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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte JOHN DAVID COULL, NICHOLAS ROBERT ATKINS,
HOWARD PETER HODSON, ADRIAN JAMES WHITE,
KNUT LEHMANN, and MANUEL HERM

Appeal 2018-000167
Application 14/062,230
Technology Center 3700

Before JOHN C. KERINS, BRANDON J. WARNER, and
ALYSSA A. FINAMORE, *Administrative Patent Judges*.

WARNER, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE

Rolls-Royce plc and Rolls-Royce Deutschland Ltd & Co KG (“Appellants”)¹ appeal under 35 U.S.C. § 134(a) from the Examiner’s decision rejecting claims 1–6, which are all the pending claims. Appeal Br. 5. We have jurisdiction over the appeal under 35 U.S.C. § 6(b). An oral hearing was held on July 8, 2019.

We REVERSE.

¹ Rolls-Royce plc and Rolls-Royce Deutschland Ltd & Co KG are the applicants, as provided in 37 C.F.R. § 1.46, and are identified as the real parties in interest. Appeal Br. 1.

CLAIMED SUBJECT MATTER

Appellants' disclosed invention "relates to a blade of a turbine and preferably for a gas turbine engine, and in particular a structure of the tip of the blade." Spec., p. 1, ll. 3–4. Claim 1, reproduced below with emphasis added, is representative of the subject matter on appeal.

1. A turbine blade comprising a root portion, a platform and an aerofoil, wherein:

the aerofoil is mounted on the platform and is formed by a pressure side wall and a suction side wall and has an outer surface,

the pressure side wall and the suction side wall meet at a leading edge and a trailing edge,

the aerofoil has an aerofoil tip and an axial chord length,

the suction side wall defines an overhang at the aerofoil tip,

the overhang has a *maximum overhang length that is between 5% and 20% of the axial chord length of the blade and is located between 15% and 40% of the suction surface length from the leading edge*, and

the overhang *reduces in overhang length from the maximum overhang length towards the trailing edge until the overhang length reaches zero at a position between 50% and 100% of the suction surface length from the leading edge*.

EVIDENCE

The Examiner relied on the following evidence in rejecting the claims on appeal:

Klasing

US 2010/0221122 A1

Sept. 2, 2010

REJECTION

The following rejection is before us for review: Claims 1–6 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Klasing. Final Act. 3–7.

ANALYSIS

All the claims require a turbine blade with an aerofoil formed by a pressure side wall and a suction side wall, which meet at a leading edge and a trailing edge, where “the suction side wall defines an overhang at the aerofoil tip,” and the overhang specifically “has a *maximum overhang length that is between 5% and 20% of the axial chord length of the blade* and is *located between 15% and 40% of the suction surface length from the leading edge*,” and the overhang also “*reduces in overhang length from the maximum overhang length towards the trailing edge until the overhang length reaches zero at a position between 50% and 100% of the suction surface length from the leading edge.*” Appeal Br., Claims App. (emphasis added). From these emphasized claim limitations, the particularly claimed configuration of the recited overhang is designed to reduce secondary flow losses in the blade passage and thereby reduce heat transfer to the blade suction surface near the tip by exploiting an over-tip leakage (“OTL”) flow region in which the flow chokes as it flows over the tip, and to displace the OTL vortex away from the suction side wall, even though there is minimal aerodynamic benefit to be gained by having an overhang on the rear portion of the blade. *See, e.g., Spec., p. 6, l. 23 – p. 7, l. 25.*

In rejecting the claims, the Examiner relies on Klasing for disclosing the general recited structures of an aerofoil formed by a pressure side wall

and a suction side wall, which meet at a leading edge and a trailing edge, and where the suction side wall defines an overhang at the aerofoil tip. *See* Final Act. 3 (citing Klasing, Figs. 1, 2). But the Examiner acknowledges that Klasing does not disclose its overhang as having the specific configuration details, such as maximum length and location of the overhang, as well as the particular disposition of the overhang reducing to zero, as emphasized above in the recitations of the present claims. *See id.* at 4. For these specific structural details, the Examiner simply concludes that—because Klasing discloses “the general conditions” of the claim (essentially, an aerofoil with a suction side wall that defines an overhang)—it would have been obvious to one of ordinary skill in the art, at the time the invention was made, for Klasing’s overhang to have been modified to include the emphasized claim limitations because “it is not inventive to discover the optimum workable range by routine experimentation.” *Id.* at 4–5 (citing *In re Aller*, 220 F.2d 454, 456 (CCPA 1955)).

Appellants persuasively argue that the Examiner’s rejection does not provide an adequately supported reason why a person of ordinary skill in the art would have modified the configuration of Klasing’s overhang to include the emphasized claim limitations, suggesting instead that such modifications are the result of improper hindsight reconstruction. *See* Appeal Br. 5–12. In particular, the Examiner does not demonstrate that Klasing recognized any of the specific structural details of the emphasized claim limitations to be result-effective variables that might be optimized for any particular purpose, and a general appreciation for the fact that “the overhang size and shape may be varied” is insufficient. Ans. 2 (citing Klasing ¶¶ 51, 59). In other words, we agree with Appellants that the “optimization” explanation provided by

the Examiner appears to have been gleaned from Appellants' own Specification, rather than reached on the basis of the facts established by the prior art, and thus is the result of improper hindsight reconstruction. *See* Appeal Br. 5–11; Reply Br. 2–7.

Rejections based on obviousness must rest on a factual basis; in making such a rejection, the Examiner has the initial burden of supplying the requisite factual basis and may not, because of doubts that the invention is patentable, resort to speculation, unfounded assumptions, or hindsight reconstruction to supply deficiencies in the factual basis. *See In re Warner*, 379 F.2d 1011, 1017 (CCPA 1967). Here, absent improper hindsight reconstruction, we do not see a sufficiently articulated explanation, based on an objective rational underpinning, as to why one of ordinary skill in the art would have been led to modify specific structural details of Klasing's overhang to include the emphasized claim limitations. No adequate reason for such modification is otherwise evident from the record.

In the absence of such an articulated explanation, we agree with Appellants that “Klasing fails to recognize undisclosed overhang-length claim features result-effective variables,” such that the Examiner's stated reason to “optimize” them is not sufficiently rooted in the cited art. Appeal Br. 5–6. In short, the *ability* to modify the structure of Klasing's disclosed overhang—in and of itself—is not a *reason* to do so.

Accordingly, based on the record before us, the Examiner has not met the burden of establishing a proper prima facie case of obviousness. Thus, we do not sustain the rejection of claims 1–6 under 35 U.S.C. § 103(a) as being unpatentable over Klasing.

Appeal 2018-000167
Application 14/062,230

DECISION

We REVERSE the Examiner's decision rejecting claims 1–6 under 35 U.S.C. § 103(a) as being unpatentable over Klasing.

REVERSED