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D E C I S I O N
of 4 April 2006

Case Number: T 0742/05 - 3.2.04

Application Number: 00967936.6

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Language of the proceedings: EN

Title of invention:
Z-engine

Applicant:
JANHUNEN, Timo

Opponent:
-

Headword:
-

Relevant legal provisions:
EPC Art. 54(1), (2), 111(1), 123(2)
EPC R. 67

Keyword:
"Essential reasoning communicated only with decision -
substantial procedural violation - yes"
"Novelty - yes, after amendment"
"Remittal to examining division - yes"
"Reimbursement of appeal fee - yes"

Decisions cited:
G 0004/92, T 0951/92

Catchword:
-



Case Number: T 0742/05 - 3.2.04

D E C I S I O N
of the Technical Board of Appeal 3.2.04
of 4 April 2006

Appellant: JANHUNEN, Timo
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Decision under appeal: Decision of the examining division of the
European Patent Office posted 30 March 2005
refusing European patent application
No. 00967936.6 pursuant to Article 97(1) EPC.

Composition of the Board:

Chairman: M. Ceyte
Members: M. Poock
C. Heath

Summary of Facts and Submissions

- I. European patent application No. 00 967 936.6 was refused with the decision of the examining division posted 30 March 2005.

The examining division held that the subject-matter of claim 13 lacks novelty (Article 54(1), (2) EPC) having regard to the disclosure of document US-A-4 565 167 (D1) and that the amendments in claims 16 to 18 introduce subject-matter which extends beyond the content of the application as filed, contrary to the requirements of Article 123(2) EPC.

The characterising portion of claim 13 underlying the impugned decision reads as follows:

"characterised in that it includes means for feeding scavenging air under pressure of at least 3 bar during approximately 60 to 30 degrees of the crankshaft before the top dead centre."

- II. In a first communication dated 8 March 2004, the primary member of the examining division had raised a novelty objection reading:

"The present application does not meet the requirements of Article 52(1) EPC, because the subject-matter of claim/s 1,2,5-9,12 and 14, 19 is not new in the sense of Article 54(1) and (2) EPC.

US 4565167 A (figures, col. 4, 8,9,10) disclose an two - stroke engine having intake-and exhaust-valves, the exhaust valves are opened from shortly

before BDC up to 40°-45° BTDC. The intake-valves, which are used for supplying compressed air or an air/fuel mixture (claim 17, col. 11) are opened from 40°-45° (col. 12; fig. 5) to 10° BTDC. the supplied compressed air/mixture charge has been in the piston compressor to more than 3 bar (col. 12, 13) by a(n e.g. single piston) compressor (for several working cylinders)."

In a second communication dated 2 August 2004, the primary member had stated the following:

"1. Your comments have been taken into account.

Your remarks concerning US 4565167 A are not true, said document not only deals with the compression ratio but discloses specific charge pressure values, e.g. above 3 BAR, said document reads:

<<During heavy load operation, the nominal compression ratio would be increased by increasing compressor speed until the compression ratio equalled or exceeded the expansion ratio. The speed of the compressor would be decreased during normal operation such as cruising in order to operate in the economical extended expansion mode. It is further envisaged that a reciprocating internal combustion engine according to any of the designs of this invention may have only one compressor cylinder for use in charging a single expander (power) cylinder, i.e., a two-cylinder engine. In this case, the expander cylinder would be of greater volume than the compressor cylinder. Higher than normal compression ratios can be utilized in the gasoline

engines of this invention for the following reasons. The charge being compressed outside the hot firing cylinder will be cooler to begin with (it also will require less power to compress this cooler charge) which causes a corresponding decrease in temperature of the end-gas at peak pressure. Extreme charge turbulence causes mixing of the burned and unburned gases at the flame front greatly increasing the flame speed and allows the flame front to reach any end-gas before the pressure wave arrives. The much smaller combustion chamber (1/4 to 1/6 normal size) presents a much shorter flame path from the spark plug to the end gas, further assuring arrival of the flame front ahead of the pressure wave. Furthermore, the greater expansion of the gases produces a cooler exhaust valve which is in the region of the end-gas which again reduces the chance of detonation. This also reduces the peak pressure temperature. The nominal time between start of compression and peak pressure is much less since compression is done outside the firing cylinder which fact gives the fuel less residence time for pre-knock conditions to occur. **Alternatively, the following system may be used.** The air charge will have such rapid swirl that if fuel injection takes place at the time of sparking and upstream of the spark the burning of the fuel can take place as injection proceeds with the flame front remaining static just downstream of the spark plug leaving no fuel in the end gas. Pre-ignition will not be a problem in the engine of these designs because the residence time of the fuel is less than that required for pre-ignition to occur. **The power of compression ignition engines operating in this working cycle can be greatly**

increased by supercharging. The inlet pressure can be boosted from a slight boost up until the theoretical compression ratio equals or surpasses the expansion ratio. Some locomotives operate with a **supercharge boost of three atmospheres** which, with a compression ratio of 12:1, produces a theoretical compression ratio of 48:1. The power of spark ignition engines can also be greatly increased by similarly boosting the inlet air pressure. This working cycle may under certain conditions, such as when used in a compression ignition engine at very light loads, result in the combustion gases expanding to pressures less than atmospheric. At such conditions the nominal compression ratio can be increased until it is equal to the expansion ratio by increasing supercharge boost, or the expansion ratio can be decreased by closing off one or more of the expander cylinders. The latter can be done by deactivating their intake and exhaust valves along with their respective fuel injector(s)....>>

All the objections put forward on the previous communication are being upheld."

III. On 27 May 2005, the applicant (appellant) lodged an appeal against the decision of the examining division together with the statement of grounds of appeal and paid the prescribed appeal fee on 30 May 2005.

He requested that the decision under appeal be set aside, that the case be remitted to the first instance for further prosecution with claims 1 to 8 as filed with letter of 1 November 2005 and claims 9 to 14 as

filed with letter of 16 March 2006, and that the appeal fee be reimbursed.

- IV. The actual set of claims 1 to 14 does not contain the subject-matter of former claims 16 to 18 which was objected under Article 123(2) EPC in the impugned decision and former claim 13 was amended as claim 12 to read:

"12. An internal combustion engine having at least one cylinder, exhaust valve(s) (6) and valve(s) (7) for the incoming new gas working with the two-stroke principle, whereby each cylinder produces power at every rotation of the crankshaft, **characterised** in that the valve(s) (7) for the incoming new gas include means for feeding scavenging air under pressure of at least 3 bar starting at 60 degrees of the crankshaft before the top dead centre and lasting 20 to 30 degrees time of the crankshaft rotation."

- V. The appellant substantially argued that the opening and closing times of the inlet valves of claim 12 and D1 are different, that the significance of the statements in D1 as to the pressure of super charging is not very high having regard to the claimed subject-matter and that he would have expected a more detailed argumentation of the examiner to be able to respond appropriately.

Reasons for the Decision

1. The appeal complies with the requirements of Articles 106 to 108 and Rules 1(1) and 64(b) EPC and is, therefore, admissible.

2. *Amendments*

2.1 Apart from the correction of some minor errors, only the characterising portion of claim 12 was substantially amended in the appeal proceedings.

These amendments are supported by page 1, last paragraph of the application as filed (which is published under WO 01/42 634 A1). The typical opening time of "120° after lower dead point -30° before the upper dead point" means that the valve is opened at 60° before upper dead point (BTDC) and closed at 30° BTDC resulting in 30° opening time. Moreover, the first sentence of this paragraph teaches that the opening time can be 20° to 30° in the neighbourhood of the upper dead point.

2.2 The amended set of claims does not contain the subject-matter of former claims 16 to 18.

2.3 These amendments do not therefore contravene the requirements of Article 123(2) EPC.

3. *Novelty*

3.1 It is well established practice that any prior disclosure is novelty destroying if the claimed subject-matter can be inferred directly and

unambiguously from that disclosure (see Case Law of the Boards of Appeal of the European Patent Office, 4th edition, I.C.2.3, second paragraph).

- 3.2 D1 discloses (see the embodiment shown in figures 1 to 7, 8, 9, 10 and 11 respectively) an internal combustion engine having at least one cylinder, an exhaust valve (e.g. figure 4) and a valve for the incoming new gas working with the two stroke principle (see e.g. figure 3), whereby each cylinder produces power at every rotation of the crankshaft.

Further, it discloses means which are suitable for feeding scavenging air (inlet duct 16, 17, scavenging valve i and a valve actuation mechanism 25, 26 including a cam 24) under a pressure of at least 3 bars.

- 3.2.1 D1 consistently describes that the scavenging air is subjected to super charging to a higher pressure (see column 4, lines 20 - 31 and column 6, lines 37-43 regarding figure 1; see column 9, lines 35 - 44 regarding figure 9 and column 11, lines 41 - 43 regarding figure 10). In column 11, lines 55 - 62 it is mentioned that any suitable compressor could be employed. The higher pressure is specified in detail with respect to a locomotive (column 14, lines 34 to 41) where a super charge boost of 3 atmospheres is employed.

The board is convinced that the person skilled in the art will, in view of this disclosure, understand the term "high pressure" in the meaning of "at least 3 bar".

3.2.2 From column 4, lines 49 to 65; column 5, lines 1 and 13 for instance, it follows that the intake valve i is opened at 40° BTDC and closed at 10° BTDC. Although it is specified in column 4, lines 53 to 55 that the intake valve i may open earlier, it is not specified when. In contrast, claim 12 requires that the inlet valve is opened at 60° BTDC.

Therefore it can be stated that D1 does not directly and unambiguously disclose the characterising feature of claim 12 and in particular that the means for feeding scavenging air ... open at 60° BTDC.

3.3 Consequently, the subject-matter of claim 12 is new (Article 54(1), (2) EPC).

4. *Remittal*

The amended claims clearly meet the objections on which the decision relied.

Under these circumstances, the board considers it appropriate to exercise its discretion under Article 111(1), second sentence, second alternative EPC to remit the case to the examining division for concluding the examination.

5. *Reimbursement of the appeal fee*

5.1 Rule 67 EPC stipulates that the reimbursement of an appeal fee shall be ordered in the event that the appeal is allowable if such reimbursement is equitable by reasons of a substantial procedural violation.

5.2 According to Article 113 EPC, the decisions of the European Patent Office may only be based on grounds on which the parties concerned have had an opportunity to present their comments. In this context, the word "grounds" should rather be interpreted as referring to the essential reasoning, both legal and factual, which leads to refusal of the application (see T 951/92, OJ EPO 996, see item 3, v).

5.3 In the impugned decision it is stated that D1 "discloses a two stroke engine with an exhaust valve and intake valve -which can also be named scavenger valve- in which pressurised air is lead through the scavenger valve from (letter of 11/03/05) 40° before TDC to 10° before TDC, ...". This fact was mentioned in the examiner's communication of 8 March 2004.

The conclusion drawn from this disclosure was, however, only communicated to the applicant with the impugned decision where the foregoing passage continues "thus during approximately 60° to 30° of the crankshaft before TDC (i.e. during 30°-60° of crankshaft rotation before TDC.)". Moreover the applicant was not informed why the examiner considered that such disclosure takes away the novelty of the last feature of the objected claim.

5.3.1 It is not at all self-evident why the valve timing known from D1 (see above 3.2.2) should be novelty destroying for the different timing described in claim 13 of the impugned decision.

It is appreciated that the opening time is defined in this claim by the relative expression "approximately".

Nevertheless, in the view of the board, this does not extend the matter for which protection is sought to cover an opening time of the inlet valve from 40° to 10° BTDC because this would mean a tolerance of at least 50% which is not realistic.

The board considers that the conclusion drawn from the disclosure of D1 regarding the last feature of the objected claim is an essential and indispensable part for the reasoning of the decision under appeal which was not communicated to the appellant before the decision was issued.

Under these circumstances it could not be expected that the applicant had fully understood the objection raised so that he could have reacted adequately.

Thus, the appellant was not clearly informed of the ground on which the finding of non-compliance was based (see T 951/92, supra, see item 3, v) so that the applicant has had no opportunity to comment upon the alleged violation of Articles 52(1), 54(1), (2) EPC before the decision was issued.

- 5.3.2 For the foregoing reasons, the conclusion drawn from the disclosure of D1 in the decision under appeal cannot be considered as merely an argument which does not change the grounds on which the decision is based.

Therefore, the situation in this case is different to the one in G 4/92 (OJ EPO 1994, 149 see section 10).

- 5.4 The board therefore concludes that the requirements of Article 113(1) EPC are not met which represents a

substantial procedural violation and justifies the reimbursement of the appeal fee according to Rule 67 EPC.

6. For the further prosecution of this case, it should be noted that on page 1, line 23 "ration" should read "ratio".

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The case is remitted to the examining division for further prosecution, with the claims identified above in section III.
3. The request for reimbursement of the appeal fee is allowed.

The Registrar:

The Chairman:

G. Magouliotis

M. Ceyte