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Bezeichnung der Erfindung: Fuel injector valve
Title of invention:
Titre de l'invention :

Klassifikation / Classification / Classement : F 02 M 51/08

ENTSCHEIDUNG / DECISION
vom / of / du 20 January 1987

Anmelder / Applicant / Demandeur :

Patentinhaber / Proprietor of the patent /
Titulaire du brevet : NISSAN MOTOR COMPANY, LIMITED

Einsprechender / Opponent / Opposant : Robert Bosch, GmbH
Drägerwerk AG

Stichwort / Headword / Référence :

EPÜ / EPC / CBE Articles 54(3), 56 and 83; Rule 27(1)(d)

Kennwort / Keyword / Mot clé : "Earlier European Patent application - equivalents not embraced" - "Inventive step" - "Disclosure of the invention" - "Technical problem and its solution"

Leitsatz / Headnote / Sommaire

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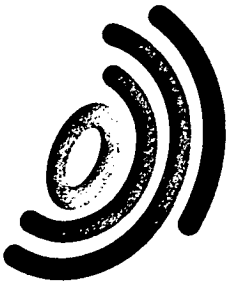

Case Number : T 167 /84

D E C I S I O N
of the Technical Board of Appeal 3.2.2
of 20 January 1987

Appellant : (Opponent 01)
Robert Bosch GmbH
Robert-Bosch-Platz 1
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Representative :

Respondent : (Proprietor of the patent)
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Further party to the proceedings (Opponent II):
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Representative :
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Decision under appeal : Decision of Opposition Division of the European Patent Office dated 9 February 1984 rejecting the opposition filed against European patent No. 0 007 724 pursuant to Article 102(2) EPC dispatched on 14 June 1984.

Composition of the Board :

Chairman : C. Maus
Member : H. Seidenschwarz
Member : P. Ford

Summary of Facts and Submissions

I. European patent No. 7 724 comprising twelve claims was granted to the Respondent on 12 May 1982 in response to European patent application No. 79 301 303.8 filed on 6 June 1979 and claiming the priority of a previous application of 6 July 1978.

Claim 1 reads as follows:

"1. A fuel injector valve including:
a fuel chamber (26);
fuel inlet means (22, 24) for introducing fuel into said chamber;
an outlet through which fuel exits from said chamber;
a non-magnetic valve set (30) surrounding said outlet;
a main magnetic pole member (18) having one end (18c) spaced from the opposed to said valve seat, said main magnetic pole member (18) being cylindrical;
a side magnetic pole member (34) surrounding the space between said valve seat and the end (18c) of the said main magnet pole member;
a magnetic spherical valve member (28) located in said space, said valve member (28) being movable between an open position spaced from said valve seat (30) by a first clearance and in contact with the end (18c) of said main magnetic pole member (18) when said main magnetic pole member is magnetically energized, and a closed position spaced from the end (18c) of said main magnetic pole member (18) and in contact with said valve seat (30) when said main magnetic pole member (18) is magnetically de-energized and said valve member is acted upon by fuel in said chamber; and
guide means (F_1, F_2) associated with said valve seat (30) and the end (18c) of said main magnetic pole member (18) for maintaining a second clearance between said valve

member (28) and said side magnetic pole member (34) so that said spherical valve member (28) is prevented from contacting said side magnetic pole member (34); characterised by a fuel inlet passageway (22, 24) extending axially through the main magnetic pole member (18), which passageway forms said fuel inlet means, and intermediate passageway means (18d, 34a) for accommodating a flow of fuel from said fuel inlet passageway (22) to said first clearance while bypassing said second clearance."

II. Oppositions were independently filed by the Appellant and by another party (Opponent II) requesting the revocation of the patent. In support of their requests, the Opponents referred to fifteen documents as well as the documents cited as references in the search report or in the patent specification.

III. After considering the Grounds for Opposition, the Opposition Division rejected the oppositions at the conclusion of the oral proceedings of 9 February 1984. The written statement of reasons for the decision was dispatched on 14 June 1984.

IV. On 13 July 1984, the Appellant lodged an appeal against the decision, requesting that the decision under appeal should be set aside and that the patent should be revoked in its entirety. Subsidiarily he requested oral proceedings. The fee for appeal was paid on 28 July 1984.

The Statement of Grounds of the Appeal was received on 11 October 1984.

V. In his Statement and during the oral proceedings which took place on 20 January 1987, the Appellant maintained the following objections to the patent:

a) The subject-matter of Claim 1 lacked novelty having regard to DE-A-2 147 710 and, alternatively, in conformity with Article 54(3) EPC, the earlier European patent application No. 79 301 297.2 (publication number 6769). In respect of this application, the Appellant argued that the disclosure of an earlier European application also embraced equivalents which were not explicitly disclosed. He referred to Part C IV, 7.4 of the "Guidelines" which he contended supported his interpretation, rather than Part C IV, 7.2 cited by the Board, as did the EPC itself which was not so restrictive as the "Guidelines".

b) No technical teaching comprising a problem and its solution could be understood from the patent specification, which was therefore open to objection under Article 100(b) EPC, in conjunction with Article 83 and Rule 27(1)(d) EPC.

c) Present Claim 1 protected subject-matter which should be protected in the earlier application No. 79 301 297.2. Double-patenting was, however, unallowable under the EPC.

d) The fuel injector valve according to Claim 1 involved no inventive step having regard to the state of the art.

e) Claim 1 was incorrectly delimited.

Opponent II who is a party to the appeal proceedings as of right in accordance with Article 107 EPC, adopted in the

oral proceedings the objections put forward by the Appellant.

The Respondent requested that the appeal should be dismissed and that his costs in the appeal should be reimbursed under Article 104 EPC. He contested the arguments of the other parties and was of the opinion that the subject-matter of Claim 1 was novel and unobvious.

Reasons for the Decision

1. The appeal complies with Articles 106 to 108 and Rule 65 EPC. It is, therefore, admissible.

2. The invention concerns an electromagnetically operated fuel injector valve which is suitable for a so-called single point fuel injection (SPI) system.

Reading the statements in the introductory part of the description, the person skilled in the art would learn that the state of the art available to the public before the claimed date of priority included various types of electromagnetically operated valves.

One of them was provided with an elongate valve member which is slidable in an elongate valve member guide. This valve could, however, not satisfy the requirements of an SPI system as the frequency of practical vibration of the valve member was too low (cf. column 1, lines 47 to 51, EP-A1 0 007 724).

Another type was disclosed in DD-A-97 026 (corresponding to DE-A1-2 147 710, cited by the Appellant). This valve comprised a magnetic spherical valve member which is movable within a fluid chamber between a non-magnetic

valve seat, surrounding an outlet in the chamber, and the end of the magnetic pole member, and a side member guiding the valve member. From the cited document the skilled person could further learn that a spring could bias the valve member toward the valve seat but that this was not a necessary feature of this valve.

3. Bearing in mind this state of the art the person skilled in the art would understand immediately that the injector valve disclosed in DD-A-97 026 solves already the following problems which according to column 3, lines 1 to 30 of the description the invention is intended to solve:

a) to render unnecessary the use of an elongate valve member guide which requires high precision machining in production.

b) to enable a spring for biasing the valve member to the valve seat member to be omitted.

It should also be noted that the Respondent admitted in the oral proceedings that the invention was concerned with an improvement of a fuel injector valve comprising a spherical valve member.

Concerning the other problems mentioned in the place cited, it should be remarked that the state of the art referred to during the procedure and published before the priority date comprised no electro-magnetically operated fuel injector valve including a side magnetic pole member. Such member is an element of the injector valve which is disclosed in the earlier application No. 79 301 297.2 and which is also discussed in the introductory part of the description (cf. column 1, line 52 and following).

The Appellant put forward no argument that the fuel injector valve according to the closest prior art (DD-A-97 026) solved already the other problems.

Hence, the technical problem can be understood as it is stipulated in Rule 27(1)(d) EPC. The objection of the Appellant referring to the problem is, therefore, not justified.

4. In the Board's judgement the subject-matter of Claim 1 solves the problems existing in a fuel injector valve of the type disclosed in DD-A-97 026. It follows from the description of the patent specification, taken as a whole, that the providing of a side magnetic pole member and the splitting up of the fuel flow into a main flow streaming through the intermediate passageway means and into a lesser fuel flow occuring through the clearance between the valve member and the side magnetic pole is advantageous in several respects:

As a side magnetic pole member is located in close proximity to the surface of the spherical valve member, the magnetic force acts more effectively on the valve member (cf. column 5, lines 3 to 13 and column 9, lines 26 to 33 of the description). This causes an improvement in the response characteristics of the valve. Lateral vibrations of the valve member which are influenced by the volume of fuel flowing along the surface of the spherical valve member are reduced by means of the through holes of the side magnetic pole member (cf. column 6, line 33 to column 7, line 6). The smooth and stable opening and closing actions of the valve member are, therefore, better as compared with an injector valve without through-holes.

Contrary to the opinion of the Appellant the invention fulfils, therefore, the requirements of Rule 27(1)(d) EPC also in this respect.

5. Concerning the question as to whether or not a technical teaching comprising a problem and its solution could be understood from the patent specification the Appellant referred also to Article 100(b) EPC in conjunction with Article 83. He gave, however, no reason why the skilled person could not carry out the invention on the basis of the instructions which the patent as granted includes, in compliance with these Articles.

The Board considers also the objection of the Opponent II unjustified according to which specifications concerning the dimensioning of the clearance defined between the valve member and the side magnetic pole member were necessary. It is within the scope of normal considerations of the person skilled in the art to determine the width of the clearance with regard to the requirements which the valve shall fulfil.

6. The Board cannot agree with the opinion of the Appellant that the subject-matter of Claim 1 lacked novelty against DE-A1-2 147 710. This follows already from the fact that the member 19 of the injector valve disclosed in this document is not a side magnetic pole member but a member guiding the spherical valve member. Since this difference is sufficient to prove the novelty it is not necessary to detail the other features which distinguish the invention from this valve.

EP-A-6 769 which is to be taken into consideration with regard to Article 54 EPC also does not take away the novelty of the valve according to Claim 1. The Appellant conceded that the whole content of this document including

any features implicit to a person skilled in the art failed to disclose a valve which comprises completely the features mentioned in Claim 1. He is, however, of the opinion that the "whole contents" of an older document within the meaning of Article 54(3) EPC comprise also features which are equivalents to the features according to the document. In support of his view he refers to the EPC and Part C, Chapter IV, No. 7.4 of the "Guidelines".

The Board cannot agree with this point of view on the following grounds: In order to mitigate the harsh effects of the "whole contents approach", its application is confined to novelty (cf. Article 56 EPC, second sentence). Further, in order to reduce the risk of "self collision" it has always been considered justified to adopt a strict approach to novelty. For this reason, Part C, Chapter IV, No. 7.2 of the Guidelines expressly states that "when considering novelty, it is not correct to interpret the teaching of a document as embracing well-known equivalents which are not disclosed in the document; this is a matter of obviousness". This approach has been consistently followed in the practice of the European Patent Office and the Appellant completely failed to satisfy the Board that it is wrong on any ground.

Having examined the other documents published before the date of priority as claimed, the Board has come to the conclusion that the subject-matter of Claim 1 is novel having regard to this prior art. Since the Appellant raised no objection against novelty as far as that state of the art is concerned no detailed substantiation of the matter is required here.

Hence, the injector fuel valve according to Claim 1 is new having regard to the prior art in the meaning of Articles 54(2) and (3) EPC.

7. From the reasons given above it follows that a patent granted in the earlier application No. 79 301 297.2 would, therefore, not protect the same subject-matter as the present Claim 1.

8. Concerning the question as to whether or not the injector fuel valve according to Claim 1 was obvious, the following should be observed:

8.1 The skilled person learns from DE-A1-2 147 710 that it is appropriate to provide a guide member if the magnetic valve member of the injector fuel valve disclosed in the document consists of a spherical valve member which is disposed within the chamber into which the fuel is admitted. It guides the spherical valve member straight on the magnetic pole member if the valve member moves laterally at the beginning of its opening movement. The guide member fulfils, therefore, in principle the same purpose as the guide rod 50 in the event that the magnetic valve member consists of a cylindrical valve member 18a. According to page 16 of the document the combination of a spherical valve member and of a guide member is more advantageous insofar as the friction does not obstruct the opening movement of the valve considerably.

This document does not comprise, therefore, any teaching which directed the considerations of the skilled person towards the subject-matter of Claim 1 even if it would be supposed that the fuel could also flow through the clearance between the valve member and the guide member which, however, is not mentioned in the document.

8.2 The statement of the Appellant is correct that the prior art in the technical field of electromagnetically operated fuel valves included valves comprising a side magnetic

pole member for concentrating the magnetic field (cf. DE-A1-2 262 488, DE-B1-1 500 223, US-A-3 731 880 and DE-C1-743 620 to which the Appellant referred in this respect during the oral proceedings). In the Board's view, these valves would, however, not suggest the idea to provide in a valve of the type disclosed in DD-A-97 026 the features mentioned in the characterizing portion of Claim 1 for the following reasons:

8.2.1 The side magnetic pole member of the electromagnetically operated fuel valve according to DE-A1-2 262 488 consists essentially of a cylindrical body. It guides the spherical valve member without clearance. The fuel flows through longitudinal slots provided in the body.

8.2.2 The same principle underlies the construction of the side magnetic pole member of the valve described in DE-B-1 500 223. The cylindrical body constituting likewise a member guiding the spherical valve member is furnished with side channels through which the fuel flows as soon as the valve opens.

8.2.3 It follows from the description of the valve disclosed in US-A-3 731 880 that the fuel flows laterally to the valve seat. Hence, it does not pass the circular opening in the annular flux guide which guides the magnetic valve member.

8.2.4 The valve member of the electromagnetically operated fuel injector valve according to DE-C1-743 620 is provided outside the magnetic circle. The fuel enters the valve housing laterally and flows in toto through the holes which are provided in a guide member guiding the valve member which consists of a cylindrical body.

8.2.5 From the foregoing discussion, it follows that even a combination of the teachings of the cited documents would not suggest the subject-matter of Claim 1 as a solution of the entire problem as discussed in paragraph 3 which underlies the invention.

8.3 The other citations are further from the valve according to Claim 1 than the publications discussed in the foregoing paragraphs. Their teachings could, therefore, neither per se nor in combination with the teachings of the other documents lead the skilled person to the fuel injector valve according to Claim 1.

8.4 This valve involves, therefore, an inventive step within the meaning of Article 56 EPC.

9. The Board agrees with the Respondent's (Patentee's) view that it would have been more appropriate to derive the preamble of Claim 1 from the valve disclosed in DD-A-97 026 instead of the valve according to EP-A1-0 006 769. If this had been done the discrepancy in the present specification would have been avoided that the preamble of Claim 1 does not refer to the valve representing the closest prior art according to Article 54(2) EPC and, therefore, forming the basis for determining the problem underlying the invention. In the present case the derivation of the preamble from the closest prior art document would, however, only lead to a re-arrangement of the features and not to a further restriction of the protection. As the patent is granted, however, the opportunity for such an improvement of the text of the claim has passed. The wording of the claim should, therefore, remain unamended.

10. Consequently, the patent can be maintained with Claim 1 in the wording as granted and with Claims 2 to 12 which concern particular embodiments of the valve according to Claim 1.

11. Concerning the Respondent's request for an award of his costs incurred by reason of the oral proceedings, the Board considers that, for reasons of equity, such an award should be made (Article 104(1) and Rule 63 EPC). The oral proceedings were held at the request of the Appellant, not at the request of the Respondent, and the Appellant failed to succeed on any point. No new point was introduced at the oral proceedings by the Appellant and the case could have been decided without oral proceedings. Furthermore, the Respondent's representative was required to travel a considerable distance to attend the oral proceedings.

Order

For these reasons, it is decided that:

1. The appeal is dismissed.

2. The costs incurred by the Patentee in respect of the oral proceedings shall be paid to the Patentee by the Appellant.

The Registrar: The Chairman:

B.A.Norman C. Maus

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