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Datasheet for the decision of 26 October 2007

Case Number: T 0646/05 - 3.5.02

Application Number: 98108372.8

Publication Number: 0881756

IPC: H02K 19/22

Language of the proceedings: EN

Title of invention:
Alternator for vehicle

Patentee:
Denso Corporation

Opponent:
Valeo Equipements Electriques Moteurs

Headword:
-

Relevant legal provisions:
-

Relevant legal provisions (EPC 1973):
EPC Art. 54, 56

Keyword:
"Novelty and inventive step of granted claim (yes)"
"Admissibility of late-filed document (no)"

Decisions cited:
G 0002/88

Catchword:
See points 2, 4.1, 4.2 and 12 of the reasons.

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Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number: T 0646/05 **-** 3.5.02

D E C I S I O N
of the Technical Board of Appeal 3.5.02
of 26 October 2007

Appellant: (Patent Proprietor)	Denso Corporation 1-1, Showa-cho Kariya-City Aichi-Pref. 448 (JP)
Representative:	Winter, Brandl, Fürniss, Hübner Röss, Kaiser, Polte Partnerschaft Patent- und Rechtsanwaltskanzlei Alois-Steinecker-Straße 22 D-85354 Freising (DE)
Respondent: (Opponent)	Valeo Equipements Electriques Moteurs 2 rue André Boulle F-94017 Créteil (FR)
Representative:	de Lambilly Delorme, Marie Pierre Valéo Electrical Systems 2 rue André Boulle B.P. 150 F-94017 Créteil Cedex (FR)
Decision under appeal:	**Decision of the Opposition Division of the European Patent Office posted 13 April 2005 revoking European patent No. 0881756 pursuant to Article 102(1) EPC.**

Composition of the Board:

Chairman: M. Ruggiu
Members: J.-M. Cannard
H. Preglau

Summary of Facts and Submissions

I. The proprietor appealed against the decision of the opposition division revoking European patent No. 0 881 756. The reason given for the revocation was that claim 1 of the contested patent did not involve an inventive step.

II. The following documents, in particular, which are mentioned in the decision of the opposition division, have been considered in the present appeal:

C3: construction drawing 2078995 of an alternator A16R46T, last modification of 18 May 1988,

C4: construction drawing 2074802 of a cylindrical portion of a rotor core for an alternator A16R,

C5: construction drawing of a yoke portion of a rotor core for an alternator A16R,

C6: excerpt of a catalogue "PARIS-RHONE" 1979,

C11: report on a test performed on a vehicle alternator Bosch KC90A by the respondent in 1992,

C13: excerpt of a catalogue "Valeo 93/94", 1993,

C14: construction drawing 2072219 of a rotor for an alternator A16R, last modification of 13 July 1988,

C15: construction drawing 2181176 of a yoke portion of a rotor core for an alternator A16R,

C16: excerpt of a leaflet "Valeo A16R",

C17: excerpt of a leaflet "Valeo A16R",

C20: excerpt of a catalogue "PARIS-RHONE" 1983, and

C21: notice "Bosch Séries GC, KC et NC Alternateurs compacts pour voitures", 1990.

Furthermore, the respondent filed the following documents in the course of the appeal and asked that they be taken into account:

a copy of the statement of grounds of appeal filed in appeal case T 0655/05-352 with documents cited in that case, in particular documents D1A and D1B that are identical with documents C3 and C14 of the present case, all filed for the first time with the respondent's letter dated 6 January 2006,

a declaration by Mr Figuière, filed with the letter of the respondent dated 12 April 2007, and

a translation into English of a Japanese patent document JP57-28558, 2 pages of information generated by software systems of the French army, and 6 pages of information relating to Renault S-series busses, all filed for the first time with the opponent's letter dated 26 September 2007.

III. Claim 1 of the patent in suit as granted reads as follows:

"An alternator for a vehicle, comprising:

a field rotor (3) including a Lundel-type iron core (7) and a field coil (8) provided on the Lundel-type iron core (7), the Lundel-type iron core (7) having a cylindrical portion (71), a yoke portion (72), and a claw-like magnetic pole portion (73), the field coil (8) being provided on the cylindrical portion (71), the yoke portion (72) extending from the cylindrical portion (71) in a radially outward direction, the claw-like magnetic pole portion (73) being connected to the yoke portion (72) and being formed so as to surround the field coil (8); and

a stator (2) located radially outward of the claw-like magnetic pole portion (73) and opposing the claw-like magnetic pole portion (73), the stator including a multiple-layer iron core (32) and an armature coil (33) provided on the multiple-layer iron core (32);

wherein a ratio of an axial-direction length L1 of the multiple-layer iron core (32) of the stator (2) to an axial-direction length L2 of the cylindrical portion (71) of the Lundel-type iron core (7) is in a range of 1.25 to 1.75, and a ratio of an outside diameter R2 of the cylindrical portion (71) of the Lundel-type iron core (7) to an outside diameter R1 of the claw-like magnetic pole portion (73) of the Lundel-type iron core (7) is in a range of 0.54 to 0.60."

Claims 2 to 6 of the patent in suit are dependent on claim 1.

IV. Oral proceedings were held before the Board on 26 October 2007.

V. The submissions of the appellant proprietor that are relevant to the present decision can be summarized as follows:

The Japanese patent application JP57-28558 was filed by the opponent in the form of its translation into English. This application should not be considered in the proceedings because, according to the translation, it had been published on 2 July 1999, namely after the filing date of the patent in suit. Thus, the translation of the application was not relevant and should not be admitted in the proceedings. Even if the Japanese application had been published on 16 February 1982 as this appeared from its abstract, it would not be possible to consider it without delaying the proceedings because it was not proved that its content was identical to that of the translation.

It was not contested that alternators Bosch KC90A had been made available to the public, but the content of document C11 itself was not public. It was doubtful whether the values measured on the alternator Bosch KC90A reported in C11 were correct because C11 was inconsistent as concerned the length of the rotor claws, the values reported in C11 were noted with different numbers of digits and they differed considerably from the values measured by the proprietor on alternators of the same type, as appeared from an Annex 3 filed with

the statement of grounds of appeal. The disclosure of the prior use alternator according to C11 was in any case limited to the reported values. Manufacturing tolerances of the manufacturer and measurement errors made by the respondent could not be taken in account because they were not known. In case of uncertainty about a prior art disclosure, the proprietor should be given the benefit of doubt. The subject-matter of claim 1 was novel because the opponent had not proved that the prior use alternator reported in C11 disclosed the ratios specified in claim 1.

Starting from the alternator Bosch KC90A specified in C11, the objective technical problem was to provide alternative designs for a compact alternator which enabled the dimensional changes required by the restricted space available in motor rooms, while maintaining efficiency. The solution consisted in increasing the claimed ratio R2 to R1 and was not obvious to the skilled person.

There was no suggestion in the prior art to choose as designing rule the two ratios specified in claim 1, nor to modify four specific independent parameters of the alternator in such a way as to obtain the claimed ratios. Even if the alternator of C11 showed values R2 and R1 having a ratio of 0.539, which was close to the claimed range, there was no hint in the prior art for rounding the value of this ratio. The skilled person would not consider modifying only one parameter of the alternator without modifying other parameters because this would influence the power output of the alternator. The skilled person would refrain from increasing the outer diameter R2 of the cylindrical portion of the rotor core

because this would reduce the space available for the field coil and the flux generated by the rotor.

It was not obvious to increase the ratio L1 to L2 when starting from the prior art alternators tested by the proprietor and referred to in the table of Annex 3. In particular, the skilled person would not consider an increase of the length L1 of the stator core, because this would increase the weight and reduce the efficiency of the alternator.

The copy of the statement of grounds of appeal and the cited documents filed in the case T 0655/05-352 should not be admitted in the present proceedings because it was not acceptable that an appellant be faced at the appeal stage with the content of another case, different in the substance from the present case, unless the opponent exactly indicated the pieces of information which were specifically relevant.

VI. The submissions of the respondent opponent that are relevant to the present decision can be summarized as follows:

The patent application JP57-28558 could not be filed at an earlier stage because it became available only at the end of the proceedings in Japan. According to the translation into English, this application disclosed an alternator which showed a ratio R2 to R1 falling within the claimed range. The application was relevant to the case and should be admitted in the proceedings.

The alternator according to claim 1 was neither novel, nor involved an inventive step having regard to the

alternator Bosch KC90A reported in C11 which had been made available to the public and formed a public prior use. The measured values given in C11 were noted without indicating end digits which had a zero value and they were correct. The prior use alternator reported in C11, which showed a ratio R2 to R1 having a value of 0.539, disclosed all the features set out in claim 1 when this value was rounded up or when the tolerances indicated in the Annex 3 of the statement of ground of appeal were taken into account. It would also be obvious to the skilled person to modify the dimensions of the prior use alternator within the range defined by the manufacturing tolerances. The person skilled in the art was aware of the fact that increasing the diameter R2 of the cylindrical portion of the rotor core would increase the power output of the alternator and reduce the space available for the field coil. It was part of the normal activities of the skilled person to optimise the ratio R2 to R1 so as to find an acceptable compromise between these two effects.

The diagram of figure 10 of the opposed patent showed that the ratios L1 to L2 and R2 to R1 of the alternator of C11 were such that said alternator could have a higher power output per unit of weight than some alternators falling within the scope of the claims. Thus, the objective technical problem addressed by the invention was not to increase the power output per unit of weight, as alleged by the proprietor. As it was not possible to find another realistic technical problem solved by the alternator specified in claim 1, one had to conclude that the claimed ranges for these ratios were arbitrarily chosen and claim 1 did not involve an inventive step.

The documents C3 and C14, the documents cited in the statement of grounds of appeal in the parallel case T 0655/05-352 filed on 4 July 2005, the declaration of 12 April 2007 by Mr Figuière and the information filed with the letter of 26 September 2007 proved that an alternator A16R45T was part of the state of the art. The alternator set out in claim 1 differed from said prior use alternator A16R45T only by the ratio L1 to L2. No inventive step could be recognized in reducing the axial length L1 of the stator core because this reduced the weight of the alternator.

VII. The appellant (patentee) requested that the decision under appeal be set aside and that the patent be maintained unamended.

VIII. The respondent (opponent) requested that the appeal be dismissed.

Reasons for the Decision

1. The appeal is admissible.

Document JP57-28558 and its translation

2. The opponent referred to a Japanese document JP57-28558 and filed a translation into English of this document for the first time with its letter of 26 September 2007, i.e. one month before the oral proceedings. According to its first page, this translation relates to a published patent application JP57-28558 having a publication date of 2 July 1999. According to the opponent, this date was

in fact the publication date of the granted patent, and the application document JP57-28558 was published on 16 February 1982, i.e. before the priority dates of the patent in suit. In the circumstances, because they were doubts that the content of the translation was identical to that of the application published on 16 February 1982, the Board decided not to admit the late-filed Japanese application JP57-28558 and its translation into the proceedings.

Novelty with respect to the alternator according to document C11

3. Document C11 is a report on a test performed by the respondent on a vehicle alternator Bosch KC90A, which was purchased and analysed in the year 1992. It is beyond dispute that alternators Bosch KC90A have been the objects of public prior uses. According to the decision under appeal, the alternator reported in C11 shows all the features of the field rotor and stator recited in the first two paragraphs of claim 1. This has not been contested by the appellant.

4. A ratio of the outside diameter R2 of the cylindrical portion of the rotor core to the outside diameter R1 of the claw-like pole portion of the rotor core which falls within the range of 0.54 to 0.60 cannot however be derived directly and unambiguously from the values reported in C11. The subject-matter of claim 1 is therefore considered to be new.

4.1 According to the measurements made on the alternator reported in C11, the axial-direction length L1 of the stator core has a value of 33.84mm, the axial-direction

length L2 of the cylindrical portion of the rotor core a value of 27mm, the outside diameter R2 of said portion a value of 50.3mm, and the outside diameter R1 of the claw-like pole portion of the rotor core a value of 93.29mm. As the other measured dimensions of the alternator, some of these values are noted with two digits, some with one digit and others with no digits. C11 gives no explanation for these differences in the notation of the measurements. However, it is reasonable to assume that the last digits of the measurements are not noted when their values are zero. Therefore, the alternator reported in C11 shows a calculated ratio of the length L1 to the length L2 which has a value of 1.253, and a calculated ratio of the diameter R2 to the diameter R1 which has a value of 0.539. It is a fact that the calculated ratio R2 to R1 of the diameters measured in C11 has a value which is lower than the lowest value of the claimed range of the ratio R2 to R1, namely 0.54, and does not fall within this range. The Board cannot find any reason for justifying a rounding of the ratio R2 to R1 = 0.539 to a value of 0.54. Rounding the ratio would be an additional step beyond what has been made available to the public, which step would introduce an element of subjectivity in the assessment of novelty. These considerations are consistent with the opponent's view that the value of 1.253 for the ratio L1 to L2 is higher that the lowest value 1.25 of the claimed range for this ratio.

4.2 It is not disputed by the parties that the measured dimensions of a manufactured alternator could deviate from the nominal values specified by the manufacturer by the manufacturing tolerances and that measured values are affected by measurement errors. However, no

information concerning the nominal values and the manufacturing tolerances specified by the manufacturer of the alternator of C11 are available and C11 does not specify any range for the measurement errors. Accordingly, the Board does not see any basis for going beyond the values reported in C11. When assessing the novelty of the claimed ratios, other values than those directly resulting from the measured values indicated in C11 and which could be obtained when taking measurement errors or manufacturing tolerances into consideration, cannot be regarded as having been made available to the public (see G 2/88, OJ 1990, 93, reasons, point 10). Moreover, taking into account manufacturing tolerances when deriving from the values of the diameters R2 and R1 given in C11 a ratio of these diameters might indicate a range in which the ratio of the nominal values of the diameters R1 and R2 falls, but this cannot prove that the claimed ratio R2 to R1 has been made available to the public.

4.3 The proprietor has not disputed the fact that other alternators Bosch KC90A were made available to the public. However, as the nominal values and the manufacturing tolerances specified by the manufacturer have not been made available to the public and the actual measuring errors affecting the measurements made on the alternator considered in C11 are unknown (see *supra*), it cannot be unambiguously proved on the basis of the measurements given in C11 that the ratio L1 to L2 and the ratio R2 to R1 of another alternator Bosch KC90A effectively made available to the public fall within the claimed ranges. For the same reasons, it cannot be concluded that the measurements made on an alternator Bosch KC90A by the opponent are incorrect simply because

they are not identical to those given by the proprietor in the Annex 3.

Inventive step starting from the alternator according to C11

5. According to the patent specification (see for instance paragraph [0069]), the subjective problem addressed by the invention is to increase the power output per unit of weight of an alternator. As appears from the diagram of figure 10, the alternator of the invention, which is located in the region defined by the claimed ratios L1 to L2 and R2 to R1, has a power output per unit of weight higher (K> 26) than the prior art alternators mentioned in the patent in suit. The alternator tested in C11, which has ratios L1 to L2 and R2 to R1 respectively equal to 1.253 and 0.539, would be located on the line K= 29 for the power output per unit of weight and thus would apparently solve the subjective problem. The Board agrees with the appellant that, starting from the alternator considered in C11, the objective technical problem addressed by the invention can be seen as providing an alternative design for a compact alternator so that it could be installed in the limited space available in the engine room of specific automotive vehicles, while maintaining a high power generating ability, in particular a high power output per unit of weight. The Board considers the reformulated problem as a realistic one because it is supported by the requirements set out in the patent in suit, for instance in paragraph [0002]. This problem is solved by selecting a ratio R2 to R1 which is in the range of 0.54 to 0.60.

6. It is part of the common general knowledge of the skilled person that the output of an alternator depends on the magnitude of the flux generated by the rotor, which is proportional to the product of the number of turns of the field coil and the current flowing in this field coil, and inversely proportional to the magnetic resistance of the magnetic path in the rotor and stator cores. The skilled person starting from an alternator as reported in C11 and faced with the objective technical problem of the invention might consider reducing the radial dimensions of the alternator to accommodate it in the space available in the engine room of a car. However, it is unlikely that the skilled person would simply consider decreasing the outside diameter R1 of the rotor without modifying other dimensions of the alternator because this would reduce the area available for the field coil, the flux and finally the output power. It is also unlikely that the skilled person would consider reducing both the diameter R1 and the diameter R2 of the cylindrical portion of the rotor core in such a way that the ratio R2 to R1 of the alternator is changed, because this would modify the prior art compromise between the space available for the field coil and the magnetic resistance.

7. Moreover, the alternator of C11 does not suggest to select as a designing rule the ratio L1 to L2 and the ratio R2 to R1, but merely shows specific values for these individual lengths and diameters, among a plurality of other parameters. Faced with the problem of the invention, the skilled person starting from the structure and dimensions disclosed by the prior use would have no reason to select at the same time the two ratios specified in claim 1. Nor would he consider

increasing the ratio R2 to R1 in such a way that it would be in the range 0.54 to 0.60, while maintaining the ratio L1 to L2 of the axial dimensions of the alternator unchanged.

8. According to the opponent, it would be obvious to arrive at the invention by modifying the measured values of the dimensions L1, L2, R1 and R2 of the alternator of C11 within ranges defined by the manufacturing tolerances. However, it is not known how, in particular in which direction, the measured values given in C11 have been affected by measurements errors and manufacturing tolerances. Therefore, C11 cannot even suggest whether the measured values and their ratios should be increased or decreased. Thus, there is no obvious reason for the skilled person faced with the problem of the invention to modify the ratio R2 to R1 in the direction of the claimed range.

9. Accordingly, the prior use alternator considered in C11 would not lead in an obvious way the skilled person to the alternator set out in claim 1.

Inventive step starting from a prior art alternator having a ratio R2 to R1 falling within the range specified in claim 1

10. According to the table of annex A3 filed with the statement of grounds of appeal, some alternators tested by the patent's proprietor have a ratio R2 to R1 which falls in the claimed range. This is the case more specifically for the alternator Valeo A13VI tested in 1992 which shows a ratio of the diameters R2 to R1 of 0.564 falling within the claimed range, and a ratio of the lengths L1 to L2 of 1.077 outside the claimed range.

It is not disputed that this alternator is part of the state of the art and can be taken as an alternative starting point for the assessment of inventive step. However, this other line of argumentation does not lead in an obvious way to the alternator according to claim 1 of the patent in suit.

11. As appears from the diagram of figure 10 of the patent in suit and from the values indicated by the proprietor for the ratios L1 to L2 and R2 to R1, starting from any one of these alternators and taking into account the effects achieved by the invention, the objective technical problem could be seen as increasing the power output per unit of weight. This problem is solved in the claimed invention by selecting a ratio L1 to L2 which is in the range of 1.25 to 1.75.

11.1 It is unlikely that the skilled person aware of one of said prior use alternators and wishing to increase the power output per unit of weight of the alternator would consider increasing the length L1 of the axial-direction of the stator core because this would increase the weight of the alternator. Nor would the skilled person consider reducing the axial-direction length L2 of the cylindrical portion of the rotor because this would reduce the space available for the field coil and the power output of the alternator.

11.2 More generally, the Board has found no suggestion in the prior art to consider the ratio L1 to L2 and the ratio R2 to R1 in connection with the power output per unit of weight of the alternators. Therefore, there is no obvious reason for the skilled person to modify the measured values of the lengths L1 and L2 and their ratio,

while maintaining the ratio R2 to R1 unchanged, so as to arrive at the claimed alternator.

12. According to the opponent, documents C3 to C6, C13 to C17 and C20, the declaration by Mr Figuière and the information filed with the letter of 26 September 2007 prove that a vehicle alternator A16R45T manufactured by "Paris-Rhone", which had a ratio of the diameters R2 to R1 falling within the claimed range, had been used publicly and rendered obvious the subject-matter of claim 1. In view of the foregoing, it does not appear necessary to consider this matter further because there is no obvious reason to modify the lengths L1 and L2 of the A16R45T alternator so as to arrive at the claimed alternator. The same considerations apply to the copy of the statement of grounds of appeal in the case T 0655/05-352 with the documents filed therewith, which were annexed by the respondent to the letter of reply dated 6 January 2006. In this respect, the opponent provided no argumentation, but only specifically mentioned the documents D1A and D1B, which, in his view, were respectively identical to documents C3 and C14.

13. Accordingly, the arguments of the opponent respondent have not convinced the Board that the subject-matter of claim 1 of the patent in suit lacked novelty, or was obvious to the person skilled in the art, at the filing date of the patent. The Board therefore considers that the subject-matter of claim 1 is new (Article 54(1) EPC) and involves an inventive step within the meaning of Article 56 EPC.

14. The Board therefore concludes that the grounds for opposition mentioned in Article 100 EPC do not prejudice the maintenance of the patent unamended.

Order

For these reasons it is decided that :

1. The decision under appeal is set aside.

2. The patent is maintained unamended.

The Registrar: The Chairman:

U. Bultmann M. Ruggiu