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D E C I S I O N
of 14 August 2002

Case Number: T 0084/00 - 3.2.4

Application Number: 96110885.9

Publication Number: 0752518

IPC: F02B 63/02

Language of the proceedings: EN

Title of invention:
Overhead cam engine with dry sump lubrication system

Applicant:
TECUMSEH PRODUCTS COMPANY

Opponent:
-

Headword:
-

Relevant legal provisions:
EPC Art. 111(1)

Keyword:
"Remittal to first instance for further prosecution"

Decisions cited:
-

Catchword:
-

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Case Number: T 0084/00 - 3.2.4

D E C I S I O N
of the Technical Board of Appeal 3.2.4
of 14 August 2002

Appellant: TECUMSEH PRODUCTS COMPANY
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Representative: Dr Weitzel & Partner
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Decision under appeal: **Decision of the Examining Division of the European Patent Office posted 3 November 1999 refusing European patent application No. 96 110 885.9 pursuant to Article 97(1) EPC.**

Composition of the Board:

Chairman: C. A. J. Andries
Members: M. G. Hatherly
C. Holtz

Summary of Facts and Submissions

I. On 9 December 1999 the appellant (applicant) filed a notice of appeal against the examining division's decision of 3 November 1999 refusing the European patent application No. 96 110 885.9 (publication No. 0 752 518).

The appeal fee was paid simultaneously and the statement of grounds of appeal was received on 3 January 2000.

II. In reply to the board's communication of 25 April 2002, the appellant filed amended pages of the claims and description of the patent application by letter of 3 June 2002. Following a telephone conversation on 23 July 2002 between the appellant's representative and the board's rapporteur, further amended pages were filed by letter dated 25 July 2002.

III. The independent claim 1 now reads:

"A single cylinder, four stroke cycle, overhead cam internal combustion engine comprising:
an engine block including, a cylinder (22) and cylinder head (24) and having a camshaft cavity and a crankcase cavity (91);
an interconnected crankshaft (42), connecting rod (92) and piston (46) assembly disposed in said crankshaft cavity,
an overhead camshaft (40) and valve assembly (67, 68) disposed in said camshaft cavity; and
a pair of valve stem bores extending from said camshaft cavity through said cylinder head (24), said valve assembly including valve stems disposed in said stem

bores;
an integrally formed cylinder and cylinder head;
said camshaft (40) includes a drive member (72) located externally of said engine block;
said crankshaft (42) includes a drive member (90) located externally of said engine block;
an externally disposed endless loop member (105) interconnecting the said drive members for transmitting rotational motion from the crankshaft to the camshaft;
the cylinder bore in the cylinder (22), in which the piston (46) reciprocates, is defined by an annular wall (48) of the engine block having a substantially uniform thickness around substantially all of the wall circumference in the area of said bore (44) where said piston (46) reciprocates,
except for two radially projecting bosses (54, 55) spaced 180° apart and through which pass symmetrical axially-extending lubrication conduits (56, 57) drilled therethrough
and that radially projecting from the annular wall there is a series of axially spaced, annular cooling fins (59) which are uniformly shaped along the length of the cylinder (22)."

IV. The following prior art was cited before the examining division:

D1: US-A-5 090 375

D2: US-A-5 031 591

D3: DE-A-4 015 610

V. The appellant requests that the decision under appeal is set aside and that a patent be granted in the

following version:

- claim 1 filed with the letter of 25 July 2002;

- claims 2 to 10 filed with the letter of 3 June 2002;

- description pages 1 to 4 and 24 filed with the letter of 3 June 2002;

- description pages 5 and 6 filed with the letter of 25 July 2002;

- description pages 8 to 23 as originally filed;

- drawings Figures 1 to 10, 11A and 11B as originally filed.

Reasons for the Decision

1. The appeal is admissible, see the reasons given in section 1 of the board's communication of 25 April 2002.

2. *Amendments*

2.1 The basis for the present claim 1 in the originally filed application is as follows:

2.1.1 The whole of the pre-characterising portion of the originally filed claim 1 forms the first part of the present claim 1, except for a correction in lines 10 and 11 of the claim filed with the letter of 25 July 2002 that the pair of valve stem bores extend from said

camshaft cavity through said cylinder head (24), as shown in Figure 1.

2.1.2 The negative feature in the characterising portion of the originally filed claim 1

- "there are no further internal passages in said block extending between said camshaft cavity and said crankshaft cavity"

was incorrect, see the examining division's communication of 13 November 1998 page 1, section 1.

This negative feature is replaced in the present claim 1 by

- "said camshaft (40) includes a drive member (72) located externally of said engine block;
said crankshaft (42) includes a drive member (90) located externally of said engine block;
an externally disposed endless loop member (105) interconnecting the said drive members for transmitting rotational motion from the crankshaft to the camshaft".

This wording is the whole of the originally filed claim 2 except that the term "engine housing" has been amended for consistency to "engine block".

2.1.3 The feature in the present claim 1

- "the cylinder bore in the cylinder (22), in which the piston (46) reciprocates, is defined by an annular wall (48) of the engine block having a substantially uniform thickness around substantially all of the wall circumference in the

area of said bore (44) where said piston (46) reciprocates",

is the whole of the originally filed claim 3 with a minor clarification.

2.1.4 The feature in the present claim 1

- "except for two radially projecting bosses (54, 55) spaced 180° apart and through which pass symmetrical axially-extending lubrication conduits (56, 57) drilled therethrough"

is taken from page 11, lines 7 to 11 of the originally filed description.

2.1.5 The feature in the present claim 1

- "that radially projecting from the annular wall there is a series of axially spaced, annular cooling fins (59) which are uniformly shaped along the length of the cylinder (22)"

is taken from page 11, lines 15 to 18 of the originally filed description.

2.1.6 Thus there is no objection to the present claim 1 under Article 123 EPC.

2.2 The present dependent claims 2 to 4 and 5 to 10 correspond to the originally filed claims 4 to 6 and 8 to 13 respectively.

2.3 The description

Pages 1 to 3 and the first half of page 4, all filed with the letter of 3 June 2002, are the same as those originally filed.

The second half of the present page 4 and the whole of the present page 5 are merely an acknowledgement of the cited prior art.

The present page 6 is derived from lines 17 to 22 of the original page 4, and line 30 of the original page 3.

The present page 24 is the same as that originally filed with a speculative paragraph deleted.

2.4 The drawings are those originally filed.

2.5 Thus there is no objection to the present version of the patent application under Article 123 EPC.

3. *Claim 1 - novelty*

3.1 Contrary to the present claim 1, the cylinder 16 and cylinder head in D1 are not integrally formed (see their separation aligned with the top of the piston in the Figure).

3.2 In the engine of D2 the timing belt 17, the crankshaft pulley 16 and the camshaft pulley 15 are located within the cylinder block 2, whereas the present claim 1 specifies that the camshaft and crankshaft drive members and the loop member shall be located externally of the engine block.

The same applies to the engine of D3.

3.3 Therefore, the subject-matter of the present claim 1 is novel over the cited prior art (Articles 52(1) and 54 EPC).

4. *Inventive step - claim 1*

4.1 The examining division argued in its decision that the engine defined by the **then current** claim 1 was obvious to the skilled person from the teaching of D1 and either D2 or D3.

4.2 D1 discloses an engine with the features set out in the first part of the **present** claim 1 up to but not including the feature of "an integrally formed cylinder and cylinder head" (see section 3.1 above).

4.3 Continuing the comparison of the present claim 1 and D1, it can be seen from the Figure that the camshaft 44 of the engine of D1 includes a drive member (camshaft pulley 38) located externally of the engine block; the crankshaft 26 includes a drive member (crankshaft pulley 34) located externally of said engine block; and an externally disposed endless loop member (timing belt 36) interconnects the said drive members 38 and 34 for transmitting rotational motion from the crankshaft 26 to the camshaft 44.

In the engine of D1, the cylinder bore in the cylinder 16, in which the piston 20 reciprocates, is defined by a wall of the engine block.

4.4 The present claim 1 continues by specifying that (except for specified bosses and except for specified cooling fins) this wall of the engine block is annular with a substantially uniform thickness around

substantially all of the wall circumference in the area of said bore where said piston reciprocates.

The board finds that this means that the annular wall of the engine block has a substantially uniform thickness both in the circumferential direction (as shown in Figure 4) and in the axial direction (as shown in Figure 1).

The board arrives at this finding despite the examining division's statement near the end of page 3 of its decision that

- "the phrase "having a substantially uniform thickness around substantially all of the wall circumference in the area of said bore where said piston reciprocates" states not that the wall should not vary in thickness at all, rather that each circumference should be a constant thickness. Even if the wall is generally thicker at the valve end of the cylinder than at the crankshaft end of the cylinder in the arrangement of US-A-5 090 375, each circumference maintains a substantially constant thickness, so that this feature is given."

The examining division is, in effect, cutting the cylinder of D1, transversely to its longitudinal central axis, into an infinite number of slices of zero thickness (i.e. planes) and saying that, taking each slice on its own, the annular wall is of substantially uniform thickness around substantially all of the wall circumference. However the term "annular wall" can only be applied to a slice with a finite thickness and, if the cylinder as a whole is for example frustoconical,

then so each slice of a finite thickness is frustoconical.

4.5 D1 gives too little information to be able to determine whether the wall of the cylinder 16, ignoring the fins 18, has a substantially uniform thickness around substantially all of the wall circumference in the area of said bore where said piston reciprocates. Nothing is written about this in the description and claims. Moreover the Figure is schematic so that scaling it is inappropriate.

Still further, one sees the wall in section at a single plane and so knows nothing about the wall in front of and behind this plane.

The latter point is illustrated by D2. One might assume from the horizontal section of Figure 2 of D2 that the wall of cylinder block 2, ignoring the fins, is a circular cylindrical tube. However the vertical section of Figure 1 and the end view of Figure 3 of D2 show that this assumption would be totally wrong. Of course the non-symmetry in D2 is caused by the the timing belt 17 and its pulleys 15 and 16 being located within the cylinder block 2, which is not the case in D1 but this does not alter the fact that a single section of a machine does not deliver all information about that machine.

So uniformity of the cylinder wall of D1 is not proven.

4.6 As just stated, Figures 1 and 3 of D2 show that the wall of the cylinder block 2 of D2 does not have a substantially uniform thickness around substantially all of the wall circumference in the area of said bore

where said piston reciprocates.

Neither does the cylinder block of D3, as can be seen from Figures 1, 4, 5 to 7, 10 (a section on line X-X of Figure 7), 12 and 14 (a section on line XIV-XIV of Figure 12).

4.7 Thus the teachings of D1 to D3, taken together but in the absence of other information (such as the skilled person's knowledge), do not yield a cylinder block with an annular wall of substantially uniform thickness.

4.8 However the classic, original form of engine cylinder, i.e. a cylindrical tube, has the same wall thickness all around and all along the cylinder.

This was pointed out to the appellant in section 4.3 of the board's communication of 25 April 2002, along with objections to the clarity of the then current claim.

The appellant responded by defining the engine cylinder more precisely concerning the bosses and fins, thus moving the claimed engine away from the classic, original engine form.

4.9 Indeed claim 1 now specifies

"two radially projecting bosses (54, 55) spaced 180° apart and through which pass symmetrical axially-extending lubrication conduits (56, 57) drilled therethrough".

Such bosses are not disclosed in any of D1 to D3.

4.10 Moreover claim 1 now specifies

"that radially projecting from the annular wall there is a series of axially spaced, annular cooling fins (59) which are uniformly shaped along the length of the cylinder (22)."

The Figure of D1 clearly shows fins of different radial extension both in the axial direction and the circumferential direction.

Figure 1 of D2 appears to show such uniform fins but the Figure 2 (the section taken at 90° to the section of Figure 1) shows that, as in D1, the radial lengths of the fins vary in both the axial and circumferential directions.

No fins are present in the engine of D3.

4.11 Therefore the board does not consider that, on the basis of the cited prior art at present on file, the skilled person would arrive at the subject-matter of claim 1 in an obvious manner.

However the features referred to in sections 4.9 and 4.10 above are taken not from dependent claims but from the description (as explained in sections 2.1.4 and 2.1.5 above). Accordingly the board does not know whether they were borne in mind when searching.

5. *Future action*

In order to preserve the right of the appellant to argue before two instances, the board will make no further comment on the present application but will remit it to the examining division for further prosecution (Article 111(1) EPC).

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 on the basis of

   - claim 1 filed with the letter of 25 July 2002;

   - claims 2 to 10 filed with the letter of 3 June 2002;

   - description pages 1 to 4 and 24 filed with the letter of 3 June 2002;

   - description pages 5 and 6 filed with the letter of 25 July 2002;

   - description pages 8 to 23 as originally filed;

   - drawings Figures 1 to 10, 11A and 11B as originally filed.

The Registrar: The Chairman:

G. Magouliotis C. Andries