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Datasheet for the decision of 30 March 2011

Case Number: T 1470/08 - 3.5.02

Application Number: 98123192.1

Publication Number: 0923187

IPC: H02K 3/12

Language of the proceedings: EN

Title of invention:
Alternator for a vehicle

Patentee:
Denso Corporation

Opponent:
Valeo Equipements Electriques Moteur
Koch, Alexander W., Prof. Dr.-Ing.

Headword:
-

Relevant legal provisions:
EPC Art. 56, 83, 84, 123(2), 123(3)

Relevant legal provisions (EPC 1973):
-

Keyword:
"Added subject-matter - no"
"Extension of scope of protection - no"
"Support in the description - yes"
"Sufficiency of disclosure - yes"
"Inventive step - yes"

Decisions cited:
-

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Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number: T 1470/08 **-** 3.5.02

D E C I S I O N
of the Technical Board of Appeal 3.5.02
of 30 March 2011

Appellant I: (Opponent I)
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Respondent: (Patent Proprietor)
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Decision under appeal:
Interlocutory decision of the Opposition Division of the European Patent Office posted 30 May 2008 concerning maintenance of European patent No. 0923187 in amended form.

Composition of the Board:

Chairman: M. Ruggiu
Members: R. Lord
E. Lachacinski

Summary of Facts and Submissions

I. These are appeals of the opponents I and II against the interlocutory decision of the opposition division concerning the European patent No. 0 923 187 that, account being taken of the amendments made by the patent proprietor in the auxiliary request filed during the oral proceedings of 26 February 2008, the patent and the invention to which it related met the requirements of the EPC.

II. The following documents of the state of the art are relevant for the present decision:

D1: EP 0 730 335 A2;
D8: WO 92/06527 A;
D9: US 1 822 261 A;
D19: US 5 210 928 A;
A2: JP 9 215 280 A with machine translation into English;
A3: JP 63 274 335 A with translation into French; and
C2: Brochure technique, Valeo Team Garage, Alternateur V40 ESA.

III. Oral proceedings before the board took place on 30 March 2011.

Appellant I (opponent I, Valeo Equipements Electriques Moteur) requested that the decision under appeal be set aside and that the patent be revoked.

Appellant II (opponent II, Prof. Dr.-Ing. Alexander Koch) was not represented at the oral proceedings, but had requested in writing that the decision under appeal

be set aside and that the patent be revoked.

The respondent (patent proprietor, Denso Corporation) requested that the decision under appeal be set aside and that the patent be maintained in amended form on the basis of claim 1 of the auxiliary request filed with letter dated 26 February 2009 and claims 2 to 10 filed on 26 February 2008, description columns 1 to 5 filed on 26 February 2008, drawings Figs. 1 to 10 of the patent specification (main request), or if that was not possible, on the basis of either of the sets of claims of auxiliary request 1 or auxiliary request 2, both sets filed with the letter of 28 February 2011.

IV. Claim 1 of the appellant's main request reads as follows:

"A stator (2) of an alternator (1) for a vehicle, including a stator core (32) having a plurality of slots (35) and stator windings (33) disposed in said plurality of slots (35), wherein said stator windings (33) comprise a plurality of conductor segments (33), having a first and a second end (33d) and a plurality of connected portions (33f) between said conductor segments thereby forming continuously connected coils and each of said connected portions (33f) comprises said first end of said conductor segments (33) and said second end of another of said conductor segments (33),

characterized in that each of said conductor segments (33) has rectangular cross section at both ends, said rectangular cross section has radial sides w longer than circumferential sides t, and an end of one of said conductor segments and an end of another of said

conductor segments are disposed side by side;

that said connected portions (33f) have the form of a raindrop-shaped edgeless ball;

that each of said connected portions (33f) is larger in both thickness T and width W than any one of said ends (33d) of said conductor segments (33 [sic], so that T > t and W > 2w; and

that the surface of the connected portions (33f) is coated evenly with resinous film (33g)."

Claims 2 to 10 are dependent on claim 1.

V. The appellant I essentially argued as follows:

Claim 1 of the respondent's main request contravened Article 123(3) EPC because it covered embodiments in which the arms of the U-shaped conductors are separated, which were disclosed in the patent only as part of the third embodiment, and because it covered embodiments in which the conductors are coated.

Claim 1 of the respondent's main request contravened Article 123(2) EPC because it did not define either that the external connections are on the same side of the core as the conductor segment connected portions or that the connected portions are all at the same height from the core, both of which features were essential to the invention.

Claim 1 of the respondent's main request contravened Article 123 EPC because it did not include the features

that the alternator included a ventilation fan and associated air exit slots, that the conductor segments were of copper, or that the connected portions were formed by non-contact arc welding, all of which were essential to the invention.

The missing essential features indicated in the two preceding paragraphs also resulted in the claim not being supported by the description, contrary to the requirements of Article 84 EPC.

The patent in suit did not meet the requirement for sufficiency of disclosure of Article 83 EPC because it did not disclose the welding conditions to be used for forming the connected portions or the nature of the resin and the coating procedure to be used for forming the resinous film. It also contravened that requirement because claim 1 of the main request covered the use of laser welding, which could not produce the defined shape of the connected portion, because that claim covered the use of conductor segments of aluminium, which could not be welded to produce the defined shape of the connected portion, and because the variation in the height of the conductor segment ends above the core would have made the described welding method impossible.

Each of the documents D8, D9 and A3 represented an appropriate starting point for the assessment of inventive step, noting in particular that the technical fields of alternators and starter motors for vehicles were closely related, so that the teaching of D9 would be directly applicable to alternators.

That the conductor segments of an alternator should have a rectangular cross-section was well known in the technical field, as demonstrated for example by A3 and by the two prior art citations in D8. That these should be arranged with their longer sides in the radial direction and joined in that direction would be a trivial selection among the available options.

The use of TIG welding for joining the ends of conductors in alternators and similar machines was well-known, e.g. from A2, D1 and D19, and would inevitably have resulted in a connected portion of edgeless raindrop shape with width and thickness greater than those of the conductor ends.

The desirability of resin coating of the connected portions would also have been obvious to the skilled person, for instance from page 31 of document C2.

Therefore the subject-matter of claim 1 of the respondent's main request did not involve an inventive step according to Article 56 EPC.

VI. The appellant II essentially argued as follows:

An alternator according to the preamble of claim 1 of the respondent's auxiliary request as addressed in the decision under appeal was known from document D8. The arrangement of the conductor ends and the shape of the connected portion would have arisen from the obvious application to this device of the teaching of document A2 concerning the use of TIG welding. The provision of a resin coating on the connected portions would have been obvious to the skilled person in the light of the

teaching of document A3 (features 12a and 12b). The alleged synergetic effect discussed in the decision under appeal was based on effects which were not disclosed in the patent in suit, so should not have been taken into account. Thus the subject-matter of that claim did not involve an inventive step according to Article 56 EPC.

VII. The arguments of the respondent in so far as they are relevant for the present decision can be summarised as follows:

Claim 1 of the main request was based on original claims 1, 9 and 10 together with paragraph [0020] of the description (of the published application), and the amendments with respect to the granted claim 1 all represented restrictions of its scope of protection. Thus the requirements of Article 123(2) and (3) EPC were satisfied.

Claim 1 of the main request defined all of the technical features which were essential to the invention. Features such as the ventilation of the alternator or the material of the conductor segments were not central to the claimed invention, so that there was no reason why they should be defined in the claim. Moreover the description of the embodiments was sufficiently clear and precise to enable the skilled person to produce the claimed alternator, in particular the claimed shape of the connected portions. Thus the requirements of Articles 83 and 84 EPC were satisfied.

The combination of the characterising features of claim 1 of the main request addressed the technical

problem of providing improved cooling without any deterioration of the quality of the insulation and avoiding deposition of dirt particles on the connections, and did so in a manner which involved synergetic effects, which on the basis of the prior art would not have been evident to the skilled person, thus indicating that the claimed subject-matter involved an inventive step according to Article 56 EPC. In particular, the edgeless shape of the connected portions resulted in it being easier to produce an even resin coating of sufficient overall thickness to ensure effective insulation and protection without having regions of excess thickness which would reduce the air flow for cooling, the side-by-side arrangement of the connected portions being in the radial direction enabled an increased air flow between these portions, thus improving cooling, and reduced the risk of resin bridges being formed, and the increased air flow and the edgeless shape of the connected portions both contributed to a reduction of deposition of dirt particles on the connected portions.

Reasons for the Decision

1. The appeal is admissible.

2. *Added subject-matter and extension of scope of protection (Article 100(c) EPC and Article 123(2) and (3) EPC)*

2.1 Claim 1 according to the respondent's main request is based on a combination of claims 1, 9 and 10 of the application as originally filed, together with the

definition of the resin coating and details of the dimensions and shape of the connected portions which all have a basis in paragraph [0020] of the description of the original application (as published). Original claim 10 was dependent on claim 9 which was in turn dependent on claim 1, so that the combination of these original claims was explicitly disclosed. Paragraph [0020] formed part of the description of the first embodiment of the application, but the board considers that the skilled person would recognise that the particular features introduced into claim 1 from that paragraph are not restricted to the specific circumstances of that embodiment, and thus sees no reason why the skilled person would not consider that teaching to be more generally applicable. The description according to the main request has moreover been amended to explicitly indicate that those embodiments which are no longer covered by claim 1, as a result of the introduction of the features of original dependent claims 9 and 10, are not part of the invention. The board therefore concludes that the subject-matter of the patent in the form of the respondent's main request does not extend beyond the content of the application as originally filed, and thus meets the requirements of Article 123(2) EPC.

2.2 The appellant I has argued that claim 1 according to the respondent's main request contravenes Article 123(2) EPC because it does not define either that the external connections are on the same side of the core as the conductor bar connected portions or that the connected portions are all at the same height from the core, both of which features were essential to the invention. However, since these features were not defined in

claim 1 of the application as filed, the board can see no reason why the fact that they are not defined in the present claim 1 should have any relevance with respect to the requirements of Article 123(2) EPC.

2.3 The amendments introduced in claim 1 of the respondent's main request with respect to claim 1 of the patent in suit as granted all result in restrictions of the scope of protection of the claim. The only amendments to the description which are potentially of relevance to the scope of protection are the statements that the second and third embodiments are not part of the invention, which, if they have any effect on the scope of protection, could only result in it being restricted. The board therefore concludes that the patent in the form of the respondent's main request meets the requirements of Article 123(3) EPC.

2.4 The appellant I has argued that because claim 1 of the respondent's main request covers embodiments in which the arms of the U-shaped conductors are separated, which were disclosed in the patent only as part of the third embodiment, and because it covers embodiments in which the conductors are coated, it contravenes Article 123(3) EPC. The board observes however that such embodiments also fell within the scope of protection of claim 1 of the patent in suit as granted, so that the fact that they fall within the scope of the present claim 1 cannot result in an extension of the scope of protection of the patent.

2.5 During the oral proceedings before the board appellant I also presented various arguments in the context of Article 123 EPC relating to features which

were alleged to be essential to the claimed invention but which were not defined in claim 1 of the respondent's main request. The board notes that, regardless of the question as to whether these features were essential to the invention (which issue is addressed in section 3. below), the fact that these features were defined neither in claim 1 of the application as originally filed, nor in claim 1 of the patent as granted, implies that their absence in the present claim 1 cannot result in a contravention of either paragraph (2) or paragraph (3) of Article 123 EPC.

2.6 The board therefore concludes that the respondent's main request meets the requirements of Article 123(2) and (3) EPC.

3. *Support in the description (Article 84 EPC)*

3.1 The argumentation of appellant I relating to missing essential features referred to in section 2.5 above was also raised by him in the context of a lack of support in the description within the meaning of Article 84 EPC. The features in question are that the conductor segments should be U-shaped, that the connected portions should all be at the same end of the core and at the same height from the core, that the alternator should comprise ventilator fans, that the conductor segments should be of copper and should not be coated with insulation, and that the connection should be by non-contact arc welding. As also noted above, these features were not defined in claim 1 of the patent as granted, so that these objections applied also to that claim, and were not occasioned by amendments to the

claim during the opposition and appeal procedures. The raising of these objections thus represents an attempt to raise contravention of Article 84 EPC as an opposition ground. Such an attempt cannot however be successful, since this is not one of the permissible grounds for opposition under Article 100 EPC.

3.2 For the sake of completeness, the board observes that, although the features indicated by appellant I as being essential are clearly desirable, for the reasons he has indicated, that reasoning is not sufficient to establish that they are essential. To the contrary, and as argued by the respondent, the invention of the patent in suit is concerned specifically with the nature of the connection portions, which is defined in detail in claim 1 of the main request, so that details of how the connected portions are formed or of the other parts of the alternator are not of direct relevance to the invention. Thus there is no requirement for them to be defined in the claim.

3.3 The objections under Article 84 EPC raised by appellant I therefore do not prejudice the maintenance of the patent in amended form on the basis of the respondent's main request.

4. *Sufficiency of disclosure (Articles 83 and 100(b) EPC)*

4.1 The appellant I has argued that, because the patent in suit does not contain details of the welding conditions to be used for producing the connected portions, the disclosure of the patent would not be sufficient to enable the skilled person to produce a connected portion of the shape and dimensions defined in claim 1

of the respondent's main request. In this context he has referred to a number of prior art documents, for example D19, which refer to different parameters which must be selected when carrying out TIG welding (i.e. the type of welding described in the main examples of the patent). The board considers, however, that the selection of these welding conditions would fall within the capability of the skilled person, and that the evidence cited by the appellant is not sufficient to indicate that this would not be the case. The board notes in particular that the document A2, which concerns the welding of the ends of conductor segments in the related field of vehicle starter motors, suggests that the use of TIG welding in these circumstances would usually result in a generally ball-shaped connected portion with dimensions exceeding the dimensions of the conductor segments in both directions (i.e. a shape and size as defined in the present claim 1), unless measures are taken to avoid this (see the translation of that document, page 2, lines 8 to 10 and paragraphs 0036 and 0037 in conjunction with Fig. 9).

4.2 The appellant I has also argued that the patent in suit does not contain details of the properties of the resin or of the coating procedure, so that the disclosure of the patent would not be sufficient to enable the skilled person to coat the connected portions evenly, in particular to avoid resin bridges forming between adjacent portions. However, the mere existence of such a problem (which has not been disputed) is not sufficient to justify the conclusion that this problem would prevent the skilled person from carrying out the invention as claimed. The board is of the opinion that

the skilled person would recognise that this problem would merely require him to select a resin composition with appropriate properties (in particular viscosity) to avoid the formation of bridges for the particular geometry of the component being coated, which would fall within the scope of his ordinary capabilities.

4.3 In his replies to the board's communication accompanying the summons to oral proceedings the appellant I has additionally presented further objections of insufficiency of disclosure on the grounds that:

- the claim was not restricted to non-contact arc welding, so covered the use of laser welding which could not produce the defined shape of the connected portion;
- the claim did not exclude that the conductor segments were of aluminium, which could not be welded to form the defined shaped of the connected portion; and
- the formation of the connected portions as defined would not be possible because of the variation of the height of the ends of the conductor segments above the core.

However, the submissions of appellant I do not go beyond establishing that a difficulty exists in each of these aspects. The appellant has not provided any evidence to establish that these difficulties would prevent the skilled person from carrying out the invention as claimed.

4.4 The board therefore concludes that, although the appellant I has established that certain difficulties might exist in carrying out the claimed invention, and

that the patent in suit does not provide explicit teaching as to how to overcome those difficulties, he has not provided sufficient evidence to prove that the skilled person would not be capable of solving these problems without undue burden. Since in this respect the onus of proof lies with the appellant opponent, the board concludes that the patent according to the respondent's main request meets the requirements of Article 83 EPC.

5. *Novelty (Articles 54 and 100(a) EPC)*

The novelty of the subject-matter of claim 1 of the respondent's main request is not in dispute.

6. *Inventive step (Articles 56 and 100(a) EPC)*

6.1 The board considers that the document D8 represents the best starting point for the assessment of inventive step. It is not in dispute that this document describes a stator of an alternator for a vehicle including all the features of the preamble of claim 1 of the respondent's main request.

6.2 The stator according to claim 1 of this request is distinguished from that of D8 by the following technical features:

(a) that the ends of the conductor segments have rectangular cross-section and are oriented such that their radial sides are longer than their circumferential sides;

(b) that the ends of the connected conductor segments are arranged side-by-side in the radial direction (this direction being implicit in the claim);

(c) that the connected portions have the form of a "*raindrop-shaped edgeless ball*" with thickness and width greater than those of the combined ends of the conductor segments; and

(d) that the surfaces of the connected portions are "*coated evenly with resinous film*".

6.3 The board agrees with the appellants that each of these characterising features would individually be obvious to the skilled person, for the following reasons (using the feature labelling of the previous section).

(a) D8 provides no clear teaching concerning the shape of the conductor segments, but it is not disputed that rectangular segments were commonly used in such devices, in particular in order to increase the fill factor of the core slots. Moreover, the board considers that it would have been obvious to the skilled person, given the space constraints in the core and the need to bend the segments in the circumferential direction, to orient such segments with their longer side in the radial direction.

(b) Given the above conclusion concerning the shape of the conductor segments, the skilled person would have been presented with only two practical options as to how to arrange the conductor ends when connecting them, i.e. joining either by the longer or shorter sides. In the absence of any particular unexpected advantage of either of these choices, the board is of the opinion that the selection of the second of these, as in the present claim 1, would have been obvious to the skilled person, regardless of the fact that document A2 discloses the other option (see e.g. Fig. 6 of that document).

(c) D8 describes at a number of points that the ends of the conductor segments are joined by soldering or welding (see e.g. page 3, line 2 and page 9, line 9). Since TIG welding is a known technique for making such connections (see e.g. A2, paragraphs 0006 and 0020 of the translation; D1, column 9, line 17 and column 23, line 2; and D19, column 4, lines 1 to 7, column 8, lines 48 to 52, column 9, lines 33 to 43 and Fig. 20), the board considers that it would be obvious to the skilled person to make use of that technique when carrying out the teaching of D8. The board considers moreover that the use of this technique with a reasonable selection of welding parameters would result in a connected portion in the form of an edgeless ball, which could be considered to be raindrop-shaped, with thickness and width exceeding those of the conductor segments, for the reasons discussed in paragraph 4.1 above with reference to document A2.

(d) D8 also describes in the final sentence on page 9 that the insulation on the ends of the conductor segments can be removed before they are connected. The board is of the opinion that, in the light of this teaching and his common knowledge concerning vehicle alternators, the skilled person would consider it obvious that it would be desirable to restore the insulation after the connections have been formed, in particular by applying a coating of resinous material. The need for such insulation in vehicle alternators is illustrated for instance in document C2, on page 31.

6.4 The respondent has, however, convincingly argued that the combination of these features has synergetic effects addressing the technical problem of providing improved cooling without any deterioration of the quality of the insulation and avoiding deposition of dirt particles on the connections, which argument is also reflected in the positive opinion on inventive step given on pages 8 and 9 of the decision under appeal.

6.4.1 Specifically, the board agrees with the respondent that the edgeless shape of the connected portions results in it being easier to produce an even resin coating of sufficient overall thickness to ensure effective insulation and protection without having regions of excess thickness which would reduce the air flow for cooling, that the side-by-side arrangement of the connected portions being in the radial direction not only enables an increased air flow between these portions, thus improving cooling, but also reduces the risk of resin bridges being formed, and that the increased air flow and the edgeless shape of the connected portions both contribute to a reduction of deposition of dirt particles on the connected portions.

6.4.2 Appellant I has presented no arguments concerning these synergetic effects, his arguments having addressed only the individual characterising features. Appellant II in his written submissions has in this context argued that the independent claim does not define the presence of gaps between the connected portions, so that the alleged synergetic effects would not necessarily arise in the claimed device. The board considers that, although this feature is not explicitly defined in the

claim, the skilled person would consider it to be implicit in the definition that the connected portions are coated evenly. Appellant II also argued that the alleged synergetic effects should not have been taken into account because they were not disclosed in the patent in suit. However, the board considers that, since all of the individual elements of these synergetic effects were disclosed either in the introductory part of the description or in the description of the first embodiment, the skilled person would have been able to derive the effects from the disclosure of the patent in the light of the closest prior art. The board notes also that the objections of appellant II in this context related to claim 1 according to the auxiliary request as addressed in the decision under appeal, whereas claim 1 according to the respondent's present main request defines the shape of the connected portions more precisely, such that the synergetic effects described by the respondent can be seen more clearly to be relevant.

6.4.3 The board therefore concludes that, although each of the individual characterising features of claim 1 of the respondent's main request can be considered to be obvious to the skilled person, the combination of those features would not be obvious, because it results in synergetic effects going beyond the effects of the individual features and which would not have been apparent to him without the use of hindsight.

6.5 Appellant I has also presented argumentation concerning inventive step taking either of the documents D9 and A3 as the starting point.

6.5.1 The board notes that D9 does not concern alternators as such, but instead, to the extent that it mentions a specific type of machine, concerns starter motors, and that as far as the features which are relevant to the above discussion of synergetic effects are concerned, it contains no relevant teaching beyond what is known from D8. Thus, even if the board were to accept that the teaching of D9 relating to starter motors was directly applicable to alternators, the conclusion in section 6.4 above based on synergetic effects would apply correspondingly.

6.5.2 The document A3 is based on an unconventional stator structure in which the core itself (reference number 10 in Fig. 6 of that document) does not have any slots, the magnetic function of the conventional slot walls being provided instead by the elements 5a, 5b, 6a and 6b which are fixed to the conductor segments (see also Figs. 1(b), 1(d) and 3). The appellant I has not presented any reason why the skilled person would consider applying the teaching of this document to an alternator with a conventional slotted core. The board thus concludes that starting from this document the skilled person would not arrive in an obvious manner at an alternator according to claim 1 of the respondent's main request.

7. Thus, having regard to the cited state of the art, the stator defined by claim 1 of the respondent's main request is not obvious to a person skilled in the art. The board concludes therefore that the subject-matter of claim 1 of this request involves an inventive step in the sense of Article 56 EPC.

The subject-matter of claims 2 to 10 of this request, which depend on claim 1, is thereby also to be considered to be new and to involve an inventive step.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The case is remitted to the department of first instance with the order to maintain the patent in amended form in the following version:

claim 1 filed with letter dated 26 February 2009,
claims 2 to 10 filed on 26 February 2008,
description: columns 1 to 5 filed on 26 February 2008,
drawings: figures 1 to 10 of the patent specification.

The Registrar: The Chairman:

U. Bultmann M. Ruggiu