injectable flexible polymer.

The external slide component is a slide 13 in which the double sleeve 12 extends without play, intended to hold the shape of the flexible double sleeve 12. The slide 13 has a generally tubular shape with, at one end, an external annular rim 19 for holding it in the adapter 1, in cooperation with an internal annular shoulder formed on the adapter. The slide 13 includes a transverse annular partition 22 in fact disposed at the bottom of the other 25 of the two sleeves of the internal double sleeve 12 intended to receive the outlet fitting 23 of the cartridge.

In this connection, an internal lip 27 cooperating with the external wall of the fitting 23 of the cartridge is formed on the internal wall 26 of the sleeve 25 close to the opening of the sleeve and its bevelled rim 31 in order to perfect the seal.

The slide 13 with its partition 22 is made of rigid material, e.g. a polypropylene. This rigid transverse partition 22 thus serves as a support for one of the fittings, in this case the outlet fitting 23 of the cartridge 20. When the fitting 23 of the cartridge is engaged in the sleeve 25, there is no risk that it will pierce the flexible partition 14 as the rigid partition 22 is inserted between the flexible partition 14 and the fitting 23.

The rigid transverse partition 22 is provided with orifices 28 for the passage of the material of the double sleeve 12, in this case injection-moulded material.

The central bore 29 extending through the flexible transverse partition 14, the bore 35 which forms a continuation thereof and extends through the rigid transverse partition 22 and the bore formed by the internal wall 26 of the sleeve 25 which forms a continuation of the bore 35 form the duct for the passage of gas of the sealing connector 11.

In the example of the connector shown in Figures 1-3, not only is the rigid transverse partition 22 integral with the slide 13, but the assembly formed by this partition and the slide is formed in one piece, in this case by injection moulding. In addition, it will be noted that the two transverse partitions, namely the flexible partition 14 and the rigid partition 22, are contiguous.

- The connection of the inlet fitting 32 of the solenoid valve 30 and the outlet fitting 23 of the gas cartridge 20 will now be described.

In order to mount the adapter 1 on the cartridge 20, the fastening skirt 5 is inserted inside the edge 21 of the cartridge 20. The circumferential boss 6 is hooked and clipped on to the internal wall of the edge 21.

When the adapter 1 is fastened to the cartridge 20, the outlet fitting 23 of the cartridge 20 is guided by the bevelled rim 31 of the sleeve 25 until the edge 33 of the fitting 23 comes to bear against the rigid partition 22.

The adapter 1 is then slid on to the solenoid valve 30 and the connector 11 is slid on to the male inlet fitting 32 of the solenoid valve, the fitting engaging in the sleeve 16 of the connector 11 until the spherical portion 18 of the fitting is housed in the dish 17 of the sleeve 16 and therefore the adapter is hooked on to the fitting.

Finally, the connector 11 is mounted on the cartridge 20 and the solenoid valve 30 by a relative movement of translation of the three elements.

If, for some reason, it is desired to remove the cartridge 20 from its housing before it is empty, by virtue of the slide 13, the connector 11 will be retained in the adapter 1 and the outlet fitting 23 will return to its closing position prior to mounting.

The first variant embodiment of the connector of Figure 4, shown in very diagrammatic form, also includes a tubular slide 113 in which a double sleeve 112 is housed, with its flexible transverse partition 114 for dimensional adjustment. The connector 111 of this Figure 4 is distinguished from that of Figures 1-3 in that the slide includes two rigid transverse partitions, one 122 serving as a support for the outlet fitting of the cartridge and the other 123, adjacent to the flexible transverse partition 114, to reinforce it. The two rigid transverse partitions 122, 123 are disposed at a short distance from one another.

In the second variant embodiment of Figure 5, the connector 211 includes two sleeves 216 and 225 for receiving the fittings, but not formed in one piece. One, namely the connector 216, is made of flexible material in order to receive the inlet fitting 32 of the transmission member (solenoid valve) 30. The other, namely the connector 225,

is made of a rigid material in order to receive the outlet fitting 23 of the cartridge. The second rigid sleeve 225 has the particular feature that it is formed in one piece with the external slide 213. It extends inside the latter with, in this case, annular play 250. As for the rest, the flexible annular partition 214 for dimensional adjustment is once again situated at the bottom of the first flexible sleeve 216 and the rigid transverse annular partition 222 intended to serve as a support for the outlet fitting 23 of the cartridge is situated at the bottom of the second rigid sleeve 225.

As a result of the rigidity of the sleeve 225, sealing with the outlet fitting 23 of the cartridge is ensured essentially by an internal lip 227 cooperating with the external wall of the fitting.

In the embodiment of Figure 5, the connector is obtained by simple assembly; with no need for overmoulding, as in the case of the connectors of the other figures.

WHAT IS CLAIMED IS:

1. A sealing connector (1) for ensuring sealing between a gas cartridge (20) having an outlet fitting (23) and a transmission member (30) for filling a combustion chamber of a gas fastening device having an inlet fitting (32) with gas, including two internal sealing sleeves (16; 25) for receiving the outlet fitting and the inlet fitting, one (16;216) of the sleeves being of flexible material, and having at a bottom of said one sleeve (16; 216) a flexible transverse annular partition (14; 214) for dimensional adjustment, and the connector having an external slide (13; 213), wherein the connector further has adjacent a bottom of the other (25; 225) of the two sleeves a rigid transverse annular partition (22; 222) to serve as a support for one of the fittings.
2. The sealing connector according to claim 1, wherein the rigid partition (22; 222) is integral with the external slide (13; 213).
3. The sealing connector according to claim 1 or 2, wherein the flexible annular partition (14; 214) and the rigid annular (22; 222) partition are contiguous.
4. The sealing connector according to any one of claims 1 to 3, wherein the two sleeves (16; 25) are jointed together to form a double internal sealing sleeve (12) formed in one piece from flexible material.
5. The sealing connector according to claim 4, wherein both sleeves are of injection-moulded flexible material and the rigid annular supporting partition (22) is provided with orifices (28) for passage of the injection-moulded material.

6. The sealing connector according to claim 4 or 5, wherein the slide (113) includes two transverse rigid partitions (122, 123), one (122) of the rigid slide partitions acting as a stop for one of the fittings and the other (123) of the two rigid slide partitions, adjacent to the flexible annular partition (114) is for dimensional adjustment, and to reinforce the annular flexible partition.
7. The sealing connector according to claim 1, 2 or 3, wherein the sleeve (225) at the bottom of which the rigid transverse annular partition (222) is situated, forms one single piece made of rigid material with the external slide (213).
8. The sealing connector according to claim 7, further comprising an internal sleeve (225) formed in one piece with the external slide (213) and extending inside the external slide (213) with play (250).
9. An assembly consisting of a transmission member (30) for filling a combustion chamber of a gas fastening device with gas, a gas cartridge (20), an adapter (1) and, mounted in the adapter, a sealing connector (11; 111; 211) for providing sealing between the transmission member (30) and the cartridge (20), wherein the sealing connector is according to any one of claims 1 to 8.

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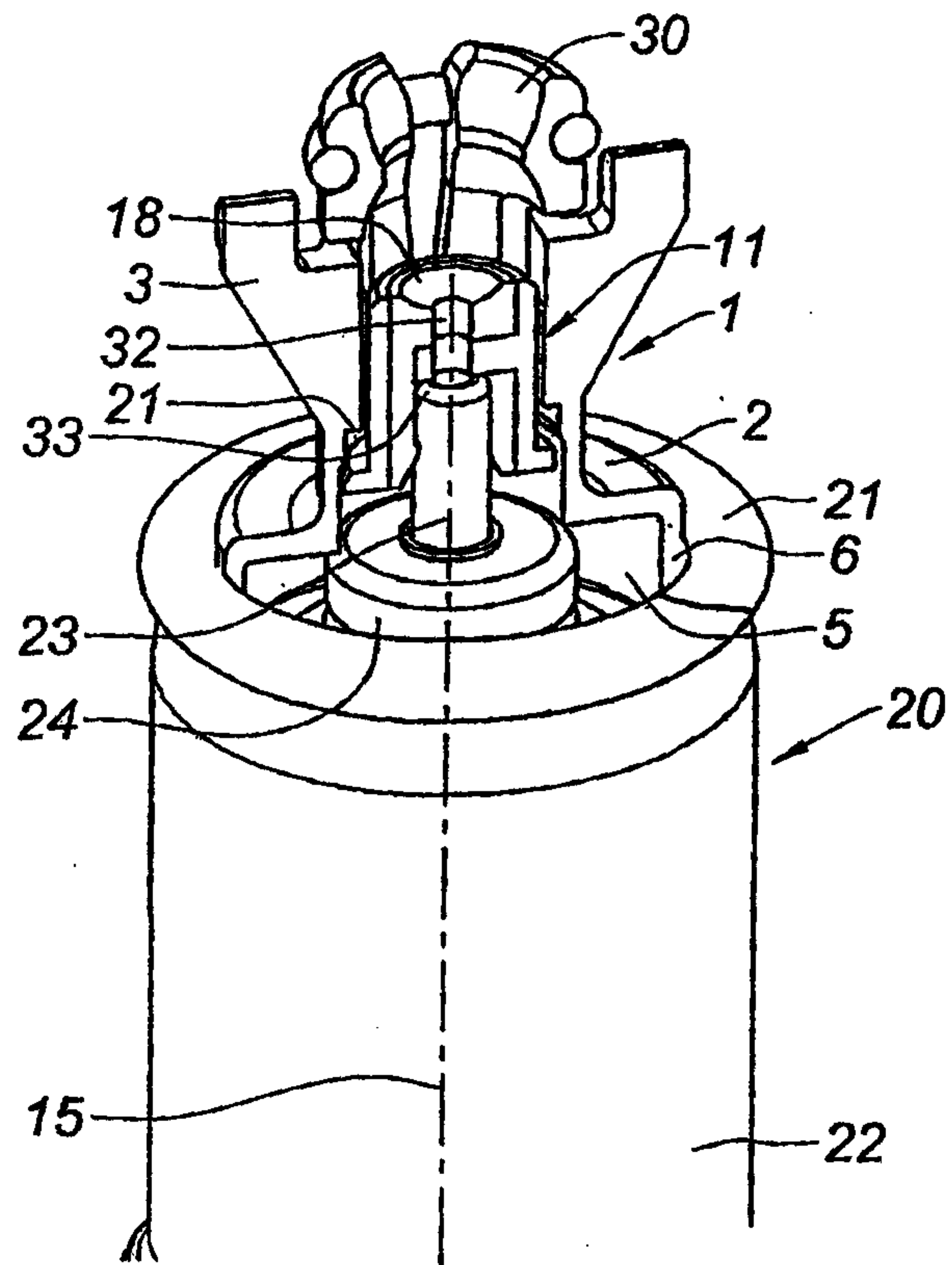


Fig. 1

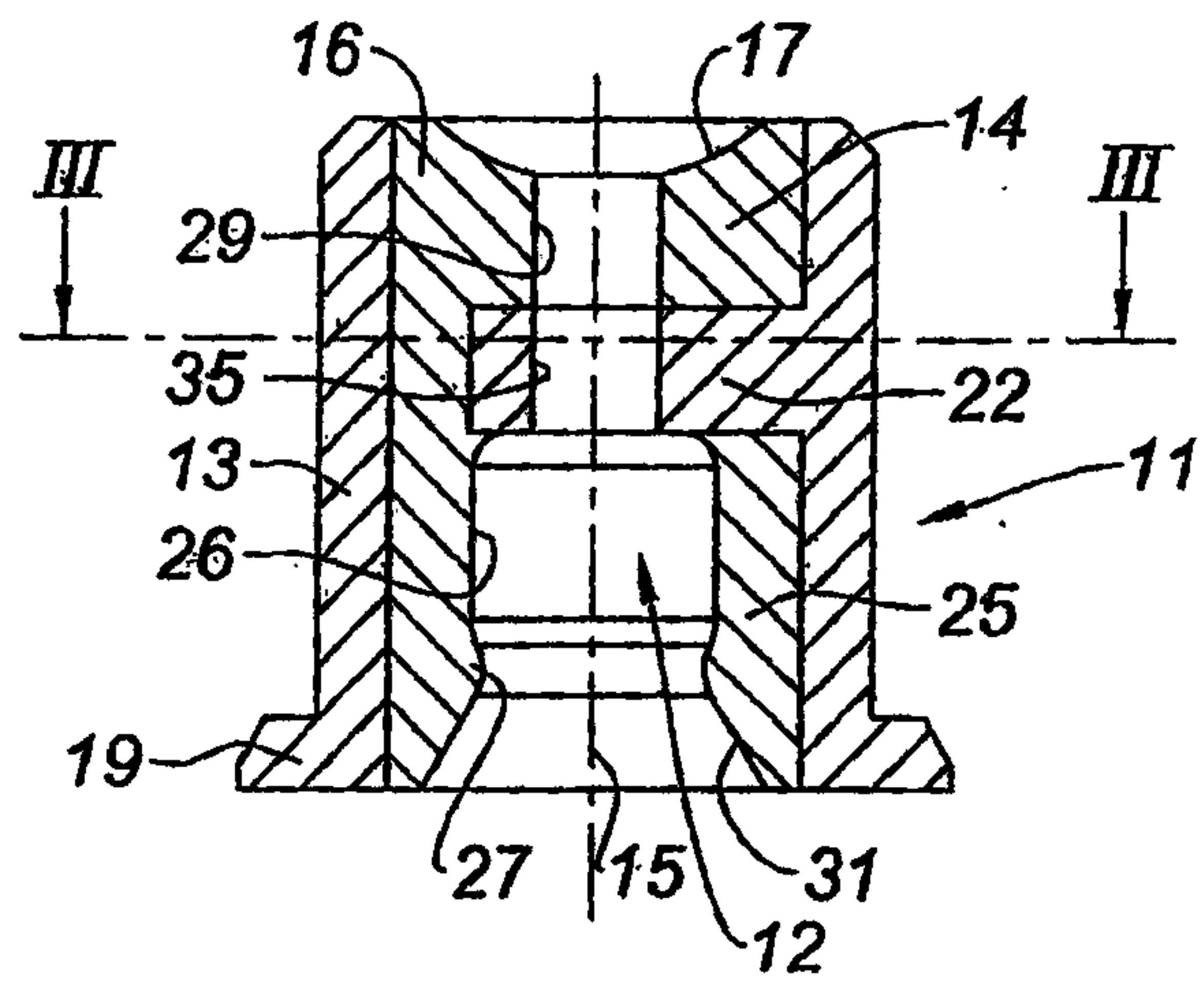


Fig. 2

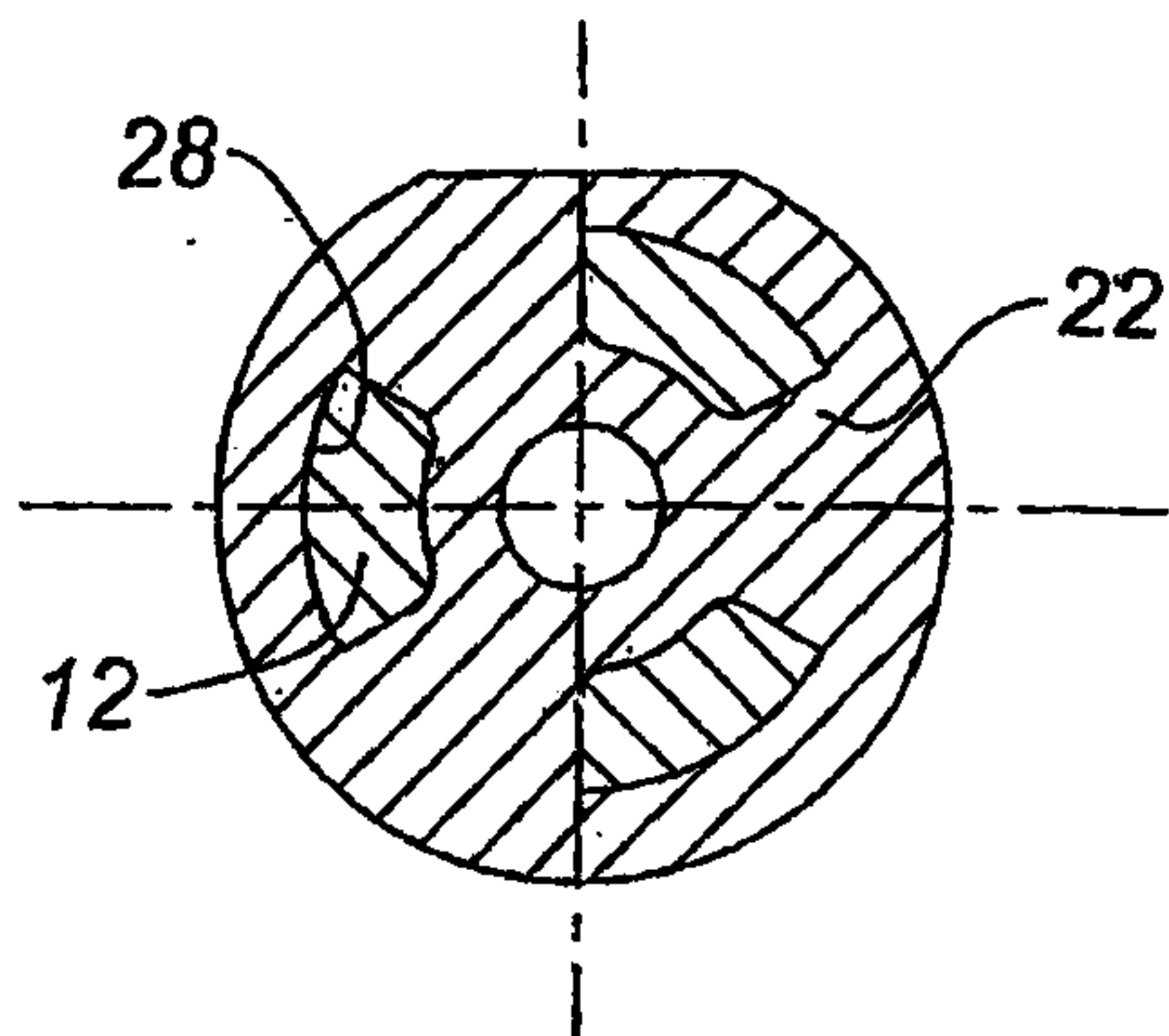


Fig. 3

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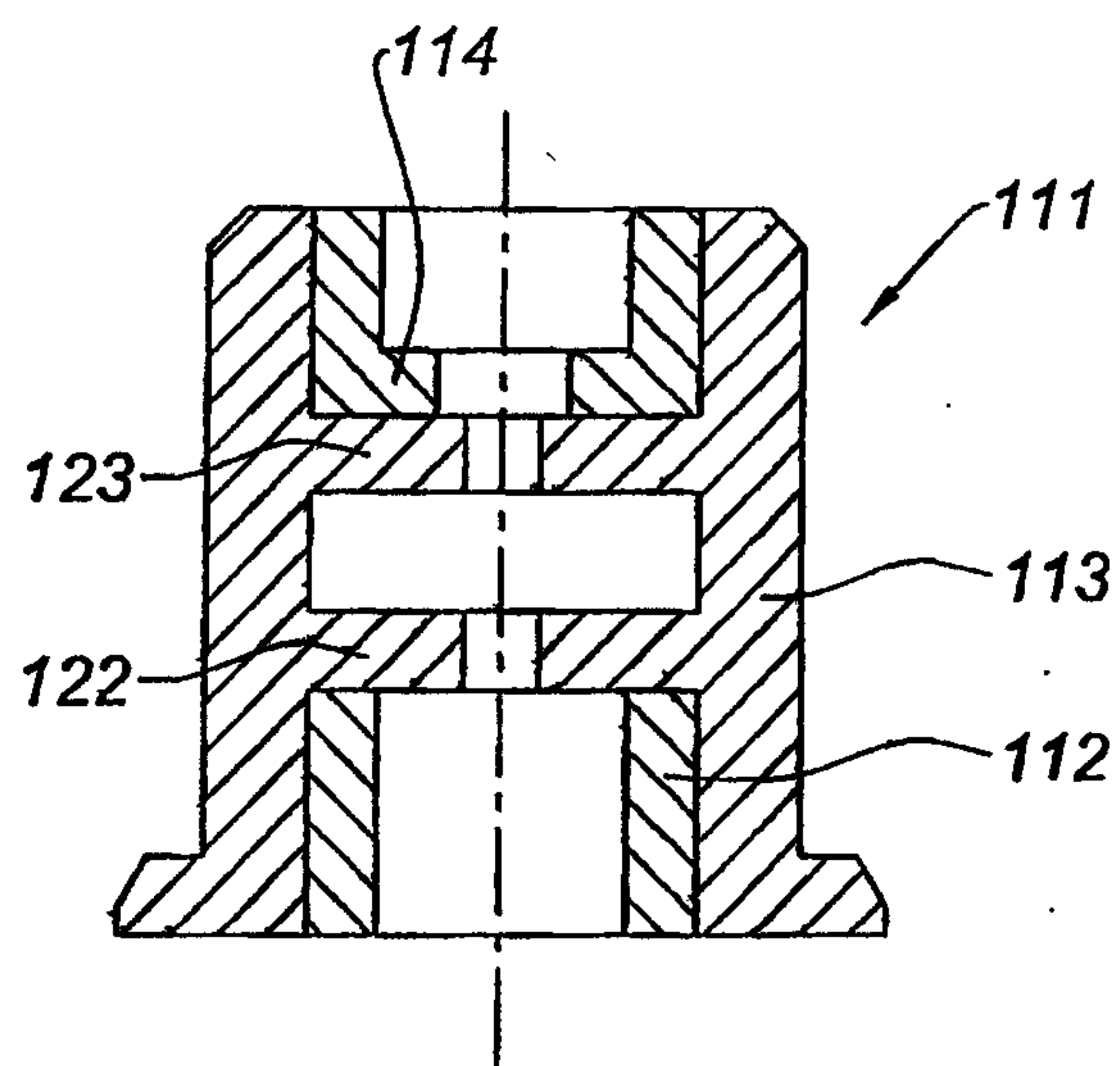


Fig. 4

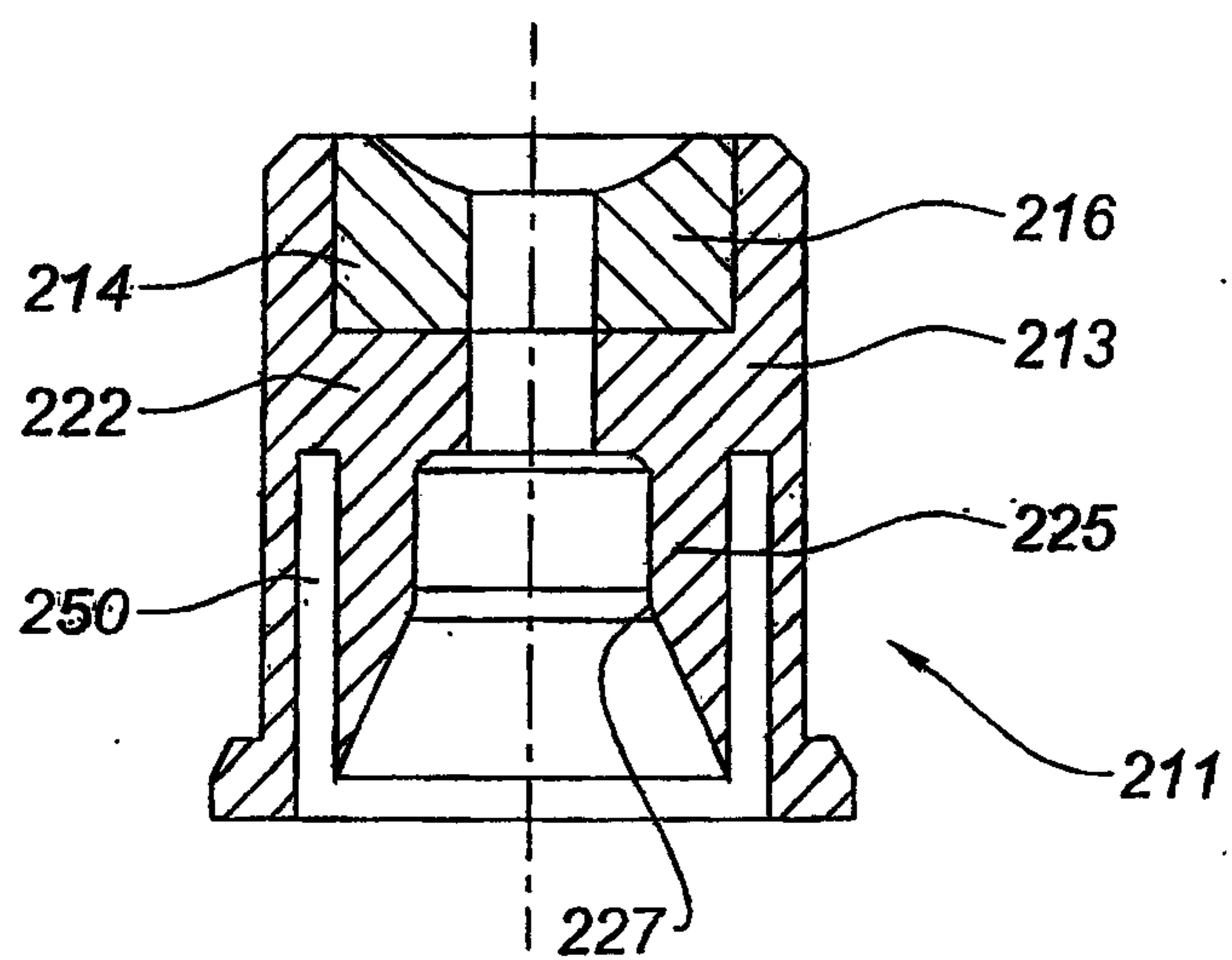


Fig. 5

