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**Datasheet for the decision  
of 4 February 2020**

**Case Number:** T 2497/16 - 3.2.06

**Application Number:** 08425486.1

**Publication Number:** 2146055

**IPC:** F01D5/08, F01D5/30, F01D11/00,  
F01D25/12

**Language of the proceedings:** EN

**Title of invention:**

Sealing element for a gas turbine, a gas turbine including said  
sealing element and method for cooling said sealing element

**Patent Proprietor:**

ANSALDO ENERGIA S.P.A.

**Opponent:**

Siemens Aktiengesellschaft

**Headword:**

**Relevant legal provisions:**

EPC Art. 54, 56, 111(1)

**Keyword:**

Novelty - main request (no)

Inventive step - auxiliary request (yes)

Remittal to the department of first instance - (yes)

**Decisions cited:**

**Catchword:**



**Beschwerdekammern**  
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Case Number: T 2497/16 - 3.2.06

**D E C I S I O N**  
**of Technical Board of Appeal 3.2.06**  
**of 4 February 2020**

**Appellant:** Siemens Aktiengesellschaft  
(Opponent) Werner-von-Siemens-Straße 1  
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**Respondent:** ANSALDO ENERGIA S.P.A.  
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**Decision under appeal:** Decision of the Opposition Division of the  
European Patent Office posted on 21 October 2016  
rejecting the opposition filed against European  
patent No. 2146055 pursuant to Article 101(2)  
EPC.

**Composition of the Board:**

**Chairman** M. Harrison  
**Members:** P. Cipriano  
J. Hoppe

## Summary of Facts and Submissions

- I. An appeal was filed by the appellant (opponent) against the decision of the opposition division rejecting the opposition to European patent no. 2 146 055. It requested that the decision under appeal be set aside, that the European patent be revoked and that the appeal fee be reimbursed.
- II. In its reply of 2 May 2017, the respondent (proprietor) requested that the appeal be dismissed. It also filed four auxiliary requests.
- III. The Board issued a communication inviting the appellant to file comments on the auxiliary requests, to which the appellant duly responded.
- IV. The following documents, referred to by the appellant in its grounds of appeal, are relevant to the present decision:  
  
D2 EP 0 801 208 A2  
D3 US 6 065 932
- V. The Board issued a summons to oral proceedings and a communication containing its provisional opinion, in which it indicated *inter alia* that D2 did not seem to disclose all the features of claim 1 of the main request, that the subject-matter of claim 1 appeared to involve an inventive step. The Board however noted that if the main request were not allowable the auxiliary requests might need to be discussed.
- VI. Oral proceedings were held before the Board on 4 February 2020, during which the appellant *inter alia*

withdrew its request for reimbursement of the appeal fee and the respondent withdrew its auxiliary requests 2, 3 and 4.

The final requests were:

The appellant (opponent) requested that the decision under appeal be set aside and the European patent be revoked.

The respondent (patent proprietor) requested that the appeal be dismissed (main request), or as an auxiliary measure that the patent be maintained in amended form based on auxiliary request 1, filed with letter dated 2 May 2017.

VII. Claim 1 of the main request (as granted) reads as follows (labelling of the features having been added by the Board):

"A gas turbine including

- a) at least one rotor ring (2) and
- b) at least a plurality of rotor blades (3) radially arranged about the rotor ring (2) and
- c) having an end portion (7) fixed to the rotor ring (2);
- d) the gas turbine (1) comprising at least one sealing element (22),
- e) which includes a wall (23), coupled to the rotor ring (2) and to at least one rotor blade (3), and
- f) is provided with an external face (24), arranged in contact with a hot working fluid in the gas turbine (1), and
- g) (1) with an internal face (25)
- g) (2) arranged in contact with a cooling fluid of the gas turbine (1);
- h) the wall (23) having a gap (29),

- i) which is the space defined between the external face (24) and the internal face (25) and
- j) which, in use, is travelled through by the cooling fluid;
- k) the wall (23) having a lower edge (27) adapted to engage a circumferential seat (28) made in the rotor ring (2); the gas turbine (1) being characterized in that
  - l) it comprises a plurality of ribs (33),
  - m) which extend from the internal face (25) of the wall (23)."

Claim 1 of auxiliary request 1 further comprises the following features added at the end of the claim:  
"wherein the wall (23) has an upper edge (26) adapted to engage a corresponding circumferential groove (20) of a rotor blade (3); the gap (29) substantially extending close to the upper edge (26);  
wherein the internal face (25) of the wall (23) is provided with at least one inlet (31) for feeding the gap (29) with the cooling fluid of the gas turbine (1) and the external face (24) of the wall (23) is provided with at least one outlet (30) for communicating the gap (29) with the hot working fluid of the gas turbine (1); the inlet (31) and the outlet (30) are circumferentially offset."

VIII. The arguments of the appellant relevant to the decision may be summarised as follows:

*Main request - novelty*

D2 disclosed all the features of claim 1 of the main request.

The skilled person reading D2 recognised that the cover plate of Figure 5 had a wall having a lower edge which was that shown in Figure 1 and which was adapted to engage a circumferential seat made in the rotor ring as defined in feature k). Feature k) was present in the embodiment of Figure 5, since Figure 3 was an enlarged view of a part of Figure 1, Figure 4 showed the cover plate of Figure 3 and Figure 5 disclosed a simple modification to the conduits of the cover plate of Figure 4.

Feature i) defined that the gap of feature h) is the space defined between the external face and the internal face. The conduit 126 disclosed in D2 corresponded to such a space. Thus feature i) was disclosed.

D2 further disclosed features l) and m). The ribs had to be mentally erased from the piece such that the inner face could be established by the skilled person reading D2 in the same way as this was required in the patent, where the ribs are stated to "extend from" the internal face.

The skilled person therefore recognized that the side walls laterally delimiting the cavities 128 and 132 and the wall separating the cavities were ribs in the sense of the patent. Ribs were not required to have a specific shape and the ribs in D2 also served to increase the stiffness of the cover plate.

*Auxiliary request 1 - inventive step*

Claim 1 did not involve an inventive step. D2 disclosed the features of granted claim 2 and D3 the features of granted claims 3 and 5.

IX. The arguments of the respondent relevant to the decision may be summarised as follows:

*Main request - novelty*

D2 did not disclose the features i), k), l) and m).

The embodiment of Figure 5 of D2 disclosed the wall portion of a sealing element having a lower edge that was not adapted to engage a circumferential seat made in the rotor ring, since the lower edge had a different shape than the lower edge that was seen engaging the rotor ring in Figure 1. Feature k) was therefore not disclosed.

Feature i) defined a gap which was a hollow space between the external and the internal face. From the patent taken as a whole it could be inferred that the faces were physical entities and not abstract planes delimiting the wall.

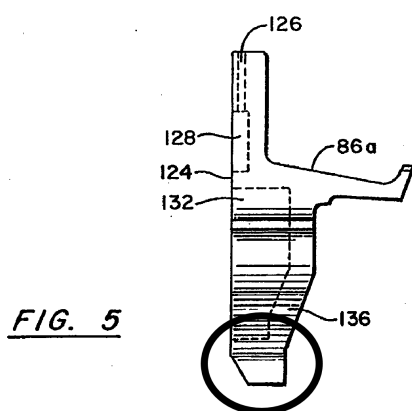
The gap in D2 was not a space defined between the external face (24) and the internal face (25) (feature i), since the internal face was not arranged in contact with a cooling fluid of the gas turbine.

As regards features l) and m), the skilled person contemplating D2 would not recognize an internal face of the sealing element from which the ribs protrude in the way suggested by the opponent. In fact the skilled person contemplating D2 would consider the opposite and directly and unambiguously derive cavities 128 and 132 recessing into the abutting surface 124 and delimited by side walls instead of ribs extending from an internal face of the wall.



## Reasons for the Decision

1. Main request - novelty
  - 1.1 The respondent argued that D2 did not disclose the features i), k), l) and m).
  - 1.2 The respondent did not contest that the remaining features were disclosed in D2. The Board also finds no reason to conclude otherwise.
  - 1.3 Figure 5 in D2 discloses a cover plate 86a with a lower edge of the base comprising an inclined side wall as seen in the circle of the Figure below.



The Board finds that such a base corresponds to a lower edge of a wall adapted to engage a circumferential seat made in the rotor ring as defined in feature k) of claim 1. This is further supported by Figure 1 of D2, where a cover plate is seen in its assembled state on the rotor assembly retained adjacent to the blades in the disk attachment slots (see also column 3, lines 47 to 51).

1.4 The respondent argued that since the shape of the lower edge of the base of the cover plate 86a in Figure 5 was different from the one of the cover plate 86 in Figure 1 (which depicted to parallel side walls), the cover plate 86a of Figure 5 was thus not adapted to engage the circumferential seat made in the rotor ring in Figure 1. However, the Board does not find this argument persuasive as explained below.

1.4.1 Figure 1 shows a cover plate 86 confined between the rotor disk 30, the blade 22 and the rear side plate 78 where the base 88 of the cover plate (which corresponds to the lower edge defined in the claim) engages the circumferential seat made in the rotor ring 30 in Figure 1. It is evident that cover plate 86 as shown in Figure 1 is simply a small part belonging to a larger assembly, such that its exact shape is not depicted in detail in that Figure.

1.4.2 Figure 3 is an enlarged view "similar" to Figure 1 (see column 2, line 55) of a cover plate 86a also having a base with an inclined lateral wall also confined between a blade 22, a rotor disk 30 and a rear side plate 78.

The skilled person reading D2 would directly and unambiguously derive that the rear side plate 78, blade 22 and rotor disk 30 of Figure 3 are indeed the same as shown in Figure 1, since throughout the application all the parts of the rotor assembly besides the cover plate are depicted and disclosed in the same way and the same reference numerals are used. Thus, although Figure 3 for example does not show the entire rotor disk 30, the skilled person reading D2 would immediately understand that the rotor disk 30 is the same as that of Figure 1 and that the cover plate 86a of Figure 3 is also

adapted to engage a circumferential seat made in the rotor ring 30 of Figure 3.

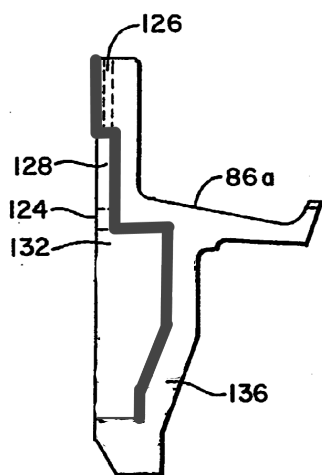
- 1.4.3 Since the cover plates 86a of Figure 3 and Figure 5 are alternative embodiments whose only difference is that one has grooves 122 instead of fully bounded passages 126 for directing the air towards the trailing edge of the blades, the skilled person reading the application would understand that the inclined wall of the base of the cover plate of Figure 5 is identical to the one of Figure 3 and thus is also adapted to engage a circumferential seat made in the rotor ring as defined in feature k) of claim 1.

The embodiment of Figure 5 of D2 thus discloses feature k).

- 1.5 Feature i) defines that the gap of feature h) is the space defined between the external face and the internal face (of the wall). From the whole disclosure of the patent, the skilled person would infer that the internal and the external face of the wall may be two physical entities and not simply abstract planes delimiting the wall. A space between the internal and external faces forming a gap therefore does not necessarily need to be a hole crossing through the whole wall in the transverse direction between abstract planes, as argued by the appellant.

- 1.5.1 The Board finds that the internal face of the cover plate in D2 may be defined by the whole frontal projection of it, i.e. by the part of the abutting surface 124 to the left of the passages 126 in Figure 5, by the surface of the manifold 128 and of the reduction cavity 132 facing towards the left, by the areas extending to the sides of the manifold 128 and of

the weight reduction cavity 132 and between them below the side walls delimiting the manifold and the weight reduction cavity. The thick line in the simplified version of Figure 5 of D2 shown below illustrates an example of a cross section of such an internal face.



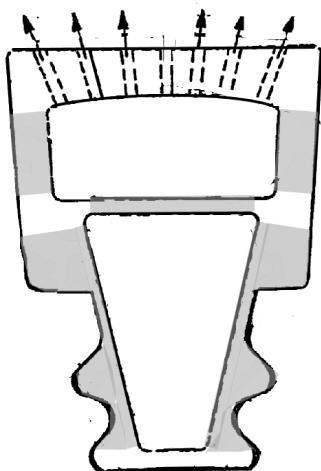
1.5.2 The cover plate 86a has passages 126 machined through its interior (see Figure 5 and the paragraph bridging columns 4 and 5 of D2). Each one of these passages 126 defines a space between an external face (the surface of the cover plate facing towards the right in Figure 5) and an internal face (the surface of the cover plate facing towards the left in Figure 5 of D2 and also as depicted in the Figure above and explained in point 1.5.1) and thus each of the passages corresponds to a gap as defined in feature i) of claim 1.

1.5.3 The respondent argued that the whole internal face needed to be in contact with the cooling fluid. However, this is not required by the claim, which only defines more generally "an internal face arranged in contact with a cooling fluid" without any further limitations or requirements. This interpretation is also supported by the patent, since the reference signs 24 and 25 (in Figures 4 and 3 respectively), used to

indicate the external and the internal faces respectively point to the thinner overlapping areas (as the respondent called them) of the wall 23, which do not contact any fluid.

Several parts of the abutting surface 124 and of the manifold 128 that are part of the internal face in Figure 5 of D2 contact the cool leakage air 114 (see Figures 3 and 4) and thus they correspond to parts of the internal face as defined in the claim.

- 1.6 Features l) and m) define a plurality of ribs which extend from the internal face of the wall. As explained above under point 1.5.1, the internal face in D2 can be defined as comprising the area of the manifold and of the weight reduction cavity facing towards the left (in regard to the simplified version of Figure 5 of D2 shown above) as well as the area below the delimiting side walls extending laterally from these bottom areas, such that these delimiting walls correspond to ribs extending from the internal face, as exemplified by the grey areas in the Figure below, which is intended to illustrate how the embodiment of Figure 5 would look when viewed from the left onto the plane of the abutting surface 124.



1.7 The respondent argued that the skilled person contemplating D2 would not recognize an internal face of the sealing element from which the ribs protrude in the way suggested by the appellant. The Board, however, does not find this argument persuasive.

Claim 1 does not define any specific shape, arrangement or attachment for the ribs besides extending from the internal face of the wall, i.e. the ribs may extend from a hidden theoretical surface beneath them. The only function associated with the ribs in the patent is disclosed in paragraph 24, whereby the ribs act to structurally stiffen the sealing element. Since the side walls of the embodiment of Figure 5 in D2 also stiffen the cover plates (by countering the pressure exerted on the cover plates by the leakage air) and can be seen as extending from a theoretical surface at their base, they also correspond to the ribs as defined in claim 1. As can be seen from Figures 3 and 4 of the contested patent, the ribs 33 also cover a theoretical area below them that is part of the internal face 25 from which they project. The embodiment of Figure 5 in D2 therefore also discloses features l) and m).

1.8 Since the embodiment of Figure 5 in D2 discloses all the features of claim 1, the subject-matter of claim 1 is not novel under Article 54 EPC. The main request is therefore not allowable.

2. Auxiliary request 1 - inventive step

2.1 Claim 1 of auxiliary request 1 differs from claim 1 of the main request in that the following features have been added from granted claims 2, 3, 5 and 7 respectively:

- wherein the wall (23) has an upper edge (26) adapted to engage a corresponding circumferential groove (20) of a rotor blade (3); the gap (29) substantially extending close to the upper edge (26); (from granted claim 2),
- wherein the internal face (25) of the wall (23) is provided with at least one inlet (31) for feeding the gap (29) with the cooling fluid of the gas turbine (1) (from granted claim 3), and
- the external face (24) of the wall (23) is provided with at least one outlet (30) for communicating the gap (29) with the hot working fluid of the gas turbine (1); (from granted claim 5),
- the inlet (31) and the outlet (30) are circumferentially offset (from granted claim 7).

2.2 During the oral proceedings the appellant merely referred to its written submissions and stated that it had no further objections with regard to this request. The Board notes in this regard that the appellant's statements in its grounds of appeal on pages 11 and 12 refer to an auxiliary request 1 which is not identical to auxiliary request 1 as provided with the respondent's reply and are thus not relevant for the assessment. The appellant has, in its complete written submissions regarding claim 1 of present auxiliary request 1, only stated that D2 disclosed the features of granted claim 2 and that D3 disclosed the features of granted claims 3 and 5 and therefore claim 1 did not involve an inventive step.

2.3 The written submissions of the appellant, do not contain a single argument regarding the obviousness of the subject-matter of a claim containing at least the feature of granted claim 7, which evidently results in a particular flow requirement and which does not appear

to be *prima facie* obvious for inclusion in D2 for a skilled person, even when considering D3. The Board also cannot see *prima facie* why the subject-matter of claim 1 would not involve an inventive step.

- 2.4 In the absence of any substantiated argument from the appellant as to why the subject-matter of claim 1 of auxiliary request 1 would not involve an inventive step, the Board finds that the claim meets the requirement of Article 56 EPC.
- 2.5 No objections were raised against claims 2 to 9 of auxiliary request 1 by the appellant nor can the Board itself identify any.
- 2.6 Thus, the claims as amended are found to meet the requirements of the European Patent Convention. However, since the description to be appended to the amended set of claims has not yet been adapted, this task is entrusted to the opposition division, to which the case is thus remitted in accordance with Article 111(1) EPC.



## Order

### For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The case is remitted to the opposition division with the order to maintain the patent in amended form based on claims 1 to 9 of auxiliary request 1, filed with letter of 2 May 2017 and a description to be adapted.

The Registrar:

The Chairman:



M. H. A. Patin

M. Harrison

Decision electronically authenticated