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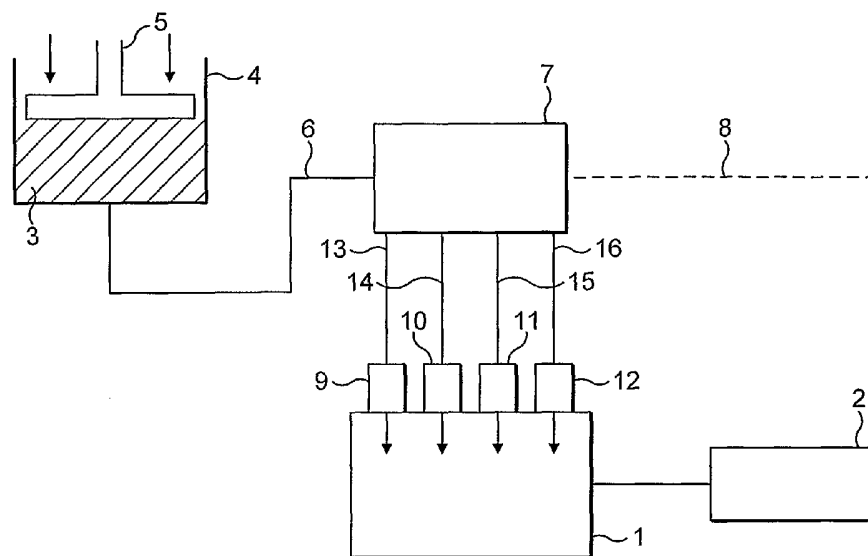
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[Continued on next page]

(54) **Title:** GAS ENGINE



(57) **Abstract:** A compression ignition internal combustion engine (1) which operates using a methane based fuel and an ignition initiator. The fuel and method of operating the engine (1) can be employed in a range of applications such as, for example, road or marine vehicles or in static applications such as electrical generators.

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# INTERNATIONAL SEARCH REPORT

Int'l application No  
PCT/GB2005/001721

A. CLASSIFICATION OF SUBJECT MATTER  
F02M21/02 F02B43/00

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)  
F02D F02M

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 practical, search terms used)

EPO-Internal, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 315 973 A (HILL ET AL) 31 May 1994 (1994-05-31) column 9, line 19 - column 11, line 52; figures 1-10	1-7,9,23
X	----- EP 1 211 407 A (TOYOTA JIDOSHA KABUSHIKI KAISHA) 5 June 2002 (2002-06-05) paragraph [0009] - paragraph [0034]; figures 1,6 paragraph [0059] - paragraph [0062]	1-8,10
X	----- EP 1 243 776 A (ETRA S.P.A. ECOLOGIC TRANSPORTATION SYSTEMS) 25 September 2002 (2002-09-25) paragraph [0046] - paragraph [0067]; figure 1	1,5
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Further documents are listed in the continuation of Box C.

See patent family annex.

\* Special categories of cited documents :

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"E" earlier document but published on or after the international filing date

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"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

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Date of mailing of the international search report

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**INTERNATIONAL SEARCH REPORT**

International application No  
PCT/GB2005/001721

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	<p>WO 02/101213 A (GREEN, JASON, E) 19 December 2002 (2002-12-19) page 8, line 9 - page 12, line 12; figures 1,2</p> <p style="text-align: center;">-----</p>	1
A	<p>EP 0 801 223 A (CENTRO RICERCHE FIAT SOCIETA CONSORTILE PER AZIONI) 15 October 1997 (1997-10-15) column 6, line 6 - column 7, line 9; figures 6,7</p> <p style="text-align: center;">-----</p>	1

# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/GB2005/001721

## Box II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1.  Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
  
2.  Claims Nos.:  
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
  
3.  Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

## Box III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1.  As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2.  As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3.  As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4.  No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:  
  
1-10, 23

Remark on Protest

- The additional search fees were accompanied by the applicant's protest.
- No protest accompanied the payment of additional search fees.

## INTERNATIONAL SEARCH REPORT

International Application No. PCT/ GB2005/ 001721

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-10,23

A compression ignition engine arranged to operate using a mixture of a methane based gas and an ignition initiator, wherein the mixture is injected into a combustion chamber of the engine and method thereof.

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2. claims: 11-14

A fuel suitable for supplying to the combustion chamber of a compression ignition engine, wherein the fuel contains a mixture of methane based gas and an ignition initiator.

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3. claims: 15-17

A method of making a liquified or pressurised gas wherein the gas contains methane and a ignition initiator is added into said gas.

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4. claim: 18

A fuel injector wherein first and second fuel are mixed together before being injected into a combustion chamber.

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5. claims: 19,20

A fuel injector assembly with a fuel injector and a separate mixing unit wherein a first and a second fuel are mixed in the mixing unit and then the mixed fuel is supplied to the fuel injector.

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6. claims: 21,22

A fuel delivery system wherein a liquified or pressurised methane based gas comprising an ignition initiator is supplied to the engine using a common fuel rail.

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# INTERNATIONAL SEARCH REPORT

Information on patent family members

Intellectual application No
PCT/GB2005/001721

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