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GB 599446
GB 349535
GB 294558
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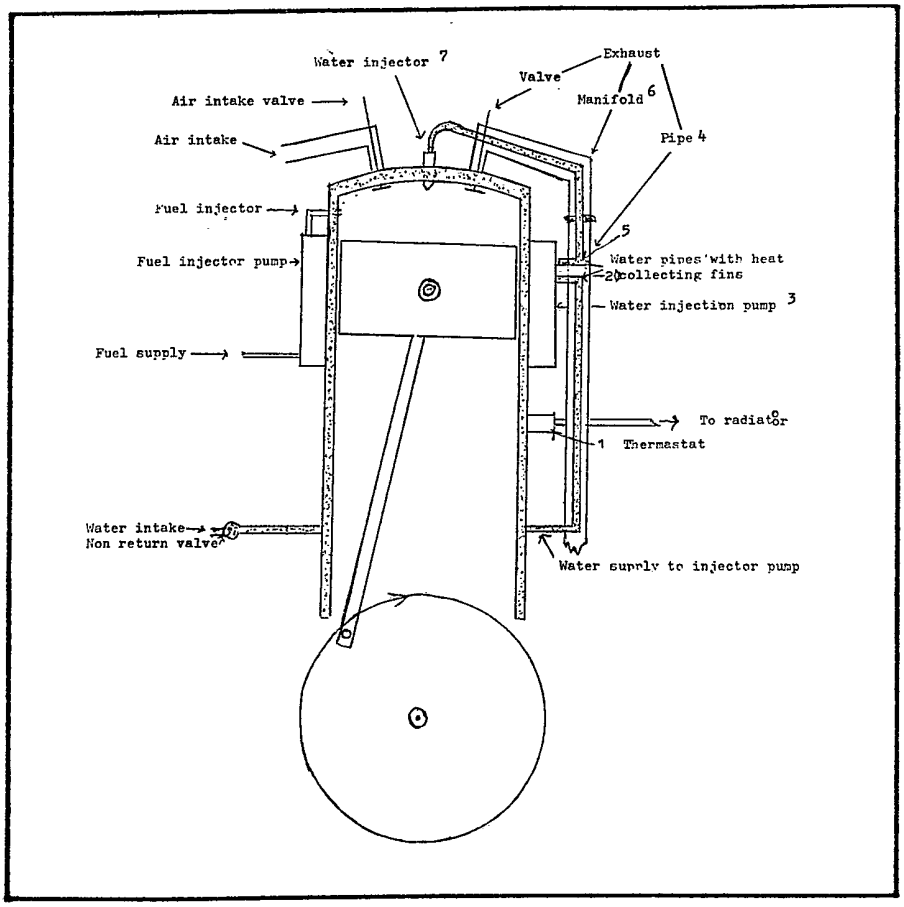
F1B
(71) Applicant
William Henry Goodridge,
234 Columbia Rd.,
Bournemouth
(72) Inventor
William Henry Goodridge

(54) Internal Combustion Engine with Hot Water Injection

(57) The waste heat in the cooling water and hot exhaust gases are used to produce water at a high temperature and pressure which is injected into the engine cylinder during the power stroke where it turns to steam thus giving extra thrust to the power stroke.



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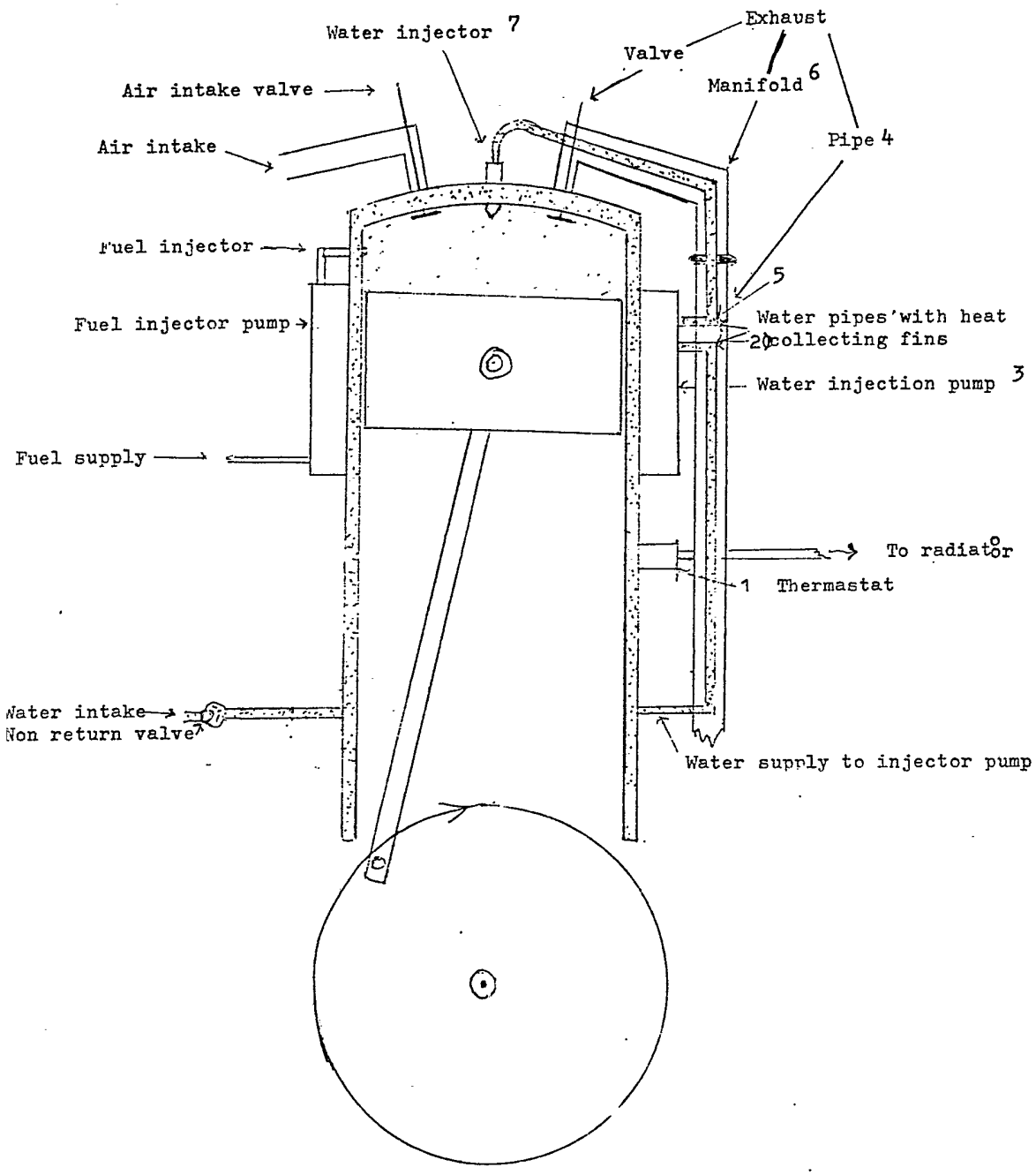
Water injector 7
Exhaust
Valve
Manifold 6
Air intake valve
Air intake
Pipe 4
Fuel injector
5
Fuel injector pump
Water pipes with heat
20 collecting fins
Water injection pump 3
Fuel supply
To radiator
1 Thermastat
Water intake
Non return valve
Water supply to injector pump

SPECIFICATION

The Goodridge Diesel/water Injection Engine

Reed's Practical Mathematics Series Volume 3 Heat & Heat Engines for Engineers

States that of the total heat supplied in fuel to an I.C. diesel engine 40% is converted to power the rest is lost in the cooling water and the heat remaining in the exhaust gasses, the principle of this system is to recycle this lost heat to increase the power output of the engine without encreased fuel consumption.

This is achieved by removing the fan and waterpump which are no longer required, the thermastat (1) is set to open at a temperature as high as possible within safety limits, this hot water is drawn off from the water jacket through finned pipe (2) by the injecter pump (3) this pipe passes through exhaust pipe (4) where it collects more heat, on leaving the pump it passes through another finned pipe (5) through the exhaust manifold (6) to the injector (7) at this stage the water is under a pressure of approx: 1200 lbs sq in being a multi-cylinder engine when a cylinder is about to start its power stroke the adjacent cylinder is just finishing its exhaust stroke the red hot gasses from this pass other the injector pipe (5) bringing the temperature up to approx: 250C, being under a pressure of 1200 lbs sq in it remains saturated water (as stated in Calenders steam tables) when injection takes place 20 degrees after fuel injection the temperation in the cylinder has rissen to around 1600 degrees C at a pressure of about 600 lbs sq in this drop in pressure allows the water to turn to steam instantaneously an increase in volume of 1672 to 1 giving a very substantial boost to the power stroke when its pressure would be normably falling rapidly.

Water drawn off from the water jacket is replaced from a water tank through a non-return valve.

The energy normally used to drive the fan and waterpump is an added bonus.

An engine specially designed for this system could be of the opposed piston type or dual cylinder construction to take full advantage of this power by using a longer power stroke.

In very hot countries by using Parabolic mirrors to concentrate the suns heat at very high temperatures on the critical parts i.e. on all water pipes leading to and including the water injector it would be possible to gradually reduce the fuel supply and finally cut off the fuel completely and run on solar heat only.

Claims

1. A system for transfering the energy contained in waste heat from an internal combustion engine, converting it to kinetic energy in the form of high temperature vapour at high pressure to retain it in its saturated condition then inject it back into the engines cylinder during the power stroke and so become unsaturated and release its energy in the form of steam, increasing in volume at a ratio 1672 to 1.

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