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**Datasheet for the decision
of 8 May 2013**

Case Number: T 0980/11 - 3.2.03

Application Number: 02252910.1

Publication Number: 1253377

IPC: F23Q 7/00

Language of the proceedings: EN

Title of invention:

Heater, glow plug and water heater

Patent Proprietor:

NGK SPARK PLUG CO., LTD

Opponent:

BERU AG

Headword:

-

Relevant legal provisions:

EPC Art. 54, 56

Keyword:

"Novelty (yes): inventive step (yes)"

Decisions cited:

-

Catchword:

-



Case Number: T 0980/11 - 3.2.03

D E C I S I O N
of the Technical Board of Appeal 3.2.03
of 8 May 2013

Appellant: BERU AG
(Opponent) Mörikestr. 155
D-71636 Ludwigsburg (DE)

Representative: Kotitschke & Heurung Partnerschaft
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Respondent: NGK SPARK PLUG CO., LTD
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Representative: Nicholls, Michael John
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Decision under appeal: Interlocutory decision of the Opposition
Division of the European Patent Office posted
10 February 2011 concerning maintenance of
European patent No. 1253377 in amended form.

Composition of the Board:

Chairman: U. Krause
Members: G. Ashley
E. Kossonakou

Summary of Facts and Submissions

- I. European patent EP-B1-1 253 377 relates to a heater that can be used as glow plug for diesel engines or for heating water. Grant of the patent was opposed on the basis that the subject-matter is neither new nor has an inventive step (Article 100(a) EPC).
- II. The Opposition Division concluded that the amended claims of the main request were allowable and hence decided that the patent could be maintained in amended form. The decision was posted on 10 February 2011.
- III. The Opponent (hereafter the Appellant) filed notice of appeal on 20 April 2011, paying the appeal fee on the same day. A statement containing the grounds of appeal was filed on 20 June 2011.
- IV. Oral proceedings took place on 8 May 2013.
- V. Requests

The Appellant requested that the decision under appeal be set aside and the patent be revoked.

The Respondent requested that the appeal be dismissed and the patent be maintained in the form allowed by the Opposition Division.

- VI. Claims

Claim 1 of the main request reads as follows:

"1. A heater comprising:

a metal sheath (3);

a heating element (6) that is connected to the inner surface of the metal sheath (3) at one end thereof;

a center pole (4) that is extending from an opening of the metal sheath to an interior of the metal sheath and directly or indirectly connected to the heating element (6);

an insulating material (14) that is packed in the interior of the metal sheath (3);

and

an elastic packing (15),

wherein the opening of the metal sheath (3) is closed by sealing of a gap between the metal sheath (3) and the center pole (4) with the elastic packing (15), said elastic packing (15) having a portion between the metal sheath (3) and the center pole (4),

further comprising a metal shell (2) having an engagement portion (2a), wherein the metal sheath (3) forms an interference fit with the engagement portion (2a) of the metal shell at a fixed portion (3a) of the metal sheath (3),

wherein said metal sheath (3) has a small outer diameter portion (3b) having an outer diameter smaller than an inner diameter of the engagement portion (2a),

wherein a difference in diameter between the small outer diameter portion (3b) of the metal sheath (3) and an inner diameter of the engagement portion (2a) of the metal shell (2) is from 0.02 mm to 0.5 mm,

wherein the small outer diameter portion (3b) is between the fixed portion (3a) and the opening, and an axial length (L2) of the small outer diameter portion (3b) is greater than the axial length (L1) of the portion of the elastic packing (15),

characterised by the axial length (L1) of said portion of the elastic packing (15) being not smaller than 2.5 mm."

Dependant claims 2 to 7 and 9 concern preferred embodiments of the heater of claim 1. Claim 8 refers to a glow plug as being a heater according to claims 1 to 7.

VII. Cited Documents

The following evidence was considered by the Opposition Division.

(a) In Support of First Prior Use (D):

D1: Invoice addressed to J. Eberspaecher GmbH & Co., Esslingen, dated 30.03.1999;

D2: Technical drawing of a glow plug, numbered A 0 100 226 228, dated 06.09.94, with latest changes dated 03.12.97;

D3: Technical drawing of a heating rod,

numbered 1 105 500 061 0500, dated 05.09.94,
with latest changes dated 08.11.99;

- D4: Technical Drawing of an O-Ring,
numbered 3 000 358 600 000, dated 15.08.94;
- D5: Parts List for a glow plug,
numbered 0100.226.228.07.00;
- D6: Photographs of a sectioned glow plug;
- D7: Sectioned glow plug.

- D10: Technical drawing of the unaltered glow plug
of D2;
- D11: Technical drawing of a glow plug,
numbered 0 100 226 228 000, dated 06.09.94;
- D12: Technical drawing of a heating rod,
numbered 1 105 500 061 000, dated 05.09.94;
- D13: Technical drawing of a glow plug body,
numbered 2 100 120 093 000, dated 05.09.94;
- D14: Technical drawing of a glow plug body,
numbered 2 101 123 141 000, dated 05.09.94;
- D15: Parts list for a glow plug,
numbered 0100226228, dated 06.09.94;
- D16: Angebotszeichnung (1994/1997),
entitled "Beispiel 0100.226.228";
- D17: Pictures of a sectioned glow plug,
entitled "Beispiel 0100.226.228";
- D18: Picture of an X-ray, "Röntgenbild Pressitz mit
Bereich Heizstababdichtung", with the heading
"Beispiel 0100.226.228".

(b) In Support of the Second Prior Use (E):

- E1: Invoice addressed to Renault VI, Saint-Priest,
dated 31.03.1999;

- E2a: Technical drawing of a glow plug,
numbered 0 100 221 135-A, dated 07.07.1983,
with latest changes dated 24.06.87;
- E2b: Technical drawing of a glow plug,
numbered A 0 100 221 135, dated 06.03.96,
with latest changes dated 16.12.98;
- E3: Technical drawing of a heating rod,
numbered 1 106 400 186 0100, dated 28.06.94,
with latest changes dated 09.12.96;
- E4: Technical drawing of an O-Ring,
numbered 3 000 358 400, dated 16.07.92,
with latest changes dated 25.01.00;
- E5: Parts list of a glow plug
numbered 0100.221.135.06.00;

- E10: Technical drawing of a glow plug,
numbered 0 100 221 135 030, dated 29.06.94;
- E11: Technical drawing of an ultra rapid glow plug,
numbered 0 100 221 135-A, dated 08.07.83;
- E12: Technical drawing of a heating rod,
numbered 1 106 400 186 000, dated 28.05.94;
- E13: Technical drawing of a glow plug body,
numbered 2 100 120 073 000, dated 09.02.94,
with latest change dated 29.04.94;
- E14: Brochure of "Beru Spark Plugs", dated 93/34;
- E14': Technical drawing of a glow plug body,
numbered 2 101 123 136 000, dated 28.06.94;

- E15: Parts list, numbered 0100 221 135 030,
dated 29.06.94.

(c) Late-Filed Evidence

The above documents D10 to D18 and E10 to E15 were filed after the opposition time limit according to Article 99 EPC and were not admitted by the Opposition Division into the proceedings.

(d) Patent Documents:

P2: JP2002-98332

P2a: English translation of P2

(e) Other Evidence:

An affidavit from Mr Ulf Wyrwich was filed with the grounds of appeal.

VIII. Submissions of the Parties

(a) Admissibility of D10 to D18, E10 to E15 and the Affidavit of Mr Wyrwich

The Respondent submitted that the late-filed documents should not be taken into consideration. It was reasoned that there had been no indication in the grounds of opposition that further evidence relating to the alleged prior uses would follow, and the originally filed evidence was only "topped-up" when it became apparent during the opposition proceedings that it contained deficiencies. The new documents were not *prima facie* relevant because:

- they are dated earlier than documents on file and hence less relevant for the alleged sales;

- there is no clear indication of either an interference fit or the dimensions of the seal;
- the figures contain blacked-out tolerances that might be important for interpreting the dimensions.

Regarding the affidavit, this was considered by the Respondent merely to be a statement from an interested party, not supported by documentary evidence and hence of little probative value.

The Appellant argued that the new documents were in response to amended claims filed by Patent Proprietor. In addition, they were filed in response to points that had arisen during the course of the opposition proceedings. Although the late-filed drawings show amendments, they were nevertheless created before the relevant filing date of the patent and consequently of relevance. Although some tolerances are blacked-out, the drawings indicate dimensions and features not present in the originally filed documents.

When the newly filed documents, including the affidavit, are considered together with the evidence already on file, the alleged prior uses are proved "up to the hilt". Consequently, the late-filed documents are highly relevant and should be admitted into the proceedings.

(b) Novelty

Appellant's Case:

The Appellant submitted that the subject-matter of claim 1 lacks novelty in respect of the glow plugs sold

in 1999 to J. Eberspaecher GmbH & Co (prior use D). Parts list D5 shows that these glow plugs correspond to the glow plug of the drawing D2 and the heater of drawings D3. Further details of the sold glow plugs are given in documents D10 to D18.

The design of the heater was established in 1994, ie several years before the priority date of the disputed patent, and only minor amendments not affecting the fundamental design, were carried out between 1994 and 1999.

It is not possible to show that the glow plugs mentioned on the invoice (D1) are exactly the same as those of the drawings. Nevertheless, the cited documents establish "up to the hilt" that the features defined in claim 1, especially the presence of an interference fit and the dimensions of the seal, in particular the ratio L2 to L1, were present in the glow plugs sold to J. Eberspaecher GmbH & Co. The affidavit of Mr. Wyrwich confirms that the sold glow plugs correspond to those of claim 1.

Similarly, the features of the glow plugs sold to Renault (prior use "E") anticipate the subject-matter of claim 1, as evidenced by documents E1 to E15.

Respondent's Case:

The Respondent argued, *inter alia*, that the chain of evidence linking the glow plugs mentioned on the invoices D1 and E1 to features shown in the drawings is incomplete.

In the years between the design of the glow plugs in 1994 and the sale of glow plugs in 1999 several changes to the design were carried out. For example, it can be seen from a comparison of D3 with the earlier drawing shown in D12 that decisions were taken not to crimp the top of the glow plug and to alter the shape of the end of the centre pole; such changes are not of a minor nature. Since the evidence presented by the Appellant does not prove conclusively the features of the glow plugs sold to either J. Eberspaecher GmbH & Co or to Renault, the claimed heater is novel.

(c) Inventive Step

Appellant's Case:

The Appellant alleged a lack of inventive step with respect to P2/P2a. The heater of P2/P2a has a liquid silicon seal (8) that corresponds to the elastic packing of claim 1. The claimed heater differs from that of P2/P2a only in terms of the length of the seal.

Although the seal is said in P2/P2a to be for sealing in the insulating powder, it would inevitably also have the function of preventing ingress of oil and moisture. The objective problem facing the skilled person is therefore to improve the seal.

There are only two possible solutions: either to use a different type of seal or to increase the length of the seal.

Use of an O-ring as a seal against oil and moisture is common in the art, as evidenced by the affidavit of Mr Wyrwich. Use of a typical O-ring, such as described in the prior use above, to replace the silicon seal would result in a seal having the claimed length.

Increasing the length of a seal to make it more effective is also an obvious step and, as demonstrated in the contested patent, it only requires five tests to establish that for a glow plug of the type disclosed in P2/P2a a minimum length of 2.5 mm is necessary.

Respondent's Case:

The Respondent agreed that the only novel feature is the defined length of the seal.

The function of the seal (8) in P2/Pa is simply to keep the insulating powder in, and not to prevent the ingress of moisture and oil. The disputed invention is based on the recognition that seal (8) can fulfil these additional functions. Hence the problem to be solved is not just to improve the seal, but to provide a seal against oil and moisture. Use of seal (8) for this purpose is not obvious for the following reasons:

- Given that the aim of P2/2a is to reduce the size of the glow plug, the desire is to have seal (8) as small as possible. This is particularly so, as P2/2a teaches that the insulating properties of the seal are inferior to those of the insulating powder. There is therefore no incentive to increase the length of the seal.

- Should the silicon seal of P2/2a be replaced by an O-ring having a length of more than 2.5 mm, it would be necessary to machine the wall of the metal sheath to give a longer thin section; this would reduce its strength, which would not help the purpose of reducing the diameter of the glow plug.

Both the recognition of the problem, namely prevention of oil and moisture entering the insulating powder through the seal (8), and the solution of having a seal with a minimum length of 2.5 mm, are not obvious in light of the disclosure of P2/P2a.

Reasons for the Decision

1. The appeal is admissible.
2. Admissibility of Documents D10 to D18, E10 to E15 and the Affidavit of Mr Wyrwich
 - 2.1 Documents D10 to D18, E10 to E15 were filed after the nine month time limit set in Article 99 EPC for filing an opposition. The Opposition Division was of the view that these documents did not add anything to the teachings of the documents already in the opposition procedure, and hence did not admit them into the proceedings in accordance with Article 114(2) EPC.
 - 2.2 In the annex to the invitation to oral proceedings, comments were made (page 3, point 1b) of the communication) about the evidence submitted by the Appellant (then Opponent) to support the alleged prior uses (D) and (E). The Opposition Division was of the

view that, without further evidence, it could not be assumed that the sales had made the glow plugs publically available. In addition, it was not apparent that certain features of the glow plugs could have been derived by a purchaser. In its decision (page 13, point 5.3), the Opposition Division concluded that the prior uses threatened neither novelty nor inventive step of the claimed subject-matter, and hence there was no need to consider the public availability of the glow plugs.

- 2.3 In response to the opinion of the Opposition Division, as set out in the summons to oral proceedings, the Appellant submitted drawings D10 to D14, D16 and E10 to E14', which it was argued provide further details of the dimensions of the glow plugs; D15 and E15 are lists of parts, from which certain glow plugs are made; E14 is an extract of a trade catalogue for glow plugs; D17 is a sectioned view of a glow plug and D18 an X-ray of part of a glow plug. It is apparent that these documents amount to supplementary evidence addressing points raised in the summons to oral proceedings, namely the features of the glow plugs and whether or not they were made available to the public.

In its decision, the opposition division held (page 8, third paragraph) that the late-filed documents did not add to the teachings of the documents already in the proceedings. However, this reasoning is not correct, as they show additional dimensions which relate to the dimensions defined in claim 1, and which had been blacked-out on the originally filed documents.

2.4 The affidavit was filed together with the grounds of appeal in order to establish that the sold glow plugs had an elastic packing with an axial length corresponding to that of claim 1. The affidavit also stated that the technical drawings filed during the opposition proceedings corresponded to the glow plugs which were subject of the sale.

2.5 The late-filed documents therefore concern alleged prior uses that had been set out in the grounds of opposition, and seek to address evidential issues raised during the course of the opposition proceedings. Although the Opposition Division was of the view that the new documents "are not particularly relevant", it is not possible to conclude *a priori* that they are irrelevant.

For these reasons, the late-filed documents are admitted into the proceedings.

3. Novelty (Article 54 EPC)

3.1 The Appellant alleges that the claimed subject-matter lacks novelty in respect of two sales, the first one of which concerned 299 glow plugs sold to J. Eberspaecher GmbH & Co, as evidenced by an invoice dated 30. March 1999 (D1) (Prior use "D").

3.2 The invoice D1 refers to glow plugs of the type 953 MJ (GH 953). The question is whether or not the technical features of these particular glow plugs can be identified from the evidence submitted by the Appellant.

3.3 D5 is a list of parts for a glow plug of the type GH 953, and it is indicated as being valid from 11 May 2001, ie over two years after the alleged sale. Nevertheless, D5 specifies the heater of GH 953 as having the part number 1105.500.061.05.00. Document D3 is a technical drawing of a heater that also has this part number. From the dates entered into D3, it is apparent that the drawing was first made in 1994. It was, however, revised seven times over the following five years, with the last revision dated 8 November 1999, ie about seven months after the alleged sale of the glow plugs. The drawing itself does not indicate the revisions, so it is not possible to establish with any degree of certainty the features of the heater 1105.500.061.05.00 referred to on the invoice.

3.4 D15 is a parts list for glow plug 952 MJ; this is a different designation from that used on the invoice D1 (953 MJ) and it is not clear to what extent they refer to the same component. Reference is made in D15 to heating element 1105500061, but again this designation differs from that of D5 and D3 (1105500061.0500), and the significance of the end numerals is not apparent. Heating element 1105500061 is shown in the technical drawings of D12, which the Appellant submits nevertheless shows features of the glow plugs sold to J. Eberspaecher GmbH & Co.

Drawing D12 carries the date 5 September 1994 and there is no indication of it having been revised. However, since this date is over four years before the date of the alleged sale, it is not possible to conclude that the glow plugs sold in 1999 had exactly the same features as those shown in D12.

3.5 The Appellant submits that the drawings D3 and D12 show the essential features of the heaters sold in 1999, and in particular those features relevant to claim 1, as is evidenced by the affidavit of Mr Wyrwich, and that the revisions carried out after 1994 only concerned minor changes.

Regarding the affidavit, Mr Wyrwich merely states that the glow plugs sold in 1999 met the requirements of claim 1. Mr Wyrwich does not present from personal knowledge further details of the specific sales to J. Eberspaecher GmbH & Co or to Renault. Consequently, the affidavit does not cast any more light on the matter.

3.6 Regarding the revisions, the Respondent identified two that had taken place. Firstly, the top of the heater as shown in D12 is crimped, whereas in the later version of the drawing shown in D3, there is no crimping. Secondly, the end of the centre pole is shown to be a truncated cone in D3, whereas in the earlier version of D12 it is flat. It would therefore seem that some revisions are not as trivial as suggested by the Appellant.

Irrespective of whether or not the revisions concern minor modifications, it is not possible to determine with certainty the features of the glow plugs mentioned on the invoice D1. The chain of evidence from the invoice, via the parts list (D5) to the drawings of the heater in D3 is, as submitted by the Respondent, incomplete.

3.7 The standard for establishing a lack of novelty is high - the claimed subject-matter must be directly and unambiguously derivable from the prior art. The required standard of evidence is high, particularly when it concerns a prior use arising from the activities of the Opponent, as is the case here. Sufficient doubts have been raised as to the exact nature of the features of the glow plugs that were subject of the sale, such that a lack of novelty based on the alleged prior use "D" has not been proven to the required standard.

3.8 The second prior use (prior use "E") concerns the sale of 400 glow plugs of the type "135" to Renault, as evidenced by invoice E1 and supported by documents E2a to E15. The same reasoning set out above for prior use D also applies to prior use E, namely, that it is not possible to establish a clear link between the cited drawings and the glow plugs referred to on the invoice, such that the exact features of the glow plugs can be determined.

3.9 Consequently, the claimed subject-matter is novel with respect to prior uses D and E.

4. Inventive Step (Article 56 EPC)

4.1 The Appellant submits that the claimed heater lacks an inventive step in light of the disclosure P2/P2a.

4.2 P2/P2a discloses a glow plug having a similar structure to that defined in claim 1 (compare Figure 2 of P2/2a with the enlarged view in Figure 1 of the disputed patent). In particular, a liquid silicon seal (8),

which seals in the insulating powder, corresponds to the elastic packing of claim 1. It is agreed that the claimed subject-matter differs from the glow plug of P2/P2a only in that the axial length of the elastic packing is defined as being not smaller than 2.5 mm.

4.3 According to the disputed patent (paragraph [0004]), the invention addresses the problems caused by moisture and oil permeating into the insulating powder located in the interior of the metal sheath.

4.4 The width (G) of seal (8) is defined in P2/2a as being 0.2 to 0.8 mm, but the document is silent regarding its length. It is thus necessary to determine whether it would be obvious to solve the above problem by providing a seal with a length of not less than 2.5 mm.

4.5 Like that of the disputed invention, the glow plug of P2/P2a has a central electrode pole (6) which is surrounded by a metal sheath (3). The centre pole and the metal sheath are insulated from each other by filling the gap between them with an insulating powder. The function of seal (8) is said in P2/2a (paragraph [0031]) to keep the insulating powder within the gap; further, since the seal contacts both the centre pole (6) and the metal sheath (3) it must itself be insulating.

4.6 The Respondent submits that the only function of seal (8) is to stop the insulating powder from falling out, and it is not really its purpose to prevent an ingress of moisture and oil into the insulation material. The Board agrees with this argument. From Figure 1 of P2/2a, it can be seen that seal (8) sits within an outer

cylindrical metal shell (2), which is itself sealed at both ends.

P2/2a discloses (paragraph [0024]) that at the bottom, the cylindrical shell (2) is sealed by brazing or by an interference fit ("bonding through press-in"), and at the top it is sealed by O-ring (10) (paragraph [0034]). It is thus apparent that it is these seals that prevent the ingress of oil and moisture into the interior of the glow plug of P2/P2a. Of course, as argued by the Appellant, seal (8) would have some effect in preventing oil and moisture from coming into contact with the insulating powder, but this is not its primary function. As set out above, its main purpose is to stop the insulating powder from falling out and to provide insulation between the central pole and the metal sheath.

- 4.7 Nevertheless, the question remains as to whether it would be obvious to establish the length of seal (8) as being not less than 2.5 mm, or to replace it with an O-ring of comparable length, as argued by the Appellant.

Firstly, the purpose of the invention of P2/P2a is to decrease the outer diameter of the glow plug (to 8 mm or less) whilst maintaining the insulation between the central electrode pole (6) and the metal sheath (3) (see paragraph [0004]). P2/2a teaches in paragraph [0064] that the insulating properties of the liquid silicon used to form the seal are not as good as those of the powder; thus it is reasonable to assume that the skilled person, faced with the aim of P2/P2a, would use as small a seal as possible to keep the insulating powder in.

Secondly, there is no reason to improve the sealing effect of seal (8). In particular, there is no reason to replace seal (8) by an O-ring even if, as submitted by the Appellant, O-rings are well known in the art for this purpose. As mentioned above, seal (8) is already encapsulated within cylinder (2) which is sealed at the top and bottom by an O-ring and an interference fit respectively. Faced with the problem of enhancing protection against ingress of moisture and oil, the obvious step would be to improve the O-ring seal (10).

4.8 The Opposition Division concluded that the claimed subject-matter was inventive, as none of the cited documents addressed the problem of improving the properties of the seal used for sealing the insulating powder (page 11 of the contested decision). In particular, it was argued that increasing the length of seal (8) of P2/P2a would lead to practical difficulties in that the seal would be long and thin, which would not necessarily improve the sealing effect, and in that the thin section of the wall of the metal sheath must be extended, resulting in a weaker structure. The arguments put forward by the Appellant have not convinced the Board that the conclusion of the Opposition Division was wrong. Consequently, the claimed heater has an inventive step with respect to the cited prior art.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

The Chairman:

C. Spira

U. Krause