

(19)



(11)

EP 2 138 695 A3

(12)

EUROPEAN PATENT APPLICATION

(88) Date of publication A3:
17.02.2010 Bulletin 2010/07

(51) Int Cl.:
F02F 1/20 (2006.01)

(43) Date of publication A2:
30.12.2009 Bulletin 2009/53

(21) Application number: **09006877.6**

(22) Date of filing: **22.05.2009**

(84) Designated Contracting States:
**AT BE BG CH CY CZ DE DK EE ES FI FR GB GR
HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL
PT RO SE SI SK TR**
Designated Extension States:
AL BA RS

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(30) Priority: **27.06.2008 JP 2008168687**

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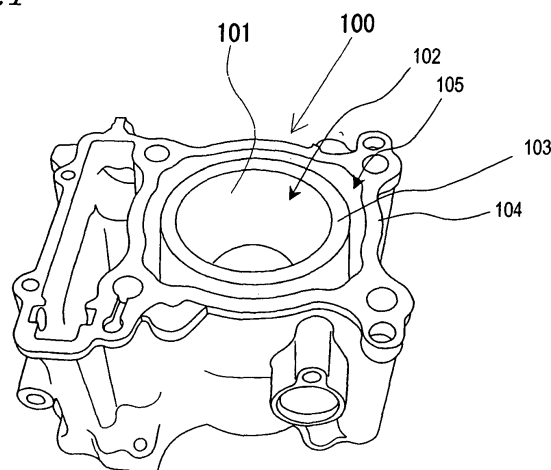
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(54) **Cylinder block, internal combustion engine, transportation apparatus, and method for producing cylinder block**

(57) The cylinder block according to the present invention is a cylinder block composed of an aluminum alloy containing silicon, the cylinder block including a cylinder wall having a slide surface. The cylinder block according to the present invention includes a plurality of

silicon crystal grains on the slide surface, such that the ten point-average roughness Rz_{JIS} of the slide surface and the load length ratio $Rmr(30)$ of the slide surface at a cut level of 30% are larger in the upper 1/4 portion of the slide surface than in the lower 1/4 portion of the slide surface.

FIG. 1



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**PARTIAL EUROPEAN SEARCH REPORT**

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which under Rule 63 of the European Patent Convention EP 09 00 6877 shall be considered, for the purposes of subsequent proceedings, as the European search report

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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-/-			TECHNICAL FIELDS SEARCHED (IPC)
			F02F
INCOMPLETE SEARCH			
The Search Division considers that the present application, or one or more of its claims, does/do not comply with the EPC to such an extent that a meaningful search into the state of the art cannot be carried out, or can only be carried out partially, for these claims. Claims searched completely : Claims searched incompletely : Claims not searched : Reason for the limitation of the search: see sheet C			
Place of search		Date of completion of the search	Examiner
Munich		9 September 2009	Yates, John
CATEGORY OF CITED DOCUMENTS		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	
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			

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EPC FORM 1503 03.82 (P04E07)

Application Number
EP 09 00 6877

DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (IPC)
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X	DE 195 06 568 A1 (BAYERISCHE MOTOREN WERKE AG [DE]) 29 August 1996 (1996-08-29) * column 2, line 28 - line 42 *	1	
Y	US 2 292 662 A (FREEMAN SANDERS ARTHUR) 11 August 1942 (1942-08-11) * page 2, line 2 - line 7; figure 6 *	1	
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**INCOMPLETE SEARCH
SHEET C**

Application Number

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Claim(s) completely searchable:

7-9, 16

Claim(s) searched incompletely:

1

Claim(s) not searched:

2-6, 10-15

Reason for the limitation of the search:

The parameter "load length ratio Rmr (30)" in claim 1 is not adequately described in the application as a whole. Further, by choosing this uncommon parameter, the applicant prevents any comparison with the prior art. Further still, examples are included which do not seem to correspond to what is claimed.

In the description in paragraph 0094 and fig 6 the parameter Rmr(c) is described. This is, however, not the same parameter as Rmr (30), which is used in the claim. Rmr is the length of material at a depth below a reference level, whereas Rmr(c) is at a depth below the highest peak. In the description there is mention of a "line connecting the apices i.e. load length M1(c)", yet it is far from clear in fig 6, which line is indeed intended. Further, presuming the Rmr (30) to express the idea that the depth (c) is 30%, there is no clear statement as to what it should be a percentage of (presumably overall depth, but this is not confirmed in the application). Since most analysis packages allow the reference line for Rmr to be selected from various levels, it is clearly important to know what is intended. This information, in particular with regard to Rmr(30), cannot be definitely established in the application.

Even if the information was to be clearly given, it would still prevent a comparison with the prior art, since it is an uncommon parameter, which the prior art generally does not specify. Even in the one document which does cite an apparently similar parameter "load length ratio (tp)" (D3 = JP2002138896) uses a cutting level of 20%, rather than the 30% mentioned in claim 1. Simply choosing a parameter which is unlikely to be given in the prior art does not, however, justify an invention.

Thus in order to allow any kind of comparison, we must try to interpret what is hidden behind the parameters quoted. Here the present application is not particularly clear, but that which could be understood is probably best illustrated using prior art D6 = JP60-147736U. Looking at fig 3a and 3b it can be seen that in 3a, which shows the upper part of the cylinder, much deeper cuts have been added to the basic structure. Because the cuts are much deeper, the ten point average roughness will be greater, and taking a cut at a depth of 30% of the overall depth of the deep cuts in fig 3a will give many more wide plateaus than taking a cut at 30% of the much shallower peaks shown in fig 3b, so that it can be expected that a material ratio would also be much greater in the upper part of the cylinder. Thus it seems that D6 in fact gives a good example of what the claim is trying to express.

This is more than can be said for the application. Looking at method claim 15, it is said that there is no further etching step after the first one. Looking at fig 11c of the current application, however, not etching results in a mirror surface, which will apparently have a material ratio of 100%, certainly much higher than the result shown in

**INCOMPLETE SEARCH
SHEET C**

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fig 11d, so that an arrangement of claim 15 would not correspond to one of claim 1.

In view of this, any attempt at discerning the subject matter to be searched can only be based on supposition and can certainly not cover the full potential range given in the claim. From the description it appears that an important embodiment of the invention treats the upper part of the cylinder after honing, then treats the whole cylinder further in order to obtain different effects in different areas. This is a concrete idea which can indeed be compared with the prior art, and this has been made the subject of the search.



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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 additional sheet(s)

☐ 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

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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: 1-6, 10-15

Block with particular different roughness above and below.

2. claims: 7-9, 16

block surface partially coated

**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
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

09-09-2009

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EPO FORM P0459

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