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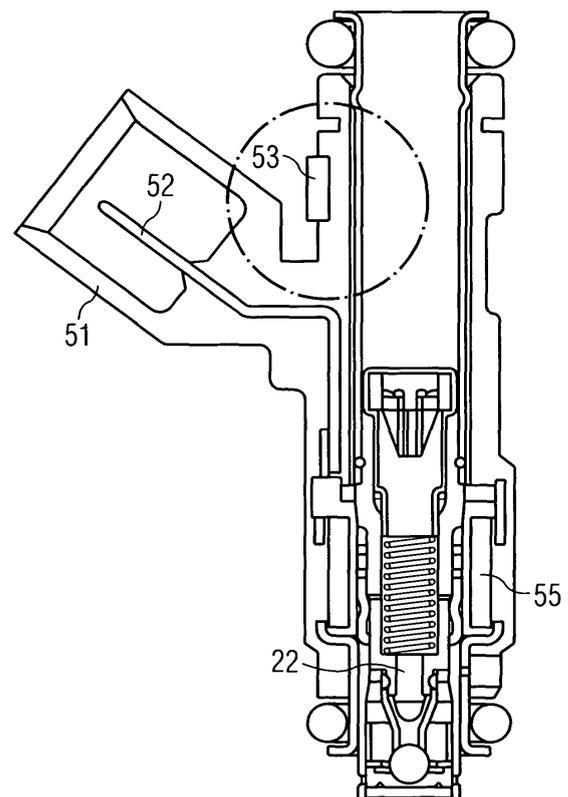
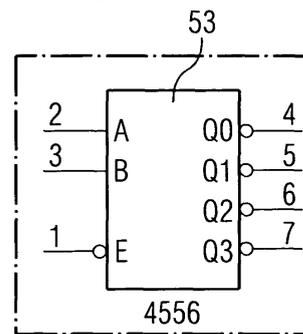
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(54) **Fluid injector**

(57) A fluid injector comprises a body and an electronic memory unit (53) for storing injector-specific data. The electronic memory unit (53) is arranged on the body or is taken in by the body.

**FIG 2**



## Description

**[0001]** The invention relates to a fluid injector, in particular a fluid injector for metering fuel to a combustion chamber of an internal combustion engine. Fuel injectors are in widespread 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.

**[0002]** Fluid injectors 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 fluid injector being responsible for the way the fluid is dosed may vary greatly. In addition to that, fluid injectors may accommodate an actuator for actuating a needle of the injector, which may for example be an electromagnetic actuator or a piezoelectric actuator.

**[0003]** In order to enhance the combustion process in view of the creation of unwanted emissions, the respective fluid injector may be suited to dose fluid 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 case of a Diesel engine in the range of up to 2000 bar.

**[0004]** The object of the invention is to create a fluid injector, which enables to obtain characteristic information about the specific fluid injector in a simple way.

**[0005]** This object is achieved by the features of the independent claim. Advantageous embodiments of the invention are given in the sub-claims.

**[0006]** The invention is distinguished by a fluid injector with a body and an electronic memory unit for storing injector-specific data. The electronic memory unit is arranged on the body or is taken in by the body. This has the advantage that specific information about the fluid injector may be stored in the electronic memory unit and then may later be read from the electronic memory unit. This may enable to determine exactly the history of the individual injector, especially when it is returned after a service inspection or in order to determine its characteristics during a service inspection. The specific data may simply be stored on the electronic memory unit during the production process of the fluid injector and is then part of the fluid injector. In this way, it is possible to access all these data directly from the fluid injector without needing to contact the manufacturer and accessing a database of the manufacturer. This also takes away the need for the manufacturer to keep such a database.

**[0007]** It enables in this way very fast technical service for an internal combustion engine incorporating, for example, a fluid injector, if the fluid injector has some defect.

**[0008]** Depending on the memory space available on the electronic memory unit, various information about the fluid injector may be stored such as a production number, a production site, a production date or time, for example, in a Julian date format, assembly line parameters, a test

line production date and parameters, injector calibration information, a shipping date, or an installation date. It may, however, also comprise other information.

**[0009]** In an advantageous embodiment of the fluid injector, the body comprises a first body with a recess. The body further comprises a needle that obstructs injection of fluid in its closing position and otherwise enables fluid injection. The body further comprises a second body being arranged and formed in a way to at least in part cover the first body. The electronic memory unit is arranged on the second body or is taken in by the second body. In this way, the fluid conduction and fluid dosing is separated from the second body. This enables to choose an appropriate material for accommodating the electronic memory unit in respect of ease of manufacturing, a thermal heat transfer, and electromagnetic compatibility.

**[0010]** In a further advantageous embodiment of the fluid injector, the second body comprises plastics. In this way, the second body can simply be brought in shape to accommodate the electronic memory unit.

**[0011]** In this respect it is advantageous if the second body is molded. It is then simple to manufacture in respect of accommodating the electronic memory unit and enables in a simple way to seal and cover the electronic memory unit to protect it from any environmental influence.

**[0012]** In a further advantageous embodiment of the fluid injector, the second body comprises a connector comprising at least one terminal for electrically connecting the injector and the electronic memory unit is electrically connected to at least one terminal of the connector. In this way, simple access for reading information from the electronic memory unit is possible.

**[0013]** In a further advantageous embodiment of the fluid injector, the electronic memory unit is arranged in an area of a second body with a high thickness. This enables to subject the electronic memory unit to less heat peaks.

**[0014]** Exemplary embodiments of the invention are explained in the following with the aid of schematic drawings. These are as follows:

FIG. 1 a first embodiment of a fluid injector and

FIG. 2 a second embodiment of a fluid injector.

**[0015]** Elements of the same design and function that occur in different illustrations are identified by the same reference character.

**[0016]** A fluid injector, that is embodied as a fuel injector, that is suitable for injecting fuel into a gasoline engine or that may also be suitable for injecting fuel in a Diesel engine, comprises a housing 1, a valve body 2 and an actuator unit 3. The fuel injector is preferably located in a cylinder head of an internal combustion engine and provides a combustion chamber with fuel. The housing 1 may comprise a fluid duct 10 to lead the fuel to a valve body 2.

**[0017]** The valve body 2 comprises a cartridge 21 with a recess 23 and a needle 22 that is inserted into the recess 23 and is guided in an area of a guide formed in the recess 23. The needle 22 is of an outward opening type but it may also be of an inward opening type. The needle 22 is pushed in its closing position by a return spring 24, which rests on a spring washer that is connected to the needle. The return spring 24 exerts a force on the needle 22 in the closing direction of the needle 22.

**[0018]** The actuator unit 3 is inserted into the housing 1. The actuator unit 3 is contacted mechanically on one of its axial ends by a thermal compensator 4 and the other axial end is coupled to the needle 22.

**[0019]** The actuator unit 3 is formed in this embodiment of the fluid injector as a piezoelectric actuator unit. It may, however, also be formed as any other kind of actuator unit being suitable for actuating a fluid injector, such as an electromagnetic actuator. Depending on actuating signals, the actuator unit 3 changes its axial length and in that way pushes the needle 22 away from its closing position or leaves it in its closing position.

**[0020]** A first body is formed by the housing 1, the valve body 2, a cartridge 21, and the needle 22. The first body may, however, also comprise just one or more of the above elements. It may also be formed as a single part apart from the needle 22.

**[0021]** A second body 5 is arranged and formed in a way to at least in part cover the first body. The second body 5 may comprise a connector 51 with at least one terminal 52 for connecting the actuator unit 3 with an electronic control unit.

**[0022]** An electronic memory unit 53 is arranged on the second body 5 or is taken in by the second body 5, as shown in FIG. 1. The electronic memory unit 53 comprises electronic memory for storing data. Preferably, it is of a type of memory that may be written once and after that be only read. That way, it may be a read-only memory, for example, being formed as an EPROM.

**[0023]** Various data may be stored in the electronic memory unit 53 characterizing the individual fluid injector. This data may, for example, be a production number, an assembly line site identifier, an assembly line production date and parameters, a test line production date and parameters, an injector calibration information, a shipping date and installation date. It may also comprise other information. The dates may preferably be stored in a Julian date way. For example, it may comprise information about dynamic and/or static characteristics of the fluid injector. In this way, a high degree of traceability is given, enabling, for example, in a simple way to determine where the fluid injector was manufactured or assembled.

**[0024]** The electronic memory unit 53 is extremely well protected against environmental influences such as dirt or aggressive fluids, if it is fully covered by the second body 5 as shown in FIG. 1. The second body 5 preferably comprises plastics and is in addition to that preferably molded.

**[0025]** The electronic memory unit 53 is preferably

electrically connected to at least one terminal 52 of the connector 51. This enables in an easy way to read out data from the electronic memory unit 53. Alternatively, the electronic memory unit 53 may be provided with means to read out the information stored in the electronic memory unit 53 by way of inductive or capacitive coupling.

**[0026]** The electronic memory unit 53 may also be arranged on the second body 5, that is on the outer surface of the second body 5, as is shown by way of example in FIG. 2. In the example in the second embodiment of the fluid injector shown in FIG. 2, the second body 5 also takes in a coil 55 being part of an electromagnetic actuator forming the actuator of the fluid injector.

**[0027]** In this respect, the electronic memory unit 53 may also be designed to selectively add or reduce resistance to the coil 55 in order to switch from high to low impedance or vice-versa.

**[0028]** In both the first and second embodiment of the fluid injector, the electronic memory unit 53 may either be taken in by the second body 5 or also be arranged on the second body 5. In both cases, also the second body 53 and the first body form a body. The body may also comprise just parts of the first and/or second body 5.

**[0029]** The electronic memory unit 53 is preferably located in or on the second body 5 on a location with a high thickness of the second body 5. This enables together with the suitable choice of material that the electronic memory unit 53 is subjected to less heat peaks.

### Claims

1. A fluid injector with a body and an electronic memory unit (53) for storing injector-specific data, with the electronic memory unit (53) being arranged on the body or being taken in by the body.
2. A fluid injector according to claim 1 with the body comprising a first body with a recess and with a needle that obstructs injection of fluid in its closing position and otherwise enables fluid injection, the body further comprising a second body (5) being arranged and formed in a way to at least in part cover the first body, and with the electronic memory unit (53) being arranged on the second body (5) or being taken in by the second body (5).
3. A fluid injector according to claim 2 with the second body (5) comprising plastics.
4. A fluid injector according to claim 3 with the second body (3) being molded.
5. A fluid injector according to one of the claims 2 to 4, comprising a connector (51) comprising at least one terminal (52) for electrically connecting the fluid injector and with the electronic memory unit (53) being

electrically connected to at least one terminal (52) of the connector (51).

6. A fluid injector according to one of the claims 2 to 5 with the electronic memory unit (53) being arranged in an area of the second body (5) with a high thickness.

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FIG 1

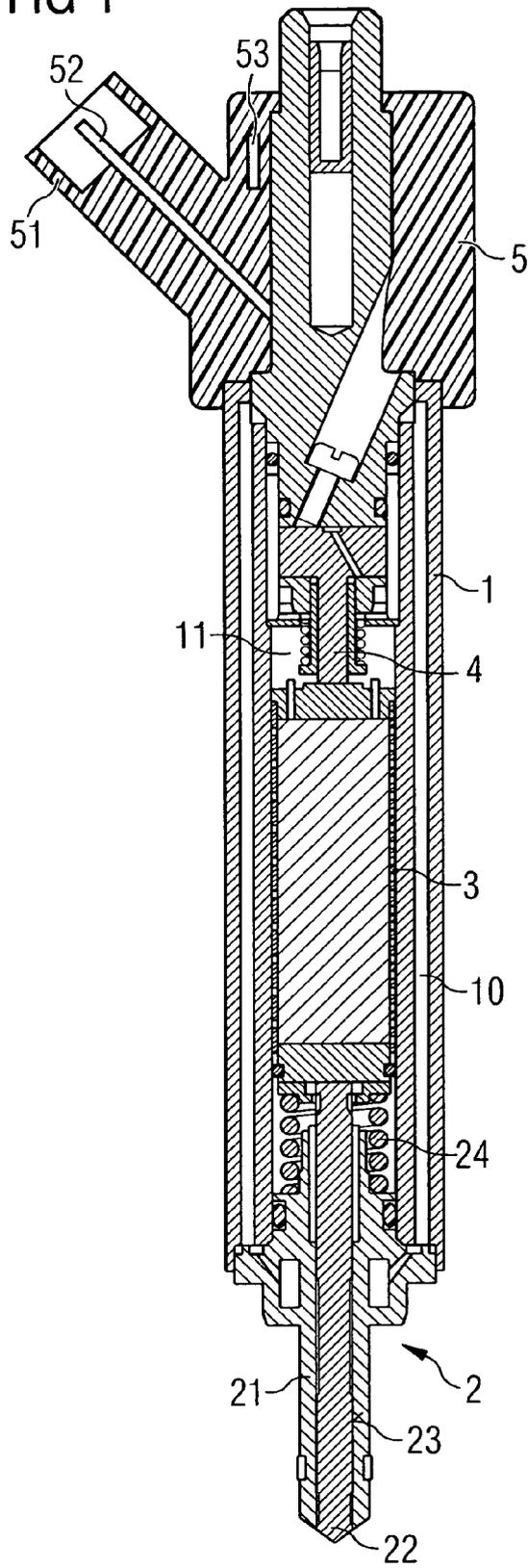
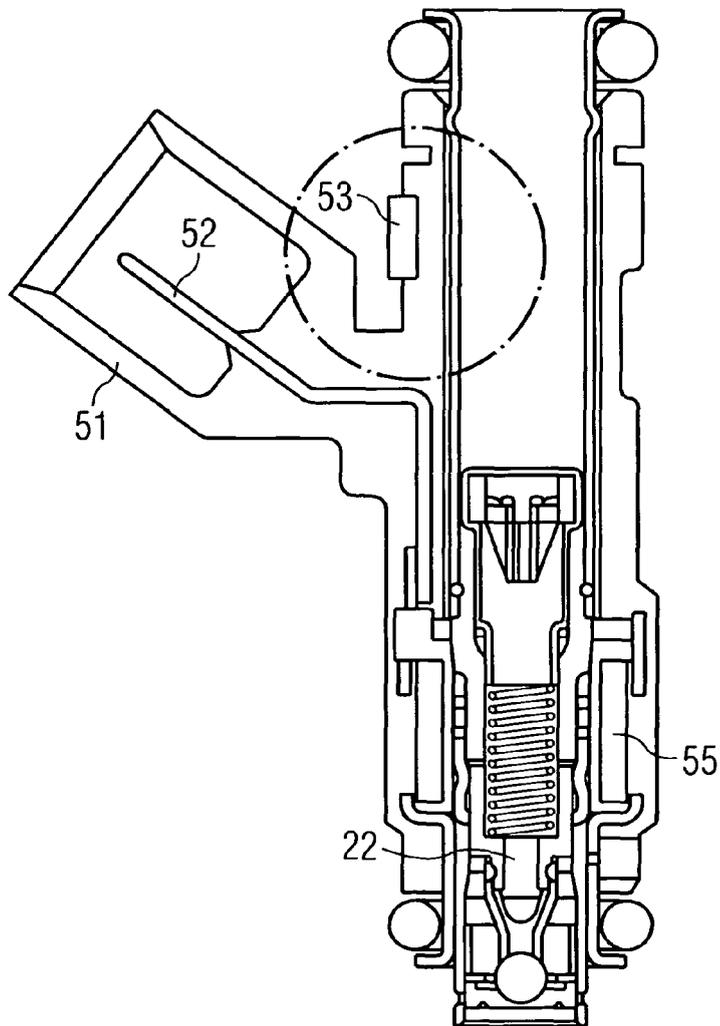
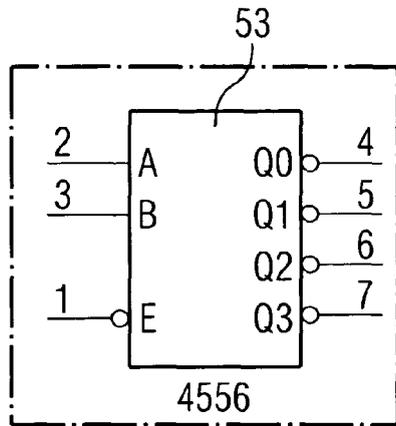


FIG 2





DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
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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 21 July 2005	Examiner Wagner, A
<b>CATEGORY OF CITED DOCUMENTS</b> 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 05 00 9617

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on  
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