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(54) **Method for assembling a valve assembly of an injection valve and valve assembly of an injection valve**

Verfahren zur Zusammensetzung der Ventilanordnung eines Einspritzventils und Ventilanordnung eines Einspritzventils

Procédé d'assemblage d'un ensemble de soupape d'une soupape d'injection et ensemble de soupape d'une soupape d'injection

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Description

[0001] The invention relates to a method for assembling a valve assembly of an injection valve, and a valve assembly of an injection valve.

[0002] A valve assembly according to the preamble of claim 6 is disclosed in DE 10 2005 061 408 A1.

[0003] Injection valves are in wide spread use, in particular for internal combustion engines where they may be arranged in order to dose the fluid into an intake manifold of the internal combustion engine or directly into the combustion chamber of a cylinder of the internal combustion engine.

[0004] Injection valves are manufactured in various forms in order to satisfy the various needs for the various combustion engines. Therefore, for example, their length, their diameter and also various elements of the injection valve being responsible for the way the fluid is dosed may vary in a wide range. In addition to that, injection valves may accommodate an actuator for actuating a needle of the injection valve, which may, for example, be an electromagnetic actuator or piezo electric actuator.

[0005] In order to enhance the combustion process in view of the creation of unwanted emissions, the respective injection valve may be suited to dose fluids under very high pressures. The pressures may be in case of a gasoline engine, for example, in the range of up to 200 bar and in the case of diesel engines in the range of up to 2000 bar.

[0006] The object of the invention is to create a method for assembling a valve assembly of an injection valve and a valve assembly of an injection valve.

[0007] This object is achieved by the features of the independent claims. Advantageous embodiments of the invention are given in the sub-claims.

[0008] According to a first aspect the invention is distinguished by a method for assembling a valve assembly of an injection valve, the valve assembly comprising a valve body and a valve needle. The valve body has a central longitudinal axis, a cavity with a fluid inlet portion and a fluid outlet portion. The valve needle is axially movable in the cavity and prevents a fluid flow through the fluid outlet portion in a closing position and releases the fluid flow through the fluid outlet portion in further positions. The method comprises the following steps: providing the valve body and forming a recess in the valve body in a manner that the recess faces the central longitudinal axis, providing a needle guide element being designed to guide the valve needle in the cavity, arranging and aligning the needle guide element relative to the valve body in such a manner that the needle guide element is arranged in the cavity and one part of the needle guide element is arranged on a shoulder of the valve body facing away from the fluid outlet portion, deforming the part of the needle guide element in radial direction in such a manner that the part is getting into engagement with the recess in the valve body thereby fixedly coupling the needle guide element relative to the valve body.

[0009] This has he advantage, that a simple method for fixing the needle guide element to the valve body is available. A deformation of the needle guide element is possible without producing flaking particles, for example of the coating, during the assembly process. The method makes only a small space necessary for coupling the needle guide element with the valve body. Consequently, the valve body can have a large extension in axial direction.

[0010] In an advantageous embodiment at least one pin element is moved in axial direction for deforming the part of the needle guide element in radial direction. This is a simple possibility to obtain a locally limited radial deformation of the part of the needle guide element though a secure coupling between the needle guide element and the valve body can be obtained.

[0011] In a further advantageous embodiment a plurality of pin elements is arranged circumferentially the valve body and the pin elements are moved in axial direction to deform the part of the needle guide element. By this a plurality of areas of engagement between the valve body and the guide element can be obtained. Consequently, a very secure coupling between the valve body and the needle guide element is possible.

[0012] In a further advantageous embodiment the pin element comprises an end portion facing the second part of the needle guide element. The end portion has the shape of a spherical cap. This has the advantage that the deformation of the needle guide element can be carried out with great care by the pin element.

[0013] In a further advantageous embodiment a tool is moved in axial direction to arrange and align the needle guide element relative to the valve body. The tool comprises at least one aperture extending in axial direction, wherein the at least one pin element is arranged to be moved in axial direction. This has the advantage that a tool can be used to align the needle guide element relative to the valve body as well as to take up the pin elements.

[0014] According to a second aspect the invention is distinguished by a valve assembly of an injection valve. The valve assembly comprises a valve body, a valve needle and a needle guide element. The valve body has a central longitudinal axis and a cavity with a fluid inlet portion and a fluid outlet portion. The valve needle is axially movable in the cavity. The valve needle prevents a fluid flow through the fluid outlet portion in a closing position and releases the fluid flow through the fluid outlet portion in further positions. The needle guide element is designed to guide the valve needle and is arranged in the cavity. The valve body has a recess facing the central longitudinal axis. One part of the needle guide element is arranged on a shoulder of the valve body facing away from the fluid outlet portion. The part of the needle guide element is in engagement with the recess in the valve body thereby fixedly coupling the needle guide element relative to the valve body.

[0015] Exemplary embodiments of the invention are explained in the following with the aid of schematic drawings. These are as follows:

Figure 1 an injection valve with a valve assembly in a longitudinal section view,

Figure 2 portion II of the valve assembly of the injection valve according to figure 1 in a longitudinal section view,

Figure 3 a needle guide element of the injection valve in a top view,

Figure 4a a further longitudinal section view of the valve assembly of the injection valve, and

Figure 4b a further longitudinal section view of the valve assembly of the injection valve.

[0016] Elements of the same design and function that appear in different illustrations are identified by the same reference character.

[0017] An injection valve 62, that is in particular suitable for dosing fuel to an internal combustion engine, comprises a valve assembly 60 and an inlet assembly 61.

[0018] The valve assembly 60 comprises a valve body 4 with a central longitudinal axis L and a cavity 8, which takes in a valve needle shaft 10 and preferably a part of an armature 12. The valve needle shaft 10 and the armature 12 are forming a valve needle 14.

[0019] The inlet assembly 61 comprises an inlet tube 2. In the inlet tube 2 and in the armature 12 an inner cavity 16 is provided. A spring 18 is arranged in the inner cavity 16. Preferably, it rests on a spring seat being formed by an anti-bounce disc 20. By this the spring 18 is mechanically coupled to the valve needle 14. An adjusting tube 22 is provided in the inner cavity 16. The adjusting tube 22 forms a further seat for the spring 18.

[0020] In a closing position of the valve needle 14 it sealingly rests on a seat plate 26. The seat plate 26 is arranged in the valve body 4. In the closing position of the valve needle 14 a fluid flow through at least one injection nozzle 24 is prevented. The injection nozzle 24 may be, for example, an injection hole. However, it may also be of some other type suitable for dosing fluid.

[0021] A needle guide element 28 is arranged in the cavity 8. The needle guide element 28 can guide the valve needle 14 in axial direction. The needle guide element 28 has a part 30 which is arranged on a shoulder 33 of the valve body 4. Preferably, the part 30 has a planar shape and is extending in a radial direction. The shoulder 33 has a wall section 34 facing away from the fluid outlet portion 44. The planar part 30 of the needle guide element 28 is arranged on the wall section 34. Consequently, the planar part 30 is facing away from the fluid outlet portion 44 as well. The needle guide element 28 has a further part 32 which is arranged at an inner wall of the cavity 8. Preferably, the further part 32 of the needle guide element 28 is formed as a hollow cylindrical ring element. In a cross sectional view as shown in the figures 2, 4a and 4b the planar part 30 and the further part 32 of the needle guide element 28 are forming a "L".

[0022] Additionally, a further needle guide element 35 for guiding the valve needle 14 is provided. The further needle guide element 35 is arranged in the cavity 8 near the seat plate 26 or adjacent to the seat plate 26. The needle guide element 28 and the further needle guide element 35 enable a secure axial guiding of the valve needle 14 inside the valve body 4.

[0023] The injection valve 62 is provided with an actuator unit that comprises preferably an electromagnetic actuator, comprising a coil 36, which is preferably overmolded. A valve body shell 38, the armature 12 and the inlet tube 2 are forming an electromagnetic circuit which can apply a force on the valve needle 14. The actuator unit may also comprise another type of actuator, which is known to a person skilled in the art for that purpose. Such an actuator may be, for example, a piezoelectric actuator.

[0024] A fluid inlet portion 42 is provided in the valve body 4 which communicates with a fluid outlet portion 44 which is a part of the cavity 8 near the seat plate 26.

[0025] The valve body 4 has a recess 46 facing the central longitudinal axis L. The planar part 30 of the needle guide element 28 is in engagement with the recess 46 in the valve body 4. By this the needle guide element 28 is fixedly coupled to the valve body 4.

[0026] In the following, the function of the injection valve 62 is shortly described:

[0027] The fluid is led from the fluid inlet portion 42 to the fluid outlet portion 44. The axial position of the valve needle 14, which determines whether the fluid outlet portion 44 is opened or closed for a fluid flow, depends on the force balance between the spring 18 and the forces applied to the valve needle 14 by the actuator unit with the coil 36.

[0028] In the closing position of the valve needle 14 the valve needle 14 sealingly rests on the seat plate 26 and consequently prevents a fluid flow through the fluid outlet portion 44 and the injection nozzle 24.

[0029] In the case that the coil 36 gets energized, the coil 36 may effect a force on the valve needle 14. The valve needle 14 is able to move in axial direction out of the closing position. Outside of the closing position of the valve needle 14, there is a gap between the seat plate 26 and the valve needle 14 at an axial end of the valve needle 14 facing away from the coil 36. This enables a fluid flow through the injection nozzle 24.

[0030] In Figure 3 a preferred embodiment of the needle guide element 28 is shown in detail. The needle guide element 28 is formed as a ring. The planar part 30 of the needle guide element 28 has pressure portions 47 from which tongues 48 are extending in radial direction away from the central longitudinal axis L.

[0031] In the preferred embodiment shown in Figure

3, the needle guide element 28 has three pressure portions 47 and three respective tongues 48. In further embodiments the number of the pressure portions 47 and the respective tongues 48 can be smaller than three. Preferably, the number of the pressure portions 47 and the respective tongues 48 is larger than three.

[0032] As shown in Figures 2 and 4b, the tongues 48 of the needle guide elements 28 are extending in radial direction away from the central longitudinal axis L thereby extending into the recesses 46 in the valve body 4. Consequently, the needle guide element 28 is in engagement with the recess 46 in the valve body 4 and the needle guide element 28 is fixedly coupled to the valve body 4.

[0033] In Figures 2, 4a and 4b a tool 50 is shown which is arranged above the shoulder 33 of the valve body 4 and the planar part 30 of the needle guide element 28 during the assembly process. The tool 50 can hold down the planar part 30 of the needle guide element 28. A further tool 52 is arranged in the cavity 8 of the valve body 4 and can hold the needle guide element 28 in position during the assembly process.

[0034] The tool 50 has at least one aperture 54 which extends in axial direction and has preferably a cylindrical shape. In each of the apertures 54 a pin element 56 is arranged which can be moved in axial direction. The numbers of the apertures 54 and the pin elements 56 are correlated to the number of the tongues 48 which is desired for the secure coupling of the needle guide element 28 with the valve body 4 as will be described in the following.

[0035] Preferably, the apertures 54 in the tool 50 are arranged on a circle with the centre being arranged on the central longitudinal axis L. Preferably, the angular distance between each of two apertures 54 is equal.

[0036] Each of the pin elements 56 has an end portion 58 which can be brought into engagement with the planar part 30 of the needle guide element 28 as will be described in the following. Preferably, the end portion 58 of the pin element 56 has the shape of a spherical cap. In a further preferred embodiment, the end portion 58 of the pin element 56 has a semispherical shape.

[0037] In the following the method for assembling the valve assembly 60 of the injection valve will be described:

[0038] In a first step, the valve body 4 will be provided and the recess 46 is formed in the valve body 4 in a manner that the recess 46 faces the central longitudinal axis. Preferably, the recess 46 is formed as a groove which makes it possible that only a minimal effort is necessary for forming the recess 46.

[0039] In the following, the needle guide element 28 is provided and arranged in the cavity 8 of the valve body 4 in a manner that the planar part 30 of the needle guide element 28 is arranged on the shoulder 33 of the valve body 4. This means that the planar part 30 is adjacent to the wall section 34 of the shoulder 33 facing away from the fluid outlet portion 44. The further part 32 of the needle guide element 28 which is forming a hollow cylinder is arranged on the inner wall of the valve body 4 facing the central longitudinal axis L.

[0040] In a further step the tool 50 and the further tool 52 are inserted into the cavity 8 of the valve body 4 to align and fix the needle guide element 28 in relation to the valve body 4. The respective situation is shown in Figure 4a.

[0041] In a further step the pin elements 56 which are arranged in the apertures 54 of the tool 50 are moved in axial direction towards the planar part 30 of the needle guide element 28 until the end portions 58 of the pin elements 56 come into engagement with the planar part 30 of the needle guide element 28 in the area of the pressure portions 47 of the needle guide element 28. By pressing the pin elements 56 into the needle guide element 28 the planar part 30 is plastically deformed and material from the pressure portions 47 of the planar part 30 of the needle guide element 28 is expanded thereby forming tongues 48 in locally limited areas (Figure 3). The tongues 48 come into engagement with the recesses 46 in the valve body 4.

[0042] Now the coupling between the needle guide element 28 and the valve body 4 is completed, as shown in Figures 2 and 4b. After the tool 50 with the pin elements 56 and the further tool 52 are removed from the cavity 8 of the valve body 4 further assembly process steps for assembling the valve assembly 60 of the injector valve 62 can be carried out.

[0043] The described method makes a secure coupling of the needle guide element 28 with the valve body 4 possible. In particular, if the number of pressure portions 47 and tongues 48 is equal or larger than three and the angular distance with respect to the central longitudinal axis L between each of two tongues 48 is approximately equal, a very good mechanical coupling between the needle guide element 28 and the valve body 4 can be obtained.

[0044] As the end portions 58 have the shape of a spherical cap the deformation of the needle guide element 28 can be carried out with great care and the production of flaking particles during the assembly process can be prevented.

[0045] As the tool 50 with the pin elements 56 needs only a small space for the coupling process of the needle guide element 28 with the valve body 4, the valve body 4 can have a large extension in axial direction. This can be seen in particular in Figure 2 where the tool 50 is arranged in a very small area between the valve body 4 and the further tool 52 in radial direction and the valve body 4 extends in both axial directions from the coupling zone between the valve body 4 and the planar part 30 of the needle guide element 28. This means that the tool 50 can be simply inserted into the cavity 8 even in the case that there is only a small space between the valve body 4 and the further tool 52.

[0046] In the case that the tool 50 needs a larger space between the valve body 4 and the further tool 52 as shown in Figures 4a and 4b the radial extension of the valve body 4 in the axial direction facing away from the fluid

outlet portion 44 can be reduced.

Claims

1. Method for assembling a valve assembly (60) of an injection valve (62),
the valve assembly (60) comprising

- a valve body (4) having

-- a central longitudinal axis (L), and
-- a cavity (8) with a fluid inlet portion (42) and a fluid outlet portion (44),

- a valve needle (14) axially movable in the cavity (8), the valve needle (14) preventing a fluid flow through the fluid outlet portion (44) in a closing position and releasing the fluid flow through the fluid outlet portion (44) in further positions,

the method comprising the following steps:

- providing the valve body (4) and forming a recess (46) in the valve body (4) in a manner that the recess (46) faces the central longitudinal axis (L),
- providing a needle guide element (28) being designed to guide the valve needle (14) in the cavity (8),
- arranging and aligning the needle guide element (28) relative to the valve body (4) in such a manner that the needle guide element (28) is arranged in the cavity (8) and one part (30) of the needle guide element (28) is arranged on a shoulder (33) of the valve body (4) facing away from the fluid outlet portion (44),
- deforming the part (30) of the needle guide element (28) in radial direction in such a manner that the part (30) is getting into engagement with the recess (46) in the valve body (4) thereby fixedly coupling the needle guide element (28) relative to the valve body (4).

2. Method according to claim 1, wherein at least one pin element (56) is moved in axial direction for deforming the part (30) of the needle guide element (28) in radial direction.

3. Method according to claim 2, wherein a plurality of pin elements (56) is arranged circumferentially the valve body (4) and is moved in axial direction to deform the part (30) of the needle guide element (28).

4. Method according to claim 2 or 3, wherein the pin element (56) comprises an end portion (58) facing the part (30) of the needle guide element (28), the end portion (58) having the shape of a spherical cap.

5. Method according to anyone of claims 2 to 4, wherein a tool (50) is moved in axial direction to arrange and align the needle guide element (28) relative to the valve body (4), the tool (50) comprising at least one aperture (54) extending in axial direction, wherein the at least one pin element (56) is arranged for being moved in axial direction.

6. Valve assembly (60) of an injection valve (62),
the valve assembly (60) comprising

- a valve body (4) having

-- a central longitudinal axis (L),
-- a cavity (8) with a fluid inlet portion (42) and a fluid outlet portion (44),
-- and a recess (46) facing the central longitudinal axis (L),

- and a valve needle (14) axially movable in the cavity (8), the valve needle (14) preventing a fluid flow through the fluid outlet portion (44) in a closing position and releasing the fluid flow through the fluid outlet portion (44) in further positions, the valve assembly (60) being **characterized in that** it further comprises a needle guide element (28) being designed to guide the valve needle (14) and being arranged in the cavity (8), wherein

- one part (30) of the needle guide element (28) is arranged on a shoulder (33) of the valve body (4) facing away from the fluid outlet portion (44), and
- the part (30) of the needle guide element (28) being in engagement with the recess (46) in the valve body (4) thereby fixedly coupling the needle guide element (28) relative to the valve body (4).

Patentansprüche

1. Verfahren zum Zusammensetzen einer Ventilanordnung (60) eines Einspritzventils (62),
wobei die Ventilanordnung (60) Folgendes umfasst:

- ein Ventilgehäuse (4), das Folgendes aufweist:

-- eine zentrale Längsachse (L) und
-- einen Hohlraum (8) mit einem Flüssigkeitseinlassabschnitt (42) und einem Flüssigkeitsauslassabschnitt (44),

- eine Ventilnadel (14), die im Hohlraum (8) axial beweglich ist, wobei die Ventilnadel (14) in einer Schließposition eine Flüssigkeitsströmung durch den Flüssigkeitsauslassabschnitt (44)

verhindert und in weiteren Positionen die Flüssigkeitsströmung durch den Flüssigkeitsauslassabschnitt (44) freigibt, wobei das Verfahren die folgenden Schritte umfasst:

- Bereitstellen des Ventilgehäuses (4) und Bilden einer Vertiefung (46) im Ventilgehäuse (4), derart, dass die Vertiefung (46) der zentralen Längsachse (L) zugewandt ist,
- Bereitstellen eines Nadelführungselements (28), das ausgestaltet ist, die Ventilnadel (14) im Hohlraum (8) zu führen,
- Anordnen und Ausrichten des Nadelführungselements (28) in Bezug zum Ventilgehäuse (4), derart, dass das Nadelführungselement (28) im Hohlraum (8) angeordnet ist und ein Teil (30) des Nadelführungselements (28) auf einem Ansatz (33) des Ventilgehäuses (4) angeordnet ist, der dem Flüssigkeitsauslassabschnitt (44) abgewandt ist,
- Verformen des Teils (30) des Nadelführungselements (28) in radialer Richtung, derart, dass der Teil (30) mit der Vertiefung (46) im Ventilgehäuse (4) in Eingriff gelangt und dadurch das Nadelführungselement (28) in Bezug zum Ventilgehäuse (4) fest koppelt.

2. Verfahren nach Anspruch 1, wobei mindestens ein Stiftelement (56) in axialer Richtung bewegt wird, um den Teil (30) des Nadelführungselements (28) in radialer Richtung zu verformen.

3. Verfahren nach Anspruch 2, wobei mehrere Stiftelemente (56) um den Umfang des Ventilgehäuses (4) angeordnet sind und in axialer Richtung bewegt werden, um den Teil (30) des Nadelführungselements (28) zu verformen.

4. Verfahren nach Anspruch 2 oder 3, wobei das Stiftelement (56) einen Endabschnitt (58) umfasst, der dem Teil (30) des Nadelführungselements (28) zugewandt ist, wobei der Endabschnitt (58) die Form einer halbgkugelförmigen Kappe aufweist.

5. Verfahren nach einem der Ansprüche 2 bis 4, wobei ein Werkzeug (50) in axialer Richtung bewegt wird, um das Nadelführungselement (28) in Bezug zum Ventilgehäuse (4) anzuordnen und auszurichten, wobei das Werkzeug (50) mindestens eine Öffnung (54) umfasst, die sich in axialer Richtung erstreckt, wobei das mindestens eine Stiftelement (56) angeordnet ist, in axialer Richtung bewegt zu werden.

6. Ventilanordnung (60) eines Einspritzventils (62), wobei die Ventilanordnung (60) Folgendes umfasst:

- ein Ventilgehäuse (4), das Folgendes aufweist:

-- eine zentrale Längsachse (L),
-- einen Hohlraum (8) mit einem Flüssigkeitseinlassabschnitt (42) und einem Flüssigkeitsauslassabschnitt (44),
-- und eine Vertiefung (46), die der zentralen Längsachse (L) zugewandt ist,

- und eine Ventilnadel (14), die im Hohlraum (8) axial beweglich ist, wobei die Ventilnadel (14) in einer Schließposition eine Flüssigkeitsströmung durch den Flüssigkeitsauslassabschnitt (44) verhindert und in weiteren Positionen die Flüssigkeitsströmung durch den Flüssigkeitsauslassabschnitt (44) freigibt, wobei die Ventilanordnung (60) **dadurch gekennzeichnet ist, dass** sie überdies ein Nadelführungselement (28) umfasst, das konstruiert ist, die Ventilnadel (14) zu führen, und in dem Hohlraum (8) angeordnet ist, wobei

- ein Teil (30) des Nadelführungselements (28) auf einem Ansatz (33) des Ventilgehäuses (4) angeordnet ist, der dem Flüssigkeitsauslassabschnitt (44) abgewandt ist, und
- der Teil (30) des Nadelführungselements (28) mit der Vertiefung (46) im Ventilgehäuse (4) im Eingriff ist und dadurch das Nadelführungselement (28) in Bezug zum Ventilgehäuse (4) festkoppelt.

Revendications

1. Procédé d'assemblage d'un ensemble soupape (60) d'une soupape d'injection (62) ;
l'ensemble soupape (60) comprenant :

- un corps de soupape (4) qui présente :

- un axe longitudinal central (L) ; et
- une cavité (8) dotée d'une partie entrée de fluide (42) et d'une partie sortie de fluide (44) ;

- un pointeau de soupape (14) mobile de manière axiale dans la cavité (8), le pointeau de soupape (14) empêchant un écoulement de fluide à travers la partie sortie de fluide (44) dans une position de fermeture et laissant passer le fluide à travers la partie sortie de fluide (44) dans d'autres positions ;

le procédé comprenant les étapes suivantes consistant à :

- fournir le corps de soupape (4) et former un évidement (46) dans le corps de soupape (4) de telle manière que l'évidement (46) fasse face à l'axe longitudinal central (L) ;
- fournir un élément de guidage de pointeau (28) conçu de façon à guider le pointeau de soupape (14) dans la cavité (8) ;
- agencer et aligner l'élément de guidage de pointeau (28) par rapport au corps de soupape (4) de telle façon que l'élément de guidage de pointeau (28) soit agencé dans la cavité (8) et qu'une partie (30) de l'élément de guidage de pointeau (28) soit agencée sur un épaulement (33) du corps de soupape (4) qui fait face en s'éloignant de la partie sortie de fluide (44) ;
- déformer la partie (30) de l'élément de guidage de pointeau (28) dans la direction radiale de telle façon que la partie (30) vienne en prise avec l'évidement (46) dans le corps de soupape (4) en accouplant de ce fait de manière sécurisée l'élément de guidage de pointeau (28) par rapport au corps de soupape (4).

2. Procédé selon la revendication 1, dans lequel au moins un élément de broche (56) est déplacé dans la direction axiale de façon à déformer la partie (30) de l'élément de guidage de pointeau (28) dans la direction radiale.

3. Procédé selon la revendication 2, dans lequel une pluralité d'éléments de broches (56) sont agencés de manière circonférentielle par rapport au corps de soupape (4) et sont déplacés dans la direction axiale de façon à déformer la partie (30) de l'élément de guidage de pointeau (28).

4. Procédé selon la revendication 2 ou la revendication 3, dans lequel l'élément de broche (56) comprend une partie d'extrémité (58) qui fait face à la partie (30) de l'élément de guidage de pointeau (28), la partie d'extrémité (58) présentant une forme de chapeau sphérique.

5. Procédé selon l'une quelconque des revendications 2 à 4, dans lequel un outil (50) est déplacé dans la direction axiale de façon à agencer et à aligner l'élément de guidage de pointeau (28) par rapport au corps de soupape (4), l'outil (50) comprenant au moins une ouverture (54) qui s'étend dans la direction axiale, dans lequel le ou les éléments de broches (56) sont agencés de façon à pouvoir se déplacer dans la direction axiale.

6. Ensemble soupape (60) d'une soupape d'injection (62) ;
l'ensemble soupape (60) comprenant :

- un corps de soupape (4) qui présente :
- un axe longitudinal central (L) ;
- une cavité (8) dotée d'une partie entrée de fluide (42) et d'une partie sortie de fluide (44) ;
- et un évidement (46) qui fait face à l'axe longitudinal central (L) ;

- et un pointeau de soupape (14) qui peut se déplacer de manière axiale dans la cavité (8), le pointeau de soupape (14) empêchant un écoulement de fluide à travers la partie sortie de fluide (44) dans une position de fermeture et laissant passer le fluide à travers la partie sortie de fluide (44) dans d'autres positions, l'ensemble soupape (60) étant **caractérisé en ce qu'**il comprend en outre un élément de guidage de pointeau (28) conçu de façon à guider le pointeau de soupape (14) et agencé dans la cavité (8), dans lequel :
- une partie (30) de l'élément de guidage de pointeau (28) est agencé sur un épaulement (33) du corps de soupape (4) qui fait face en s'éloignant de la partie sortie de fluide (44) ; et
- la partie (30) de l'élément de guidage de pointeau (28) vient en prise avec l'évidement (46) dans le corps de soupape (4) en accouplant de ce fait de manière sécurisée l'élément de guidage de pointeau (28) par rapport au corps de soupape (4).

FIG 1

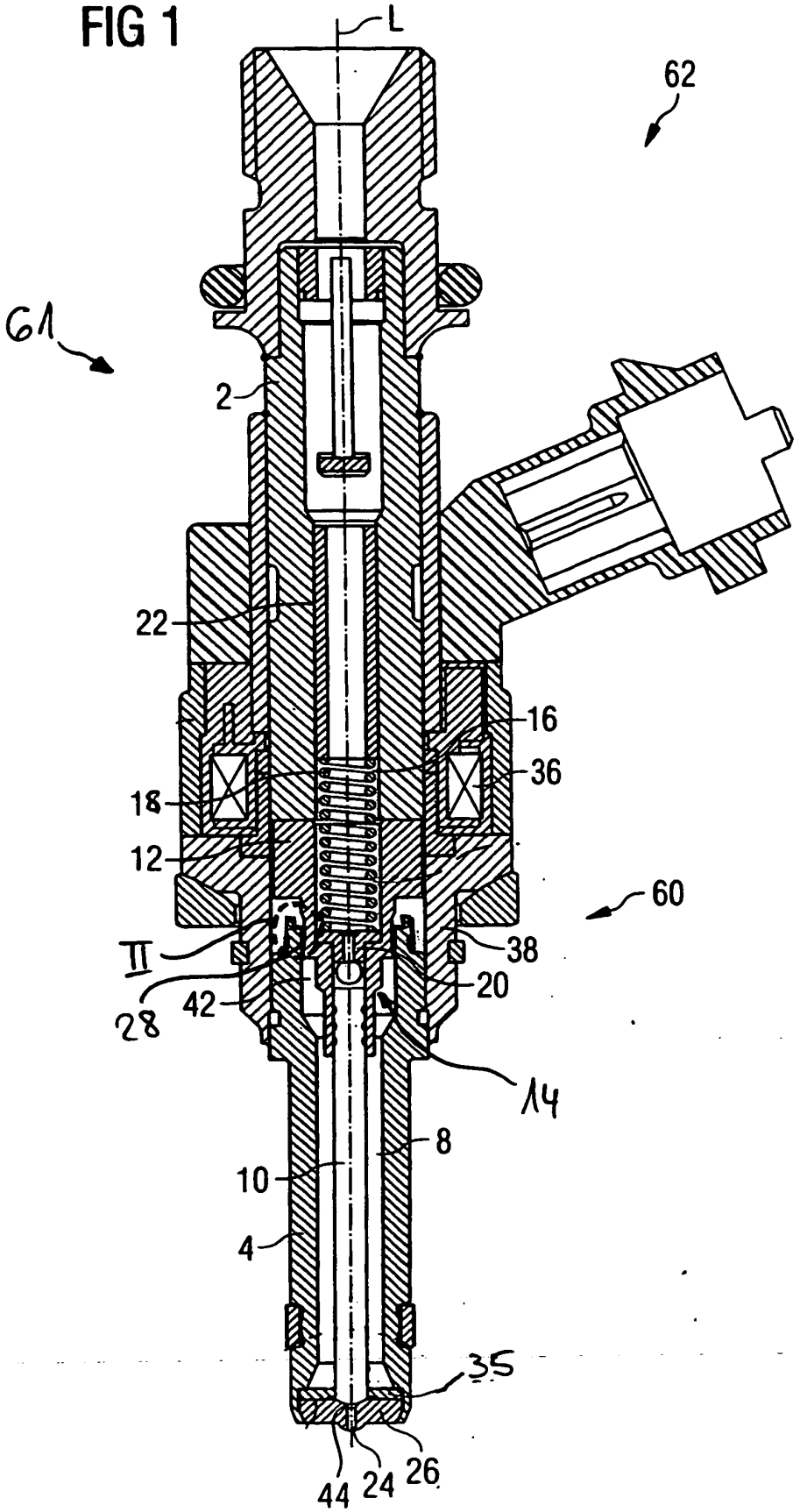


Fig. 2

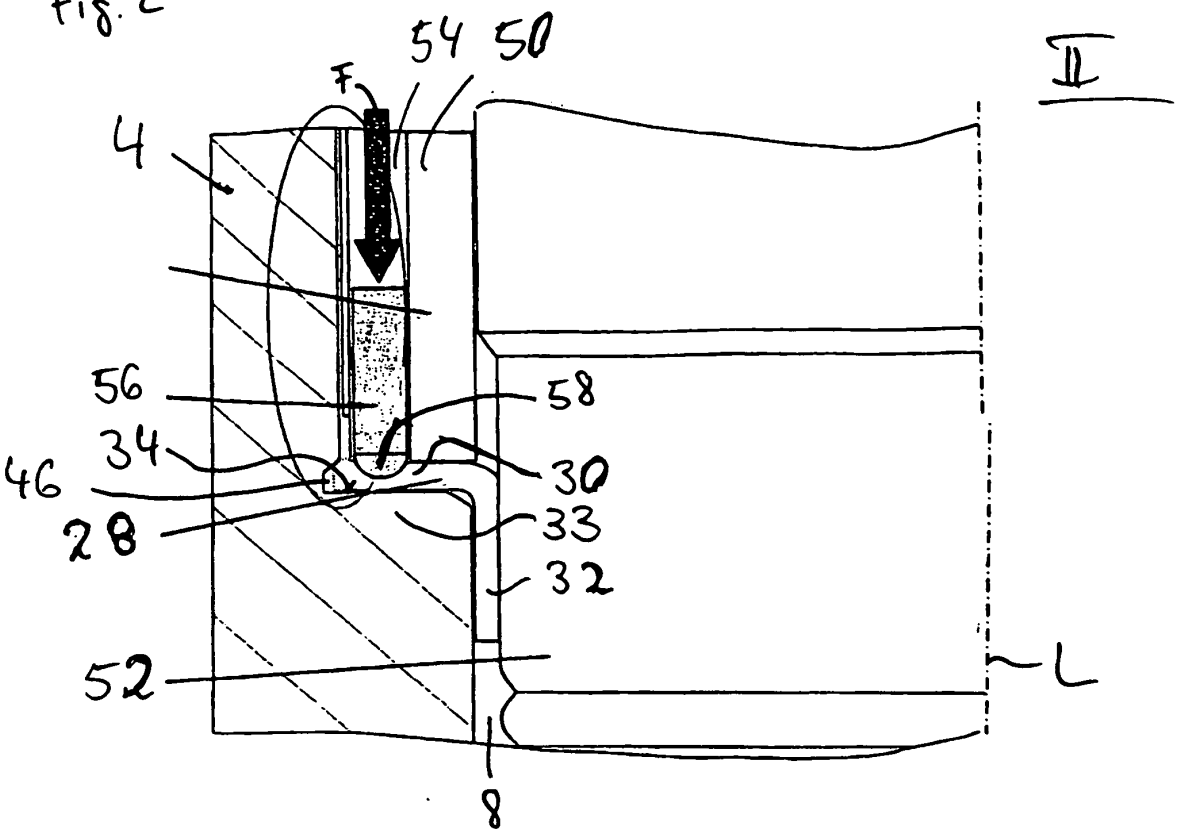


Fig. 3

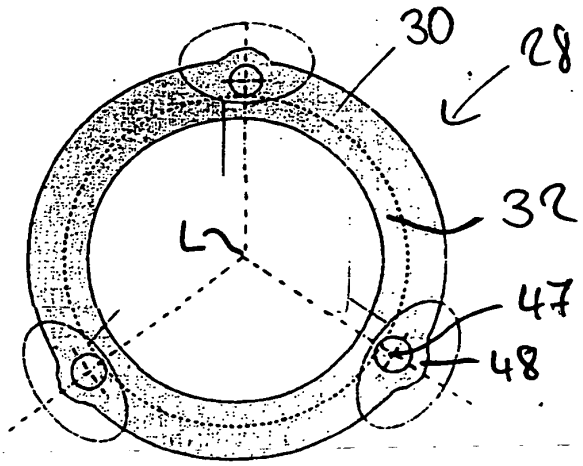


Fig. 4a

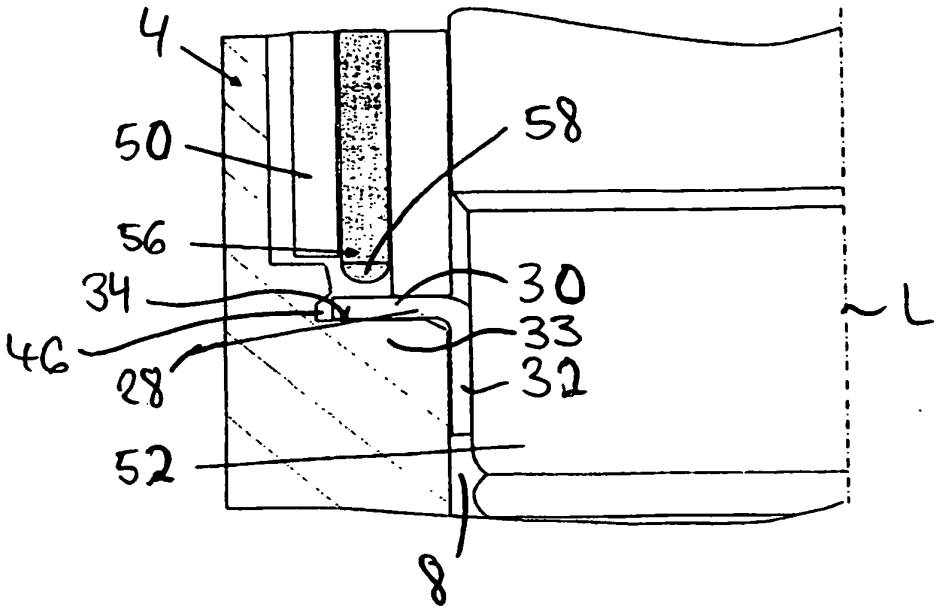
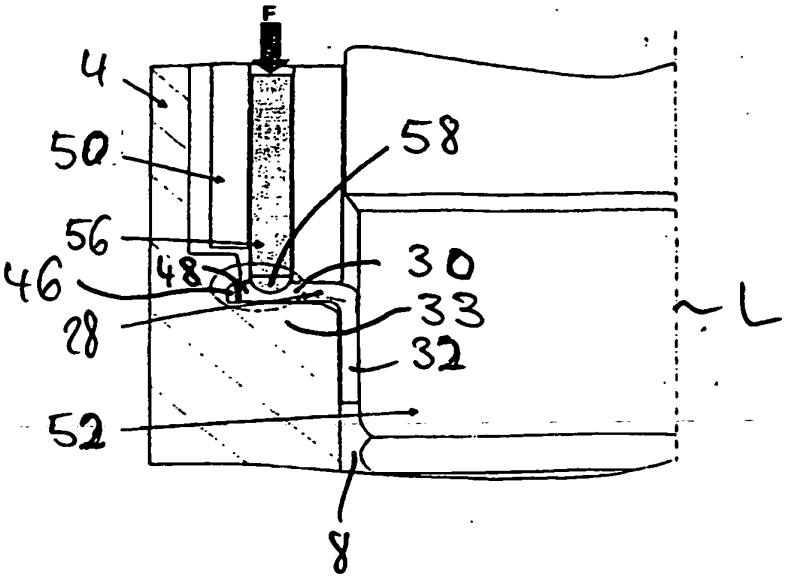


Fig. 4b



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Patent documents cited in the description

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