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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte BROOKS E. SNYDER and THOMAS N. SLAVENS

Appeal 2020-000728
Application 14/917,855
Technology Center 3700

Before ANNETTE R. REIMERS, CARL M. DEFRANCO, and
GEORGE R. HOSKINS, *Administrative Patent Judges*.

DEFRANCO, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE

Pursuant to 35 U.S.C. § 134(a), Appellant¹ appeals from the Examiner's decision to reject claims 1–17. We have jurisdiction under 35 U.S.C. § 6(b).

We AFFIRM.

¹ We use the word “Appellant” to refer to “applicant” as defined in 37 C.F.R. § 1.42(a). Appellant identifies the real party in interest as Raytheon Technologies Corporation. Appeal Br. 1; Update filed Apr. 23, 2020.

CLAIMED SUBJECT MATTER

Of the claims on appeal, claims 1 and 13 are independent. Claim 1 is directed to a gas turbine engine comprising a “component,” while claim 13 is directed to the “engine component” itself. Claim 1 is illustrative and reproduced below.

1. A gas turbine engine, comprising:

a component having a first wall and a second wall spaced-apart from the first wall, and a cooling passageway provided in part by a helical wall between the first wall and the second wall, *wherein the second wall is substantially hollow and provides a core passageway.*

Claims App. 8 (emphasis added).

EVIDENCE OF RECORD

Name	Reference	Date
Bailly	US 5,993,156	Nov. 30, 1999
Tibbott	US 9,206,697 B2	Dec. 8, 2015

EXAMINER’S REJECTIONS

Appellant appeals from the Examiner’s Final Office Action, dated March 21, 2019, which includes the following rejection:

Claims Rejected	35 U.S.C. §	Basis
1–17	103	Bailly, Tibbott

ANALYSIS

A. Independent Claims 1 and 13

Appellant argues independent claims 1 and 13 together. *See* Appeal Br. 3; Reply Br. 1. In particular, Appellant argues that claims 1 and 13 are allowable over the asserted combination of Bailly and Tibbott because “Bailly is a vane” and “Tibbott, on the other hand, is a blade.” Appeal Br. 4. “Bailly being a vane,” Appellant contends, means it “does not have any ‘tip

geometry’ that would benefit from Tibbott’s hollow pillar.” *Id.* at 4–5; *see also* Reply Br. 2 (same). Thus, according to Appellant, “Tibbott’s teaching of a hollow pillar does not extend to vanes” and a skilled artisan “would not have modified Bailly in view of Tibbott as the Examiner suggests.” Appeal Br. 5; *see also id.* at 4 (“there is no rational reason . . . to modify Bailly in view of Tibbott”).

We disagree with Appellant. The evidence fully supports the Examiner’s findings that the combination of Bailly and Tibbott teaches each of the recited limitations of claims 1 and 13 and that a skilled artisan would have been led to modify the central core 32 of the helical cooling passage 30 of Bailly’s turbine blade by incorporating Tibbott’s teaching that the helical cooling passage 52a of a turbine blade may be provided with a “hollow” core 61 in order to provide cooling directly to the tip of the airfoil. *See* Exr. Ans. 8–9 (citing Tibbott, 7:66–8:2, Fig. 11).

Moreover, contrary to Appellant’s argument, we agree with the Examiner’s finding that Bailly relates to the cooling of both turbine engine vanes *and* blades exposed to high-temperature combustion gases. *See* Exr. Ans. 3–7; Bailly, 1:4–24. For instance, Bailly discloses “a hollow airfoil or blade wall” comprising four distinct zones:

a rounded leading edge 5 facing the hot gas flow from the engine combustion chamber, a tapered trailing edge 6 remote from the leading edge and connected to it by a concave side wall 7 denoted the “high-pressure side” and a convex side wall 8 denoted the “low-pressure side” spaced from the wall 7.

Bailly, 2:66–3:8, Fig. 1. That description of Bailly’s “airfoil or blade wall” is essentially identical to Appellant’s description of the claimed invention in terms of an “airfoil wall”:

The airfoil section 66 is primarily defined by an *airfoil wall* 70, which provides a leading edge 72, a trailing edge 74, and opposed pressure and suction sides 76, 78 extending between the leading edge 72 and the trailing edge 74. In this example the *airfoil wall* 70 is a gas path wall, in that an exterior surface of the *airfoil wall* 70 will be exposed to a core air flow C during engine operation.

Spec. ¶ 43 (emphases added). Thus, we reject the notion that Bailly’s “airfoil or blade wall” (Bailly, 2:67–3:1) would not benefit from Tibbott’s teaching of providing a hollow pillar in the cooling cavity of “an aerofoil component of a gas turbine engine” (Tibbott, 1:5–6).

In other words, we agree with the Examiner that Tibbott’s teaching of providing a *hollow* core 61 for the helical cooling passage 52a in a turbine blade is directly applicable to the central core 32 and helical cooling passage 30 of Bailly’s turbine engine airfoil or blade, which otherwise meets the limitations of claims 1 and 13. *Compare* Bailly, Figs. 3–8, *with* Tibbott, Figs. 11, 12. Given that Bailly and Tibbott each disclose a cooling cavity along the leading edge of an airfoil/blade wall (that includes a central core and helical passage), we are persuaded that a skilled artisan would have been led to incorporate Tibbott’s teaching of a *hollow* core into the central core 32 of Bailly’s helical cooling passageway 30 in order to provide additional cooling capacity to the tip of Bailly’s airfoil/blade and would have done so with a reasonable expectation of success in arriving at the claimed invention. Because we are not persuaded by Appellant’s arguments to the contrary, we sustain the Examiner’s rejection of independent claims 1 and 13 as unpatentable over the combined teachings of Bailly and Tibbott.

B. The Dependent Claims

Appellant argues several of the dependent claims separately, namely, dependent claims 6 and 8, which stem from claim 1, and dependent claim 16, which stems from claim 13. We begin with dependent claim 6.

1. Claim 6

Dependent claim 6 recites that “the cross-sectional area of the cooling passageway [i.e., the helical passageway between the first and second walls] is greater adjacent a trailing edge of the component than a leading edge of the component.” Claims App. 8. The Examiner rejected claim 6 as unpatentable over Bailly and Tibbott, focusing on Bailly’s teaching that “[t]he central body, or core 32, of the [helical] ramp 30 is not necessarily cylindrical, and its cross-section may vary over its height in order to *selectively control the cooling-air passage cross-section to regulate the values of heat-exchange coefficients.*” Final Act. 5 (citing Bailly, 3:61–65) (emphasis added). Appellant responds that the Examiner relies “on principles of inherency—improperly—in a strained effort to apply Bailly’s teachings to the claims.” Appeal Br. 6; *see also* Reply Br. 3 (“the Examiner is improperly relying on inherency”).

We disagree. The Examiner clearly explains that Bailly’s disclosure of selectively varying the size and shape of core 32 necessarily results in the helical cooling passageway 11, 30 having a variety of cross-sectional areas across its span. *See* Final Act. 5–6; Exr. Ans. 9; Bailly, Figs. 3–10. By varying the cross-sectional area of the helical passageway, the Examiner reasons that “[a]t least one cross section of the cooling-passageway would therefore be greater adjacent a trailing edge of the blade than a leading edge.” Exr. Ans. 9–10. In our view, that finding by the Examiner does not

call on principles of inherency to support Bailly's disclosure of the claim 6 limitation, as Appellant argues, but instead relies on what a skilled artisan would have reasonably understood from Bailly's teaching of "selectively control[ling]" the cross-sectional area of the passageway "to regulate the values of heat-exchange coefficients." *See* Bailly, 3:61–65. That teaching by Bailly is essentially the same as Appellant's reason for varying the cross-sectional area of the claimed helical passageway—

[t]he cross-sectional area of the first and second helical passageways 94, 96 affects the level of heat transfer between the flows S_{2-1} , S_{2-2} and the airfoil wall 70 . . . one can tailor the cross-sectional area of the helical passageways 94, 96 to selectively increase and decrease the level of cooling along the airfoil section 66.

Spec. ¶ 55. Thus, we sustain the Examiner's rejection of claim 6 as unpatentable over Bailly and Tibbott.

2. *Dependent Claims 8 and 16*

Dependent claim 8 recites that the engine component includes "a leading edge cooling passageway provided between a leading edge of the component *and a lateral divider adjacent the leading edge.*" Claims App. 9 (emphasis added). Dependent claim 16 includes essentially the same limitation. *Id.* at 10. Appellant argues that the Examiner reads the claimed "lateral divider *adjacent* the leading edge" in an overly broad manner on Bailly's "right-hand divider 10" rather than on "another divider 10 (the left-hand divider) [that] is closer to the leading edge." Reply Br. 3–4 (referencing the Examiner's annotation of Figure 1 of Bailly, as depicted on page 12 of the Examiner's Answer). According to Appellant, a skilled artisan would not interpret the "adjacent" term of the claims "so broadly," given the description of the lateral divider in Appellant's Specification and

the fact that Bailly's left-hand divider 10 is "closer to the leading edge" than Bailly's right-hand divider 10 on which the Examiner reads claims 8 and 16. *Id.*

We do not find Appellant's argument persuasive. Appellant's Specification merely describes the lateral dividers as "adjacent the leading edge" and "adjacent the trailing edge" and that they "bound leading and trailing edge cooling passageways." Spec. ¶49. Nowhere does the Specification further limit the proximity of the lateral dividers relative to the cooling passageway in each of the leading and trailing edge portions of the blade. *See* Spec. ¶¶ 46, 49, 50, 54. Thus, under the broadest *reasonable* interpretation, we find that the term "adjacent," when read in the context of the claim language and the Specification, is properly construed to mean "nearby," "next to," or "adjoining" the leading edge. *See Merriam-Webster's Collegiate Dictionary*, 10th ed., at 14 (2000). Bailly meets that definition by disclosing that *both* of the lateral divider walls 10 are situated in the "upstream" portion of the airfoil, i.e., "near the leading edge," while only Bailly's lateral divider wall 14 is disclosed as being situated in the "downstream" portion of the airfoil, i.e., "near the trailing edge." Bailly, 3:9–19. Given that disclosure, we agree with the Examiner that Bailly's right-hand divider wall 10 meets the claim language as properly construed. Thus, we sustain the Examiner's rejection of claim 8 and 16.

3. *Dependent Claims 2–5, 7, 9–12, and 14, 15, and 17*

To refute the rejection of the other dependent claims, Appellant argues that they "should be allowed for at least the reason that they depend from an allowable base claim." Appeal Br. 7. As explained above in our analysis of the rejection of base claims 1 and 13, we do not find Appellant's

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reasoning persuasive. Accordingly, we sustain the Examiner's rejection of dependent claims 2–5, 7, 9–12, and 14, 15, and 17.

CONCLUSION

The Examiner's rejection of claims 1–17 is **AFFIRMED**.

DECISION SUMMARY

Claims Rejected	35 U.S.C. §	Basis	Affirmed	Reversed
1–17	103	Bailly, Tibbott	1–17	

TIME PERIOD FOR RESPONSE

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a). *See* 37 C.F.R. § 1.136(a)(1)(iv).

AFFIRMED