NOTE: This disposition is nonprecedential.

United States Court of Appeals for the Federal Circuit

SLINGSHOT PRINTING LLC,
Appellant

v.

CANON U.S.A., INC., CANON INC.,
Appellees

2024-2127

Appeal from the United States Patent and Trademark Office, Patent Trial and Appeal Board in No. IPR2022-01541.

Decided: July 21, 2026

RAYINER HASHEM, MoloLamken LLP, Washington, DC, argued for appellant. Also represented by KAYVON GHAYOUMI; CATHERINE MARTINEZ, PRATIK KUMAR RAJ GHOSH, New York, NY; MARK BORSOS, PAUL HENKELMANN, Fitch, Even, Tabin & Flannery LLP, Chicago, IL.

JULIE S. GOLDEMBERG, Morgan, Lewis & Bockius LLP, Philadelphia, PA, argued for appellees. Also represented by MARIA DOUKAS, AMANDA SCOTT WILLIAMSON, Chicago,

IL; JASON EVAN GETTLEMAN, Palo Alto, CA; JITSURO MORISHITA, Tokyo, Japan.

Before PROST, SCHALL, and STOLL, *Circuit Judges*.

SCHALL, *Circuit Judge*.

Slingshot Printing LLC ("Slingshot") appeals from the May 20, 2024 final written decision of the Patent Trial and Appeal Board ("Board") determining that claims 1–7, 9, 10, 20–22, and 24 of Slingshot's U.S. Patent No. 7,152,951 ("the '951 patent" or "the patent") are unpatentable. *Canon U.S.A., Inc. v. Slingshot Printing LLC*, No. IPR2022-01541, 2024 WL 2278719 (P.T.A.B. May 20, 2024), J.A. 1–50. For the reasons set forth below, we *affirm*.

BACKGROUND

The '951 patent is directed to a "high resolution printhead for an ink jet printer." '951 patent, Abstract. The patent explains that increasing the number of nozzles depositing ink droplets from an ink jet printhead improves print quality. *See id.* col. 1 ll. 14–25. According to the patent, a printhead's nozzles have corresponding ink chambers that must be spaced so that there is sufficient chamber wall structure between them. *See id.* col. 1 ll. 26–41. The '951 patent describes forming the ink chambers and the ink channels that feed the chambers in a "thick film layer" positioned between a printhead's silicon substrate and the printhead's nozzle plate. *Id.* col. 1 l. 65–col. 2 l. 8. The thick film layer can be formed using photolithography, which produces chamber walls that are less angled than other methods. *Id.* col. 1 ll. 34–41, col. 3 ll. 42–49, col. 5 ll. 12–62, Figs. 4, 7. Therefore, the ink chambers, and, in turn, their corresponding nozzles, can be spaced closer together and a printhead's "nozzle to nozzle spacing" or "pitch" can be decreased to thereby improve print quality. *Id.* col. 1 l. 65–col. 2 l. 14, col. 2 ll. 25–29, col. 5 ll. 34–50.

Claim 1 of the '951 patent, which is representative of the claims at issue, recites:

> 1. A printhead for an ink jet printer, the printhead comprising:
>
> a semiconductor substrate containing at least one ink feed edge and a plurality of ink ejection actuators spaced a distance from the ink feed edge, each of the ink ejection actuators having an aspect ratio ranging from about 1.5:1 to about 6:1;
>
> a thick film layer attached to the semiconductor substrate, the thick film layer having formed therein a plurality of ink feed chambers and ink feed channels corresponding to the plurality of ink ejection actuators; and
>
> a nozzle plate attached to the thick film layer, the nozzle plate containing a plurality of nozzle holes in the nozzle plate corresponding to the plurality of ink feed chambers,
>
> wherein adjacent ones of the nozzle holes are spaced apart with a pitch ranging from about 600 to about 2400 dpi and wherein the distance from the ink feed edge is substantially the same for each of the ink ejection actuators.

Id. col. 6 l. 51–col. 7 l. 3.

Canon U.S.A., Inc. and Canon, Inc. (collectively, "Canon") filed a petition for inter partes review of claims 1–7, 9, 10, 20–22, and 24 of the '951 patent. J.A. 2. The petition relied upon three references pertinent to this appeal: Japanese Patent Application Publication No. H09-131869 ("Hamafuku"), J.A. 1008–22; U.S. Patent No. 6,213,587 ("Whitman"), J.A. 940–70; and U.S. Patent No. 6,299,293 ("Imanaka"), J.A. 1023–40. The Board instituted review and held a hearing. J.A. 2.

Before the Board, the parties disputed the meaning of the term "thick film layer," which appears in each of the challenged claims. Canon requested that the term be given its plain and ordinary meaning and contended that a "thick film layer" need not be made of any particular material, whereas Slingshot argued that the term means "a polymer layer, usually a photoresist material, applied on top of the thin film layers of metal and other components on a semiconductor chip." J.A. 10–11. In the final written decision, the Board concluded that it did not need to construe the term "thick film layer" to perform its analysis. J.A. 11.

Noting that Slingshot did not argue to the contrary, the Board then agreed with Canon that Hamafuku, or alternatively, Hamafuku in combination with Whitman, discloses claim 1's "thick film layer having formed therein a plurality of ink feed chambers and ink feed channels corresponding to the plurality of ink ejection actuators." J.A. 33–34. The Board determined that, although Hamafuku, or the combination of Hamafuku and Whitman, did not teach the high-density nozzle pitch claimed in the challenged claims, it would have been obvious to a skilled artisan to modify Hamafuku's printhead to include high-density nozzle pitch, as taught by Imanaka. J.A. 35–44. In reaching this conclusion, the Board credited the testimony of Canon's expert, Mr. Curley, that one of ordinary skill in the art would have sought to use Imanaka's nozzle pitch in Hamafuku's (or Hamafuku's in combination with Whitman's) device in order to provide a more compact and higher density printhead, and would have had a reasonable expectation of success in doing so. *Id.* at 42–44 (citing J.A. 738–39 (¶¶ 404–05), J.A. 741 (¶ 409)). The Board rejected Slingshot's argument against the combination, stating that Imanaka's "preference for silicon-based materials" does not "teach away from, or otherwise discourage," a skilled artisan from combining Imanaka with Hamafuku and Whitman. J.A. 41.

The Board ultimately found claims 1–4, 6, 7, 9, 10, 20–22, and 24 to be obvious in view of the combination of Hamafuku, Imanaka, and Whitman, and claim 5 to be obvious in view of the combination of these references in addition to U.S. Patent No. 6,491,377 ("Cleland"). J.A. 47–48.

Slingshot timely appealed. We have jurisdiction under 28 U.S.C. § 1295(a)(4)(A).

DISCUSSION

I

Slingshot makes three main arguments on appeal. First, Slingshot argues that the Board erred when it declined to construe the term "thick film layer," despite the parties' dispute about the term's scope. Appellant's Br. 29–32 (citing *O2 Micro Int'l Ltd. v. Beyond Innovation Tech. Co.*, 521 F.3d 1351, 1360 (Fed. Cir. 2008)). According to Slingshot, given the high expected operating pressures in the ink chambers and ink channels, a proper understanding of "thick film layer" as being a "polymer layer" was essential to the Board's analysis of whether a skilled artisan would have incorporated Imanaka's teachings into Hamafuku and Whitman. *Id.* at 31–35 & n.2. Specifically, Slingshot asserts that Imanaka's high-density ink-chamber geometry could only be used with silicon thin film or other rigid thin films, and a skilled artisan would not have incorporated this geometry into thick film materials, which are relatively soft. *Id.*; *see also id.* at 39.

Second, Slingshot argues that the Board erred when it determined that Imanaka does not "teach away from" the claims. Appellant's Br. 37–44. Imanaka discloses that its structures are formed in a "silicon-containing material" such as "silicon nitride" or "silicon oxide" "thin film," J.A. 1035 col. 5 ll. 55–60, col. 6 ll. 50–61, and states that only certain materials have "suitable mechanical strength" for forming ink chamber walls in its design, e.g., "diamond film," *see* J.A. 1037 col. 9 ll. 43–63. Slingshot asserts that

these teachings of Imanaka would have "deterred" skilled artisans from constructing ink chambers using the spacing of Imanaka in a thick film layer. Appellant's Br. 41.

Third, Slingshot argues that a skilled artisan would not have reasonably expected success in combining Imanaka, Hamafuku and Whitman to achieve the specific claimed invention. *Id.* at 44–49 (citing *Teva Pharms. USA, Inc. v. Corcept Therapeutics, Inc.*, 18 F.4th 1377, 1381 (Fed. Cir. 2021)). On this point, Slingshot takes issue with the Board's reliance on the testimony of Mr. Curley. *Id.* at 46–47. According to Slingshot, Mr. Curley did not provide testimony on whether a skilled artisan would have expected success in taking Imanaka's structures and forming them in the softer thick film layers of Hamafuku and Whitman. *Id.* Slingshot also contends that the Board improperly relied on the '951 patent as evidence of a reasonable expectation of success. *Id.* at 49. In making this argument, it points to the Board's statement that "the printhead of the '951 patent has a higher nozzle pitch than Imanaka," when considering whether thick film layers would have sufficient mechanical strength. J.A. 44.

We address Slingshot's arguments in turn.

II

Claim construction is a question of law that may involve underlying factual inquiries. *See Teva Pharms. USA, Inc. v. Sandoz, Inc.*, 574 U.S. 318, 326 (2015). Obviousness is a question of law based on subsidiary findings of fact, including whether a skilled artisan would have been motivated to modify or combine teachings in the prior art, and whether a skilled artisan would have had a reasonable expectation of success in doing so. *In re Stepan Co.*, 868 F.3d 1342, 1345–46 (Fed. Cir. 2017). We review the Board's legal conclusions de novo and its factual findings for substantial evidence. *Id.*

A

To begin, we see no error in the Board's decision not to construe "thick film layer." As the Board noted, it needs only to construe terms "that are in controversy, and only to the extent necessary to resolve the controversy." J.A. 11 (quoting *Realtime Data, LLC v. Iancu*, 912 F.3d 1368, 1375 (Fed. Cir. 2019)). Here, there was no controversy involving "thick film layer" because, as the Board later noted, Slingshot "d[id] not contest" that Hamafuku, or Hamafuku in combination with Whitman, discloses a "thick film layer" as recited in the claims. J.A. 33–35; Oral Arg. at 1:10–23 https://www.cafc.uscourts.gov/oral-arguments/24-2127_05042026.mp3 ("Hamafuku and Whitman taught a thick film layer, we don't dispute that.").

Although presented as a claim construction argument, Slingshot's argument about the meaning of "thick film layer" in reality challenges the Board's factual findings that a skilled artisan would have been motivated to combine Imanaka's high-density ink-chamber geometry into the thick film layers of Hamafuku and Whitman and would have had a reasonable expectation of success in doing so. *See* Appellant's Br. 32 ("Given the high expected operating pressures in the ink chambers and channels, skilled artisans would not have taken the dimensions of Imanaka's specialized all silicon pressure chambers and reproduced that high-density geometry in soft, thick film materials.") (internal quotation marks and citation omitted). We accordingly address this argument in Section II.C below.

B

We turn next to Slingshot's argument that Imanaka teaches away from the claims. As Canon points out, despite the Board's use of the phrase "teach away from" in the final written decision, Slingshot did not argue to the Board that Imanaka in fact teaches away from the combination. Appellee's Br. 28. Instead, Slingshot generally challenged the motivation to combine Imanaka with Hamafuku and

Whitman. *See* J.A. 310–11, J.A. 376–77; Oral arg. at 27:20–25, 40–55 (counsel for Slingshot conceding that it did not make a "teaching away" argument separate from its motivation to combine argument before the Board). While these two issues may be similar and related, they are indeed separate. *In re Fulton*, 391 F.3d 1195, 1199–200 (Fed. Cir. 2004) ("What the prior art teaches, whether it teaches away from the claimed invention, and whether it motivates a combination of teachings from different references are questions of fact."); *see Polaris Indus., Inc. v. Arctic Cat, Inc.*, 882 F.3d 1056, 1069–70 (Fed. Cir. 2018) (explaining that a reference's statement of a preference may be relevant to motivation to combine even if it does not rise to the level of a teaching away). We therefore decline to separately address whether Imanaka teaches away from the combination. *See In re Google Tech. Holdings LLC*, 980 F.3d 858, 863 (Fed. Cir. 2020) (explaining that an argument not presented to the tribunal under review is forfeited absent exceptional circumstances).

C

To the extent Slingshot challenges motivation to combine through its claim construction argument, and to the extent Slingshot's argument that Imanaka teaches away is pertinent to the Board's general finding of motivation to combine, we note that substantial evidence supports this finding by the Board. That evidence is Mr. Curley's testimony and the references themselves. J.A. 42 ("[W]e credit the testimony of Mr. Curley that one of ordinary skill in the art would have sought to use Imanaka's heater and nozzle pitch in Hamafuku in order to provide a more compact and higher density printhead.") (citing J.A. 738–39 (¶¶ 404–05)); *see also* J.A. 42–43 ("Mr. Curley credibly testifies that all of the components described in Hamafuku, Imanaka, and Whitman 'were well known at the time' and 'it would have been straightforward for a [skilled artisan] to modify Hamafuku's printhead to include Imanaka and Whitman's

structures and dimensions.'") (quoting J.A. 741–42 (¶ 409)).

Similarly, the Board's finding that a skilled artisan would have had a reasonable expectation of success in combining the prior art references is also supported by substantial evidence. The Board considered Slingshot's argument and expert testimony that Imanaka could only use silicon-based or other thin-film materials to achieve its nozzle pitch. J.A. 43–44 (citing J.A. 1602–03 (¶¶ 91–92)). The Board noted, however, that the claims of the '951 patent "do not require the printhead to operate in any particular manner or achieve any particular operational parameters." J.A. 42. The Board credited both Imanaka's own teachings that any film with suitable mechanical strength and heat resistance could be used and Dr. Curley's testimony that the combined system of Hamafuku, Whitman, and Imanaka "would work." J.A. 42–44 ("Mr. Curley credibly testifies that all of the components described in Hamafuku, Imanaka, and Whitman 'were well known at the time' and 'it would have been straightforward for a [skilled artisan] to modify Hamafuku's printhead to include Imanaka and Whitman's structures and dimensions.'") (quoting J.A. 741–42 (¶ 409)).

We note that Mr. Curley explained that Whitman teaches that its film "preferably comprises photo-developable polymer," IPR2022-01541 (Ex. 1002) pp. 158–59 (¶ 299) (quoting J.A. 963 col. 6 ll. 23–27), and that Mr. Curley expressly testified that it would be "straightforward" for a skilled artisan to combine Hamafuku, Whitman, and Imanaka and that the combination would work. J.A. 741–42 (¶ 409). We thus are not persuaded by Slingshot's argument that Mr. Curley did not provide testimony on whether a skilled artisan would have expected success in taking Imanaka's structures and forming them in the softer thick film layers of Hamafuku and Whitman. As for Slingshot's contention that the Board erroneously relied on the '951 patent as evidence of a reasonable expectation of success,

we agree that any such reliance would be improper. *See Univ. of Strathclyde v. Clear-Vu Lighting LLC*, 17 F.4th 155 (Fed. Cir. 2021) ("[T]he inventor's own path itself never leads to a conclusion of obviousness; that is hindsight."). In context, however, any error by the Board was harmless. The Board's statement merely provided additional support in connection with its discussion of Imanaka's own teachings that "any film with suitable mechanical strength and heat resistance could be used." J.A. 44.

CONCLUSION

We have considered Slingshot's remaining arguments and find them unpersuasive. For the foregoing reasons, we affirm the Board's determination that claims 1–7, 9, 10, 20–22, and 24 of the '951 patent are unpatentable.[1]

AFFIRMED

[1] We note that Slingshot does not separately challenge the Board's findings with respect to claim 5 or Cleland.