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(71) Applicant: **ROBERT BOSCH GMBH**
70442 Stuttgart (DE)

(72) Inventors:
• **Durus, Alp**
1A blok Daire 3 Nilüfer Bursa (TR)
• **Vardar, Dogan**
16130 A Blok No;15, Nilüfer (TR)
• **Kandemir, Duygu**
1A blok Daire 3 Nilüfer Bursa (TR)

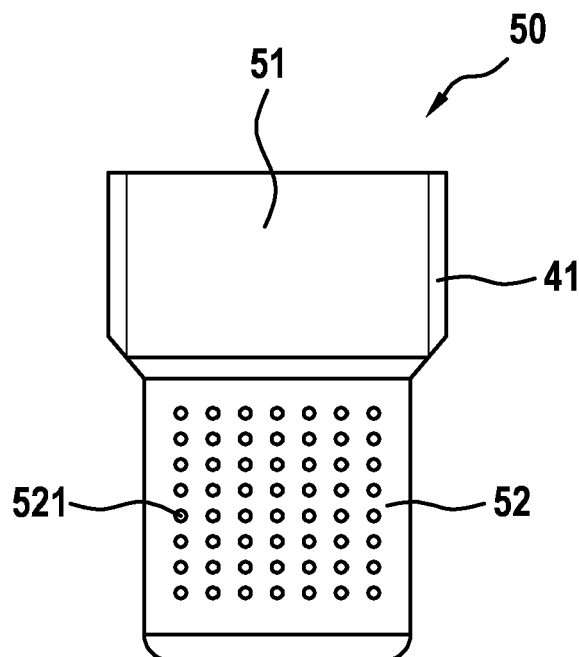
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(54) **An injection valve for internal combustion engines**

(57) The subject matter invention is an injection valve (10) for internal combustion engines, which essentially comprises a valve body (12); an input region (30) which exists in said body (12) and through which the fuel enters into the injection valve (10); a filter housing (32) which is provided inside said body (12) in order for the fuel to be

cleaned at said input region (30); a filter (40, 50) which is connected into the filter housing (32), characterized by comprising a screwing surface (321) with a certain length on the internal surface of the filter housing (32); and an outer screw (41) with a certain length so as to correspond to the screwing surface (321) on the filter (40, 50).

Fig. 1



Description

[0001] The present invention relates to an injection valve for internal combustion engines, which essentially comprises a valve body; an input region existing in said body, through which the fuel enters; a filter housing which is provided inside said body in order for the fuel to be cleaned at said input region; a filter which is connected into the filter housing.

PRIOR ART

[0002] Said injection valves essentially comprise a valve body; and a valve member which is axially movable so as to function as a piston inside said body. In more details, said valve member (it is called needle in the related technical field) sprays fuel to the combustion chamber of the engine. The fuel, which arrives at the injection valve from the fuel depot of the vehicle, comprises particles with several sizes and shapes. When these particles are sprayed to the combustion chamber, the performance of the vehicle decreases, and besides, these particles give harm to the parts during the passage thereof through the injection valve and after certain duration, the injection valve becomes useless. In order to prevent the particles, which arrive at the injection valve together with the fuel, from passing to the needle and thus to the combustion chamber, pluralities of filter applications are improved inside the injection valve. In general, filters, which function according to the breaking principle, and filters, which function according to the filtering principle, are the filter types used in particle filtering process.

[0003] The filters, which function according to the breaking principle, are embodied in a cylindrical manner. This filter system is disclosed in the patent application DE 2009 029 312 A1 and some improvements are realized. There are grooves which extend along the cylinder and through which the fuel will pass and which are placed once in every 120 degrees on the cross section. The particles inside the fuel, which pass through these channels with a high pressure, are fragmented because of mechanical friction, abrasion and thermal effects and as a result, cleaned fuel is sprayed to the combustion chamber by the needle. Moreover, the vibration, existing in the engine, helps the filtering process. Such filters are connected in a snap-fit manner to the filter housing, embodied inside the injection valve, by nailing process.

[0004] Another filter system is disclosed in the patent application DE 102 20 632 A1 in the most general form thereof and the filter here functions according to the filtering principle. On the filters which function according to this principle, there are holes which are opened by laser; and the fuel arriving at the injection valve is filtered as it is passing this filter; and the particles accumulate on the filter and the filtered fuel is sprayed to the combustion chamber by means of the needle. The filter is connected in a snap-fit manner to the filter housing, embodied on the injection valve, by nailing process.

[0005] The above mentioned two types of filtering members function with high efficiency during the first working hours after the assembly with the snap-fit process. However, as the working hours increase, because of high pressure and because of the vibration inside the engine, the filters began to realize axial oscillations inside the housings. Since metal is seated onto another metal, there is no axial fixation member. During these oscillations, the filters, which hit the lower side of the filter housing, lead to the breakage of new particles from the housing and thus new dirt is formed inside the fuel. The filter members, which should clean the particles inside the fuel, can not realize cleaning process: and they lead to extra dirt in the fuel.

[0006] In the patent application US 4,608,166, a solution is disclosed to the situation where the snap-fit process do not provide full efficiency; and channels are embodied on the filter and afterwards, in the patent application EP 1 296 057 A1, there is further improvement for the filters. However, in any of these improvements, there is no embodiment which prevents the movement of the filters inside the housing axially.

[0007] Moreover, it is impossible to change the filters, which are assembled by means of the snap-fit method, without damaging the injection valve. Because of this, the injection valve should be changed completely and this leads to economic losses.

[0008] As a result, because of the abovementioned problems, an improvement is required in the related technical field.

BRIEF DESCRIPTION OF THE INVENTION

[0009] The present invention relates to an axially fixed filter which cleans the particles existing inside the fuel entering into the injection valve which sprays fuel to the combustion chamber in internal combustion engines, in order to eliminate the abovementioned problems and to bring new advantages to the related technical field.

[0010] The main object of the present invention is to provide an injection valve where the filter, which is connected to the filter housing of an injector spraying fuel to the combustion chamber in internal combustion engines, is prevented from moving axially during the operation of the injector.

[0011] Another object of the present invention is to provide an injection valve where the filter of the injection valve, which is in connection onto the engine, can be fixed and removed without giving damage to the injection valve body and in an easy manner.

[0012] In order to realize all of the abovementioned objects and the objects which are to be obtained from the detailed description below, the present invention relates to an injection valve for internal combustion engines, which essentially comprises a valve body; an input region which exists in said body and through which the fuel enters; a filter housing which is provided inside said body in order for the fuel to be cleaned at said input re-

gion; a filter which is connected into the filter housing, Said injection valve comprises a screwing surface with a certain length on the internal surface of the filter housing; and an outer screw with a certain length so as to correspond to the screwing surface on the filter.

[0013] In a preferred embodiment of the subject matter invention, said screwing surface is embodied to the region which is adjacent to the inlet existing in the input region of the filter housing.

[0014] In another preferred embodiment of the subject matter invention, said filter is a grooved filter.

[0015] In another preferred embodiment of the subject matter invention, said outer screw is embodied on the grooved filter so as to be adjacent to the upper part.

[0016] In another preferred embodiment of the subject matter invention, the filter is a filter cartridge.

[0017] In another preferred embodiment of the subject matter invention, the filter cartridge has a wide region which is at a certain length and it has a narrow region at the continuation of the wide region and the outer screw is embodied to said wide region.

[0018] In another preferred embodiment of the subject matter invention, the screwing surface and the outer screw are embodied in the form of M3,5 x 0,6.

[0019] In order for the embodiment and the advantages of the subject matter invention to be understood in the best manner with the additional elements, it has to be evaluated with the detailed description and with the figures explained below.

BRIEF DESCRIPTION OF THE FIGURES

[0020]

In Figure 1, the general view of a filter cartridge is given.

In Figure 2, the general view of a filter cartridge is given.

In Figure 3, the general view of a grooved filter is given.

In Figure 4, the view of the filter housing is given inside the injector cross section.

In Figure 5, the general view of an injector is given.

REFERENCE NUMBERS

[0021]

10 Injection Valve
11 Channel
12 Body
20 Needle Region
30 Input Region
31 Inlet

32 Filter Housing
321 Screwing Surface
40 Grooved Filter
41 Outer Screw
42 Groove
43 Upper Part
44 Lower Part
50 Filter cartridge
51 Wide Region
52 Narrow Region
521 Hole

THE DETAILED DESCRIPTION OF THE INVENTION

[0022] In this detailed description, the subject matter improvement is explained with references to examples Without forming any restrictive effect in order to make the subject more understandable. Accordingly, in the detailed description and in the figures below, an injection valve (10) is disclosed which is improved for preventing the axial movement of the injection valve filter inside the filter housing, which sprays fuel to the combustion chamber of internal combustion engines.

[0023] The injection valve (10) is generally embodied in a cylindrical form and it comprises two main regions, namely the needle region (20) and an input region (30) around the needle region (20). The needle region (20) comprises members for providing fuel spraying process in a controlled manner to the combustion chamber (not illustrated in the figures) by the injection valve (10).

[0024] On the injection valve (10) body (12), a channel (11) is embodied between the needle region (20) and the input region (30). On the channel (11) and around the input region (30), a wider region is embodied when compared with the diameter of the channel (11); and this region is defined as the filter housing (32). On the upper region of the filter housing (32) and at the continuation of the channel (11), an inlet (31) part is embodied for providing the fuel to enter into the injection valve (10). On the body (12) and inside the filter housing (32), a screwing surface (321), which has a length of L and which has M3,5 x 0.6 dimensions, is embodied to the region of the filter housing (33) which is close to the inlet (31) part.

[0025] In the injection valve (10), two types of filters can be connected to the filter housing (32). These filter types are called namely the grooved filter (40) and the filter cartridge (50).

[0026] The grooved filter (40) is generally embodied so as to be cylindrical. On the lateral surface of the grooved filter (40) and beginning from the upper part (43), an outer screw (41) with a certain length and with a dimension of M3,5 x 0,6 is embodied. At the upper part (43), where the outer screw (41) is embodied, three grooves (42) are embodied so that there is an angle of 120 degrees in between on the cross section towards the lower part (44) and these grooves (42) end around the upper part (43). In the same manner, there are three grooves (42) which are embodied on the lateral surface

from the upper part (43) towards the lower part (44) and which have an angle of 120 degrees with respect to each other on the cross section. The grooves (42) end at a certain distance from the upper part (43) and at a vicinity of the outer screw (41) opened. Thanks to this, openings are embodied, which are called groove (42) and which exist on the two directions of the cylinder bases and which have an angle of 120 degrees with respect to each other and these grooves (42) extend orthogonally 35 to the cross sections of the upper and the lower part (43, 44). Thus, in a grooved filter (40), there are six grooves (42) where in one direction there are three grooves and in the other direction there are also three grooves. The grooves (42) in both directions are embodied so as not to coincide with each other.

[0027] The filter cartridge (50) is embodied so as not to have a base and so as to have a hollow cylinder form; and at the side where the base is open, the diameter is wider than the diameter of the side where the base is closed. This region is defined as the wide region (51). The wide region (51) has a certain length and an outer screw (41) with said determined length and with dimensions of M3,5 x 0,6 is embodied here. The cylinder diameter narrows after a certain length. The diameter stays fixed until the end of the cylinder beginning from the region where the diameter narrows. This region is defined as the narrow region (52). In the filter cartridge (50), holes (521) are embodied on the narrow region by means of the laser method; and the filter cartridge (50) has a screen-like appearance when viewed from above, the holes (521) have a diameter which is smaller than the diameter of the particles inside the fuel.

[0028] The input region (30), existing on the injection valve (10), is the region where fuel enters the system. A filter, which has properties suitable to the fuel to be used, is connected to the filter housing (32) embodied at the input region (30). The grooved filter (40) or the filter cartridge (50), in connection with the filter housing (32), provides the fuel entering into the injection 20 valve (10) to be cleaned. The channel (11), which is embodied between the input region (30) of the injection valve (10) and the needle region (20) in just the opposite direction, provides the fuel to be transferred to the needle region (20) of the input region (30). The members, existing inside the needle region (20), spray fuel to the combustion chamber of the engine in a controlled manner and at a certain pressure. The needle, which functions as a valve member, opens and closes the spraying hole existing on the bottom point of the injection valve (10).

[0029] The fuel, arriving to the input region (30), is filtered in the filter region and the passage of the particles inside the fuel to the needle region (20) is prevented. The filtering process is realized in two different ways depending on the characteristic of the filter used. The grooved filters (40) clean the fuel with the help of mechanical friction and abrasion and with the help of the thermal effects. The particles inside the fuel hit the groove (42) walls and they are thereby fragmented and the fragmented harm-

less particles are distributed into the fuel. The filter cartridges (50) clean the fuel using the accumulation method. While the fuel, which enters into the filter cartridge (50), pass through the holes (521) which are opened by laser, the particles inside the fuel accumulate inside the filter cartridge (50) and the clean fuel exit through the filter cartridge (50).

[0030] The injection valve (10) essentially exists in connection with the combustion chamber of the engine. The injection valve (10) is in connection where the part comprising the needle region (20) is inside the combustion chamber and where the other parts thereof are outside the combustion chamber. The fuel, which is transferred to the injection valve (10) by means of the fuel pump which is one of the pieces belonging to the engine fixtures, enters into the body (12) through the input region (30). The fuel, which will advance inside the channel (11), arrives at the filter region and the particles inside the fuel are deactivated by means of the affects which will be different depending on the characteristic of the filter used. The fuel, whose filtering process is completed, is transferred to the needle region (20) by means of the channel (11); and the fuel is sprayed to the combustion chamber under high pressure in a controlled manner by the systems which are in connection inside the needle region (20).

[0031] The protection scope of the present invention is set forth in the annexed claims and cannot be restricted to the illustrative disclosures given above, under the detailed description. It is because a person skilled in the relevant art can obviously produce similar embodiments under the light of the foregoing disclosures, without departing from the main principles of the present invention.

Claims

1. An injection valve (10) for internal combustion engines, which essentially comprises a valve body (12); an input region (30) which exists in said body (12) and through which the fuel enters into the injection valve (10); a filter housing (32) which is provided inside said body (12) in order for the fuel to be cleaned at said input region (30); a filter (40, 50) which is connected into the filter housing (32), **characterized by** comprising a screwing surface (321) with a certain length on the internal surface of the filter housing (32); and an outer screw (41) with a certain length so as to correspond to the screwing surface (321) on the filter (40, 50).
2. An injection valve (10) according to claim 1, **characterized in that** said screwing surface (321) is embodied to the region which is adjacent to the inlet (31) existing in the input region (30) of the filter housing (32).
3. An injection valve (10) according to claim 1 or 2,

characterized in that said filter is a grooved filter (40).

4. An injection valve (10) according to anyone of the preceding claims, **characterized in that** said outer screw (41) is embodied on the grooved filter (40) so as to be adjacent to the upper part (43). 5
5. An injection valve (10) according to anyone of the claims between claim 1 and claim 3, **characterized in that** the filter is a filter cartridge (50). 10
6. An injection valve (10) according to claim 5, **characterized in that** the filter cartridge (50) has a wide region (51) which is at a certain length and it has a narrow region (52) at the continuation of the wide region (51) and the outer screw (41) is embodied to said wide region (51). 15
7. An injection valve (10) according to anyone of the preceding claims, **characterized in that** the screwing surface (321) and the outer screw (41) are embodied in the form of M3,5 x 0,6. 20

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Fig. 1

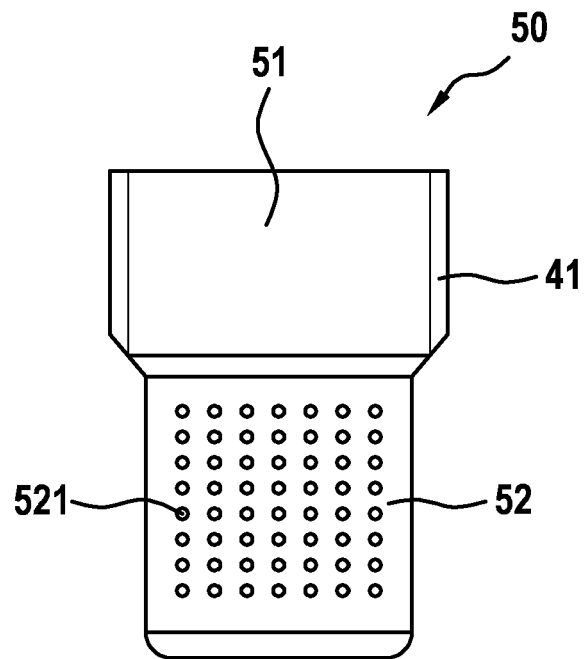


Fig. 2

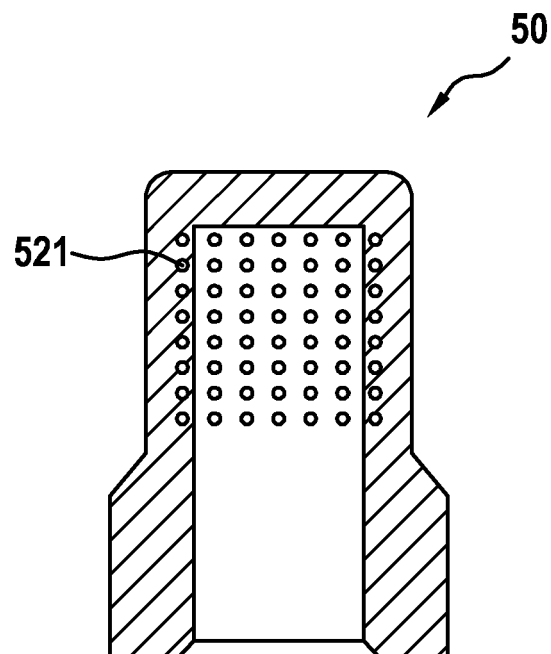


Fig. 3

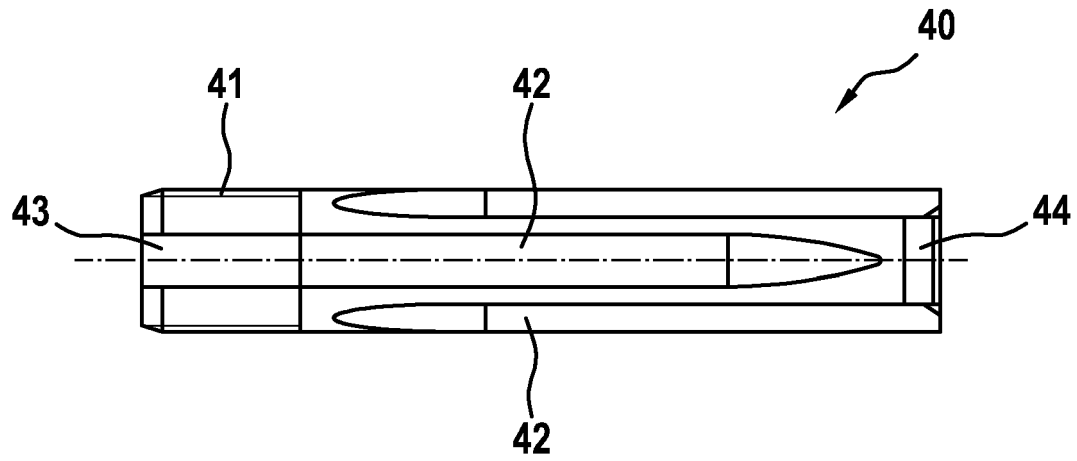


Fig. 4

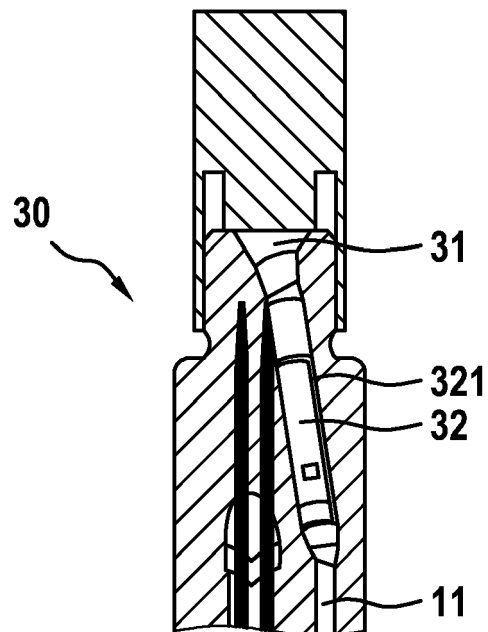
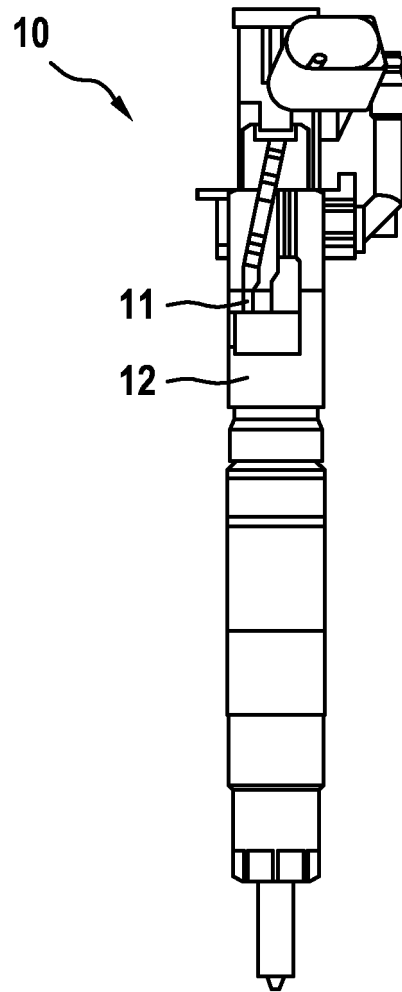


Fig. 5



REFERENCES CITED IN THE DESCRIPTION

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