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(54) VERSATILE ADDITIVE TO LUBRICATING AND FUEL MATERIALS AND FUELS CONTAINING SAID ADDITIVE

(57) The claimed inventions relate to petrochemistry, in particular to additives for lubricating and fuel materials and to a versatile additive-containing fuel for internal combustion engine, diesel fuel and a furnace fuel for furnaces of heat-and-power generating plants and metal melting furnaces. The inventive additive contains 0.1-82% of monoatomic aliphatic saturated C1-C4 alcohol, 0.1-16% of water- and/or alcohol-soluble ammonium salt of saturated monocarboxylic C2-C5 acid and/or 0.1-44% of carbamide and water up to 100%. The fuel contains a mixture of liquid hydrocarbons and the additive dissolved therein. Gasoline, diesel fuel and furnace fuel are used in the form of the liquid hydrocarbon mixture. The additive is embodied in the form of the versatile additive having the above-mentioned composition taken in a quantity raging from 0.000005 to 0.005%. The liquid hydrocarbon mixture is also embodied in the form of a colza oil and/or a diesel fuel and/or a colza oil methyl ether. Said invention makes it possible to reduce a soot deposit formation during the operation of engines, decrease the toxicity of exhaust gases and the wearing of metal components of engine fuel systems by increasing a molar refraction due to formation of a double ion layer in friction pairs.

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Description

[0001] Suggested inventions are related to petrochemistry sphere and, specifically, to the additives to lubricants and fuels, as well as to internal-combustion engine fuel, diesel fuel, and heat-electric power plants and smelting furnaces fuel containing the universal additive.

[0002] The most close to suggested universal additive according to technical essence there is the universal additive to lubricants and fuels which contains aliphatic C_1-C_4 monatomic saturated alcohol and water /RF patent No. 2034905 for an invention, IPC 6 C10L1/18, C10L1/22, Date of publication: 1995.05.10/. Additionally to mentioned ingredients the known additive contains the urea and the acetic acid.

[0003] Detriment of described additive is that during its usage some metallic structures of fuel system, particularly of carburetor internal-combustion engine, undergo to increased corrosion and wear leading to reducing the engine life.

[0004] The most close to suggested fuel for internal-combustion engine there is the fuel containing the mixture of liquid hydrocarbons and the small amount of additive dissolved in the hydrocarbons mixture / RF patent No. 2057787 for an invention, IPC 6 C10L1/18, C10L1/22, C10L1/28; Date of publication: 1996.04.10/. Mentioned fuel contains also the benzine and kerosene-gasoil fractions, as well as the organic alcohol nitrates, copolymer of carboxylic acid higher ethers with vinyl monomer, the organic acids metal polymers, and polymethyl siloxane.

[0005] Described fuel allows raising the hydrocarbon fuel combustion degree due to using in its composition the additives containing the metals, but presence of metals in fuel increases the metallic parts wear and corrosion that leads to loss of engine life.

[0006] The most close to suggested fuel for diesel engine there is the fuel containing the mixture of liquid hydrocarbons and the small amount of additive dissolved in the hydrocarbons mixture /RF patent No. 2057787 for an invention, IPC 6 C10L1/18, C10L1/22, C10L1/28; Date of publication: 1996.04.10/. Mentioned fuel contains the benzine and kerosene-gasoil fractions, as well as the organic alcohol nitrates, copolymer of carboxylic acid higher ethers with vinyl monomer, the organic acids metal polymers, and polymethyl siloxane.

[0007] Described fuel allows raising the hydrocarbon fuel combustion degree due to using in its composition the additives containing the metals, but presence of metals in fuel increases the metallic parts wear and corrosion that leads to loss of engine life.

[0008] The author did nor find out the fuel compositions used as the heat-electric power plants and smelting furnaces fuel only, and therefore he selected as the most close to fuel suggested the fuel containing the mixture of liquid hydrocarbons and the small amount of additive dissolved in the hydrocarbons mixture / RF patent No. 2246528 for an invention, IPC 7 C10L1/22; Date of publication: 2005.02.20/.

[0009] Detriment of described fuel is that during its usage as the heat-electric power plants and smelting furnaces fuel the required amount of additive is such that usage of this fuel with additive becomes unprofitable.

[0010] In described fuels the engine efficiency raise is achieved due to fuel combustion increase only and not associated with the ion processes in cylinder, as for essential influence on these processes the compounds in fuel composition should have the ability to create the stable ionized atmosphere around the gas particles. Polarization of compound's molecules in external electric field of the central compound's ion is the parameter of such ability. As the measure of polarization there is taken molar refraction - function of refraction index of the substance, its molecular mass and density; this function does not depend on aggregate state and temperature. Molar refraction, Rm, m^3/mole, is determined using the following formula:

$$Rm = (n^2-1)/(n^2+1)\cdot M/\rho,$$

where
n is the substance refractive index;
M is molar mass, kg/mol;
p is density, kg/m^3.

[0011] Molar refractions of known additives have the relatively low values which do not exceed $3\cdot10^{-5}$ m^3/mol; therefore such additives virtually do not influence on ion processes during the fuel combustion and do not contribute to increasing the engine heat efficiency.

[0012] The base of suggested inventions is determined by the task of creating such compositions of fuel and universal additive to the lubricants and the fuels which upon their usage both for engine (transmission) oils, lubricants, benzine, and for kerosene, diesel fuel, furnace fuel and masout would allow, additionally to reduction of fouling during the engines operation process and reduction of exhaust gas toxicity, to reduce the engine fuel system metallic parts wear due to creating the conditions for molar refraction increase by means of forming double ion layer in friction pairs.

[0013] Suggested, as well as the known, universal additive to the fuels contains the aliphatic C_1-C_4 monatomic saturated

alcohol and water, and, *in compliance with the invention,* it additionally contains water- and / or alcohol-soluble ammonium salt of saturated monobasic carboxylic C_2-C_5 acid and / or carbonic acid and / or carbamide at the following ratio of ingredients, mass %:

aliphatic C_1-C_4 monatomic saturated alcohol water- and / or alcohol-soluble ammonium salt of saturated	0,1-82
monobasic carboxylic C_2-C_5 acid and / or carbonic acid	0,1-16
and / or carbamide	0,1-44
water -	to 100.

[0014] The first alternative of suggested internal-combustion engine fuel contains the mixture of liquid hydrocarbons and the additive dissolved in the hydrocarbons mixture, and, *in compliance with the invention,* benzine is used as the mixture of liquid hydrocarbons and the universal fuel additive having the composition specified above and the following ratio of ingredients, mass %, is used as the additive:

universal additive - 0,0000050...0,0008
benzine - the rest.

[0015] The second alternative of suggested internal-combustion engine fuel contains the mixture of liquid hydrocarbons and the additive dissolved in the hydrocarbons mixture, and, *in compliance with the invention,* masout is used as the mixture of liquid hydrocarbons and the universal fuel additive having the composition specified above and the following ratio of ingredients, mass %, is used as the additive:

universal additive - 0,00001...0,005
masout - to 100.

[0016] The first alternative of suggested diesel engine fuel contains the mixture of liquid hydrocarbons and the additive dissolved in the hydrocarbons mixture, and, *in compliance with the invention,* diesel fuel is used as the mixture of liquid hydrocarbons and the universal fuel additive having the composition specified above and the following ratio of ingredients, mass %, is used as the additive:

universal additive - 0,00001...0,0025
diesel fuel - to 100.

[0017] The second alternative of suggested diesel engine fuel contains the mixture of liquid hydrocarbons and the additive dissolved in the hydrocarbons mixture, and, *in compliance with the invention,* rapeseed oil and / or diesel fuel and / or methyl ether of rapeseed oil is used as the mixture of liquid hydrocarbons and the universal fuel additive having the composition specified above and the following ratio of ingredients, mass %, is used as the additive:

universal additive - 0,00001...0,0025
diesel fuel and / or methyl ether of rapeseed oil - 10...90
rapeseed oil - to 100.

[0018] The third alternative of suggested diesel engine fuel contains the mixture of liquid hydrocarbons and the additive dissolved in the hydrocarbons mixture, and, *in compliance with the invention,* methyl ether of rapeseed oil is used as the mixture of liquid hydrocarbons and the universal fuel additive having the composition specified above and the following ratio of ingredients, mass %, is used as the additive:

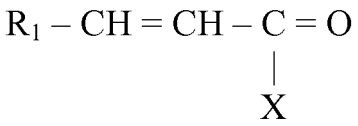
universal additive - 0,00001...0,0025
methyl ether of rapeseed oil - to 100.

[0019] Heat-electric power plants and smelting furnaces fuel contains the mixture of liquid hydrocarbons and the additive dissolved in the hydrocarbons mixture, and, *in compliance with the invention,* masout is used as the mixture of liquid hydrocarbons and the universal fuel additive having the composition specified above and the following ratio of ingredients, mass %, is used as the additive:

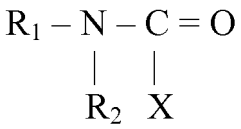
universal additive - 0,00001...0,005
masout - to 100.

[0020] The author have found in some organic compounds the ability to high polarization characterized by the molar refraction minimum values of $5 \cdot 10^{-5}$ m^3/mol, i.e. the property which ensures during the fuel combustion the fast accumulation of negative ions excess in combustion chamber due to their diffusion from the cylinder internal surface to its volume that leads to creating the electrostatic pressure of mutually repulsed like charges in direction if piston's working surface. Formation of such electrostatic pressure occurs due to transformation of combustion products' molecules heat energy portion to ions' potential energy in the space charge electrostatic field. Upon increasing the working volume due to piston movement this potential energy is completely transformed to effective work. Thus, the total portion of heat being transformed to work at electrostatic complex energy presence is greater than at the expansion adiabatic process occurring at ion diffusion absent. Adding to fuels the organic substances in form of additives with the indicated properties ensures increase of engine heat efficiency value and reduction of discharge gases due to decrease of operating temperature in cylinder. Furthermore, absence of solid particles and halogens in combustion products in combination with the combustion temperature decrease contributes to engine wear reduction and the catalytic filters life time extension.

[0021] Suggested universal additive to fuels represents the composition having the following structural formula:



or



where R_1 is substituted or unsubstituted aryl, alkyl or alkenyl radical;
R_2 is hydrogen, aryl or alkyl radical;
X is substituted or unsubstituted amides, substituted or unsubstituted aryl, alkyl or alkenyl radical.

[0022] Dibenzalacetone (molar refraction value equals $7.29 \cdot 10^{-5}$ m^3/mol), N-phenyl amide of salicylic acid (molar refraction value equals $6.04 \cdot 10^{-5}$ m^3/mol), N,N'-dimethyl-N,N'-diphenyl urea (molar refraction value equals $7.22 \cdot 10^{-5}$ m^3/mol), N,N'-diphenyl-N,N'- diethyl urea (molar refraction value equals $8.15 \cdot 10^{-5}$ m^3/mol), or N,N'-diisopropyl-N,N'-diphenyl urea (molar refraction value equals $9.08 \cdot 10^{-5}$ m^3/MOJIb) can be the examples of such compositions. The other compositions meeting the specified above requirements can be used additionally to mentioned substances.

[0023] Suggested universal additive to fuels may be introduced in conventional ways. As a rule, the additive is introduced as the condensate containing the additive itself and its carrier. As a rule, such concentrates contain from 5 to 50 mass % of additive, mainly in the form of solution in petroleum product. As the liquid carriers the re can be used organic solvents such as petroleum fractions, aromatic hydrocarbons, and paraffin hydrocarbons. Liquid carrier should be chosen providing its compatibility with the additive and fuel.

[0024] The author has determined in experimental way the optimal ingredients and their ratio in suggested compositions of universal additive to fuel materials and fuel. It was found that the presence of ammonium salt of saturated monobasic carboxylic C_2-C_5 acid and / or carbonic acid (water- and / or alcohol-soluble) in composition of universal additive to fuels ensures the formation of required double-layer ion coating. Amount of mentioned substance equal to 0.1-16 mass % is optimal. In case of ammonium salt amount less than 0.1 mass % the universal additive usage effect is virtually absent. Increase in mentioned substance amount over 16 mass % is not economically reasonable as such increase does not perceptibly contribute to fuel combustion intensity raise. Mentioned substance plays the role of ions creator in suggested composition. The carbamides play the same role in suggested composition. They can substitute in composition of the universal additive to fuels for ammonium salts of saturated monobasic carboxylic C_2-C_5 acid and / or carbonic acid (water- and / or alcohol-soluble) or be used independently or together with the mentioned ammonium salts. Optimal experimental amount of carbamide equals 0.1-44 mass %. In case of carbamide amount less than 0.1 mass % and absence of ammonium salt of saturated monobasic carboxylic C_2-C_5 acid and / or carbonic acid (water- and / or alcohol-soluble) the universal additive to fuels usage effect is virtually absent. Increase of carbamide amount over 44 mass % is not reasonable as leads to destruction of formed ion structures.

[0025] Spatial structure of saturated hydrocarbon - traditional fuel for internal-combustion engine - in case of addition

to it of aliphatic C_1-C_4 alcohol and acetic acid at the components ratio specified above contributes during the pre-flame period to destruction of chain side branches without formation of peroxide - primary cause of detonation. It increases the fuel combustion speed as the oxygen substitutes for the hydrogen more intensively covering the greater part of hydrocarbons. The released heat amount increases, i.e. the engine efficiency increases, fouling on piston-cylinder assembly surface and toxicity of discharged gases decreases not only during the continuous operation of diesel engine but during its warm-up as well.

[0026] In the first alternative of fuel for internal-combustion engine the benzine is used as the mixture of liquid hydrocarbons as the most commonly used product. The experiments have shown that the optimal amount of universal additive for benzine is 0.0000050...0.0008 mass %. In case of the universal additive amount less than 0.0000050 mass % the effect of its usage with benzine is virtually absent. Increase of the universal additive amount over 0.0008 mass % is not economically reasonable as such increase does not perceptibly contribute to fuel combustion intensity raise.

[0027] In the second alternative of fuel for internal-combustion engine the masout is used as the mixture of liquid hydrocarbons. The experiments have shown that the optimal amount of universal additive for masout is 0.00001...0.005 mass %. In case of the universal additive amount less than 0.00001 mass % the effect of its usage with masout is virtually absent. Increase of the universal additive amount over 0.005 mass % is not economically reasonable as such increase does not perceptibly contribute to masout combustion intensity raise.

[0028] In the first alternative of suggested fuel for diesel engine the diesel fuel is used as the mixture of liquid hydrocarbons. The experiments have shown that the optimal amount of universal additive for benzine is 0.00001...0.0025 mass %. In case of the universal additive amount less than 0.00001 mass % the effect of its usage with diesel fuel is virtually absent. Increase of the universal additive amount over 0.0025 mass % is not economically reasonable as such increase does not perceptibly contribute to fuel combustion intensity raise.

[0029] In the second alternative of fuel for diesel engine the rapeseed oil is used as the mixture of liquid hydrocarbons. The experiments have shown that the optimal amount of universal additive for rapeseed oil is 0.00001...0.0025 mass %. In case of the universal additive amount less than 0.00001 mass % the effect of its usage with rapeseed oil is virtually absent. Increase of the universal additive amount over 0.0025 mass % is not economically reasonable as such increase does not perceptibly contribute to fuel combustion intensity raise.

[0030] In the third alternative of fuel for diesel engine the methyl ether of rapeseed oil is used as the mixture of liquid hydrocarbons. The experiments have shown that the optimal amount of universal additive for methyl ether of rapeseed oil is 0.00001...0.0025 mass %. In case of the universal additive amount less than 0.00001 mass % the effect of its usage with methyl ether of rapeseed oil is virtually absent. Increase of the universal additive amount over 0.0025 mass % is not economically reasonable as such increase does not perceptibly contribute to fuel combustion intensity raise.

[0031] In suggested fuel for heat-electric power plants and smelting furnaces the masout is used as the mixture of liquid hydrocarbons. The experiments have shown that the optimal amount of universal additive for masout is 0.00001... 0.005 mass %. In case of the universal additive amount less than 0.00001 mass % the effect of its usage with masout is virtually absent. Increase of the universal additive amount over 0.005 mass % is not economically reasonable as such increase does not perceptibly contribute to fuel combustion intensity raise.

[0032] Suggested universal additive is also used as the additive to lubricants such as to engine lubricants and oils for cars and trucks, transmission oils, gear and cylinder oils. Optimal amount of the universal additive in lubricant is 0.00001... 0.15 mass %, as namely at such additive amount double ion layer is formed that contributes to reducing the friction and friction pairs wear speed. In case of the universal additive amount less than 0.00001 mass % the effect of its usage with lubricant is virtually absent. Increase of the universal additive amount over 0.15 mass % leads to double layer destruction and extinction of its usage effect.

[0033] Examples. The universal additive to lubricants and fuels was prepared by means of simple mixing of listed ingredients with specified above ratio of volumes and agitated till complete dissolution of ammonium salt and / or carbamide.

[0034] For experimental examination of suggested universal additive efficiency there were prepared 13 compositions and 9 from these compositions have shown the optimal results given in Table 1.

[0035] Tests were carried out according to standard procedures using the automobiles ZIL-130, 138, GAZ-24, VAZ-21011, 2103, TOYOTA CAMRY 2,4, TOYOTA CRESIDA 1,6; buses LAZ-699P and Ikarus-280:

Content of CO and CH was determined according to GOST 21393-75, condition of combustion chamber - according to GOST 20991-75 (for gasoline engine) and GOST 20303-74 - for diesel engines. The test results are shown in Table 2. As the example the table shows the results of the universal additive test at GAZ-24 automobile engine (benzene AI-93), exhaust opacity was determined for diesel fuel at the engines Ikarus-280 bus, automobiles KaMaz-5220, SCANIA 3664, VOLVO FH-12, RENAULT 5489, TOYOTA HIACE 95 HP, TOYOTA DYNA 2t. 95 HP.

Mechanical impurities content was determined according to GOST ГОСТ 6370-83. During examination of all suggested compositions of fuels no mechanical impurities were detected using the available instruments.

[0036] As it is seen in table the usage of universal additive to suggested compositions of fuel (examples 1-5) allows reducing the amount of hazard emissions to atmosphere (CO and CH) by 5-20 times in comparison with benzine without the suggested additive to fuels (example 15) and by 5-10 times in comparison with the additive-prototype (example 14). The engine power rises by 18-40% (prototype - 4-5%), and the fuel consumption decreases by 15-27% (prototype - 4-5%). Exhaust opacity of diesel engines, where the fuel with the additive was used, decreases by 6-19 times (prototype - by 1.5-2 times). It is possible to significantly reduce the fouling on the piston-cylinder assembly surface. Total coefficient of combustion chamber surface condition reduces from 6,5 to 1,3-1,4 units for benzine (prototype - 6 units). The best achieved results for different engine types are shown in Tables 3 and 4.

[0037] Thus, usage of suggested additive may have the significant economic effect as this additive allows reducing the hazard emissions to atmosphere, reducing consumption of fuel and oil, raising the engine power, and increasing the engine overhaul life.

[0038] Suggested fuel for heat-electric power plants and smelting furnaces was tested in short drum-type furnace, fuming furnace, boilers PTK-4, HES, and Martin furnace. Test results are shown in Table 5.

[0039] Comparative test of conventional and suggested fuel compositions have shown the suggested compositions advantages consisting in hazard emissions reduction and the engine efficiency increase (Table 1), as well as the engine wear reduction by 1.5 ... 2 times, absence of negative influence on spark plugs, and the catalytic filters life-time increase by 20 %...40 %.

[0040] Experimental examination of suggested universal additive was carried out on 14 samples of lubricants of the following types: "ANGROL" (TU 0253-270-05742746-94 /3/), "VELS TRANS" (TU 0253-071-00140636-95 /7/), "NORSI" (TU 38.601-07-19-93 /4/), "SAMOIL 4405" (TU 38.301-13-012-97 /6/), ESSO ATF D, ESSO TORQUE FLUID 30, ESSO GEAR OIL LS 85W-90, ESSO TORQUE FLUID 50, ESSO TORQUE FLUID 62, Mobilube SHC 75W-90 LS, Mobilube HD 80W-90, Mobilube HD SOW-90, Mobilube GX 80W-A, Mobilube ATF SHC. Examination results are shown in Table 6.

Table 1

Quantitative composition of samples of suggested universal additive to fuels														
No.	**Ingredient description**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**
1	Methyl alcohol	52											50	
2	Ethyl alcohol		60				0,1	75	64		84			0,1
3	Propyl alcohol			68										
4	Isopropyl alcohol				74					58				
5	Butyl alcohol					82						22		
6	Isobutyl alcohol						69,9							
7	Ammonium salt of acetic acid		12				0,1	5				4		0,9
8	Ammonium salt of propionic acid			9,9							6			
9	Ammonium salt of butyric acid					6								
10	Ammonium salt of isobutyric acid	0,1					10							
11	Ammonium salt of valeric acidacid								14					

(continued)

Quantitative composition of samples of suggested universal additive to fuels														
No.	**Ingredient description**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**
12	Ammonium salt of isovaleric acidacid				8					10				
13	Ammonium salt of carbonic acid	8,9					5,9	4					18	
14	Carbamide	7		0,1								30		44
15	Water	32	28	22	18	12	14	16	28	32	10	44	32	55

Table 2

	Test results (+)														
Additive samples / parameters	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
Content of CO, % (++)	0,1/ 0,2	0,1/ 0,1	0,1/ 0,2	0,1/ 0,5	0,1/ 0,2	0,1/ 0,1	0,1/ 0,2	0,1/ 0,5	0,1/ 0,2	0,3/ 0,5	0,4/ 0,6	0,3/ 0,5	0,2/ 0,3	1,4/ 2,1	2,0/ 2,8
Content of CH, % (++)	60/ 20	65/ 20	55/ 15	50/ 15	55/ 18	60/ 19	60/ 20	65/ 20	55/ 17	90/ 35	85/ 40	80/ 30	77/ 25	250/ 100	750/ 650
Power, HP	125	125	128	126	127	124	128	125	124	108	105	103	120	94	90
Fuel consumption, 1.	8,4	8,3	8,4	8,2	8,4	8,2	8,3	8,3	8,4	9,5	9,7	9,5	8,9	10,8	11,2
Exhaust opacity, % (++)	4,1/ 4,6	4,3/ 4,7	4,2/ 4,9	4,0/ 4,6	4,3/ 4,6	4,2/ 4,8	4,1/ 4,5	4,3/ 4,7	4,2/ 4,9	5,3/ 6,8	5,9/ 7,0	6,1/ 7,3	5,2/ 6,6	21,1/ 30,0	44,0/ 56,0
Combustion chamber surface condition, units	1,4	1,3	1,3	1,4	1,3	1,4	1,4	1,4	1,3	1,6	1,6	1,7	1,5	6	6,5

(+) - numbers of samples in Table 2 correspond to numbers of samples in Table 1. Column No. 14 contains the research results for fuel with an additive-prototype. Column No. 15 - benzine without additive.
(++) - 1-st parameter was determined at minimal idle rpm, 2-nd - at maximal idle rpm.
Note: additive was introduced to benzine in amount of 0.00065 mass %; to diesel fuel - 0.00165 mass %.

Table 3

Comparative values of fuel consumption for different engines of cars and buses			
Automobile type	**Fuel**	**Consumption on 100 km, l, without additive**	**Consumption on 100 km, l, with suggested additive**
GAZ-24	AI-93	11,2	8,2
VAZ-2103	A-76	9,8	7,7
ZIL-138	A-50	34	26,2
ZIL-138	A-76	31,2	22,7
LAZ-699P	A-76	39	30,5
KAMAZ-5320	Diesel fuel	24,7	19,7
IKARUS-280	Diesel fuel	39,8	33,4
SCANIA 3664	Diesel fuel	47	37,3
VOLVO FH-12	Diesel fuel	40,58	37,8
RENAULT 5489	Diesel fuel	51,16	45,45
TOYOTA CAMRY 2,4	Mogas 92	10,5	9,25
TOYOTA CRESIDA 1,6	Mogas 92	9,5	8,46
TOYOTA HIACE 95 HP	Diesel fuel	9,4	8,1
TOYOTA DYNA 2t. 95 HP	Diesel fuel	10,84	9,25

Table 4

Comparative values of engine power and hazardous emissions during its running									
Automobile type	**Fuel type**	**Power HP Without additive**	**CO,% Without additive (+)**	**CH,% Without additive (+)**	**Exhaust opacity, % Without additive (+)**	**Power, HP. With additive**	**CO,% With additive (+)**	**CH,% With additive (+)**	**Exhaust opacity, % With additive (+)**
ZIL-138	A-50	118	1,0/4,2	1200/ 850		170	0,1/0,2	65/30	
ZIL-130	A-76	130	1,4/3,5	1300/ 950		180	0,1/0,2	60/25	
GAZ-24	AI-93	90	2,0/2,8	750/ 650		128	0,1/0,15	50/15	
KAMAZ-5320	Diesel fuel	170			90,4/ 43,8	218			4,8/3,5
IKARUS-280	Diesel fuel	190			44,0/ 56,0	250			4,0/4,6
TOYOTA CAMRY 2,4	Mogas 92		1,42	112			1,18	89	
TOYOTA CRESIDA 1,6	Mogas 92		1,65	126			1,39	97	
TOYOTA HIACE 95 HP.	Diesel fuel		0,01	12			0,01	9	
TOYOTA DYNA 2t. 95 HP.	Diesel fuel		0,01	14			0,01	11	
(+) - 1-st parameter was determined at minimal idle rpm, 2-nd - at maximal idle rpm. Note: additive was introduced to benzine in amount of 0,00065 mass %; to diesel fuel - 0,00165 mass %.									

Table 5

Comparative values of masout specific consumption for different types of boiler furnaces		
Type of boiler furnace	**Masout consumption without suggested additive, t/hour**	**Masout consumption with suggested additive, t/hour**
Short drum-type furnace	1,25	0,94
Fuming furnace	2	1,65
PTK-4 boiler	1,2	1,02
HES boiler (50 t of steam per hour)	1,5	1,37
HES boiler (200 t of steam per hour)	1	0,83
Martin furnace	2	1,8
Note: additive was introduced to masout in amount of 0,0022 - 0,0026 mass %		

Table 6

Results of oils and lubricants with additive study														
Parameter/ Sample No.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**
Wear spot at pressure of 200 N during 1 hour, mm	0,34	0,32	0,33	0,32	0,32	0,32	0,33	0,32	0,32	0,33	0,36	0,36	0,31	0,51
Note: Numbers of samples in Table 1 correspond to numbers of examples in Table 6. Column No. 14 contains the research results for oil with suggested additive.														

Claims

1. Universal additive to the fuels containing the aliphatic C_1-C_4 monatomic saturated alcohol and water *different in* that it additionally contains water- and / or alcohol-soluble ammonium salt of saturated monobasic carboxylic C_2-C_5 acid and / or carbonic acid and / or carbamide at the following ratio of ingredients, mass %:

aliphatic C_1-C_4 monatomic saturated alcohol	0,1-82
water- and / or alcohol-soluble ammonium salt of saturated monobasic carboxylic C_2-C_5 acid and / or carbonic acid	0,1-16
and / or carbamide	0,1-44
water -	to 100.

2. Internal-combustion engine fuel containing the mixture of liquid hydrocarbons and the additive dissolved in the hydrocarbons mixture *different in* that the benzine is used as the mixture of liquid hydrocarbons and the universal fuel additive having the composition specified above and the following ratio of ingredients, mass %, is used as the additive:

   universal additive - 0,0000050...0,0008
   benzine - to 100.

3. Internal-combustion engine fuel containing the mixture of liquid hydrocarbons and the additive dissolved in the hydrocarbons mixture *different in* that masout is used as the mixture of liquid hydrocarbons and the universal fuel additive having the composition specified above and the following ratio of ingredients, mass %, is used as the additive:

   universal additive - 0,00001...0,005
   masout - to 100.

4. Diesel engine fuel containing the mixture of liquid hydrocarbons and the additive dissolved in the hydrocarbons mixture *different in* that diesel fuel is used as the mixture of liquid hydrocarbons and the universal fuel additive having the composition specified above and the following ratio of ingredients, mass %, is used as the additive:

   universal additive - 0,00001...0,0025
   diesel fuel - to 100.

5. Diesel engine fuel containing the mixture of liquid hydrocarbons and the additive dissolved in the hydrocarbons mixture *different in* that rapeseed oil and / or diesel fuel and / or methyl ether of rapeseed oil is used as the mixture of liquid hydrocarbons and the universal fuel additive having the composition specified above and the following ratio of ingredients, mass %, is used as the additive:

   universal additive - 0,00001...0,0025
   diesel fuel and / or methyl ether of rapeseed oil - 10...90
   rapeseed oil - to 100.

6. Diesel engine fuel containing the mixture of liquid hydrocarbons and the additive dissolved in the hydrocarbons mixture *different in* that methyl ether of rapeseed oil is used as the mixture of liquid hydrocarbons and the universal fuel additive having the composition specified above and the following ratio of ingredients, mass %, is used as the additive:

   universal additive - 0,00001...0,0025
   methyl ether of rapeseed oil - to 100.

7. Heat-electric power plants and smelting furnaces fuel containing the mixture of liquid hydrocarbons and the additive dissolved in the hydrocarbons mixture *different in* that masout is used as the mixture of liquid hydrocarbons and the universal fuel additive having the composition specified above and the following ratio of ingredients, mass %, is used as the additive:

universal additive - 0,00001...0,005
masout - to 100.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/UA 2006/000015

A. CLASSIFICATION OF SUBJECT MATTER
see supplemental 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)

C10L 1/182, 1/222, 1/223, 1/188, C10M 141/00, 141/02, 141/06

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)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	RU 2034905 C1 (KOLLEKTIVNOE MALOE NAUCHNO-PROIZVODSTVENNOE PREDPRIYATIE "ADIOZ"), 10.05.95, the abstract, table 2	1-7
Y	RU 2090654 C1 (ROSSIISKY NAUCHNY TSENTR "PRIKLADNAYA KHIMIYA), 20.09.97, second paragraph of the description	1-7
Y	FR 2496119 AI (INSTITUT FRANCAIS DU PETROLE) 18.06.1982, example 4	5
Y	FR 2492402 AI (INSTITUT FRANCAIS DU PETROLE) 23.04.1982 example A, page 8, table 1, claim 9	5, 6
Y	A.M. Danilov "Primenenie prisadok v toplivakh", idatelstvo "Mir", M., 2005, pages 62-71, 80-89	2-7

☒ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent 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 such 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	Date of mailing of the international search report
17 November 2006	23 November 2006
Name and mailing address of the ISA/ RU Facsimile No.	Authorized officer Telephone No.

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/UA 2006/000015

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	RU 2246528 C1 (PETROV DMITRY GEORGIEVICH et al.), 20.02.2005	1-7
A	US 4897086 A (MOBILOIL CORPORATION) 30.01.1990	1-7
A	RU 2058375 Cl (AOOT "NOVOKUIBYSHEVSKY NEFTEPERERABATYVAJUSCHY ZAVOD"), 20.04.96	1-7

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/UA 2006/000015

CLASSIFICATION OF SUBJECT MATTER

C10L 1/182 *(2006.01)*
C10L 1/222 *(2006.01)*
C10L 1/188 *(2006.01)*
C10M 141/02 *(2006.01)*
C10M 141/06 *(2006.01)*

Form PCT/ISA/210 (extra sheet) (April 2005)