BESCHWERDEKAMMERN DES EUROPÄISCHEN PATENTAMTS

BOARDS OF APPEAL OF THE EUROPEAN PATENT OFFICE

CHAMBRES DE RECOURS DE L'OFFICE EUROPEEN DES BREVETS

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File Number: T 486/90 - 3.5.2

Application No.: 84 110 562.0

Publication No.: 0 136 584

Title of invention: Rotor for rotary machine

Classification: H02K 13/00

D E C I S I O N
of 7 May 1991

Proprietor of the patent: Mitsubishi Denki Kabushiki Kaisha

Opponent: Robert Bosch GmbH

EPC Article 56

Keyword: "Inventive step - no"

Headnote

Europäisches Patentamt | European Patent Office | Office européen des brevets

Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number : T 486/90 - 3.5.2

D E C I S I O N
of the Technical Board of Appeal 3.5.2
of 7 May 1991

Appellant : (Opponent)
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Decision under appeal :
Decision of the Opposition Division of the European Patent Office dated 18 April 1990 rejecting the opposition filed against European patent No. 0 136 584 pursuant to Article 102(2) EPC.

Composition of the Board :

Chairman : E. Persson
Members : W.J.L. Wheeler
W. Riewald

Summary of Facts and Submissions

I. The Appellant contests the decision of the Opposition Division rejecting the opposition to European patent No. 136 584.

II. The following prior art documents were considered in the proceedings before the Opposition Division:

D1: EP-A-0 030 725
D2: DE-A-3 025 735.

III. As granted, the patent had only one claim, worded as follows:

"A rotor for rotary machines, comprising:

a rotary shaft (1);

magnetic field cores (2a,2b) fixed to said rotary shaft (1) and having an annular recessed portion;

a magnetic field coil (3) received within said recessed portion;

slip rings (4) mounted on said rotary shaft (1) at one side of said magnetic field cores for supplying electric current to said field coil (3);

lead wires (31) introduced at outsides of said magnetic field cores (2a,2b) from said magnetic field coil (3) and connected via terminals (41) to said slip rings (4); and

a fan (5a) fixed at one side of at least one said magnetic field core (2a)

characterised in that

said fan (5a) has at least one holding portion (51) for firmly holding said lead wires (31),

the or each holding portion (51) is formed by a recessed portion formed on said fan,

two holding portions (51) are arranged at two mutually opposed positions on said fan (5a),

said fan (5a) comprises a worked disk having an open central portion and a peripheral folded portion to form blades, said holding portions (51) being formed at opposite sides of said magnetic field cores (2a,2b) and

said holding portions (51) are arranged at two positions angularly opposite each other on said fan (5a)."

IV. In the course of the proceedings before the Board, the Respondent filed three new independent claims to be considered as first, second and third auxiliary requests.

According to the first auxiliary request, the first characterising feature of the claim is amended to read:

"said fan (5a) has at least one holding portion (51) firmly holding said lead wires (31) against side surfaces (2a-1) of said magnetic field cores (2a,2b);".

According to the second auxiliary request, the first characterising feature of the claim is amended to read:

"said fan (5a) has at least one holding portion (51) firmly holding said lead wires (31);"

and the following additional feature is inserted immediately after the first characterising feature:

"side surfaces (2a-1) are recessed in said magnetic field cores (2a,2b) and said lead wires (31) are held between said holding portion (51) and said recessed side surfaces (2a-1);".

According to the third auxiliary request, presented at oral proceedings held on 7 May 1991, the additional feature inserted in accordance with the second auxiliary request is amended to read:

"side surfaces of said magnetic field cores (2a,2b) have a circumferentially recessed portion (2a-1) and said lead wires (31) are held cooperatively between said holding portion (51) and said recessed portion (2a-1) of side surfaces (2a-1);".

In addition, in all the claims according to the auxiliary requests, the feature: "said fan (5a) comprising a worked disk having an open central portion and a peripheral folded portion to form blades," is transferred to the prior art part of the claim.

V. The Appellant argued in effect that the rotor as claimed according to the main request and first two auxiliary requests differed from the prior art known from D1 only in that at least one lead wire was firmly held by a recessed portion formed on the fan. It was, in principle, immaterial whether the lead wire was accommodated in a recess in the core (as in D1) or in a recess in the fan. It was conventional practice to fix rotor windings by means of varnish. If this were done with the rotor described in D1 the lead wires would be firmly held in

place. In the reduced scale drawing shown alongside the abstract of D1, no clearance was visible between the fan and the lead wires or between the lead wires and the core. That drawing would suggest clamping the lead wires against the core side by means of the fan. The Appellant pointed out that the reference to magnetic field cores in the plural in the amendments according to the auxiliary requests made no sense and implied an arrangement having lead wires clamped at both sides of the rotor which was not originally disclosed. Regarding the third auxiliary request, the fact that the side surface (2a-1) was circumferentially recessed did not assist in solving the problem of firmly holding the lead wires.

VI. The Respondent argued that the Appellant had interpreted more into D1 than was actually disclosed there. As could be seen from Figure 3 of D1 in combination with the description on page 3, lines 24 to 29, the lead wires passed through relatively large chambers bounded by the side of the core, two of the core fingers and the fan. There was no express or implied disclosure of the idea of using the fan to firmly hold the lead wires. The varnish argument was irrelevant, as varnish was not mentioned in D1 or in the patent in suit. D2 was the only citation concerned with the problem of firmly holding the lead wires, and there a special device was used for that purpose. The combination of D1 and D2 would, therefore, lead the skilled person away from the present invention, in which the fan was used for firmly holding the lead wires.

VII. The Appellant requested that the decision under appeal be set aside and that the European patent No. 136 584 be revoked.

IX. The Respondent requested that the appeal be dismissed, or, alternatively, that the patent be maintained on the basis of the first, second or third auxiliary request (noted in paragraph IV above).

Reasons for the Decision

1. The appeal is admissible.

2. It is common ground between the parties and the Board that the closest prior art is disclosed in D1. There the rotor comprises a shaft (5), a pair of magnetic field cores fixed thereto, a magnetic field coil (7) received within an annular recessed portion of said cores, slip rings (9) mounted on said rotary shaft, a pair of lead wires for the coil running over the outside of a first one of the cores at diametrically opposed positions and connected via terminals to the slip rings, and a pair of fans (8, 8a) fixed to the sides of the cores, which fans have blades on their peripheral portions. The cores each have a central portion surrounded by several pole fingers (6, 6'), part of each finger extending slightly beyond the end of the central portion of the core in the manner of a radial rib. The arrangement is such that each lead wire runs through a space defined between the end of the central portion of the first core, two of the radial ribs and the fan. There is no disclosure as to whether the lead wires are firmly held in place against the end of the central portion of the core by the fan. There is also no disclosure of the fan comprising a worked disc.

3. The rotor according to the main request differs from the rotor known from D1 in that the fan comprises a worked disk having a peripheral portion folded to form the blades and at least one recessed portion for firmly holding the

lead wires. The rotors according to the first and second auxiliary requests are further distinguished from the rotor known from D1 in that the recessed portion(s) of the fan firmly hold the lead wires against the end of the core.

4. Firmly holding the lead wires by means of recessed portions of the fan eliminates chafing, thereby preventing the insulating layer of the lead wires being damaged or the lead wires being severed.

5. In the opinion of the Board, it must be regarded as inherently obvious to a person skilled in the art that the fans (8, 8a) on the rotor known from D1 can be made by working a metal disc and that chafing of the lead wires can be prevented by depressing portions of the fan towards the core so as to clamp the lead wires firmly against the end of the core. Such measures belong to the realm of routine workshop technique.

6. By taking these obvious measures, the skilled person would inevitably arrive at a rotor having all the features specified in the claim according to the main request and the claims according to the first and second auxiliary requests. The Board notes that the claims do not specify that the recessed portions of the fan are displaced from the plane of the disk in a direction away from the core (as shown in Figure 4 of the patent in suit). However, even if this point were to be clarified by amendment, it is obvious that the direction (towards or away from the core) and depth of the recessed portions depend on the shape of the end of the core (whether it is recessed or not and, if so, to what extent). No inventive step would be involved in adapting the idea of using the fan to clamp the wire to a particular configuration of core.

7. The fact that D2 discloses the use of a special component to clamp the wire does not affect the above conclusion. In the D2 rotor, there is only one fan and it is mounted at the opposite end of the rotor to the slip rings, so that the lead wires do not pass anywhere near the fan.

8. The Board, therefore, agrees with the Appellant that the subject-matter of the claim according to the main request and that of the claims according to the first and second auxiliary requests does not involve an inventive step within the meaning of Article 56 EPC.

9. Turning now to the third auxiliary request, the Board agrees with the Appellant that the feature of the surface (2a-1) being circumferentially recessed plays no role in the clamping of the lead wires. Rather, as may be seen from Figure 4 of the patent in suit, the recessed portion (2a-1) serves as a seat for the fan to facilitate its axial alignment on the rotor. Such a centring technique belongs to the realm of routine workshop technique and does not, by itself, involve an inventive step within the meaning of Article 56 EPC. Furthermore, there does not appear to be any synergy between the features provided for centring the fan and those provided for holding the lead wires. They therefore represent a mere collocation rather than a true combination. Thus, the Board is of the opinion that the subject-matter of the claim according to the third auxiliary request does not involve an inventive step within the meaning of Article 56 EPC.

10. In the result, the Board is of the opinion that ground (a) in Article 100 EPC prejudices maintenance of the patent in suit as granted or on the basis of any of the amended forms of the claim requested by the Respondent.

Order

For these reasons, it is decided that:

1. The decision under appeal is set aside.

2. European patent No. 136 584 is revoked.

The Registrar: The Chairman:

J. Rückerl E. Persson