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**D E C I S I O N**  
**of 14 May 2003**

**Case Number:** T 0558/02 - 3.2.4

**Application Number:** 95934001.9

**Publication Number:** 0787252

**IPC:** F02B 75/28

**Language of the proceedings:** EN

**Title of invention:**

A dual piston internal combustion engine

**Applicant:**

Beare, Malcolm J.

**Opponent:**

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**Headword:**

-

**Relevant legal provisions:**

EPC Art. 56, 111(1)

**Keyword:**

"Inventive step - main request (no)"

"Remittal to the first instance for further prosecution on the basis of an auxiliary request"

**Decisions cited:**

-

**Catchword:**

-



**Case Number:** T 0558/02 - 3.2.4

**D E C I S I O N**  
**of the Technical Board of Appeal 3.2.4**  
**of 14 May 2003**

**Appellant:** Beare, Malcolm J.  
"Wynkie Marsh"  
Bordertown  
S.A. 5268 (AU)

**Representative:** Burrows, Anthony Gregory  
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**Decision under appeal:** Decision of the Examining Division of the  
European Patent Office posted 14 February 2002  
refusing European patent application  
No. 95 934 001.9 pursuant to Article 97(1) EPC.

**Composition of the Board:**

**Chairman:** C. A. Andries  
**Members:** T. Kriner  
C. Holtz

## Summary of Facts and Submissions

I. The Appellant (Applicant) lodged an appeal against the decision of the Examining Division, posted on 14 February 2002, refusing the European patent application No. 95 934 001.9. The notice of appeal was filed and the appeal fee paid on 29 April 2002, i.e. outside the two month term under Article 108 EPC for filing an appeal. On the same day the Appellant filed a request for Restitutio in Integrum and paid the required fee. The statement of grounds for the appeal was received on 24 June 2002.

With an interlocutory decision of 9 August 2002, the Board allowed the request for re-establishment, and considered the notice of appeal and the appeal fee to have been submitted in due time.

II. The Examining Division had held in the decision under appeal that the application did not meet the requirements of Article 52(1) EPC in conjunction with Article 56 EPC in view of the disclosure of documents:

D1: FR-A-2 633 010 and

D2: WO-A-94/04799.

In addition to these documents the following documents have been cited in the international search report, in the additional search report and in the application:

D3: Patent Abstracts of Japan, M 553, page 148,  
JP-A-61 190 125

D4: DE-C-577 234

D5: US-A-1 339 187

D6: US-A-1 590 940

D7: FR-A-2 480 851

D8: US-A-2 473 759

D9: US-A-2 442 302

D10: US-A-2 435 361

D11: US-A-2 345 056

D12: US-A-3 134 373

D13: US-A-4 535 592.

III. The appellant implicitly requested (see letter of 24 June 2002, page 2, paragraphs 3 and 5) that the decision under appeal be set aside and a patent be granted on the basis of claims 1 to 29 according to the main request or on the basis of claims 1 to 27 according to the auxiliary request, both requests filed with letter of 24 June 2002.

IV. Claim 1 of the main request reads as follows:

"An internal combustion engine comprising;  
two cylinders (4, 8) meeting to form a combustion space (12) therebetween;  
a first piston (3) adapted to reciprocate within the first cylinder (4);  
a second piston (7) adapted to reciprocate within the second cylinder (8);

the said two pistons (3, 7) being drivably coupled so as to synchronously move one with respect to the other such that the second piston (7) moves at a frequency half of that of the first piston (3);

means for providing an air/fuel mixture inlet (14; 71) through a first aperture or apertures in the wall of the second cylinder (8);

means for providing an exhaust outlet (15) through a second aperture or apertures in the wall of the second cylinder (8);

the apertures being positioned so as to be opened or closed by covering and uncovering of the apertures by the movement of the second piston (7); and

said aperture or apertures being covered by said second piston (7) at the time of occurrence of the highest pressures in the combustion space (12); characterised in that

said engine further comprises a timed exhaust sealing valve (17) to effect an opening or closing of the exhaust outlet (15) at a selected time in the operating cycle of the engine, and in that

the exhaust sealing valve (17) is a rotary valve (17)."

- V. Claim 1 of the auxiliary request differs from claim 1 of the main request mainly in that the last feature according to which "the exhaust sealing valve (17) is a rotary valve (17)" is replaced by the following feature:

"said coupling means includes a scotch yoke of said second piston (7)."

Furthermore it is stated in claim 1 that the two pistons are drivably coupled to each other "by coupling

means", and it is now clearly confirmed that the aperture or the apertures which are covered by the second piston are the "first and second" ones.

VI. In support of his requests, the Appellant relied essentially on the following submissions:

D1 which the Examining Division asserted to be the closest prior art concerned an internal combustion engine permitting the omission of the usual timing system. Thus the teaching of D1 to a person of ordinary skill in the art was not to employ a timed exhaust valve. Since this teaching would lead in a direction away from the present application, the skilled person would not consider combining the disclosure of D1 and D2.

With respect to the auxiliary request, none of the present documents cited in the search reports disclosed coupling means including a scotch yoke of the second piston, let alone the advantageous combination of a timed exhaust sealing valve and such a scotch yoke of the second piston.

Therefore, the subject-matter of claim 1 of the main and of the auxiliary request was not only new, but also based on an inventive step.

### **Reasons for the Decision**

1. The appeal is admissible
2. *Amendments*

The subject-matter of claim 1 according to the main request is disclosed in claims 1, 3 and 4 of the originally filed international application published as WO-A-96/12096, in Figure 1 of this document and in the corresponding description on page 9, line 24 to page 10, line 3.

The feature of claim 1 of the auxiliary request, according to which the coupling means includes a scotch yoke of the second piston, is disclosed in Figure 14 of WO-A-96/12096, in the corresponding description on page 14, lines 23 to 25, and in the description on page 17, lines 24 to 27.

The features of claims 2, 5 to 20 and 22 to 29 of the main request are disclosed in claims 4 to 20 and 21 to 28 published in WO-A-96/12096; and the features of claims 3, 4 and 21 are disclosed in Figures 1 to 3, on page 10, lines 12 to 23, on page 8, line 24 to page 9, line 1, and on page 5, lines 26 to 31 of this document.

The features of claims 2, 5 to 19 and 20 to 28 of the auxiliary request are disclosed in claims 4 to 19 and 21 to 28 published in WO-A-96/12096; and the features of claims 3, 4 are disclosed in Figures 1 to 3 and on page 10, lines 12 to 23 of this document.

The description has been amended in order to adapt it to the amended wording of claim 1 according to the main request. Moreover, the documents D1, D2 and D13 have been cited as representing the most relevant state of the art.

Therefore, all amendments meet the requirements of Article 123(2) EPC.

3. *State of the art*

- 3.1 D1 which represents the most relevant state of the art discloses an internal combustion engine comprising;
- a cylinder having two cylinder-sections meeting to form a combustion space therebetween;
  - a first piston (1) adapted to reciprocate within the first cylinder-section;
  - a second piston (2) adapted to reciprocate within the second cylinder-section;
  - the said two pistons being drivably coupled so as to synchronously move one with respect to the other such that the second piston moves at a frequency half of that of the first piston (see page 1, lines 9 to 16);
  - means for providing an air/fuel mixture inlet (6) through a first aperture or apertures in the wall of the second cylinder-section;
  - means for providing an exhaust outlet (5) through a second aperture or apertures in the wall of the second cylinder-section;
  - the apertures being positioned so as to be opened or closed by covering and uncovering of the apertures by the movement of the second piston (see page 1, lines 9 to 11); and
  - said aperture or apertures being covered by said second piston at the time of occurrence of the highest pressures in the combustion space (see Figure 1).

However, D1 does not disclose that

- (a) the two cylinder-sections are formed by two cylinders;
- (b) the engine comprises a timed exhaust sealing valve



to effect an opening or closing of the exhaust outlet at a selected time in the operation cycle of the engine,

- (c) the exhaust sealing valve is a rotary valve, and
- (d) the coupling means includes a scotch yoke of the second piston.

3.2 Documents D5 to D11 disclose further internal combustion engines which are similar to the one according to D1 which, however, disclose less features of claim 1 of the main and of the auxiliary request than D1 does.

3.3 Each of the documents D3 and D4 refers to an internal combustion engine comprising two cylinders meeting to form a combustion space therebetween.

The engine according to D3 additionally comprises  
a first piston (4) adapted to reciprocate within the first cylinder;  
a second piston (3) adapted to reciprocate within the second cylinder (6);  
the said two pistons being drivably coupled so as to synchronously move one with respect to the other such that the second piston moves at a frequency half of that of the first piston.

The engine according to D4 additionally comprises  
a first piston (E) adapted to reciprocate within the first cylinder;  
a second piston (E1) adapted to reciprocate within the second cylinder;  
the said two pistons being drivably coupled so as

to synchronously move one with respect to the other;

means for providing an air/fuel mixture inlet (A1) through a first aperture or apertures in the wall of the second cylinder;

means for providing an exhaust outlet (B1) through a second aperture or apertures in the wall of the second cylinder.

Further features of claim 1 according to the main or auxiliary request are not disclosed in any of D3 or D4.

3.4 Each of D2 and D13 refers to a timed exhaust sealing valve (D2: 7 / D13: 67, 69) for an internal combustion engine, to effect an opening or closing of the exhaust outlet (D2: C / D13: 21) at a selected time in the operation cycle of the engine, wherein the exhaust sealing valve is a rotary valve (D13: see in particular Figure 5).

3.5 D12 refers to a rotary valve (V2) to effect an opening or closing of the inlet manifold of a dual piston internal combustion engine.

3.6 In view of the assessments above, the subject-matter of claim 1 according to the main and the auxiliary request is novel.

#### 4. *Inventive step*

##### 4.1 Main request

4.1.1 The subject-matter of claim 1 of the main request differs from that which is described in D1 in that

(a) the two cylinder-sections are formed by two

cylinders;

(b) the engine comprises a timed exhaust sealing valve to effect an opening or closing of the exhaust outlet at a selected time in the operation cycle of the engine; and

(c) the exhaust sealing valve is a rotary valve.

4.1.2 The provision of two cylinders instead of a single cylinder is not described as to serve for a special purpose in the present application.

The provision of a valve according to features b and c serves to prevent the back flow of the exhaust gases into the combustion chamber through the intake part of the engine cycle (see page 11, lines 17 to 28; and page 13, lines 10 to 13). In accordance with D1, the back flow of the exhaust gases into the combustion chamber through the intake part of the engine cycle is already prevented by a check valve or any other suitable means (see page 1, lines 23 to 26) which inevitably closes the exhaust port through the intake part of the engine cycle.

Hence, the object to be achieved by the subject-matter of claim 1 of the main request may be regarded as to provide an alternative design of an internal combustion engine as disclosed in D1.

4.1.3 The provision of two separate cylinders in an internal combustion engine similar to the one according to D1 is suggested by any of D3 or D4; and the provision of a timed rotary exhaust sealing valve to effect an opening or closing of the exhaust outlet at a selected time in

the operation cycle of an internal combustion engine, is suggested by D2.

Since the skilled person would regard it as an obvious design possibility to provide the cylinder arrangement according to D3 or D4 and the valve according to D2 in an engine according to D1, the subject-matter of claim 1 of the main request does not involve an inventive step.

- 4.1.4 The Appellant's argumentation that the skilled person would not consider a combination of D1 and D2 is not convincing.

D1 refers to an internal combustion engine which permits the omission of the gas exchange system of a standard four stroke engine (see page 1, lines 4 to 7). Consequently the skilled person would not consider the provision of such a conventional gas exchange system, comprising a camshaft, rocker arms, valves, cylinder head etc. ..., in a an engine according to D1. However, there is no reason which could prevent the skilled person from providing a timed exhaust sealing valve in this engine in order to prevent the back flow of exhaust gases into the combustion chamber through the intake part of the engine cycle. On the contrary, since D1 explicitly suggest the provision of any suitable means to prevent the back flow of exhaust gases into the combustion chamber (see claim 8 and page 1, lines 23 to 26), the skilled person would consider the use of any such means, for example the one disclosed in D2.

- 4.2 Auxiliary request

4.2.1 The subject-matter of claim 1 of the auxiliary request differs from that which is described in D1 in that

- (a) the two cylinder-sections are formed by two cylinders;
- (b) the engine comprises a timed exhaust sealing valve to effect an opening or closing of the exhaust outlet at a selected time in the operation cycle of the engine; and
- (d) the coupling means includes a scotch yoke of the second piston.

4.2.2 As shown in section 4.1 above, the provision of features a and b is obvious.

The present documents D1 to D13 do, however, not suggest to provide coupling means for a first and second piston which includes a scotch yoke of the second piston in order to minimise the vertical extent caused by the second piston (see page 17, lines 24 to 27).

Since this could be a result of the fact that feature d was not comprised in the claims published in WO-A-96/12096 and therefore probably has not been considered for the search, it is appropriate to remit the case for further prosecution to the first instance (Article 111(1) EPC), in particular to assess whether or not feature d is known in the state of the art, and should the occasion arise to assess whether or not the provision of a coupling means having this feature in an engine according to D1 is obvious.

## Order

### For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The main request is refused.
3. The case is remitted to the first instance for further prosecution of the application on the basis of the following documents:

**Claims:** No. 1 to 27 according to the auxiliary request filed with letter of 24 June 2002;

**Description:** Pages 1, 5 to 18 as published in WO-A-96/12096;  
Pages 4, 4/1 filed with letter of 7 July 1997;  
Pages 1, 2a, 2b, 3 filed with letter of 21 November 2000;

**Drawings:** Figures 1 to 16 as published in WO-A-96/12096.

The Registrar:

The Chairman:

G. Magouliotis

C. Andries