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D E C I S I O N
of 10 June 1998

Case Number: T 0176/96 - 3.2.4

Application Number: 90903301.1

Publication Number: 0461129

IPC: F02D 9/02

Language of the proceedings: EN

Title of invention:
Internal Combustion Engine Air Supply System

Applicant:
Orbital Engine Company/PTY. LTD

Opponent:
-

Headword:
-

Relevant legal provisions:
EPC Art. 123(2), 84, 54,

Keyword:
"Amendments - added subject-matter (no)"
"Novelty (yes)"
"Claims - clarity (yes)"

Decisions cited:
-

Catchword:
-

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Case Number: T 0176/96 - 3.2.4

D E C I S I O N
of the Technical Board of Appeal 3.2.4
of 10 June 1998

Appellant: Orbital Engine Company (Australia) PTY. LTD.
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Decision under appeal: Decision of the Examining Division of the European Patent Office posted 25 September 1995 refusing European patent application No. 90 903 301.1 pursuant to Article 97(1) EPC.

Composition of the Board:

Chairman: C. A. J. Andries
Members: H. A. Berger
J. P. B. Seitz

Summary of Facts and Submissions

I. The appellant (applicant) has lodged an appeal against the examining division's decision of 25 September 1995 to refuse European patent application No. 90 903 301.1 for grounds based on Articles 54, 123(2) and 84 EPC. The appeal was received on 28 November 1995 and the appeal fee was paid on 23 November 1995. The statement of the grounds of appeal was received on 29 January 1996.

II. In the decision of the examining division only the prior art document GB-A-2 052 796 (D1) was cited.

III. In response to a communication of the board, the appellant filed new application documents. Oral proceedings were held on 10 June 1998 during which the appellant filed a new set of claims 1 to 7, amended Figures 1 to 4 and amended pages 3a, 10, 12 and 13.

IV. Claim 1 reads as follows:

"A method of supplying air to an internal combustion engine having air supply system comprising:

- a first intake passage (11) through which air can flow to the engine;
- a first control means (12) operable to vary the air flow rate through the first passage;
- a driver actuated mechanism (14) operatively coupled to said first control means to vary the air flow rate through the first passage to the engine in response to the driver demand;
- a second air intake passage (13) through which air can flow to the engine;
- a second control means (18) operable to vary the air flow rate through the second passage; and

- an actuator means (2, 5, 6, 17) operable in response to sensed engine operating conditions to operate the second control means to vary the air flow rate to the engine through the second passage;
- said first control means and second control means being operable so that at some operating points of the engine the air supplied to the engine can be solely through one of the first or second air passages or simultaneously through both;
- and said driver actuated mechanism and said actuator means being operatively arranged so that during an initial portion of driver induced movement of the driver actuated mechanism from an engine idle position, substantially all of the air supply to the engine is through the second air passage (13),

the method being characterised by

- said actuator means being arranged so that, during at least a first part of said initial portion of driver induced movement from an engine idle position, said second control means does not substantially increase the mass of air delivered per cylinder through said second air intake passage."

V. In his argumentation the appellant maintained that all the features of amended claim 1 are disclosed in the originally filed application. The initial portion of the driver induced movement is disclosed in originally filed claim 2. The feature of the characterising portion of new claim 1 is derivable from Figure 4 and the description thereof. The appellant further argued that the amendments to claim 1 completely remove the

grounds for refusal set out in paragraphs A1 to A4 of the decision of the examining division. Moreover, he is of the opinion that the method of the present claim 1 is new having regard to document D1 since the characterising portion of this claim is not disclosed in this document.

VI. Requests

The appellant requests that the decision under appeal be set aside and a patent be granted on the basis of the following documents:

Claims: 1 to 7 as filed during the oral proceedings on 10 June 1998.

Description: Pages 1, 2, 4 to 7, 14 as originally filed;
page 3, filed with letter dated 25 January 1996;
pages 3a, 10, 12 and 13 as filed during the oral proceedings on 10 June 1998;
pages 8, 9, 11 filed with letter dated 16 February 1994.

Drawings: Sheets 1/5 to 4/5 (Figures 1 to 4) as filed during the oral proceedings on 10 June 1998,
sheet 5/5 (Figure 5) filed with letter dated 19 May 1998.

Reasons for the Decision

1. The appeal is admissible.

2. *Allowability of the amendments (Article 123(2) EPC)*

2.1 The features of claim 1 are indicated as follows in order to simplify examination:

A method of supplying air to an internal combustion engine having air supply system comprising:

a. a first air intake passage (11) through which air can flow to the engine;

b. a first control means (12) operable to vary the air flow rate through the first passage;

c. a driver actuated mechanism (14) operatively coupled to said first control means to vary the air flow rate through the first passage to the engine in response to the driver demand;

d. a second air intake passage (13) through which air can flow to the engine;

e. a second control means (18) operable to vary the air flow rate through the second passage; and

f. an actuator means (2, 5, 6, 17) operable in response to sensed engine operating conditions to operate the second control means to vary the air flow rate to the engine through the second passage;

g. said first control means and second control means being operable so that at some operating points of the engine the air supplied to the engine can be solely through one of the first or second air passages or simultaneously through both; and

h. said driver actuated mechanism and said actuator means being operatively arranged so that during an initial portion of driver induced movement of the driver actuated mechanism from an engine idle position, substantially all of the air supply to the engine is through the second air passage (13),

the method being characterised by

i. said actuator means being arranged so that, during at least a first part of said initial portion of driver induced movement from an engine idle position, said second control means does not substantially increase the mass of air delivered per cylinder through said second air intake passage.

2.2 Amendments in the claims

2.2.1 Present claims 1 to 7 have a different category to that of the originally filed claims. Since the essential features of the application comprise method steps the change of the category is acceptable.

2.2.2 Claim 1

Features a to g are based on the originally filed claim 1 and feature h is based on the originally filed claim 2. In feature g the amendment "so that at some operating points" more clearly takes into account the disclosed lost motion mechanism.

Feature i is fairly based on the description and the drawing, Figure 4. The originally filed description discloses on page 2, last paragraph, that under low to medium load conditions, it is desirable to maintain a relatively steady rate of air supply to the engine whereas the same passage indicates alternatively small variations to the air supply rate under these load conditions. This last disclosure is confirmed by page 5, lines 31 to 33, where for the same load conditions the reduced level of variation for the air supply rate is set out. Also the indication on originally filed page 13, lines 25 to 28 points in the same direction, namely "it will be noted from Figure 4, that in the load range requiring a fuelling rate of 2 to about 9 mg/cyl/cyc ..., the rate of air supply to the engine remains substantially constant", although this information prima facie does not seem to be correct for the whole indicated fuelling rate range when looking at Figure 4.

However, it is clearly stated in the originally filed claim 2 that the initial portion of the driver induced movement is started from engine idle position. In this respect it should be noted that according to the originally filed claim 3 this initial portion is defined from idle position to at least the position of the mechanism corresponding to one quarter (25%) maximum engine load. This 25% engine load corresponds to a fuelling rate of about 6 to 7 mg/cyl/cyc when taking into account the figures of the fuelling rates disclosed on page 13, lines 12, 13 (fuelling rate of 9 mg/cyl/cyc, 40% of engine rated output), and line 16 (fuelling rate of 15 mg/cyl/cyc, 60% of rated output), on page 14, line 9 (5 to 8 mg/cyl/cyc, 20% to 35% of rated output), and those in Figure 5 according to which the air/fuel ratio is decreased (air flow rate substantially constant and increasing fuel flow rate) between 2 mg/cyl/cyc and 6 or 7 mg/cyl/cyc.

Furthermore, Figure 4 clearly discloses that during at least a first part (2 to 4 mg/cyl/cyc) of said initial portion (2 to 6-7 mg/cyl/cyc) of driver induced movement, said second control means does not substantially increase the mass of air delivered per cylinder through said second air intake passage (see also the last sentence in lines 30 to 35 of originally filed page 13), so that it can be stated that also for feature i there is a fair basis in the originally filed application.

2.2.3 The content of claims 2 to 7 are mainly based on originally filed claims 3 to 8 with amendments to adapt them to the new claim 1.

2.3 Amendments to the description

The amendments to the description, namely pages 3, 3a, 8, 9 and 10 to 12 mainly concern the adaptation to the new claim 1 (see page 3a), the citation of the most relevant state of the art document (see page 3) and the correction of reference numbers. The last paragraph of page 13 was adapted to the originally filed Figure 4 for clarity reasons. With regard to the version of page 13 on which the refusal of the examining division was based, this last paragraph of page 13 was amended in order not to violate Article 123(2) EPC.

2.4 Amendments to the drawings

The amendments to the drawings concern corrections of obvious mistakes.

2.5 The amendments therefore satisfy Article 123(2) EPC.

3. *Novelty*

3.1 Compared with claim 1 of the application, document D1 discloses an air/fuel ratio control system with which a method of supplying air to an internal combustion engine can be carried out. Said air supply system comprises:

(a) a first air intake passage through which air can flow to the engine;

(b) a first control means (Figure 1; throttle valve 14, rod 16, adjust lever 18) operable to vary the air flow rate through the first passage;

(c) a driver actuated mechanism (26,29,30,24) operatively coupled to said first control means to vary the air flow rate through the first passage to the engine in response to the driver demand;

(d) a second air intake passage (40) through which air can flow to the engine;

(e) a second control means (42) operable to vary the air flow rate through the second passage; and

(f) an actuator means (43) operable in response to sensed engine operating conditions (in control circuit 100) to operate the second control means (42) to vary the air flow rate to the engine through the second passage;

(g) said first control means (throttle valve) and second control means (42) being operable so that at some operating points of the engine the air supplied to the engine can be solely through one of the first or second (page 3, lines 28 to 32) air passages or simultaneously through both (page 3, lines 32 to 36).

Document D1 furthermore discloses that

said driver actuated mechanism and said actuator means are operatively arranged so that during an initial portion of driver induced movement of the driver actuated mechanism from an engine idle position, substantially all of the air supply to the engine is through the second air passage (see the elongated opening 22 in the lever 18; page 3, lines 28 to 36) (feature h of claim 1 of the application).

3.2 The method of claim 1 of the application differs therefrom by feature i, i.e. "said actuator means being arranged so that, during at least a first part of said initial portion of driver induced movement from an engine idle position, said second control means does not substantially increase the mass of air delivered per cylinder through said second air intake passage".

According to Figures 3A and 3B of document D1, the intake air flow rate drawn into the throttle chamber (12) is controlled by the air bypass valve (42) before the accelerator manipulation angle reaches the angle Θ_N (see page 3, lines 14 to 46). According to Figure 3A by-pass air is controlled in a range between an upper and a lower horizontal limit line representing a maximal and a minimal constant air flow each depending on the constructional and operational parameters of the system. The controlled air flow lies between these two

limit lines. If the bypass valve is fully closed (lower horizontal line) only leakage air (flow rate Q_0) can be supplied to the engine (page 3, lines 41). Document D1 however does not disclose an operation condition during which the control unit controls the air flow rate along the upper horizontal limit line A_3 or along another substantially horizontal line of Figure 3A, i.e. a program in the control unit according to which the by-pass air flow is kept constant during the lower load conditions.

Figure 5 of document D1 clearly indicates the process steps to be followed during the initial portion of the driver induced movement after idling (comparable with the last feature of claim 1 of the application, i.e. feature (i), namely the steps 520, 521, 528, and 532. Indeed in step 528 it is decided whether idling is occurring or whether the accelerator is depressed, in which latter case step 532 is made. Step 532 refers to Figure 7 (see page 4, lines 50 to 57), which however does not disclose a constant bypass air flow QaB in the initial portion but instead discloses a constantly increasing bypass air flow over the accelerator manipulation angle θ_{TH} per engine speed N. Figure 7, therefore, for instance discloses an increasing air flow QaB for a constant engine speed N.

Figure 6 of document D1 however concerns the engine starting condition (see page 3, lines 115 to 126 and Figure 5, method steps 520, 524) and not the initial portion of the driver induced movement starting from an engine idle position.

Document D1 therefore does not disclose or even suggest feature i of the present claim 1.

3.3 The method of claim 1 of the application therefore is new with respect to the state of the art known from document D1.

4. *Clarity (Article 84 EPC)*

With the amendments of the application documents, in particular the amendment on page 13, last paragraph and the amendments in the claims, the lack of clarity is removed.

5. *Remittal to the first instance*

Due to the amendments made, the grounds for the refusal have been overcome, so that the board remits this case to the first instance for further prosecution on the basis of the documents as defined in above section VI.

Furthermore, since the last feature of claim 1 (feature i) is only based on the disclosure of the originally filed description and Figure 4, and since this feature only concerns the software part of the control unit, i.e. how specific features are controlled, it should be checked by the first instance if a search in this respect has already been carried out.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The case is remitted to the first instance for further prosecution.

The Registrar:

N. Maslin

The Chairman

C. Andries

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