EUROPEAN PATENT SPECIFICATION

(45) Date of publication and mention of the grant of the patent:
03.08.2005 Bulletin 2005/31

(21) Application number: 02425617.4

(22) Date of filing: 11.10.2002

(54) Anti-pollution economiser device for fluid fuels
Umweltschutz- und Sparvorrichtung für flüssige Treibstoffe
Dispositif économiseur et anti-pollution pour combustibles fluides

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR IE IT LI LU MC NL PT SE SK TR

Designated Extension States:
AL RO SI

(43) Date of publication of application:

(73) Proprietor: Dukic Day Dream S.r.l.
36061 Bassano del Grappa (Vicenza) (IT)

(72) Inventor: Campostrini, Michele
36060 Longa di Schiavon (Vicenza) (IT)

(74) Representative: Lanzoni, Luciano
c/o BUGNION S.p.A.
Via A. Valentini, 11/15
47900 Rimini (IT)

(56) References cited:
DE-A- 10 106 532 FR-E- 71 176
US-A- 5 076 246

Note: Within nine months from the publication of the mention of the grant of the European patent, any person may give notice to the European Patent Office of opposition to the European patent granted. Notice of opposition shall be filed in a written reasoned statement. It shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).
The invention relates to an anti-pollution economiser device for fluid fuels, whose longitudinal dimension is predetermined by the distance between its inlet and its outlet and of the type comprising a conduit, able to be coupled along a fuel supply pipe in correspondence with said inlet and outlet, and comprising a magnetic field generator, able to generate a magnetic field affecting the fuel that flows inside the conduit.

Device of this kind have been known for a long time: for instance, as disclosed in US Patent 3,116,726, where the magnetic field is produced by solenoids traversed by a current and where it is noted that, in fact, subjecting a fuel to a magnetic field appears to entail at least a considerable improvement in the combustion properties of the fuel.

Device also exist where the magnetic field is produced directly by magnets, for instance in US Patent 3,349,354, which states that use of said fields, applied to fuel, leads to beneficial results.

In another document, US Patent 3,989,017, the magnetic field, also produced by solenoids wound about the device, traversed by the fuel, is used to reduce consumption and pollution.

Document DE-A-4213583 discloses a device for conditioning fuel which comprises: a conduit for the fuel which is eventually shaped like a spiral pipe, a device for heating fuel (for example a tube, in which hot fluid is conveyed, in direct contact with the previous conduit), and a magnetic source for conditioning fuel.

Document US-A-5076246 discloses a device for simultaneously conditioning liquid fuel and liquid coolant in an engine or the like using a magnetic field. The fuel conduit is a spiral pipe with odd number of coils or a concentrically located pipe filled with a bed of ferromagnetic filings on which the magnetic field acts. This conduit is placed near the coolant conditioning circuit in order to take advantage of additional heat exchanged between the liquids. The effect of the magnetic field on the cooling system is the reduction of scales.

Document FR-71176 and DE-A-10106532 disclose a device for conditioning fuel. Fuel is conveyed in conduits which are shaped in order to present reiterated forwards-backwards path and along this path the fuel is interested by the action of an electromagnetic field imposed by an external magnetic source.

Document WO-9701702 discloses a device for increasing the combustion efficiency of fuel. Energy savings are obtained by subjecting the fuel to a magnetic field in order to achieve a substantial reduction of the potential energy of its molecules, and simultaneously reducing turbulence, driving the fuel along a labyrinth path and thin flow gaps. In fact the fuel, introduced in a central passageway of the device, flows radially, then in a first annular gap in a direction opposite to the direction of the flow in the central passageway and thereafter in a second thin annular flow gap, coaxial with said first annular gap, but in the same direction of the current in the central passageway.

The aim of the present invention is considerably to increase the beneficial influence of the magnetic field on fuels in general, with substantial size parity with known devices or even with smaller size both in terms of length and cross section.

The subject device, as it is claimed below, allows considerably to increase, in a particular fashion, the path of the fuel under any condition of use, so as to subject it to a constant increase of exposure to the magnetic field, for the same longitudinal size.

The subject device is normally usable along the pipe for supplying a fluid fuel or hydrocarbons, between the pump and the carburettor, for fixed or automotive internal combustion engines, but it can also be used for any other fluid fuel in general, for instance methane gas (in this case, for burners and boilers) or fuel oil (Diesel engines) etc.

According to various trials and tests conducted by the Applicant, the subject device allows considerable energy savings and pollution abatement, thanks to the improved combustion, which also allows an improved efficiency, in terms of increased power (for instance in engines) or heating efficiency (for instance in boilers).

Lastly, it allows less maintenance on the plant that uses it, since internal deposits are limited or eliminated altogether. It therefore allows a longer working life of the plant that benefits therefrom.

Further aims and advantages, which shall become more readily apparent from the description that follows, are achieved, in accordance with the present invention, by the subject tank, structured and devised as set out in the claims.

The invention is described in greater detail hereafter with the aid of the drawings, which show an embodiment provided purely by way of non limiting example:

- figure 1 shows a lateral schematic view, in partial longitudinal section, of a first embodiment of the subject device, drawn with continuous lines, and of a second embodiment thereof, drawn partially in dashed lines;
- figure 2 shows a partial front view of the device of figure 1;
- figure 3 shows a partial cross section of the subject device, according to the section line III-III of figure 1;
- figure 4 shows a lateral schematic view, partially in longitudinal section, of a third example of the subject device;
- figure 5 shows a partial cross section of the subject device, according to the section line V-V of figure 1;
- figure 6 shows a lateral schematic view, partially in longitudinal section and partially in section plane, of a fourth embodiment of the subject device.

With reference to the accompanying drawings,
the subject device 1 has standard longitudinal size, predetermined by the distance between its inlet 21 and its outlet 22.

[0017] It comprises a conduit 2, interposed between the inlet 21 and the outlet 22, able to be coupled directly in sealed fashion along a pipe for supplying a fuel (for instance by simply tightening a common locking clamp) and comprises a magnetic field generator 3, able to generate a magnetic field affecting the fuel that flows inside the conduit 2.

[0018] One of the characteristics of the device 1 resides in the fact that the conduit 2 identifies, in its interior, a path of the fuel that is repeatedly deviated, relative to the longitudinal axis 33 of the supply pipe.

[0019] A first practical embodiment is shown in figures 1, 2 and 3 in continuous lines. In this case, the conduit 2, whose inlet 21 and outlet 22 are preferably coaxial to the supply pipe, is mainly applied to fuel supply pipes for vehicles or engines, whose diameters are relatively small. The conduit 2 is advantageously shaped according to a spiral conduit 27, preferably having very tight coils with reduced internal clearance, in order to minimise size and maximise exposure to the field.

[0020] If the device is used for fixed installations, for instance boilers, the fuel supply pipe normally has considerably larger diameter. In this case, however, the conduit 2 advantageously contains a second spiral conduit 27, with the same characteristics as the one illustrated above, having smaller cross section than the conduit 2 that contains it. It is also visible, drawn in part with dashed lines, in figures 1, 2 and 3, where this second embodiment is illustrated. Obviously, in this case the extreme lateral walls 11, which in the first case may also not be necessary, are not present, or have appropriate and large openings, to allow the free flow of the fuel both inside of the conduit 2, with the conditioning of the conduit 27, and inside the conduit 27 itself.

[0021] A third example which is not within the scope of the invention as defined in the claims, shown in figures 4 and 5, the conduit 2, also preferably destined to supplying fuel for vehicles, is shaped according to a conduit 23 having a reiterated forward-backwards path, interposed between its inlet 21 and its outlet 22, mutually offset and able to be directly coupled in sealed fashion along the supply pipe, also in a very simple manner, as illustrated above.

[0022] In an additional embodiment, the conduit 2 can have, in its interior, a labyrinth path. It can be undulatory, according to sinuosities, or be conditioned, as in the practical example of figure 6, by multiple concentric conduits. The conduit 2 can also contain only a second inner conduit 24, provided with superficial openings 25 and with baffles 26 in such a way as to determine in any case a tortuous fuel flow.

[0023] In particular, the baffles 26 comprise first baffles 261 inside the innermost conduit 24 and second more exterior baffles 262, all longitudinally offset from each other, the first baffles 261 having shape corresponding to the cross section of the innermost conduit 24 (for instance, discoidal shape, if the conduit 2 has circular cross section) able to delimit separate inner compartments of the innermost conduit 24, whilst the second baffles 262 having centrally hollow shaped (for instance shaped according to annuli, if the conduit 2 has circular cross section), able to delimit gaps identified externally to the innermost conduit 24. This holds true for any number of concentric conduit present and in particular for three conduits, as shown in figure 6.

[0024] At this point it should be pointed out that, advantageously, for minimum size purposes, irrespective of the embodiment, the subject device 1 can use conduits 2 whose cross section corresponds to that of the supply pipe, or is even smaller, as in the cases of employment for engine fuels, where the inlets 21 and 22, whose diameter is equal to that of the conduit 2 interposed between them would be coupled inside the fuel supply pipe.

[0025] Lastly, it is pointed out that the magnetic field, whose direction is the same as the flow of the fuel, is produced by solenoids 4 powered with direct current, with substantially cylindrical development, electrically isolated from the conduit 2, by means of isolating sleeves 41, and enveloping the conduit 2, in its various forms illustrated above, coaxially to the axis 33 of the supply pipe.

[0026] Advantageously, a direct current power supply in the order of 12 or 24 is sufficient, with appropriate cross sections of the coils of the solenoids, normally connected in series and with a corresponding battery, which in the case of vehicle engines may coincide with the battery with which they are already equipped.

[0027] Moreover, all components can be replaced with other technically equivalent elements.

Claims

1. Anti-pollution economiser device for fluid fuels, with longitudinal size predetermined by the distance between its inlet (21) and its outlet (22) and of the type comprising a conduit (2) for the fuel able to be coupled along a fuel supply pipe in correspondence with said inlet (21) and outlet (22), and comprising a magnetic field generator (3), able to generate a magnetic field affecting the fuel that flows inside the conduit (2), characterised in that the conduit (2) has in its interior, an undulatory labyrinth path of the fuel that is repeatedly deviated, relative to the longitudinal axis (33) of the supply pipe according to sinuosoids.

2. Device as claimed in claim 1, characterised in that the conduit (2) contains at least a second spiral conduit (27), whose cross section is smaller than that of the conduit (2) that contains it.
3. Device as claimed in any of the previous claims, characterised in that the conduit (2) has its cross section corresponding to that of the supply pipe (3).

4. Device as claimed in claim 1, characterised in that the conduit (2) contains at least a second inner conduit (24), provided with superficial openings (25) and with baffles (26) in such a way as to determine a tortuous path of the fuel.

5. Device as claimed in claim 4, characterised in that the baffles (26) comprise first baffles (261) interior to the innermost conduit (24) and second outer baffles (262), all longitudinally offset from each other, the first baffles (261) having shape corresponding to the cross section of the innermost conduit (24), able to delimit separate inner compartments of the innermost conduit (24), whilst the second baffles (262) have centrally hollow shape, able to delimit gaps identified externally to the innermost conduit (24).

6. Device as claimed in any of the previous claims, characterised in that the magnetic field is produced by solenoids (4) with substantially cylindrical development, electrically insulated by the conduit (2) and enveloping the conduit (2) coaxially to the axis (33) of the supply pipe.

7. Device as claimed in claim 6, characterised in that the solenoids (4) are powered with direct current and produce a magnetic field having the same direction as the flow of the fuel.

Revendications

1. Dispositif économiseur et anti-pollution pour combustibles fluides, dont la dimension longitudinale est prédéterminée par la distance entre son entrée (21) et sa sortie (22) et du type comprenant un conduit (2) pour le combustible pouvant être accouplé le long d'un tube d'alimentation du combustible en correspondance de ladite entrée (21) et sortie (22), et comprenant un générateur de champ magnétique (3), pouvant générer un champ magnétique agissant sur le combustible qui flue à l'intérieur du conduit (2), caractérisé en ce que le conduit (2) présente en son intérieur un parcours ondulatoire en labyrinthe du fluide qui est répétitivement dévié,
par rapport à l'axe longitudinal (33) du tube d'alimentation, selon la forme d'une sinusoïde.

2. Dispositif selon la revendication 1, caractérisé en ce que le conduit (2) contient au moins un second conduit en spirale (27), dont la section transversale est inférieure à celle du conduit (2) qui le contient.

3. Dispositif selon n'importe laquelle des revendications précédentes, caractérisé en ce que le conduit (2) présente une section transversale correspondant à celle du tube d'alimentation (3).

4. Dispositif selon la revendication 1, caractérisé en ce que le conduit (2) contient au moins un second conduit interne (24), pourvu d'ouvertures superficielles (25) et de déflecteurs (26) de manière à déterminer un parcours tortueux du combustible.

5. Dispositif selon la revendication 4, caractérisé en ce que les déflecteurs (26) comprennent de premiers déflecteurs (261) internes au conduit le plus interne (24) et de seconds déflecteurs externes (262), tous décalés entre eux en direction longitudinale, les premiers déflecteurs (261) ayant une forme correspondant à la section transversale du conduit le plus interne (24), pouvant délimiter les compartiments internes séparés du conduit le plus interne (24), alors que les seconds déflecteurs (262) ont une forme centrale creuse, pouvant délimiter des interstices identifiés à l'extérieur du conduit le plus interne (24).

6. Dispositif selon n'importe laquelle des revendications précédentes, caractérisé en ce que le champ magnétique est produit par des solénoïdes (4) avec un développement substantiellement cylindrique, isolés électriquement par le conduit (2) et enveloppant le conduit (2) en direction coaxiale à l'axe (33) du tube d'alimentation.

7. Dispositif selon la revendication 6, caractérisé en ce que les solénoïdes (4) sont alimentés en courant continu et produisent un champ magnétique ayant une direction identique à celle du flux de combustible.