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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte STEVEN D. PORTER and JOHN T. OLS

Appeal 2019-001997
Application 14/787,490
Technology Center 3700

Before MICHAEL L. HOELTER, JILL D. HILL, and LISA M. GUIJT,
Administrative Patent Judges.

GUIJT, *Administrative Patent Judge.*

DECISION ON APPEAL
STATEMENT OF THE CASE

Appellant¹ appeals under 35 U.S.C. § 134(a) from the Examiner's rejection of claims 1, 4–10, 13–19, and 23–30 under 35 U.S.C. § 103 as unpatentable over Durocher (US 2011/0081239 A1; published Apr. 7, 2011)

¹ United Technologies Corporation (“Appellant”), the applicant as provided for under 37 C.F.R. § 1.46, is also identified as the real party in interest. Appeal Br. 1.

and Wood (US 6,312,219 B1; issued Nov. 6, 2001).² We have jurisdiction under 35 U.S.C. § 6(b).

We REVERSE.

CLAIMED SUBJECT MATTER

Claims 1, 10, and 19 are the independent claims on appeal. Claim 1, reproduced below, is exemplary of the subject matter on appeal.

1. A turbine vane comprising:
 - an airfoil extending between an inner platform and an outer platform, said airfoil being hollow and a hollow within said airfoil extending between an inner leading edge to an inner trailing edge;
 - an inner radius defined at said inner trailing edge in a circumferential direction measured between walls which extend from said inner leading edge to said inner trailing edge, and said inner radius varying along a radial length defined between said inner and outer platforms; and
 - wherein said inner radius is greater in at least one of said inner and said outer platforms than at smaller radius locations disposed in a region defined radially between said inner and outer platforms; and
 - wherein said inner radius is greater at both said inner and outer platforms than it is at said smaller radius locations.

ANALYSIS

Rejection I

Regarding independent claim 1, the Examiner finds that Durocher discloses the airfoil as claimed, including an inner radius defined at an inner

² Appeal is taken from the Final Office Action dated April 5, 2018, as supplemented by the Advisory Action July 3, 2018.

trailing edge, which varies along a radial length defined between the inner and outer platforms. Final Act. 3 (citing Durocher, Fig. 2). The Examiner determines that Durocher does not disclose that the variable inner radius is greater in at least one of the inner and outer platforms than at smaller radius locations disposed in a region defined radially between the inner and outer platforms, as claimed, and the Examiner relies on Wood for teaching that an inner radius may be greater in at least one of the inner and outer platforms than at smaller radius locations defined therebetween. *Id.* at 3–4 (citing Wood 4:19–24). The Examiner reasons that it would have been obvious “to modify the stator vanes of Durocher to include the blade profile of Wood because the profile of Wood provides improved performance by decreasing wetted surface area and thereby decreasing drag.” *Id.* at 5 (citing Wood 4:19–24).

Appellant does not dispute that Durocher discloses a variable inner radius defined at an inner trailing edge, as claimed, or that modifying the waist³ of a vane according to the teaching of Wood would result in Durocher’s variable inner radius being greater in at least one of the inner and outer platforms than at small radius location disposed in a region defined radially between the inner and outer platforms, as claimed, as long as the waist relative to the trailing edge is subject to such a modification. However, Appellant argues that Wood only discloses narrowing the chord *solely* from the leading edge, and *expressly not* from the trailing edge, such that one skilled in the art would not have been led to modify Durocher’s

³ “Waist” is defined in Wood as “a waist **36** of minimum chord length which is preferably disposed centrally between the root **28** and the tip **30** along the longitudinal or radial span of the vane.” Wood 3:58–41.

variable inner radius of the inner *trailing* edge, and further, not for the purpose taught by Wood: such a variable radius on the inner *leading* edge “reduces ‘wetted surface area, and therefore aerodynamic drag.’” Appeal Br. 2–3 (quoting Wood 4:19–24). Appellant argues that “[t]hese [advantages] would appear to be functions that are measured at a leading edge of a vane, where the products of combustion would initially contact the vane,” and that “[t]hese would not appear to have any benefit at a trailing edge.” *Id.* at 3. Appellant further argues that “Wood would only suggest modifying a leading edge, and not the trailing edge.” *Id.*; *see also* Reply Br. 1 (arguing that the Examiner erred by “measur[ing] [a leading edge] structure on Wood” and proposing to move the same structure (or shape) “to the trailing edge of Durocher”).

The Examiner responds that “the modification of the entire profile,” as proposed by the Examiner, “provide[s] a benefit to the vane structure, and thereby [the Examiner’s proposed modification has] proper supporting rationale.” Ans. 4.

We are persuaded by Appellant’s argument. Wood discloses, with reference to Figure 1, that

stator vane **18** preferably narrows in chord *solely from the leading edge 24 toward the trailing edge 26, with the trailing edge remaining straight in profile.* In the preferred embodiment, the trailing edge **26** is configured to extend solely radially in axial elevation or project without inclination with the leading edge. In this way, *the waist 36 is defined solely by the tapered or scalloped leading edge 24, with the trailing edge being straight radially and without scallop.*

Wood 4:10–18 (emphasis added). Wood also discloses that

[b]y introducing the narrow waist **36** centrally in the vane by reducing chord length from both endwalls [of the leading edge], improved 3D performance of the stator stage may be effected. The narrow midspan or central portion of the vane has a corresponding direction in wetted surface area, and therefore aerodynamic drag is corresponding reduced.

Id. at 4:19–24. In other words, Wood teaches narrowing the chord to create a scalloped edge (i.e., an edge with an inner radius that varies as claimed) *solely* at the inner *leading* edge, and Wood specifically guides one skilled in the art *not* to perform such narrowing of the chord at the inner *trailing* edge (as required by claim 1) for the purpose of improving performance and reducing aerodynamic drag—the motivation relied on by the Examiner *supra*. Thus, Wood expressly discourages the Examiner’s proposed modification of Durocher. *Cf.* Spec. ¶ 67 (disclosing that varying the inner radius at the inner trailing edge, as claimed, “eliminate[s] material, and thus provide[s] a weight savings”), Fig. 2C (described as “show[ing] a difference in the amount of material between the Figure 2B radius 190 and the Figure 2A radius 89” (Spec. ¶ 54), which is depicted at the inner trailing edge, as claimed).

Accordingly, we do not sustain the Examiner’s rejection of independent claim 1 and claims 4–9 and 28 depending therefrom. The Examiner relies on the same findings with respect to independent claims 10 and 19, and therefore, for essentially the same reasons set forth *supra*, we also do not sustain the Examiner’s rejection of claims 10 and 19, and claims 13–18 and 23–27, 29, and 30 depending therefrom. Final Act. 7–13.

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Application 14/787,490

DECISION

The Examiner's decision rejecting claims 1, 4–10, 13–19, and 23–30
is REVERSED.

REVERSED