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(72) Inventor: **Athanasios too Panagioti, Nicolaou
19100 Megara Attikis (GR)**

(74) Representative: **Argyriadis, Korinna
Argyriadis - Metallinos - Schinas,
14, Sina Street
106 72 Athens (GR)**

(71) Applicant: **Athanasios too Panagioti, Nicolaou
19100 Megara Attikis (GR)**

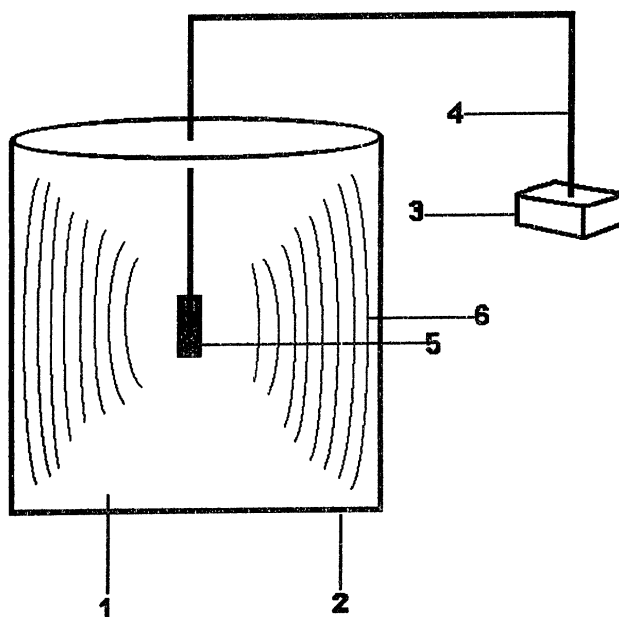
(54) **Method for quality improvement of crude oil with electromagnetic waves**

(57) A method which uses electronic or electromechanical technology for the qualitative upgrade of crude oil causing before its refinement processing a quantitative diversification of its refinement products through a proportionate increase of the lower volatility fractions and a corresponding proportionate decrease of the higher volatility fractions.

Sending towards the space occupied by the volume

of crude oil (1) an emission of electromagnetic waves (6) of multiple frequencies, generated by electronic or electromechanical devices (3) and occupying one or more wide frequency ranges of the electromagnetic spectrum, frequencies from 1Hz to 300GHz, the emission manner of the electromagnetic waves themselves or together with their emission as a whole being either pulsatory or temporally interruptible, or pulsatory and temporally interruptible.

Drawing 1



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Description

[0001] The present invention concerns a method which uses electronic or electromechanical technology to achieve a qualitative upgrade of crude oil before its refinement processing causing a quantitative diversification of its refinement products through a proportionate increase of the lower volatility fractions and a corresponding proportionate decrease of the higher volatility fractions.

[0002] Crude oil is the most important raw material in addition to constituting the basis of the petrochemical industry; its importance to mankind is tremendous and this is evident every day in all human activities, especially in the winter. Its great economic importance has led to such extensive research regarding its manner of creation and entrapment in the tanks where today it undergoes exploitation that today these processes are well understood.

As it is known, there are a lot of crude oil grades of different economic values. This difference between the more expensive grades of crude oil and the cheaper ones is due to the existence of quantitatively greater proportions of lower volatility fractional products (propane, butane, naphtha, kerosene, etc.) and quantitatively smaller proportions of higher volatility fractional products (heavy oil, fuel oil, etc.).

To date there exists no method applied to crude oil from its collection from the tanks, where today it undergoes exploitation, to the initiation of its refinement process. The aim of the present invention is the achievement, with the process crude oil is subjected to before its refinement, of a quantitative decrease of its higher volatility fractional products, on the one hand, and a corresponding increase of its lower volatility fractional products, on the other, which results in the economic upgrade of the crude oil processed with this method.

[0003] The present method upgrades the quality of crude oil by emitting towards the space occupied by the volume of crude oil electromagnetic waves of multiple frequencies, generated by electronic or electromechanical devices and emitted covering one or more wide range frequencies of the electromagnetic spectrum from 1Hz to 300GHz, the emission manner of the electromagnetic waves and their emission as a whole being either pulsatory or temporally interruptible or pulsatory and temporally interruptible.

[0004] The present method is applied to all grades of crude oil.

An advantage of this method is that it admits of wide industrial application and, furthermore, it does not require that the implemented specifications of the existing industrial facilities be changed.

Another advantage of this method is that its implementation is financially expedient as it requires very low operational costs and the labour costs required for the implementation of the method is almost inexistent.

A further advantage of the method is that it can be ap-

plied even if between the multiple frequency electromagnetic waves emission source and the crude oil volume we want to upgrade qualitatively there interferes any kind of material such as plastic, glass, concrete, metal, except for conductive material which are grounded and generate a Faraday shield.

An additional advantage of this method is that the commencement of the qualitative upgrade of crude oil occurs with the commencement of the implementation of the method, while the required application time for the occurrence of a financially expedient qualitative upgrade is short, measurable in hours. For example, a volume of 100,000 cubic meters of crude oil can be qualitatively upgraded with the method in a time period of 48 hours.

[0005] The invention is summarily described below with the help of non-restrictive examples and with reference to the attached drawing, which illustrates one application form of the method which constitutes the object of the present invention.

Drawing 1 illustrates one application way of the invention, in a crude oil storage tank.

One way of implementing the invention is described with reference to drawing 1. The crude oil (1) is placed inside a tank (2) of usual storage and temperature. Near it is placed an electronic or electromagnetic device (3) generating electromagnetic waves (6) of multiple frequencies and modulating their emission manner, and from which extends a tube (4) which ends in their emitting antenna (5) located inside the tank (2) and the volume of crude oil (1). The electromagnetic waves (6) of multiple frequencies are emitted in the space occupied by the volume of crude oil (1). The emitting antenna (5) may constitute an integral part of the emitting device (3) or be connected to it with a tube (4).

[0006] To implement the method we use an electronic or electromagnetic device (3) or devices generating electromagnetic waves (6) of multiple frequencies, whose emission covers a wide frequency range of electromagnetic waves of the electromagnetic spectrum from 1Hz up to and including 300GHz.

The generated emission of electromagnetic waves (6) of multiple frequencies covering the frequency range of the electromagnetic spectrum from 1Hz up to and including 300GHz, either of one or of more parts of the above frequency range of the electromagnetic waves, must be intermittent, that is, either pulsatory or interruptible or combinations of these two (pulsatory and interruptible), which means emitted intermittently, in the form of intermittent electromagnetic waves.

[0007] Potentially, the emission of electromagnetic waves (6) covering the whole of the frequency range from 1Hz up to and including 300GHz, or parts of it, must last, for example, 40μsec, followed by its nullification (pulsatory emission), then another 40μsec followed by its nullification and so on. Also potentially, the emission of electromagnetic waves (6) covering the whole of the frequency range of electromagnetic waves from 1Hz up to and including 300GHz, or parts of it, must last, for

example, 40μsec, followed by a temporal interruption of 2μsec (interruptible emission), then another emission of 40μsec followed by a temporal interruption of 2μsec and so on.

Also potentially, the emission of electromagnetic waves (6) covering the whole of the frequency range of electromagnetic waves from 1Hz up to and including 300GHz, or parts of it, must last, for example, 40μsec, followed by a temporal interruption of 2μsec (interruptible emission), then an emission of 40μsec, followed by a nullification (pulsatory), followed by an emission of 40μsec, followed by a temporal interruption of 2μsec and so on.

Also, the electromagnetic radiation transmitted to the space occupied by the volume of crude oil (1) is emitted intermittently in the form of electromagnetic waves (6) and it is possible for the electromagnetic waves themselves or together with their emission as a whole to have all combinations of the pulsatory and interruptible emission manners and to be found throughout the frequency range from 1Hz up to and including 300GHz, or in parts of this frequency range of the electromagnetic spectrum.

[0008] The electromagnetic waves (6) of multiple frequencies used in the implementation of the method are capable of not being modulated as well as being modulated in any way. Like, for example, FM (Frequency Modulation), AM (Amplitude Modulation), Pulse Code Modulation or any other kind of modulation.

This method can make use of more than one emission of electromagnetic waves (6) of multiple frequencies simultaneously or not in the same space, which have been programmed to emit multiple electromagnetic waves (6) of the same or different frequencies, including the harmonic frequencies of the electromagnetic waves (6) generated by the device or devices and are used for the implementation of the method, as well as of the same or different transmitting power.

For example, a device generating electromagnetic waves (6) of multiple frequencies consisting of a transmitter which emits multiple electromagnetic waves (6) and covering the frequency range of the electromagnetic waves (6) from 50Hz up to and including 100KHz and a transmitter which emits multiple electromagnetic waves (6) and covering the frequency range of the electromagnetic waves (6) from 900MHz up to and including 100GHz.

One way of realizing the method with electronic technology is to use an emission source of electromagnetic waves (6) of multiple frequencies which covers a wide frequency range of the electromagnetic spectrum from 1Hz to 300GHz.

The device consists of three units. The first unit consists of a square-wave oscillator with an adjustable energy cycle, that is, in its exit an adjustment will give us square waves each lasting 3μsec, 2μsec apart from each other. This output signal of the first unit drives the second unit which consists of a transistor used as a feed convector,

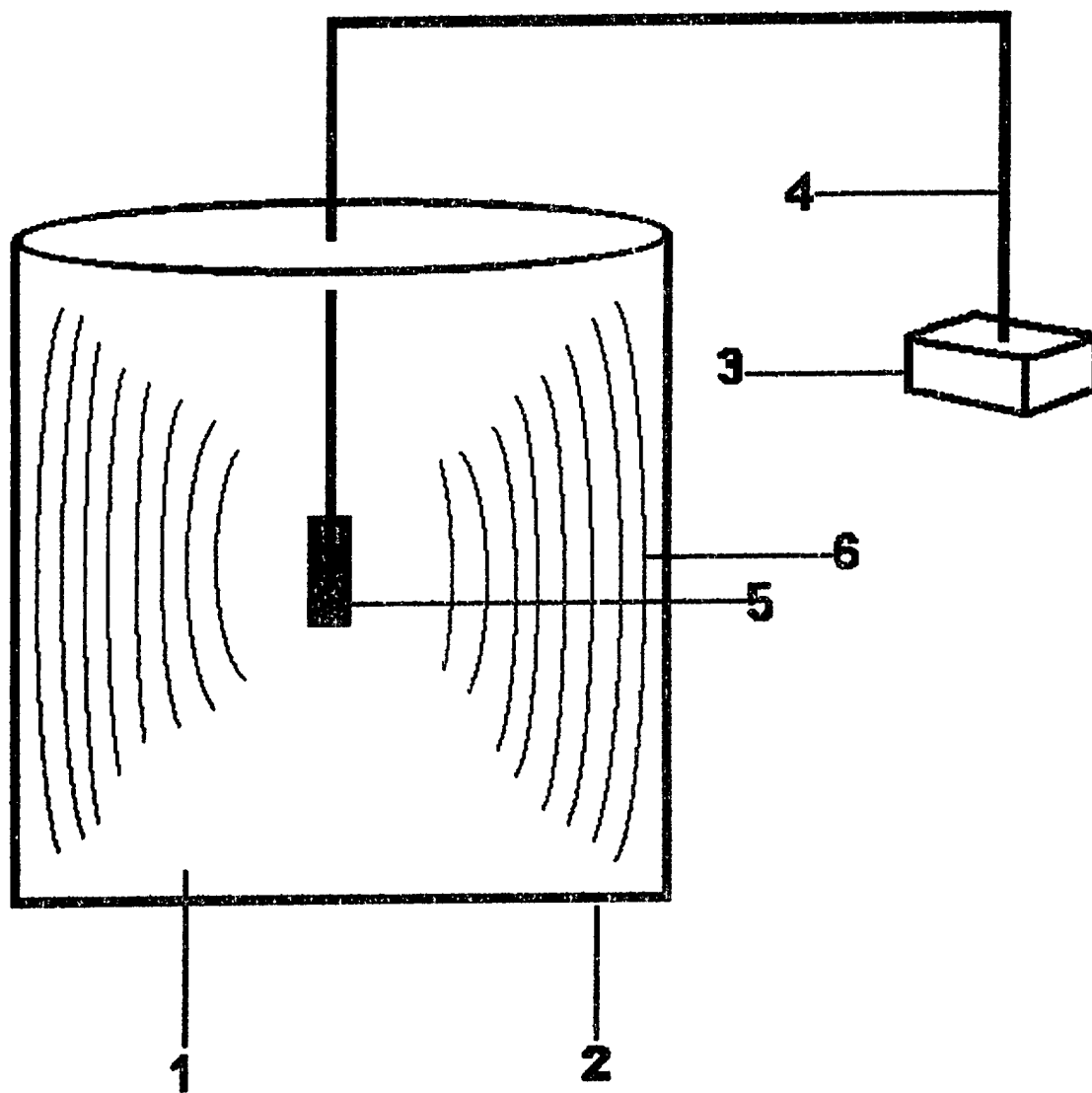
that is, it is from its collector that we will be getting the feed voltage of the third unit. The third unit consists of a free oscillator with an output wattage of 10watt, tuned to a frequency of 50MHz. Knowing that the emission frequency of a free oscillator is connected with the stability of its feed voltage, we cause a frequency drift of its operation by interrupting its feed from the second unit, that is, the feed convector, so that the frequency is increased when the voltage is decreased, and the frequency is decreased when the feed voltage is increased. Thus the oscillator, operating with voltage modulated by the signal we created with the first and second units, will generate a temporally interruptible emission of wide spectrum frequencies of electromagnetic waves (6), at the same time generating in its exit an enormous amount of harmonic ones. With a spectrum analyser of electromagnetic radiation we can establish that the frequency range of the electromagnetic spectrum occupied by this circuit is from 50KHz to 1500MHz.

Claims

1. A method for a qualitative upgrade of crude oil with electromagnetic waves used by the electronic or electromechanical technology causing before its refinement processing a quantitative diversification of its refinement products through a proportionate increase of the lower volatility fractions and a corresponding proportionate decrease of the higher volatility fractions, **characterized by** the fact that the application of the method emits towards the space occupied by the volume of crude oil (1) electromagnetic waves (6) of multiple frequencies, generated by electronic or electromechanical devices (3) and cover one or more wide range frequencies of the electromagnetic spectrum from 1Hz to 300GHz, the emission manner of the electromagnetic waves themselves (6) or together with their emission as a whole being either pulsatory or temporally interruptible, or pulsatory and temporally interruptible.
2. A method for a qualitative upgrade of crude oil (1) with electromagnetic waves (6), according to claim 1, the electromagnetic radiation emitted towards the space occupied by the volume of crude oil (1) being **characterized by** the fact that it is emitted intermittently, in the form of intermittent electromagnetic waves.
3. A method for a qualitative upgrade of crude oil (1) with electromagnetic waves (6), according to claims 1 and 2 whereby the emission of the electromagnetic waves (6) of multiple frequencies is **characterized by** the fact that it has a spectral expansion which covers the frequency range of electromagnetic waves (6) from 1Hz up to and including 300GHz.

4. A method for a qualitative upgrade of crude oil (1) with electromagnetic waves (6), according to claims 1, 2 and 3 whereby the emission of electromagnetic waves (6) of multiple frequencies is **characterized by** the fact that it is realized with either one or more wide frequency ranges of electromagnetic waves (6) of the electromagnetic spectrum from 1Hz up to and including 300GHz, including the harmonic frequencies of the electromagnetic waves (6) generated by the device or devices and utilized in the application of the method. 5 10
5. A method for a qualitative upgrade of crude oil (1) with electromagnetic waves (6), according to claims 1, 2, 3 and 4 **characterized by** the fact that all, some or one of the emitted electromagnetic waves (6) of multiple frequencies used by the method may be modulated in any way or may not be modulated at all. 15 20
6. A method for a qualitative upgrade of crude oil (1) with electromagnetic waves (6), according to claims 1, 2, 3, 4 and 5, **characterized by** the fact that the temporal duration between the output pulses or the cluster of output pulses of the emission of electromagnetic waves (6) of multiple frequencies, as well as the temporal duration between the emission interruptions, may be either of constant or variable time. 25 30
7. A method for a qualitative upgrade of crude oil (1) with electromagnetic waves (6), according to claims 1, 2, 3, 4, 5 and 6, **characterized by** the fact that it is realized by sending one or more emissions of electromagnetic waves (6) of multiple frequencies simultaneously or not simultaneously to the same space. 35 40
8. A method for a qualitative upgrade of crude oil (1) with electromagnetic waves (6), according to claims 1, 2, 3, 4, 5, 6 and 7, **characterized by** the fact that the electromagnetic waves (6) of multiple frequencies of the emissions are of the same or different frequencies, even of the same or different voltage. 45 50 55

Drawing 1





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EUROPEAN SEARCH REPORT

Application Number
EP 01 60 0003

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The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
THE HAGUE		27 July 2001	Michiels, P
CATEGORY OF CITED DOCUMENTS 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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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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