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(54) FUEL FILTER FOR REDUCING CONTAMINANT EMISSIONS

(57) The present invention relates to a fuel filter for the reduction of contaminant emissions, which is formed from two hollow, cylindrical casings that are open at only one of the ends thereof, the closed ends thereof each having inlet and outlet nozzles arranged off-centre vis-à-vis the circle that defines the closed end of each casing; inside the casings there are, at the periphery and separated from the corresponding inner walls thereof, separate filtering plastic meshes which are fixed to the corresponding closed ends of the cylinders via the lower part thereof, which are formed from successive vertical rectangles placed close to one another around the inner periphery of each one of the casings and housing, in an intermediate position between the inner walls of each casing and the actual filtering meshes, an anisotropic reactive sheet, placed peripherally inside the filter, composed of a barium-ferrite-dust conglomerate supported in a synthetic rubber.

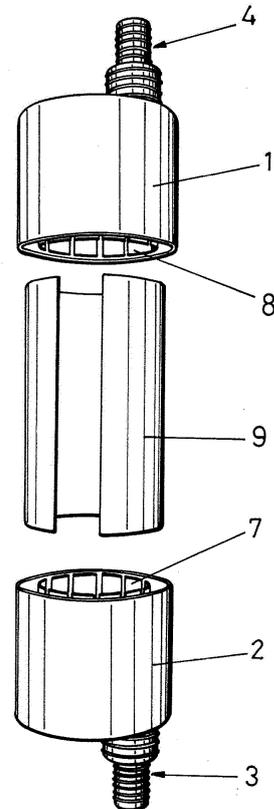


FIG.1

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Description

Object of the invention

[0001] The present invention refers to a fuel filter for reducing contaminant emissions (for example carbon monoxide or nitrogen oxide, etc.) produced by combustion, for use in both vehicles and devices or in machines which use the energy produced by burning various fuels.

[0002] More specifically, the present invention refers to a fuel filter for reducing contaminant emissions and saving liquid or gas fuels, such as petrol, diesel, compressed natural gas (CNG) or liquefied petroleum gas (LPG), in any piece of apparatus or any vehicle which uses said fuel in order to operate, for example incinerators, central heating boilers, current generators, vehicle internal combustion engines, public works machinery, etc., it being possible for the filter to easily adapt to the engine in these devices or vehicle.

Background of the invention

[0003] Various devices exist on the market which, either by mechanical or chemical means - mainly mechanical - make it possible to reduce fuel combustion without affecting the performance of the engine. For example, some of the mechanical devices which may be cited include those which operate by enriching the air in the combustion chamber with a vaporisation before the fuel is diffused, those which cause turbulence in the fuel admission conduit or those in which the fuel is made to pass through a micro-perforated grille in order to improve diffusion thereof.

[0004] The liquid or gas fuel used in internal combustion engines is composed of groups of molecules. Each molecule generates a magnetic field for itself, which is why, in this sense, the fuel molecules are polarized. Therefore, the fuel particles of the positive and negative electric charges are not divided into smaller particles but rather remain joined together simply by means of electrostatic attraction. We may therefore conclude that the fuel cannot actively interact with the oxygen during combustion, therefore causing it to be incomplete. This is the reason why in general, engines only derive benefit from 80% of the fuel they use, the remaining 20% being expelled outwards in the form of contaminant fuel waste.

[0005] The fuel filter, object of the present invention, modifies the molecular structure of the various fuels that pass through it, thereby modifying their physical properties by means of reordering their molecules, without modifying the chemical properties of the fuels.

[0006] When the fuel passes through the filter, object of the present invention, optionally including a usual and known filter element, it comes into contact with a multipolar reagent, which generates turbulence into said fuel in order to move it around, thereby varying its molecular structure, oxygenation capacity and volume and enabling a closer fuel/comburent relation, which results in better

combustion and less contaminant gasses being released into the environment, as well as facilitating combustion, reducing mechanical wear of the engine components and making it possible to increase its useful life.

Brief description of the invention

[0007] The present invention refers to a fuel filter for reducing contaminant emissions and saving liquid or gas fuels, such as petrol, diesel, compressed natural gas (CNG) or liquefied petroleum gas (LPG) in any piece of apparatus or any vehicle which uses said fuel in order to operate, for example incinerators, central heating boilers, current generators, vehicle internal combustion engines, public works machinery, etc., it being possible for the filter to easily adapt to the engine in said devices or vehicles.

[0008] The fuel filter object of the present invention is formed by a cylinder made of plastic material, which is resistant to solvents, fuels and weak acid, inside which there is a reactive sheet, with an inlet nozzle at one end and an outlet nozzle at the opposite end, the diameter of both of which may be adapted and which correspond to the fuel feeder channels of the engine itself, these being separated from the vertical axle of the cylinder in an off-centre way. The inlet nozzle essentially enables the fuel to enter the inside of the cylinder. The fuel crosses the reactive sheet arranged inside it and optionally passes through a filter element of the variety which is usually employed, before being expelled from the outlet nozzle.

[0009] The reactive sheet housed inside the cylinder consists of an anisotropic sheet basically composed by a barium-ferrite dust conglomerate (BaFe , BaFe_2O_4 , $\text{Ba}^{2+}(\text{Fe}^{3+})_2(\text{O}^{2-})_4$) and synthetic rubber of the multipolar variety. This sheet is placed at the periphery, surrounding the inner walls of the cylinder and is held in position by means of a filtering plastic mesh, this mesh being part of the same container cylinder.

Description of the Figures

[0010] With the aim of illustrating the object of the present invention in more detail, the same is described below based on the attached figures, in which:

Fig 1: Schematic view of the fuel filter, object of the invention, showing the components thereof and the distribution of the same, according to one embodiment.

Fig 2: Details the nozzles in the fuel filter, according to Fig. 1, demonstrating acceptable diameters.

Fig 3: Detailed representation of the inside of the fuel filter, shown in Figure 1.

Detailed description of the invention

[0011] As shown in Figure 1, the fuel filter object of the present invention is formed from two hollow cylindrical

casings (1, 2), which are only open at one of their ends. At the closed end of both casings, there is an inlet and outlet nozzle (3, 4), which are especially separated at the same distance from the centre of the circle defined by the closed end of each casing, in such a way that they are off-centre in relation to the end circle. At their open end, the casings (1, 2) have means which are suitable for their subsequent assembly facing one another, in such a way that finally, once assembled, they define a hollow cylinder. These means optionally enable the opening and closing of the cylinder by means of separating the corresponding casings, with the aim of accessing the internal components of the filter, object of the invention, in order to replace it, for example.

[0012] The casing and nozzle assembly (1-3; 2-4) is preferably made as one single piece from a thermoplastic material, which is not very permeable to gases and vapour, which is very rigid, tenacious, and dimensionally stable, with high thermal resistance and which is stable in relation to fuels and solvents, such as polyoxymethylene (POM).

[0013] As can be seen in Figure 2, the inlet and outlet nozzles (3, 4) have corresponding projections with two different diameters, arranged in order from largest (5) to smallest (6). The projections (5, 6) make it possible to connect the fuel feeder tube in a safe way. Equally, their different diameters make it possible to use the filter, object of the present invention, with different tube diameters, if it is simply a case of cutting the nozzles (3, 4) in a crosswise direction, at a suitable height corresponding to the diameter of the fuel feeder tube in each case.

[0014] Returning to Figure 1, inside the casings (1, 2) there are filtering plastic meshes (7, 8) at the periphery, which are separated from the corresponding inner walls of the casings. The filtering meshes (7, 8) are fixed to the corresponding closed ends of the cylinders by their lower part, forming part of each one of the casings. In the embodiment shown in Figure 1, the filtering plastic meshes (7, 8) are formed from successive vertical rectangles placed near to one another around the inner perimeter of each one of the casings (1, 2), preferably made of the same material as that used for the casings. In addition to the fuel filtering which enters inside the filter, object of the invention, via the nozzle (3, 4), these filtering meshes make it possible to hold an anisotropic reactive sheet (9) in an intermediate position between the inner walls of each casing and the filtering meshes themselves, placed at the periphery inside the filter, object of the invention.

[0015] The reactive sheet (9) housed inside the cylinder consists of a fine anisotropic sheet basically composed of a barium-ferrite dust conglomerate (BaFe , BaFe_2O_4 , $\text{Ba}^{2+}(\text{Fe}^{3+})_2(\text{O}^{2-})_4$) supported in a synthetic rubber of the multipolar variety. As mentioned above, said sheet is placed at the periphery around the inner walls of the cylinder and is held in position by means of the filtering plastic mesh (7, 8), this mesh being part of the same container cylinder.

[0016] Inside the casings (1, 2), there is, in supportive

continuation from the centre of the base of the inner cylinder defined by each casing, a hollow cylindrical extension (10) of a height slightly lower than that of the casings, which also forms one single structure with said casings and, which is therefore made of the same material as they are.

[0017] The anisotropic sheet preferably has a barium-ferrite to synthetic rubber ratio of 9:1.

[0018] When the fuel crosses the inlet nozzle and passes through the filter, object of the invention, it comes into contact with the sheet, being altered based on the various multipolar fields provoked by the reactive sheet and furthermore being submitted to the turbulences caused by the filtering mesh, this causing oxygen bubbles to appear in the fuel, which facilitate combustion in addition to increasing the fuel volume. This improved combustion makes it possible to reduce the amount of contaminant gases released into the atmosphere by exhaust tubes or chimneys, in addition to less coal dust wastes being produced in combustion, since these wastes do not contaminate the engine oil and increasing the useful life thereof, thereby improving the overall performance of the engine.

[0019] Optionally, the fuel filter object of the present invention formed from two hollow cylindrical casings (1, 2) additionally includes a filtering element of the variety usually employed in these kinds of filters.

[0020] All the components of the filter, object of the present invention, are completely recyclable and after their useful life is over, they may be used for various things, for example recycling the casings in order to make new filters, recovering the filtering mesh entirely after cleaning it, and crushing the reactive sheet, separating the rubber mineral, in order for it to undergo new extrusion processes and obtain new sheets.

Claims

1. Fuel filter for reducing contaminant emissions, **characterised in that** it is formed from two hollow cylindrical casings (1, 2), which are only open at one of their ends, having inlet and outlet nozzles (3, 4) arranged at their closed ends, arranged off-centre from the circle defined by the closed end of each casing; inside the casings (1, 2) being filtering plastic meshes (7, 8) at the periphery, which are separated from the corresponding inner walls thereof and fixed to the closed end components of the cylinders by their lower portion, being formed by successive vertical rectangles arranged near to one another around the internal perimeter of each one of the casings (1, 2), which house, in an intermediate position between the inner walls of each casing and the filtering meshes themselves, an anisotropic reactive sheet (9) placed at the periphery inside the filter, formed by a barium-ferrite dust conglomerate supported in a synthetic rubber, both casings (1, 2) having supporting

continuations inside them, extending from the centre of its internal base by way of hollow cylindrical extensions (10).

2. Fuel filter according to claim 1, **characterised in that** the casings (1, 2) have means suitable for its subsequent vis-à-vis assembly at their open end, in such a way that finally, once assembled, they define a hollow cylinder. 5
3. Fuel filter according to claim 2, **characterised in that** said means make it possible to open and close the cylinder by means of separating the corresponding casings, with the aim of accessing the internal components of the cylinder. 10
4. Fuel filter according to claim 1, **characterised in that** the inlet and outlet nozzles (3, 4) have corresponding projections with two different diameters arranged in order from largest (5) to smallest (6). 15
5. Fuel filter according to claim 1, **characterised in that** the reactive sheet (9) housed inside the cylinder consists of a fine anisotropic sheet formed by a barium-ferrite dust conglomerate, supported in a synthetic rubber, with a barium-ferrite to synthetic rubber ratio of 9: 1. 20
6. Fuel filter according to any one of claims 1 to 4, **characterised in that** the casings (1, 2), the nozzles (3, 4) and the filtering meshes (7, 8) are made from polyoxymethylene. 25
7. Fuel filter according to any one of the previous claims, **characterised in that** it includes a filtering element as an additional component. 30

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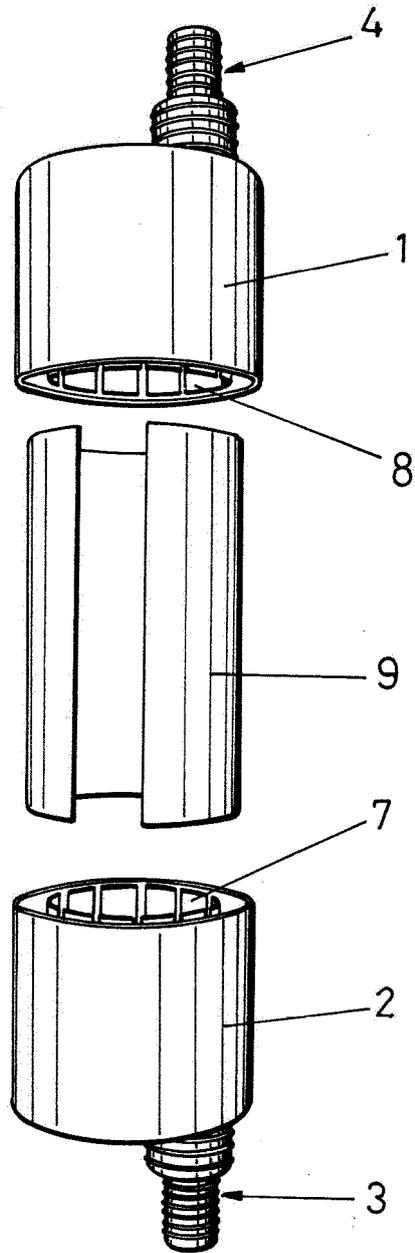


FIG.1

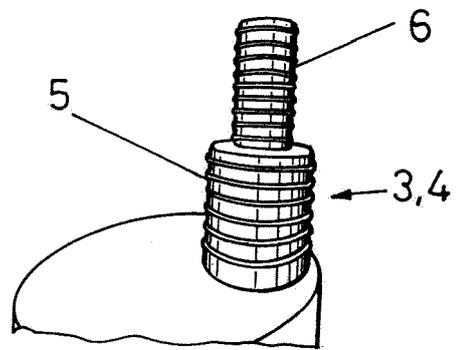


FIG.2

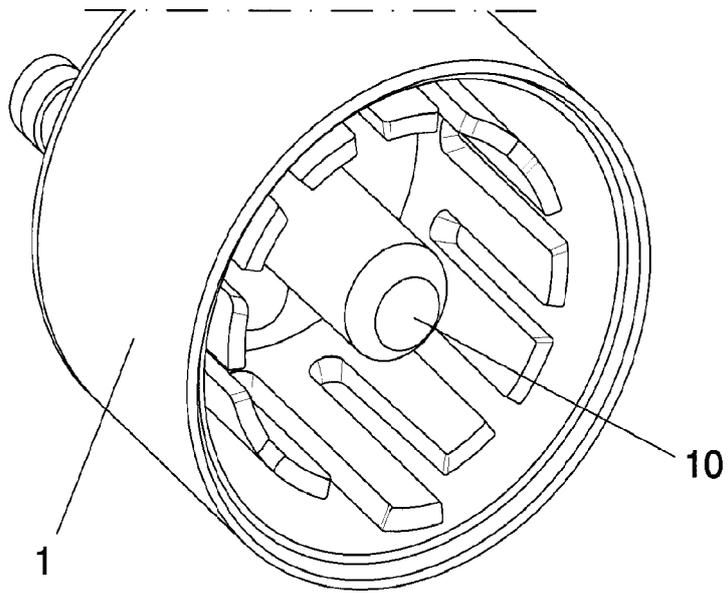


FIG. 3

INTERNATIONAL SEARCH REPORT

International application No.
PCT/ES2012/070307

A. CLASSIFICATION OF SUBJECT MATTER				
See extra sheet				
According to International Patent Classification (IPC) or to both national classification and IPC				
B. FIELDS SEARCHED				
Minimum documentation searched (classification system followed by classification symbols) B01D, F02M				
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched				
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) EPODOC, INVENES				
C. DOCUMENTS CONSIDERED TO BE RELEVANT				
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.		
Y	ES 2080673 A2 (SOTO BERTRAN JUAN ET AL.) 01/02/1996, figure 1; paragraph 1 lines 39-60; paragraph 2 lines 1-13 and líneas 54-63; paragraph 3 lines 10-23; paragraph 4 lines 1-12.	1-7		
Y	US 4067810 A (SULLIVAN DANIEL W) 10/01/1978, paragraph 4 lines 44-53, claim 1; paragraph 1 lines 15-30; figures 7, 13, 16	1-5,7		
Y	FR 2787036 A1 (FILTRAUTO) 16/06/2000, page 5 lines 5-8; claim 11; page 1 lines 1-20	6		
A	EP 0852291 A1 (KRINGS JEAN CHARLES HENRY ET AL.) 08/07/1998, the whole document.	1-7		
<input type="checkbox"/> Further documents are listed in the continuation of Box C. <input checked="" type="checkbox"/> See patent family annex.				
* Special categories of cited documents: <table border="0" style="width: 100%;"> <tr> <td style="width: 50%;"> "A" document defining the general state of the art which is not considered to be of particular relevance. "E" earlier document but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure use, exhibition, or other means. "P" document published prior to the international filing date but later than the priority date claimed </td> <td style="width: 50%;"> "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family </td> </tr> </table>			"A" document defining the general state of the art which is not considered to be of particular relevance. "E" earlier document but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure use, exhibition, or other means. "P" document published prior to the international filing date but later than the priority date claimed	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family
"A" document defining the general state of the art which is not considered to be of particular relevance. "E" earlier document but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure use, exhibition, or other means. "P" document published prior to the international filing date but later than the priority date claimed	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family			
Date of the actual completion of the international search 02/07/2012		Date of mailing of the international search report (25/07/2012)		
Name and mailing address of the ISA/ OFICINA ESPAÑOLA DE PATENTES Y MARCAS Paseo de la Castellana, 75 - 28071 Madrid (España) Facsimile No.: 91 349 53 04		Authorized officer C. Rodríguez Tornos Telephone No. 91 3496854		

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CLASSIFICATION OF SUBJECT MATTER

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B01D29/11 (2006.01)

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