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Datasheet for the decision of 22 May 2012

Case Number: T 1984/09 - 3.2.04

Application Number: 03770927.6

Publication Number: 1561030

IPC: F03D 11/00, H02G 13/00

Language of the proceedings: EN

Title of invention:
Lightning protection of a pitch-controlled wind turbine blade

Applicant:
LM GLASFIBER A/S

Opponent:
ENERCON GmbH

Headword:
-

Relevant legal provisions:
EPC Art. 56, 114(2)
RPBA Art. 12(4)

Keyword:
"New evidence (documents admitted)"
"Inventive step (main request: yes)"

Decisions cited:
-

Catchword:
-

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Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number: T 1984/09 - 3.2.04

D E C I S I O N
of the Technical Board of Appeal 3.2.04
of 22 May 2012

Appellant: (Patent Proprietor)
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Decision under appeal:
Decision of the Opposition Division of the European Patent Office posted 22 July 2009 rejecting the opposition filed against European patent No. 1561030 pursuant to Article 101(2) EPC.

Composition of the Board:

Chairman: A. de Vries
Members: C. Scheibling
T. Bokor

Summary of Facts and Submissions

I. The Appellant (Opponent) lodged an appeal, received 29 September 2009, against a decision of the Opposition Division posted 22 July 2009 to reject the opposition against European patent nr. 1 561 030, and simultaneously paid the appeal fee. The statement of the grounds of appeal was received 1 December 2009.

II. The opposition had been filed against the patent as a whole based among others on Article 100(a) in combination with Articles 56 EPC for lack of inventive step.

The Opposition Division held that the grounds mentioned did not prejudice the maintenance of the granted patent having regard in particular to the following document:
D1: WO-A-01/86144.

III. During the appeal proceedings the Board considered the following further documents filed by the Appellant with the appeal:
D9: EP-A-1 154 537
D10: G. Dalén: "Lightning Protection of Large Rotor Blades Design and Experience", International Energy Agency R&D Wind, 26th Meeting of Experts, 1994, pp 55-66

IV. Oral proceedings before the Board were duly held on 22 May 2012.

V. The Appellant requests that the decision under appeal be set aside and the patent be revoked in its entirety.

The Respondent (Proprietor) requests that the appeal be dismissed (main request), or, in the alternative, that the decision be set aside and the patent be maintained in amended form on the basis of one of first to sixth auxiliary requests filed with letter of 29 March 2012. Should documents D9 to D12 be admitted into the proceedings, he requests that the case be remitted to the first instance.

Both parties have requested oral proceedings.

VI. The wording of claim 1 as granted (main request) is as follows:

"A wind turbine rotor including a rotor hub (3) and a plurality of blades (4), and where each blade root (16) is connected to said rotor hub through a pitch bearing (5) in such a manner that the pitch angle of the blade is adjustable by a turning of the blade about its longitudinal axis relative to the rotor hub, and where the blade is provided with at least one electrically conducting lightening down-conductor (6) extending in the longitudinal direction of the blade to the blade root and being electrically isolated from the pitch bearing (5), and where a spark gap (15) is provided between the lightning down-conductor and the rotor hub, said spark gap (15) being adapted to conduct a lightning current passing through the lightning down-conductor, characterised in that a sliding contact connection (7, 12) is provided parallel to the spark gap (15) between the lightning down-conductor (6) and the rotor hub (3), said sliding contact connection ensuring electrical contact between said lightening

down-conductor (6) and said rotor hub (3) irrespective of the pitch angle of the blade."

VII. The Appellant argued as follows:

New documents D9 and D10 were retrieved to address the decision's finding that sliding contacts from rotor to hub were not shown in any of the citations. D9 is particularly pertinent as there it performs all the functions of the claimed turbine and differs by only one feature. Two other documents (D11 and D12) are less pertinent and their admission is no longer sought.

D1, the closest prior art, has separate paths for lightning down conductance and static discharge. The static discharge path across the pitch bearing must also serve formation of leaders, the same purpose as the slip-ring in the patent. The purpose of the slip ring must therefore be to better protect the pitch bearing against flow of any current, not only static current but also lightning discharges that might occur if the inductance were to fail. The problem of avoiding static discharge across the bearing is known in the art, see also the prior art discussion in the patent, while the problem of component failure is also well-known. The solution of either problem involves the application of common general knowledge. Alternatively the skilled person can draw on D9, which gives him a clear idea how to protect the bearing against currents.

VIII. The Respondent argued as follows:

The new documents add nothing to the procedure: slip-rings are also shown in D1. If admitted, then this new evidence warrants a remittal.

The patent's basic idea is to assist leader formation, which takes place within milliseconds, and so produce controlled lightning down conductance. Vis-a-vis D1 the patent provides a mechanically much simpler way of achieving this. D1 would require too many modifications.

In particular the skilled person would not look toward D9 as its teaching is incompatible with D1. D9 shows only a single path and serves only the purpose of lightning down conductance. Why would the skilled person consider it to aid static discharge?

Reasons for the Decision

1. The appeal is admissible.

2. *Late filed evidence*

D9 and D10 were filed with the grounds of appeal to address the appealed decision's finding at point 3 that none of the prior art shows sliding contacts across the pitch bearing. The relevance of D9 is easy to determine from the cited passages: figure 3, see also paragraph [0028] shows lightning down conductance involving a slip ring at 15 bypassing the pitch bearing. Though D10 on page 56 also mentions a slip ring, this is provided from hub to nacelle, and the Board therefore does not consider this document more relevant than what is already on file. It therefore exercises its discretion under Article 114(2) EPC in conjunction with Article 12(4) of the Rules of Procedure of the Boards of Appeal of the EPO to admit D9 but not D10 into the procedure.

3. *Remittal*

Though D9 sheds new light on the known use of slip rings across a pitch bearing, the Board does not consider that this new information alters the legal and factual framework to the extent as to warrant a remittal. The Board shall therefore decide on the appeal itself.

4. *Background*

The patent concerns lightning down conduction in a wind turbine. Each blade has a lightning conductor which is

isolated from the blade's pitch bearing and connects to the hub via a spark gap. The lightning conductor also connects to the hub via a parallel sliding contact which maintains connection regardless of blade pitch angle.

According to specification paragraphs [0007], [0011] and [0033] the sliding contact or slip-ring ensures formation of "leaders" from the blades, so that a subsequent lightning discharge, which is directed to a leader, takes place in a controlled, predetermined manner via the spark gap. Without the slip-ring discharge might still take place via the pitch bearing, causing damage there, see specification paragraph [0008].

5. *Inventive Step*

5.1 The sole contention concerns inventive step. It is common ground that D1 discloses the closest prior art. The parties also agree that certainly the feature of the sliding contact connection across the pitch bearing which isolates it completely from the lightning conductor constitutes a difference of the turbine of claim 1 over that shown for example in figure 3 of D1. In D1, see figure 3, a static diverter 24 arranged in parallel to a spark gap at 9 connects to the blade or pitch adapter to directly discharge static charge into the hub via the adapter and thus the pitch bearing.

5.2 According to the patent the effect of the sliding contact is, as stated previously, to ensure leader formation so that subsequent lightning discharges follow a predetermined path that avoids the pitch

bearing. This problem of leader formation is not addressed in any of the cited prior art documents, nor does it appear obvious per se. In as far as this effect is not achieved in D1, but is by means of the slide contact, this feature would render the claimed turbine non-obvious over D1.

It is however arguable that the static diverter 24 in D1, which provides a permanent galvanic connection to earth via the hub, for this reason already implicitly performs this function. This diverter, see figure 1 and page 4, second paragraph, includes, in addition to an ohmic resistor, an inductance which effectively blocks conduction of lightning through the static diverter so that it is constrained to discharge via the spark gap. Whether or not the inductance also allows leaders to form depends on the time dependency of leader formation. The Respondent-Proprietor states that leaders form in a matter of milliseconds at most, while the Appellant contends that even in that timeframe the inductance would hardly effect leader formation via the static diverter. Either way no conclusive evidence has been provided. Given that here the burden of proof rests on the Appellant-Opponent, the Board is thus unable to conclusively base a finding of non-obviousness on this effect.

5.3 The Appellant argues that the real effect of the slide contact is that it prevents static current from passing through the pitch bearing and damaging it. This problem would be well known in the prior art. Other than that this might be inferred from a mention of the problem in the discussion of the prior art in paragraph [0005] of

the patent specification, no evidence has been put forward to this effect.

That the patent mentions the problem in the context of the prior art does not mean it therefore forms part of the prior art (unless it were to be expressly acknowledged as such, which is not the case here). Indeed, it appears a more valid assumption that this reflects part of the patent's contribution to the prior art.

Indeed, D1's teaching appears to suggest that static discharge across the pitch bearing was not seen as problematic in the prior art. Where D1 allows such static discharge via the pitch bearing it expressly conducts lightning discharges through the hub and hub bearings (page 7, third paragraph), which suggests that D1 at least did not regard a continuous static discharge through the pitch bearing as harmful.

As it is unproven that the problem of static discharge through the pitch (or other) bearing was known before priority, and indeed D1 suggests the opposite, the Board must assume that it was not known in the prior art. Nor can the Board consider it to be obvious in view of what D1 suggests. If the problem is not known or obvious, the Board can but conclude that its solution as defined in granted claim 1 is equally non-obvious.

5.4 Even if this problem had been known, D9, in the Board's opinion does not offer a solution that could be combined with D1. In D9 slip-rings serve exclusively to conduct lightning to earth past bearings in blades and

hub, as lightning discharges are seen to be deleterious to the bearing, paragraph [0009]. In this respect it has the same purpose as D1, which however uses spark gaps to avoid lightning conductance via the bearings. Even if the slip rings in D9 must also conduct static to earth, there is no express teaching to that effect, that a slip rings also prevents conduction through the bearings and associated damage.

As noted D1 and D9 serve the same purpose but offer alternative solutions. In as far as the skilled person might recognize in D9 a way of avoiding static discharge through the pitch bearings he would be inclined to adopt the whole approach taught therein, rather than only part of its teaching.

5.5 Finally, it is true that component failure is a common concern in any field. The skilled person would certainly be aware of the consequences of a malfunction of the inductance in the static discharge circuit in D1. Without any express teaching to this effect it is by no means obvious that he would then look to adopting an alternative approach. Rather, weighing the likelihood of the inductance failing against cost he would use inductances of a quality that meet his needs.

5.6 On the basis of the Appellant's arguments the Board is unable to conclude that the claimed invention lacks inventive step. This ground invoked by the Appellant-Opponent does not prejudice maintenance of the patent, confirming the decision's finding. The appeal must therefore fail.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar The Chairman

G. Magouliotis A. de Vries