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BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte DAVID LEE WILLIAMSON, CARLOS EDUARDO SILVA, RAYMOND JOHN BANKERT, and JESSICA LEE PRINCE

Appeal 2018-008655
Application 14/460,410
Technology Center 3700

Before JAMES A. WORTH, KENNETH G. SCHOPFER, and TARA L. HUTCHINGS, *Administrative Patent Judges*.

SCHOPFER, *Administrative Patent Judge*.

DECISION ON APPEAL

Pursuant to 35 U.S.C. § 134(a), Appellant[1] appeals from the Examiner's decision to reject claims 1–4, 7, 8, 13, 16, and 17. We have jurisdiction under 35 U.S.C. § 6(b).

We AFFIRM.

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[1] We use the word "Appellant" to refer to "applicant" as defined in 37 C.F.R. § 1.42. Appellant identifies the real parties in interest as General Electric Company and ExxonMobil Research and Engineering Company. Appeal Br. 1–2.

BACKGROUND

The Specification discloses that "[t]he present invention relates generally to power train architectures and, more particularly, to gas turbines, steam turbines, and generators used as part of a power train in a power-generating plant with low viscosity fluid bearings." Spec. ¶ 2.

ILLUSTRATIVE CLAIM

Claim 1 is the only independent claim on appeal and recites:

1. A power train architecture comprising:

a first gas turbine comprising a compressor section, a turbine section, and a combustor section operatively coupled to the compressor section and the turbine section;

a first rotor shaft extending through the compressor section and the turbine section of the first gas turbine;

a first generator, coupled to the first rotor shaft and driven by the turbine section of the first gas turbine; and

a first plurality of bearings supporting the first rotor shaft within the compressor section and the turbine section of the first gas turbine and the first generator, wherein each of the bearings of the first plurality of bearings is a low-loss bearing including a low-loss lubricant, and wherein the low-loss lubricant is a mineral oil-based lubricant having a viscosity grade between VG8 and VG20, where VG represents the viscosity grade in centistokes at 40 °C; and

wherein the compressor section, the turbine section, and the generator each include a plurality of rotating components, at least one of the rotating components in at least one of the compressor section of the first gas turbine, the turbine section of the first gas turbine, and the first generator including a low-density material.

Appeal Br. 18.

REJECTIONS

1. The Examiner rejects claims 1, 4, 7, and 8 under 35 U.S.C. § 103 as unpatentable over Shibuya[2] in view of Leonhardt,[3] Baten,[4] and Kelly.[5]
2. The Examiner rejects claims 2 and 3 under 35 U.S.C. § 103 as unpatentable over Shibuya in view of Leonhardt, Baten, Kelly, Thiele,[6] and Alvanos.[7]
3. The Examiner rejects claim 13 under 35 U.S.C. § 103 as unpatentable over Shibuya in view of Leonhardt, Baten, Kelly, and Chillar.[8]
4. The Examiner rejects claims 16 and 17 under 35 U.S.C. § 103 as unpatentable over Shibuya in view of Leonhardt, Baten, Kelly, Chillar, Thiele, and Alvanos.

DISCUSSION

Claims 1, 4, 7, and 8

With respect to claim 1, the Examiner finds that Shibuya teaches a power train architecture with a first gas turbine compressor, a turbine section, a first rotor shaft, and a first generator. Final Act. 3. The Examiner acknowledges that Shibuya does not teach support bearings, a low-loss lubricant included in support bearings, or the use of low-density materials. *Id.* However, the Examiner finds that Baten, Leonhardt, and Kelly cure these deficiencies. *Id.* The Examiner concludes that it would have been

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[2] Shibuya et al., US 6,178,734 B1, iss. Jan. 30, 2001.
[3] Leonhardt, US 6,165,951, iss. Dec. 26, 2000.
[4] Baten, US 2010/0187180 A1, pub. July 29, 2010.
[5] Kelly et al., US 2007/0274854 A1, pub. Nov. 29, 2007.
[6] Thiele, US 6,240,730 B1, iss. June 5, 2001.
[7] Alvanos et al., US 2009/0148271 A1, pub. June 11, 2009.
[8] Chillar et al., US 2009/0301078 A1, pub. Dec. 10, 2009.

obvious to combine these references, which provide evidence of well-known facts in the art, by known methods that would yield predictable results. *Id.* at 3–4. The Examiner further explains that the combination would have been obvious in order to provide adequate support for the power train architecture, to provide a lubricant with a desired effectiveness, and to produce a turbine blade with predictable results. Ans. 3.

As discussed below, we are not persuaded of reversible error in the rejection of claim 1.

Appellant first argues that the Examiner has not set forth proper motivation to support the combination of references. Appeal Br. 9. In support, Appellant asserts that the Examiner has not set forth evidence showing "that would lead one of ordinary skill in the art to combine the references to address" the problem solved by the claimed invention. *Id.* at 10 (citing *In re Sponnoble*, 405 F.2d 578 (CCPA 1969)).

We are not persuaded by this argument. Contrary to Appellant's assertion, the courts have held that the reason for a proposed combination of art need not be the same as the motivation that inspired the inventor. *See KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 420 (2007) ("[A]ny need or problem known in the field of endeavor at the time of invention and addressed by the patent can provide a reason for combining the elements in the manner claimed."); *In re Kahn*, 441 F.3d 977, 990 (Fed. Cir. 2006) ("[T]he skilled artisan need not be motivated to combine [a prior art reference] for the same reason contemplated by the [inventor]"); *In re Beattie*, 974 F.2d 1309, 1312 (Fed. Cir. 1992) ("As long as some motivation or suggestion to combine the references is provided by the prior art taken as a whole, the law does not require that the references be combined for the

reasons contemplated by the inventor."); *In re Kronig*, 539 F.2d 1300, 1304 (CCPA 1976). "[T]he problem motivating the patentee may be only one of many addressed by the patent's subject matter." *KSR*, 550 U.S. at 420,

With respect to *Sponnoble*, the Federal Circuit has stated that it stands "for the proposition that the discovery of an unknown problem can result in a patentable invention, even if the solution would have been obvious once the problem is identified." *In re Conrad,* 759 F. App'x 982, 985 (Fed. Cir. 2019). However, the court noted that this case "did not address whether the Board must consider the discovery of an unknown problem when there exists an independent motivation to combine prior art references." *Id.* Thus, where the rejection lacks a specific reason for making a combination, the inventor's motivation may be relevant in making an obviousness determination.

Here, we find that the Examiner has set forth an adequate reason for the proposed combination of art and we are not persuaded that the claims are nonetheless not obvious because the art does not recognize the particular problem addressed by the inventor. In terms of the elements, the Examiner finds that the use of bearings to support a shaft and generator was well known in the art; that the use of low viscosity lubricants was known; and the use of low-density materials was known. *See* Final Act. 3–4. Further, we determine that the Examiner has set forth adequate reasoning with rational underpinnings to support the conclusion that it would have been obvious to provide these elements in Shibuya. Specifically, the Examiner determines that it would have been obvious to provide low loss lubricant bearings as claimed in order to effectively support the rotor and provide a desired lubrication effectiveness. Ans. 3; Final Act. 3. The Examiner also

determines that it would have been obvious to provide low-density components as a simple substitution of known parts and "to provide a well-known and predictable turbine blade." Ans. 3; Final Act. 4.

Appellant does not specifically address the reasoning provided by the Examiner, and we determine that the Examiner's reasoning is supported on the record before us. In particular, Baten teaches as background that bearings are "used to support the rotating parts of a gas or steam turbine" and are "often coupled to a lubrication system that provides a continuous flow of oil that lubricates, cools, and removes debris from the bearings." Baten ¶ 2. We find that this supports the Examiner's determination that it would have been obvious to use bearings with a lubricant to support Shibuya's power train architecture.

Further, Leonhardt specifically teaches the use of low viscosity lubricants in the claimed range for use in lubricating bearings. *See* Leonhardt col. 1, ll. 14–17; col. 3, ll. 27–30. Leonhardt also indicates that the properties, including viscosity, of the lubricants disclosed are related to the lubricant's effectiveness in providing adequate lubrication over long periods of time. *See id.* at col. 1, ll. 21–51. Thus, Leonhardt supports the Examiner's reasoning that using a lubricant as taught by Leonhardt, including a viscosity in the claimed range, would have been obvious in order to provide a desired lubricant effectiveness.

Finally, Kelly teaches that the use of composite materials "may be useful for light weight, high-strength, high-temperature capable components for gas turbine engines." Kelly ¶ 2. Kelly further discloses that suitable turbine blades include titanium alloys such as Ti-6Al-4V. *Id.* at ¶ 20. The Examiner finds that this is a low-density material as claimed, and Appellant

does not contest this finding. *See* Final Act. 3; *see also* Appeal Br. 6–13. We find that this evidence supports the Examiner's reasoning that it would have been obvious to substitute a low-density component into Shibuya's device, as required by claim 1.

Thus, we determine that the Examiner has set forth adequate articulated reasoning with rational underpinnings to support the conclusion that it would have been obvious to combine the art of record with respect to claim 1. *See KSR*, 550 U.S. at 418 (quoting *In re Kahn*, 441 F.3d at 988).

We are also not persuaded of reversible error by Appellant's other arguments regarding the Examiner's reliance on Leonhardt. First, Appellant asserts that Leonhardt discloses a preferred viscosity range starting at the maximum of the claimed range, and thus, Leonhardt "favors viscosities that the Appellants' specification defines as 'high viscosity.'" Appeal Br. 12. Although Leonhardt suggests preferable viscosities on the higher end of the range required by the claim, there can be no dispute that Leonhardt discloses both preferable and more preferable viscosities within the claimed range. *See* Leonhardt col. 3, ll. 27–29. We are not persuaded that one of ordinary skill in the art would completely disregard this teaching in favor of using higher viscosity lubricants. At worst, this language suggests that using lower viscosity lubricants, within the range claimed, would provide some of the benefits disclosed in Leonhardt.

Second, Appellant argues that the Examiner erred in finding that viscosity is a result-effective variable and that the Examiner erred in determining that the viscosity grade of the lubricant is an intended. *See* Reply Br. 3–4. We are not persuaded of reversible error by these arguments. As discussed above, the Examiner has cited to sufficient evidence to support

the conclusion that it would have been obvious to use a lubricant as claimed in order to provide an effective lubricant, as taught by Leonhardt, without the need to rely on the Examiner's alternative findings.

Third, Appellant argues that other evidence "refutes the teachings of [Leonhardt], regarding the breadth of acceptable lubricant viscosities recognized by persons of skill in the power train art at the time of the filing of the present application." Reply Br. 2–3. In support, Appellant refers to evidence allegedly showing that "power-generating gas and steam turbines could be supported only by bearings whose lubricants have a viscosity greater than [VG26]." *Id.* Thus, Appellant asserts that there was no reasonable expectation of success in using low viscosity lubricants. *Id.* at 3. We are not persuaded of error by this argument. Although this evidence may show that lubricants with higher viscosity are generally used, we find it is insufficient to overcome the express teaching in Leonhardt that lubricants with viscosities in the claimed range would have certain beneficial properties disclosed in Leonhardt. Appellant has not explained adequately why one of ordinary skill in the art would consider that this evidence shows the differences in viscosity are so significant that one of ordinary skill in the art would ignore the express teaching in Leonhardt of the use of a lubricant with a viscosity in the claimed range.

Based on the foregoing, we are not persuaded of error in the rejection of claim 1. Accordingly, we sustain the rejection of claim 1. We also sustain the rejection of claims 4, 7, and 8 for the same reasons and because Appellant does not provide separate arguments regarding these claims. *See* Appeal Br. 9–13.

Claims 2 and 3

Claim 2 recites four separate bearings at four separate locations. *See* Appeal Br. 18. Claim 3 recites a fifth bearing located at a fifth location. *Id.* The Examiner finds that Thiele and Alvanos teach the well-known use of bearings at each of the locations required by these claims. Final Act. 5.

With respect to this rejection, Appellant argues only that Thiele teaches away from the combination with Shibuya, Baten, Leonhardt, and Kelly. Appeal Br. 13. In support, Appellant argues that Thiele is directed to the use of oil-free bearings that avoid contamination issues related to oil leakage from bearings. *Id.* Appellant asserts that Thiele identifies problems associated with the use of oil-based lubricants and one of ordinary skill "would not be motivated to consider [Thiele's] teachings, when confronted with the problem of reducing the *viscous losses* from the bearings of a power plant, while maintaining power output." *Id.* at 14.

We are not persuaded of error. The Examiner relies on Thiele and Alvanos only insofar as they provide support that it was well known to place the bearings in the positions claimed in order to support the respective portions of the power train architecture claimed. Final Act. 5. Although Thiele uses a water based lubricant and identifies disadvantages of using oil-based lubricants, we agree with the Examiner that this evidence does not teach away from the combination proposed. In particular, we agree with the Examiner that Thiele's teachings regarded the lubricant used "does not make the placement of the bearings less obvious." Ans. 6. More specifically, although Thiele may teach the use of one type of lubricant over another, Thiele's teachings regarding the placement of bearings are applicable regardless of the lubricant used. Thus, without further explanation from

Appellant, we find that one of ordinary skill in the art would not be discouraged from applying Thiele's teachings regarding the placement of bearings in Shibuya's apparatus.

Based on the foregoing, we are not persuaded of reversible error, and thus, we sustain the rejection of claim 2. Because Appellant does not provide separate arguments regarding claim 3, we also sustain the rejection of that claim for the reasons discussed.

Claim 13

With respect to the rejection of claim 13, Appellant argues that Chillar also does not provide reasoning to support the proposed combination of Shibuya, Baten, Leonhardt, and Kelly. Appeal Br. 15. However, as discussed above, we find that the Examiner has adequately supported this combination. Because Appellant does not otherwise explain why the rejection with Chillar includes reversible error, we are not persuaded of error here for the same reasons discussed above. Accordingly, we sustain this rejection.

Claims 16 and 17

With respect to the rejection of claims 16 and 17, Appellant relies only on the argument previously presented and discussed above. We find those arguments unpersuasive here, and thus, we sustain the rejection of claims 16 and 17 for the reason discussed above.

CONCLUSION

We AFFIRM the rejections of claims 1–4, 7, 8, 13, 16, and 17.

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)(l)(iv).

In summary:

Claims Rejected	35 U.S.C. §	Reference(s)/Basis	Affirmed	Reversed
1, 4, 7, 8	103	Shibuya, Leonhardt, Baten, Kelly	1, 4, 7, 8	
2, 3	103	Shibuya, Leonhardt, Baten, Kelly, Thiele, Alvanos	2, 3	
13	103	Shibuya, Leonhardt, Baten, Kelly, Chillar	13	
16, 17	103	Shibuya, Leonhardt, Baten, Kelly, Chillar, Thiele, Alvanos	16, 17	
Overall Outcome			1–4, 7, 8, 13, 16, 17	

AFFIRMED