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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte FREDERICK M. SCHWARZ and JORN A. GLAHN

Appeal 2019-002460
Application 14/934,303¹
Technology Center 3700

Before MICHAEL C. ASTORINO, CYNTHIA L. MURPHY, and
KENNETH G. SCHOPFER, *Administrative Patent Judges*.

ASTORINO, *Administrative Patent Judge*.

DECISION ON APPEAL

Pursuant to 35 U.S.C. § 134(a), the Appellants appeal from the Examiner’s decision rejecting claims 1–20. We have jurisdiction over the Appeal under 35 U.S.C. § 6(b).

We AFFIRM.

¹ “The real party in interest is the assignee of the entire right in this application, United Technologies Corporation.” Appeal Br. 1.

STATEMENT OF THE CASE

Claimed Subject Matter

Claim 1, the sole independent claim, is representative of the subject matter on appeal and reproduced below.

1. A gas turbine engine compressor section comprising:
a hub carrying a last row of compressor blades; and
a compressor exit guide vane downstream of said last row of compressor blades, a housing radially inward of said compressor exit guide vane, a non-contact seal being positioned on one of said housing and said hub, said non-contact seal being intended to limit flow from a compression chamber downstream across said seal.

Rejections

I. Claim 1 is rejected under 35 U.S.C. § 103 as unpatentable over Benkler et al. (US 2012/0114459 A1, pub. May 10, 2012) (“Benkler”) and Justak (US 2008/0246223 A1, pub. Oct. 9, 2008).

II. Claims 2–5 and 12 are rejected under 35 U.S.C. § 103 as unpatentable over Benkler, Justak, and Hiernaux (US 2012/0134787 A1, pub. May 31, 2012).

III. Claims 6–11 and 13–16 are rejected under 35 U.S.C. § 103 as unpatentable over Benkler, Justak, Hiernaux, Kohler et al. (US 3,751,909, issued Aug. 14, 1973) (“Kohler”), and Kernon et al. (US 5,224,819, issued July 6, 1993) (“Kernon”).

IV. Claims 17–20 are rejected under 35 U.S.C. § 103 as unpatentable over Benkler, Justak, Kohler, and Kernon.²

² The statement for the ground of rejection includes a reference to Hiernaux, however the substance of the rejection does not rely of Hiernaux’s teachings.

ANALYSIS

Rejection I

Claim 1 recites, “said non-contact seal being intended to limit flow from a compression chamber downstream across said seal.” Appeal Br. 4 (Claims App.).

The Appellants argue that Benkler’s labyrinth seal 40 does not correspond to the claimed seal because labyrinth seal 40 intentionally provides a leakage path from chamber (hollow space) 54 through annular gap 38. *See* Appeal Br. 2 (citing Benkler ¶ 43). The Appellants’ argument is not persuasive of Examiner error.

We agree with the Examiner that claim 1 “requires only that a seal is intended to limit flow from a compression chamber downstream across said seal,” which is distinct from preventing all fluid flow across the seal. Ans. 3. Stated otherwise, the Appellants’ argument is not commensurate with the scope of claim 1 because a seal may be intended to limit flow and still allow some leakage to occur.

Moreover, we agree with the Examiner that merely because Benkler’s labyrinth seal 40 allows leakage does not suggest that it does not limit flow. *See id.*; Final Act. 4–5. Benkler describes “annular gap 38, which is located between the respective—spatially fixed—annular body 34 and the axially adjacent—rotating—compressor disk 30, can be sealed in a conventional manner, by means of a labyrinth seal 40, for example.” Benkler ¶ 40, Fig. 2. Benkler discloses that seals, like that of labyrinth seal 40, are suitable to

See Final Act. 11–13. Therefore, we do not understand the ground of rejection include Hiernaux and remove the reference to Hiernaux from the ground of rejection.

prevent a transfer of hot flow medium S from flow passage 22 into hollow space 54. *See id.* ¶ 42. Benkler also discloses that components that are adjacent to hollow space 54 may benefit by the introduction of cooling medium K into hollow space 54. *Id.* ¶ 43. Benkler describes, “[t]he discharge of the ‘used’ cooling medium K is carried out by means of gap leakage, for example, at . . . annular gaps 38, 50 and 52.” *Id.* From the foregoing, one of ordinary skill in the art would understand that labyrinth seal 40 is positioned within annular gap 38, which is the space where hot flow medium S and cooling medium K may flow through. Because labyrinth seal 40 takes up space within annular gap 38, it intentionally limits the flow of any medium that travels through annular gap 38, including cooling medium K.

Further, the Examiner’s rejection includes a modification of Benkler’s labyrinth seal 40 with Justak’s teaching of a non-contact seal — with a labyrinth geometry — due to better wear rate and clearance as compared to a standard labyrinth seal. *See* Final Act. 5 (citing Justak ¶¶ 2, 4, 15, 16 (Table)). The Examiner determines it would have been obvious to one of ordinary skill in the art to modify Benkler’s labyrinth seal to be a non-contact seal with a labyrinth geometry, as taught by Justak, to ensure a longer lasting seal. *See id.* The proffered modification does not change the position of Benkler’s seal within annular gap 38. Therefore, we determine that Benkler’s seal, as modified, also takes up space within annular gap 38 and intentionally limits flow of cooling medium K through annular gap 38.

The Appellants argue that Justak’s non-contact seal is more complex than Benkler’s labyrinth seal, and that there is no indication that a non-contact seal would benefit Benkler’s gas turbine engine compressor section

at annular gap 38. *See* Appeal Br. 2–3. Stated differently, the Appellants argue, “[g]iven that leakage must occur across the seal 40 there is no reason that one would put a more effective seal there.” Reply Br. 1. The Appellants’ argument is not persuasive of Examiner error.

The Examiner explains that one of ordinary skill in the art would have understood that the proposed modification of Benkler’s seal ensures a longer lasting seal. *See* Final Act. 5. We determine that the Examiner’s rejection includes adequate reasoning with rational underpinning. *See In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006) (“[R]jections on obviousness grounds . . . [require] some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.”) (cited with approval in *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2007)).

Additionally, the Examiner explains that gap leakage of used cooling medium K may occur through annular gaps 50 and 52 as well annular gap 38. *See* Ans. 4–5. In other words, gap leakage of used cooling medium K does not necessary have to occur through annular gap 38. *See* Benkler ¶ 43, Fig. 2. Further, it is notable that another function of Benkler’s seal 40 is to prevent transfer of hot flow medium S from flow passage 22 into hollow space 54. Benkler ¶ 40. Therefore, even if modifying Benkler’s seal in the manner proposed by the Examiner runs counter to the seal allowing leakage, this potential disadvantage would constitute a typical design tradeoff that would not have dissuaded one of ordinary skill in the art from exploring the benefits of modifying Benkler’s seal to incorporate a non-contact seal.

Thus, we sustain the Examiner’s rejection of claim 1 as unpatentable over Benkler and Justak.

Rejection II

Claim 2 depends from claim 1 and recites “a sacrificial piece is located on the other of said housing and said hub.” Appeal Br. 4 (Claims App.).

The Appellants argue that the inclusion of “[a] sacrificial piece would generally be utilized when a very tight seal connection is intended,” so its inclusion “is in direct contrast to Benkler and its intended leakage path.” *Id.* at 3. The Appellants’ argument is not persuasive of Examiner error.

Similar to the discussion above, even if modifying Benkler’s seal in the manner proposed by the Examiner runs counter to the seal allowing leakage, this potential disadvantage would constitute a typical design tradeoff that would not have dissuaded one of ordinary skill in the art from exploring the benefits of modifying Benkler’s seal to further incorporate a sacrificial piece as required by claim 2. *See* Final Act. 6; Ans. 5–6.

Thus, we sustain the Examiner’s rejection of claims 2–5 and 12 as unpatentable over Benkler, Justak, and Hiernaux.

Rejection III

The Appellants argue that “the Examiner appears to be picking and choosing from various features in various completely unrelated references.” Appeal Br. 3. The Appellants’ argument is not persuasive as it does not explain which references are unrelated and why those references are unrelated. The Appellants also rely on the unpersuasive arguments discussed above. Thus, we sustain the Examiner’s rejection of claims 6–11 and 13–16 as unpatentable over Benkler, Justak, Hiernaux, Kohler, and Kernon.

Rejection IV

The Appellants provide a separate heading for the rejection of claims 17–20. Appeal Br. 3. However, the Appellants do not advance a separate argument for this ground of rejection, rather the Appellants only rely on the unpersuasive arguments discussed above. Thus, we sustain the Examiner’s rejection of claims 17–20 as unpatentable over Benkler, Justak, Kohler, and Kernon.

DECISION

We AFFIRM the Examiner’s decision rejecting claims 1–20.

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

AFFIRMED