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**Datasheet for the decision
of 6 July 2007**

Case Number: T 0353/05 - 3.2.04

Application Number: 01110241.5

Publication Number: 1162356

IPC: F02D 13/04

Language of the proceedings: EN

Title of invention:

Method and apparatus for compression brake enhancement using fuel and an intercooler bypass

Applicant:

MACK TRUCKS, INC.

Opponent:

-

Headword:

-

Relevant legal provisions:

EPC Art. 56

Keyword:

"Inventive step (no) - obvious combination"

Decisions cited:

T 0936/96

Catchword:

-



Case Number: T 0353/05 - 3.2.04

D E C I S I O N
of the Technical Board of Appeal 3.2.04
of 6 July 2007

Appellant: MACK TRUCKS, INC.
2402 Lehigh Parkway South
Allentown, PA 18105-1907 (US)

Representative: Hano, Christian
v. Füner Ebbinghaus Finck Hano
Mariahilfplatz 2 & 3
D-81541 München (DE)

Decision under appeal: Decision of the Examining Division of the
European Patent Office posted 18 November 2004
refusing European application No. 01110241.5
pursuant to Article 97(1) EPC.

Composition of the Board:

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

Summary of Facts and Submissions

- I. This appeal lies from the decision of the Examining Division posted 18 November 2004 in which European patent application No. 01 110 241.5 was refused.

The Examining Division held that the subject-matter of claim 1 did not involve an inventive step starting from D4 (US-A-5 385 019) and combined with D1 (US-A-5 634 447).

- II. This claim 1 reads as follows:

"An internal combustion engine comprising at least one cylinder (16) , a turbocharger (2), an electronic control unit (14) , a compression release brake (9), a compression release brake controller (30) for engaging said compression release brake (9), and a fuel injection assembly (18) which, upon receiving an injection signal from the engine control unit (14), injects a small amount of fuel into the cylinder (16) during a compression stroke of the engine while said compression release brake (9) is engaged, characterized by an intercooler (4) for lowering the temperature of compressed intake air delivered from said turbocharger (2) and for delivery into an intake manifold (7) of the engine, and an intercooler bypass assembly (5) for automatically diverting at least a portion of the compressed air from the turbocharger (2) directly into the intake manifold (7) and around the intercooler (4) upon receiving a bypass signal from the compression release controller (30)".

III. The Applicant lodged the appeal against this decision on 13 January 2005 and paid the prescribed appeal fee simultaneously. The statement setting out the grounds of appeal was received on 24 February 2005.

IV. Oral proceedings took place on 6 July 2007.

The Appellant (Applicant) requested that the decision under appeal be set aside and that a patent be granted on the basis of claims 1 to 14 filed on 5 June 2003.

These claims are identical to those underlying the impugned decision.

V. The Appellant argued essentially as follows:

D4 includes a very clear and unequivocal teaching to the effect that fuel supplied to the engine must be shut off during compression braking (see column 1, lines 13 to 31; column 2, lines 55 to 59). Therefore, the person skilled in the art would not apply the teaching of D1, i.e. to supply fuel to the combustion chamber during operation of the engine brake, on the internal combustion engine of D4.

The compression brake of D1 is disclosed in a combustion engine without an intercooler and cannot be used with the combustion engine of D4 because this engine is provided with an intercooler.

The simultaneous use of the minimum fuel injection and the intercooler bypass of claim 1 causes a synergistic increase in engine braking power and efficiency throughout the speed range.

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. *Inventive step*
 - 2.1 Closest prior art
 - 2.1.1 It is established jurisprudence of the Boards of Appeal that the closest prior art for assessing inventive step is normally a prior art document disclosing subject-matter conceived for the same purpose or aiming at the same objective as the claimed invention and having the most relevant technical features in common, i.e. requiring the minimum of structural modifications (see "Case Law of the Boards of Appeal of the European Patent Office", 5th edition, I.D.3.1).
 - 2.1.2 Documents D1 and D4 both address the problem of improving the engine braking effectiveness (D1: column 1, lines 39 to 41; D4: column 1, lines 58 to 61). Of the features of claim 1, document D1 does not disclose an intercooler and an intercooler bypass assembly. In contrast, document D4 does not disclose the fuel injection assembly. Thus, the internal combustion engine of D4 has more relevant features in common with claim 1 than D1.

Moreover, document D4 appears to be the "most promising springboard" towards the invention (see "Case Law of

the Boards of Appeal of the European Patent Office", 5th edition, I.D.3.4).

2.1.3 Consequently, the closest prior art is represented by document D4.

2.2 Problem and solution

2.2.1 In view of this closest prior art, the problem underlying the invention can be seen in providing an internal combustion engine with an improved engine braking system, as stated on page 3, lines 19 and 20 of the application as filed.

2.2.2 The Board has no doubts that this problem is actually solved in the known internal combustion engine by the feature relating to the fuel injection assembly, which, upon receiving an injection signal from the engine control unit, injects a small amount of fuel into the cylinder during a compression stroke of the engine while said compression release brake is engaged.

2.3 Obviousness of the solution

2.3.1 D1 relates to internal combustion engines with a compression brake with increased engine braking potential. Thus, it addresses the same problem (see column 1, lines 32 to 35) as the application. This is the reason why the skilled person would take this document into consideration.

D1 teaches to inject a small quantity of fuel into the cylinders of the engine on the compression stroke well in advance of the top dead centre (see column 1, lines

49 to 51; column 3, lines 10 to 18) for, as already stated, increasing the braking effectiveness.

The combination of D4 and D1 would thus reveal the subject matter of claim 1, and this was in fact not disputed by the applicant's representative in the oral proceedings.

2.3.2 Yet it was disputed that the person skilled in the art would combine these two documents in the first place. After all, D4 mentions that the fuel supplied to the engine should be cut off during braking (see column 1, lines 27, 28 and column 2, lines 58, 59).

(a) In document D1, conventional combustion engines are described under the heading "THE PRIOR ART" (column 1, lines 20 to 35) in which the fuel supplied to the engine is automatically shut off when the compression brake is activated. Thus, this type of engine control exactly matches the one disclosed in D4, where it is stated in column 2, lines 58 and 59 that the fuel supply to the engine during operation of the brake is "conventionally" turned off.

(b) The invention disclosed in D1, which was filed two years after D4, deviates from this "conventional" operation of combustion engines and explicitly teaches the "adding, rather than restricting, fuel" for increasing the braking potential (see column 1, lines 32 to 57). D1 thus represents an important technological step in adding braking power to an engine, and it is a rather general

teaching that can be applied to all kinds of combustion engines.

- (c) The Board therefore takes the view that the skilled person would, in fact, apply the explicit teaching of D1 on the internal combustion engine of D4 when faced with the problem stated above. When starting from D4 and then to proceed to D1 in chronological order is thus an obvious step to take for the skilled person in order to find the most appropriate and up-to-date solution to the technological problem at issue.

2.3.3 It is true that the combustion engine of D1 is not provided with an intercooler, in contrast to the one of D4. However, this cannot be an obstacle in applying the teaching of D1 to D4, as the latter explicitly teaches to bypass the intercooler during the operation of the compression brake (see column 2, lines 3 to 8). Thus, when the compression brake is activated, the intercooler is not effective. Therefore, nothing speaks against the skilled person applying the general teaching of D1 in order to improve the compression braking system of the D4 engine.

2.3.4 The synergistic effect claimed by the Appellant cannot alter these findings:

- (a) First of all, a synergistic effect, i.e. an advantage could only be taken into consideration for the determination of the problem if it is supported by convincing evidence. This is not the case here.

(b) Secondly, even if this effect had to be taken into consideration the underlying problem would not be different.

(c) Finally, in general, once a realistic technical problem is defined and once it is established that a particular solution to such problem would have been envisaged by a person skilled in the art in the light of the relevant state of the art, then this solution lacks an inventive step. This assessment cannot be altered by the fact that the claimed invention inherently also solves further technical problems (see T 936/96 of 11 June 1999, section 2.6, not published in OJ European Patent Office but mentioned in Case Law of the Boards of Appeal of the European Patent Office, 4th edition, I.D.7.7.1), which, moreover, is not the case here.

2.3.5 In view of the foregoing, the Board concludes that the subject-matter of claim 1 does not involve an inventive step as required by Articles 52(1) and 56 EPC.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

The Chairman:

G. Magouliotis

M. Ceyte