

NOTE: This disposition is nonprecedential.

**United States Court of Appeals
for the Federal Circuit**

APPLE INC.,
Appellant

v.

COREPHOTONICS, LTD.,
Appellee

2020-1438

Appeal from the United States Patent and Trademark
Office, Patent Trial and Appeal Board in No. IPR2018-
01146.

Decided: June 23, 2021

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Before TARANTO, HUGHES, and STOLL, *Circuit Judges*.

STOLL, *Circuit Judge*.

This is an appeal from the final decision of the Patent Trial and Appeal Board in an *inter partes* review of U.S. Patent No. 9,568,712. Petitioner Apple Inc. appeals, asking this court to consider a dispute regarding anticipation by an inoperative embodiment, as well as a factual issue regarding motivation to combine. Because we determine that the Board’s finding of no anticipation is correct as a matter of law, we affirm that finding. We also determine that the Board’s finding of no motivation to combine is premised on a clear mathematical error that appears to have tainted its analysis. Thus, we vacate the Board’s determination of nonobviousness and remand for reconsideration.

BACKGROUND

I

The ’712 patent is assigned to Corephotonics Ltd. and relates to a miniature telephoto lens assembly that can be used in portable electronic devices, such as a cell phone. ’712 patent col. 1 ll. 18–22. Cell phone cameras “in particular require a compact imaging lens system for good quality imaging and with a small total track length (TTL).” *Id.* at col 1 ll. 29–32. TTL is measured from the first lens to “an electronic sensor, film, [or] an image plane corresponding to either the electronic sensor or a film sensor[.]” *Apple Inc. v. Corephotonics Ltd.*, No. IPR2018-01146, 2019 WL 6999883, at *6 (P.T.A.B. Dec. 4, 2019) (*Final Decision*). Given the high demand for digital cameras in cell phones, the design for the optical lens assemblies for use in cell phone cameras has evolved. According to the ’712 patent, “[c]onventional lens assemblies comprising four lens elements are no longer sufficient for good quality imaging,” and the latest five-lens-element assemblies “suffer[] from at least the fact that the TTL/EFL (effective focal length)

ratio is too large.” ’712 patent col. 1 ll. 32–38. Thus, the ’712 patent is directed to a compact five lens assembly with a TTL that is smaller than the EFL, i.e., a TTL/EFL ratio that is less than one, providing “better image quality than existing lens assemblies.” *Id.* at col. 1 ll. 39–41. Figure 1A illustrates an embodiment of the claimed five lens assembly, which “advantageously” has a TTL/EFL ratio of less than one:

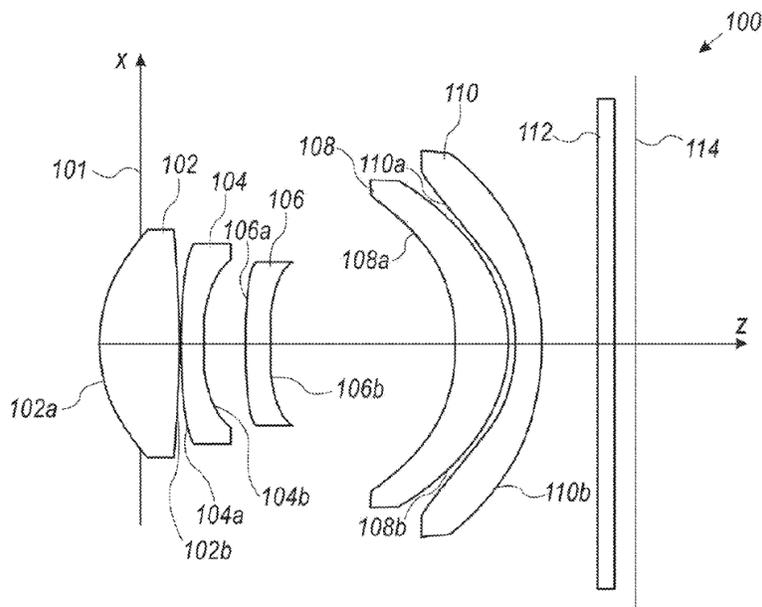


FIG. 1A

Id. Fig. 1A; *id.* at col. 2 ll. 58–59, col. 4 ll. 40–42.

Each of the embodiments described in the ’712 patent also has “an F number” less than 3.2. *See id.* at col. 2 ll. 2–3. The F number refers to the amount of light that enters the lens assembly: A lower F number represents a wider camera aperture, which allows more light to enter the lens system, and a higher F number represents a smaller camera aperture, which means less light enters the lens system. *See* Appellant’s Br. 10 (first citing J.A. 1734

(Moore Dep. 83:4–11); and then citing J.A. 1464 (Moore Decl. ¶ 36)).

Claims 1 and 6 are representative of the claims on appeal:

1. A lens assembly, comprising: a plurality of refractive lens elements arranged along an optical axis, wherein at least one surface of at least one of the plurality of lens elements is aspheric, wherein the lens assembly has an effective focal length (EFL), a total track length (TTL) of 6.5 millimeters or less and a ratio TTL/EFL of less than 1.0, and wherein the plurality of lens elements comprises, in order from an object side to an image side, a first lens element with a focal length f_1 and positive refractive power, a second lens element with a focal length f_2 and negative refractive power and a third lens element with a focal length f_3 , the focal length f_1 , the focal length f_2 and the focal length f_3 fulfilling the condition $1.2 \times |f_3| > |f_2| > 1.5 \times f_1$.

...

6. The lens assembly of claim 2, wherein a lens assembly F# is smaller than 2.9.

'712 patent col. 7 ll. 55–67, col. 8 ll. 32–33.

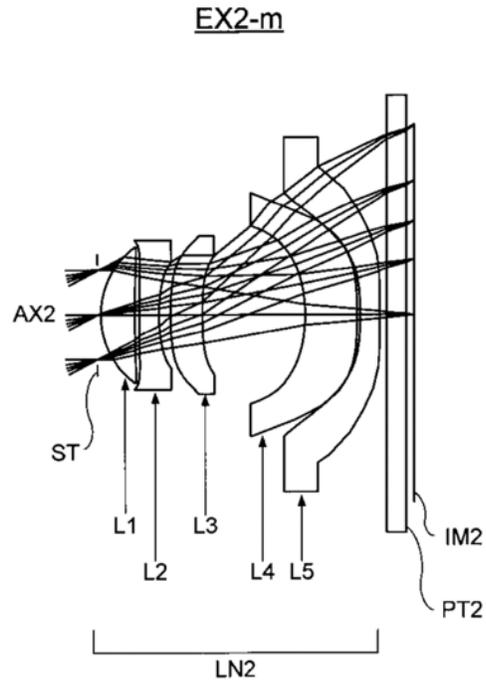
II

A

Konno¹ is the primary prior art reference relied on by Apple for both anticipation and obviousness. Like the '712 patent, Konno is directed to a “thin and small-sized imaging apparatus capable of acquiring an image of high quality and high resolution[.]” J.A. 824 ¶ 6. Konno specifically discloses dual lens assemblies comprising both a

¹ Japanese Patent Publication JP 2013-106289.

wide-angle lens and a telephoto lens. Relevant here is Konno's telephoto lens from Example 2—referred to as "EX2-LN2"—the sole embodiment that Apple relies on:



J.A. 851 Fig. 16. As shown below, Konno discloses several parameters for its dual lens system:

Effective Focal Length (EFL)

[Table 1]

		Example 1		Example 2	
		LN1	LN2	LN1	LN2
Focal Length of Entire System (mm)	fw or fm	2.73	4.32	3.70	5.51
Fno	FNOw or FNOm	4.00	4.00	3.00	4.00
Lens Entire Length (at infinite) (mm)	TLw or TLm	3.04	3.65	4.45	4.91
Maximum Image Height (mm)	2Y'	5.12	5.12	5.80	5.80
Entire Viewing Angle (deg)	2 ω w or 2 ω m	86.32	61.28	76.18	65.52
L1 Focal Length (mm)	f1w or f1m	2.60	2.10	2.47	2.54
L2 Focal Length (mm)	f2w or f2m	-7.91	-5.51	-3.53	-4.02
L3 Focal Length (mm)	f3w or f3m	3.14	-13.70	13.47	22.96
L4 Focal Length (mm)	f4w or f4m	-1.68	-3.09	2.42	-5.99
L5 Focal Length (mm)	f5w or f5m	-	-	-1.84	-7.73
Composite Focal lengths of L1 and L2 (mm)	fFw or fFm	3.48	2.91	5.48	4.84
Focal Length of Lens LX (mm)	fXw or fXm	3.14	-13.70	2.47	-5.99
Number of Pixels of Sensor (MegaPixels)	PX	10.00	10.00	13.00	13.00
Segmented Minimum Number of Pixels (MegaPixels)		4.00	4.00	5.86	5.86
Segmented Maximum Focal Length (mm)		4.32	6.83	5.51	8.21
Electronic Zoom Ratio (Power)	ZR		2.50		2.22
Focal Length (135 Conversion) (mm)		23.07	36.52	37.60	41.10

Total Track Length (TTL)

J.A. 459 (as annotated by Apple's expert Dr. Sasián (citing J.A. 841 Tbl. 1)). As shown in Table 1, Konno's telephoto lens EX2-LN2 has an EFL of 5.51 mm and a TTL of 4.91 mm, resulting in a TTL/EFL ratio of 0.891, i.e., less than 1.0. It is undisputed, however, that the data provided in Table 1 for EX2-LN2 contains an error such that "lenses L4 and L5 overlap (i.e., occupy the same space)." J.A. 497–98 (Sasián Decl. ¶ 64).

Konno further explains that, for a dual lens assembly, it is desirable for the F-numbers of the wide-angle and telephoto lenses to be close to one another to reduce the "impression of blurring," which gives "an unnatural feeling to the user." J.A. 831 ¶ 38. Konno also explains that, "[t]o slim down the entire apparatus, it is advantageous to make the second imaging optical system darker than the first imaging optical system[,] i.e., the F-number of the second imaging optical system would need to be higher than the first imaging optical system. *Id.* Thus, "it is preferred that the F-numbers of the first and second imaging optical systems

are close to each other so as to satisfy the conditional expression (5).” *Id.* Conditional expression (5) refers to the following “[d]esirabl[e]” relationship:

$$0.6 < \text{FNOW}/\text{FNOM} < 1.3$$

J.A. 831 ¶ 37. FNOW refers to the F number of the first lens, i.e., the wide-angle lens, and FNOM refers to the F number of the second lens, i.e., the telephoto lens. *See id.* As shown above in Table 1, Konno’s telephoto lens EX2-LN2 has an F number (FNOM) of 4.00, and its wide-angle lens, EX2-LN1, has an F number (FNOW) of 3.00, thus satisfying conditional expression (5).

B

Bareau² is a secondary prior art reference relied on by Apple for obviousness. Bareau generally discusses the implications for designing and manufacturing digital camera lenses for cell phones as compared to conventional camera lenses. In discussing the specifications for a ¼” CMOS image sensor for use in a cell phone camera, Bareau discloses that the F number is “2.8, fixed,” J.A. 776, explaining that “most camera module customers specify” this F number, J.A. 777.

III

Apple filed an IPR petition challenging claims 1, 2, 6, 7, 12–17, and 19 of the ’712 patent on three grounds. *Final Decision*, 2019 WL 6999883, at *1. Relevant here, ground 1 asserted that claims 1, 2, 7, 12–13, 15–16, and 19 were anticipated by Konno, and ground 2 asserted that claims 6 and 14 would have been obvious over Konno in view of

² Jane Bareau & Peter P. Clark, *The Optics of Miniature Digital Camera Modules*, 6342 Proceedings of the Society of Photo-Optical Instrumentation Engineers, International Optical Design Conference (July 25, 2006), <https://doi.org/10.1117/12.692291>.

Bareau.³ *Id.* at *2. The Board ultimately determined that Apple failed to demonstrate that claims 1, 2, 7, 12–13, 15–16, and 19 were anticipated by Konno or that claims 6 and 14 would have been obvious over Konno in view of Bareau. *Id.* at *16.

Apple appeals. We have jurisdiction pursuant to 28 U.S.C. § 1295(a)(4)(A).

DISCUSSION

On appeal, Apple argues that the Board erred in finding that Konno does not anticipate claims 1, 2, 7, 12–13, and 19⁴ because it applied the wrong legal framework for enablement of an anticipatory prior art reference. Apple contends that, under the proper framework, Konno anticipates the claims. Apple also asserts that the Board erred in holding that that claims 6 and 14 would not have been obvious because its motivation to combine analysis is premised on a clear mathematical error. We address each issue in turn.

I

“A patent claim is invalid as anticipated only if each and every element of the claim is expressly or inherently disclosed in a single prior art reference.” *Guangdong Alison Hi-Tech Co. v. Int’l Trade Comm’n*, 936 F.3d 1353, 1363–64 (Fed. Cir. 2019) (first citing 35 U.S.C. § 102 (2006); and then citing *SRI Int’l, Inc. v. Internet Sec. Sys., Inc.*, 511 F.3d 1186, 1192 (Fed. Cir. 2008)). The ultimate question of anticipation is a finding of fact that we review

³ The Board’s finding that claims 15–17 are unpatentable as anticipated by U.S. Patent No. 3,888,956 to Eggert (ground 3) is not at issue in this appeal.

⁴ Because claims 15 and 16 were found unpatentable as anticipated by Eggert, Apple does not raise claims 15 and 16 in this appeal. Appellant’s Br. 8 n.2.

for substantial evidence. *See id.* at 1364 (citing *Vizio, Inc. v. Int’l Trade Comm’n*, 605 F.3d 1330, 1342 (Fed. Cir. 2010)).

A

We begin our anticipation analysis by addressing Apple’s argument that the Board improperly shifted the burden to Apple to prove that Konno was an enabling prior art reference. “A prior art reference cannot anticipate a claimed invention ‘if the allegedly anticipatory disclosures cited as prior art are not enabled,’” *In re Antor Media Corp.*, 689 F.3d 1282, 1287 (Fed. Cir. 2012) (quoting *Amgen Inc. v. Hoechst Marion Roussel, Inc.*, 314 F.3d 1313, 1354 (Fed. Cir. 2003)), that is, that the prior art reference “enable[s] the portions of its disclosure alleged to anticipate the claimed invention,” *id.* at 1290. Whether a prior art reference is enabling is ultimately a question of law we review de novo, but is “based on underlying factual findings” that that we review for substantial evidence. *Id.* at 1287. In its decision, the Board found that Apple’s “early identification of the error” in Konno overcame the presumption of enablement afforded to patents and printed publications. *Final Decision*, 2019 WL 6999883, at *10. The Board then determined that Apple’s “failure to address the issue of enablement in connection with the challenge applying Konno alone prior to institution means that [Apple] has failed to carry its burden of establishing anticipation” by a preponderance of the evidence. *Id.* In other words, the Board shifted the burden to Apple to provide evidence before institution (i.e., in its petition) that Konno was enabling as part of its burden to prove anticipation. This was error. For the reasons discussed below, however, we conclude the Board’s error was harmless.

It is well-established that prior art patents and printed publications like Konno, a Japanese patent publication, are presumed enabling. *See, e.g., Impax Labs., Inc. v. Aventis Pharm., Inc.*, 545 F.3d 1312, 1316 (Fed. Cir. 2008); *Amgen*,

314 F.3d at 1354–55; *Antor*, 689 F.3d at 1288–89. We have held in the context of both district court litigation and patent prosecution that the burden of proving that a prior art reference is not enabling is on the patentee/applicant, and that it is error to shift that burden to the patent challenger/examiner. For example, in *Impax*, we explained that “when an accused infringer asserts that a prior art patent anticipates specific patent claims, the infringer enjoys a presumption that the anticipating disclosure also enables the claimed invention.” 545 F.3d at 1316 (citation omitted). There, we relied on our earlier decision in *Amgen*—where we held that it was error to shift the burden of “proving the prior art reference’s enablement of the claimed invention on the alleged infringer,” *id.* (citing *Amgen*, 314 F.3d at 1355–56)—to conclude that “the district court correctly placed the burden of proving non-enablement on the patentee,” *id.* Likewise, in *Antor*, we explained that, “during patent prosecution, an examiner is entitled to reject claims as anticipated by a prior art publication or patent without conducting an inquiry into whether or not that prior art reference is enabling.” 689 F.3d at 1289. Once the examiner has made a prima facie case of anticipation, we held that “the burden shifts to the applicant to submit rebuttal evidence of nonenablement.” *Id.*

The Board, citing *Antor* and *Amgen* (among others), acknowledged this in its decision, but reasoned that “none of these cases were in the context of AIA trial proceedings.” *Final Decision*, 2019 WL 6999883, at *9. We disagree with the Board’s reasoning. We do not see a principled distinction between our cases holding that this presumption and burden apply during patent examination and in district court litigation, and AIA trial proceedings. Thus, regardless of the forum, prior art patents and publications enjoy a presumption of enablement, and the patentee/applicant has the burden to prove nonenablement for such prior art. It was error for the Board to suggest otherwise.

As a result of its error, the Board refused to consider evidence that Apple introduced with its reply in support of enablement of Konno—which Apple reasonably introduced after Corephotonics raised the issue of nonenablement. *See* Appellant’s Br. 50 (citing J.A. 1656–61); *see also* J.A. 1770–71 (Sasián Reply Decl. ¶ 2). The Board reasoned that Apple’s failure to address enablement in its petition meant Apple “failed to carry its burden of establishing anticipation.” *Final Decision*, 2019 WL 6999883, at *10; *see also id.* at *9. This too was error because the Board in effect shifted the burden to Apple to prove enablement before any assertion of nonenablement was raised.

B

Although the Board erroneously shifted the burden to Apple to prove that Konno was enabling, that error was harmless because, even affording Apple the presumption, we conclude that the Board correctly found that Konno cannot anticipate the challenged claims as a matter of law.

Here, Apple admits that Konno’s telephoto lens EX2-LN2—the sole embodiment that it relies on for anticipation—contains an error, specifically that lens elements L4 and L5 overlap. The Board found that “lens L4 and L5 of Konno’s lens assembly ‘cannot be arranged’ to provide ‘[a] lens assembly . . . [that] has an effective focal length (EFL), a total track length (TTL) of 6.5 millimeters or less’ as claimed without removing the overlap between lens L4 and L5.” *Final Decision*, 2019 WL 6999883, at *10 (alterations in original). As such, the Board found that Konno could not anticipate the challenged claims absent impermissible modification. *See id.* We discern no error with this conclusion. As the Board correctly noted, “[p]rior art that must be modified to meet the disputed claim limitation does not anticipate the claim.” *Id.* at *9 (quoting *Enplas Display Device Corp. v. Seoul Semiconductor Co.*, 909 F.3d 398, 405 (Fed. Cir. 2008)). Such modifications are permissible only in an obviousness analysis.

Apple argues that there is no need to modify Konno's telephoto lens EX2-LN2 to meet the challenged claims because it literally meets the claim limitations regardless of whether there is overlap between lenses L4 and L5. As Apple's expert, Dr. Sasián, explained, Konno's telephoto lens EX2-LN2 has a 5.51 mm EFL, a 4.91 mm TTL, and the TTL/EFL ratio is 0.891, thus meeting the claim limitations of a TTL of 6.5 mm or less and a TTL/EFL ratio of less than 1.0. *See, e.g.*, J.A. 459 (Sasián Decl. (claim limitation [1.5])). Although Apple is correct that the EX2-LN2 embodiment meets the numerical requirements of the claims absent modification, the problem is that the relied upon embodiment is inoperative unless the overlap between lenses L4 and L5 is fixed. Under our precedent, such inoperative embodiments cannot be anticipatory. *See In re Dowty*, 118 F.2d 363, 366 (C.C.P.A. 1941) (“[A]n inoperative prior art device may not be relied upon as an anticipation.” (quoting *In re Kehl*, 101 F.2d 193, 195 (C.C.P.A. 1939))). We therefore conclude that Konno's inoperative telephoto lens EX2-LN2 cannot anticipate the challenged claims.

We are also not persuaded by Apple's argument that it is not relying on lenses L4 and L5 for purposes of anticipation because the challenged claims require only three lenses. As an initial matter, Apple's petition and supporting expert declaration from Dr. Sasián repeatedly refer to both lens L5 and Konno's telephoto lens EX2-LN2 as a whole, without any suggestion that Apple was not relying on lenses L4 and L5 from that embodiment. *See Final Decision*, 2019 WL 6999883, at *10; *see also* Appellee's Br. 15–18. We also agree with Corephotonics that the parameters of Konno's telephoto lens EX2-LN2 that Apple relies on to show anticipation—the EFL, TTL, and TTL/EFL ratio—are dimensions that are based on all five lens elements, not just three of the five. Appellee's Br. 16–18.

We therefore affirm the Board’s finding that the inoperative embodiment of Konno relied upon by Apple does not anticipate claims 1, 2, 7, 12–13, and 19.

II

We turn next to the Board’s determination that Apple failed to demonstrate that dependent claims 6 and 14 were unpatentable as obvious. Apple asserts that the Board’s finding that Apple did not provide a sufficient rationale for combining Konno with Bateau is unsupported by substantial evidence because its finding is premised on a mathematical error. We agree.

A

Obviousness is a question of law based on underlying fact findings that we review for substantial evidence, including “whether a [person of ordinary skill in the art] would have been motivated to combine the prior art to achieve the claimed invention and whether there would have been a reasonable expectation of success in doing so.” *TQ Delta, LLC v. Cisco Sys., Inc.*, 942 F.3d 1352, 1357 (Fed. Cir. 2019) (quoting *In re Warsaw Orthopedic, Inc.*, 832 F.3d 1327, 1333 (Fed. Cir. 2016)).

Our review of the Board’s decision is under the standard set forth in the Administrative Procedure Act, which “requires us to set aside conclusions or findings that are ‘arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law,’ or ‘unsupported by substantial evidence.’” *Alacritech, Inc. v. Intel Corp.*, 966 F.3d 1367, 1370 (Fed. Cir. 2020) (quoting 5 U.S.C. §§ 706(2)(A), (E)). As a part of this review, “the Board is obligated to ‘provide an administrative record showing the evidence on which the findings are based, accompanied by the agency’s reasoning in reaching its conclusions.’” *TQ Delta*, 942 F.3d at 1358 (quoting *In re Lee*, 277 F.3d 1338, 1342 (Fed. Cir. 2002)). Where the Board’s decision is based on multiple alternative grounds, “we will uphold a decision of less than

ideal clarity if the [Board’s] path may reasonably be discerned,” *Japanese Found. for Cancer Rsch. v. Lee*, 773 F.3d 1300, 1308 (Fed. Cir. 2014) (quoting *Bowman Transp., Inc. v. Ark-Best Freight Sys., Inc.*, 419 U.S. 281, 285–86 (1974)), for example, if “at least one of [the] multiple grounds is valid and the [Board] would have acted on that ground even if others were unavailable.” *Japanese Found.*, 773 F.3d at 1308 (citing *Casino Airlines, Inc. v. Nat’l Transp. Safety Bd.*, 439 F.3d 715, 717 (D.C. Cir. 2006)).

B

We agree with Apple that the Board made a clear mathematical error in finding that there was not sufficient rationale for combining Konno’s teachings with Bareau.

Apple presented evidence to the Board that a skilled artisan would have reduced the F number of Konno’s telephoto lens EX2-LN2 from 4.0 to 2.8, as taught by Bareau, “to conform to modern cellphone camera lens specifications.” *Final Decision*, 2019 WL 6999883, at *11 (quoting J.A. 122). The Board rejected Apple’s arguments, finding that Apple’s “rationale for combining Konno and Bareau is not supported by sufficient rational underpinning.” *Id.* at *12. Specifically, the Board found that, in the combination proposed by Apple, FNOM—from Konno’s telephoto lens EX2-LN2—“is lowered to 2.8, based on the teachings of Bareau,” which “fail[s] to satisfy Konno’s conditional expression (5).” *Id.* This finding is incorrect. Konno’s conditional expression (5) requires that the ratio of the F number for Konno’s wide-angle lens to the telephoto lens be within a certain range, “[d]esirably” between 0.6 and 1.3. J.A. 831 ¶ 37. As Apple explained in its opening brief, if the F number of Konno’s telephoto lens EX2-LN2 is decreased from 4.0 to 2.8, as taught by Bareau, the ratio of the F number for the wide-angle lens (3.0) to the telephoto lens in the modified Konno-Bareau lens assembly (2.8) would be 1.07, which, contrary to the Board’s finding, satisfies Konno’s conditional expression (5). Appellant’s Br. 56.

Based on the decision before us, we are “unable to conclude that [the Board] would have reached the same decision absent its [mathematical] mistake[.]” *Hermes Consol., LLC v. E.P.A.*, 787 F.3d 568, 571 (D.C. Cir. 2015). As an initial matter, this is not a situation where we can reasonably discern that the Board was relying on multiple, independent grounds to support its finding. For instance, the Board explained that it was “not persuaded that the ordinarily skilled artisan would have looked to lower the FNOm value of Konno’s telephoto lens assembly based on Bateau’s teachings of a general preference to lower the F number in cellphone cameras with wide-angle lens assemblies.” *Final Decision*, 2019 WL 6999883, at *12. The Board also concluded that Apple failed to explain why a skilled artisan “would disregard Konno’s own intrinsic teaching of a lower F number (i.e., for a wide-angle lens assembly) and look to another reference, Bateau, also concerning wide-angle lens assemblies, to lower the F number of Konno’s telephoto lens assembly.” *Id.* (emphasis omitted). Thus, it is not clear if the basis for the Board’s decision is premised on the fact that Bateau’s teachings are limited to wide-angle lens assemblies, whereas Apple sought to modify Konno’s telephoto lens assembly, or its view that modifying Konno in view of Bateau would require disregarding Konno’s own intrinsic teaching. Nor can we discern from the Board’s decision whether the “intrinsic teaching” it was referring to was: (1) Konno’s conditional expression; (2) Konno’s statement that “it is advantageous to make the second imaging optical system darker than the first imaging optical system,” *id.* (quoting J.A. 831 ¶ 38 (emphasis omitted)), i.e., by increasing the F number of the second optical imaging system (here, the telephoto lens EX2-LN2) compared to the first; or (3) both.

We therefore vacate the Board’s determination that claims 6 and 14 would not have been obvious in view of Konno and Bateau, and remand to the Board for reconsideration.

CONCLUSION

We have considered the parties' remaining arguments and do not find them persuasive. For the foregoing reasons, we affirm the Board's anticipation finding, vacate the Board's determination of nonobviousness, and remand for further proceedings consistent with this opinion.

**AFFIRMED-IN-PART, VACATED-IN-PART, AND
REMANDED**

COSTS

No costs.