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(54) **Modified single-cylinder otto engine**

(57) The present invention relates to a single-cylinder Otto engine for ethanol operation, which engine comprises an engine block (1) with a cylinder (2), a cylinder head (3), a piston (4) disposed movably inside the cylinder, two valves (5, 5') arranged by the cylinder, a carburettor (6) with a removable fuel nozzle (7), and an air filter arrangement (8), wherein the minimum play between the valve end (5A) and its opposing surface (3A; 4A) is between 0.2 - 1 mm, preferably 0.3 - 8 mm, more preferably 0.4 - 0.6 mm, and, the fuel nozzle (7) is provided with an opening (6A), the diameter of which is between 5-20%, more preferably 10-15%, greater than the corresponding opening (6A) for petrol operation; and also to such an engine with a non-removable fuel nozzle (7) and an air filter arrangement (8), wherein the minimum play between the valve end (5A) and its opposing surface (3A; 4A) is between 0.2 - 1 mm, preferably 0.3 - 8 mm, more preferably 0.4 - 0.6 mm, and, the air filter (8) in the intake channel is provided with a choke element (8B) containing a restriction (8A) that reduces the total opening area to 50 - 200 mm², preferably 80 - 150 mm², more preferably 90 - 120 mm².

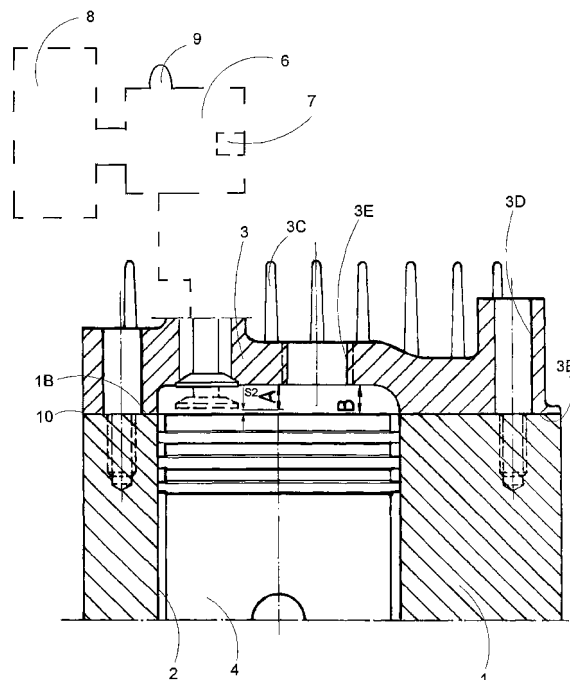


Fig. 1

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EUROPEAN SEARCH REPORT

Application Number
EP 07 10 6894

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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 20 August 2007	Examiner Yates, John
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	

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EPO FORM 1503 03.82 (P04C01)



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The present search report has been drawn up for all claims				
Place of search Munich		Date of completion of the search 20 August 2007	Examiner Yates, John	
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				

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Application Number
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DOCUMENTS CONSIDERED TO BE RELEVANT			
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**CLAIMS INCURRING FEES**

The present European patent application comprised at the time of filing more than ten claims.

- ☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims 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 the first ten claims.

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:



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**LACK OF UNITY OF INVENTION
SHEET B**

Application Number
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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: 1-4,9

Fuel supply in an ethanol engine

2. claims: 5-8

Air supply in an ethanol engine

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

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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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20-08-2007

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