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INVALIDATION SEARCH

Title: "MULTI-FUEL ENGINE CONVERSION SYSTEM"

Submitted to:

Address:

Email:

Client Reference No:

Patent Number: [US7019626](#)

Priority Date: **3 Mar 2005** Date:

08th JUNE, 2016.

Feature to Search

E1. A multi-fuel conversion kit comprising, an injector structured to introduce a first fuel into an engine that also combusts a second fuel.

E2. A controller structured to control the injector and the indicator communicating with the controller.

E3. The indicator indicating a current amount of injected first fuel to an engine operator so that the engine operator can adjust the amount of injected first fuel.

Search Strategy

Database: AcclaimIP, USPTO, Patentscope, Espacenet, Google Patents, Inpass.

Keywords:

Set 1	Multi-fuel, Bi-fuel, two-fuel, dual-fuel
Set 2	Injector, injection

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Set 3	Combustion engine, internal combustion
Set 4	Controller, controlled
Set 5	Communication, conveying, sending, receiving

US CLASSIFICATIONS

123/575 Diverse fuel supply:

123/299 Using multiple injectors or injections:

INTERNATIONAL CLASSIFICATIONS

F02B75/12 Other methods of operation

F02D19/06 Peculiar to engines working with pluralities of fuels

F02D19/10 Peculiar to compression-ignition engines in which the main fuel is gaseous

Search Results Reference

1:

Patent/Publication Number: [US6457463](#)

Title: Multi-fuel direct injection engine

Assignee/Applicant: Bombardier Motor Corporation

Filing Date: 28 Nov 2000

Priority Date: 28 Nov 2000

Also Published as: NONE

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Relevant Excerpt E1	<p><u>IN CLAIMS:</u></p> <p>14. The power source as recited in claim 13, wherein the injection system is disposed to inject the fuel directly into the combustion chamber.</p>
	<p>27. A fuel injected engine, comprising:</p> <p>means for injecting a plurality of fuel types into a cylinder of an internal combustion engine; means for storing a plurality of fuel maps corresponding to the plurality of fuel types.</p>
Relevant Excerpt E2	<p><u>IN CLAIMS:</u></p> <p>1. An engine system, comprising: an internal combustion engine having a combustion chamber; an injector deployed in communication with the combustion chamber to discharge a fuel into the combustion chamber; and an electronic control unit in communication with the injector, the electronic control unit having available a plurality of fuel maps corresponding to a plurality of fuel types, wherein the desired fuel map is selected to match the fuel type injected.</p>

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Relevant Excerpt E3	<u>IN CLAIMS:</u> 28. A method for utilizing a plurality of fuel types in an internal combustion engine, comprising: injecting one of a plurality of fuel types into a cylinder of an internal combustion engine; storing a plurality of fuel maps corresponding to the plurality of fuel types; and controlling the injection of a fuel into the cylinder according to a corresponding fuel map.
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Reference 2:

Patent/Publication Number: [US6035837](#)

Title: Bi-fuel liquid injection system for an internal combustion engine

Assignee/Applicant: Siemens Automotive Corporation

Filing Date: 4 Dec 1998

Priority Date: 6 Nov 1998

Also Published as: WO2000026521A1, WO2000026521A9

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Relevant Excerpt E1	<p><u>IN CLAIMS:</u></p> <p>1. A bi-fuel, variable vapor pressure injection system for an internal combustion engine, comprising:</p> <p>a source of first liquid fuel; a source of second liquid fuel; at least one variable vapor pressure fuel injector; a common fuel rail for supplying one of said first and second fuels to said at least one fuel injector; a first valve structure in selective communication with each of said sources of said first and second fuels and in communication with an inlet of said fuel rail to selectively control supply of one of said first and second fuels to said fuel</p>
	<p>rail.....said first and second valve structures being selectively controllable (1) to permit residual first fuel to be purged from said fuel rail into said source of second fuel when supplying said second fuel to said fuel rail, and (2) to permit residual second fuel to be purged from said fuel rail into said vapor purge system when supplying said first fuel to said fuel rail.</p>

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Relevant Excerpt E2	<p><u>IN CLAIMS:</u></p> <p>21. A method of selectively supplying first and second hydrocarbon fuels from respective sources to an internal combustion engine, comprising:</p> <p>providing a common fuel rail to supply at least one variable vapor pressure fuel injector with one of the first and second fuels; providing a first valve structure in selective communication with each of the sources of fuel and in communication with an inlet of said fuel rail.</p>
Relevant Excerpt E3	<p><u>IN CLAIMS:</u></p> <p>20. A bi-fuel, variable vapor pressure injection system for an internal combustion engine, comprising:</p> <p>a source of first liquid fuel; a source of second liquid fuel; at least one variable vapor pressure fuel injector; a common fuel rail for supplying one of said first and second fuels to said at least one fuel injector.</p>

Reference 3:

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Patent/Publication Number: [US4700672](#)

Title: Two-fuel injector apparatus for an internal combustion engine

Assignee/Applicant: S.E.M.T., S.A.

Filing Date: 11 Mar 1987

Priority Date: 14 Mar 1986

Also Published as: DE3765661D1, EP0237071A1, EP0237071B1

Relevant Excerpt E1

IN CLAIMS:

1. An injector apparatus for an internal combustion engine, the apparatus being capable of injecting two fuels, namely a "pilot injection" liquid fuel and a "main injection" liquid or gaseous fuel, the injector apparatus comprising a low-pressure pump for pilot injection fuel feed, a high-pressure injection-type pump, two fuel injectors.

Relevant Excerpt E2

IN CLAIMS:

4. An injector apparatus for an internal combustion engine, the apparatus being capable of injecting two fuels, namely a "pilot injection" liquid fuel and a "main injection" gaseous fuel, the injector apparatus comprising a low-pressure pump for pilot injection fuel feed, a high-pressure injection-type pump, two fuel injectors, and a metering pump selectively connecting the low-pressure pump.....and the metering pump including two orifices and a duct putting the two volumes controlled by the piston into communication with each other.

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Relevant Excerpt E3	<u>IN CLAIMS:</u> 3. An injector apparatus according to claim 1 or claim 2, wherein the main injection fuel is a liquid fuel, and wherein the active sections subjected to the control pressure for raising the pilot injection needle and the main injection needle are identical , with both needles being pressed against their seats by a common rating element.
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