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D E C I S I O N
of 5 October 2005

Case Number: T 0434/03 - 3.2.04

Application Number: 97925913.2

Publication Number: 0901564

IPC: F01L 3/02

Language of the proceedings: EN

Title of invention:
An exhaust valve for an internal combustion engine

Patentee:
MAN B & W Diesel A/S

Opponents:
I. Wärtsilä Schweiz AG
II. Märkisches Werk GmbH
III. TRW Deutschland GmbH

Headword:
-

Relevant legal provisions:
EPC Art. 54, 56, 104, 114(2)
EPC R. 71(2)

Keyword:
"Late-filed material - not admitted"
"Novelty and inventive step - yes"

Decisions cited:
T 1002/92, T 0932/99

Catchword:
-

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Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number: T 0434/03 - 3.2.04

D E C I S I O N
of the Technical Board of Appeal 3.2.04
of 5 October 2005

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Decision under appeal: **Decision of the Opposition Division of the European Patent Office posted 7 February 2003 rejecting the opposition filed against European patent No. 0901564 pursuant to Article 102(2) EPC.**

Composition of the Board:

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

Summary of Facts and Submissions

I. This appeal is directed against the decision of the opposition division dated 7 February 2003 on the rejection of three oppositions against European patent No. 0 901 564.

Opponent II lodged the appeal on 15 April 2003 and simultaneously paid the prescribed appeal fee. The statement of grounds of appeal was received on 17 June 2003.

II. The appellant (opponent II) relied upon the following documents:

D7: EP-A-0 280 467;
D15: "Groß-Motorenteile", leaflet of TRW Thomson GmbH, pages 7, 8, 1987;
D21: technical drawing of an exhaust valve, serial No. 29156;
D22-D25: documents for demonstrating that the prior use exhaust valves were available to the public;
D26: technical analysis of an exhaust valve;
D27: diagram "Nickel Alloys $R_{p0,2}$ vers. Hardness";
D28: hardness conversion table (DIN 50 150);
D29: Metals Handbook, 1990, Table 5.

Documents D7 and D15 were filed with the notice of opposition, D21-D29 with the statement of grounds of appeal. D21-D26 refer to an alleged public prior use of exhaust valves.

Further, the appellant offered two witnesses for proving the prior use.

The respondent (patent proprietor) additionally relied upon documents A2-A12 of which the following are relevant to this decision:

A4: photographs of analysed valves;
A5: diagram of hardness measurements of exhaust valves;
A8: characteristics of selected nickel-base alloys;
A9: diagram of properties of Inconel 718.

III. With the summons to oral proceedings, the board had expressed its preliminary view that the exhaust valves prior use did not appear to be sufficiently substantiated to be admitted into the proceedings under Article 114(1) EPC. Further, the parties were informed that the subject-matter of the independent claims appeared to be new and inventive in view of documents D7, D15, D28 and D29.

IV. Oral proceedings took place on 5 October 2005. The duly summoned appellant and the parties to the proceedings (opponents I and III) had notified the board beforehand of their intention not to attend the oral proceedings and were not present.

In accordance with Rule 71(2) EPC the oral proceedings were held in their absence.

V. The appellant requested in writing:

- that the decision of the opposition division be set aside and the European patent be revoked, and
- that documents D21-D29 be admitted into the appeal proceedings.

The respondent requested:

- that the appeal be dismissed and that the patent be maintained, or in the alternative,
- that the decision under appeal be set aside and European patent be maintained on the basis of one of the sets of claims according to the first to fifth auxiliary requests submitted with letter dated 31 October 2003; and
- that documents D21-D29 be disregarded;
- that documents A2-A12 be admitted into the proceedings; and
- that the costs incurred by the late submissions of the appellant in relation to the alleged prior use be apportioned to the appellant.

VI. The appellant's submissions may be summarised as follows:

(a) The subject-matter of claims 1 and 7 is not new with respect to the prior use exhaust valves.

(i) D26 discloses a yield strength of at least 1300 MPa and a hardness in the seat area of at least 450 HV10 for an analysed exhaust valve of the series "29156" which was

manufactured after the priority date of the patent in suit. The exhaust valves of the series "29156" (D21) manufactured before the priority date must have had the same properties because their manufacture remained unchanged since 1990. The seat area was always treated with the same thermo-mechanical process.

(ii) The exhaust valves of the series "29156" (D21) manufactured before the priority date must have had the claimed yield strength because all known nickel alloys having a hardness of HV > 400 have a yield strength of more than 1000 MPa as is known from D27. Moreover, the current materials have achieved hardness values which realise the claimed yield strength values.

(b) Moreover, from D27 it follows that the subject-matter of claims 1 and 7 is not new with respect to D15 or D7 when taking D28 into consideration.

(c) Finally, the subject-matter of claim 1 does also not involve an inventive step, because it is obvious from D29 taken alone or in combination with D27.

VII. The respondent's submissions may be summarised as follows:

(a) The subject-matter of claims 1 and 7 is new and involves an inventive step because none of the cited documents demonstrates that, prior to the

priority date of the patent in suit, exhaust valves having a yield strength of at least 1000 MPa at a temperature of approximately 20°C in the seat area of the valve disc were known. This also applies to the use of a nickel-based chromium-containing alloy with such yield strength in exhaust valves.

(b) The appellant's submission that the D21 valves were manufactured since 1990 such that the relevant properties of the exhaust valves remained unchanged, and in particular that the seat area was always treated with the same thermo-mechanical methods (see statement of grounds of appeal, paragraph bridging pages 5 and 6) is an intentionally wrong statement that was costly to contradict. In making such statement, "the appellant neglected the principle of good faith when he wilfully presented facts and made a procedural statement which he knew were incorrect and misleading …" (see respondent's fax of 4 October 2005) which would justify the apportionment of costs to the appellant.

VIII. The independent claims as granted read as follows:

"1. An exhaust valve for an internal combustion engine particularly a two-stroke crosshead engine, comprising a movable spindle with a valve disc of a nickel-based alloy, which also constitutes an annular seat area at the upper surface of the valve disc, which seat area abuts a corresponding seat area on a stationary valve member in the closed position of the valve, the seat area of the valve disc having been subjected at its

manufacture to a thermo-mechanical deformation process at which the material is at least partially cold-worked, characterised in that the valve disc is made of a nickel-based alloy which can achieve a yield strength of at least 1000 MPa, and that the seat area at the upper surface of the valve disc has been given dent mark preventing properties in the form of a yield strength (R_{p02}) of at least 1000 MPa at a temperature of approximately 20°C by means of the thermo-mechanical deformation process and possibly a yield strength increasing treatment."

"7. Use of a nickel-based chromium-containing alloy with a yield strength of at least 1000 MPa at approximately 20°C as a dent mark limiting or preventive material in an annular seat area at the upper surface of a movable valve disc in an exhaust valve for an internal combustion engine, particularly a two-stroke crosshead engine, the seat area abutting a corresponding seat area on a stationary valve member when the valve is closed."

Reasons for the Decision

1. The appeal complies with the requirements of Articles 106 to 108 and Rule 64 EPC and is therefore admissible.

2. *State of the art*

2.1 Documents filed with the notice of opposition

2.1.1 Document D15 relates to an exhaust valve for a large sized internal combustion engine. It discloses (see page 8, right column, second paragraph) that the hardness in the seat area of 40 to 50 HRC can be achieved by a thermo-mechanical treatment. However, it does not disclose that the material of the seat area has been at least partially cold-worked and provides a yield strength of at least 1000 MPa at a temperature of approximately 20°C.

2.1.2 Document D7 relates to a manufacturing method for engine valves. It discloses (see e.g. fig. 2) that the hardness in the seat area of 40 to 47 RC can be achieved by a thermo-mechanical treatment, in particular by cold working (see page 5, lines 3, 4). However, it also does not disclose that the material of the seat area has a yield strength of at least 1000 MPa at a temperature of approximately 20°C.

2.2 Documents filed with the statement of grounds of appeal

2.2.1 General considerations

Documents D21-D29 were cited for the first time in the statement of grounds of appeal. It is well established case law of the boards of appeal that such late-filed material should only exceptionally be admitted into the proceedings, for instance for their relevance, i.e. their evidential weight in relation to other documents already in the proceedings (see Case Law of the Boards of Appeal of the European Patent Office, 4th edition, VI.F.2. and in particular decisions T 1002/92, OJ 95, 605 and T 932/99, not published in the OJ EPO, cited therein).

Material filed in response to a change of the subject of the proceedings cannot, however, be disregarded.

2.2.2 Documents D21 - D25

D21 is a technical drawing of an exhaust valve of the series "29156". It indicates that the entire valve disc should be made of NIMONIC 80A and be provided with a hardness of HV > 400 at the valve disc seat area.

Neither D21 nor D22-D25 address the yield strength of the valve material at all or disclose a yield strength of at least 1000 MPa at a temperature of approximately 20°C for the seat area or that the seat area has been at least partially cold-worked.

2.2.3 Document D26

This document discloses a yield strength of at least 1300 MPa and a hardness in the seat area of at least 450 HV10 for an analysed exhaust valve of the series "29156" which was manufactured after the priority date of the patent in suit.

However, the board does not share the appellant's view that exhaust valves of this series manufactured before the priority date must have had the same properties as those manufactured thereafter, and that the seat area was always treated with the same thermo mechanical process.

The comparison of the properties of exhaust valves manufactured prior to the patent's priority date with

those manufactured after this priority date reveals that their grain structure is different.

Figs. 3 and 4 of A4 relate to an exhaust valve manufactured prior to the patent's priority date and show a uniform grain structure throughout the cross-section of the test sample. Fig. 2 of A4 relates to an exhaust valve manufactured after the patent's priority date and shows, in contrast, a dual grain structure, fine grains directly below the valve seat area and more coarse grains further down below the seat area.

Moreover, as is shown in A5, the hardness and distribution values of exhaust valves manufactured prior to and after the patent's priority date are different.

In view of the foregoing, the board concludes that the thermo-mechanical treatment of the exhaust valves and thus the properties of the exhaust valves manufactured prior and after the patent's priority date were different. Therefore, D26 cannot demonstrate that the exhaust valves manufactured according to D21-D25 before the priority date of the patent in suit had the yield strength mentioned in claims 1 and 7.

2.2.4 D27

D27 is a diagram produced by the appellant with data from reference books. The appellant tried to demonstrate a direct relationship of the hardness and yield strengths for nickel-based alloys, i.e. that a low hardness always results in a low yield strength and

a high hardness always results in a high yield strength. However, the board does not share this view.

D27 is incomplete because it does not contain values for all nickel-based alloys, in particular those having a large hardness and low yield strength. If the values for those nickel-based alloys identified in A8 were included, the line shown in D27 would look different. Thus, the line is not representative for all nickel-based alloys.

For Nimonic 80A, only a single value of 600 MPa for the yield strength is shown. However, the yield strength of nickel-based alloys having the same hardness can differ considerably depending on their thermo-mechanical history. This can be seen, for instance, in A9 in which the yield strength and the hardness is shown for Inconel 718, a Ni-Cr-alloy, being subjected to hot forging or cold working.

These findings are consistent with the appellant's submissions in the letter of 21 September 2005 in which he admits that the hardness and yield strength are not exactly linked.

Furthermore, there is no evidence that the nickel-based alloys used for producing D27 were known at the patent's priority date.

Thus it is concluded that D27 does not establish that all known nickel-based alloys having a hardness of HV > 400 have a yield strength of more than 1000 MPa.

Moreover, in the absence of any evidence, the board could not accept the appellant's argument that the current materials have achieved hardness values which realise the claimed yield strength values.

Therefore, D27 cannot demonstrate that the exhaust valves manufactured according to D21-D25 before the patent's priority date or the valves known from D15 or D7 had the yield strength mentioned in claims 1 and 7.

2.2.5 Hearing of the witnesses

The appellant had offered the hearing of two witnesses in connection with all issues related to the prior use ("für alle im Zusammenhang mit der offenkundigen Vorbenutzung gemachten Angaben"). Such an offer does not set out in a sufficiently precise manner the facts in respect of which the witness shall be heard. Furthermore, the appellant did not give a sufficiently clear indication as to which circumstances might have enabled the witnesses to prove the written statements, and their connection to the evidence concerned.

Finally such an offer of witness evidence does not relate to the crucial aspect of the alleged prior use, namely as to whether the exhaust valves manufactured according to D21-D25 before the priority date had a yield strength R_{p02} of at least 1000 MPa at a temperature of approximately 20°C in the seat area of the valve disc.

It goes without saying that this cannot be established by hearing two witnesses but rather by a technical analysis of an exhaust valve according to D21-D25

manufactured before the priority date of the patent in suit. Nor can the hearing of the two witnesses establish that the seat area properties of valves according to D21-D25 manufactured after the priority date are the same as those of the valves according to D21-D25 manufactured prior the priority date. This fact can only be evidenced by a technical analysis of valves manufactured prior and after the priority date of the patent in suit and a comparison of the measured properties. This means that the evidence offered would have been immaterial to the board's decision on the alleged prior use.

Therefore, the board saw no reason to summon the witnesses.

2.2.6 In view of the foregoing, it is summarised that from these documents it is not known to provide a yield strength of at least 1000 MPa at a temperature of approximately 20°C for the seat area of an exhaust valve.

Therefore, the late-submissions would not change the outcome of the proceedings and, thus, are not relevant for this decision.

Consequently, the documents D21 to D27 were not admitted into the proceedings (Article 114(2) EPC).

2.2.7 Documents A2-A12

The documents were filed by the respondent as counter-evidence in response to the appellant's late submissions and are therefore admitted.

2.2.8 Documents D28, D29

These documents are admitted into the appeal proceedings, as D28 was useful for the conversion of the hardness based on different systems and D29 was the only document in which the yield strength of the valve disc made of a nickel-based alloy is addressed.

3. *Novelty*

3.1 Neither D7 nor D15 considered alone or in combination with D28 address the yield strength of the valve material at all or disclose that the seat area is provided with a yield strength of at least 1000 MPa at a temperature of approximately 20°C.

Although D29 mentions a yield strength of 976 MPa, it does not disclose a yield strength of at least 1000 MPa.

3.2 The subject-matter of claim 1 and 7 is therefore new (Article 54(1),(2) EPC).

4. *Inventive step*

4.1 The appellant argued that it would be obvious for the person skilled in the art, when combining D29 with the known fact that hardness and yield strength are linked (D27), to extend the disclosed value for the yield strength of 976 MPa to at least 1000 MPa. However, the board could not accept this view because it was not supported by evidence other than D27 that could demonstrate where and why the skilled person would find an incentive to do so (see also 2.2.4. above).

The appellant further questioned whether the claimed alloy with a yield strength of at least 1000 MPa essentially differed from the alloy of D29 with a yield strength of 976 MPa. Also in this respect the board was unable to agree because this point was not supported by any convincing evidence and the burden of proof for this argument lies with the appellant.

4.2 In the absence of any teaching regarding the yield strength of at least 1000 MPa for the valve seat, the person skilled in the art could not arrive at the subject-matter of claims 1 and 7 without inventive considerations.

Consequently, the subject-matter of claims 1 and 7 also involves an inventive step (Article 56 EPC).

5. In view of the foregoing, it was not necessary to consider the auxiliary requests.

6. *Costs*

6.1 Article 104 EPC stipulates that each party to the proceedings shall meet its costs unless the board of appeal orders a different apportionment of costs for reasons of equity.

6.2 The respondent invited the board to deviate from the general rule expressed in Article 104 for those costs the respondent incurred in order to disprove the alleged prior use. He argued that the analyses of exhaust valves had become necessary only because the appellant rather fecklessly claimed that the properties

of the D21 exhaust valves manufactured prior and after the priority date were the same. These analyses -in his view- convincingly proved that this was not the case.

6.3 While the board has some sympathy for the respondent's point of view, it needs to be stressed that disproving allegations made by the opposing party in the procedures before the board is nothing out of the ordinary for a party when preparing its case. Moreover while the board might have taken a different view if there had been proof of the appellant's intention to wilfully supply wrong or misleading information, the current case does not give rise to such considerations. The board thus feels unable to entertain the respondent's request for a corresponding apportionment of costs.

Order

For these reasons it is decided that:

1. The appeal is dismissed.

2. The respondent's request for apportionment of costs is rejected.

The Registrar: The Chairman:

G. Magouliotis M. Ceyte