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EXAMINER

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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte BRANDON W. SPANGLER,
CORNEIL S. PAAUWE, and DOMINIC J. MONGILLO

Appeal 2018-003800
Application 11/679,958
Technology Center 3700

Before JENNIFER D. BAHR, BENJAMIN D. M. WOOD, and
HYUN J. JUNG, *Administrative Patent Judges*.

BAHR, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE

Brandon W. Spangler et al. (Appellants)¹ appeal under 35 U.S.C. § 134(a) from the Examiner's decision rejecting claims 1, 3, 4, 10, 12, 14, and 23–26 under 35 U.S.C. § 103(a) as unpatentable over Bouchard (US 5,971,703, issued Oct. 26, 1999) and Stec (US 6,171,058 B1, issued Jan. 9, 2001). We have jurisdiction under 35 U.S.C. § 6(b). We AFFIRM.

¹ According to Appellants, United Technologies Corporation is the real party in interest. Appeal Br. 1.

THE CLAIMED SUBJECT MATTER

Appellants' invention relates to "a featherseal for turbine engine components such as vanes and blade outer air seals." Spec. ¶ 2. Multiple blade outer air seals, which form part of an outer case of a gas turbine engine, define "the outer radial flow path boundary" and "accommodate thermal and dynamic variation typical in a high pressure turbine (HPT) section of the gas turbine engine." *Id.* ¶ 6. The blade outer air seals are "suspended in close proximity to the rotor blade tips to seal between the tips and the outer case." *Id.* "A featherseal is captured circumferentially intermediate each [blade outer air seal] to span the intervening gap and minimize fluid leakage due to relative excursions of each [blade outer air seal]." *Id.* Claims 1, 10, and 14 are independent. Appeal Br. 8–10 (Claims App.). Claim 1, reproduced below, is representative of the claimed subject matter.

1. A featherseal for engagement with a turbine engine component comprising:
 - a featherseal having a first side, a second side opposite said first side, a first end, and a second end opposite said first end, wherein said first side is normal to said first and second ends, said second side is parallel to said first side, and said second end is parallel to said first end, wherein a longitudinal axis is defined between said first and second sides, said longitudinal axis being parallel to said first side and said second side, and wherein said first side is a linear longitudinal side defined by a continuous, straight edge without any tabs, said first side extending parallel to said longitudinal axis from said first end to said second end;
 - a first lateral tab extending from said second side in a direction transverse to said longitudinal axis, wherein said first lateral tab is provided a first distance from said first end; and
 - a second lateral tab which extends from said second side in a direction transverse to said longitudinal axis, said first

lateral tab spaced from said second lateral tab, said first lateral tab being shorter, relative to said longitudinal axis, than said second lateral tab, and wherein said second lateral tab is provided a second distance from said second end, said second distance greater than said first distance.

DISCUSSION

Appellants argue all of the claims together. Appeal Br. 4–7. We decide the appeal on the basis of claim 1, and claims 3, 4, 10, 12, 14, and 23–26 stand or fall with claim 1. *See* 37 C.F.R. § 41.37(c)(1)(iv) (permitting the Board to select a single claim to decide the appeal as to a single ground of rejection of a group of claims argued together).

The Examiner finds that Bouchard discloses a featherseal (seal 55) having first and second opposed and parallel sides and first and second opposed and parallel ends, wherein the featherseal is adapted to be engaged in adjacent featherseal slots (adjacent slots 63A, 63B) of adjacent blade outer air seals (shroud segments 19A, 19B). Final Act. 4–5 (including an annotated version of Bouchard’s Fig. 1). However, the Examiner finds that Bouchard’s featherseal (seal 55) lacks first and second tabs extending from the second side as recited in claim 1. *See id.* at 5.

The Examiner finds that Stec teaches a featherseal (damper 28) including first and second lateral tabs (side tabs 36) of substantially rectangular shape for engaging a transverse post (rib 46) in a slot (pocket 26) to axially position and retain the featherseal. *Id.* at 6 (citing Stec 4:51–57; 6:52–54; Fig. 2). The Examiner determines it would have been obvious to modify Bouchard’s blade outer air seal assembly “by adding first and second lateral tabs to one side of” the featherseal (seal 55) and “associated posts within the featherseal slot as taught by Stec for the purpose of axially

retaining the featherseal within the featherseal slot.” *Id.* Appellants do not contest the Examiner’s determination that it would have been obvious, based on the combined teachings of Bouchard and Stec, to provide first and second lateral tabs on one side of Bouchard’s featherseal (seal 55). *See* Appeal Br. 4–7; Reply Br. 1–3.

The Examiner reasons that because Appellants have not disclosed that the particular relative lengths and locations of the tabs along the second side of the featherseal “solves any stated problem or is for any particular purpose, and it appears that the featherseal of Bouchard as modified by Stec would perform equally well with tabs of different lengths and different [spacings] from their respective ends . . . , it would have been an obvious matter of design choice” to resize and reposition the first and second tabs so that they have different lengths and are spaced different distances from the first and second ends, respectively, as claimed, “which would yield predictable results,” namely, “a featherseal which fits within a groove with a matching shape and whose axial movement is prevented by the presence of the tabs.” Final Act. 6–7.

Appellants assert that the Examiner’s reliance on design choice is improper because Appellants establish “that the tab arrangement is critical.” Appeal Br. 5–6 (citing Spec. ¶¶ 27–29 in support of this assertion). We agree with the Examiner that Appellants’ Specification “does not provide support for criticality for the length of the tabs or the spacing of the tabs from the seal ends.” *See* Ans. 2.

Appellants’ Specification explains that, in prior art gas turbine engines, a radial tab is provided at the aft end of each featherseal to prevent the featherseal from being dislodged in the forward and aft directions during

movement of each blade outer air seal. Spec. ¶ 7. “The radial tab is typically hardcoated to minimize wear from the brushseal.” *Id.* Appellants’ Specification discloses that, in Appellants’ invention, first tab 80 and second tab 82 extend from tab side 96 with tab space 84 therebetween, and tab space 84 engages post 88 in first featherseal slot 86 defined by blade outer air seal body 70 as featherseal 76 is slideably engaged into first featherseal slot 86, thereby locking featherseal 76 into the blade outer air seal to prevent fore-aft movement of the featherseal. *Id.* ¶ 28. According to the Specification, tabs 80, 82 provide a locking feature that obviates the need for a radial tab and, thus, hardcoating of the featherseal and radial tab. *Id.* ¶ 29. Eliminating the hardcoating process and the bending operation to form the radial tab reduces the cost of manufacturing featherseal 76 and also reduces leakage by permitting a more uniform surface to featherseal 76, thereby providing a closer fit within slots 86, 90. *Id.* Eliminating the radial tab also permits the brushseal to ride directly upon the blade outer air seal rather than the featherseal, thus providing “a more continuous, consistent and wear reducing sealing interface to still further minimize leakage and maintenance requirements.” *Id.*

Thus, Appellants’ Specification establishes “that there are benefits to the disclosed featherseal,” and, in particular, to the tabs provided on Appellants’ featherseal. *See* Reply Br. 3; Ans. 4 (acknowledging such benefits). However, the tabs perform the disclosed locking function by providing a tab space therebetween for engaging a post of a commensurate length provided in a commensurate location in the featherseal slot of one of the adjacent blade outer air seals. The relative sizes and particular locations of the tabs are immaterial to providing this locking feature and, thus, are not

critical to Appellants' invention. In other words, the features of the first tab being shorter than the second tab, and the distance of the second tab from the second end of the featherseal being greater than the distance of the first tab from the first end of the featherseal are not critical to the operation of the claimed invention. In this regard, the Examiner's position that the relative sizes and particular locations of the tabs along the second side of the featherseal are an obvious matter of design choice is consistent with cases in which reliance on such an obviousness rationale was held to be appropriate. *See In re Rice*, 341 F.2d 309, 314 (CCPA 1965) ("Appellants have failed to show that the [differences in the claimed invention], as compared to [the reference], result in a difference in function or give unexpected results."); *In re Kuhle*, 526 F.2d 553, 555 (CCPA 1975) ("Use of such a means of electrical connection in lieu of those used in the references solves no stated problem and would be an obvious matter of design choice within the skill of the art.").

Appellants assert that "the Examiner is resorting to mere speculation, unfounded assumptions, and hindsight reconstruction," and that "the only real evidence cited by the Examiner is Stec, and Stec does not support the Examiner's position," "especially when Stec suggests that there are benefits to having a symmetrical end-to-end featherseal, which is contrary to the claim language." Appeal Br. 6.

As Stec points out, damper 28 must be installed with first notch 34 adjoining shank bulge 30 in blade shank 20. Stec 5:16–18. Stec recognizes that the side-to-side asymmetry of side notches 34, 48 eliminates (as not achievable) two of the four possible orientations of installing damper 28 in pocket 26. *Id.* 5:34–43. Of the two remaining possible orientations, both are

correct orientations if tabs 36 are each spaced the same distance from the adjacent end of the damper, but there is only one correct orientation if the tabs are spaced different distances from the adjacent end of the damper. Stec recognizes that symmetry about neck 50 of damper 28 along axis 38 is not required to provide axial self-retention against rib 46. *Id.* 5:51–55 (teaching that a single tab 36 is sufficient to perform this function); *see also id.* 6:50–54 (teaching that side notch 34 and cooperating aft side tab 36 collectively provide axial self-retention of damper in pocket 26); *id.*, Fig. 2.

Stec discloses that, at least for the particular configuration of adjoining blades shown (i.e., with only one rib 46 for engaging one tab 36), “[t]he damper is preferably symmetrical end-to-end for permitting two correct installation orientations, with two Murphy-proofed incorrect installation orientations which prevent assembly.” *Id.* 6:42–43, 54–57. However, Stec also teaches that damper 28 “may be suitably modified for different applications,” such as using two ribs 46 to adjoin respective ones of two side tabs 36 for axially retaining damper 28 in both forward and aft directions. *Id.* 6:43–47.

Persons having ordinary skill in the art would have readily appreciated that, in applications in which two ribs 46 (or other means associated with the pocket for providing retention in both the forward and aft directions) are provided, ribs 46 (or other retention means in the pocket) and tabs 36 may be arranged either symmetrically end-to-end to permit two correct installation orientations or asymmetrically end-to-end to permit only one correct installation orientation. “A person of ordinary skill is also a person of ordinary creativity, not an automaton.” *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 421 (2007). More specifically, ribs 46 and tabs 36 may be

arranged symmetrically about the center of bulge 30 and neck 50, respectively, to permit two correct installation orientations and two Murphy-proofed incorrect installation orientations. Alternatively, ribs 46 and tabs 36 may be arranged asymmetrically (i.e., with different spacings from the forward and aft ends of the pocket and damper, respectively) to permit only one correct installation orientation and three Murphy-proofed incorrect installation orientations. Whether configured (in cooperation with retention means in pocket 26) to permit only one correct installation orientation or to permit two correct installation orientations, Stec's tabs 36 would perform equally well to retain damper 28 axially in pocket 26. Thus, although Stec expresses a preference for a symmetrical arrangement permitting two correct installation orientations, Stec's teachings generally support the Examiner's position that the particular relative sizes and positioning of the tabs specified in claim 1 solve no stated problem and are an obvious matter of design choice.

For the above reasons, Appellants fail to persuade us that the Examiner's determination that the particular relative lengths and positioning of the tabs solve no stated problem and would have been an obvious matter of design choice is incorrect or that Stec's teachings are contrary to the claim language. Accordingly, Appellants do not apprise us of error in the rejection of claim 1 as unpatentable over Bouchard and Stec, which we, thus, sustain. We also sustain the rejection of claims 3, 4, 10, 12, 14, and 23–26, which fall with claim 1, as unpatentable over Bouchard and Stec.

Appeal 2018-003800
Application 11/679,958

DECISION

The Examiner's decision rejecting claims 1, 3, 4, 10, 12, 14, and 23–26 is AFFIRMED.

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