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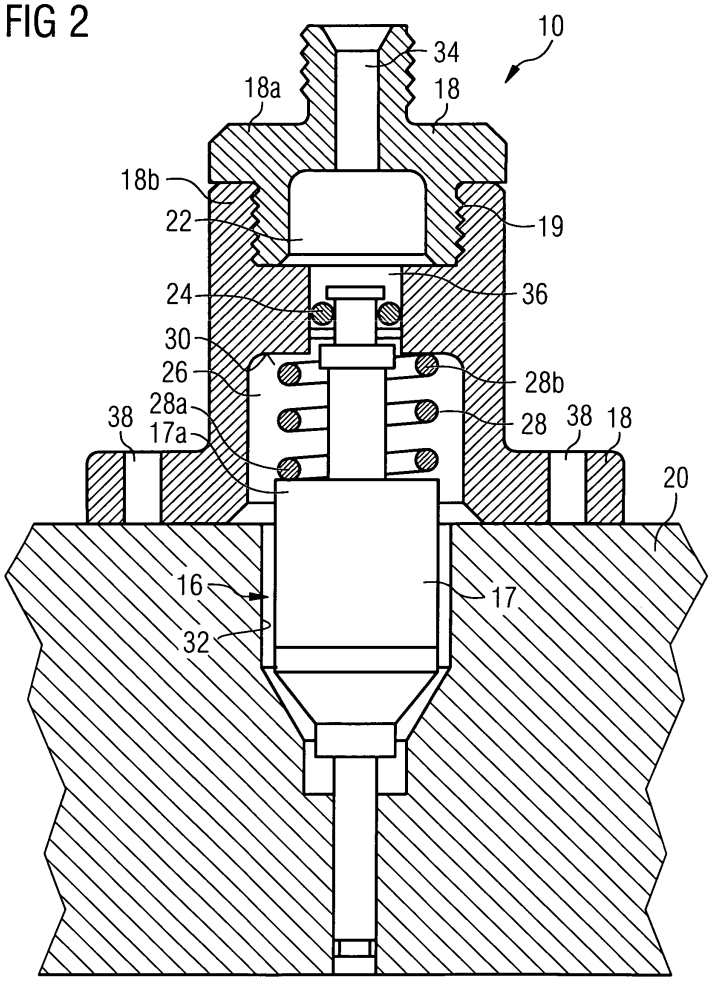
(54) **Coupling body for a coupling arrangement and coupling arrangement**

(57) Coupling body (18) for a coupling arrangement (10) enabling a coupling of a fluid supply (14) with an injector (16), comprising a fluid inlet portion (34) being hydraulically coupable with the fluid supply (14), a fluid outlet portion (36) being hydraulically coupable with the injector (16), and a cavity (22) being arranged hydraulically between the fluid inlet portion (34) and the fluid outlet portion (36) and being formed to be enabled to receive a quantity of fluid to balance variations of the fluid pressure in the fluid inlet portion (34).

FIG 2



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Description

[0001] The invention relates to a coupling body for a coupling arrangement. Furthermore, the invention relates to the coupling arrangement with an injector.

[0002] EP 0 969 203 A1 discloses a coupling system between an engine head, an injector and a fuel manifold. The engine head has a seating designed to house the injector. The fuel manifold extends above the engine head and is connected to the injector through a bush projecting from the fuel manifold. The injector is coupled to a seat by means of a ball coupling. The fuel manifold is rigidly secured to the engine head of the engine.

[0003] The object of the invention is to create a coupling body for a coupling arrangement and a coupling arrangement with the injector which enable an easy assembling of the coupling arrangement and which facilitate a reliable and precise function of the coupling arrangement.

[0004] These objects are achieved by the features of the independent claim. Advantageous embodiments of the invention are given in the sub-claims.

[0005] The invention is distinguished by a coupling body for a coupling arrangement enabling a coupling of a fluid supply with an injector, comprising a fluid inlet portion being hydraulically coupable with the fluid supply, a fluid outlet portion being hydraulically coupable with the injector, and a cavity being arranged hydraulically between the fluid inlet portion and the fluid outlet portion and being formed to be enabled to receive a quantity of fluid to balance variations of the fluid pressure in the fluid inlet portion.

[0006] The dynamic of the fluid pressure at the entrance of the injector can be strongly influenced by adequate means upstream the injector. The means to achieve this is the cavity in the coupling body wherein the pressure fluctuations of the fluid supply may be dampened. Preferably, the cross-section of the cavity is increased compared to the cross-section of the fluid inlet portion thereby supplying a volume for a reduction of the fluid pressure dynamics. An advantage of the invention is that for each coupling body an individual pressure equalisation at the fluid outlet portion and consequently at the injector is possible.

[0007] Preferably, the coupling body has a first coupling body section and a second coupling body section, the first coupling body section comprising the fluid inlet portion and the cavity, and the first coupling body section being reversibly separable from the second coupling body section. The advantage of this is that a simple exchange of the first coupling body section is possible. Consequently, this exchange makes it possible to vary the volume of the cavity. Therefore, the size of the cavity may be adapted easily according to the necessary pressure equalisation at the fluid outlet portion.

[0008] According to a second aspect, the invention is distinguished by a coupling arrangement comprising an injector receiving device, the coupling body comprising a recess, and a securing means being arranged in the recess and being coupled with the injector to maintain the injector in a seat of the injector receiving device. This makes it possible that mechanical loads on the injector are reduced.

[0009] According to a preferred embodiment of the invention, the securing means is an elastic spring element. This has the advantage that a simple spring element as securing means can result in small mechanical loads on the injector.

[0010] Preferably, the coupling body is rigidly coupled to the injector receiving device. This has the advantage that mechanical forces of the fluid supply may be absorbed by the injector receiving device. Consequently, the forces on the injector may be reduced.

[0011] Exemplary embodiments of the invention are explained in the following with the aid of schematic drawings. These are as follows:

Figure 1, a fuel injection device in a schematic view, and

Figure 2, a coupling arrangement in a longitudinal section view.

[0012] Elements of the same design and function that appear in different illustrations are identified by the same reference character.

[0013] A fuel injection device 11 (figure 1), that is in particular suitable for dosing fuel to an internal combustion engine, comprises a fuel tank 12 that communicates via a common pipe 13 with a fluid supply 14. The fluid supply 14 comprises several branches 15, each suitable for fluid transport. Each branch 15 of the fluid supply 14 is coupled with one injector 16 by a coupling body 18.

[0014] The injectors 16 are arranged in an injector receiving device 20 which may be an engine head of a combustion engine.

[0015] In figure 2, a detailed view of the coupling arrangement 10 with the coupling body 18, the fluid supply 14, and the injector 16 is given.

[0016] The coupling body 18 comprises a first coupling body section 18a and a second coupling body section 18b. The first coupling body section 18a comprises a fluid inlet portion 34 and a cavity 22. Furthermore, the first coupling body section 18a is rigidly coupled to the second coupling body section 18b. The coupling between the first coupling body section 18a and the second coupling body section 18b is realised by a thread 19 which allows a reversible separation of the first coupling body section 18a from the section coupling body section 18b. Consequently, an exchange of the first coupling body section 18a may be put into effect in a very simple manner. Therefore, the size of the cavity 22 can be adapted very easily by the exchange of the first coupling body section 18a.

[0017] The second coupling body section 18b comprises a fluid outlet portion 36 in which the injector 16 is arranged partially. A sealing device 24 is separating the

fluid outlet portion 36 from a recess 26 of the second coupling body section 18b. The recess 26 receives a securing means 28 and further parts of the injector 16 as an injector main body 17.

[0018] In the example illustrated here, such securing means 28 consists of an elastic spring element, in particular a coil spring. The elastic spring element is located between the injector 16 and the coupling body 18 in such a manner as to press the injector 16 into a seat 32 arranged in the injector receiving device 20. In figure 2 it is shown that the elastic spring element is housed inside the second coupling body section 18b in such a manner as to have a first end 28a bearing against an end portion 17a of the injector main body 17 and a second end 28b bearing against a bottom 30 of the recess 26.

[0019] The second coupling body section 18b has through holes 38 by which the coupling body 18 can be rigidly coupled to the injector receiving device 20. Thereby, mechanical forces caused by the fluid supply 14 and received by the coupling body 18 may be absorbed by the injector receiving device 20 thereby reducing the mechanical load on the injector 16. The coupling body 18 may be coupled with the injector receiving device 20 by not shown screws or bolts being arranged in the through holes 38.

[0020] In the following, the function of the coupling arrangement 10 will be described in detail:

> Fluid is transported by not shown pumps from the fuel tank 12 to the pipe 13 and further to the fluid supply 14 where it is divided into the branches 15 and led to the coupling arrangements 10.

[0021] In the following, the function of only one of the coupling arrangements 10 is described. The fluid is received by the fluid inlet portion 34 of the coupling body 18 and flows on to the cavity 22. The cavity 22 with its enlarged volume compared to the fluid inlet portion 34 serves as a fluid storage element thereby receiving fluid and keep it until it is needed by the injector 16. Pressure peaks of the fluid in the fluid supply 14 can be reduced as long as the cavity 22 is not completely filled with fluid. Therefore, the volume of the cavity 22 is preferably 10 to 20 cm^3 at a flow rate of 5 to 30 g/s and a pressurization time of 0,5 to 3 s which is necessary to obtain a sufficient fluid pressure in the cavity 22. With this volume of the cavity 22 it is possible that pressure peaks in the fluid inlet portion 34 in particular in a range of +/- 5 bar may be buffered by the cavity 22 and thus, the mechanical load of the injector 16 may be kept small.

[0022] A further advantage of this embodiment of the coupling arrangement 10 is that a cavity spacer which is usually arranged between the conical section of the injector main body 17 and the conical section of the seat 32 to compensate tolerances due to high mechanical loads is no longer necessary as the securing means 28 in combination with the peak reducing function of the cavity 22 is reducing the mechanical load in the contact area between the conical section of the injector main body 17 and the conical section of the seat 32.

Claims

1. Coupling body (18) for a coupling arrangement (10) enabling a coupling of a fluid supply (14) with an injector (16), comprising

   - a fluid inlet portion (34) being hydraulically coupable with the fluid supply (14),
   - a fluid outlet portion (36) being hydraulically coupable with the injector (16), and
   - a cavity (22) being arranged hydraulically between the fluid inlet portion (34) and the fluid outlet portion (36) and being formed to be enabled to receive a quantity of fluid to balance variations of the fluid pressure in the fluid inlet portion (34).

2. Coupling body (18) in accordance with claim 1, with a first coupling body section (18a) and a second coupling body section (18b), the first coupling body section (18a) comprising the fluid inlet portion (34) and the cavity (22), and the first coupling body section (18a) being reversibly separable from the second coupling body section (18b).

3. Coupling arrangement (10) with the injector (16), the fluid supply (14) and the coupling body (18) in accordance with claim 1 or 2.

4. Coupling arrangement (10) in accordance with claim 3 comprising an injector receiving device (20), the coupling body (18) comprising a recess (26), and a securing means (28) being arranged in the recess (26) and being coupled with the injector (16) to maintain the injector (16) in a seat (32) of the injector receiving device (20).

5. Coupling arrangement (10) in accordance with claim 4 wherein the securing means (28) is an elastic spring element.

6. Coupling arrangement (10) in accordance with one of the claims 3 to 5 with the coupling body (18) being rigidly coupled to the injector receiving device (20).

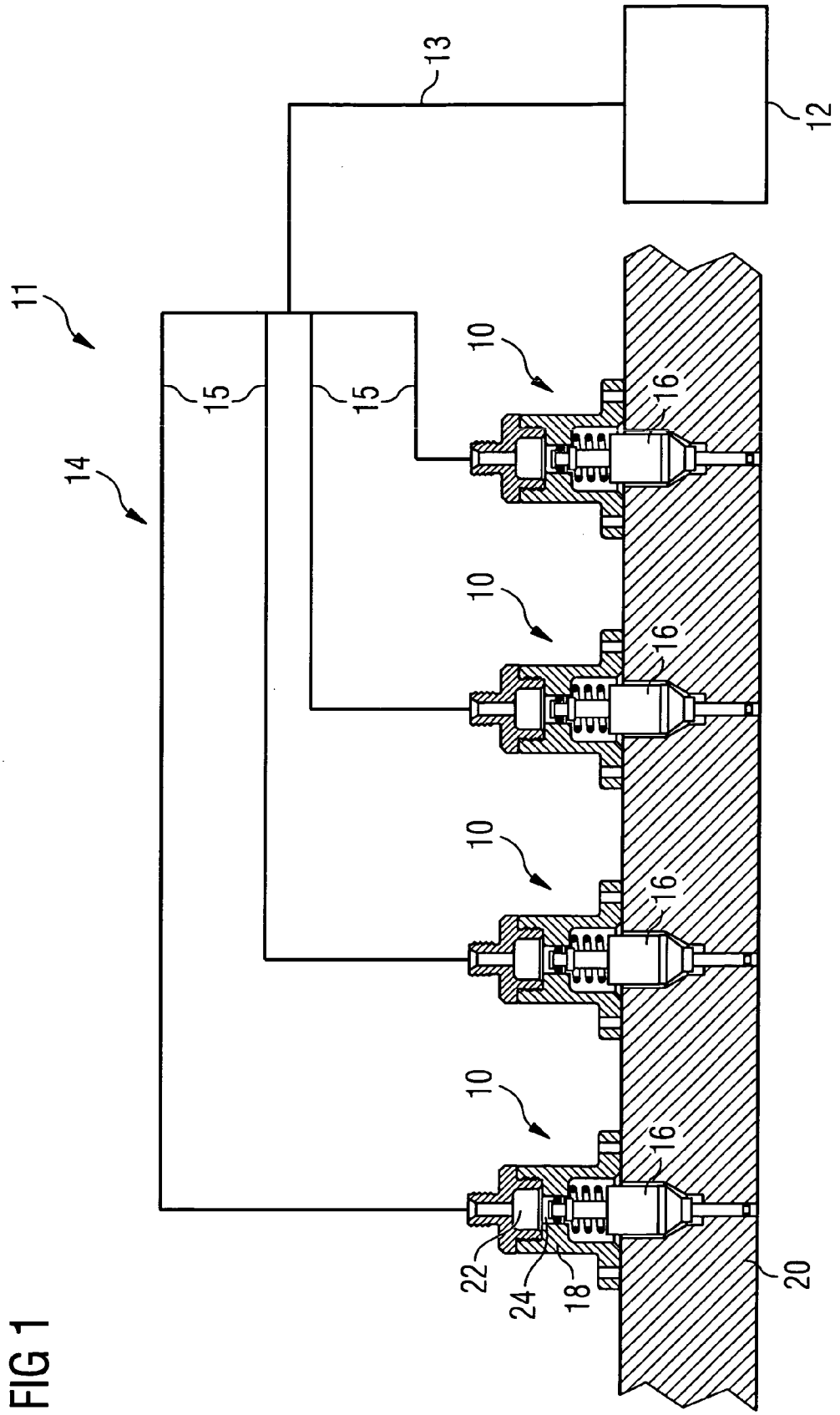
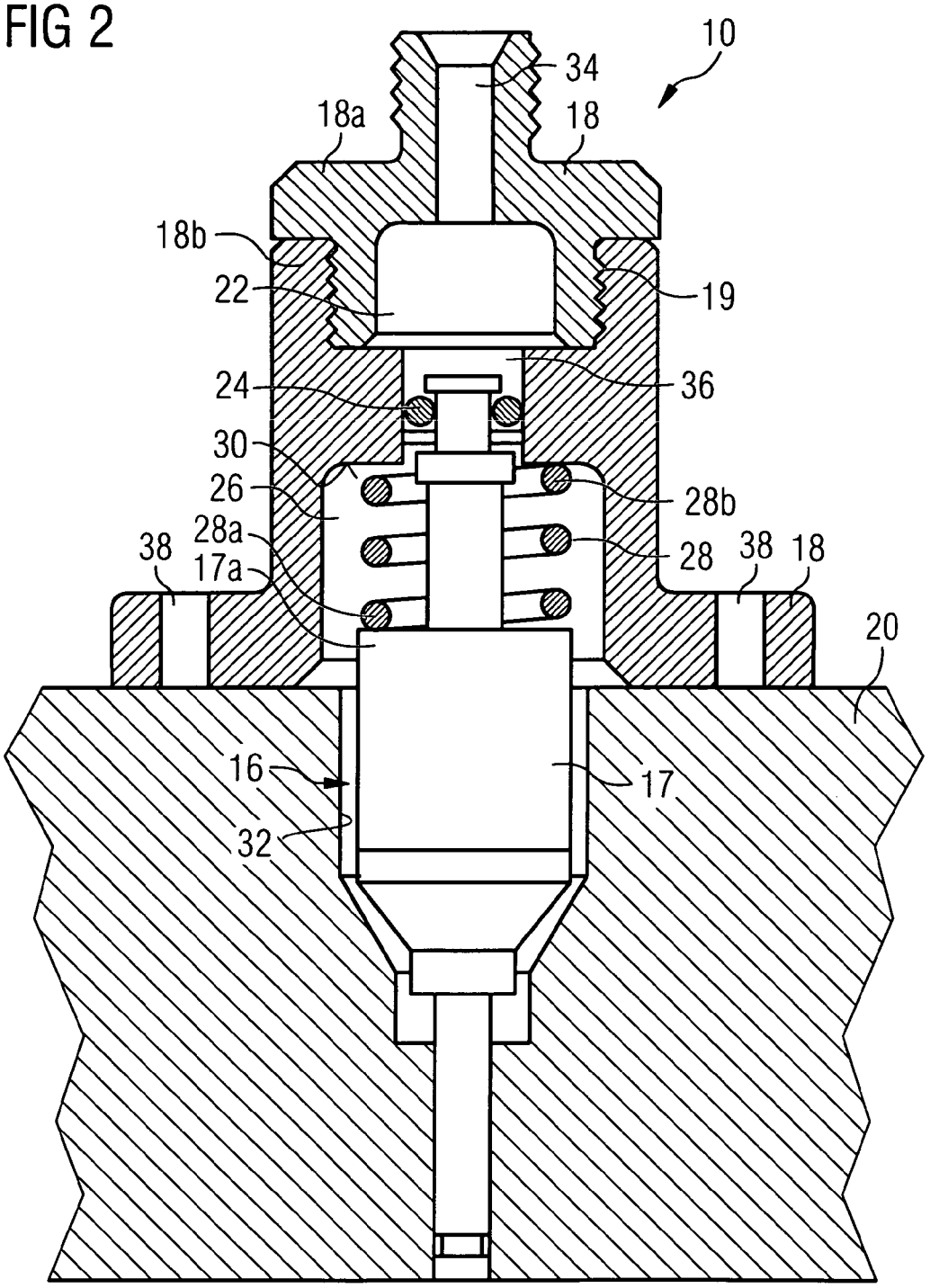


FIG 1

FIG 2



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Application Number
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TECHNICAL FIELDS SEARCHED (IPC)

F02M

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	30 October 2006	Morales, Miguel

CATEGORY OF CITED DOCUMENTS

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REFERENCES CITED IN THE DESCRIPTION

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