

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

MANUFACTURING RESOURCES INTERNATIONAL, INC.,
Petitioner,

v.

SAMSUNG ELECTRONICS CO., LTD.,
Patent Owner.

IPR2023-01202
Patent 8,223,311 B2

Before JAMESON LEE, THOMAS L. GIANNETTI, and
JOHN A. HUDALLA, *Administrative Patent Judges*.

HUDALLA, *Administrative Patent Judge*.

DECISION
Granting Institution of *Inter Partes* Review
35 U.S.C. § 314

Manufacturing Resources International, Inc. (“Petitioner”) filed a Petition (Paper 1, “Pet.”) requesting an *inter partes* review of claims 1–7 and 9–13 of U.S. Patent No. 8,223,311 B2 (Ex. 1001, “the ’311 patent”). Petitioner filed a Declaration of Carl D. Meinhart, Ph.D. (Ex. 1003) with its Petition. Samsung Electronics Co., Ltd. (“Patent Owner”) filed a Preliminary Response (Paper 6, “Prelim. Resp.”). Patent Owner filed a Declaration of Bruce W. Smith, Ph.D. (Ex. 2008) with its Preliminary Response. With our authorization, Petitioner filed a Preliminary Reply (Paper 7 (“Reply”)) and Patent Owner filed a Preliminary Sur-reply (Paper 9 (“Sur-reply”)) limited to addressing Patent Owner’s testimonial evidence in the Preliminary Response.

In the Preliminary Response, Patent Owner indicates that it has filed a statutory disclaimer for claim 12 of the ’311 patent. Prelim. Resp. 2–3 (citing Ex. 2007 (Statutory Disclaimer)); *see infra* § I.D. As a result, claims 1–7, 9–11, and 13 (the “challenged claims”) are the only claims at issue.

We have authority to determine whether to institute an *inter partes* review. *See* 35 U.S.C. § 314 (2018); 37 C.F.R. § 42.4(a) (2023). Under 35 U.S.C. § 314(a), we may not authorize an *inter partes* review unless the information in the petition and the preliminary response “shows that there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition.” For the reasons that follow, we institute an *inter partes* review as to claims 1–7, 9–11, and 13 of the ’311 patent on all grounds of unpatentability presented.

I. BACKGROUND

A. *Real Parties-in-Interest*

Petitioner identifies Manufacturing Resources International, Inc. as the real party-in-interest. Pet. 1. Patent Owner identifies Samsung Electronics Co., Ltd., Samsung Electronics America, Inc., Samsung Research America, Inc., and Samsung International, Inc. as the real parties-in-interest. Paper 3, 2.

B. *Related Matters*

The parties identify the following proceeding related to the '311 patent (Pet. 1; Paper 3, 2):

Components for Certain Environmentally-Protected LCD Digital Displays and Products Containing Same, Inv. No. 337-TA-1349 (USITC).

Petitioner has also filed petitions for *inter partes* review related to other patents owned by Patent Owner in IPR2023-01201 and IPR2023-01203. *See* Pet. 1.

C. *The '311 Patent*

The '311 patent relates to “a liquid crystal display [LCD] device with a heat dissipation structure to cool the liquid panel of the device.” Ex. 1001, 1:17–19. The '311 patent indicates that “[t]he light source in the backlight unit not only emits light but also generates heat to cause degradation of liquid crystals,” and that “[t]herefore, the LCD device must include a heat dissipation element to discharge or release the heat generated by the light source.” *Id.* at 1:33–37. According to the '311 patent, “when the LCD device is used outdoors, a front side of the liquid crystal panel is exposed to sunlight, leading to an increase in temperature and degradation of the panel.”

Id. at 1:41–43. As such, “conventional LCD devices are not applicable to outdoor billboards to which sunlight energy is incident for long periods of time.” *Id.* at 1:45–47. To address this, the ’311 patent discloses “an LCD device with a heat dissipation structure to remove or release heat incident on a front side of a liquid crystal panel.” *Id.* at 1:50–52.

In particular, the ’311 patent discloses a liquid crystal display device including a housing and a supporting bottom plate arranged beneath the housing. Ex. 1001, 4:53–55. Figure 2 of the ’311 patent is reproduced below.

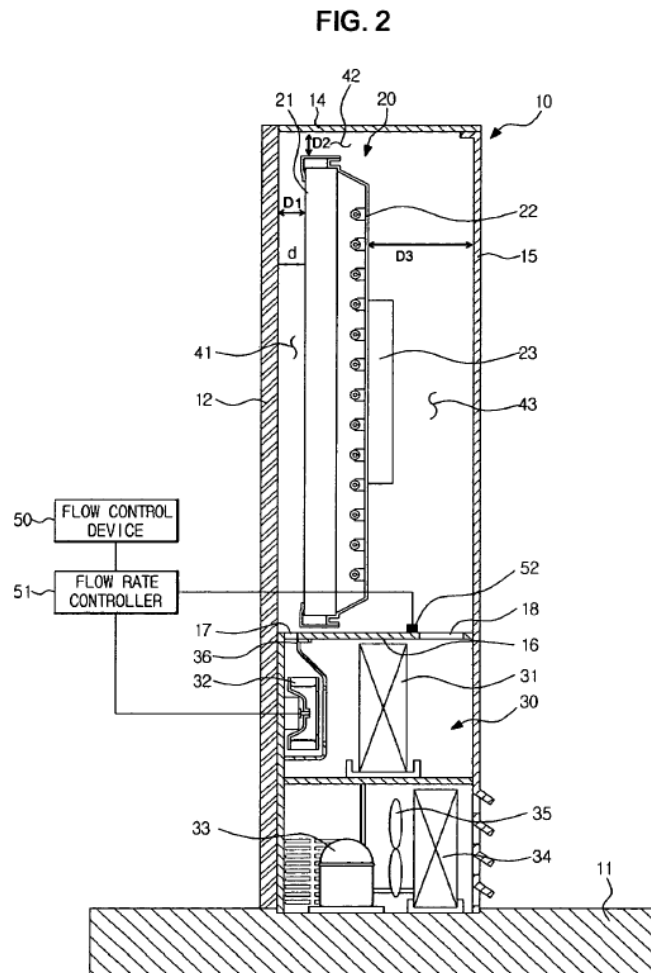


Figure 2 is “a side cross-sectional view illustrating the liquid crystal display device.” *Id.* at 4:1–2. Figure 2 depicts a “housing 10 . . . partitioned into upper and lower spaces by a partition 16 built in the housing.” *Id.* at 5:1–3. Furthermore, “[t]here is a liquid crystal panel assembly 20 in the upper space while an air conditioner 30 is arranged in the lower space.” *Id.* at 5:3–5.

According to the ’311 patent,

air in the housing 10 can pass through a first channel 41 defined between the liquid crystal panel assembly 20 and the protection panel 12, a second channel 42 defined between the liquid crystal panel assembly 20 and the top panel 14 of the housing 10, and a third channel 43 defined between the liquid crystal panel 20 and the rear panel 15.

Id. at 5:23–29. “[A]ir blown toward the first channel 41 by . . . cooling fan 32 removes heat incident on the front side of . . . liquid crystal panel 21 and cools the liquid crystal panel 21 while passing through the first channel 41.” *Id.* at 5:47–50. Then, “[a]fter passing through the first channel 41, the air passes through the second and third channels 42 and 43 in this order.” *Id.* at 5:53–55. “In particular, the air passing through the third channel 43 removes heat generated from . . . backlight unit 22 and . . . circuit board 23.” *Id.* at 5:55–57.

According to the ’311 patent, a “temperature sensor . . . measures the temperature of the air having passed through all of the first to third channels” and a “flow rate controller . . . regulates the flow rate of air in the cooling fan . . . according to a signal transmitted from the temperature sensor.” Ex. 1001, 9:43–47. “[I]f the air passing through the first channel . . . is turbulent, the turbulent air flow can considerably remove the heat incident on the front side of the liquid crystal panel . . . , compared to a laminar flow.” *Id.* at 6:31–34. The ’311 patent discusses “achieving a

minimum flow velocity of air sufficient to generate a turbulent flow.” *Id.* at 9:27–28.

The application that led to the ’311 patent was filed on June 5, 2009, and claims priority to, *inter alia*, a Korean application that was filed on June 13, 2008 (i.e., the earliest possible effective filing date). Ex. 1001, codes (22), (30). Petitioner also notes that in the related ITC action, Patent Owner has asserted a conception date of April 22, 2008, and a reduction to practice date of May 30, 2008. Pet. 4. We apply the June 13, 2008, date for qualifying the asserted references as prior art, though we note that Petitioner’s asserted references would qualify as prior art even under Patent Owner’s asserted conception date from the ITC action.

D. Patent Owner’s Disclaimer of Claim 12

As indicated above, Patent Owner filed a statutory disclaimer of claim 12 of the ’311 patent. *See* Ex. 2007. In view of Patent Owner’s statutory disclaimer, we treat claim 12 as having never been part of the ’311 patent. *See Vectra Fitness, Inc. v. TNWK Corp.*, 162 F.3d 1379, 1383 (Fed. Cir. 1998) (“This court has interpreted the term ‘considered as part of the original patent’ in [35 U.S.C. §] 253 to mean that the patent is treated as though the disclaimed claims never existed.”) (citing *Guinn v. Kopf*, 96 F.3d 1419, 1422 (Fed. Cir. 1996)). And, because no *inter partes* review will be instituted based on disclaimed claims, we do not consider claim 12 to be within the scope of this proceeding. *See* 37 C.F.R. § 42.107(e) (“No *inter partes* review will be instituted based on disclaimed claims”); *see also General Elec. Co. v. United Techs. Corp.*, IPR2017-00491, Paper 9 (PTAB July 6, 2017) (precedential) (denying institution of *inter partes* review in

view of a statutory disclaimer of all challenged claims). Thus, we confine our unpatentability analysis to claims 1–7, 9–11, and 13, the challenged claims of the ’311 patent that have not been disclaimed.

E. Illustrative Claim

Of the challenged claims, claims 1, 9, and 13 are independent. Claims 2–7, 10, and 11 depend directly or indirectly from one of claims 1 and 9. Claim 1 is illustrative of the challenged claims and recites:

1. A liquid crystal display device, comprising:
 - a liquid crystal panel;
 - a protection panel separated from the liquid crystal panel by a channel;
 - a flow control device to impart turbulence to an air flow in the channel, the flow control device comprising:
 - a temperature sensor to measure the temperature of air discharged from the channel; and
 - a flow rate controller to control air flow through the channel according to the measured temperature.

Ex. 1001, 10:32–41.

F. Prior Art

Petitioner relies on the following prior art:

Japanese Patent Application No. 2006-163217, filed Dec. 10, 2004, published Jun. 22, 2006 (Exs. 1005, 1006, “Nagayama”);¹

¹ Nagayama is a Japanese-language publication (Ex. 1005) that was filed with an English-language translation (Ex. 1006, 1–19) and a declaration attesting to the accuracy of the translation (*id.* at 20). Our citations to Nagayama herein refer to the translation.

U.S. Patent No. 6,493,440 B2, filed Apr. 23 2001, issued Dec. 10, 2002 (Ex. 1007, “Gromatzky”);

Patent Cooperation Treaty (PCT) Patent Application Publication No. WO 2007/116125 A1, published Oct. 18, 2007 (Ex. 1008, “Karppanen”); and

Patent Cooperation Treaty (PCT) Patent Application Publication No. WO 2008/050660 A2, published May 2, 2008 (Ex. 1010, “Utsunomiya”).

G. The Asserted Grounds

Petitioner challenges claims 1–7, 9–11, and 13 of the ’311 patent based on the following grounds (Pet. 3–4):

Claims Challenged	35 U.S.C. §	References
1–3, 5–7, 9, 11, 13	103(a) ²	Nagayama, Gromatzky
4, 10	103(a)	Nagayama, Gromatzky, Utsunomiya
1–3, 5–7, 9, 11, 13	103(a)	Karppanen, Gromatzky
4, 10	103(a)	Karppanen, Gromatzky, Utsunomiya

II. ANALYSIS

We now consider Petitioner’s asserted grounds and Patent Owner’s arguments to determine whether Petitioner has met the “reasonable likelihood of prevailing” standard for institution under 35 U.S.C. § 314(a).

² The Leahy-Smith America Invents Act (“AIA”), Pub. L. No. 112-29, 125 Stat. 284, 287–88 (2011), amended 35 U.S.C. §§ 102 and 103. Because the ’311 patent was filed before March 16, 2013 (the effective date of the relevant amendments), the pre-AIA versions of §§ 102 and 103 apply.

A. Legal Standards

A claim is unpatentable under 35 U.S.C. § 103(a) if the differences between the claimed subject matter and the prior art are such that the subject matter, as a whole, would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. *See KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007).

The question of obviousness is resolved on the basis of underlying factual determinations, including (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of skill in the art; and (4) where in evidence, so-called secondary considerations.³ *See Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966). We also recognize that prior art references must be “considered together with the knowledge of one of ordinary skill in the pertinent art.” *In re Paulsen*, 30 F.3d 1475, 1480 (Fed. Cir. 1994) (citing *In re Samour*, 571 F.2d 559, 562 (CCPA 1978)).

B. Level of Ordinary Skill in the Art

Citing testimony from Dr. Meinhart, Petitioner contends a person of ordinary skill in the art “would have had at least a Bachelor of Science degree in mechanical engineering, electrical engineering, or a similar degree with one or two years of graduate school training or one to two years of industry experience in the fields of mechanical design, fluid mechanics, heat transfer, or electronics cooling.” Pet. 7 (citing Ex. 1003 ¶ 15). Petitioner further notes that “[l]ack of work experience could have been remedied by

³ The present record does not include any evidence of secondary considerations of nonobviousness.

additional education, and vice versa,” and that “[s]uch academic and industry experience would be necessary to appreciate what was obvious and/or anticipated in the industry and what a [person of ordinary skill in the art] would have thought and understood at the time.” *Id.* (citing Ex. 1003 ¶ 16). Patent Owner does not dispute Petitioner’s proposed level of ordinary skill in the art at this time. Prelim. Resp. 5.

For purposes of this Decision, we adopt Petitioner’s definition of the level of ordinary skill in the art without the qualifier “at least,” which introduces ambiguity. On the present record, we are satisfied that this definition of the level of skill is consistent with the teachings of the ’311 patent and the asserted prior art.

C. *Claim Interpretation*

In an *inter partes* review, we construe each claim using the same claim construction standard that would be used to construe the claim in a civil action under 35 U.S.C. [§] 282(b), including construing the claim in accordance with the ordinary and customary meaning of such claim as understood by one of ordinary skill in the art and the prosecution history pertaining to the patent.

37 C.F.R. § 42.100(b). Accordingly, our claim construction standard is the same as that of a district court. *See id.* Under the standard applied by district courts, claim terms are generally given their plain and ordinary meaning, as would have been understood by a person of ordinary skill in the art at the time of the invention and in the context of the entire patent disclosure. *Phillips v. AWH Corp.*, 415 F.3d 1303, 1313 (Fed. Cir. 2005) (en banc). “There are only two exceptions to this general rule: 1) when a patentee sets out a definition and acts as his own lexicographer, or 2) when

the patentee disavows the full scope of a claim term either in the specification or during prosecution.” *Thorner v. Sony Comput. Entm’t Am. LLC*, 669 F.3d 1362, 1365 (Fed. Cir. 2012).

Petitioner states that “[n]othing in the specification or prosecution history of the ’311 Patent expressly defines any term appearing in any claim of the ’311 Patent,” and that “the Board does not need to construe any claim term for purposes of evaluating the prior art in this Petition.” Pet. 7.

Petitioner concludes that “for purposes of this proceeding only, Petitioner believes that no claim term requires construction.” *Id.* Likewise, Patent Owner contends that “claim construction is not necessary for the Board to determine that the Petition fails to demonstrate a reasonable likelihood that any challenged claim of the ’311 patent is unpatentable.” Prelim. Resp. 5.

For purposes of this Decision, we determine that no aspects of the challenged claims require explicit construction. *See, e.g., Realtime Data, LLC v. Iancu*, 912 F.3d 1368, 1375 (Fed. Cir. 2019) (“The Board is required to construe ‘only those terms . . . that are in controversy, and only to the extent necessary to resolve the controversy.’” (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999))).

D. Obviousness Ground Based on Karppanen and Gromatzky

Petitioner contends the subject matter of claims 1–3, 5–7, 9, and 11–13 would have been obvious over Karppanen and Gromatzky. Pet. 38–53. Patent Owner disputes Petitioner’s contentions. Prelim. Resp. 37–51.

1. *Karppanen*

Karppanen is a PCT Patent Application Publication directed to “an electronic information board comprising a frame . . . , a flat display element . . . , such as a TFT [thin-film transistor] LCD display or a plasma display, for presenting information, and electronic equipment . . . for controlling the display element.” Ex. 1008, code (57). Figure 1 of Karppanen is reproduced below.

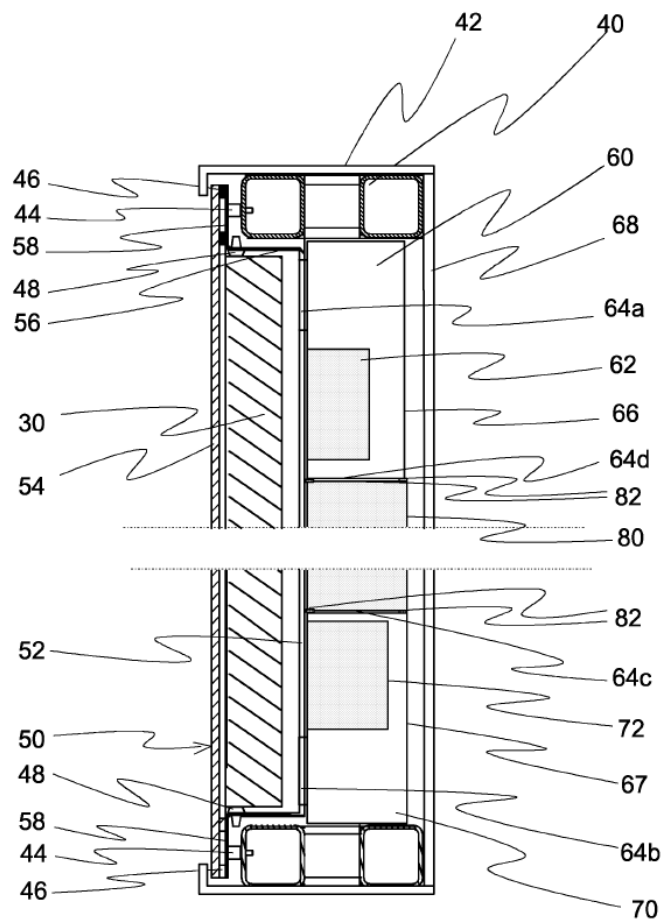


Fig. 1

Figure 1 shows “a cross-sectional drawing of an electronic information board.” *Id.* at 6:1–2. Karppanen teaches “[t]he information board has a

frame 40 manufactured of metal piping, to the edge surface of which a lining plate 42 forming the visible outer surface has been fastened.” *Id.* at 6:6–8. According to Karppanen, “[a] display casing 50 comprising a back wall 52, a transparent front plate 54 and an edge part 56 having a flange-like fastening collar 58 running in the direction of the front plate has been fastened to the frame by fastening means 44.” *Id.* at 6:9–12.

Karppanen also discloses a “cooling system [that] comprises at least one circulating fan for forming an air flow through the display casing and the device casing.” Ex. 1008, 4:3–5. According to Karppanen, “[t]he air flowing through the display and device casing ‘rinses’ the surfaces of the electronic devices and the display element, whereupon heat transfers effectively from these devices into the air flowing by.” *Id.* at 4:6–8. Karppanen states that “[t]hanks to the placement of the display element, the air can flow on its both sides, whereby the cooling of the display is effective.” *Id.* at 4:9–10.

Petitioner notes that Karppanen was published on October 18, 2007, and contends that Karppanen qualifies as prior art under 35 U.S.C. § 102(a). Pet. 11. Patent Owner does not contest the prior art status of Karppanen at this juncture. For purposes of this Decision, we determine that Karppanen qualifies as prior art under 35 U.S.C. § 102(a) because Karppanen’s publication date of October 18, 2007, is before the earliest effective filing date of the challenged claims, which is June 13, 2008. Ex. 1001, code (30); Ex. 1005, code (43).

2. *Gromatzky*

Gromatzky is a U.S. patent related to “a thermal management system for a LCD display having a thin depth enclosure, and that may be placed in and outdoor environment and/or device.” Ex. 1007, 2:52–55. According to Gromatzky, “[a] thermal management system aids the LCD display . . . in overcoming the effects of internal heat generated by components of the LCD display . . . and heat from sunlight heat, if the LCD display . . . is placed in sunlight.” *Id.* at 2:55–58. Figure 1 of Gromatzky is reproduced below.

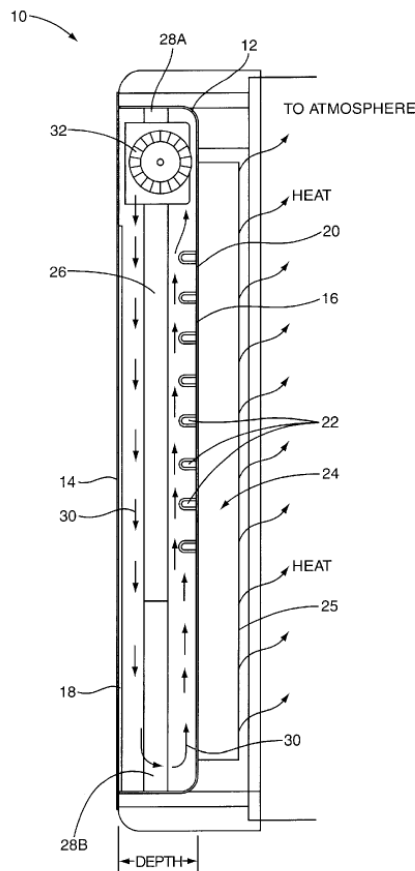


FIG. 1

Figure 1 is “a schematic diagram of . . . a thin depth LCD display enclosure having a thermal management system.” *Id.* at 2:39–41. According to Gromatzky, “LCD display 10 comprises an environmentally-sealed

enclosure 12 that has a front portion 14 and a rear portion 16.” *Id.* at 2:64–66. “The enclosure 12 includes a transparent lens 18 at the front portion 14 of the enclosure 12 for external viewing of the LCD display 10.” *Id.* at 3:10–12.

Gromatzky teaches that “[t]o dissipate the heat in the ambient air, thereby cooling the LCD module 26, an airflow path 30 is created around the LCD module 26 by placement of the LCD module 26 between the lens 18 and the backlight assembly 20.” Ex. 1007, 4:32–36. “In order to dissipate heat in the ambient air in the enclosure 12, a fan 32 is placed in the airflow path 30.” *Id.* at 4:52–53.

Petitioner notes that Gromatzky issued on December 10, 2002, and contends that Gromatzky qualifies as prior art under 35 U.S.C. § 102(b). Pet. 9. Patent Owner does not contest the prior art status of Gromatzky at this juncture. For purposes of this Decision, we determine that Gromatzky qualifies as prior art under 35 U.S.C. § 102(b) because Gromatzky’s issue date of December 10, 2002, is more than one year before the earliest effective filing date of the challenged claims, which is June 13, 2008. Ex. 1001, code (30); Ex. 1007, code (45).

3. *Claim 1*

The preamble of claim 1 recites “[a] liquid crystal display device.” Ex. 1001, 10:32. Petitioner cites Karppanen’s “electronic information board comprising a frame (40), a flat display element (30), such as a TFT LCD display or a plasma display, for presenting information.” Pet. 39 (quoting Ex. 1008, code (57)). Patent Owner does not dispute Petitioner’s analysis of the preamble. Neither party addresses whether the preamble is limiting.

Because Petitioner shows sufficiently for purposes of institution that Karppanen teaches the subject matter of the preamble (*see, e.g.*, Ex. 1008, code (57)), we need not determine whether the preamble is limiting. *See Realtime Data*, 912 F.3d at 1375.

Claim 1 further recites “a liquid crystal panel.” Ex. 1001, 10:33. Petitioner cites Karppanen’s display element 30, which can be a TFT LCD display. Pet. 39 (citing Ex. 1008, code (57), 1:13–28, 3:16–30, 6:5–7:5, Figs. 1, 2, claim 15). Patent Owner does not dispute Petitioner’s analysis for this limitation. We find Petitioner’s showing for this limitation to be sufficient for institution.

Claim 1 further recites “a protection panel separated from the liquid crystal panel by a channel.” Ex. 1001, 10:34–35. Petitioner notes that Karppanen’s display element 30 resides inside display casing 50, and Petitioner cites Karppanen’s transparent front plate 54 of display casing 50 for teaching the recited “protection panel.” Pet. 39 (citing Ex. 1008, 6:5–30, claim 3). Petitioner also cites Karppanen’s teaching that display element 30 is arranged in the display casing 50 so that “between the front surface of the display element and the front plate . . . there is a gap enabling circulation of air.” *Id.* at 39–40 (citing Ex. 1008, 3:31–4:2,⁴ 6:23–26). Petitioner contends that the gap is the recited “channel.” *Id.* at 40 (citing Ex. 1003 ¶¶ 302–305; Ex. 1008, Fig. 1). Patent Owner does not dispute Petitioner’s analysis for this limitation. We find Petitioner’s showing for this limitation to be sufficient for institution.

⁴ Petitioner mistakenly cites to the range “2:31–4:2,” but the context makes clear that Petitioner intended to cite to the range “3:31–4:2.”

Claim 1 further recites “a flow control device to impart turbulence to an air flow in the channel.” Ex. 1001, 10:36–37. Petitioner cites Karppanen’s teaching of circulating fans to create airflow across the surface of the display element. Pet. 40–41 (citing Ex. 1008, 4:3–10, 8:6–9, 9:9–11). Petitioner contends that Karppanen’s fans form an airflow in the gap between display element 30 and transparent front plate 54. *Id.* at 41 (citing Ex. 1008, 4:3–10, claim 2). Petitioner acknowledges that Karppanen does not teach a turbulent airflow, so Petitioner cites Gromatzky for teaching a fan to dissipate heat using a turbulent or laminar airflow in a channel. *Id.* at 41–42 (citing Ex. 1003 ¶¶ 309–310; Ex. 1007, 5:17–20). Petitioner notes that both Karppanen and Gromatzky are directed to thermal management in an outdoor display device using an air channel between a display and a front panel. *Id.* at 19–20 (citing Ex. 1003 ¶ 60⁵; Ex. 1007, 2:53–55, 4:32–36, 4:42–53; Ex. 1008, 4:3–10). In light of Gromatzky’s teachings of using either laminar or turbulent airflow, Petitioner contends that an ordinarily skilled artisan “would [have] recognize[d] that Karppanen’s fans could be used to generate turbulent air flow, and using those fans to generate turbulent air flow would have been a simple design choice.” *Id.* at 21 (citing Ex. 1003 ¶ 62). According to Petitioner, an ordinarily skilled artisan “would [have] recognize[d] that turbulent air flow is an efficient air flow for

⁵ Petitioner mistakenly cites the wrong paragraphs of Dr. Meinhart’s declaration throughout the portion of the Petition titled “Motivation to Combine Karppanen with Gromatzky.” See Pet. 19–21; *see also* Prelim. Resp. 39 (Patent Owner’s arguments noting same). We have adjusted the citations to match the corresponding section of Dr. Meinhart’s declaration, which spans paragraphs 60–62.

removing heat in certain applications and would [have] be[en] motivated to use turbulent air flow to transfer heat away from the LCD display.” *Id.*

Patent Owner argues that Petitioner and Dr. Meinhart do not explain how an ordinarily skilled artisan would have modified Karppanen’s fans based on Gromatzky or why an ordinarily skilled artisan would have had a reasonable expectation of success in making this modification. Prelim. Resp. 39–40 (citing Pet. 41–42; Ex. 1003 ¶ 310). Patent Owner asks us to discount Dr. Meinhart’s testimony because it lacks supporting evidence and reasoning. *Id.* at 40. Patent Owner also argues that Gromatzky states a preference for laminar airflow. *Id.* (citing Ex. 1007, 5:4–14). As such, Patent Owner contends that, “if anything, a[n ordinarily skilled artisan] would have been motivated to use laminar airflow over turbulent airflow in a display system because Gromatzky discloses that laminar airflow is more efficient and allows for a thinner depth enclosure.” *Id.* at 40–41 (citing Ex. 2008 ¶¶ 66–68).

At this stage, we find Petitioner’s contentions sufficient for institution. Karppanen and Gromatzky both teach the use of a fan (i.e., the recited “flow control device”) to create an airflow channel for dissipating heat from an LCD display. *See, e.g.*, Ex. 1007, 4:39–41; Ex. 1008, 4:3–10, 8:6–9, 9:9–11. Petitioner also establishes that, based on Gromatzky, it was known in the art to implement the channel with either a laminar and turbulent airflow. *See, e.g.*, Ex. 1007, 5:17–20. Although Gromatzky states that “laminar airflow is more efficient than turbulent airflow” (Ex. 1007, 5:6–9), it also states expressly that “any type of fan 32, including those that generate turbulent air” may be used. *Id.* at 5:17–18. This is sufficient to teach the “impart turbulence” limitation of claim 1 because we must “read[] the prior art for all

that it teaches.” *Smith & Nephew, Inc. v. Rea*, 721 F.3d 1371, 1378 (Fed. Cir. 2013). Regarding Dr. Smith’s testimony that an ordinarily skilled artisan would have implemented laminar airflow based on Gromatzky’s alleged preference (Ex. 2008 ¶¶ 66–68), we find preliminarily that the choice between laminar and turbulent airflow would have been among the known design considerations for designing a fan in light of Gromatzky’s teachings.⁶ *See, e.g.*, Ex. 1003 ¶¶ 44–51.

Similarly, regarding the reasonable expectation of success, we credit preliminarily Dr. Meinhart’s testimony that the choice of turbulent flow would have been a known design choice. *See, e.g.*, Ex. 1003 ¶ 62. His declaration includes relevant supporting background testimony on various design considerations related to how an ordinarily skilled artisan would have implemented a fan for a desired airflow, including turbulent airflow, in a gap. *See id.* ¶¶ 44–51. We further note that the very similar physical arrangements disclosed in Karppanen and Gromatzky support that an ordinarily skilled artisan would have expected success in making the combination.⁷ *Compare* Ex. 1007, 4:39–44, 4:52–56, Fig. 1, *with* Ex. 1008, 7:11–21, 8:4–9, Fig. 1; *see also* Ex. 1003 ¶¶ 308–309 (discussing similarities).

⁶ We have considered Petitioner’s arguments in the Preliminary Reply and Patent Owner’s arguments in the Preliminary Sur-reply regarding Dr. Smith’s qualifications and testimony. At this juncture, we find that the arguments do not meaningfully impact our analysis. At trial, the parties will have the opportunity to develop the record on these issues.

⁷ We also are persuaded preliminarily by certain other reasons for combining Gromatzky with Karppanen, as discussed below with respect to claim 6. *See infra* § II.D.4.

Claim 1 further recites “a temperature sensor to measure the temperature of air discharged from the channel.” Ex. 1001, 10:38–39. Petitioner cites Karppanen’s teachings that the “transducers are placed ‘in the display casing’ and that the transducers transmit temperature signals to the control unit, which ‘controls the operation of the circulating fans 72 based on the measured temperatures in accordance with a predetermined control logic.’” Pet. 42–43 (citing Ex. 1008, 9:9–11, 9:14–17⁸). Petitioner states that, “[t]o the extent Karppanen does not expressly disclose that the transducers measure air discharged from the front channel,” an ordinarily skilled artisan would have “recognize[d] that the transducers could be positioned in a different location within the display casing.” *Id.* at 43 (citing Ex. 1003 ¶ 313). Petitioner reasons that an ordinarily skilled artisan “could position the transducers to measure air temperature of air flowing in the casing and would be positioned to measure the temperature of air,” which allegedly aligns with Karppanen’s express description of controlling the circulating fans based on measured temperatures. *Id.* (citing Ex. 1003 ¶ 314; Ex. 1008, 9:14–17).

In support of its proposed modification, Petitioner cites two non-asserted prior art references, “Burke” and “Hannemann,” for teaching the use of multiple temperature sensors to monitor the status of the display. Pet. 43–44 (quoting Ex. 1011 (“Burke”), 6:24–33) (citing Ex. 1013 (“Hannemann”) ¶ 19, claim 8). Based on these teachings, Petitioner contends that “[u]tilizing one or more temperature sensors and the decision of where and how many temperature sensors to utilize are simply a design

⁸ Petitioner mistakenly cites to the range “9:16–17,” but the context makes clear that Petitioner intended to cite to the range “9:14–17.”

choice based on the anticipated use case for the device, such as will it be utilized indoors or outdoors.” *Id.* at 44 (citing Ex. 1003 ¶ 313). Petitioner contends that an ordinarily skilled artisan “would have modified Karppanen based on these known sensors and possible locations in order to monitor the temperature of air flowing by the panel since Karppanen discloses measuring the panel temperature and measuring the temperature of the air is merely an indirect measure of panel temperature.” *Id.* (citing Ex. 1003 ¶ 314). Petitioner contends this modification “would have simplified Karppanen’s temperature sensors since a sensor for measuring the air could be placed almost anywhere in the air flow, thus providing flexibility to the designer.” *Id.* (citing Ex. 1003 ¶¶ 313–314).

Patent Owner cites several passages about Karppanen’s cooling system in support of its argument that Karppanen’s transducers measure the temperature of the physical elements of the electronic information board. Prelim. Resp. 41–43 (citing Ex. 1008, 6:31–7:1, 9:4–6, 9:9–16, 9:24–25). As such, Patent Owner argues that Karppanen does not teach a temperature sensor for measuring air discharged from the front channel of the display device. *Id.* Yet, even if Karppanen’s express disclosure is limited to temperature sensors for physical elements, Petitioner proposes moving Karppanen’s transducers such that they measure the temperature of the airflow in the front channel. *See* Pet. 42–44 (citing Ex. 1003 ¶¶ 313–314; Ex. 1008, 9:14–17). Given that Petitioner proposes a modification based on Karppanen and the knowledge of a person of ordinary skill in the art, the lack of an express teaching in Karppanen does not undermine its unpatentability contentions.

Patent Owner also disputes Petitioner’s reasons for modifying Karppanen. Patent Owner argues that placement of the temperature sensor is not a mere design choice in the ’311 patent. Prelim. Resp. 13–18, 44–45. Patent Owner notes certain passages in the specification of the ’311 patent that allegedly support the notion “that the benefit of the claimed temperature sensor is that its location and function enables measurement of the maximum temperature of the display unit, taking into consideration the temperature of air in the display, including the temperature of air in front of the display (which is exposed to sunlight).” *Id.* at 14–15 (citing Ex. 1001, 1:48–52, 8:65–9:2, 9:45–47). As such, Patent Owner contends that “[t]he placement of the temperature sensor, which impacts the function of the system, is not simply a design choice in the ’311 patent.” *Id.* at 13–14 (citing Ex. 2008 ¶¶ 85–86). Patent Owner also argues that Burke and Hannemann do not support the notion that the placement of the temperature sensor is a mere design choice. *Id.* at 15–18. Rather, Patent Owner contends these references establish that an ordinarily skilled artisan “would have many options available for the placement of temperature sensors” and “this is not an instance where there would have been only a few known, predictable solutions.” *Id.* at 17 (citing Ex. 2008 ¶ 90).

At this juncture, we agree with Patent Owner that Petitioner has not established that the location of the temperature sensor was a design choice limited to a finite number of solutions. Indeed, Petitioner itself states that “it was well known at the time of the alleged invention that temperature sensors could be placed in a *variety* of locations in a display to measure the temperature of the display as well as the temperature of air surrounding the display.” Pet. 26 (emphasis added) (citing Ex. 1003 ¶¶ 228–229).

Patent Owner also argues that merely stating that transducers *could be* placed in the front channel airflow does not mean that an ordinarily skilled artisan would have had a reason to do so. Prelim. Resp. 45 (citing Pet. 43). Moreover, Patent Owner argues that “Burke and Hannemann do not disclose or suggest measuring the temperature of air discharged from the channel.” *Id.* In addition, Patent Owner cites Karppanen’s concern with high temperatures in the upper part of the display in support of Patent Owner’s contention that an ordinarily skilled artisan “may have, if anything, been motivated to place the transducers on the parts or casing in the upper region to measure the temperature of those components.” *Id.* at 46–47 (citing Ex. 1008, 2:29–21; Ex. 2008 ¶ 101).

Based on the present record, we are persuaded preliminarily that an ordinarily skilled artisan considering Karppanen’s teachings would have had reason to position Karppanen’s transducers to measure the temperature of the airflow in the front channel. Karppanen expressly discloses “a circulating air flow” that standardizes the temperatures of the display and display casing. Ex. 1008, 9:9–14, 9:18–25. Karppanen’s circulating fans that create the airflow are controlled based on temperatures measured within the device by transducers. *Id.* at 9:14–18. Although Karppanen discloses disposing the transducers “[i]n the device and display casing,” it does not expressly state that they measure the temperature of the airflow in the front channel. *Id.* at 9:14–16. Nevertheless, Dr. Meinhart testifies that it would have been obvious to position the transducer in the channel airflow because an ordinarily skilled artisan would have been “aware that positioning a temperature sensor at the exit of [the] channel would have likely provided accurate information about the temperature of the whole LCD panel.”

Ex. 1003 ¶ 314. We find this slight modification to be a predictable variation of Karppanen based on the established function of its transducers, which is to directly or indirectly measure the temperature of LCD components. *See KSR*, 550 U.S. at 401 (“A [tribunal] must ask whether the improvement is more than the predictable use of prior art elements according to their established functions.”).

Other contemporaneous prior art references in the record (i.e., Burke and Hannemann) also support that it was known to dispose temperature sensors throughout a display device, including in various spaces. For example, Burke contemplates that “one temperature sensor 502 may monitor the temperature in the electronics chamber and another temperature sensor 502 may monitor ambient temperature in the closed air space, or backlight chamber between the backlight assembly 100 and the cooling assembly 300.” Ex. 1011, 6:24–33. This supports that an ordinarily skilled artisan would have known to dispose temperature sensors in a variety of locations, including in air spaces. Likewise, Hannemann states that “[t]he number of the temperature sensors and their physical location within the display unit can vary” when such sensors are “used to regulate the cooling or heating.” Ex. 1013 ¶ 19.

We have considered Dr. Smith’s testimony that an ordinarily skilled artisan “may have, if anything, been motivated to place the transducers on the parts or casing in the upper region to measure the temperature of those components” given Karppanen’s “focus on measuring the temperature of the physical casings to operate its cooling system.” Ex. 2008 ¶ 101. At this stage, we find Dr. Smith’s testimony does not account for the background knowledge and ordinary creativity of an ordinarily skilled artisan. *KSR*, 550

U.S. at 421 (“A person of ordinary skill is also a person of ordinary creativity, not an automaton.”). As stated above, contemporaneous prior art shows that an ordinarily skilled artisan would have known to dispose temperature sensors in various locations of a LCD device to effect temperature regulation, so we do not agree with Patent Owner that the artisan would have considered Karppanen’s teachings to be inextricably tied to physical components or any particular location within the LCD device.

For these reasons, Petitioner has shown sufficiently that, in light of the knowledge of a person of ordinary skill in the art, Karppanen teaches “a temperature sensor to measure the temperature of air discharged from the channel.”

Claim 1 further recites “a flow rate controller to control air flow through the channel according to the measured temperature.” Ex. 1001, 10:40–41. Petitioner cites Karppanen’s teaching of a control unit that controls the operation of the circulating fans. Pet. 45 (citing Ex. 1008, 8:3–21). Petitioner further cites Karppanen’s teaching of controlling airflow within the display casing using the fans to maintain “the temperature within desired limits.” *Id.* at 44–45 (citing Ex. 1008, 8:6–9, 9:9–11). Petitioner additionally cites Karppanen’s teaching of using temperature transducers in the display casing to transmit temperature signals to the control unit, which “controls the operation of the circulating fans 72 based on the measured temperatures in accordance with a predetermined control logic.” *Id.* at 45 (citing Ex. 1008, 9:14–17).

Patent Owner argues that Karppanen does not disclose this claim limitation because the recited “measured temperature” refers to the measured temperature of air inside the display, including the temperature of air

discharged from the channel. Prelim. Resp. 43. Nevertheless, this argument rehashes the same arguments Patent Owner makes against Petitioner’s modification of Karppanen to move the transducer into the exit of the channel airflow. We do not agree with these arguments for the same reasons discussed above. Based on the present record, we find that Karppanen’s control unit teaches the recited “flow rate controller.” *See, e.g.*, Ex. 1008, 8:20–21, 9:14–18. We also find that Karppanen teaches controlling the fans—and thus the airflow in the channel—based on temperatures measured by temperature transducers. *See, e.g., id.* at 9:9–21.

Petitioner has shown sufficiently that, in light of the knowledge of a person of ordinary skill in the art, the combination of Karppanen and Gromatzky teaches all limitations of claim 1. Petitioner also has put forth a sufficient rationale for combining Gromatzky with Karppanen. Based on the present record, we determine that Petitioner has established a reasonable likelihood that it would prevail in showing that the subject matter of claim 1 would have been obvious over the combination of Karppanen and Gromatzky.

4. *Claim 6*

Claim 6 depends from claim 1 and further recites that “the width of the channel is in a range of 5 to 25 mm.” Ex. 1001, 10:58–60. Petitioner acknowledges that Karppanen does not disclose the distance between the display and the front transparent plate or lens. Pet. 20. As such, Petitioner cites Gromatzky’s teaching of “a specific distance between the display panel assembly and the front side of the housing—9.4 millimeters.” *Id.* at 48 (citing Ex. 1007, 4:39–41); *see also id.* 20 (citing same). According to

Petitioner, “[o]ne of skill in the art would have been motivated to separate the transparent plate or lens and display of Karppanen by 9.4 millimeters as disclosed in Gromatzky.” *Id.* at 20–21 (citing Ex. 1003 ¶ 85). In support of the combination, Petitioner notes that Karppanen and Gromatzky both are “directed to the same problem—thermal management in an outdoor display device” and both references “address thermal management in a similar manner, namely by creating an air channel between a display and a transparent panel or lens and moving air through the channel to dissipate heat.” *Id.* at 19–20 (citing Ex. 1003 ¶ 84; Ex. 1007, 2:53–55, 4:32–36, 4:42–53; Ex. 1008, 4:3–10). Petitioner contends that this combination “would simply involve combining known elements in the prior [art] to achieve predictable results, namely protecting the display from damage and allowing air to be routed across the display.” *Id.* at 21 (citing Ex. 1003 ¶ 85).

Patent Owner criticizes Petitioner’s analysis as being incomplete and insufficient because Gromatzky’s embodiment with a 9.4 mm channel depth allegedly relates to the use of “a fan that generates laminar air flow, which is more efficient and allows for a smaller fan.” Prelim. Resp. 48 (citing Ex. 1007, 5:3–15). As such, Patent Owner contends that Petitioner’s analysis for claim 6 conflicts with the claim 1 recitation regarding turbulent airflow. *Id.*

At this stage, we do not agree with Patent Owner’s arguments because we do not view Gromatzky’s 9.4 mm channel depth as being inextricably tied to the use of laminar airflow. As discussed above with respect to claim 1, Gromatzky expressly states that its disclosed invention “may use any type of fan 32, including those that generate turbulent air.” Ex. 1007, 5:18–19. Nor does the present record establish the impossibility of using a

fan to create turbulent airflow in a 9.4 mm channel, as Patent Owner seems to imply. Based on the present record, we find sufficient Petitioner's contentions that an ordinarily skilled artisan would have implemented the Gromatzky's 9.4 mm channel depth in Karppanen's airflow channel given the similarities of two references. *See, e.g.*, Ex. 1003 ¶ 84; Ex. 1007, 2:53–55, 4:32–36, 4:42–53; Ex. 1008, 4:3–10. We also are persuaded preliminarily that the combination involves known elements that would have been combined with predictable results. *See, e.g.*, Ex. 1003 ¶ 85. Thus, we determine that Petitioner has established a reasonable likelihood that it would prevail in showing that the subject matter of claim 6 would have been obvious over the combination of Karppanen and Gromatzky.

5. *Claim 11*

Claim 11 depends from claim 9 via claim 10. Ex. 1001, 11:19–12:2. Claim 10 is not challenged in this ground, and Petitioner puts forth no contentions related to the limitations in claim 10 as part of its analysis of this ground.⁹ *See* Pet. 51 (contentions only as to claim 11). Given that claim 11 necessarily incorporates the limitations of claim 10, we find Petitioner's failure to address the limitations of claim 10 fatal to its analysis of claim 11. Thus, we determine that Petitioner has not established a reasonable likelihood that it would prevail in showing that the subject matter of

⁹ We note that Petitioner challenges claim 10 in separate grounds based on the combinations of (1) Nagayama, Gromatzky, and Utsunomiya; and (2) Karppanen, Gromatzky, and Utsunomiya. *See* Pet. 36–38, 53–55. For those grounds, Petitioner relies on Utsunomiya—which is not asserted in the present ground—as part of its analysis of claim 10. *See id.*

claim 11 would have been obvious over the combination of Karppanen and Gromatzky.

6. *Claims 2, 3, 5, 7, 9, and 13*

We have reviewed Petitioner’s analysis for claims 2, 3, 5, 7, 9, and 13. Pet. 45–53. Patent Owner relies on similar arguments to those discussed above with respect to claim 1. Prelim. Resp. 48–51. Based on the present record, Petitioner has established a reasonable likelihood that it would prevail in showing that the subject matter of claims 2, 3, 5, 7, 9, and 13 would have been obvious over the combination of Karppanen and Gromatzky.

E. *Obviousness Ground Based on Karppanen, Gromatzky, and Utsunomiya*

Petitioner contends the subject matter of claims 4 and 10 would have been obvious over the combination of Karppanen, Gromatzky, and Utsunomiya. Pet. 53–55. Patent Owner disputes Petitioner’s contentions. Prelim. Resp. 52–59. We have already determined that Petitioner has established a reasonable likelihood of success that it would prevail in showing that certain claims would have been obvious over the combination of Karppanen and Gromatzky, and we will be instituting review on all challenged claims and all challenged grounds in the Petition. *See SAS Inst. Inc. v. Iancu*, 138 S. Ct. 1348 (2018) (holding that the Board may not institute review on fewer than all claims challenged in the petition); 37 C.F.R. § 42.108(a) (“When instituting *inter partes* review, the Board will authorize the review to proceed on all of the challenged claims and on all grounds of unpatentability asserted for each claim.”). Nevertheless, we

include the following discussion regarding Petitioner's obviousness contentions for this ground.

1. *Utsunomiya*

Utsunomiya is a PCT Patent Application Publication related to “an apparatus for cooling a heat generating spot (area) of an electronic device,” such as a liquid crystal projector apparatus. Ex. 1010, 1:8–10. Figure 4 of Utsunomiya is reproduced below.

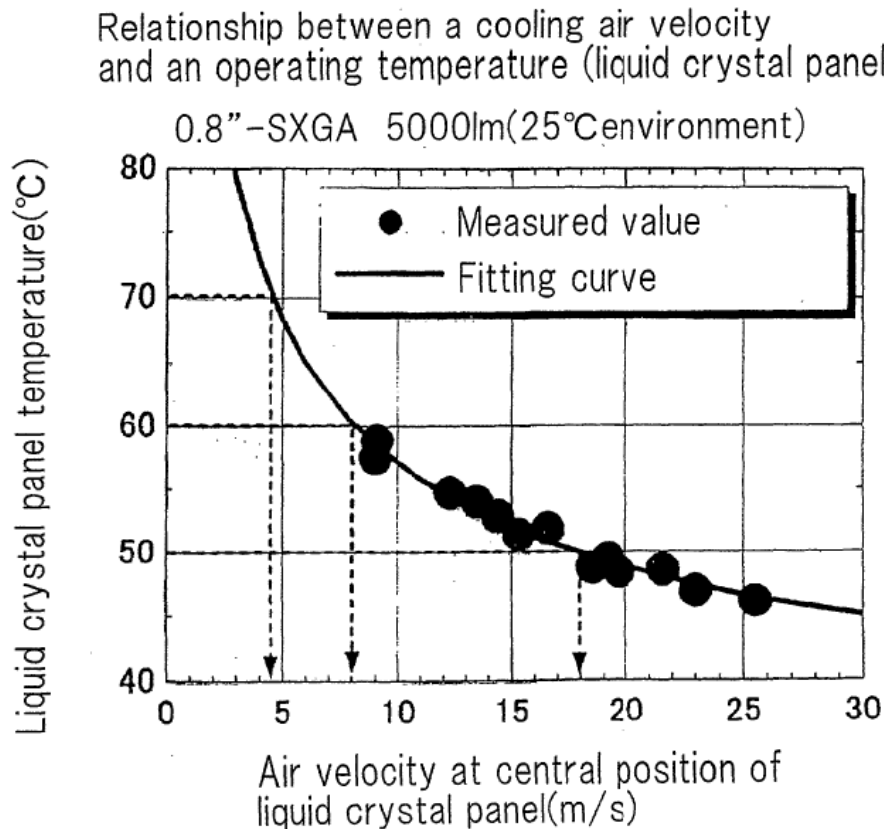


Figure 4 is “a graph showing the relationship between a panel cooling air velocity and a panel operating temperature.” *Id.* at 13:1–2. In the example shown in Figure 4, “[f]or reducing the panel operating temperature from 70°C to 60°C . . . , the air velocity may be simply increased from 4.5 m/s to 8 m/s . . . , whereas for reducing from 60°C to 50°C . . . , the air velocity

must be increased from 8 m/s to 18 m/s, as can be seen from the graph.” *Id.* at 5:22–26.

Petitioner notes that Utsunomiya was published on May 2, 2008, and contends that Utsunomiya qualifies as prior art under 35 U.S.C. § 102(a). Pet. 12. Patent Owner does not contest the prior art status of Utsunomiya at this juncture. For purposes of this Decision, we determine that Utsunomiya qualifies as prior art under 35 U.S.C. § 102(a) because Utsunomiya’s publication date of May 2, 2008, is before the earliest effective filing date of the challenged claims, which is June 13, 2008. Ex. 1001, code (30); Ex. 1010, code (43).

2. *Claims 4 and 10*

Claim 4 depends from claims 3, 2, and 1 and recites that “the flow rate controller controls fan such that the air in the channel has a velocity in a range of 4 to 14 m/s.” Ex. 1001, 10:51–54. Claim 10 depends from claim 9 and recites, *inter alia*, that “the flow control device has a flow rate controller to regulate the flow rate of the air such that air in the channel has a flow velocity of not less than 4 m/s.” *Id.* at 11:19–26. Petitioner cites Utsunomiya’s flow rates disclosed with reference to Figure 4 for teaching these limitations of claims 4 and 10. Pet. 17, 53–55 (citing Ex. 1010, 5:20–26, Fig. 4). Petitioner contends that an ordinarily skilled artisan would have modified the fan control logic in Karppanen’s control unit “according to the relationship expressly disclosed in Utsunomiya, in particular, to modify the control logic to ensure that the flow velocity of air in the front channel is maintained at 4 m/s or more.” *Id.* at 18 (citing Ex. 1003 ¶ 87). Petitioner cites Karppanen’s express concern about LCD elements becoming

inoperative at 70°C, and Petitioner contends that “Utsunomiya addresses that temperature while operating in an environment at 25 degrees.” *Id.* (citing Ex. 1003 ¶ 86; Ex. 1008, 2:29–30; Ex. 1010, Fig. 4).

Patent Owner notes that Utsunomiya relates to high-intensity lamp projectors, whereas Karppanen and Gromatzky relate to backlit LCD displays. Prelim. Resp. 54–56 (citing, *inter alia*, Ex. 1007, 1:7–9; Ex. 1008, code (57), 1:3–5, 2:19–26, 2:31–33, 9:6–9; Ex. 1010, 1:8–14, 4:12–18). Patent Owner argues that Petitioner and Dr. Meinhardt do not explain why an ordinarily skilled artisan would have understood the disclosure of Utsunomiya’s particular airflow velocities to apply to Karppanen as modified by Gromatzky. *Id.* at 56–57. Specifically, Patent Owner notes salient “differences in the thermal management problems each reference seeks to solve” and differences in the types of devices for each reference. *Id.* at 58 (citing Ex. 2008 ¶¶ 116–119, 121).

We agree with Patent Owner that Petitioner has not shown sufficiently how or why Utsunomiya’s disclosed flowrates for an LCD projector would have been applied to Karppanen’s backlit LCD display as modified by Gromatzky. In particular, the present record does not support that the particular air velocities and temperatures disclosed in Utsunomiya’s Figure 4 would have any application to the wholly different physical arrangement of Karppanen’s “channel,” i.e., the gap between display element 30 and front plate 54. Thus, we determine that Petitioner has not established a reasonable likelihood that it would prevail in showing that the subject matter of claims 4 and 10 would have been obvious over the combination of Karppanen, Gromatzky, and Utsunomiya.

F. Obviousness Ground Based on Nagayama and Gromatzky

Petitioner contends the subject matter of claims 1–3, 5–7, 9, 11, and 13 would have been obvious over the combination of Nagayama and Gromatzky. Pet. 22–36. Patent Owner disputes Petitioner’s contentions. Prelim. Resp. 5–26. As discussed above, we will be instituting review on all challenged claims and all grounds in the Petition. Still, we include the following discussion regarding certain claims in this ground.

1. Nagayama

Nagayama is a Japanese patent publication directed to “a display device, and more particularly to an outdoor display device using a flat panel type display device as a display section.” Ex. 1006 ¶ 1. Nagayama discloses “[a] display device . . . that can efficiently dissipate heat generated from a flat panel type display device.” *Id.*, code (57). In particular, Nagayama discloses a liquid crystal display device arranged such that a fan generates air flow through a gap between a liquid crystal panel and a transparent plate. *Id.* Figure 1 of Nagayama is reproduced below.

[FIG. 1]

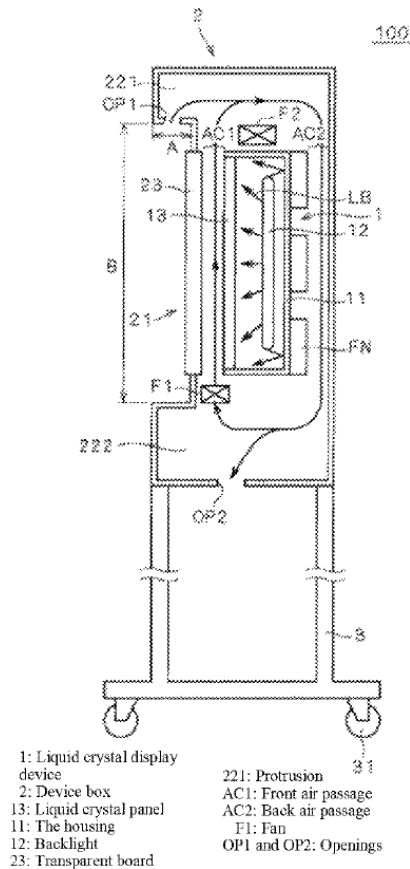


Figure 1 is a “cross-sectional view that describes the configuration of . . . an outdoor display device.” *Id.* ¶ 113. According to Nagayama, the outdoor display device includes a “liquid crystal display device 1 [that] comprises a liquid crystal panel 13 (display panel), a backlight thereof (e.g., a fluorescent light) 12, and a housing 11 that houses the backlight 12 and also the drive circuit, etc. of the liquid crystal panel 13.” *Id.* ¶ 15.

Nagayama states that “[t]he wall facing the liquid crystal panel 13 of the device box 2 is . . . fitted with, for example, a polycarbonate transparent plate 23, and the image displayed on the liquid crystal panel 13 can be viewed externally through the transparent plate 23.” Ex. 1006 ¶ 17. “[T]he liquid crystal display 1 is arranged such that the liquid crystal panel 13 of the

liquid crystal display 1 and the transparent plate 23 do not adhere, and there is a gap between the two, and the gap is referred to as the front air passage AC1.” *Id.* ¶ 20.

According to Nagayama, “[a] fan F1, which is a means of generating airflow in the front air passage AC1, is arranged in the vicinity of the opening on the lower side of the front air passage AC1, and is configured to pump air from the lower side into the front air passage AC1.” Ex. 1006 ¶ 22. Nagayama further discloses using “information about the temperature of the liquid crystal panel . . . measured using a temperature sensor . . . attached to the back surface of the liquid crystal panel” to control fans and heaters “to achieve a preset temperature.” *Id.* ¶ 74.

Petitioner notes that Nagayama was published on June 22, 2006, and contends that Nagayama qualifies as prior art under 35 U.S.C. § 102(b). Pet. 8. Patent Owner does not contest the prior art status of Nagayama at this juncture. For purposes of this Decision, we determine that Nagayama qualifies as prior art under 35 U.S.C. § 102(b) because Nagayama’s publication date of June 22, 2006, is more than one year before the earliest effective filing date of the challenged claims, which is June 13, 2008. Ex. 1001, code (30); Ex. 1006, code (43).

2. *Claim 1*

Claim 1 recites “a protection panel separated from the liquid crystal panel by a channel.” Ex. 1001, 10:34–35. Petitioner cites Nagayama’s polycarbonate transparent plate 23 for teaching the recited “protection panel” and Nagayama’s front air passage AC1 between liquid crystal panel 13 and transparent plate 23 for teaching the recited “channel.” Pet. 23–24

(citing Ex. 1003 ¶¶ 217–218; Ex. 1006 ¶¶ 13, 17, 18, 20, code (57), Fig. 1). Petitioner also cites Gromatzky’s transparent lens 18 for teaching the recited “protection panel.” *Id.* at 24 (citing Ex. 1007, 2:52–3:32, Fig. 1). Regarding the recited “channel,” Petitioner cites Gromatzky’s teaching of “[s]pacing between the lens 18 and the LCD module 26 also allows air to be routed across the LCD module 26 for thermal management.” *Id.* (quoting Ex. 1007, 4:42–45) (citing Ex. 1007, 4:32–36, 4:39–42).

In addition, Petitioner cites Nagayama’s fan F1 and Gromatzky’s fan 23 for teaching the recited “flow control device.” Pet. 25 (citing Ex. 1006 ¶¶ 22, 29, 30, Fig. 1; Ex. 1007, 4:52–53. For “impart[ing] turbulence to an air flow in the channel,” Petitioner cites Gromatzky’s teaching of fan 32 generating turbulent air. *Id.* (citing Ex. 1003 ¶¶ 223–225; Ex. 1007, 4:64–65, 5:17–20). Petitioner cites—but does not address in the Petition—Dr. Meinhart’s testimony that “[b]ecause [an ordinarily skilled artisan] only has a limited number of options regarding air flow—laminar and turbulent—it would have been obvious to try a fan that generates turbulent air” in Nagayama’s device. Ex. 1003 ¶ 225; *see also* Pet. 25 (citing same).

Patent Owner criticizes Petitioner’s unpatentability contentions because they include no rationale for implementing Gromatzky’s turbulent airflow in Nagayama’s front air passage AC1. Prelim. Resp. 7 (citing Pet. 14–15). Patent Owner also argues that, to the extent such a rationale is only presented in Dr. Meinhart’s declaration, Petitioner is improperly incorporating its arguments by reference. *Id.* at 7–8.

We agree with Patent Owner. The Petition only puts forth a rationale for combining Gromatzky with Nagayama with respect to implementing

Gromatzky’s disclosed width of the airflow passage. *See* Pet. 14–15. It does not put forth a rationale related to implementing turbulent airflow. *See id.* And, to the extent Petitioner purports to rely on Dr. Meinhart’s relevant testimony, Petitioner contravenes 37 C.F.R. § 42.6(a)(3) because Petitioner improperly incorporates Dr. Meinhart’s declaration testimony by reference. *See* Pet. 25 (citing, *inter alia*, Ex. 1003 ¶ 225).

Claim 1 further recites “a temperature sensor to measure the temperature of air discharged from the channel.” Ex. 1001, 10:38–39. Petitioner cites Nagayama’s teaching of using temperature sensor TS, which is attached to the back surface of liquid crystal panel 13, to measure the temperature of liquid crystal panel 13. Pet. 26 (citing Ex. 1006 ¶ 74). Petitioner contends “it would have been obvious to one of skill in the art to mount the temperature sensor TS in [Nagayama’s] air passage AC1 or elsewhere so as to measure the temperature of the air discharged from the channel.” *Id.* (citing Ex. 1003 ¶¶ 228–229). Just as with the Karppanen–Gromatzky ground discussed above, Petitioner cites Burke and Hannemann in support of its proposed modification. *Id.* at 26–27 (citing Ex. 1003 ¶¶ 228–229; Ex. 1011, 6:24–33; Ex. 1013 ¶ 19, claim 8). Petitioner also similarly contends that “the decision of where and how many temperature sensors to utilize are simply a design choice based on the anticipated use case for the device.” *Id.* at 27 (citing Ex. 1003 ¶¶ 228–229).

For the same reasons discussed above with respect to the Karppanen–Gromatzky ground, Petitioner has not established that placement of Nagayama’s temperature sensor TS was a design choice limited to a finite number of solutions. Nonetheless, we are persuaded preliminarily that an ordinarily skilled artisan considering Nagayama’s teachings would have had

reason to position Nagayama's temperature sensor TS to measure the temperature of the airflow in front air passage AC1. *See, e.g.*, Ex. 1003 ¶¶ 228–229; Ex. 1011, 6:24–33; Ex. 1013 ¶ 19, claim 8. As evidenced by Burke and Hannemann, Petitioner's proposed modification amounts to a predictable variation of Nagayama based on the established function of its temperature sensor, which is to directly or indirectly measure the temperature of LCD components.

Patent Owner also argues that Petitioner's proposed modification in the location of the temperature sensor would require changes to the operation and purpose of Nagayama's display system. Prelim. Resp. 19–22 (citing Ex. 2008 ¶¶ 94–98). At this juncture, we do not agree with these arguments because they focus narrowly on the exact system described in Nagayama rather than considering how an ordinarily skilled artisan would have considered the teachings of Nagayama. *See KSR*, 550 U.S. at 418 (stating that an obviousness analysis may consider “the background knowledge possessed by a person having ordinary skill in the art . . . in order to determine whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue.”).

3. *Claim 6*

Petitioner cites Gromatzky for teaching the recited channel width range of claim 6 and contends it would have been obvious to implement this channel width in Nagayama. Pet. 14–15 (citing, *inter alia*, Ex. 1003 ¶ 53), 33 (citing Ex. 1007, 4:40–42). Patent Owner makes arguments against this modification that are similar to those discussed above with respect to the Karppanen–Gromatzky ground. Prelim. Resp. 22–24; *see also supra*

§ II.D.4. We do not agree with these arguments for the same reasons discussed above.¹⁰ *See supra* § II.D.4.

4. *Claims 9 and 13*

Patent Owner puts forth arguments against Petitioner’s contentions for claims 9 and 13 that are similar to those discussed above with respect to claim 1. Prelim. Resp. 24–26. We do not find these arguments availing for the same reasons discussed above. *See supra* § II.F.2.

5. *Claim 11*

Claim 11 depends from claim 9 via claim 10. Ex. 1001, 11:19–12:2. Claim 10 is not challenged in this ground, and Petitioner puts forth no contentions related to the limitations in claim 10 as part of its analysis of this ground.¹¹ *See* Pet. 34 (contentions only as to claim 11). Given that claim 11 necessarily incorporates the limitations of claim 10, we find Petitioner’s failure to address the limitations of claim 10 fatal to its analysis of claim 11. Thus, we determine that Petitioner has not established a reasonable likelihood that it would prevail in showing that the subject matter of claim 11 would have been obvious over the combination of Nagayama and Gromatzky.

¹⁰ Notwithstanding, we have already discussed a deficiency in Petitioner’s rationale for combining Gromatzky with Karppanen related to turbulent flow. *See supra* § II.F.2.

¹¹ We note that Petitioner challenges claim 10 in separate grounds based on the combinations of (1) Nagayama, Gromatzky, and Utsunomiya; and (2) Karppanen, Gromatzky, and Utsunomiya. *See* Pet. 36–38, 53–55. For those grounds, Petitioner relies on Utsunomiya—which is not asserted in the present ground—as part of its analysis of claim 10. *See id.*

G. Obviousness Ground Based on Nagayama, Gromatzky, and Utsunomiya

Petitioner contends the subject matter of claims 4 and 10 would have been obvious over Nagayama, Gromatzky, and Utsunomiya. Pet. 36–38. Patent Owner disputes Petitioner’s contentions. Prelim. Resp. 26–37.

We include the following discussion even though we will be instituting review on all challenged claims and all grounds in the Petition. Similar to the ground based on Karppanen, Gromatzky, and Utsunomiya, Petitioner cites Utsunomiya’s flow rates disclosed with reference to Figure 4 for teaching these limitations of claims 4 and 10. Pet. 36–38 (citing Ex. 1010, 5:20–26, Fig. 4). Yet, as mentioned by Patent Owner (Prelim. Resp. 27–28), Petitioner has not included any analysis regarding its rationale for combining Utsunomiya with Nagayama and Gromatzky. Although the Petition includes a section titled “Motivation to Combine Nagayama and Gromatzky with Utsunomiya,” the analysis in that section mistakenly addresses the combination of a non-asserted reference called “Matsuoka” with Nagayama and Gromatzky. Pet. 15–16. No other portion of the Petition addresses the rationale for the actual combination asserted in this ground. Thus, we determine that Petitioner has not established a reasonable likelihood that it would prevail in showing that the subject matter of claims 4 and 10 would have been obvious over the combination of Nagayama, Gromatzky, and Utsunomiya.

III. CONCLUSION

After considering the evidence and arguments presented in the current record, we determine that Petitioner has demonstrated a reasonable likelihood that it would prevail with respect to at least one of the challenged

claims in the Petition. Accordingly, we institute an *inter partes* review on all of the challenged claims and all grounds presented in the Petition. At this stage of the proceeding, we have not made a final determination as to the patentability of the challenged claims.

IV. ORDER

Accordingly, it is

ORDERED that pursuant to 35 U.S.C. § 314, *inter partes* review is instituted as to claims 1–7, 9–11, and 13 of the '311 patent with respect to all grounds of unpatentability presented in the Petition; and

FURTHER ORDERED that *inter partes* review is commenced on the entry date of this Order, and pursuant to 35 U.S.C. § 314(c) and 37 C.F.R. § 42.4, notice is hereby given of the institution of a trial.

IPR2023-01202
Patent 8,223,311 B2

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