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(54) **Combustion process with full control over all of the purified fuels that are submitted to high compressed air.**

(57) Combustion process with full control over all of the purified fuels that are submitted to high ("jetluft") compressed air between (5 to 200 or more) atm., with H₂O, CO₂ and N₂ as recyclable outlets.

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Description

[0001] The new combustion process under a perfect control and with high compressed air ("jet air") between (5 to 200 or more) atm., for all kinds of purified fuels and with naught/zero outlet of pollutions. For a perfect combustion of all kinds of fuels that exists in the world will air be used under high pressure between (5 to 200 or more) atm.. The high compressed air shall suck in all sorts of fuels until it will be saturated to a complete combustion of the fuel .By the sucking in of the fuel by a higher compressed air the fuel particles will become so fine distributed in the air that it will be homogeneous. The quantity of the fuel that will be sucked in by the compressed air will be under a perfect control and adjusted from a tap that is assembled on the fuel pipe. To be able to inject the air under pressure (5 - 200 or more) atm., which sucks in the fuel until the air will be saturated and so that the fuel will burn up it claims different INJECTORS: a, b, c or more which are described below. With this combustion process under perfect control, the pollutions will disappear totally. After the combustion process the outlet will be H_2O , CO_2 and N_2 , that can be recovered/recycled, please see Annex 5.

[0002] With the use of the outlets from the new combustion process you can use a labyrinth for irrigation with H_2CO_3 + N_2 . The labyrinth will be used within agriculture for irrigation of plants with H_2CO_3 + N_2 which are recycled according to the new combustion process. Reactor

[0003] R1,R2 and R3; Reactor R1 will be used to obtain vapors for turbine, Reactor R2 used for thermal power station for warmth water and reactor R3it is used for warm up private houses.

[0004] These Reactors shall use an injector AF at 5 to 250 atm.

a) INJECTOR model AF, G

please see Annex 2.

A= The compressed air between (5 - 200 or more) atm., the pressure shall be chosen accordingly/in proportion to the conditions of the fuel viscosity.

F= The fuel liquid as in Table 1 on page 4/16: Gasoline, Heavy diesel, Airplane fuel, Jet fuel, Combustible oil, Alcohol, Ethanol, Methanol ex...

Or.

G = gas

natural, bio

See Annex 2.

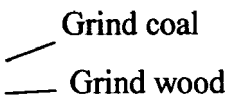
[0005] Table of signs: 1). Compressor for compressed air which shall be constructed with a cylinder for each engine cylinder i.e. an engine with 4 cylinders require a compressor for compressed air with 4 cylinders. 2) Injector AF, G for each cylinder in the engine. 3) Air pipe from the compressor to the injector AF, G of which the volume + V_i are equal to V_c + V_d see Annex 1 and 4, 4) The solenoid that opens the injector nozzle for injection. 5) The fuel pipe that has a tap put up on itself. 6) Tap on the fuel pipe. 7). The choke = (gas system) with which the engines' rev is regulated for minim $\Phi \leq 0,5$ up to rev maxim $\Phi = 1$. 8) The injectors' nozzle. 9). Mouthpiece, through it the mixture between the air and fuel is injected into the engine. 10) Cylinder. 11) Spring to the valve for out pressure of the air inside the pipe that binds the compressor with the injector. 12) The Valve for out pressure of the air into the injector pipe. 13) Crank to the compressor for the air. 14) Cylinder to the compressor for the air. 15) The air room. 16) The valve for intake of the air. 17) The spring for intake valve. 18) The filter for air. 19) The roll. 20) The eccentric that together with the roll starts the crank. 21) The spring for needle. 22) The safety bolt.

b) INJECTOR model AFS

see Annex 3.

A = The compressed air between (5 - 200 or more) atm., the pressure shall be chosen in relation to the solid fuel.

F = The fuel liquid - Combustible oil.

S = The solid 

[0006] Table of signs for Annex 3:

1) The pipe with fuel inside. 2) Tap on the pipe with fuel inside. 3) Pipe for air (the compressed air 30 - 100 atm.). 4) Tap on the pipe for air. 5) Pipe for coal. 6) Tap on the pipe for coal. 7) The section A_a for the pipe with air inside. 8) The section A_f for the pipe with fuel inside. 9) The section A_s for the pipe with coal inside. 10) Injection with air, fuel and coal that forms accordingly to the picture. 11) Support. 12) Pipe with air inside that shall have the angle 60° . 13) Pipe with coal inside that shall have the angle 60° . 14) Pipe with fuel inside that shall have the angle 60° . 15)

Nozzle with its out angle that will be 90°.

c) Rotating compressor - that will give a compressed air over 30 atm., that sucks in the fuel until the air becomes saturated and a complete combustion will occur. The fuel that is sucked in shall be regulated with a tap so that you can attain a clean outlet/exhaust without any pollution. This compressor shall inject air mixed with fuel into a hermetic closed turbine or establishment, which only has pipes for outlet.

[0007] All the types of injectors described above shall be provided with a tap for both air flow (5 - 200 or more) atm. and the fuel flow. The pressure shall be in relation with V_u (the combustion chambers volume). Regulate the fuel flow under a test/by testing/ in a special establishment with the tap for compressed air completely opened and regulate only the flow of the fuel, the mixture between the air and fuel must be saturated and then it shall be burned up in a flame and it shall be measured how clean the combustion is. The mixture shall be regulated so that the combustion shall be complete and with that only let out H_2O , CO_2 and N_2 that can be measured. By regulating the flow of the fuel that is sucked in by compressed air between (5 to 200 or more) atm. a complete control of the combustion will be attained for the first time in the world. The tap for fuel shall be blocked up at the time of total saturation of the mixture of air under pressure and fuel and shall calibrate the pipe.

[0008] The mixture between the air and the fuel into this type of injector can be reached to perfection and must respect basic THERMOCHEMISTRY¹ principles, the relation between;

1). Combustion Efficiency, η_c (%) 2) Fuel Equivalence Ratio Φ

For $\Phi = 0,4 - 1$ the combustion shall be complete and the pollution will be equal to zero and the outlets will be air, H_2O , CO_2 and N_2 , that can be recycled.

[0009]

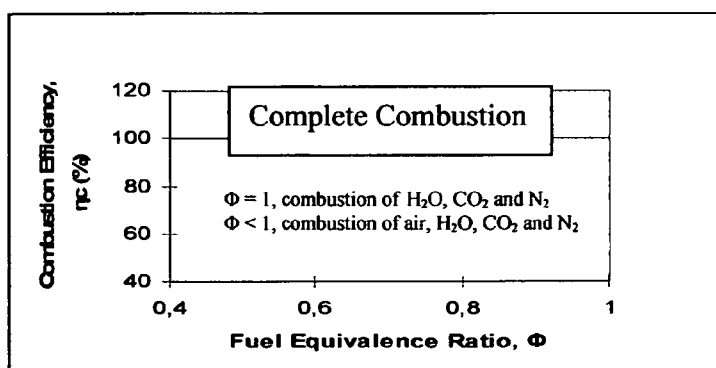
Figure 1.

$$\Phi = (AF)_{\text{stoich}} / (AF)_{\text{act}}$$

$$AF = m_a / m_f$$

m_a = air mass

m_f = fuel/gas mass



¹ See Engineering Fundamentals of the Internal Combustion Engine, 2 edition, Willard W. Pulkrabek, 2004.

[0010] The table² below shows *stoichiometric* AF the proportion between pipes for compressed air and fuel and nozzle for fuel.

Table 1:

Fuel Name	Formula	Molecular mass	Heating Value kJ/kg	Stoichiometric AF $\Phi=1$		Stoichiometric dimension for: $\Phi=1$ Compressed air pipe, Fuel pipe/ nozzle, Diameter in mm	
				Air Mol.	Fuel Mol.		
Gasoline	C_8H_{15}	111	47300	14,6	1	1,46	0,1
Light diesel	$C_{123}H_{22,2}$	170	44800	14,5	1	1,45	0,1
Heavy diesel	$C_{14,6}H_{24,8}$	200	43800	14,5	1	1,45	0,1
Isooctane	C_8H_{18}	114	47810	15,1	1	1,51	0,1

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(continued)

				Air Mol.	Fuel Mol.		Fuel pipe/ nozzle, Diameter in mm
			kJ/kg			Diameter in mm	Diameter in mm
Methanol	CH ₃ OH	32	22540	6,5	1	0,65	0,1
Ethanol	C ₂ H ₅ OH	46	29710	9,0	1	0,90	0,1
Methane	CH ₄	16	55260	17,2	1	1,72	0,1
Propane	C ₃ H ₈	44	50180	15,7	1	1,57	0,1
Heptane	C ₇ H ₁₆	100	48070	15,2	1	1,52	0,1
Cetane	C ₁₆ H ₃₄	226	47280	15,0	1	1,50	0,1
Coal(carbon)	C	12	33800	11,5	1	1,15	0,1
Toluen	C ₇ H ₈	92	42500	13,5	1	1,35	0,1
Hydrogen	H ₂	2	120000	34,5	1	3,45	0,1
This table shows the proportion between the compressed air pipe and the fuel pipe when Φ=1.							

[0011] For $\Phi = 1$ stoichiometric, the maximum energy of the fuel will be obtained. The outlets will be H₂O, CO₂ and N₂, which shall be recycled. This process is under complete control which is shown in the example below:

[0012] You decide to use 30 atm. for the compressed air, it then sucks in fuel which is regulated with a tap until it becomes saturated, i.e. $\Phi = 1$, the outlets are then H₂O, CO₂ and N₂. Now, if you raise the pressure up to 100 atm. the outlets will still be H₂O, CO₂ and N₂, this proves that you have a full control over the combustion.

² See Engineering Fundamentals of the Internal Combustion Engine, 2 edition, Willard W. Pulkkrabek, 2004, p. 444.

INJECTOR type AF, G See Annex 2.

[0013] Table of signs: 1) Compressor for compressed air that shall be built with a cylinder for each engine cylinder, i.e. one engine with 4 cylinders requires one compressor for compressed air with 4 cylinders. 2) INJECTOR AF, G for each cylinder in the engine. 3) Air pipe from the compressor to the injector AF, G, of which the volume + V_i is equal to V_c + V_d see Annex 1 and 4. 4) Solenoid that opens the injectors' needle for injection. 5) Fuel pipe with a tap fixed on it. 6) Tap on fuel pipe. 7) Choke = (gas system) with which the engines rev minim is regulated for $\Phi \leq 0,5$ up to the rev maxim $\Phi = 1.8$) The needle of the injector.

9) Mouthpiece, through which the mixture of air and fuel is injected in to the engine.

10) Cylinder. 11) The spring of the valve for out press of air in the pipes that binds the compressor with the injector. 12) Valve for out press of air in the pipes' injector. 13) Crank to the compressor for air. 14) Cylinder to compressor for air. 15) Air chamber. 16) Valve for intake of air. 17) Spring for intake valve. 18) Filter for air. 19) Roll. 20) Cam (eccentric) that together with a roll starts the crank. 21) Spring for needle. 22) Safety bolt.

[0014] The new engines shall be provided with INJECTOR model AF, G, that will not pollute the environment. This model of injector will be used together with a compressor that has an equal amount of cylinders as the engine has, i.e. if the engine has 4 cylinders the compressor will also have 4 cylinders. The compressor will replace the fuel pump and the injector shall be assembled into the axis of the cylinder in the cylinder head, and replaces the intake valve. For intake of fuel the injector will be opened by a solenoid. The flow of the fuel will be regulated with the gas (choke) system, which is installed together with the fuel pipe. On the fuel pipe there will be a tap that regulates the flow of the fuel to $\Phi = 1$, this is regulated on a special establishment. By an optimal adjustment ($\Phi = 1$) the air will be saturated with fuel which means that the combustion becomes completely clean and without any pollution.

[0015] The new engine that will be equipped with INJECTOR AF, G that injects air into the engines cylinder under high pressure mixed with intake of fuel/gas depending on the engines propellant, shall respect THERMOCHEMISTRY principles. This signifies to completely respect the state (see Figure "diagram" 1) between:

- 1). Combustion Efficiency η_c (%)
- 2). Fuel Equivalence Ratio Φ

[0016] The compressed air is equal to p , $p = k_1 \times n/V$, n = quantum of air and k_1 = constant.

[0017] The state between: $AF = m_a/m_f = N_a \cdot M_a / N_f \cdot M_f$ Stoichiometric.

[0018] $AF = m_a / m_f = 15,1 / 1,^3$ i.e. to burn up 1 gram of the gasoline you need 15,1 gram of air.

[0019] $AF = n_a / n_f = 15,1 / 1$, i.e. to burn up 1 molecular of gasoline you need 15,1 molecular of air, with this state the engine consumption of fuel will be calculated and as well the state between the air pipe, the fuel pipe and the nozzle.

$$AF_{\text{stoich}} = m_a/m_f$$

$$m_a = \eta_v \cdot \rho_a (V_d + V_c) p_c$$

$$m_f = \Phi \cdot m_a / (AF)_{\text{stoich}}$$

A = The air [Compressed air between (20 - 200 or more) atm.]

F = fuel

m_a = 15,1 air mass

m_f = fuel/gas mass

n_a = the air quantity in mole

n_f = the fuel quantity in mole

N_a = the air speed

N_f = the fuel speed

M_a = molecular mass for air

M_f = molecular mass for fuel

p_c = compressed air in the cylinder 1 atm.

$\Phi = (AF)_{\text{stoich}} / (AF)_{\text{act}} = 1$ optimal stoichiometric for air and fuel, which indicates that maximum energy is liberated from the fuel.

[0020] For $\Phi = 1$ is received a maximum number of revolutions (speed), N_{max} , from the engine.

[0021] For $\Phi \leq (0.4 - 0.5)$ is received a minimal number of revolutions, N_{min} , from the engine. Compressed air shall be stored in the pipe that joins the compressor with the injector. The pipe area will be calculated out in relation to the cylinders' ($V_c + V_d$).

$$(V_t + V_i) \times p_i = (V_c + V_d) \times p_c \text{ constant}$$

V_t = The pipe/tube hole volume

V_i = The volume in the chamber round the injectors' point

p_i = Compressed air from the pipe (20 - 200 or more) atm. determined for a certain pressure, e.g. 150 atm.

³ See Engineering Fundamentals of the Internal Combustion Engine, 2 edition, Willard W. Pulkrabek, 2004, p. 444.

p_c = Compressed air in the cylinder that is 1 atm. (atmosphere pressure)

V_c = clearance volume see Annex 1

V_d = displacement volume see Annex 1

[0022] The air mass in the air pipe shall be in state with the density and the pressure.

$$m_a = p_c \cdot \eta_v \cdot \rho_a \cdot (V_d + V_c)$$

η_v = volumetric efficiency

ρ_a = the air density.

[0023] The fuel pipe from the tap to the injector shall be dimensioned for $\Phi = 1$ through an fixed high compressed air that is in state to the air mass. For gasoline m_a/m_f is 15,1/1, i.e. to burn up 1 gram of gasoline it is needed 15,1 g of air.

The fuel mass m_f that will be sucked in by the air mass m_a shall be $m_f = m_a / 15,1$ $m_f = p_c \cdot \eta_v \cdot \rho_a \cdot (V_d + V_c) / 15,1$: with this formula you know how much fuel is needed to be burned up in the air mass. The quantity of fuel that is to be sucked in/ intaken to the air mass by the compressed air through a nozzle that becomes injected into the engines' cylinder, see Annex 4.

[0024] See Annex 4.

[0025] Table of signs for Annex 4: 1) Air pipe

2) V_t = the volume of the air pipe. 3) B = Bore, 4) V_d = Displacement volume,

5) V_c = clearance volume, 6) V_i = injector volume, 7). Fuel intake

8) Nozzle that is mounted on the injector needle.

B = cylinder diameter See Annex 1

Table of signs for Annex 1: ,

1) V_c = Clearance volume; 2) V_d = Displacement volume; 3) B = cylinder diameter 4) S = stroke 5) TDC = "the pistons' top dead center"; 6) BDC = "the pistons' bottom dead center"; 7) r = connecting rod length; 8) θ = Crank angle; 9) a = crank offset; 10) s = the pistons' position. When the mixture of air and fuel is injected in to the cylinder the whole of the cylinders' volume ($V_c + V_d$) will be filled in a fast and effective way. At the compressed air (20-200 or more) atm. there will be a maximum turbulence and then the homogeneous between the air and fuel shall be perfect. And then the mixture vaporizes rapidly and that being so the fuel explosion and combustion shall be rapidly and total. Then there will be created a maximum velocity for the engine's piston. Exhaust of gases will be H_2O

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vapour, CO_2 and N_2 . Under these conditions with $\Phi = 1$ for the new engines that will use INJECTOR AF, G there will be obtained:

- 1). Fuel consumption will be cut down (reduced to) with (30-50) % for $\Phi = 1$. see Footnote 1.
- 2). The Engines' efficiency will be improved with (30-40) %.
- 3). The fabrication cost will be cut down with (30-40) %, many components from the older engine will disappear.
- 4). The crank angel (intake angel), θ , shall be newly calculated. See Annex 1.
- 5). On these injector AF, G there shall be an assemble of (chock for speed);

- a) for N_{minimum} there shall be $\Phi \leq 0,5$
- b) for N_{maxim} there shall be $\Phi = 1$

[0026] These engines will not exhaust pollution and they will be the engines of this millennium. Jet-engines and rocket engines will use injector AF, G, plus they will suck in fuel through the compressor axis, the effect of the engine will then ascend.

[0027] When there is a high compressed air, the engines will be able to work with fine filtrated crude oil, that becomes so homogenous and fine distributed fuel, and this fuel will be injected by the injector. The compressor shall be installed on all the engines in the same position as the pump for fuel is installed in the diesel engines.

[0028] The furnaces for all the private houses shall be provided with INJECTOR AF, G with a pressure of 5 atm. from a compressor that can provide an entire residential district. This will minimise the consumption with more than half when using fuel (heating) oil. INJECTOR AF, G shall be installed in hermetically sealed boilers/furnaces with outlet pipes.

INJECTOR AFS (See Annex 3.)

[0029] Table of signs for Annex 3: 1) Pipe with fuel inside. 2) Tap on the pipe with fuel inside.

3) Pipe for air (compressed air 30-100 atm.). 4) Tap on pipe for air. 5) Pipe for coal. 6) Tap on pipe for coal. 7) The section A_a for the pipe with air inside. 8) The section A_f for the pipe with fuel inside. 9) The section A_s for the pipe with coal inside. 10) Injection with air, fuel, coal that will take the formation accordingly to the picture. 11) Hold. 12) Nozzle that makes the pipe with air inside to have the angle 60° . 13) Nozzle with the out angel 90° .

[0030] This kind of injector is provided with three different canals, one for the outflow of air and the other two for sucking in of the liquid respective solid fuel.

[0031] The injectors' outflow, where these three materials already have been mixed, shall have a double conical shape so that you can get a better spreading out and mixture. This principle is applicable on furnaces. This INJECTOR AFS shall be installed in a hermetically sealed furnace or boiler. This kind of injector will mix:

- 1) air that flows through pipe 3) coal that is finely grind and flows
- 2) liquids of fuel that flows through pipe through pipe.

The intake of fuel and coal shall be regulated with a tap. The air will also be regulated with a tap that will be opened till maximum wide when it's time for combustion. These models of furnaces will be smaller than those of today and will give the same combustion effect. The consumption of fuel will be reduced with more than half.

With this model of injector there will occur a controlled and complete combustion and the exhaust will be H_2O , CO_2 and N_2 , that will be recycled accordingly to Annex 5.

The relation between the canals in the injector will be: $A_f = A_s < A_a$, see Annex 3 . Where:

A_a = the pipe area for the compressed air flow.

A_f = the pipe area for the fuel flow.

A_s = the pipe area for the coal flow.

Example: If I burn the combustible oil and coal; AF stoichiometric is:

For the combustion of 1 molecule of combustible oil there is a need of 15,5 molecule of air.

For the combustion of 1 molecule of coal there is a need of 11,5 molecule of air.

That gives; $A_a = 11,5A_s + 15,5A_f$

R_1 = radius for the fuel pipe.

R_2 = radius for the coal pipe.

R_3 = radius for the compressed air pipe.

$A_a = \pi R_3^2 - \pi R_2^2$

$A_s = \pi R_2^2 - \pi R_1^2$

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$$A_f = \pi R_1^2$$

In state (relation to) of AF stoichiometric I shall choose $R_3 = 11,5 + 15,5 = 27 \text{ mm}$

$$A_a = \pi \cdot 27^2 - \pi \cdot R_2^2 = 3,14 \cdot 27^2 - A_s = 2289 \text{ mm}^2 - A_s$$

Stoichiometric: $A_a = 11,5 A_s + 15,5 A_f$ där $A_s = A_f$

$$A_a = 27 \cdot A_f \text{ eller } A_a = 27 \cdot A_s$$

$$A_f = A_a/27 = 2289/27 = 84,78 \text{ mm}^2$$

$$\pi R_1^2 = 84,78 \text{ mm}^2$$

$$R_1^2 = 84,78/3,14 = 27 \text{ mm}^2$$

$$R_1 = 5,19 \text{ mm}$$

$$D_{1f} = 10,38 \text{ mm}$$

$$A_s = \pi R_2^2 - \pi R_1^2$$

$$84,79 = 3,14 \cdot R_2^2 - 3,14 \cdot 5,19^2$$

$$3,14 \cdot R_2^2 = 84,79 + 84,79$$

$$= 169,56$$

$$R_2^2 = 169,56/3,14 = 54 \text{ mm}^2$$

$$R_2 = 7,35 \text{ mm}$$

$$D_{2s} = 14,7 \text{ mm}$$

[0032] For a total combustion the boiler/kiln must be hermetical sealed and have the state/relation of:

$$p_1 \cdot V_t = p_0 \cdot V_u$$

V_t = the volume that streams out from the pipe in the kiln under a high pressure.

p_1 = the compressed air that will be chosen, for example 30 atm.

p_0 = atmospheric pressure, 1 atm.

V_u = the volume that is usable in the kiln.

[0033] The heating pan (furnace) shall be constructed after the form of the flame, see Annex 3. This, so that the water, that will be warmed up will be able to absorb the warmth faster and give a result of maximum warmth action.

[0034] This principle will for the first time, have a combustion, which is complete and under full control. Pollution will not exist and the humanity will live on a clean earth, i.e. without any contaminations.

[0035] All the installations that will use this new way of combustion (burn up) all kinds of fuel will be put together with a recycling system.

All vehicles will be put together with a recycling system.

RECYCLING:

See Annex 5.

[0036] Table of signs: 1) Exhaust pipe with H_2O (steam/vapour)+ CO_2 (gas)+ N_2 for a car that consumes 5 litres of gasoline, the outlet is 16 kg that will be compressed by a compressor.

2) Compressor with a capacity of 16 kg/h. 3) Intake valve for the compressor.

4) Exhaust/outlet valve for the compressor. 5) Pipe that furnishes the reservoir with $[\text{H}_2\text{O}(\text{vapour})+\text{CO}_2(\text{gas}) + \text{N}_2] = \text{H}_2\text{CO}_3 + \text{N}_2$ that will be compressed to 100 atm..

6) Coupling valves for reservoirs, 7) Reservoir for 25 kg H_2CO_3 . 8) Condenser to 2°C .

Example: Calculate the mass of carbon dioxide CO_2 , [and water H_2O ,] that is established when 60 litres of gasoline burns up. ρ = The density for engine gasoline is approximately $0,73 \text{ kg/dm}^3$.

[0037] One mass of gasoline is 0,73 kg. If that's so, 60 litres of gasoline has the mass of, $m(\text{C}_8\text{H}_{18}) = \rho \cdot$

$$\text{[0038]} \quad V = 0,73 \cdot 60 = 43,8 = 4,38 \cdot 10^4 \text{ g.}$$

Formula of reaction:



$$n \text{ 384 }^{(2)} \quad 3072 \text{ }^{(4)} \quad 3456 \quad \text{mol}$$

$$m \text{ 4,38} \cdot 10^4 \quad ? \quad ? \quad \text{g}$$

[0039] The relation between the masses of substance is:

$$n(\text{CO}_2)/n(\text{C}_8\text{H}_{18}) = 8/1 \quad n(\text{H}_2\text{O})/n(\text{C}_8\text{H}_{18}) = 9/1$$

Calculate the mass of substance CO_2 och H_2O :

$$n(\text{CO}_2) = 8 \cdot n(\text{C}_8\text{H}_{18}) = 8 \cdot 384 = 3072 \text{ mol}$$

$$n(\text{H}_2\text{O}) = 9 \cdot n(\text{C}_8\text{H}_{18}) = 9 \cdot 384 = 3456 \text{ mol}$$

Calculate the mass of carbon dioxide and water:

$$m(\text{CO}_2) = M(\text{CO}_2) \cdot n(\text{CO}_2) = 44 \text{ g/mol} \cdot 3072 \text{ mol} \sim 135 \text{ kg}^4 \quad \text{CO}_2 = 135 \text{ kg}$$

$$m(\text{H}_2\text{O}) = M(\text{H}_2\text{O}) \cdot n(\text{H}_2\text{O}) = 18 \text{ g/mol} \cdot 3456 \text{ mol} \sim 62 \text{ kg} \quad \text{H}_2\text{O} = 62 \text{ kg}$$

Out of 60 kg gasoline through the combustion you get CO_2 (135 kg) + H_2O (62 kg) this shall be compressed to 100 atm. inside a reservoir and becomes carbonic acid H_2CO_3 . For this there is a need of a compressor that will compress everything that is exhausted from the engine. The capacity of the compressor shall be in relation to the exhaust of the engine. To build a reservoir you can use the law of gas:

$$p \cdot V = n \cdot R \cdot T$$

$$V_b = \text{the volume of the reservoir} \quad V_b = n \cdot ((R \cdot T)/p) \quad \text{for } p = 100 \text{ atm.}$$

LABYRINTH

[0040] With this invention there will be irrigation on 250-500 ha ground, within agriculture, for all the cultivatable plants with leaves. The labyrinth is good even for irrigation of woods nursery, and can even be used for irrigation in greenhouses. The irrigation shall carry on daily, shorter than 20 minutes a day until the ground will be saturated, or maybe every two days. This is up to the agronomist to decide. The labyrinth made out of pipes, see Annex 6, with holes, see Annex 7, is built under the ground to a deep (profoundly) of 80 centimeters. Round the pipe there shall be a radius of 100 mm where there will be arranged a gravel circular round the pipe, for the hole not to be stuffed up with soil.

⁴ See Gymnasiekemi A, Stig Andersson, m.fl., Liber AB, 3 u, ISBN 978-91-47-01875-8, p.114.

[0041] The irrigation, with $\text{H}_2\text{CO}_3 + \text{N}_2$ is superb, CO_2 as nourishment for the leaves that liberate O_2 from CO_2 and N_2 as nourishment for the roots of the plant, which the irrigation make the vegetation to grow rapidly and also with intensity and gives an ecological product that all of the human kind needs. The labyrinth can also be used where the people cultivate forage for the cows. For release of O_2 from CO_2 , bacteria⁵ can be used. For an excellent action against the greenhouse effect the previously mentioned bacteria should also work into the atmosphere.

[0042] Table of signs for Annex 6: 1) Reservoir that will be filled up with $\text{H}_2\text{CO}_3 + \text{N}_2$ via valves (point 11) from recycle reservoirs. 2) Pump. 3) Tap. 4) Labyrinth made out of pipes with distance between 1,5 - 2 meters among the pipes and 1 meter towards the interior from the margin.

5) Return pipe to the reservoir. 6) Discharge pipe from reservoir with a tap on prior to the pump.

7) The distance 1 meter, from margin to the inside of the labyrinth, the labyrinth shall be constructed in a way that the area is as big as possible so that's profitable.

8) The distance 1,5 meters between the pipes in the labyrinth. 9) The labyrinth made out of pipes is buried in to the ground on a deep of 80 centimeters. 10) Round the pipe you must place gravel on a radius of 100 mm, to protect the holes of the pipe from not being blocked with soil. 11) The valve for filling the reservoir with $\text{H}_2\text{CO}_3 + \text{N}_2$ from the recycle reservoirs. 12) Tap on the discharge pipe.

Table of signs for Annex 7: 1) Pipe made of PVC. 2) The holes with $\Phi = 2 - 5 \text{ mm}$. 3) Radius for the pipe is $R \geq 100 \text{ mm}$.

4) Distance between the holes on the pipe is $1 \geq 50 \text{ mm}$ and the angle between three holes on the same circumference will be 90° and the bottom of the pipe will not have any holes and shall be placed towards the deep of the soil/ground.

[0043] The reservoir for $\text{H}_2\text{CO}_3 + \text{N}_2$ will be constructed, in condition to how many litres soil that daily is used up to become saturated, and how much the plants consume CO_2 to produce O_2 .

REACTOR, R1, R2, R3 and INJECTOR AF

[0044] REACTOR R1 is for vapour to a turbine, R2 for thermal power station and R3 as small as a boiler, with inside new combustion process between 5 to 250 atm, and without any pollution.

[0045] These reactors will be used in a closed circuit to produce vapour and the water will be warmed up directly in contact with flames from the new combustion process. In this situation water take up all heating value from the fuels.

⁵ See Gymnasiekemi A, Stig Andersson, m.fl., Liber AB, 3 u, ISBN 978-91-47-01875-8.

[0046] The combustion in reactor R1 shall be made up of 16 INJECTOR model AF., placed in two rows or more. This injector is seen in Annex 8. This INJECTOR model AF, will use 250 atm., compressed air, for combustion inside the REACTOR R1. Through this new combustion process $\text{H}_2\text{CO}_3 + \text{N}_2$ is obtain, which will be part of vapour in circuit. $\text{H}_2\text{CO}_3 + \text{N}_2$ and will be recycled with a reservoir for 25 litres.

[0047] Table of signs for Annex 8: 1) The fuel pipe will be adopted in state to the fuel model from table² from new combustion process, 2) Tap on fuel pipe, 3) Solenoid on tap for fuel, 4) The air pipe with pressure on 250 atm. will be adopted in state to the fuel model from Table² in new combustion process, 5) Tap on air pipe, 6) Solenoid on tap for air. 7) Nozzle 8) The out angle for nozzle is 90° , 9) Holder

INJECTOR AF

[0048] A= air with high pressure between 5 to 250 atm.,

[0049] F= fuel liquid or gas.

[0050] This Injector with high air pressure take in so many of fuel for an total combustion with the new combustion process.

[0051] The reactor R1 shall produce vapour for the turbine with a pressure of up to 200 atm or more, which will start the turbine. The water that is used for vapour will be injected into the reactor with a pressure of 250 atm. through a system formed like a shower, which sprays water over the flames which is in two rows or more. The water in direct contact with the heat of the flames will rapidly take up all heating value and transform into vapour. The size of the reactor is chosen in state to the quantity of vapour (or water) that is needed for starting up the turbine. An example for a reactor with 2 m in diameter is that 4 m³ will be used for flame space and the rest is for a volume for stockroom of vapours and spiral pipe..In the stockroom shall be assembled a spiral of the pipes which will be warming up usually water for apartments The vapour shall be stored up to 200 atm. before it is used inside the turbine together with H₂CO₃ + N₂ which is obtained from the new combustion process. The reactor R1 for vapour (or warmth water) has a valve, on the pipe for the turbine, the valve unlocks at 200 atm.. This reactor R1 can also use injector AFS with coal that will have a shower that will be assembled under the flames. Example; for warming up 120 litre water to 100° degrees Celsius you need 1 litre of combustible oil.

Reactor R1: see in Annex 9.

[0052] Table of signs for Annex 9: 1) Reactor R1 for inside combustion in a closed circuit, has a radius of 1,5 m. 2) Injector AF for 250 atm compress air use 8 pieces on first row.3) Injector AF for 250 atm. compress air use 8 pieces on second row 5) Valve which unlocks at 200 atm.. 6) Tap on pipe for turbine.7) the pipe for turbine which is calculated with turbine necessity 8) Turbine.9) Return pipe10) Valve to reservoir for H₂CO₃ + N₂ 11) Reservoir for 25 litres.12) Tap on return pipe on water pipe.13) Shower.14) Compressor for 250 atm. 15) Pipe for water.16) Tap on water pipe.17) Stockroom 14 m³18) Pipe for water in.19) Pipe for water to apartments.20) Pump for water.21) Pipe spiral.

[0053] The reactor R1 shall be hermetically isolated for a maximum efficiency and shall have a warning system for the maximum temperature of 110°C and for the pressure a maximum of 200 atm..

[0054] The thermal power station reactor R2 shall use12 injector AF with compressed air of 50 atm. this work on two rows or more. For the warming up of the water that shall be injected into the reactor over the flames, there shall be a temperature of up till or more than 100°C with a pressure of 30 atm., but it may be lowered in a place to live or else it can be dangerous. The reactor shall be used in a closed circuit and H₂CO₃ + N₂ that were obtained through the new combustion process shall be recycled from the circuit. With this reactor the price for warmth shall be 80 % less than the actual price of today, because there is so little fuel that shall be used for heating up the water. Example from the total space in the reactor the flame shall have a 3 m³ space, and the remaining 8 m³ space shall be stock for water and for spiral pipe. This reactor has zero exhaust of pollution. The reactor R2 is used to warming up water.

[0055] This reactor R2 will be isolated thermally for maximum efficiency and assemble a warning system for temperature and pressure.

[0056] Reactor R2 will be seen in Annex 10.

[0057] Table of signs for Annex 10: 1) Reactor R2 has a radius of 2 m example. 2) Injector AF for compressed air to 30 atm. uses 6 pieces on first row. 3) Injector AF for compressed air to 30 atm, use 6 pieces on second row 4) Distance L=1 m between row 1 and row 2, 5) Valve opened at 10 atm.6) Tap on pipe for place to live.7) Pipe to apartments.8) Apartments 9) Return pipe.10) Valve to recycling reservoir. 11) Reservoir for 25 litres.12) Tap on return pipe.13) Shower. 14) Compressor for 30 atm.15) Pipe for water.16) Tap on water pipe.17) Stockroom 8 m³ example18) Pipe for water in19) Pipe for water to apartments.20) Pump for water.21) Pipe spiral for warming up usually water apartments.

[0058] Example: 1 litre combustible oil can warm up 120 litre water to100°C in contact direct with flame. In the stockroom shall be assembled a spiral of pipes for warming usually water for apartments.

[0059] If you in reactor R2 with new combustion process consume 720 litres of combustible oil in 24 hours can warm up 86400 litre water at 100°C plus 2400 litres H₂CO₃+N₂ obtain from the combustible, there shall be a total of 88800 litres. For warming up 3100 apartments with only 1300\$ USA, the price will be 1300/3100= 0,40 \$ only for an apartment, so cheap will it be, and it is equitably.

[0060] Reactor R3 is as big as a boiler and used for a private house. The reactor will use injector AF and a pressure of air at 10 atm.. This reactor R3 shall warm up water to 100°C for the private house to be heated.. Water injected in through a shower directly on the flame

[0061] This reactor will consume two litre of combustible oil during 24 hours and will heat up 240 litres of water for a private house. , In the stockroom shall be assembled a spiral of pipes for warming up usually water for private houses.

[0062] All these reactors doesn't pollute because they work in a closed circuit. A very good building, does that it can

reach high water pressure or high vapour pressure.

[0063] Table of signs for Annex 11: 1) Reactor R3 with radius $R = 0,35$ m and

[0064] $L = 1,4$ m and will have a cylinders form. 2) Injector AF with compressed air at 10 atm. with two pieces. 3) Valve open at 5 atm.. 4) Tap on pipe to the private house. 5) Pipe to the private house radiator. 6) The private house.

7) Return pipe. 8) Valve for recycle reservoir.

9) Recycle reservoir. 10) Tap on water pipe. 11) Shower. 12) Compressor for 10 atm..

13) Pipe for water. 14 Stockroom, 15) Pipe for water, 16 Pipe for water to apartments 17) Pump for water, 18) Pipe spiral for warming up water to the private houses.

[0065] The $H_2CO_3 + N_2$ which is obtained from the new combustion process will be used for irrigation in the backyard with a labyrinth.

[0066] These reactors stop for ever the exhaust of pollution in the atmosphere, through burning of all kinds of combustible. The greenhouse effect is stopped for ever,

[0067] Reactor R1 in spiral pipe will be obtain $250^\circ - 1000^\circ$ degrees or more, if the new combustion process is regulate so, for warming will be used vapor and $H_2CO_3 + N_2$ obtaining from new combustion process it work in close circle, example spiral pipe warming up crude oil for refme up it.

[0068] These reactors with spiral pipe which shall not be in contact with the flames shall obtain a high temperature over 1000° degrees Celsius for the different utility.

The flood for water, fuel, gas or air in a pipe is F or Q.

$$F = (P_1 - P_2) \cdot \pi r^4 / 8L\eta$$

F= flood in a pipe

P1= pressure of water, or air in reactor R1 is 250 atm.

P2= atmosphere pressure 1 atm. at the beginning

r= The pipe radius,⁶

L= the pipe length

η = viscosity

⁶ See in New combustion process chapter the Table.

New combustion process with full control over all of the purified fuels that are submitted to high ("jetair") compressed air between (5 to 200 or more) atm., with H_2O , CO_2 and N_2 as recyclable outlets.

Technical field/Field of the Invention

[0069] This invention shall be used by all kinds of combustion contrivance forms which can burn up all kinds of pure fuels, including synthetic, in gas, fluid, solid form. This invention shall apply to a total combustion under complete control of the combustion without any pollution, i.e. the outlet shall be H_2O , CO_2 and N_2 that are recyclable. The *invention* refers to how this (the fuels) shall be burned up with an INJECTOR with high compressed air and the air sucks in fuel which becomes homogeneously mixed with the air to give a total combustion. Another field where this invention shall be used is for all different types of engines that are manufactured on earth. The new engines shall take use of an INJECTOR with high compressed air that sucks in gas form or fuel fluid, ethanol, methanol, petrol, jet-fuel, diesel fuel, etc., that shall be ejected into the engine cylinder for combustion and the outlet shall be H_2O , CO_2 and N_2 which can be recycled, please have a look at Annex 5.

[0070] With the use of the outlets from the new combustion process you can use a labyrinth for irrigation with $H_2CO_3 + N_2$. The labyrinth will be used within agriculture for irrigation of plants with $H_2CO_3 + N_2$ which are recycled according to the new combustion process.

[0071] Reactor R1, R2 and R3; Reactor R1 will be used to obtain vapors for turbine, Reactor R2 used for thermal power station for warmth water and reactor R3 it is used for warm up private houses. These Reactors shall use an injector AF at 5 to 250 atm.

The technical point of view/Background of the Invention

[0072] All kinds of fuels have until today been burned up without control, that have led to the uncontrolled pollution of the atmosphere and that have been put in a cancer. All the engines of today, which uses different types of fuel under diverse forms, burns up the fuel uncontrolled with tons of outlets of contamination in the atmosphere. The combustion is not controlled, therefore the outlets of contamination is enormous. Since the engines have been invented there has that is to say never been a controlled combustion.

[0073] This can be referred to the *Thermochemistry* principle that shows that the engines are regulated for $\Phi > 1$ and then the outlet becomes among other things CO. All of the combustion facilities and old engines are in need for scrap and new facilities and engines need to be manufactured. In the current time all the engines that rolls in Sweden lets out

more than (18,9 millions of metric ton of CO₂) but with the new combustion principle the outlet shall halve and with the recycling process the outlet shall be zero.

[0074] It will be zero exhaust of pollution if you use H₂CO₃ + N₂ that are obtained from the new combustion process. Every dioxide and N₂ that is recycled from the new combustion process shall be used as a fertilizer or nourishment to all sorts of plants with leaves and roots that shall take up N₂ and the leaves will liberate O₂ from CO₂. These reactors R1, R2 and R3 will work for obtaining warmth water and vapors in a closed circuit without polluting.

Technical problem to be solved/The problem to be solved

[0075] With this invention the outlets of contamination in the atmosphere will be eliminated for good and give rise to a new world without any contaminations. The invention will result in that the engines' efficiency will improve, the consumption of the fuel will halve, and the cost for the heating will be 50 % less.

[0076] With the labyrinth for irrigation with H₂CO₃ + N₂ obtained from the new combustion process, the H₂CO₃ + N₂ will be further transformed to fertilize plants that leave oxygen. You can use bacteria that also liberate O₂ from CO₂. Reactor R1, R2 and R3 which work in closed circuit are without greenhouse exhaust. Thus this combustion process works inside the reactor.

Figure register

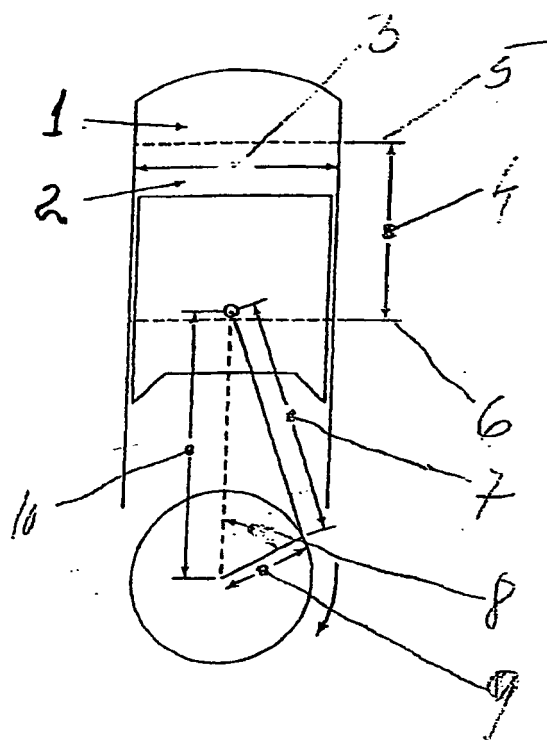
- [0077] Figure in Annex 1, displays cylinder geometry with piston.
- [0078] Figure in Annex 2, displays an air compressor connected with an injector.
- [0079] Figure in Annex 3, displays an injector for mixture of air, fuel and coal.
- [0080] Figure in Annex 4, displays the injector nozzle.
- [0081] Figure in Annex 5, displays the recycle of the outlets H₂O, CO₂ and N₂.
- [0082] Figure in Annex 6, displays the labyrinth for irrigation with H₂CO₃ + N₂ of plants with leaves.
- [0083] Figure in Annex 7, displays a pipe with holes made by PVC (a kind of plastic).
- [0084] Figure in Annex 8, displays an injector model AF.
- [0085] Figure in Annex 9, displays a reactor R1 for vapor for a turbine.
- [0086] Figure in Annex 10, displays a reactor R2 for warmth water for a thermal power station.
- [0087] Figure in Annex 11, displays a reactor R3 for warmth water for private houses.

Claims

1. New combustion process with full control over all of the purified fuels that are submitted to high ("jetluft") compressed air between (5 to 200 or more) atm., with H₂O, CO₂ and N₂ as recyclable outlets;
2. Compressor with Injector AF, G,
3. Injector AFS,
4. Recycling,
5. Labyrinth for irrigation with H₂CO₃ + N₂,
6. Combustion reactor R1 is for vapour to a turbine,
7. Combustion reactor R2 for thermal power station,
8. Combustion reactor R3 as small as a boiler,
9. Injector AF.

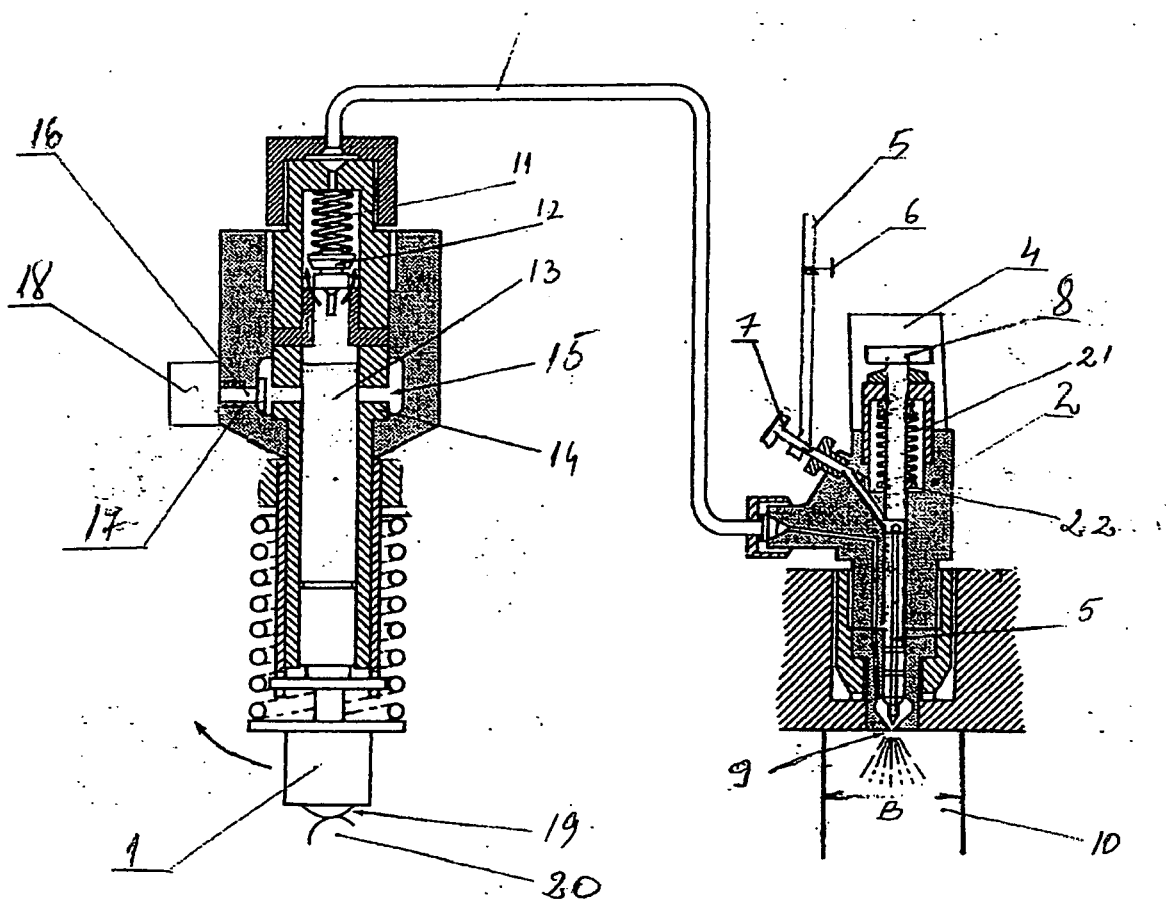
BILAGA 1

ANNEX 1

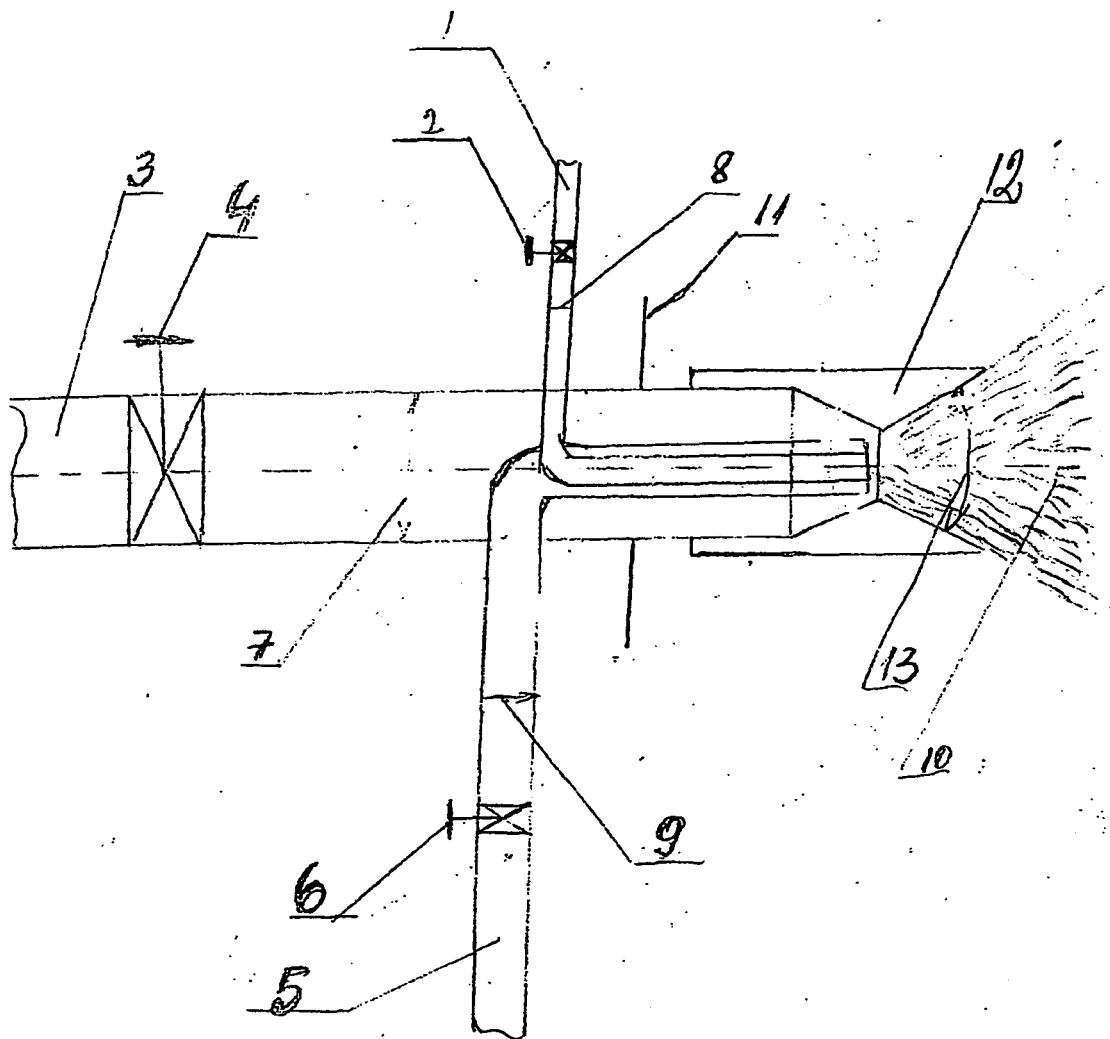


BILAGA 2
ANHEK 2

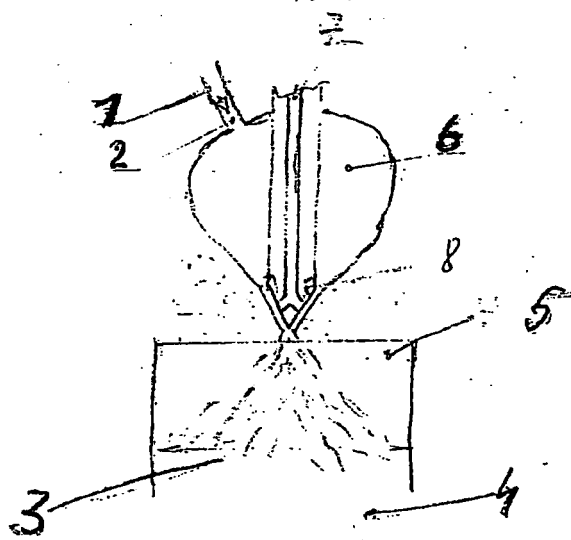
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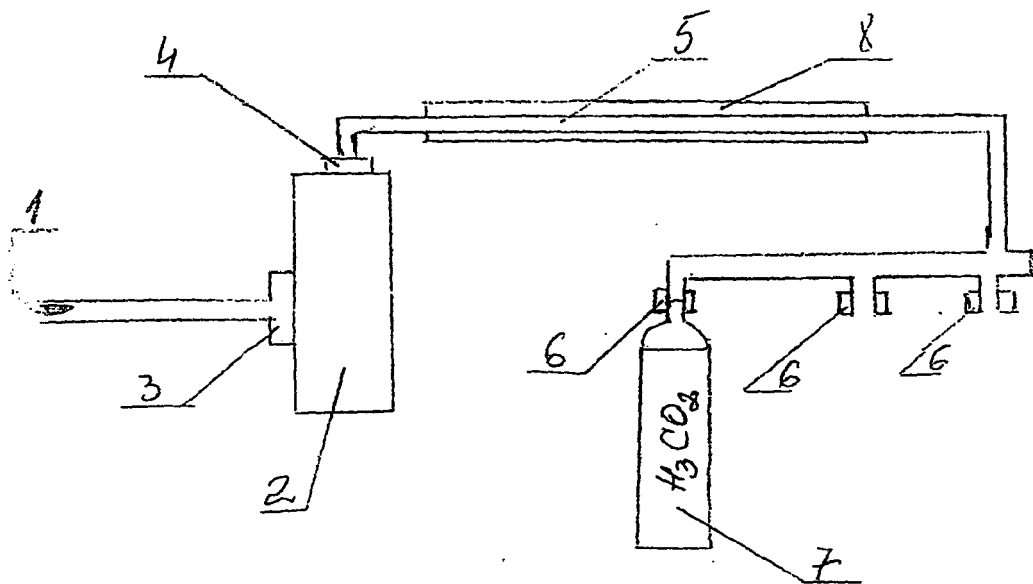
BILAGA 3
ANNEX 3.



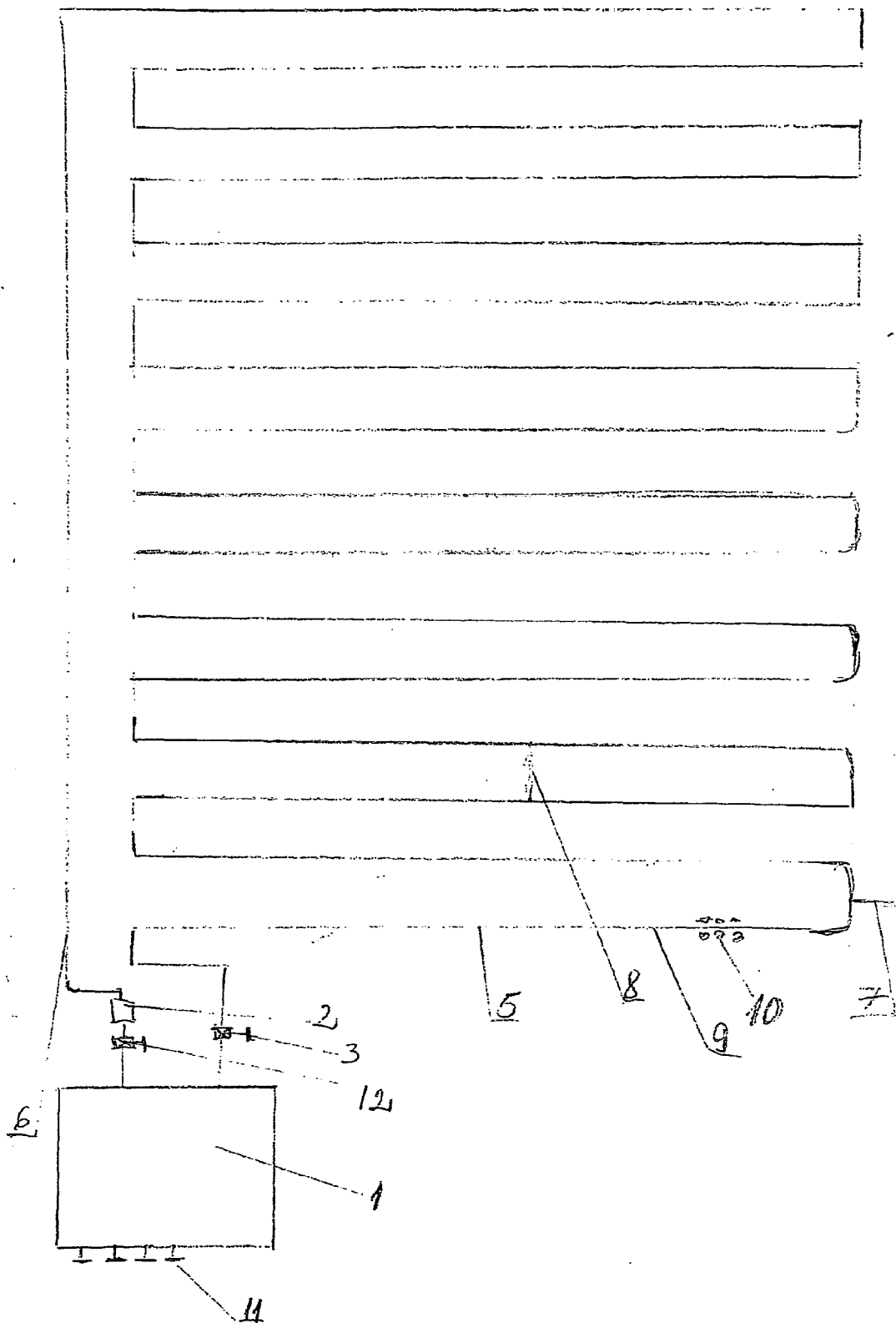
BILAGA 4
ANNEX 4



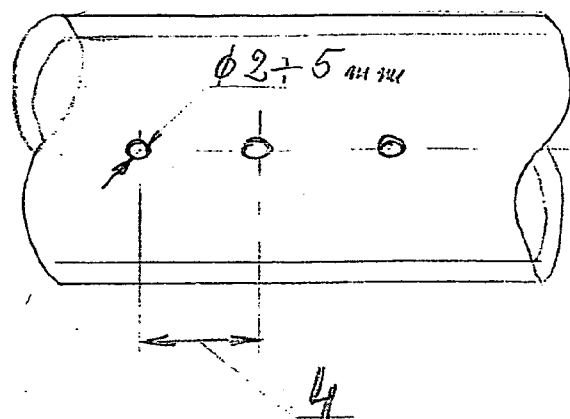
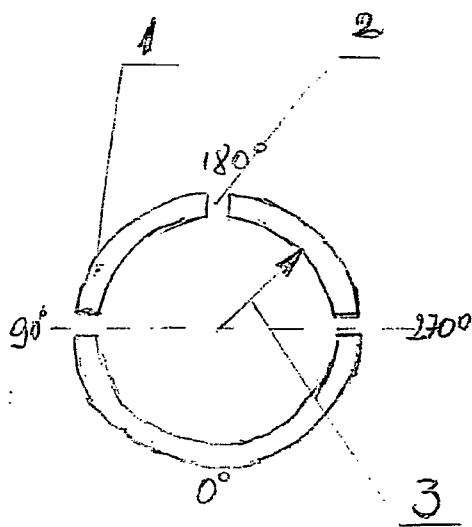
BILAG 5
ANNEX 5



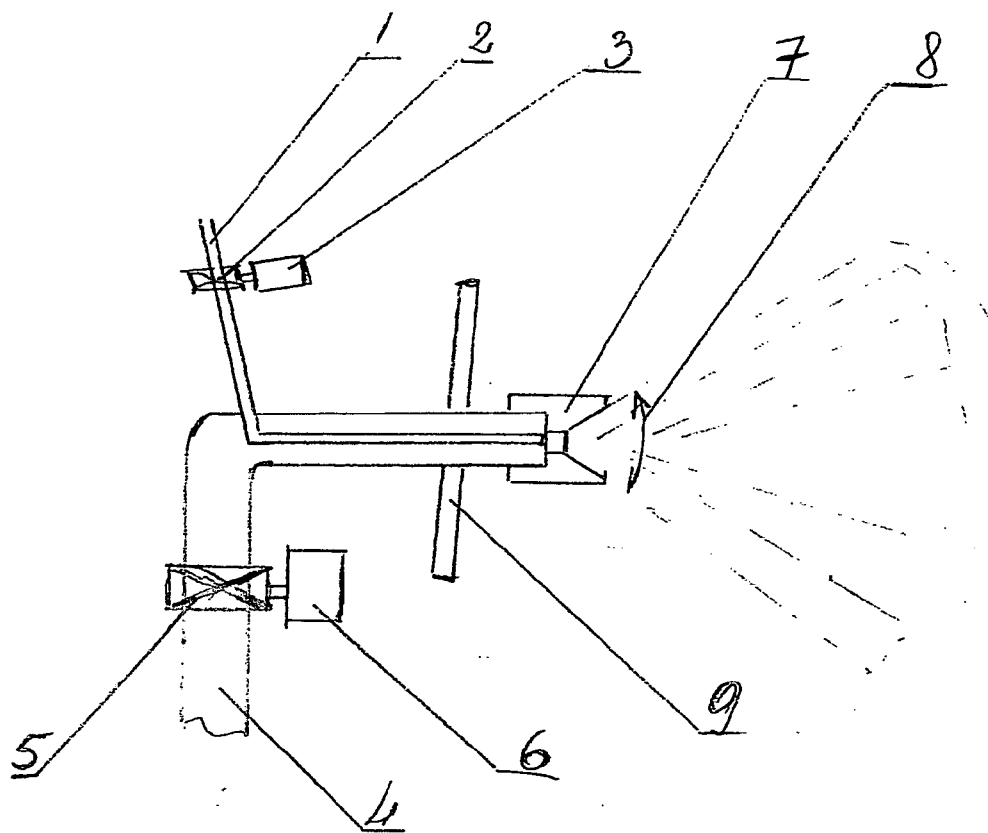
BILAG 6-
ANNEX 6



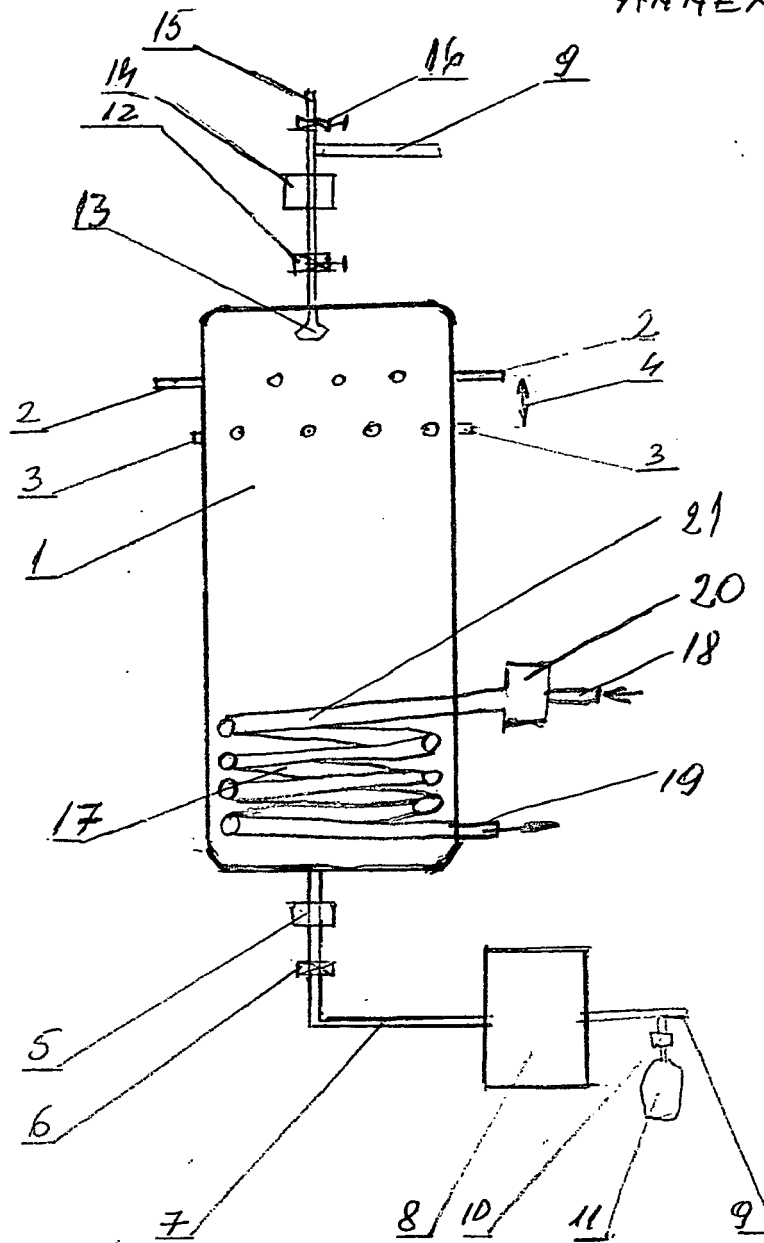
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ANNEX 7



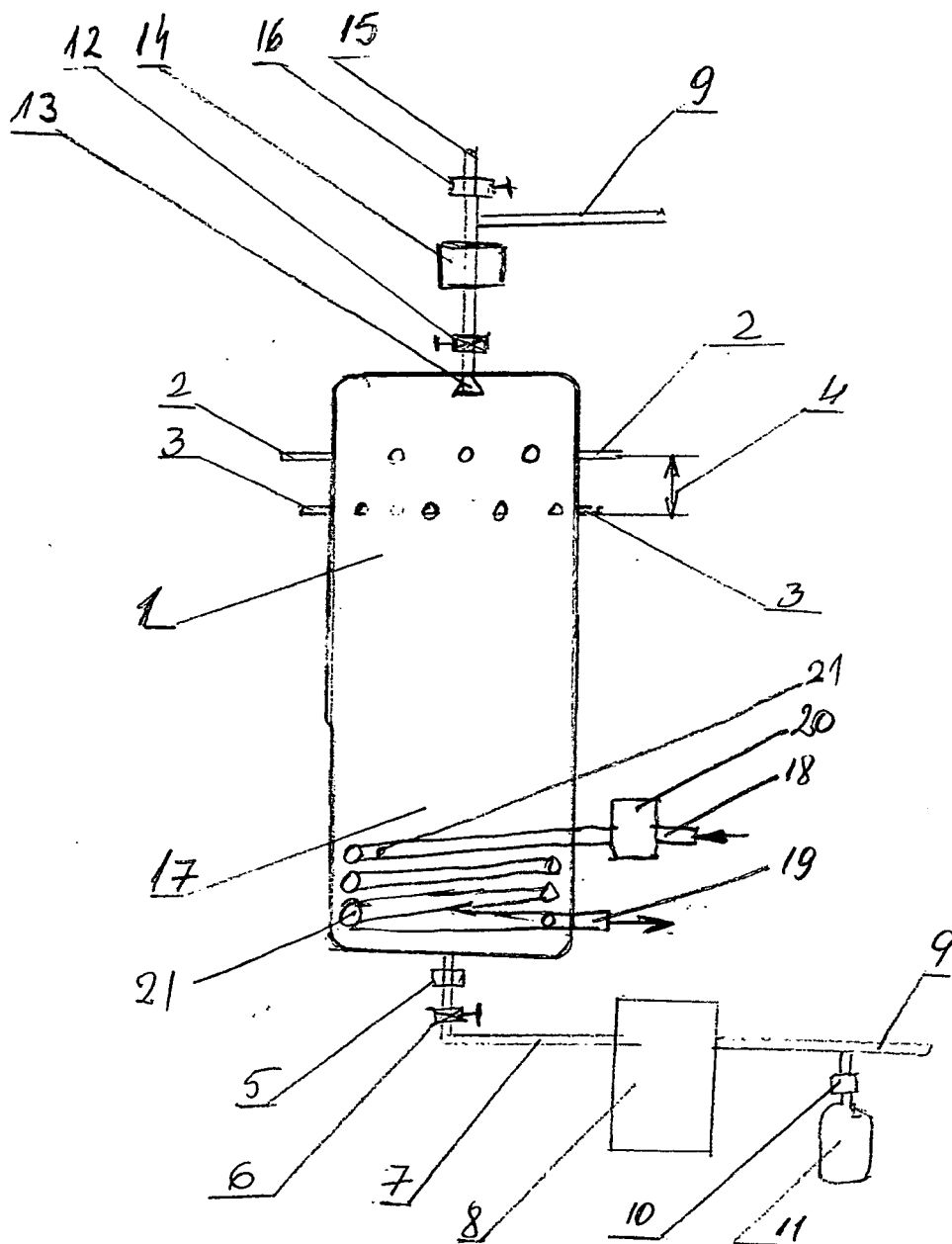
BILAGA 8
ANNEX 8



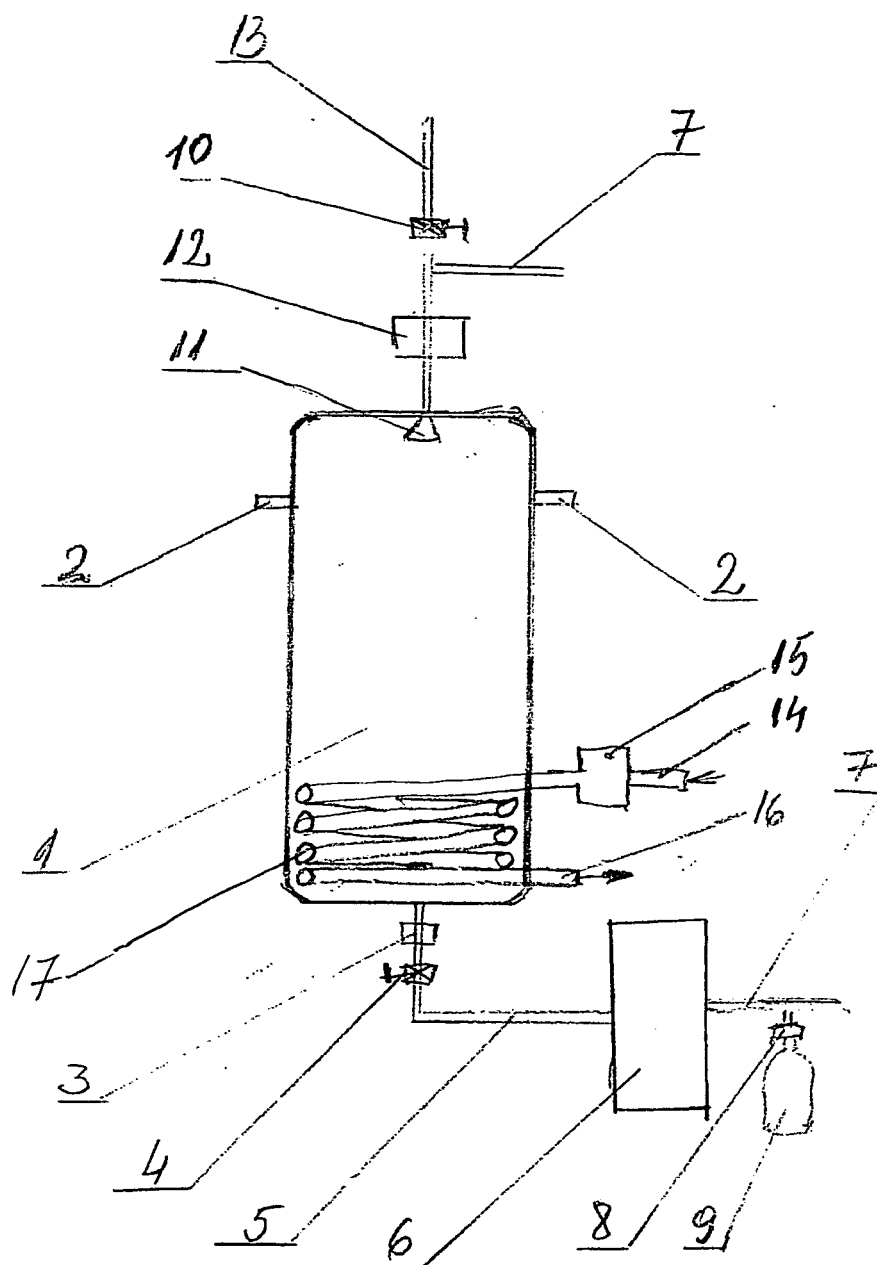
BILAGA 9
ANNEX 9



BILAGA 10
ANEXEX 10



BILAG 11
ANNEX 11





EUROPEAN SEARCH REPORT

Application Number
EP 08 01 5134

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The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 5 December 2008	Examiner Mougey, Maurice
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			

 3
EPO FORM 1503 03.82 (P04C01)



EUROPEAN SEARCH REPORT

 Application Number
 EP 08 01 5134

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3 The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 5 December 2008	Examiner Mougey, Maurice
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			

EPO FORM 1503 03.82 (P04C01)



Application Number

EP 08 01 5134

CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing claims for which payment was due.

☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due and for those claims for which claims fees have been paid, namely claim(s):

☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

☐ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.

☐ As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.

☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:

☒ None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:

see enclosure

☐ The present supplementary European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims (Rule 164 (1) EPC).



**LACK OF UNITY OF INVENTION
SHEET B**

Application Number

EP 08 01 5134

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. claims: 1-3,6-9

combustion process and equipment related to the use of high pressure air.

2. claim: 4

separation and recycling process for exhaust gas

3. claim: 5

Irrigation system

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 08 01 5134

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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05-12-2008

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

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Non-patent literature cited in the description

- **Willard W. Pulkrabek.** Engineering Fundamentals of the Internal Combustion Engine. 2004, 444 **[0012]**
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