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D E C I S I O N
of 23 June 2005

Case Number: T 1184/03 - 3.5.2

Application Number: 96927919.9

Publication Number: 0845171

IPC: H02K 47/20

Language of the proceedings: EN

Title of invention:

Magnetic circuits in the rotation system for generating both the mechanical power and the electric power

Applicant:

Bae, Youn Soo

Opponent:

-

Headword:

-

Relevant legal provisions:

EPC Art. 83, 76(1)
EPC R. 68(1), 25(1)
RPBA A. 11(6)

Keyword:

"Disclosure - sufficiency - (no)"
"Oral proceedings - request for postponing the delivery of the decision with a view to file a divisional application - (no)"

Decisions cited:

-

Catchword:

-



Case Number: T 1184/03 - 3.5.2

D E C I S I O N
of the Technical Board of Appeal 3.5.2
of 23 June 2005

Appellant: Bae, Youn Soo
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Decision under appeal: Decision of the Examining Division of the
European Patent Office posted 26 June 2003
refusing European application No. 96927919.9
pursuant to Article 97(1) EPC.

Composition of the Board:

Chairman: F. Edlinger
Members: M. Ruggiu
E. Lachacinski

Summary of Facts and Submissions

- I. The applicant filed an appeal against the decision of the examining division to refuse European patent application Nr. 96 927 919.9, which is based on a PCT application published under number WO-A-97/07587.

- II. The reasons given for the refusal were that amendments made to the application contravened Article 123 (2) EPC and that the application did not meet the requirements of Articles 83 and 84 EPC.

- III. In a communication annexed to summons to attend oral proceedings, the board expressed doubts that the application disclosed the invention in a manner sufficiently clear and complete for it to be carried out by a person skilled in the art (Article 83 EPC).

- IV. The oral proceedings before the board took place on 23 June 2005.

The appellant requested that the decision under appeal be set aside and that a patent be granted on the basis of the main request or one of the auxiliary requests I to V as set out in the letter dated 23 May 2005 based on the following documents:

Claims as filed with the letter dated 23 May 2005;

Description filed with the statement of grounds of appeal, except for pages 4 and 4a filed with the letter dated 23 May 2005;

Figures, sheets 1/12 to 5/12 and 7/12 to 12/12 filed with the statement of grounds of appeal, and Figure 4a filed with the letter dated 23 May 2005.

When asked for the final requests in the oral proceedings, after the board had announced its opinion on Article 83 EPC, the appellant further requested that the board's decision be postponed subject to the filing of a divisional application.

- V. Each of the six sets of claims proposed by the appellant contains a single independent claim and a number of dependent claims.

Claim 1 of the main request reads as follows:

"A magnetic circuit for a rotation apparatus for generating mechanical power and electrical power, the said circuit comprising:

a revolving field magnet (22) which is adapted to rotate about a fixed axis (21) under the influence of repulsive and attractive forces caused by a first magnetic field;

a circular stator (23);

a first electromagnet for generating said mechanical power comprising a plurality of spaced projecting armature parts (24) wound with respective coils and disposed on said circular stator (23) for generating said first magnetic field when input power is supplied thereto, said plurality of said projecting armature parts (24) being disposed uniformly around the circular

stator (23) in equally spaced relation over the entire 360° extent of said stator;

a second electromagnet for generating the said electrical power being arranged on the circular stator (23) and comprising a plurality of projecting armature elements (25) wound with respective coils so that each of said projecting armature element (25) is interposed between a respective pair of adjacent projecting armature parts (24), said second electromagnet being adapted to generate an electrical current upon receiving magnetic flux from said revolving field magnet (22) and magnetic flux from said first electromagnet, said plurality of said projecting armature elements (25) being disposed uniformly around the circular stator (23) in equally spaced relation over the entire 360° extent of said stator;

and magnetic flux circulation inducing means (27) comprising a plurality of coils (29) connecting each said projecting armature parts (24) to a respective adjacent projecting armature element (25) for controlling the flow of a summed magnetic flux according to the position of the said revolving field magnet (22) and a circulation conductor (26) for circulating the magnetic flux induced by the said inducing means (27) and the second electromagnet;

wherein the plurality of said projecting armature elements (25) is selected to provide for an increased torque on the revolving field magnet (22) resulting from a change of the polarity of said plurality of projecting armature elements (25) when an electric load is applied."

The independent claims 1 of auxiliary requests I to V each specify a magnetic circuit similar to that of claim 1 of the main request, comprising magnetic flux circulation inducing means for controlling the flow of a summed magnetic flux according to the position of the revolving field magnet. Claim 1 of auxiliary request I, III and IV include in particular, similar to claim 1 of the main request, the functional feature of providing for an increased torque on the revolving field magnet resulting from a change of the polarity of the plurality of projecting armature elements when an electric load is applied.

VI. The appellant essentially argued as follows:

The invention comprised the following means (page 4, line 16 *et seq.* of the application as published): a rotatory means (*i.e.* a revolving field magnet), means for generating mechanical power, means for generating electrical power, induction means for inducing magnetic flux circulation according to the rotational phase of the revolving field magnet, and a circulation conductor (yoke) for circulating the magnetic flux from the induction means and the means for generating electrical power. In an embodiment shown in Figure 3A of the application as published, the means for generating mechanical power comprised inverse Y-type armature parts indicated by the references 24A, 24B, 24C, and 24D. The means for generating electrical power comprised M-type armature elements, indicated by the reference 25 in Figure 3A, which were interposed between said inverse Y-type armature elements. An electromagnet for inducing magnetic flux circulation

comprised coils, indicated by the reference 27 in Figure 3A, each of which could be wound in common around a leg of an inverse Y-type armature part and an adjacent leg of an M-type armature element. Other coils were wound on the central legs of the M-type armature elements. The coils 27 were supplied with electrical power as was apparent from the "Pi" reference (meaning "power input") in Figure 3A. The coils 27 produced magnetic flux in the inverse Y-type armature parts, which flux generated the magnetic poles for rotating the revolving field magnet 22, *i.e.* produced mechanical power. The coils 27 and the revolving field magnet also produced magnetic flux in the M-type armature elements. As indicated on page 8, line 39 *et seq.* of the application as published, an electromotive force (and thus electrical power) was obtained in the coils on the central legs of the M-type armature elements by cutting off the magnetic flux from coils wound on the armature for generating the electrical power. Cutting off was achieved by means of an air gap between the M-type armature element and the yoke 26 of the stator (page 7, line 6 *et seq.* of the application as published). The reference "Po" (meaning "power output") associated with coils on the central leg of the M-type armature elements in Figure 3A made apparent that an electromotive force was generated in these coils. As explained in page 11, line 9 *et seq.*, of the application as published, when this electromotive force was connected to an electric load (*i.e.* when the coils on the central legs of the M-type armature elements were connected to an electric load), the polarity at the pole piece of the armature element for generating the electrical power changed from a small S (Sa) pole to an N (Nb) pole according to the amount of the

electromotive force and load, which increased the torque even when the revolving field magnet rotated at a high speed. This phenomenon was illustrated in Figures 7A and 7B of the application as published. Figure 7A showed the magnetic flux lines and the poles when no load was applied and Figure 7B when a load was applied. The flux lines for the embodiment illustrated in Figure 3A were shown in Figure 4A. The load was a resistive load, as was apparent from the mention of the coil resistance R_a for the coil of the electromagnet 27 in page 11, lines 20 to 24 of the application as published. The voltage applied to the coil 27 was a switched DC voltage, but it would be possible that an AC voltage was applied as suggested in US patent No. 5 350 991 of the same inventor as the present application. The Korean priority document of that US patent was cited in the present application as published.

Reasons for the Decision

1. The appeal is admissible.
2. *Sufficiency of disclosure*

Claim 1 of every request specifies magnetic flux circulation inducing means for controlling the flow of a summed magnetic flux according to the position of the revolving field magnet. According to the description of the application as published, the magnetic flux circulation inducing means are provided for inducing magnetic flux circulation in the armature elements 25 of the (second, e.g. M-type) electromagnet for

generating electrical power, where the flux from the magnetic flux circulation inducing means combines and overlaps with flux from the revolving field magnet. The combined flux produces an electromotive force in the coils of the armature elements of the (second) electromagnet for generating electrical power (see in particular page 5, lines 9 to 15; page 8, line 33 to page 9, line 4; and page 11, lines 9 to 13 of the application as published). This appears to be in agreement with the explanations provided by the appellant.

According to the description of the application in the present version (see the third paragraph on page 4 filed with the letter dated 23 May 2005) as well as in the version as published (see page 4, lines 5 to 15), an objective of the invention is to provide a magnetic circuit that maintains or increases the torque regardless of an increase in the counter electromotive force induced by increasing rotational speed. According to the application as published (see page 11, lines 9 to 19), this is achieved in that the magnetic polarity of the pole pieces in the armatures for generating the electrical power changes to the same polarity as that of the pole pieces in the armatures for generating the mechanical power when the electromotive force (*i.e.* the coil of the second electromagnet) is connected to an electric load. The application does not provide any further, more precise indications as to how this change of polarity could be achieved. The appellant suggested that a load suitable for causing a change of magnetic polarity would be a resistive load. However, the passage of the application as published that has been indicated by the appellant in this connection (page 11,

lines 20 to 24) refers to the coil resistance R_a , not the load connected to the electromagnet for generating electrical power. Thus, the application as published indicates neither what kind of load should be connected to that electromagnet, nor when that load should be connected to change the polarity of the armature elements of the electromagnet for generating electrical power and to increase the torque on the revolving field magnet. In the absence of a complete disclosure, a person skilled in the art is left to conjecture about how to change the magnetic polarity and thereby increase the motor torque. The direction and density of the magnetic flux in a magnetic circuit depend on the direction and magnitude of the currents and the magnetic paths involved, in particular the air gaps. As far as the embodiments of the application can be understood, switching pulse voltages are sequentially applied to at least one of a plurality of coil windings, and the power supply circuit changes the direction of the current pulses applied to the coil dependent on the rotor phase angle (see page 9, line 8 to page 10, line 13 and Figure 5 of the application as published). However, there is no disclosure about the relationship between the current pulses and the current in the load connected to the coils of the electromagnet for generating electrical power, or about the relationship between the different air gaps involved. Therefore, the board concludes that, contrary to the requirement set out in Article 83 EPC, the application does not disclose the invention defined in claim 1 of the main request and auxiliary requests I to V in a manner sufficiently clear and complete for it to be carried out by a person skilled in the art.

3. *Request to postpone the decision of the board*

Rule 25 (1) EPC provides that the applicant may file a divisional application relating to any pending earlier European patent application. Thus, the board construes the appellant's request that the board's decision be postponed subject to the filing of a divisional application as a request for postponement of the decision in order to keep the application pending for this purpose. However, Rule 68 (1) EPC provides the possibility of delivering a decision at oral proceedings. Article 11 (6) of the Rules of Procedure of the Boards of Appeal requires the board to ensure that each case is ready for decision at the conclusion of the oral proceedings, unless there are special reasons to the contrary. This case was ready to be decided at the oral proceedings. Postponing the decision of the board to allow the filing of a divisional application would run against the public interest to have the matter decided as expeditiously as possible, because matter ready to be finally decided by this board would be pending again. The divisional application would have to be filed in respect of subject-matter based on the same disclosure of the invention as in the description of the present application (see Article 76 (1) EPC). Therefore, in view of the circumstances of the present case, the board considers that the public interest has to prevail over the interest of the appellant to have another chance of getting a patent. Thus, the board has decided not to postpone the delivery of its decision.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

The Chairman:

D. Sauter

F. Edlinger