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**Datasheet for the decision  
of 25 October 2017**

**Case Number:** T 1432/12 - 3.5.02

**Application Number:** 06826384.7

**Publication Number:** 1946427

**IPC:** H02K3/24, H02K3/51

**Language of the proceedings:** EN

**Title of invention:**  
Paddled rotor spaceblocks

**Applicant:**  
General Electric Company

**Relevant legal provisions:**  
EPC Art. 84, 123(2), 52(1), 56, 109(1)

**Keyword:**  
Amendments - extension beyond the content of the application  
as filed (no)  
Inventive step - (yes) after amendment  
Interlocutory revision - department of first instance should  
have rectified decision (yes)



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Case Number: T 1432/12 - 3.5.02

**D E C I S I O N**  
**of Technical Board of Appeal 3.5.02**  
**of 25 October 2017**

**Appellant:** GENERAL ELECTRIC COMPANY  
(Applicant) 1 River Road  
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**Representative:** Fischer, Jens Peter  
General Electric Technology GmbH  
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**Decision under appeal:** Decision of the Examining Division of the  
European Patent Office posted on 25 January 2012  
refusing European patent application No.  
06826384.7 pursuant to Article 97(2) EPC.

**Composition of the Board:**

**Chairman** R. Lord  
**Members:** M. Léouffre  
R. Cramer

## **Summary of Facts and Submissions**

- I. In its decision to refuse the European patent application No. 06 826 384.7 taken according to the state of the file, the examining division referred to the official communication dated 28 September 2011, in which it held that claim 1 received with the letter dated 6 September 2011 did not comply with the requirements following from Articles 123(2) and 84 EPC, and that the subject-matter of that claim lacked an inventive step in the sense of Article 56 EPC having regard to document US 2002/0079784 A1 (D3) (see sections 1, 2 and 3 of the communication dated 28 September 2011).
- II. On 3 April 2012 the applicant appealed against this decision. The appellant requested that the contested decision be set aside and that a patent be granted on the basis of a new set of claims filed with the grounds of appeal received on 1 June 2012 .
- III. In an official communication dated 23 November 2016 the board expressed their preliminary opinion on the patentability of the set of claims filed with the grounds of appeal.
- IV. With a response dated 19 January 2017 the appellant filed new description pages 3 and 4 and a new set of claims 1 to 4 replacing the set of claims filed with the grounds of appeal.
- V. The board understands the appellant's request to be that the decision under appeal be set aside and that a patent be granted in the following version:

- Claims No. 1 to 4 filed with the letter dated 19 January 2017
- Description pages 1, 2 and 5 to 7 as originally filed
- Description page 8 filed with the letter dated 11 March 2009
- Description pages 3 and 4 filed with the letter dated 19 January 2017
- Drawings sheets 1/6 to 6/6 as originally filed.

VI. Claim 1 reads as follows:

"A dynamoelectric machine (100) cooled by a gas flow, comprising:  
a rotor (116) having a cylindrical body portion;  
a plurality of coil endwindings (128) extending axially beyond the rotor (116);  
a plurality of spaceblocks (140; 240; 340) located adjacent the plurality of endwindings (128);  
a retaining ring (130) disposed around end turns of the end windings (128), at each end of the body portion of the rotor (116), to hold the end windings (128) in place against centrifugal forces, the retaining ring (130) being fixed at one end to the body portion of the rotor;  
a passageway positioned adjacent one or more of the plurality of spaceblocks (140; 240; 340);  
characterized in that  
one or more of the plurality of spaceblocks (140; 240; 340) includes a pair of paddles attached thereto, the pair of paddles being in the form of rectangular flat plates that form C-shaped channel (155) extending into the passageway (136) in an axial direction, so as to deflect the gas flow into an axial direction, the pair of paddles of each spaceblock (140; 240; 340)

protruding beyond the full radial depth of the endwindings (128) into the passage (136)."

Claims 2 to 4 are dependent on claim 1.

- VII. The appellant submitted that the amendments to claim 1 were supported by the original description since
- the rotor was specified as having "a cylindrical body portion (114)" as recited on page 5, lines 13-14;
  - the term "adjacent" in the feature "a plurality of spaceblocks (140; 240; 340) located adjacent the plurality of endwindings (128)" could be seen as disclosed by the original terms "thereabout" and "about" (see page 7, second paragraph)
  - the feature of claim 1 "a retaining ring (130) disposed around end turns (127) of the end windings (128) at each end of the body portion (114) of the rotor (116) to hold the end windings (128) in place against centrifugal forces, the retaining ring (130) being fixed at one end to the body portion (114) of the rotor (116)" was supported by the passage from page 5, line 27 to page 6, line 2;
  - the feature of claim 1 specifying that "one or more of the plurality of spaceblocks (140, 240, 340) includes a pair of paddles attached thereto" was supported by page 7, lines 8 to 9;
  - the C-shaped channel "extending into the passageway (136) in an axial direction so as to deflect the gas flow in an axial direction" was so specified in original claim 1;
  - the feature that "the pair of paddles protrude beyond the full radial depth of the endwindings (128) into the passage (136)" was originally disclosed in figure 5 and on page 6, lines 14 to 16, page 7, lines 22 to 25 and original claim 4.

The appellant also argued that D3 (US 2002/079784) did not disclose the following features of claim 1:

- a spaceblock having a pair of paddles attached thereto;
- the paddles being in the form of flat rectangular plates;
- the paddles forming a C-shaped channel extending into the passageway in an axial direction so as to deflect the gas flow in an axial direction; and
- the pair of paddles protruding beyond the full radial depth of the endwindings.

According to the appellant, the re-entrant portion of the spaceblocks 140 in D3 produced an enhanced lower pressure region at the trailing edges thereof, and caused increased flow into the cavity 142 as described in D3 paragraph [0031], lines 6 to 11 and paragraph [0034], lines 14 to 21. This was in contrast to the present invention where the aim was to reduce flow pressure losses, by diverting the cooling flow in a largely axial direction.

The appellant was therefore of the opinion that the present invention, as recited in claim 1, was novel and involved an inventive step as required by Articles 54(1) and 56 EPC.

### **Reasons for the Decision**

1. The appeal is admissible.
2. *Articles 84 and 123(2) EPC*

With the grounds of appeal, the appellant filed an amended claim 1 in which the feature which had been

referred to as feature 1 by the examining division ("the spaceblock comprising a C-channel extending into the passageway so as to deflect the gas flow into an axial direction") has been reintroduced i.e. incorporated into the following feature of claim 1: "one or more of the plurality of spaceblocks (140; 240; 340) includes a pair of paddles attached thereto, the pair of paddles being in the form of rectangular flat plates that form C-shaped channel (155) extending into the passageway (136) in an axial direction, so as to deflect the gas flow into an axial direction". In claim 1 as filed with the grounds of appeal, as well as in the present claim 1, the paddles have also been specified as being a pair of paddles, the feature "the pair of paddles of each space blocks (140, 204, 340) protruding beyond the full radial depth of the endwindings (128) into the passage (136)" has been added, the rotor specified as having a cylindrical body portion, and the retaining ring defined.

The features mentioned in the previous paragraph are supported by the passages indicated by the appellant in its submissions.

Thus the appellant overcame the objections of lack of support (Article 123(2) EPC) and lack of clarity (Article 84 EPC) raised under items 1.1., 1.2, 2.1.1 and 2.1.2 of the communication dated 28 September 2011.

3. *Article 109 EPC*

3.1 The examining division, referring to D3 and in particular to the spaceblocks 148 shown in figure 8 of D3, which are provided with a C-formed concave surface 146, considered that the subject-matter of claim 1 then on file differed from the machine known from D3

only in that the paddles were formed of rectangular flat plates.

The examining division was of the opinion that:

- the problem of improving air flow through the rotor winding ends was not solved in a machine according to claim 1,
- no technical problem was apparently solved by the identified difference in combination with the other features of claim 1, and
- the replacement of the re-entrant portion 154 of the spaceblocks of D3 (see figure 8) comprising the sidewall portions 162, 164 by flat rectangular plates forming the paddles resulted in a non-functional modification (see item 3 of the communication dated 28 September 2011).

The examining division then concluded that the subject-matter of the claim 1 filed with the letter dated 28 September 2011 lacked an inventive step (Article 56 EPC) having regard to D3.

3.2 The claim 1 which was the subject of the contested decision lacked an essential feature relating to the orientation of the C-channel with respect to the machine, namely feature 1 cited under item 2. above. Consequently, the examining division did not assess if the combination of the feature incorporating feature 1 with the other features of the claim 1 as filed with the grounds of appeal renders the subject-matter of claim 1 inventive over D3.

3.3 Since with the set of claims filed together with the grounds of appeal, the appellant overcame all objections raised by the examining division in their communication dated 28 September 2011, and no opinion on the potential inventive step of the subject-matter as now claimed can be found in the said communication,



the examining division should have rectified its decision under Article 109(1) EPC (see Chapter IV.E. 2.9.1 of the Case Law of the Boards of Appeal of the European Patent Office, 8th edition 2016, pages 1110 and 1111).

3.4 *Article 111 (1) EPC*

An objective of Article 109 EPC is to speed up the procedure and to grant the applicant the right to two instances. Nevertheless the board may exercise any power within the competence of the department which was responsible for the decision under appeal in accordance with Article 111(1) EPC.

In their response letter dated 19 January 2017, the appellant did not object to this option.

4. *Article 54 EPC*

D3, which is considered to represent the closest prior art, discloses:

A dynamoelectric machine (see figure 1 and paragraph [0029]) cooled by a gas flow, comprising:

- a rotor 10;
- a plurality of coil endwindings 28 extending axially beyond the rotor (see figure 1);
- a plurality of spaceblocks 40, 140 (see figures 2, 6 and 7) located adjacent the plurality of coil endwindings 28;
- a retaining ring 30 disposed around end turns 27 of the end windings 28, at each end of the body portion of the rotor, to hold the end windings 28 in place against centrifugal forces, the retaining ring 30 being fixed at one end to the body portion of the rotor; and

- a passageway referred to with numbers 34 and 36 in figure 1 and 37 in figure 6, positioned adjacent the plurality of spaceblocks 140.

One or more of the plurality of spaceblocks 140 shown in figures 6 to 8 comprises paddles in the form of sidewall portions 162, 164 that form a C-shaped channel (see figure 8 and paragraph [0033]: the paddles 162, 164 are arranged such, that a "concavely curved downstream wall 146" is created) and protrude beyond the full radial depth of the endwindings 28 into the passageway 36 (see sentence bridging right-hand column of page 2 and left hand column of page 3).

From the figures 7 and 8 of D3 which are cross-sectional views along line 7-7 of figure 6, it can be concluded that the trailing knife edges 150 and sidewall portions 162, 164 of the spaceblocks 140 are positioned in parallel planes orthogonal to the axis of the machine. They cannot therefore deflect the gas flow into an axial direction.

Thus, claim 1 differs from D3 in that

- the paddles are attached to the spaceblocks, and
- the paddles are in the form of rectangular flat plates extending into the passageway in an axial direction so as to deflect the gas flow into an axial direction.

The subject-matter is consequently novel having regard to D3.

5. *Article 56 EPC*

According to the description page 7, lines 13 to 19, and with paddles having the characteristics mentioned in claim 1, a guiding channel is formed such that the

cooling flow will be diverted into the gas inlet passage in a largely axial direction. The flow pressure losses at the entrance of the passageway and the cooling losses are thereby minimized. Thus, having regard to the prior art as disclosed in D3, and in the absence of any other relevant teaching in the prior art, the invention as defined in claim 1 is not obvious and the requirements following from Article 56 EPC are met.

## 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 grant a patent in the following version:
  - Claims No. 1 to 4 filed with the letter dated 19 January 2017
  - Description pages 1, 2 and 5 to 7 as originally filed
  - Description page 8 filed with the letter dated 11 March 2009
  - Description pages 3 and 4 filed with the letter dated 19 January 2017
  - Drawings sheets 1/6 to 6/6 as originally filed.

The Registrar:

The Chairman:



G. Nachtigall

R. Lord

Decision electronically authenticated