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Datasheet for the decision of 16 December 2009

Case Number: T 1382/07 - 3.2.03

Application Number: 98117067.3

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Title of invention:
Glow plug

Patentee:
DENSO CORPORATION

Opponent:
BERU AG

Headword:
-

Relevant legal provisions:
EPC Art. 123(2)

Relevant legal provisions (EPC 1973):
-

Keyword:
"Extension of subject-matter (yes)"
"Admissibility of late filed requests (no)"

Decisions cited:
-

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Case Number: T 1382/07 **-** 3.2.03

D E C I S I O N
of the Technical Board of Appeal 3.2.03
of 16 December 2009

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Decision under appeal: **Interlocutory decision of the Opposition Division of the European Patent Office posted 8 June 2007 concerning maintenance of European patent No. 0902236 in amended form.**

Composition of the Board:

Chairman: U. Krause
Members: C. Donnelly
I. Beckedorf

Summary of Facts and Submissions

I. The appeal lies from the interlocutory decision of the opposition division, posted on 8 June 2007, maintaining European patent no. 902 236 in amended form on the basis of claims 1 to 4 of the third auxiliary request filed with letter of 13 April 2007.

In its decision, the opposition division held that the subject-matter of claim 1 as granted and that of auxiliary requests 1 and 2 filed during the oral proceedings, lacked novelty under Articles 54(3) and (4) in view of EP-A-0 834 699 (D1).

II. Both the patent proprietor (hereinafter "appellant-proprietor") and the opponent (hereinafter "appellant-opponent") lodged appeals on 17 and 15 August 2007 respectively, and set out their cases in grounds of appeal filed on 9 and 16 October 2007 respectively.

III. In a communication dated 4 September 2009, pursuant to Article 15(1) RPBA annexed to the summons to oral proceedings, the Board informed the parties of its provisional opinion. In particular, the Board indicated that the objections raised under Articles 100(c), 123(2) EPC required further discussion.

IV. In response to the Board's provisional opinion, the appellant-opponent made further comments in letter of 13 October 2009.

V. By letter of 16 November 2009 the appellant-proprietor filed new sets of claims according to first, second, third and seventh auxiliary requests and maintained the

fourth, fifth and sixth auxiliary requests dated 25 February 2008 as well as the main request for the maintenance of the patent as granted. The appellant-proprietor also filed documents DE 102008015402 B3, US-A-5 880433, Patent abstract of Japan relating to JP 2002 061838 A and DE100 41 289 B4 with the same letter.

VI. Oral proceedings were held before the Board on 16 December 2009. Following announcement of the Board's decision that the main request did not meet the requirements of Article 123(2) EPC and its further indication that the same objection appeared to apply to the remaining requests on file, the Board consented to the appellant-proprietor's plea for time to formulate new requests. After appropriate adjournment, the appellant-proprietor filed new first and second auxiliary requests to replace the first and second auxiliary requests of 16 November 2009 and withdrew the third auxiliary request of 16 November 2009 as well as the fourth and fifth auxiliary requests of 25 February 2009. The sixth auxiliary request of 25 February 2009 and the seventh auxiliary request of 16 November 2009 were maintained and renumbered as the third and fourth auxiliary requests respectively.

VII. In confirmation, the appellant-proprietor requested that the patent be maintained as granted, or, alternatively, that the patent be maintained in amended form on the basis of one of the sets of claims filed as first and second auxiliary requests during the oral proceedings, as sixth auxiliary request (new third auxiliary request) with letter of 25 February 2009 and

as seventh auxiliary request (new fourth auxiliary request) with letter of 16 November 2009.

The appellant-opponent requested that the decision under appeal be set aside and that the patent be revoked.

VIII. Claim 1 as granted reads:

"A glow plug comprising:

a hollow housing (5;92) of a given length having an open end;
a heating coil (21);
a current-controlling coil (22) having a positive temperature coefficient of resistance greater than that of said heating coil (21), connected to an end of said heating coil, and
a heater casing (3), having disposed therein said heating coil (21) and said current-controlling coil (22), inserted partially into said housing (5;92) from the open end, said heater casing (3) including a first and a second portion, the first portion including a large-diameter portion (32), the second portion including a small-diameter portion (31) and a connecting portion (33) connecting between the large-diameter portion and the small-diameter portion in series, the whole of the large-diameter portion (32) being disposed within said housing (5) in engagement therewith, the small-diameter portion (31) projecting from the open end of said housing (5;92), wherein
the whole of the heating coil (21) and said current-controlling coil (22) are disposed within the second portion of said heater casing (3), and

wherein an inner diameter of the open end of said housing (5;92) from which the heater casing (3) is inserted is greater than or equal to a diameter of the large-diameter portion (32) of the heater casing (3)."

The first auxiliary request comprises two independent apparatus claims 1 and 2. Claim 1 has been amended (modifications c.f. granted claim 1 are shown in italics) to read:

"A glow plug comprising:

a hollow housing (5;92) of a given length having an open end;
a heating coil (21);
a current-controlling coil (22) having a positive temperature coefficient of resistance greater than that of said heating coil (21), connected to an end of said heating coil, and
a heater casing (3), having disposed therein said heating coil (21) and said current-controlling coil (22), inserted partially into said housing (5;92) from the open end, said heater casing (3) including a first and a second portion, the first portion including a large-diameter portion (32), the second portion including a small-diameter portion (31) and a connecting portion (33) connecting between the large-diameter portion and the small-diameter portion in series, the whole of the large-diameter portion (32) being disposed within said housing (5) in engagement therewith *without projecting from the open end, at least the connecting portion forming a clearance with said housing and the whole of* the small-diameter

portion (31) projecting from the open end of said housing (5;92) wherein
the whole of the heating coil (21) and said current-controlling coil (22) are disposed within the second portion of said heater casing (3), and
wherein an inner diameter of the open end of said housing (5;92) from which the heater casing (3) is inserted is greater than or equal to a diameter of the large-diameter portion (32) of the heater casing (3)."

The second auxiliary request comprises two independent apparatus claims 1 and 2. Claim 1 has been amended with respect to claim 1 of the first auxiliary request to specify that there is "one single current-controlling coil (22)"

Claim 1 of the third auxiliary request is identical to claim 1 of the first auxiliary request.

Claim 1 of the fourth auxiliary request is directed at "A glow plug mount structure comprising a glow plug..." wherein the definition of the glow plug is identical to that of claim 1 as granted together with the additional feature reading:

"wherein a glow plug mount hole (81) is formed in an engine, having mounted therein said glow plug with a clearance of 0.25mm or more between an outer wall of the small-diameter portion (31) of the heater casing (3) of said glow plug and an inner wall of said glow plug mount hole (81)."

IX. The arguments of the parties relevant to the decision can be summarised as follows.

Extended subject-matter, Articles 100(c), 123(2) EPC

(a) *Main request - Claim 1 as granted.*

According to the appellant-opponent, the feature in claim 1:

"wherein an inner diameter of the open end of said housing from which the heater casing is inserted is greater than or equal to a diameter of the large-diameter portion of the heater casing"

contravenes Article 123(2) EPC since in the first embodiment of figures 1 and 2 the small diameter portion 31 projects wholly out of the housing whereas in the second embodiment of figures 4 and 5 it only projects partly out. Thus, the features of the diameter of the open end of the housing being equal to the diameter of large-diameter portion and that of it being greater have been taken in isolation from the first and second embodiments respectively, without heed to the specific relative projection of small-diameter portion from the housing in each case.

Consequently, claim 1 as granted has been generalised such that it covers configurations which were not originally disclosed. In the written procedure at page 2, lines 3 to 6 of letter dated 3 December 2007 reference is made to the arrangement wherein the inner diameter of the open end being greater than larger diameter portion as infringing Article 123(2) EPC.

However, this variation is clearly shown in figures 4 and 5. During the oral proceedings it was made clear that an arrangement wherein the small diameter portion of the heater casing only partly projects from the housing in combination with the open end diameter being equal to the larger diameter portion was not originally disclosed, but now falls within the scope of the claim.

In the appellant-proprietor's opinion this feature is originally disclosed since it is common to all embodiments of figures 1, 2 and 7, on the one hand, and figures 4 and 5 on the other, that the larger diameter portion does not project from the housing so that a desired clearance between the small-diameter portion and an inner wall of the glow plug mount hole formed in the engine is ensured thereby reducing heat transfer to the engine head.

Figures 4 and 5 disclose an embodiment comprising a glow plug whose small diameter portion is disposed partly inside a housing which displays an inner diameter at its open end which is greater than an outer diameter of the large diameter portion of heater casing.

Assuming that the inner diameter of the glow plug mount hole remains essentially identical to that shown in the original figure 9, the glow plug of the present invention according to all the embodiments allows that the clearance between the heater casing and the glow plug mount hole is increased so that heat transfer to the engine head is minimised. Thus, the present invention teaches that it is possible to decrease the inner diameter of the glow plug mount hole with respect

to the prior art structure of the original figure 9 whilst achieving a clearance between the heater casing and the glow plug mount hole of the same size as in the prior art.

Thus, the skilled person would realise that the original application documents are not restricted to the case where the small-diameter portion needs to protrude entirely from the housing in order to decrease heat transfer if the outer diameter portion is equal to the inner diameter of the housing end. By the same token, neither is it restricted to a configuration wherein the inner diameter of the housing can only be greater than the outer diameter of large-diameter portion if the small diameter portion is disposed partially inside the housing.

Furthermore, according to the originally filed description at page 12, lines 9 to 15, the pocket 87 is formed between the housing 92 and the small diameter portion 31. Thus, it is not possible to restrict the teaching of the application to cases where the inner diameter of the housing can only be greater than the outside diameter of the large-diameter portion if simultaneously the small diameter portion is disposed partly inside the housing. Also page 12, lines 23 to 24 of the original description states that the second embodiment is identical in other arrangements with those of the first embodiment.

Additionally, the original set of claims left open the relation of the diameters of the open end with respect to the large-diameter portion and the original claim 1 requires that the heater casing is partially located

within the housing, However, there are only two possibilities which permit mounting of the heater casing in the housing, either the diameters are the same or the inner diameter of the open end is greater than the large diameter portion. Consequently, original claim 1 effectively mentions these two possibilities.

The disputed feature also finds justification when considering the alternative manufacturing process for the housing-casing assembly using brazing mentioned at page 8, line 19. A brazing process necessarily demands the presence of a gap between the two parts to be assembled for the brazing material to flow into and form the bond. Thus, when using brazing, the inner diameter of the open end of the housing must also be greater than the diameter of the large-diameter portion in the embodiment according to figures 1 and 2.

(b) *First and second auxiliary requests*

The appellant-opponent argued that these requests should not be admitted into the procedure since they had only been filed in extremis during the oral proceedings. Moreover, both sets of claims now comprised two independent claims which still comprised the feature that contravened Article 123(2) EPC.

The appellant proprietor was of the opinion that the requests should be admitted since they in effect only represented deletion of subject-matter. They were not filed earlier since the preliminary opinion gave the impression that the objection would not be sustained and it is not in the interest of the Board or the

parties for the number of auxiliary requests to proliferate.

(c) *Third and fourth auxiliary requests*

The appellant-opponent was of the view that neither request met the requirements of Article 123(2) EPC for the same reasons as the main request.

The appellant-proprietor stated that the third auxiliary request specified that the whole of the small diameter portion projects from the open end of the housing. Thus, the objection under Article 123(2) EPC should be overcome.

Reasons for the decision

1. The appeal is admissible

2. *Extension of subject-matter, Articles 123(2), 100(c) EPC, claim 1 as granted.*

2.1 Before analysing this objection in detail it is first necessary to set out the Board's interpretation of some of the terms used in claim 1. The diameter specified in the expression "an inner diameter of the open end of said housing" is that of the inner diameter at the extreme end of the open end of the housing and not any other inner diameter which may be present further removed from that end. Both parties agree on this point.

2.2 In accordance with the appellant-proprietor's view (see letter of 16 November 2009), the Board considers that

the wording of the expression "the whole of the large-diameter portion being disposed within the housing in engagement therewith" does not require that the large-diameter portion is in engagement with the housing along its entire length.

2.3 As also indicated by the appellant-proprietor the expression "the small-diameter portion projecting from the open end of the housing" allows for either the whole or part of the small-diameter portion to project out of the contour of the housing.

2.4 The appellant-opponent has objected that the feature in claim 1 reading:

"wherein an inner diameter of the open end of said housing from which the heater casing is inserted is greater than or equal to a diameter of the large-diameter portion of the heater casing"

contravenes Article 123(2) EPC.

Such a specification of the relationship between the inner diameter of the open end of the housing and a diameter of the large-diameter portion is absent from the claims as originally filed and was first introduced during the examination procedure with letter of 27 January 2004 which stated that the basis for the amendment could be found at page 9, lines 20, 21 and 24 together with figure 5. During a subsequent interview devoted partly to the problem this feature posed under Article 123(2) EPC, it was essentially indicated that the basis for this feature lay in the two embodiments depicted in figures 1,2 and 4,5 respectively as well as

the corresponding parts of the description. This basis has been pursued and further developed by the appellant-proprietor during the appeal proceedings.

2.5 The embodiment illustrated in figures 1 and 2 shows that the inner diameter of the end portion of the housing is equal to the diameter of the large-diameter portion, this is supported by the description page 8, lines 7 to 13 which states that the large diameter portion is press-fitted into the housing. However, figures 1 and 2 also show that the small diameter portion 31 projects entirely out of the housing as originally specified in claim 1 ("the whole of the small diameter portion projecting from the open end of said housing"). In the embodiment depicted in figures 4 and 5, the inner diameter of the end portion of the housing is greater than the diameter of the large-diameter portion, as evidenced by the presence of the pocket 87. However, in this case it is clear that the small diameter portion only projects partly out of the housing as confirmed by the original description at page 12, lines 16 to 22 which specifies that the pocket 87 defines a clearance between the small-diameter portion and the inner wall of the housing.

2.6 Thus, it can be appreciated that granted claim 1 was drafted with the intention of covering the two separate embodiments illustrated in figures 1,2 and 4,5 respectively which the originally filed claim 1 failed to do since it required that the whole of the small-diameter portion project from the housing which would have excluded the embodiment according to figures 4 and 5.

2.7 However, it is the opinion of the Board that, in making this amendment, the subject-matter of the application has been extended to encompass other variants which are neither disclosed nor unambiguously and directly derivable from the original documents. In particular, as pointed out by the appellant-opponent during the oral proceedings, a configuration wherein the small diameter portion of the heater housing only partly projects from the housing in combination with the open end diameter housing being equal to the larger diameter portion now falls within the scope of the claim. The arrangement indicated at page 2, lines 3 to 6 of appellant-opponent's letter dated 3 December 2007 does not correctly identify this variation, but is considered an obvious error, since the appellant-proprietor had so understood it and responded accordingly. Further, the appellant-opponent had couched the objection in general terms relating to the isolation of individual features. Thus, it can be seen that similar considerations apply to the specific arrangement wherein the small-diameter portion projects entirely out of the housing in combination with an inner diameter of the open end of the housing being greater than the large-diameter portion.

2.8 Thus, the Board concurs with the appellant-opponent that each alternative comprised in the feature specifying that the diameter of the open end of the housing is equal to or greater than the diameter of large-diameter portion has been taken in isolation from the first and second embodiments respectively, without heed to the associated specific relative projection of small-diameter portion from the housing in each case.

2.9 The feature of the relative projection of the small-diameter portion from the housing cannot be neglected as being technically irrelevant since not only was this aspect originally specified in claim 1, but also it influences the basic problem underlying the contested patent of heat transfer from the glow plug to the engine head.

2.10 The appellant-proprietor acknowledges that perhaps not all such variants are explicitly disclosed in the original application, but has argued that all embodiments covered are directly and unambiguously derivable since it is common to all embodiments that the larger diameter portion does not project from the housing so that a desired clearance between the small-diameter portion and an inner wall of the glow plug mount hole is ensured. However, this reasoning is not convincing since the offending feature does not concern the glow plug mount hole, but rather the construction of the glow plug itself.

2.11 The appellant-proprietor's further arguments assuming that the inner diameter of the glow plug mount hole remains essentially identical to that shown in the original figure 9 fail to convince for similar reasons.

2.12 The other arguments which rely on the skilled person using his knowledge of heat transfer to obtain alternative arrangements are also not persuasive since they are a question of obviousness rather than unambiguous disclosure.

2.13 The passage at page 12, lines 23 to 24 of the original description is also not helpful since it states that

the second embodiment is identical in **other** arrangements with those of the first embodiment. Thus, this takes nothing away from the differences specified in the preceding paragraphs.

2.14 The fact that the original set of claims left open the relationship between the diameter of the open end and the large-diameter portion whilst specifying that the heater casing to be partially located within the housing, cannot be construed as an implicit disclosure of all the arrangements now possible under claim 1. It may be that to permit mounting of the heater casing in the housing either the diameters must be equal or the inner diameter of the open end must be greater than the large diameter portion. However, not only is neither of these possibilities explicitly disclosed, but also the question of the associated relative projection of the small-diameter portion is not addressed.

2.15 It has also been argued that the disputed feature finds justification through the fact that brazing can be used to join the housing to the casing. The Board does not share this view. All brazing processes do not necessarily require a gap between the two parts to be assembled since it is common practice for the brazing material to be applied to the joint once a press-fit has been made or for one of components to be coated with the brazing compound before press-fitting and subsequent heating in an oven. With either technique it would not be absolutely necessary for the inner diameter of the open end of the housing to be greater than the diameter of the large-diameter portion. Furthermore, even if a brazing process was used which required the inner diameter of the open end of the

housing to be of a greater diameter than the diameter of the large diameter portion, it would still not provide a basis for the disclosure of an arrangement wherein the small diameter portion only partially protrudes from the open end of a housing having an inner diameter equal to the diameter of the large-diameter such that a pocket is formed between the small diameter portion and the housing.

2.16 Thus, the main request does not meet the requirements of Article 123(2) EPC.

3. *First and second auxiliary requests*

3.1 The Board is of the opinion that these requests cannot be admitted into the procedure since they have only been filed at the last possible moment during the oral proceedings. Furthermore, the fact that both requests have been amended to comprise two independent claims one of which still contains the feature objected to, is an indication that the amended claims have great potential for throwing up new difficulties. Moreover, the success of the objection under Articles 100(c), 123(2) EPC could have been anticipated by the appellant-proprietor and corresponding fall-back positions could have been filed at an early stage. The preliminary opinion does not provide any attenuating circumstances since it simply indicates that the matter was still open and would be the first aspect to be decided at the oral proceedings.

4. *Third and fourth auxiliary requests*

4.1 Claim 1 of the third auxiliary request specifies that the whole of the small diameter portion projects from the open end of the housing. However, this amendment alone does not fully overcome objection under Article 123(2) EPC that the alternatives of the diameter of the open end of the housing being equal to or greater than the diameter of large-diameter portion have been taken in isolation from the first and second embodiments respectively, without heed to the specific relative projection of small-diameter portion from the housing in each case. In particular, the very specific arrangement wherein the inner diameter of the open end of the housing is greater than the diameter of the large-diameter portion in combination with the whole of the small-diameter portion projecting from the housing is not originally disclosed, but still covered by the amended claim.

4.2 The fourth auxiliary request is directed at a glow plug mount structure, but still comprises the feature objected to in the main request under Article 123(2) EPC.

4.3 Thus, the third and fourth auxiliary requests also do not meet the requirements of Article 123(2) EPC.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The patent is revoked.

Registrar: Chairman:

A. Counillon U. Krause