

Submersed device for reducing the polluting emissions
and saving energy in hydrocarbon combustion vehicles

The present invention essentially relates to the motor vehicles, particularly those vehicles with internal-combustion or diesel engines as well as all of the apparatus that burn liquid hydrocarbons.

5 As it is well-known, the propulsors of the above motor vehicles are not able to transform the whole mass of the hydrocarbons into work and, as a consequence, a portion of these hydrocarbons remains unburnt.

A number of solutions have been so far proposed to
10 overcome these problems and the related efforts have regarded both the engine and the control electronics with the result of a considerable increase in the production costs and a continuous demand of servicing to keep the apparatus under perfect operating
15 conditions, which is necessary to guarantee low consumptions and reduced emissions.

It is also known from German Patent DE 4417167.6 a device that produces a composite emission of electromagnetic waves and far infrared waves inside the
20 fuel tank including magnetic elements distributed along and leant on an axial conductor provided with a diode and pressed against the conductor by a cotton sheath or so-called "sock".

However, this device has some drawbacks and
25 disadvantages which will be shortly illustrated herebelow.

A first problem consists in that it is necessary to

inlet some radiant additive substances into the fuel tank in order to obtain a sufficient propagation of the far infrared waves. This solution is only palliative as the substance to be melt inside the fuel tends to clog the conducts from the fuel pump to the engine.

Moreover, in the above-mentioned German Patent the electromagnetic waves are caused to propagate by the contact and the correct positioning of the balls and the magnets located inside the device and held in their positions just because of the compression of a cotton "sock" which is wrapped around all of the elements and contributes to reflect the waves. This is a source of drawbacks as the cotton envelope tends to deteriorate with time causing several problems among which:

- both the balls and the magnets lose their initial position interrupting the electric connection to one another and an internal copper wire ;
- the deterioration of the cotton causes the loss of its reflecting efficiency;
- the deteriorated cotton loses its capability of filtering external agents;
- the deteriorated cotton can fray causing further possibilities for the conducts from tank to engine to become clogged.

Therefore, it is self-evident that the device disclosed in the above-mentioned German Patent cannot in any way be used in the practice first of all because its operation capability changes with time and then because it could cause damages to the vehicle.

This invention seeks to overcome these problems by

providing a device which does not need any servicing, is easy to be installed without modifying in any way the fuel pump system of the vehicles, and operates inside the mass of the fuel in the fuel tank.

5 This has been accomplished by a device to be submerged inside the fuel tank which is capable of producing an emission of far infrared electromagnetic waves so that both its function and structure still remain unchanged in time without the use of additives in the fuel.

10 The composition of the materials which the different parts of the device consist of and their space distribution are such as to increase the production of electromagnetic waves and far infrared rays so that the energy associated to these electromagnetic waves, which
15 spread throughout the fuel, interacts with the hydrocarbon molecules and temporarily modifies their structure in order to make them more easily vaporizable. This advantageously increases and improves the combustion, ensuring that most of the previously
20 unburnt fuel will be burnt. Advantageously, this causes the polluting emissions as well as the consumption to reduce considerably and the engine to be better cleaned and its performance to be more effective.

25 A better understanding of this invention will ensue from the following detailed description with reference to the accompanying drawings which illustrate a preferred embodiment only by way of a not limiting example.

In the drawings:

Figure 1 is an external perspective view of the invention;

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Figures 2 to 5 are elevation views of the four sides of the device;

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Figures 6 and 7 are partially sectioned perspective views which show the arrangement and the structure of the internal parts of the invention;

Figures 8 and 9 show the installation of the device inside the fuel tank.

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As already mentioned, the device according to this invention temporarily modifies the molecular structure of the hydrocarbons contained in the liquid fuel and acts as a fuel vaporization accelerator.

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In particular this is accomplished by energising the fuel molecules by the emission of far infrared rays, which are generated by the synergical action of the electromagnetic fields generated by permanent magnets 6, the ceramic material contained inside ceramic sleeves 4 and ceramic balls 5 as well as the kinetic energy of the fuel during the running of the vehicle, and the current generated in the device by the ions inside the fuel.

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The infrared rays are formed by electromagnetic waves characterized by a wave length between 0.76 e 1000 μm

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and are furthermore divided into "near", "middle", and "far" infrared according to the following table:

INFRARED RAYS (IR)	WAVE LENGTH (µm)
NEAR	from 0.76 to 2.5
MIDDLE	over 2.5 up to 25
FAR	over 25 up to 1000

5 Far infrared rays are known for their capacity of generating chemical and physical transformations in the structure of any material.

The device according to this invention has a cylindrical form and consists of an external tube 3
10 perforated by a number of holes and preferably made of silver-plated bronze with two caps at its ends, an anchoring wire 1 being bound to one cap 2 (see figures 1-5). Such anchoring wire 1 is secured to the device by a hinged member which permits it to rotate without
15 entangling the wire.

A complex assembly consisting of a preferably stiff, central copper wire 9 is disposed inside this perforated tube 3 at the middle of which a diode 10 is soldered, as it may be seen in figures 6 and 7. Such
20 copper wire 9 is put with its whole length inside a conduct formed by a plurality of sleeves 4 of ceramic material alternated to ring-shaped permanent magnets 6. Some further balls 5 made of ceramic material are located outside such sleeves 4 and magnets 6.

25 According to a particular characteristic of the present

invention, copper wire 9, sleeves 4, magnets 6, and balls 5 are electrically connected to one another.

The complex assembly of the device is also provided with a ceramic cotton "sock" 7 enclosed inside a ceramic filter consisting of a metal net 8 completely wrapped around the whole assembly.

As mentioned above, the assembly described above is located inside the perforated metal tube 3 and then closed at its both ends by two caps 2. It should be noted that the continuity of the electric connection among ceramic cotton, metal net, and outer perforated cylinder also guarantees the electric connection between the latter and the above-mentioned copper wire 9 to which diode 10 is connected.

The various components of the device will thereafter be described in greater detail in order to better disclose the characteristics and the peculiarities that distinguish the present invention.

The outside perforated tube 3 is made of bronze and has a silver coating. The choice of these materials has a dual function: bronze avoids rust while silver increases the purifying effects towards external aggressive chemical agents.

Metal net 8 sprayed with a ceramic composition has the function of keeping all of the elements contained in its interior in the right position.

Cotton "sock" 7 aiming at both preventing external agents from entering the device and spreading the emitted waves has a very strong and unalterable weaving, and is provided with an inner layer that is

soaked with platinum powder during the final phase of weaving.

Magnetic rings 6 are made of permanent magnetic material including rare earth elements such as samarium (Sm) and cobalt (Co). These magnets belonging to the last generation have far higher performances than any other magnet currently available, in particular the high energy and magnetic power of samarium allow very compact and highly efficient magnets to be designed.

These permanent magnets 6 interact synergically with sleeves 4 and balls 5 of ceramic material and increase the emission of electromagnetic waves in the far infrared field, which is very important for their spreading. The combination of magnets and ceramic materials is essential to enhance the chemical effects of their components. The magnets could also have other forms, for example balls, tablets and so on.

Sleeves 4 of ceramic material are made by moulding followed by a baking for many hours at a temperature of about 1200°C. Such ceramic material is baked six times and then cooled by natural air.

The ceramic material of sleeves 4 produces far infrared rays, its efficiency being based on its anti-corrosive property which prevents rust from being developed.

Ceramic balls 5 increase the production of such far infrared rays.

Ceramic balls 5 are moulded and then baked at 500-600°C. Their main function is to extend the effects of ceramic sleeves 4 throughout the device. In the illustrated embodiment, the ceramic materials used for

ceramic sleeves 4 and for ceramic balls 5, mainly include SiC, TiO₂, Cr₂O₃, Al₂O₃, Fe, and the manufacturing method includes essentially the following steps:

- 5 - providing a mixture by spraying liquid on the parts to be mixed;
- drying
- moulding (by compression)
- baking;
- 10 - final shaping and cleaning;
- packaging.

The device is placed inside the fuel tank so as to hang inside therein, as shown in figures 8 and 9, and is connected to wire 1 which is provided with a hinge member.

15 The composite electromagnetic waves which are being formed are emitted towards the internal walls of the fuel tank through ceramic cotton 7 and through metal net 8. The quality of the fuel is gradually improved by the emission of electromagnetic waves. In other words
20 fuel is purified so that it can burn very quickly without producing heavy smokes and/or particulate, etc. This means that the liquid fuel inside the fuel tank undergoes a temporary modification of its molecular
25 structure so that the latter can be quickly vaporized by the composite wave.

In other words, considering for example fuels such as gasoline or diesel oil characterized by complex chains of carbon and hydrogen atoms, the latter are broken by
30 the composite wave generated according to the present

invention. These chains are interrupted at their carbon-carbon bonds and their hydrogen-hydrogen bonds giving rise to chains which are more suitable for a better combustion.

5 This is also the case for all of combustibles and liquid fuels originating from hydrocarbons.

According to the present invention, when the fuel inside the fuel tank is shaken by the vehicle's movement, the static electric charges (ions) produced
10 inside are transferred to diode 10 through central copper wire 9 in order that the electric charges accumulate between the conduct formed by ceramic sleeves 4, ring magnets 6, and diode 10 acting as an electrode.

15 The above-mentioned diode 10 helps to concentrate the flow of the electromagnetic waves, and further causes the production of far infrared waves to be maintained. In this way ceramic sleeves 4 emit far infrared rays and ceramic balls 5 help to spread them.

20 The change of the molecular structure of the fuel causes a weakening of the reciprocal molecular aggregation, giving rise to a better as well as greater permeation of the oxygen between the molecules of the hydrocarbons.

25 All this brings several advantageous consequences among which:

- drastic reduction of unburnt hydrocarbon emissions;
- reduction in consumptions;
- the engine fuel supply system is cleaner;
- 30 - better efficiency and performance of the engine;

- less request of servicing.

Furthermore, the engine fuel pump system is in no way altered or changed as the device is installed inside the fuel tank, and the lack of external supply totally eliminates any possibility of explosions due to short circuit.

Experimental tests have demonstrated that the use of this device reduces fuel consumptions by 10 - 25%, depending on the type of engine and its wear.

Finally, it should be noted from the above description that this invention can be applied without modifications to any motor vehicle burning liquid hydrocarbons since only a minimum oscillation movement (vibration) of the vehicle is requested.

It should be appreciated that such movement is essentially given by the movement of the vehicles or, in case of engines of still devices, by the vibrations produced during the operation thereof.

The present invention has been described and illustrated according to a preferred embodiment thereof, however, it should be understood that those skilled in the art can make equivalent modifications or replacements without departing from the scope of the present industrial invention.

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Claims

1. A submersed device for reducing the polluting emissions and saving energy in motor vehicles having liquid-hydrocarbon internal-combustion engines, characterized in that there are generated, in combination, magnetic fields and far infrared electromagnetic waves which spread inside the fuel and interact with the molecules of the hydrocarbons and temporarily modify their structure so that they can be more easily vaporized, the temporary modification of the hydrocarbons' molecular structure being obtained by energising the same molecules through the energy associated to said far infrared rays under the action of said magnetic fields.

2. The device of claim 1, characterized in that there is provided, in combination, a perforated tube (3) in which a complex assembly is located inside a "sock" (7) made of ceramic cotton and put inside a ceramic filter formed by a metal net (8), said assembly including a central copper wire (9) provided at its middle with a diode (10) soldered thereto and put with its whole length inside a conduct formed by a plurality of sleeves (4) made of ceramic material alternated to ring-shaped permanent magnets (6), balls (5) made of ceramic material being located outside said sleeves (4) and magnets (6).

3. The device of claim 2, characterized in that copper



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wire (9), sleeves (4), magnets (6) and balls (5) are electrically connected to one another.

5 4. The device of the preceding claims, characterized in that said perforated metal tube (3) is closed at its both ends by two caps (2), the continuity of the electric connection between ceramic cotton, metal net and external perforated cylinder also guaranteeing the electric connection between the latter and copper wire
10 (9) on which diode (10) is placed.

15 5. The device of the preceding claims, characterized in that the emissions of far infrared rays which energise the molecules of the fuel are originated by the synergical action of permanent magnets (6), the ceramic material contained inside sleeves (4) and balls (5) as well as the kinetic energy of the fuel during the running of the vehicle, and the current generated in
20 the device by the ions inside the fuel.

25 6. The device of the preceding claims, characterized in that the external perforated tube (3) is made of bronze and silver-plated, the choice of such materials having the dual function of preventing rust from being formed and increasing the purifying effect towards aggressive
external agents.

30 7. The device of the preceding claims, characterized in that metal net (8) is sprayed with a ceramic composition and has the function of keeping all of the





elements contained in its interior in the right position.

5 8. The device of the preceding claims, characterized in that the cotton "sock" (7) aiming at both preventing external agents from entering the device and spreading the emitted waves has a very strong and unalterable weaving, and is provided with an inner layer that is soaked with platinum powder during the final phase of
10 weaving.

9. The device of the preceding claims, characterized in that the magnet rings (6) are made of permanent magnetic material formed by rare earth such as samarium
15 (Sm) and cobalt (Co).

10. The device of the preceding claims, characterized in that said permanent magnets (6) interact synergically with sleeves (4) and balls (5) of ceramic material and increase the emission of electromagnetic
20 waves in the far infrared field so as to promote their spreading.

11. The device of the preceding claims, characterized in that sleeves (4) of ceramic material are made by
25 moulding and then baking for many hours at the temperature of about 1200°C, such ceramic being baked six times and then cooled in natural air.

30 12. the device of the preceding claims, characterized





in that said ceramic balls (5) are made by moulding and baking at a temperature of 500-600°C, their main function being that of extending the effects of ceramic sleeves (4) to the whole device.

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13. The device of the preceding claims, characterized in that the ceramic materials used for sleeves (4) and balls (5) mainly include SiC, TiO₂, Cr₂O₃, Al₂O₃, Fe.

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14. The device of the preceding claims, characterized in that said sleeves (4) and said balls (5) are made by a manufacturing method including substantially the following steps:

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- providing a mixture by spraying liquid on the parts to be mixed;

- drying

- moulding (by compression)

- baking;

- final shaping and cleaning;

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- packaging.

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15. The device of the preceding claims, characterized in that it is disposed in the fuel tank so as to hang inside therein and is connected to a wire (1) which is provided with a hinge member.

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16. The device of the preceding claims, characterized in that the complex chains of carbon and hydrogen atoms characterizing fuels such as gasoline or diesel oil are broken by the composite wave which is being generated,





said chains being interrupted at their carbon-carbon bonds and hydrogen-hydrogen bonds giving rise to chains which are more suitable for a better combustion.

5 17. The device of the preceding claims, characterized
in that, when the fuel inside the fuel tank is shaken
by the vehicle's movement, the static electric charges
(ions) produced inside are transferred to diode (10)
through central copper wire (9) in order that the
10 electric charges accumulate between the conduct formed
by ceramic sleeves (4), ring magnets (6), and diode
(10) acting as an electrode, said diode (10) helping to
concentrate the flow of the electromagnetic waves, and
further causing the production of far infrared waves to
15 be maintained.

18. The device of the preceding claims, characterized
in that said ceramic sleeves (4) emit far infrared
waves and balls (5) help to spread them.

20 19. The device of the preceding claims, characterized
in that said change of the molecular structure of the
fuel causes a weakening of the reciprocal molecular
aggregation, giving rise to a better as well as greater
25 permeation of the oxygen between the molecules of the
hydrocarbons.

20. The device of the preceding claims, characterized
in that it can be applied without modifications to any
30 motor vehicle burning liquid hydrocarbons since only a



minimum oscillation movement (vibration) of the vehicle is requested, such movement being given by the movement of the vehicles or, in case of engines of still devices, by the vibrations produced during the operation thereof.

21. The device of the preceding claims, characterized in that the far infrared rays which are being emitted are electromagnetic waves having a wave length from 25 to 1000 μm



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