

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SAMSUNG ELECTRONICS CO., LTD. AND SAMSUNG
ELECTRONICS AMERICA, INC.

Petitioner

v.

MANUFACTURING RESOURCES INTERNATIONAL, INC.,

Patent Owner

U.S. Patent No. 11,013,142

Filing Date: July 20, 2020

Issue Date: May 18, 2021

Title: Electronic Display with Cooling

Inter Partes Review No. IPR2023-00221

PATENT OWNER'S NOTICE OF APPEAL

Pursuant to 35 U.S.C. §§ 141, 142, and 319; 28 U.S.C. § 1295; 37 C.F.R. §§ 90.2–90.3; Federal Rule of Appellate Procedure 15; and Federal Circuit Rule 15, Patent Owner Manufacturing Resources International, Inc (“Patent Owner”) hereby gives notice that it appeals to the United States Court of Appeals for the Federal Circuit from the Patent Trial and Appeal Board’s Final Written Decision dated June 18, 2024 (Paper 54), and from all underlying findings, orders, decisions, rulings, and opinions adverse to Patent Owner, including, without limitation, those underlying the Final Written Decision. A copy of the public Final Written Decision is attached to this Notice.

In accordance with 37 C.F.R. 90.2(a)(3)(ii), Patent Owner further notes that the issues on appeal include all issues decided adversely to Patent Owner in any orders, decisions, rulings, and opinions. This will likely include, but is not limited to:

1. The Board’s determination that Petitioner established that claims 1-15 of U.S. Patent No. 11,013,142 are unpatentable under 35 U.S.C. § 103, and any finding or determination (factual or legal) supporting that determination;
2. The Board’s claim constructions, including but not limited to its construction of “closed loop” and “heat exchanger”;
3. Whether the Board erred in its consideration of objective indicia of nonobviousness, including without limitation its determination of

insufficient nexus between the challenged claims and Patent Owner's evidence of secondary considerations; and

4. Whether the Board erred in any finding or determination supporting or relating to the above-referenced issues and any other issues decided adversely to Patent Owner in any orders, decisions, rulings, or opinions of the Board.

In accordance with 37 C.F.R. 90.2(a)(1), copies of this Notice of Appeal are being filed simultaneously with the Patent Trial and Appeal Board and with the Director of the United States Patent and Trademark Office. In addition, this Notice of Appeal, along with the required docketing fees, is being filed electronically with the Clerk of the United States Court of Appeals for the Federal Circuit.

Dated: August 15, 2024

By: /John C. Alemanni/
John C. Alemanni
Reg. No. 47,384
Lead Counsel for Patent Owner

CERTIFICATE OF FILING AND SERVICE

I hereby certify that, in addition to being filed electronically through the Patent Trial and Appeal Board's P-TACTS System, the original version of the foregoing **PATENT OWNER'S NOTICE OF APPEAL** was filed on this 15th day of August, 2024, with the Director of the United States Patent and Trademark Office, by emailing the email address indicated on United States Patent and Trademark Office's web page for the Office of the General Counsel, and by Express Mail at the following address:

Director of the United States Patent and Trademark Office
c/o Office of the General Counsel
United States Patent and Trademark Office
P.O. Box 1450
Alexandria, Virginia 22313-1450.

The undersigned also hereby certifies that a true and correct copy of the foregoing **PATENT OWNER'S NOTICE OF APPEAL** and the filing fee is being filed via the electronic filing system, CM/ECF, with the United States Court of Appeals for the Federal Circuit on August 15, 2024, and one true and correct copy of the foregoing was sent by Express Mail on this 15th day of August, 2024 to the Clerk's Office of the United States Court of Appeals for the Federal Circuit, at the following address:

Office of the Clerk
United States Court of Appeals for the Federal Circuit
717 Madison Place, N.W., Suite 401
Washington, DC 20439

The undersigned hereby certifies that on the date below a copy of this
PATENT OWNER'S NOTICE OF APPEAL was served on Petitioners by filing
through the P-TACTS System and by electronic delivery via email to the following:

Sanjeet Dutta – sdutta@goodwinlaw.com
Douglas J. Kline – dkline@goodwinlaw.com
Srikanth Reddy – sreddy@goodwinlaw.com
Naomi L. Birbach – nbirbach@goodwinlaw.com

Dated: August 15, 2024

/John C. Alemanni /
John C. Alemanni
Reg. No. 47,384
Counsel for Patent Owner

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SAMSUNG ELECTRONICS CO., LTD. and SAMSUNG ELECTRONICS
AMERICA, INC.,
Petitioner,

v.

MANUFACTURING RESOURCES INTERNATIONAL, INC.
Patent Owner.

IPR2023-00221
Patent 11,013,142 B2

Before JAMESON LEE, JO-ANNE M. KOKOSKI, and
JOHN A. HUDALLA, *Administrative Patent Judges*.

LEE, *Administrative Patent Judge*.

JUDGMENT
Final Written Decision
Determining All Challenged Claims Unpatentable
35 U.S.C. § 318(a)

I. INTRODUCTION

We instituted an *inter partes* review of claims 1–15 (“challenged claims”) of U.S. Patent No. 11,013,142 B2 (Ex. 1001, “the ’142 patent”) owned by Manufacturing Resources International, Inc. (“Patent Owner”). Paper 11 (“Decision to Institute” or “Inst. Dec.”). We have authority to conduct this *inter partes* review under 35 U.S.C. § 6. This Final Written Decision is issued pursuant to 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73. We determine that Samsung Electronics Co., Ltd. and Samsung Electronics America Inc. (“Petitioner”) have proven by a preponderance of the evidence that claims 1–15 of the ’142 patent are unpatentable.

A. Background

Petitioner filed a Petition requesting an *inter partes* review of the challenged claims pursuant to 35 U.S.C. §§ 311–319. Paper 3. Patent Owner filed a Preliminary Response. Paper 7 (“Prelim. Resp.”). With authorization from the Board, and as agreed to by Patent Owner, Petitioner filed a Corrected Petition (Paper 9) that does not change the substance of what was initially filed, without need for Patent Owner to file any revision to the Preliminary Response. The Corrected Petition substitutes for and replaces the initially filed petition. Hereinafter, we refer to the Corrected Petition as “Petition” or “Pet.”

The Decision to Institute was entered on June 20, 2023. Paper 11. Thereafter, Patent Owner filed a confidential Response (Paper 17, “PO Resp.”), and Petitioner filed a confidential Reply (Paper 28, “Reply”). These papers are sealed because we granted respective motion to seal by the parties directed to portions of Patent Owner’s Response, portions of Petitioner’s Reply, and certain exhibits relied on in the Patent Owner

Response and/or Petitioner's Reply. Paper 47. The public redacted version of the Patent Owner Response is Paper 33, and the public redacted version of Petitioner's Reply is Paper 35. Patent Owner filed a public Sur-reply. Paper 37. We also granted the parties' joint motion for entry of a stipulated protective order to govern the handling of confidential information. Paper 47. A copy of the entered protective order is Paper 46.

Additionally, we granted Petitioner's Motion to Submit Supplemental Information that is U.S. International Trade Commission ("ITC")'s "Notice of a Commission Determination Not to Review a Final Initial Determination Finding No Violation of Section 337; Termination of the Investigation" in related proceeding before the ITC, i.e., ITC Inv. No. 337-TA-1331.

Paper 48. The Notice has been submitted as Petitioner's Exhibit 1042.

A consolidated oral hearing was held on March 20, 2024, for this proceeding and related proceeding IPR2023-00254. The hearing transcript has been entered as Paper 52.

B. Real Parties in Interest

Petitioner identifies Samsung Electronics Co., Ltd, Samsung Electronics America, Inc., Samsung SDS Co., Ltd., Samsung SDS America, Inc., Coates Signco Pty Limited, Coates US Inc., and Industrial Enclosure Corporation d/b/a Palmer Digital Group as the real parties in interest. Pet. 2. Patent Owner identifies itself as the real party in interest. Paper 5, 2.

C. Related Matters

Each party identifies the following district court litigation involving the '142 patent as a related matter: *Manufacturing Resources, Inc. v. Samsung Electronics Co., Ltd. et al.*, No. 2:22-cv-00320 (E.D. Tex.). Pet. 2;

Paper 5, 2. Each party identifies the following proceeding before the ITC involving the '142 patent as related matter: *In re Certain Outdoor and Semi-Outdoor Electronic Displays, Products Containing Same, and Components Thereof*, Investigation No. 337-TA-1331. Pet. 2; Paper 5, 2.

Petitioner also refers to a district court proceeding involving related patents: *Manufacturing Resources, Inc. v. Civiq Smartscales, LLC. et al.*, No. 17-269-RGA (D. Del.) (“the Delaware action”). Pet. 13 (citing Ex. 1023, 1).

Petitioner and Patent Owner each identify the following *inter partes* review proceedings before the Board as related matters: IPR2023-00199 and IPR2023-00220. Pet. 2–3; Paper 5, 2. Patent Owner additionally identifies IPR2023-00254 and IPR2023-00255 as being directed to a related patent. Paper 5, 2.

D. The '142 Patent

The '142 patent relates to systems and methods for cooling electronic image assembly or display. Ex. 1001, code (57); 1:60–62. The disclosed embodiments include two separate flow paths for gas through an electronic display. *Id.* at 2:41–42. The first flow path is a closed loop and the second flow path is an open loop. *Id.* at 2:42–44. The '142 patent describes:

The closed loop path travels across the front surface of the image assembly, continues to the rear of the display where it may enter a heat exchanger, finally returning to the front surface of the image assembly. The open loop path may draw ambient gas (ex. ambient air) through the rear of the display (sometimes through a heat exchanger, behind an image assembly, or both) and then exhausts it out of display housing. A heat exchanger may be used to transfer heat from the circulating gas to the ambient gas. In alternative embodiments, the ambient gas may also be forced behind the image assembly (sometimes a backlight), in order to

cool the image assembly and/or backlight assembly (if a backlight is necessary for the particular type of display being used).

Id. at 2:44–57. Figure 2A is reproduced below:

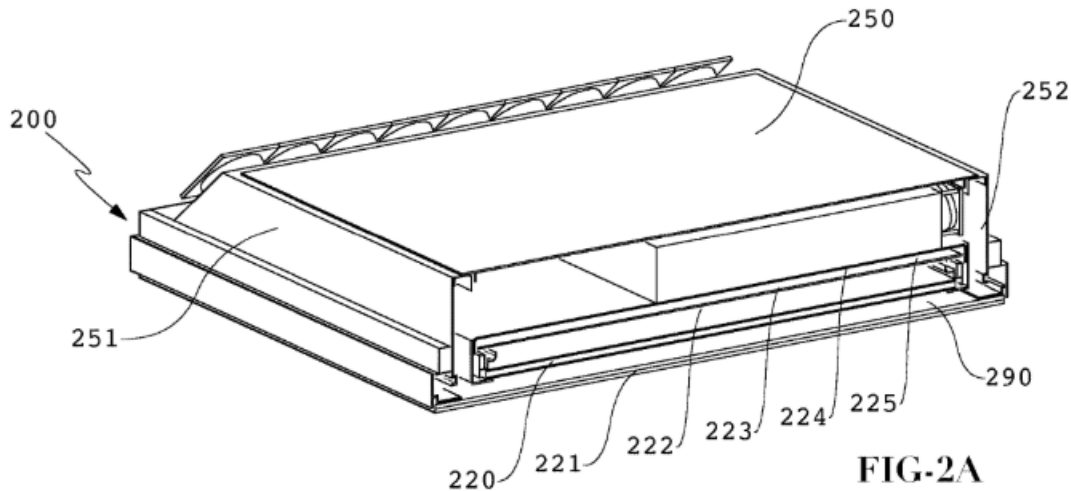


Figure 2A is a perspective sectional view of an embodiment showing the closed loop and open loop channels in a cooling system for an electronic display. Ex. 1001, 3:5–6.

Rear cover 250 and side covers 251 and 252 together seal overall display 200. Ex. 1001, 5:50–53. Image assembly 220 is near the front of display 200. *Id.* at 5:53–54. Image assembly 220 may be an LCD, light emitting diode (LED), organic light emitting diode (OLED), field emitting displays (FED), light emitting polymers (LEP), plasma displays, or any other flat/thin display. *Id.* at 5:55–60. Front display surface 221, optionally comprising several layers for polarizing light, reducing glare or reflections, may be made of any transparent material and is placed in front of image assembly 220, defining channel 290 through which a circulating gas may flow. *Id.* at 5:60–67. The '142 patent refers to channel 290 as a “closed loop” path. *Id.* at 6:7–8 (emphasis added).

The '142 patent describes that a polarizing layer may be attached to one of the panes of glass in order to reduce the internal reflections and solar loading on image assembly 220, and that it is preferable that the polarizing layer be attached to the inner surface of front display surface 221 and contain an anti-reflective coating. Ex. 1001, 6:3–9.

Figure 2B is reproduced below:

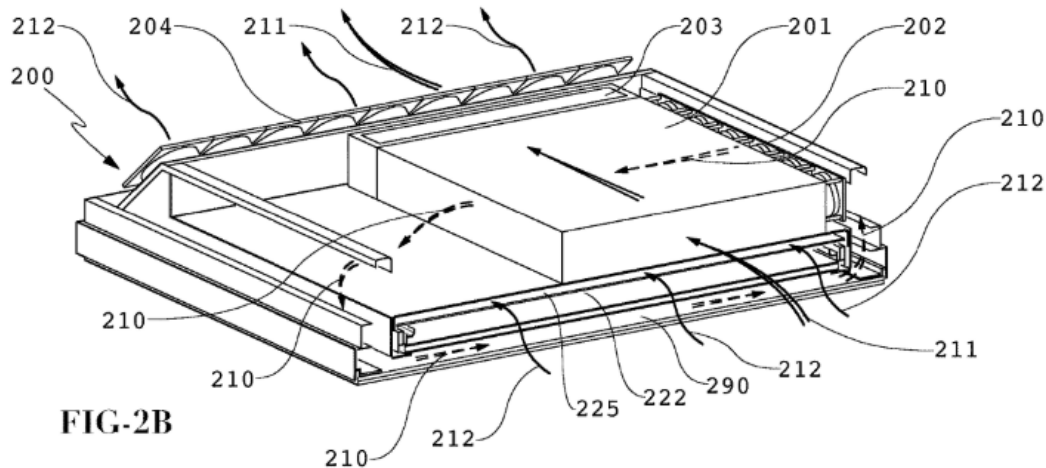


Figure 2B is a perspective section view similar to Figure 2A but with rear and side covers removed. *Id.* at 3:7–9.

The closed loop air flow is in channel 290 and the open air flow is ambient air 211 through heat exchanger 201. *Id.* at 6:7–8, 6:38–40, 6:49–51. There may be an optional additional open channel 225. *Id.* at 6:40–44. Image assembly 220 may be an LCD stack with backlight assembly 222 which has rear surface 223. *Id.* at 6:13–25. A second surface 224 may be placed behind rear surface 223. *Id.* at 6:26–28. “The space between the rear surface 223 of the backlight and the second surface 224 may define an additional optional *open loop channel 225* through which ambient gas may travel in order to cool the backlight assembly 222 (or image assembly 220 if no backlight is used).” *Id.* at 6:28–33 (emphasis added).

Closed loop fan assembly 202 propels circulating gas 210 around closed loop 290. *Id.* at 6:37–38. Open loop fan assembly 203 exhausts ambient air 211 through heat exchanger 201. *Id.* at 6:49–51. Additional optional open loop fan assemblies may be used to exhaust ambient gas which has traveled through optional open channel 225. *Id.* at 6:40–44. The '142 patent describes that in the illustrated embodiment, ambient gas 211 and 212 do not mix with circulating gas 210. *Id.* at 6:52–53.

Figure 3 is reproduced below:

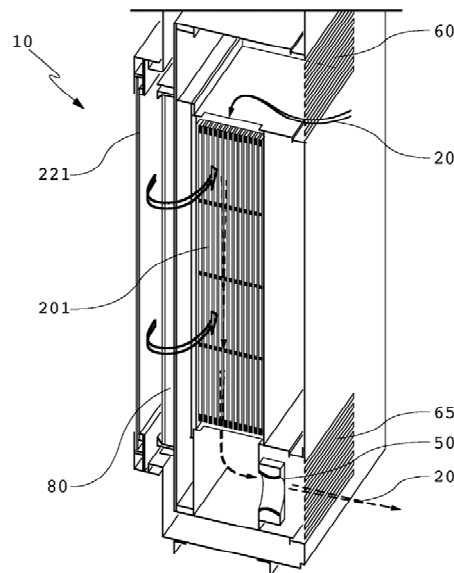


Figure 3 is a perspective sectional view of an embodiment where ambient gas is ingested only into the heat exchanger and not other channels. Ex. 1001, 3:10–12.

Figure 3 shows inlet 60 and exhaust apertures 65 for ambient gas 20. *Id.* at 6:63–65. Fans 50 draw ambient gas 20 into inlet aperture 60 and through heat exchanger 201. *Id.* at 7:1–3. In this embodiment, the image assembly is designated by reference numeral 80 rather than reference numeral 220 as in Figures 2A and 2B. *Id.* at 7:5–10. The '142 patent describes: “This heat may be transferred to the circulating gas as it passes

through the channel between the front display surface 221 and the image assembly 80, where this heat may then be transferred to the ambient gas 20 and expelled from the display.” *Id.* at 7:32–36.

Claims 1, 6, and 12 are independent and reproduced below:¹

[1pre] A cooling system for an electronic image assembly, the cooling system comprising:

[1a] a housing for the electronic image assembly;

[1b] a cover panel forming a forward portion of the housing, wherein the cover panel is located forward of, and at least some distance from, the electronic image assembly and is configured to permit viewing of images displayed at the electronic image assembly through said cover panel;

[1c] a closed loop airflow pathway passing through the housing, wherein said closed loop airflow passes around said electronic image assembly and is configured to accommodate circulating gas, and wherein at least a portion of said closed loop airflow pathway extends between said electronic image assembly and said cover panel;

[1d] an open loop airflow pathway for ambient air passing through said housing and behind said electronic image assembly;

[1e] at least one air circulation device positioned to force the circulating gas through the closed loop airflow pathway when activated; and

[1f] at least one polarizer located at an inward facing surface of said cover panel and configured to prevent at least determining an identifier assigned to the entity based at least some sunlight striking said cover panel from traveling beyond said at least one polarizer.

¹ The bracketed captions correspond to those used by Petitioner to reference the claim elements. *See* Pet. 109–14. We use them here for ease of reference, understanding, and consistency.

Ex. 1001, 9:55–10:13.

[6 pre] A cooling system for an electronic image assembly, the cooling system comprising:

[6a] a housing for the electronic image assembly;

[6b] a transparent cover panel forming a front portion of the housing, the transparent cover panel located forward of, and at least some distance from, the electronic image assembly;

[6c] an open loop airflow pathway passing through the housing behind the electronic image assembly;

[6d] a closed loop gas circulation pathway contained within the housing, wherein a portion of said closed loop gas circulation pathway passes between said transparent cover panel and said electronic image assembly;

[6e] an inlet located at a first portion of said housing for ingesting ambient air from said open loop airflow pathway;

[6f] an exhaust located at a second portion of said housing for exhausting said ambient air from said open loop airflow pathway;

[6g] an air circulation device positioned along said open loop airflow pathway between said inlet and said exhaust, wherein said air circulation device is configured to force said ambient air through the open loop airflow pathway when activated;

[6h] a gas circulation device positioned along said closed loop gas circulation pathway to force circulating gas around the closed loop gas circulation pathway when activated;

[6i] a heat exchanger located rearward of the electronic image assembly, wherein a first portion of said heat exchanger forms part of said open loop airflow pathway, and wherein a second portion of said heat exchanger forms part of said closed loop gas circulation pathway; and

[6j] one or more solar energy reduction layers located at said transparent cover panel, wherein each of said one or more solar energy reduction layers is configured to prevent a portion of solar energy entering said transparent cover panel from thermally interacting with the circulating gas at said portion of said closed loop gas circulation pathway passing between said transparent cover panel and said electronic image assembly or thermally interacting with said electronic image assembly.

Id. at 10:32–11:6.

[12pre] A method for cooling an electronic image assembly, said method comprising the steps of:

[12a] placing said [the] electronic image assembly within a housing;

[12b] forcing circulating air through a closed loop airflow pathway within said housing, wherein at least a portion of said closed loop airflow pathway extends between an electronic image assembly and a cover panel forming a front portion of said housing and spaced apart from said electronic image assembly, wherein said cover panel is configured to permit viewing of images displayed at the electronic image assembly through said cover panel;

[12c] forcing ambient air through a second airflow pathway within said housing, wherein said second airflow pathway extends behind said electronic image assembly; and

[12d] providing one or more solar energy reduction layers at an inward facing surface of said cover panel, wherein each of said one or more solar energy reduction layers is configured to reduce an amount of solar energy transferred to said circulating air in at least said portion of said closed loop airflow pathway.

Id. at 11:26–12:16.

E. Evidence relied on by Petitioner and Declarations

Petitioner relies on the following references:²

Name	Patent Document	Exhibit
Karppanen ³	WO 2007/116116 A1	1004
Larson ⁴	US 6,392,727	1005
Yare ⁵	UK 2,402,205 A	1006

In citing to Karppanen and Yare, we refer to the actual page numbers of the references rather than the Bates numbers added by Petitioner.

Petitioner also relies on the Declaration of Robert Smith-Gillespie. Ex. 1002. Patent Owner relies on the Declaration of Himanshu Pokharna, Ph.D. Ex. 2024.

F. Asserted Grounds of Unpatentability

Petitioner asserts that the challenged claims of the '142 patent are unpatentable based on the following grounds:

² The '142 patent issued from Application No. 16/933,932, filed July 20, 2020, which claims priority to a long chain of ancestral applications including, *inter alia*, Provisional Application No. 61/138,736, filed Dec. 18, 2008, Provisional Application No. 61/033,064, filed Mar. 3, 2008, and Provisional Application No. 61/095,616, filed Sept. 9, 2008. Ex. 1001, codes (21), (22), (60). Petitioner has not challenged the '142 patent's entitlement to the earlier filing date of any ancestral application.

³ Published October 18, 2007. Ex. 1004, code (43).

⁴ Issued May 21, 2002, based on Application No. 09/224,591, filed Dec. 31, 1998. Ex. 1005, codes (21), (22), (45).

⁵ Application published December 1, 2004. Ex. 1006, code (43).

Claims Challenged	35 U.S.C. § ⁶	Reference(s)/Basis
1–15	103	Karppanen, Larson
1–15	103	Yare, Larson

Pet. 5.

II. ANALYSIS

A. *Level of Ordinary Skill in the Art*

Petitioner asserts that a person of ordinary skill in the art (“POSITA”) as of March 3, 2008,

would have possessed a bachelor’s degree in a pertinent discipline, such as mechanical engineering, physics, product design, or a related field. (Ex. 1002, ¶ 39.) Such a person would also have 2–4 years of experience in working with electronic displays and have an understanding of product design issues and failure modes associated with electronic displays. (*Id.*) Alternatively, a POSITA would have had 5–7 years of experience in the field working with electronic displays and have a similar understanding of product design issues and failure modes associated with electronic displays. (*Id.*)

Pet. 6 (citing Ex. 1002 ¶ 39).

Patent Owner asserts its own understanding for the level of ordinary skill:

A POSITA would possess a bachelor’s degree in a pertinent discipline, such as mechanical or electrical engineering, physics, applied physics, or a related field. Such a person would also have had 2–4 years of experience in working with electronic displays including thermal management associated with

⁶ The Leahy-Smith America Invents Act, Pub. L. No. 112–29, 125 Stat. 284 (2011) (“AIA”), amended 35 U.S.C. §§ 102 and 103. Based on the record before us, the ’142 patent has an effective filing date prior to the effective date of the applicable AIA amendments (March 16, 2013). We, therefore, refer to the pre-AIA version of 35 U.S.C. § 103.

electronic displays. Alternatively, a POSITA would have had 4–6 years of experience in the field and would have developed a similar understanding of thermal management associated with electronic displays.

PO Resp. 15.

Patent Owner argues:

Petitioner proposes a POSITA definition that includes “industrial designers” as persons with ordinary skill and does not require any special experience or knowledge of a thermal management of the electronic displays. Instead, under Petitioner’s definition, it is sufficient that a POSITA have a generalized knowledge of “product design issues and failure modes associated with electronic displays.” This definition is overly inclusive and sweeps in individuals who clearly fall short of the ordinary skill necessary to ascertain the thermal management systems disclosed in the ’142 Patent, including individuals who design the external housing of displays (e.g. bus shelters), electrical outlet of the display, or computer hardware. Such mechanisms are not components of the cooling system for electronic displays, which is the subject matter of the ’142 Patent. ’142 Patent, 1:59-61.

PO Resp. 15–16. We do not discern a meaningful difference between the definitions of Petitioner and Patent Owner. In a deposition in the related ITC proceeding, Mr. Smith-Gillespie was asked the following question by Patent Owner’s counsel:

When you refer to a degree in product design, are you referring to a degree in industrial design, or are you referring to some type of engineering degree?

Ex. 2022, 72:2–5.

Mr. Smith-Gillespie answered as follows:

I would say product design is more of an engineering-type discipline, which would be inclusive of mechanical and electrical design. There are degree programs like that.

Ex. 2022, 72:6–9. With that understanding of “product design,” the two definitions, insofar as formal education is concerned, are essentially the same.

With regard to experience, the suggested distinction between Patent Owner’s language “thermal management associated with electronic displays” and Petitioner’s language “failure modes associated with electronic displays” is not supported by meaningful explanation and is at best inconclusive.

Patent Owner also argues that Mr. Smith-Gillespie contradicted himself regarding his alleged inclusion of “industrial design” as a suitable education background:

In his declaration, Smith-Gillespie opines that the definition of a POSITA includes an industrial designer. *See* Ex. 1002 (Smith-Gillespie Dec.) ¶39. However, when deposed in February, two months after submitting his declaration, Smith-Gillespie stated that he no longer believed that an industrial designer fell within the scope of an ordinarily skilled artisan in the field of art. *See* Ex. 2022 (Smith-Gillespie Tr. (Feb. 10, 2023)) at 73:3–7 (“Q. Okay. So an industrial designer, as we just described, would not qualify based on that educational background as a person of ordinary skill in the art, under your definition; is that right? A. That’s correct.”).

PO Resp. 17–18. The problem with Patent Owner’s argument is that in his declaration Mr. Smith Gillespie refers to a degree in “product design,” not “industrial design.” Ex. 1002 ¶ 39. Thus, there is no inconsistency.

We adopt Petitioner's articulation of the level of ordinary skill in the art. This determination of the level of ordinary skill in the art is consistent with what is reflected by the content of the applied prior art references. *Cf. Okajima v. Bourdeau*, 261 F.3d 1350, 1354–55 (Fed. Cir. 2001) (the applied prior art may reflect an appropriate level of skill). Further, our obviousness conclusions would be no different even if Patent Owner's articulation of the level of ordinary skill in the art is adopted.

B. Claim Construction

We use the same claim construction standard that would be used to construe a 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) (2022). The claim construction standard set forth in *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc) is applicable.

Claim terms are generally given their ordinary and customary meaning as would be understood by one with ordinary skill in the art in the context of the specification, the prosecution history, other claims, and extrinsic evidence including expert and inventor testimony, dictionaries, and learned treatises, although extrinsic evidence is less significant than the intrinsic record. *Phillips*, 415 F.3d at 1312–17. Usually, the specification is dispositive, and it is the single best guide to the meaning of a disputed term. *Id.* at 1315.

The specification may reveal a special definition given to a claim term by the patentee, or the specification or prosecution history may reveal an intentional disclaimer or disavowal of claim scope by the inventor. *Id.*

at 1316. If an inventor acts as his or her own lexicographer, the definition must be set forth in the specification with reasonable clarity, deliberateness, and precision. *Renishaw PLC v. Marposs Societa' per Azioni*, 158 F.3d 1243, 1249 (Fed. Cir. 1998). The disavowal, if any, can be effectuated by language in the specification or the prosecution history. *Poly-Am., L.P. v. API Indus., Inc.*, 839 F.3d 1131, 1136 (Fed. Cir. 2016).

Only those claim terms that are in controversy need to be construed, and only to the extent necessary to resolve the controversy. *Realtime Data, LLC v. Iancu*, 912 F.3d 1368 (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))).

Hereinbelow, we discuss the claim terms “closed loop” and “heat exchanger.” Neither party has proposed an express construction for any other term. We find that no express claim construction of any other claim term is necessary to reach our decision in this proceeding.

1. “closed loop”

The term “closed loop” is recited in each independent claim. Petitioner asserts that in the Delaware action, the district court construed “closed loop” as “gas pathway within a display housing containing gas that is essentially isolated from external air.” Pet. 13 (citing 1023, 1). Petitioner asserts that the district court’s construction is the proper construction, in light of the specification and the prosecution history of the ’142 patent. *Id.*

Petitioner explains:

The '142 patent refers to the gas/air, circulating through a closed loop as the “circulating gas/air” and also as the “isolated gas.” (Ex. 1001, 9:64–10:3, 10:7–9, 10:56–58, 11:30–12:6 (claims reciting circulating gas/air), 3:30–[39], 3:50–52 (referring to gas in the closed loop as “circulating gas” and “isolated gas”), FIG. 1.)

Moreover, during prosecution, the Applicant distinguished the claimed invention from prior art reference U.S. Patent No. 5,869,919 (Ex. 1027) (“Sato”), by arguing that Sato did not disclose a “closed loop” because in Sato, ambient air entered and exited the display unit. (Ex. 1022, pp. 323–324 (Office Action dated 9/30/2020 at 3–4), pp. 254–55 (Response filed on 12/18/2020 at 17–18).) Thus, Applicant argued that the gas/air in the closed loop was isolated from ambient air.

Pet. 13–14.

Petitioner’s characterization of the prosecution history with respect to the Sato reference⁷ is inaccurate. Specifically, the remarks by Applicants are as follows: “Claim 1 is amended to require that the portion of the airflow pathway extending between the electronic image assembly and the cover panel be part of a closed loop. Sato, on the other hand, teaches that the arrowed line 416 represent ambient air which enters and exits the unit. *See e.g.*, figure 4.” Ex. 1022, 255.

Applicants distinguished the closed loop from a path that contains essentially only air flowing directly from the display inlet to the display outlet. That does not distinguish a “closed loop” from a path that recirculates air but still may have some introduction of outside air by lack of

⁷ Petitioner indicates that Sato is Exhibit 1027. Pet. 14. However, Exhibit 1027 is not Sato, but a redlined version of the corrected petition. Pet. iii.

sealing or by leakage. Applicants did not argue that air in the closed loop must be virtually free of outside ambient air.

Patent Owner explains that the ITC in the related investigation rejected Petitioner's proposed construction and noted that the '142 patent specification specifically states that the closed loop and open loop need not be isolated from each other. PO Resp. 18 (citing Ex. 1028, 48). The '142 patent states: "Although not required, it is preferable that the circulating gas and ambient gas do not mix." Ex. 1001, 4:18–19. The '142 patent also states: "Since gas for the open loop may contain various contaminants, a *preferable* embodiment should be adequately sealed to prevent the gas from the two loops from mixing." *Id.* at 6:56–59 (emphasis added). The '142 patent additionally explains that keeping the gas from the two loops from mixing "is not necessary, however, as filters (either removable or permanent) may be used to minimize the effect of particulate for both the open and closed loops." *Id.* at 6:59–62. Thus, we determine that isolation of the closed loop and the open loop is preferable, not mandatory.

For the foregoing reasons, Petitioner's arguments regarding "closed loop" are not persuasive. We reject Petitioner's contention that a "closed loop" must be essentially isolated from external air. As explained above, that construction is contrary to the express disclosures of the specification of the '142 patent and not required by any Applicant representation during prosecution noted by Petitioner. We need not express any further view on the meaning of "closed loop." We apply the plain and ordinary meaning for "closed loop."

2. “heat exchanger”

The term “heat exchanger” is recited in claim 3 (which depends from claim 1), independent claim 6, and claim 15 which depends from claim 12. Petitioner in its Petition did not construe the term and states that aside from the term “closed loop,” all other claim terms from the ’142 patent should be given their plain and ordinary meaning. Pet. 14.

Patent Owner states that it agrees with Petitioner that “heat exchanger” should be given its plain and ordinary meaning, but asserts that the plain and ordinary meaning of “heat exchanger” as would have been understood by one of ordinary skill in the art “is the specific type of thermal management devices referred to as a ‘heat exchanger.’” PO Resp. 20. In particular, Patent Owner states: “The ’142 Patent specification describes a heat exchanger consistent with the understanding of a POSITA as *a device that uses alternating, enclosed channels or tubes of fluid.*” *Id.* (emphasis added). Thus, according to Patent Owner, whatever Petitioner relies on to meet “heat exchanger” must include alternating, enclosed channels or tubes. Petitioner disagrees. Reply 4–12.

For reasons discussed below, we are persuaded by Petitioner that a heat exchanger may, but does not have to, include enclosed channels or tubes. Patent Owner’s construction that a heat exchanger must include enclosed channels or tubes is too narrow and not supported by the record evidence.⁸

⁸ Patent Owner also asserts that Petitioner attempts to read “heat exchanger” as anything that exchanges heat. PO Resp. 24–25 (citing Pet. 13–15). We disagree. We find no such assertion in the cited evidence. During the oral hearing, counsel for Petitioner stated, consistent with the Petition: “We

a) *Patent Owner's Construction is Against Usage in the Art*

Yare is a prior art reference asserted by Petitioner in the instant case.

Ex. 1006. Figure 5 of Yare is reproduced below:

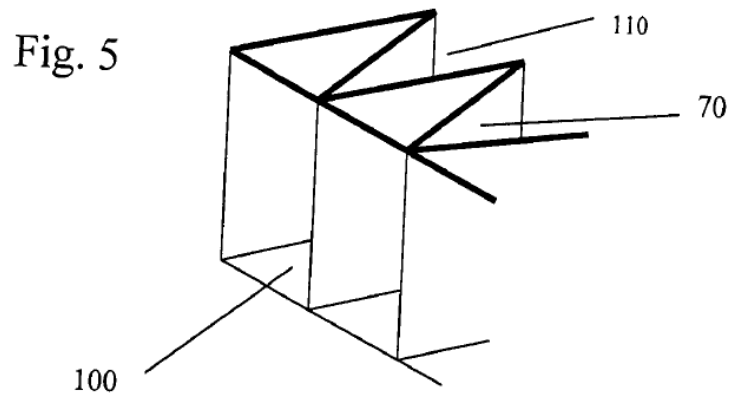


Figure 5 is a perspective view of a part of Yare's heat exchanger. Ex. 1006, 3:28–29.

Despite the fact that illustrated component 70, made of corrugated metal, is without an enclosed channel or tube, Yare refers to it as “heat exchanger.” Ex. 1006, 6:7–11. Yare further states that heat exchanger 70 could be flat plates. *Id.* at 6:14–16. Patent Owner has not disputed that Yare refers to its element 70 as “heat exchanger.”

Nagashima (Ex. 2020) was a reference shown to Dr. Pokharna during cross-examination. Reply 6. Figure 6A of Nagashima is reproduced below:

actually do not take the position that a heat exchanger is anything under the sun.” Paper 51, 12:4–5; *see id.* at 17:12–16.

FIG. 6A

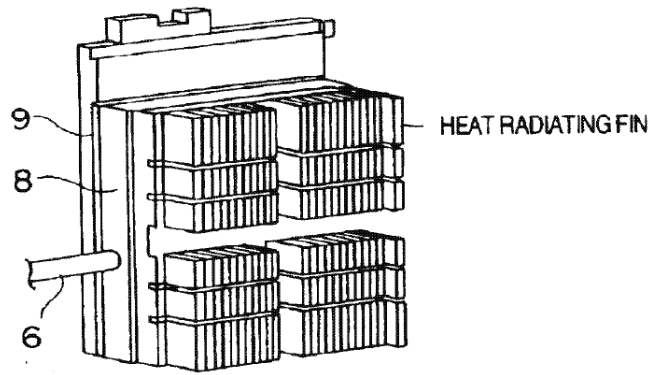


Figure 6A illustrates a sample configuration for cooling a central processing unit (CPU). Ex. 2020, 3:8–10.

Nagashima states that “the embodiment shown in FIG. 6 aims at radiating by liquid cooling an extra heat that cannot be radiated from the heat radiating fin provided on the heat receiving head.” Ex. 2020, 7:9–12.

Figure 6B of Nagashima is reproduced below:

FIG. 6B

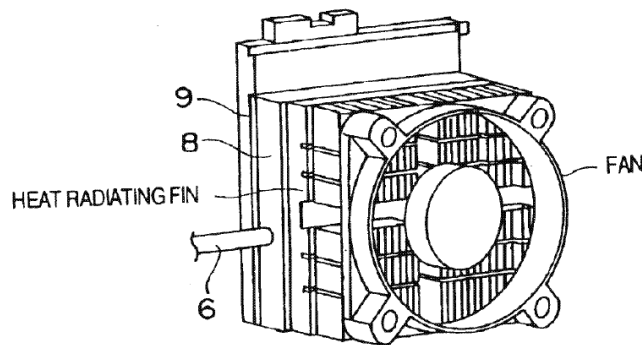


Figure 6B illustrates a sample configuration, including a fan, for air cooling a central processing unit (CPU). Ex. 2020, 3:8–10.

Nagashima states that “FIG. 6B shows a construction in which a fan is further provided on the heat radiating fin on the heat receiving head. The provision of the ventilating fan realizes the effective and rapid radiation of heat from the heat radiating fin.” Ex. 2020, 7:16–19.

Patent Owner’s expert, Dr. Pokharna, was asked on cross examination how one of ordinary skill would have understood the direction of airflow generated by the fan in Nagashima’s Figure 6B. Dr. Pokharna answered that the direction of airflow “will go through *the heat exchanger* and then [it] finds its way out of the chassis” even though the radiating fin of Nagashima does not include any enclosed channel or tube. Ex. 1037, 41:23–42:9 (emphasis added). Dr. Pokharna’s acknowledgment that Nagashima’s radiating fin is a “heat exchanger” undermines Patent Owner’s suggestion that a heat exchanger must include enclosed channels or tubes.

Equally, if not more, significant is Patent Owner’s express acknowledgement that “skilled artisans may colloquially refer to an object that is exchanging heat as a heat exchanger.” PO Resp. 35–36 (citing Ex. 2024 ¶ 96). Dr. Pokharna acknowledges that, as used in the art, the term “heat exchanger” sometimes has a meaning broader than just systems that utilize channels of flowing fluid to transfer heat between two fluid streams, and “refer to a device that moves heat.” Ex. 2024 ¶ 96. These acknowledgements by Patent Owner and Patent Owner’s expert support Petitioner’s position that a “heat exchanger” does not have to have enclosed channels or tubes.

Petitioner further relies on the prosecution history of the grand-parent U.S. Patent No. 10,506,740, noting that the Examiner had applied heat sink element 22 in the form of a heat transporting plate in U.S. Pat. Pub. No.

2004/0135482 (“Thielemans” (Ex. 1034)) as the claimed heat exchanger, which did not have enclosed channels or tubes, and the Applicants did not dispute that characterization by the Examiner. Reply 8 (citing Ex. 1033, 10–32, Ex. 1034 ¶ 49, Fig. 1a). Figure 1a of Thielemans is reproduced below:

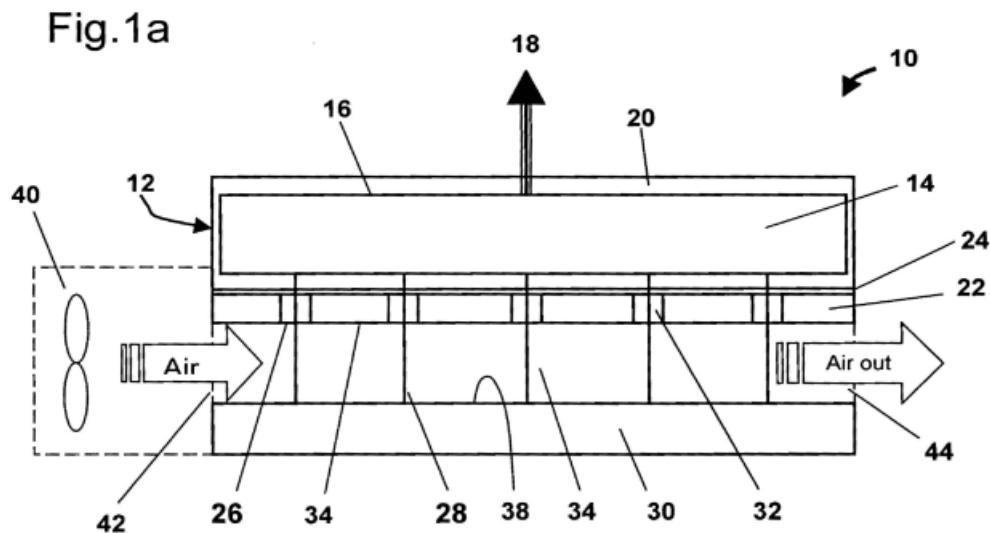


Figure 1a is a schematic diagram of a section through a flat panel display of Thielemans. Ex. 1034 ¶ 33.

The Applicants’ decision not to address the Examiner’s finding that heat sink element 22 of Thielemans is a heat exchanger does not substantiate the Applicants’ agreement with the Examiner in that regard. However, the Examiner’s application of element 22, disposed adjacent a forced air flow and without an enclosed channel or tube, as a heat exchanger, still undermines Patent Owner’s assertion that a heat exchanger must have enclosed channels or tubes. This position of the Examiner is consistent with the usage shown above in the context of Yare and Nagashima.

Patent Owner also cites to several printed publications in support of its contention that a “heat exchanger” must have enclosed tubes or channels:

(1) Dave S. Steinberg, COOLING TECHNIQUES FOR ELECTRONIC EQUIPMENT (2d ed. 1991) (Ex. 1013, “Steinberg”)⁹; (2) Allan W. Scott, COOLING ELECTRONIC EQUIPMENT (1974) (Ex. 1012, “Scott”)¹⁰; and (3) Frank Incropera et al., *Chapter 11 Heat Exchangers*, FUNDAMENTALS OF HEAT AND MASS TRANSFER, at 669–707 (2006) (Ex. 2017, “Incropera”). PO Resp. 23–24. Patent Owner alleges that Steinberg “distinguish[es] a heat sink (chapter 3 on conduction) and plates with fins (chapter 5) from a heat exchanger which contains channels for airflow (chapter 6).” *Id.* Patent Owner also alleges that Scott “distinguish[es] forced air cooling over fins in chapter four from heat exchangers in chapter 5).” *Id.* With respect to Incropera, Patent Owner asserts that it “confirmed heat exchangers were known thermal management devices that had specific structural features of closed tubes or channels” (PO Resp. 23), but justifies the assertion only by noting the following testimony of Dr. Pokharna before the ITC:

So the heat exchanger [Incropera] describes first as exchanging heat between two fluid streams that are not mixed together. And it goes on to explain various kinds of heat exchangers in the introduction itself. That is what is called a shell-and-tube heat exchanger. []

You have a bank of tubes that have one fluid going through it, something, let’s say, that you need to cool. And around there is the other fluid that is going around it to enhance the heat transfer without mixing these two fluids.

But of particular interest here I want to mention are these two kinds of configurations that are shown here at the bottom, which are curiously similar to the structures that we saw in the ’740 and ’142 application.

⁹ Petitioner mistakenly cites to Exhibit 2020 as Steinberg.

¹⁰ Petitioner mistakenly cites to Exhibit 1019 as Scott.

Ex. 2015, 1251:7–23 (cited at PO Resp. 23).

These assertions of Patent Owner are unavailing. They are overly general and lack meaningful explanation.

For instance, Incropera describes: “The process of heat exchange between two fluids that are at different temperatures and separated by a solid wall occurs in many engineering applications. The device used to implement this exchange is termed a heat exchanger” Ex. 2017, 670. Incropera continues to describe that a “common configuration” for a heat exchanger, is “the *shell-and-tube* heat exchanger.” *Id.* at 676. That, however, does not mean a shell-and-tube configuration is the only configuration for a heat exchanger. Patent Owner has not identified any part of Incropera which clearly conveys that a “heat exchanger” must have or be formed of enclosed channels or tubes.

Patent Owner also provides no explanation or analysis as to how Scott allegedly “distinguish[es] forced air cooling over fins in chapter four from heat exchangers in chapter 5.” PO Resp. 23. In fact, the excerpt of Scott cited by Patent Owner (Ex. 1012) does not even include Chapter 5. Thus, the record does not support Patent Owner’s assertions regarding Scott.

As for Steinberg, Patent Owner has not articulated why or how the subject matter covered in Steinberg’s different chapters is delineated in the mutually exclusive manner suggested by Patent Owner. For example, in subsection 6.23, Steinberg refers to “multiple fin heat exchangers, as shown in Figure 4.2,” contained within the sidewalls of the chassis. Ex. 1013, 220. Figure 4.2 of Steinberg is reproduced below:

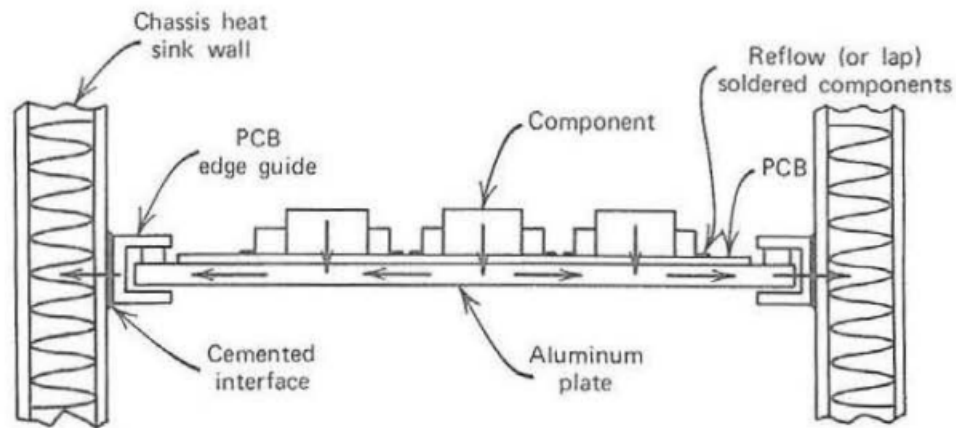


Figure 4.2 Conduction heat flow path from component to heat sink.

Figure 4.2 shows heat flow path to a heat sink. Ex. 1013, 79.

Steinberg describes: “The heat can then flow along the PCBs [printed circuit boards] to the air cooled side walls of the chassis, which *contain* multiple fin heat exchangers, as shown in Figure 4.2.” Ex. 1013, 220 (emphasis added). Thus, the side walls are not a part of the heat exchanger. The fins do not have enclosed channels or tubes and, yet, Steinberg refers to the fins as “multiple fin heat exchangers.” Such disclosure shows that there may be overlap between fins and heat exchangers, and that a heat exchanger need not have enclosed channels or tubes but may consist solely of fins, so long as there is air flow across the fins.

We note further that Patent Owner’s expert, Dr. Pokharna, testifies that “[h]eat exchangers are *typically* enclosed in a casing and contain separate channels for multiple fluid pathways.” Ex. 2024 ¶ 62. But what is typical, by definition, is not always the case, as is exemplified by the disclosed structures discussed above in Yare, Nagashima, Thielemans, and Steinberg.

b) *The Specification Shows No Special Definition or Disavowal and Does not Support Patent Owner's Construction*

In support of its arguments regarding the construction of “heat exchangers,” Patent Owner cites certain evidence in the specification and prosecution history of the ’142 patent. *See* PO Resp. 20–23. But Patent Owner has not alleged that the inventors of the ’142 patent acted as their own lexicographer and conveyed their own definition of “heat exchanger” in the specification of the ’142 patent, and there is no such special definition in the specification of the ’142 patent.

Patent Owner identifies two provisional applications in the ancestral history of the ’142 patent: (1) Provisional Application No. 61/138,736 (“’736 Provisional”), filed December 18, 2008; and (2) Provisional Application No. 61/033,064 (“’064 Provisional”), filed March 3, 2008. PO Resp. 21–22. Patent Owner asserts that the ’736 Provisional is the first application in the chain of priority of the ’142 patent “to disclose and teach the integration of a heat exchanger.” *Id.* at 21.

We agree that the ’736 Provisional is the first application in the chain of priority of the ’142 patent to use the words “heat exchanger,” but that does not necessarily mean the ’736 Provisional is the first application in the priority chain to disclose use of a heat exchanger. It also does not rise to the level of clarity needed for a disavowal, i.e., that only the specifically disclosed structures in the ’736 Provisional or the ’142 patent specification, with enclosed channels or tubes, are heat exchangers and that all other structures are not a heat exchanger.

Disavowal can be effectuated by language in the specification or the prosecution history. *Poly-America, L.P. v. API Indus., Inc.*, 839 F.3d 1131,

1136 (Fed. Cir. 2016). “In either case, the standard for disavowal is exacting, requiring clear and unequivocal evidence that the claimed invention includes or does not include a particular feature.” *Id.* There is no such clarity in the circumstance here. Neither the ’736 Provisional nor the ’142 patent conveys with clarity that structures without enclosed channels or tubes are not heat exchangers.

Patent Owner produces an annotated version of Figure 7 of the ’064 Provisional, reproduced below (PO Resp. 12):

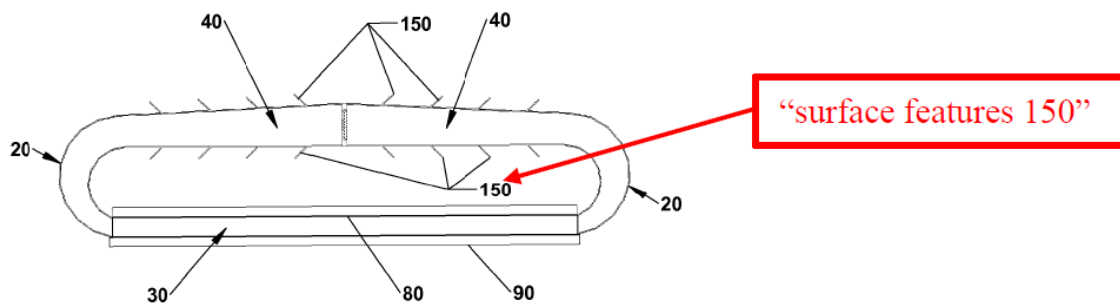


Fig. 7

Figure 7 is a top plan view of an exemplary embodiment illustrating surface features that may be included on a plenum. Ex. 2011 ¶ 18. Patent Owner has identified “surface features 150” with a red call-out box.

Patent Owner asserts: “Petitioner’s expert agrees that the ’064 Provisional Application does not describe a heat exchanger.” PO Resp. 22 (citing Ex. 2021, 73:13–74:8). We disagree with that characterization of Mr. Smith-Gillespie’s testimony. That characterization, for reasons discussed below, is distorted.

Mr. Smith-Gillespie was asked a question about paragraph 42 of the ’064 Provisional: “Does this paragraph 42 describe a heat exchanger?” Ex. 2021, 73–74. Paragraph 42 of the ’064 Provisional is reproduced below:

As can be discerned in Figs. 6 and 7, various surface features 150 may be added to improve heat dissipation from the plenum 45. These surface features 150 provide more surface area to radiate heat away from the gas within the second gas chamber 40. These features 150 may be positioned at numerous locations on the surface of the plenum 45.

Ex. 2011 ¶ 42. Mr. Smith-Gillespie answered as follows:

More likely, defines a heat sink. There's fins on the outsides of this cooling chamber, 40, and it's just flat plate on the other side. So the typical usage of – of the term “heat sink.”

So what I'm seeing is 50 is – 150, item 150 is an array of heat sinks affixed to the surface of rear cooling chamber, 40.

Ex. 2021, 74:4–12.

We disagree with Patent Owner's characterizations of Mr. Smith-Gillespie's testimony. Mr. Smith-Gillespie testified that paragraph 42 of the '064 Provisional describes a “heat sink,” which is not the same thing as denying that it describes a “heat exchanger.” *See* Ex. 2021, 73–74. Indeed, Patent Owner's characterizations of Mr. Smith-Gillespie's testimony are tied to its argument (addressed below) that a heat sink cannot be a “heat exchanger.” We do not agree with that argument, as discussed in further detail below.

Patent Owner additionally asserts that commercial sources for thermal management devices “classify heat exchangers separately from other devices such as heat sinks, heat pipes and finned surfaces.” PO Resp. 24 (citing Ex. 2024 ¶ 61). The argument is unavailing, because Dr. Pokharna does not cite to supporting evidence for his testimony that “companies that sell thermal management devices categorize heat exchangers separately from other devices.” Ex. 2024 ¶ 61. Also, the argument is unavailing because

Patent Owner has not shown that heat sinks or finned surfaces are mutually exclusive from or without overlap with heat exchangers. Note, for example, Figure 4.2 of Steinberg, reproduced above and again here:

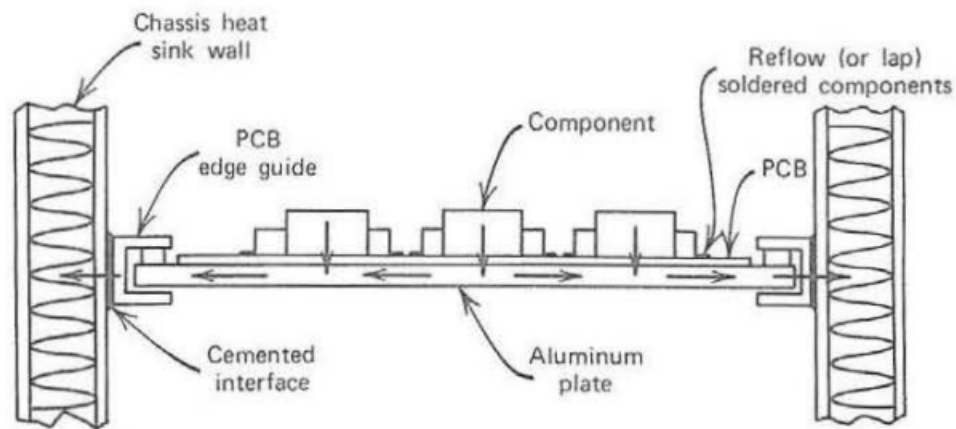


Figure 4.2 Conduction heat flow path from component to heat sink.

Figure 4.2 shows heat flow path to a heat sink. Ex. 1013, 79.

Steinberg describes: “The heat can then flow along the PCBs [printed circuit boards] to the air cooled side walls of the chassis, which contain multiple *fin heat exchangers*, as shown in Figure 4.2.” Ex. 1013, 220 (emphasis added). The fins as heat sinks are also “fin heat exchangers.” *Id.* This example undermines Patent Owner’s argument that a “heat sink” is always mutually exclusive from a “heat exchanger.”

Patent Owner argues that Petitioner’s position on what constitutes a “heat exchanger” is inconsistently applied and ever shifting. Sur-reply 11–12. Patent Owner asserts that while Petitioner regards Thielemans and Nagashima both as disclosing a heat exchanger, Petitioner regards the similar structure disclosed in the ’064 Provisional as a heat sink rather than a heat exchanger. *Id.* This argument depends on Patent Owner’s characterization of Petitioner’s expert, Mr. Smith-Gillespie, as agreeing on

cross-examination that the '064 Provisional does not disclose a heat exchanger. PO Resp. 33 (citing Ex. 2021, 73:13–74:8).

We have already discussed that testimony above and find that Patent Owner presents a distorted view of the testimony. Also, we discussed above how the record does not establish absolute mutual exclusivity between heat sinks and heat exchangers. Thus, we find no real inconsistency.

Patent Owner further asserts:

In the Background section, the '142 Patent describes prior electronic image assembly cooling systems transferred heat through walls of the enclosure using conduction and convection. '142 Patent, 1:54–2:2. Such systems may have moved “heated air . . . into convectively thermal communication with fins.” *Id.* 2:1–2.

PO Resp. 22–23. Essentially the same description of preexisting cooling systems, however, appears in the Background of the Art portion of the '064 Provisional. Ex. 2011 ¶ 3. Thus, the '064 Provisional distinguishes from preexisting art in similar manner as does the '142 patent, and the quoted language does not serve to distinguish the '142 patent from the '064 Provisional. Neither conclusively disavows claim scope for heat exchangers without enclosed channels or tubes.

Finally, while it is true that the '142 patent discloses only heat exchangers with enclosed channels or tubes, it is improper to read limitations from a preferred embodiment described in the specification, even if it is the only embodiment, into the claims absent a clear indication in the intrinsic record that the patentee intended the claims to be so limited. *EPOS Techs. Ltd. v. Pegasus Techs. Ltd.*, 766 F.3d 1338, 1341 (Fed. Cir. 2014); *Liebel–Flarsheim v. Medrad, Inc.*, 358 F.3d 898, 913 (Fed. Cir. 2004);

Teleflex, Inc. v. Ficosa N. Am. Corp., 299 F.3d 1313, 1327 (Fed. Cir. 2002).

Patent Owner has shown no such clear indication.

Patent Owner asserts that the following sentence in the specification of the '142 patent refers only to heat exchangers which include enclosed channels or tubes, because the remainder of the specification consistently describes all of these heat exchangers as having channels or tubes:

“However, many types of heat exchangers are known and can be used with any of the embodiments herein.” Ex. 1001, 4:20–22 (cited at Sur-reply 8–9).

We disagree. The immediately following sentence in the specification reads:

“The heat exchanger 101 *may be* a cross-flow, parallel flow, or counter-flow heat exchanger.” *Id.* at 4:22–23 (emphasis added). The key words here are “may be,” which are different from “must be.”

Further, although all of the described cross-flow, parallel flow, and counter-flow heat exchangers have enclosed channels or tubes, the specification does not clearly convey that only structures with enclosed channels or tubes can be heat exchangers. Based on the description given in the specification, it is more reasonable to regard heat exchangers having enclosed channels or tubes to be one of “many types” of heat exchangers not all of which have been specifically described in the specification.

c) Conclusion

For reasons discussed above, we determine that a heat exchanger may, but does not have to, include enclosed channels or tubes. No additional construction of “heat exchanger” is necessary to reach a decision.

C. *PO's Assertion that Testimony of Petitioner's Expert Should be Given Little Weight*

Patent Owner asserts that “Petitioner’s expert, Smith-Gillespie, should be given little weight as his analysis contains plain errors in thermal physics and was later contradicted during deposition and at trial [in] the 1331 Investigation.” PO Resp. 16. The assertion is without merit.

Patent Owner asserts that Mr. Smith-Gillespie made basic scientific errors “in a declaration submitted [in IPR2023-00254] regarding the ’142 Patent’s parent: U.S. Patent No. 10,506,740 (the ’740 Patent). PO Resp. 16. Patent Owner explains:

In [paragraph] 186 of his ’740 Patent Declaration, Smith-Gillespie explains that claim 7 of the ’740 Patent recites “a cooling device placed near an entrance to the open loop ambient air flow path for reducing the temperature of ambient air entering the open loop ambient air flow path.” *Samsung Electronics Co., Ltd. v. Mfg. Res. Int’l*, IPR2023-00254, Ex. 1002 (Dec. 10, 2022). Smith-Gillespie then opines that the fans 36 placed in the cooling space 20 of Karppanen are a **cooling device for reducing the temperature of ambient air entering the open loop**. Smith-Gillespie Dec. at ¶ 189 (“The cooling fans [36] can reduce the temperature of ambient air entering the open loop ambient air flow path.”). However, it is well known that a fan does not **reduce the temperature of ambient air**. See Ex. 2024 (Pokharna Dec.) at ¶¶112–13. Instead, fans merely move air within an area. If persons are standing [in the] pathway of air flowing out of the fan, they will feel cooler because additional air is passing by the person and convecting away heat. *Id.* The fan itself, however, does not reduce the temperature of the air that reaches the person within the fan’s pathway. This simple error in physics highlights Petitioner’s improper level of skill in the art and demonstrates Smith-Gillespie’s lack of knowledge and experience in thermal management—especially thermal management of electronic displays.

PO Resp. 16–17. Petitioner responds: “Mr. Smith-Gillespie did not testify that fans alone reduce the temperature of ambient air. Rather, Karppanen’s use of cooling fans 36 contribute to a reduction in the temperature of the ambient air within Karppanen’s system.” Reply 24 (citing Ex. 1004, 7:21–25).

We agree with Petitioner that Mr. Smith-Gillespie did not testify that fans alone reduce the temperature of ambient air. Nor does the cited testimony say that the fans reduce the temperature of ambient air without providing an air flow. We do not read Mr. Smith-Gillespie’s testimony as representing that the temperature of static or non-moving ambient air is reduced by fans. Rather, Mr. Smith-Gillespie simply is indicating that fans 36 can be employed to reduce the temperature of ambient air within a display system by creating an air flow that replaces higher temperature air inside the display system with lower temperature air from outside the display system. That also is what Karppanen indicates. Ex. 1004, 7:16–25 (stating that the temperature of the air in the cooling space is regulated with an air flow achieved by means of cooling fans).

Thus, Patent Owner’s argument that Mr. Smith-Gillespie made a basic scientific error is unpersuasive.

Patent Owner asserts that Mr. Smith-Gillespie “directly contradicted himself when pressed during deposition” with regard to the level of ordinary skill in the art. PO Resp. 17. We addressed this assertion in our discussion above in Section II.A. on the level of ordinary skill in the art and do not agree with Patent Owner that Mr. Smith-Gillespie contradicted himself.

Accordingly, we do not discount Mr. Smith-Gillespie’s testimony based on Patent Owner’s assertions.

D. Alleged Obviousness of Claims 1–15 over Karppanen and Larson

1. The Law on Obviousness

A claim is unpatentable under 35 U.S.C. § 103 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 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, including commercial success, long-felt but unsolved needs, failure of others, and unexpected results. *Graham v. John Deere Co. of Kansas City*, 383 U.S. 1, 17–18 (1966).

When evaluating a combination of teachings, we must also “determine whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue.” *KSR*, 550 U.S. at 418 (citing *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006)). “[T]here must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.” *Kahn*, 441 F.3d at 988.

2. Overview of Karppanen

Karppanen is an international patent application titled “Electronic Information Board.” Ex. 1004, code (54). It relates to an electronic information board comprising a frame, a flat display element for presenting information, and electronic equipment for controlling the display element. *Id.* at 1:3–5. The flat display element can be a TFT LCD (thin film transistor

liquid crystal display) or plasma display. *Id.* at 3:21–23. The information board has a display casing for the display element and a device casing for the electronic equipment needed for controlling the display element. *Id.* at 3:28–30. “Cooling elements have also been arranged in the display casing for transferring heat from the display casing to the outside of the display casing.” *Id.* at 3:30–32.

Karppanen describes:

TFT LCD displays are used to some extent in the implementation of public electronic information boards. The problem is that when used in environments having high temperatures, the temperature of the display devices easily rise too high. On the other hand, in cold environments there is the danger that the temperatures of the display devices fall too low. In both situations it is important that the temperatures at different points inside the display device can be kept as constant as possible. Then the display device operates in the widest possible range of operating temperatures, and local temperatures do not cause exceeding of the specifications given to the display element.

Id. at 1:24–32.

Figure 2 of Karppanen is reproduced below:

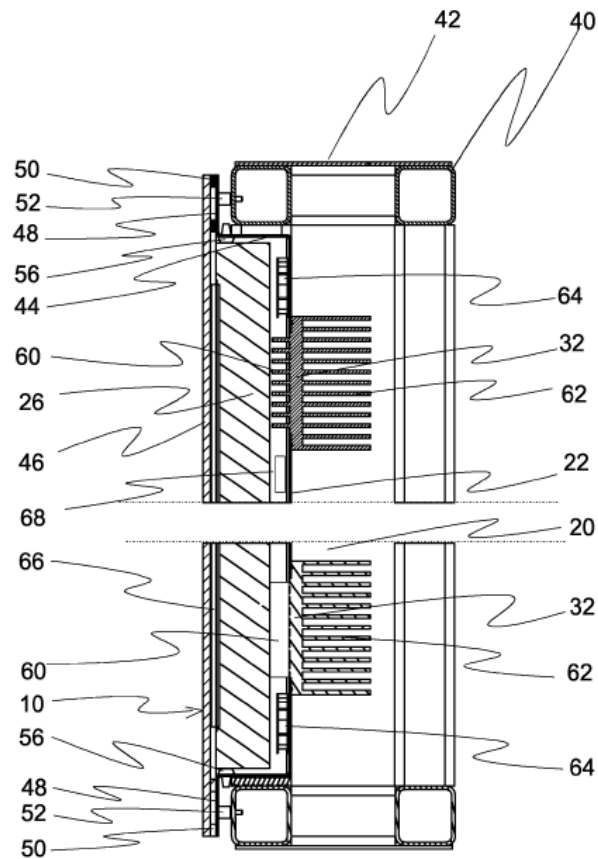


Fig. 2

Figure 2 is a cross-sectional view of one embodiment of Karppanen's electronic information board. Ex. 1004, 6:7-8.

The information board has frame 40 to an edge of which is fastened lining plate 42. Ex. 1004, 7:27-30. Display casing 10 comprises backwall 22, transparent front plate 46, and edge part 44. *Id.* at 7:31-32. Edge part 44 has flange-like fastening collar 48 running in the direction of the front plate and is fastened to the frame by fastening means 52. *Id.* at 7:32-34. Transparent front plate 46 is fastened to the fastening collar of the edge parts by means of sealing elements 50 so that the edge parts of the front plate and the back wall form a closed display casing. *Id.* at 7:35-38.

Inside the display casing is display element 26. *Id.* at 8:4. In the backwall of the display casing, there are cooling elements 32 which have first heat transfer part 60 extending to the inside of the display casing and second heat transfer part 62 extending to cooling space 20 outside the display casing. *Id.* at 8:13–16. The cooling elements transfer excess thermal energy from the display casing to the cooling space, from which space it is further conducted by air flow produced by cooling fans 36 out of the entire device. *Id.* at 8:19–22. First cooling element 32 in the upper half of Figure 2 is in the form of cooling fins. *Id.* at 9:1–3. Second cooling element 32 in the lower half of Figure 2 is in the form not of fins but a conduction element set against the surface of display element 26. *Id.* at 9:13–16. Karppanen states: “A conduction element is a fixed body conducting heat well, which is placed so that it touches the heat source, whereby the heat is transferred from the heat source to the cooling element by conduction.” *Id.* at 8:30–32. Karppanen describes that either fins or a conduction element, or both, can be used. *Id.* at 9:17–19.

Inside the display casing on back wall 22 are fans 64 which circulate air in the space between display element 26 and the walls of display casing 10. *Id.* at 9:3–5. Ducting 66 is arranged between display casing 10 and display element 26 so that air flow circulating the display element and equalizing the temperatures can be effected by fans 64 which force the air of the inner casing to flow past front plate 46 of the device. *Id.* at 9:5–8.

Karppanen describes that from cooling space 20 thermal energy is conducted by air flow produced by cooling fans out of the entire device. Ex. 1004, 8:19–22. In one embodiment, “there are ventilator slots or holes on the opposite sides of the cooling space for enabling air flow from the

outside of the information board to the cooling space and from the cooling space back to the outside of the information board.” *Id.* at 4:19–22.

Karppanen describes that “[i]n the cooling space there is preferably at least one cooling fan for circulating air through the cooling space.” *Id.* at 4:22–23.

3. Overview of *Larson*

Larson relates to display devices, and more particularly to a method and apparatus for reducing unwanted reflections in displays. Ex. 1005, 1:7–9. A polarized display is provided which has reduced reflectiveness in its output to maintain high contrast output and high illumination levels, and achieve less expensive production. *Id.* at 1:62–66. *Larson* describes:

A polarizer is disposed adjacent to a cover glass in front of the display. Light intended to be transmitted through the display is transmitted by the polarizer. Light reflected after passing through the polarizer is further attenuated as it intercepts the polarizer following reflection.

Id. at 1:66–2:3.

Figure 2 of *Larson* is reproduced below:

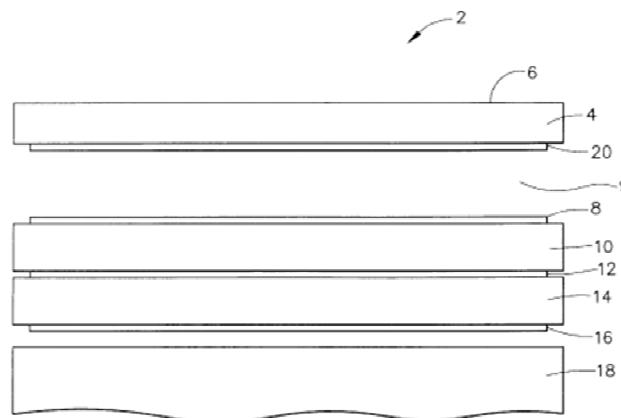


FIG. 2

Figure 2 shows the structure of a polarized display according to *Larson*. Ex. 1005, 2:16–17.

Display 2 includes cover glass 4, front gap 9, front polarizer 8, first substrate 10, liquid crystal layer 12, second substrate 14, rear polarizer 16, auxiliary polarizer 20, and backlight 18. Ex. 1005, 2:32–36. First and second substrates 10, 14 comprise conventional LCD transparent substrates. *Id.* at 2:63–64. Larson describes:

The front and rear polarizers 8, 16 suitably comprise conventional polarizers for use in conjunction with LCDs. The front and rear polarizers 8, 16 may be oriented in any suitable manner to selectively transmit light from the backlight 18 to the viewer through the front and rear polarizers 8, 16 and the liquid crystal layer 12.

Id. at 2:57–62. Auxiliary polarizer 20 is preferably aligned in the same direction as front polarizer 8. *Id.* at 3:19–22. “Alignment of the polarizers 8, 20 in the same direction minimizes the attenuation of light coming from the backlight 18. This allows maximum transmission of the light with little to no attenuation of the light.” *Id.* at 3:21–24.

Larson additionally describes:

Reflected light, however, initially passes through the cover glass and is polarized by the auxiliary polarizer 20. By removing one of the polarizations before it reaches the gap 9, the reflections from each of the interfaces between the auxiliary polarizer 20 and front polarizer 8 are reduced by around 50%. This allows for reduced overall reflections, or can be used to reduce the reflectance requirements for any antireflection coatings which may be applied to the front and auxiliary polarizers 8, 20.

Id. at 3:24–34.

4. *Independent Claim 1*

a) *Recitation [1pre]*

In its preamble, claim 1 recites: “A cooling system for an electronic image assembly, the cooling system comprising.” Ex. 1001, 9:55–56.

Petitioner asserts that Karppanen discloses such a cooling system. Pet. 21 (citing Ex. 1002 ¶¶ 140–145). Petitioner also cites (*id.* at 28) to Karppanen’s Abstract, which describes an electronic information board having a display casing, a device casing, and cooling space between the two casings for cooling elements in the display casing and the device casing. Ex. 1004, code (57). The display casing has cooling elements for transferring heat from the display casing to the cooling space, and the device casing has cooling elements for transferring heat from the device casing to the cooling space. *Id.* On opposite sides of the cooling space are ventilator slots and fans are provided for enabling air flow through the cooling space. *Id.*

Petitioner’s assertions are supported by the cited evidence. Patent Owner does not present counter-argument in this regard. We are persuaded that Karppanen discloses “[a] cooling system for an electronic image assembly.”¹¹

b) Limitation [1a]

Claim 1 recites: “a housing for the electronic image assembly.” Ex. 1001, 9:57. Petitioner asserts that Karppanen discloses an electronic image assembly with a housing formed by a cover and a display casing. Pet. 23 (citing Ex. 1002 ¶¶ 146–150). On page 24 of the Petition, Petitioner produces an annotated version of Figure 1 of Karppanen, reproduced below:

¹¹ It is not necessary to determine whether the preamble recitation is limiting. *See Realtime Data*, 912 F.3d at 1375.

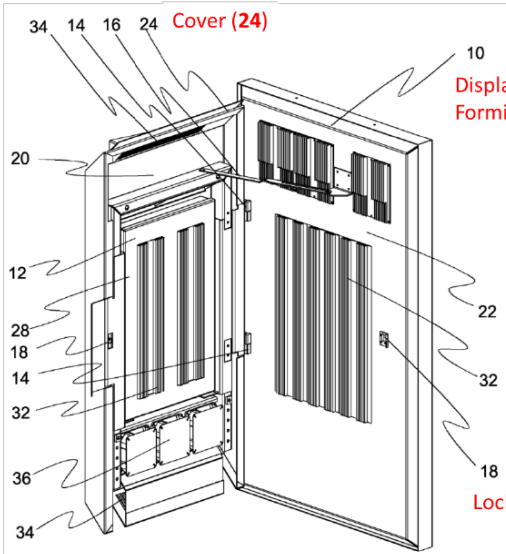


Figure 1 is a perspective view of an electronic information board according to Karppanen. Ex. 1004, 6:4–5 (color annotations added by Petitioner).

Petitioner identifies display element 26 as the electronic image assembly, and explains that cover 24 and display casing 10 together form a housing for the electronic image assembly. Pet. 24 (citing Ex. 1002 ¶ 150). Patent Owner does not present counter-argument in this regard. Petitioner's assertions are supported by the cited evidence. We are persuaded that Karppanen discloses limitation [1a].

c) *Limitation [1b]*

Claim 1 recites “a cover panel forming a forward portion of the housing, wherein the cover panel is located forward of, and at least some distance from, the electronic image assembly and is configured to permit viewing of images displayed at the electronic image assembly through said cover panel.” Ex. 1001, 9:58–63. On page 26 of the Petition, Petitioner produces an annotated version of Figure 2 of Karppanen, reproduced below:

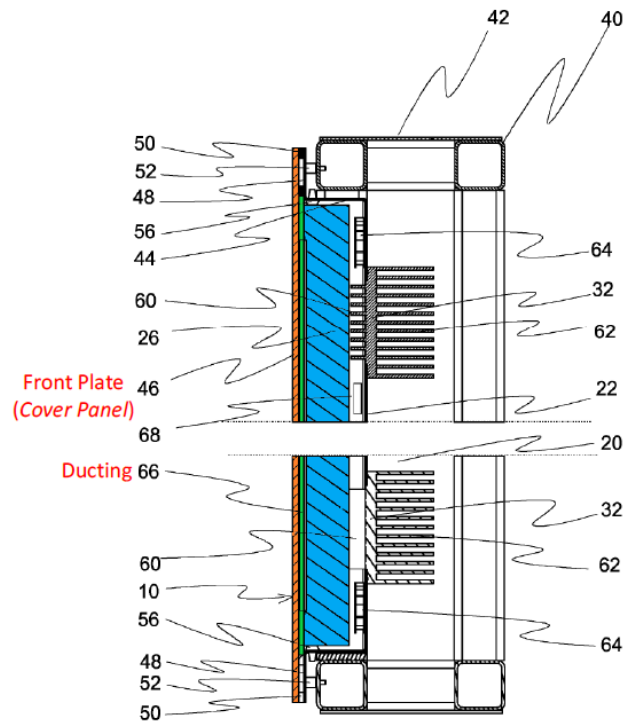


Figure 2 is a cross-section of an embodiment of Karppanen's electronic information board. Ex. 1004, 6:7–8 (color annotations by Petitioner).

Petitioner explains that Karppanen's display casing 10 forms a part of the housing and that display casing 10 includes back wall 22 and transparent front plate 46. Pet. 24–25 (citing Ex. 1004, 7:31–8:2; Ex. 1002 ¶ 152). Petitioner identifies transparent front plate 46 as “a cover panel forming a forward portion of the housing.” *Id.* at 25 (citing Ex. 1004, Fig. 1; Ex. 1002 ¶ 152).

Petitioner further identifies ducting 66 as facilitating air flow circulating the display element and fans 64 that force air from within the casing to flow past front plate 46. Pet. 25 (citing Ex. 1004, 9:3–8). Petitioner then explains: “Annotated Figure 2 shows that the front plate 46 (highlighted orange) is located in front of the display element 26

(highlighted blue), and is separated from the display element 26 by the ducting 66 (highlighted green).” *Id.* at 26.

With regard to these assertions, Patent Owner does not present counter-arguments. Petitioner’s assertions are supported by the cited evidence. We are persuaded that Karppanen discloses limitation [1b].

d) Limitation [1c]

Claim 1 further recites: “a closed loop airflow pathway passing through the housing, wherein said closed loop airflow passes around said electronic image assembly and is configured to accommodate circulating gas, and wherein at least a portion of said closed loop airflow pathway extends between said electronic image assembly and said cover panel.” Ex. 1001, 9:64–10:3. Petitioner asserts Karppanen discloses this closed loop in the form of ducting 66. Pet. 27 (citing Ex. 1002 ¶¶ 155–161).

Petitioner cites to the following passage in Karppanen:

Inside the display casing on the back wall 22 there are fans 64, which circulate air in the space between the display element and the walls of the display casing. Suitable ducting 66 has been arranged between the display casing and the display element so that an air flow circulating the display element and equalizing the temperatures can be arranged by means of the fans. The fans 64 force the air of the inner casing to flow past the front plate 46 of the device.

Ex. 1004, 9:3–8 (cited at Pet. 27).

On pages 28–29 of the Petition, Petitioner presents annotated full and partial versions of Karppanen’s Figure 2 to illustrate Karppanen’s disclosure of limitation [1c]:

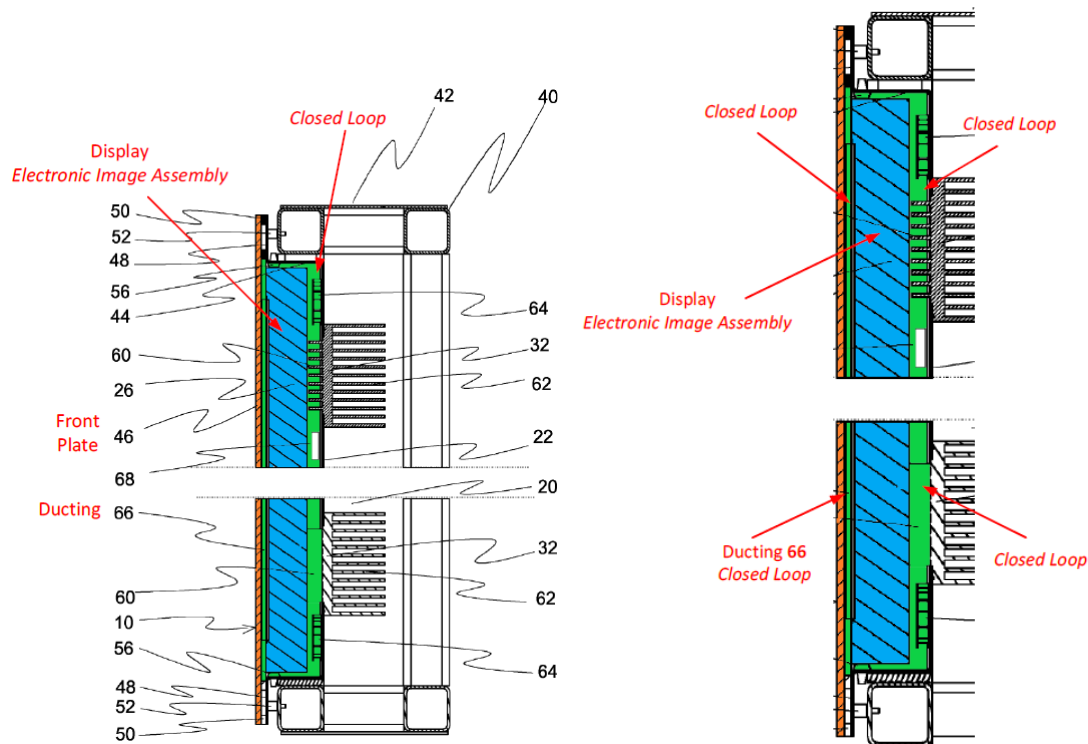


Figure 2 is a cross-section of an embodiment of Karppanen's electronic information board. Ex. 1004, 6:7–8 (color annotations by Petitioner).

Petitioner explains:

The space (highlighted green) between the display element 26 (highlighted blue) and the back wall 22, and the ducting 66 (also highlighted green) in front of the display element 26 but behind the front plate 46 (highlighted orange), form a closed pathway (highlighted green). This closed pathway is within the “housing” and thus “through the housing.” (Ex. 1002, ¶157). It is also around the display element 26 (the “electronic image assembly”). Because the display casing 10 is closed and weatherproof, the closed pathway is a “gas pathway within a display housing containing gas that is essentially isolated from external air,” (*see* Ex. 1023, p.1), i.e., “a closed loop airflow pathway passing through the housing.” (Ex. 1002, ¶157.)

Pet. 29–30.

Petitioner further explains that the two annotated versions of Figure 2 together show a closed pathway (highlighted in green) is formed around

display element 26 (highlighted blue), and thus “around said electronic image assembly.” *Id.* at 30. Petitioner also reasons that because the ’142 patent states that “air may be used as the gas for both loops,” the closed pathway shown “is configured to accommodate circulating gas.” *Id.* (citing Ex. 1001, 5:24–25; Ex. 1002 ¶ 160).

Additionally, Petitioner explains that because the closed pathway includes ducting 66 (highlighted green) that is in front of display element (highlighted blue), at least a portion of the closed loop airflow pathway extends between the electronic image assembly and the cover panel, as claimed. *Id.* (citing Ex. 1002 ¶ 161).

With regard to these assertions, Patent Owner argues that in Karppanen the closed loop is not essentially isolated from ambient air as Petitioner asserts “closed loop” requires. PO Resp. 28–31. However, as we discussed above in Section II.B.1., the term “closed loop” does not require essential isolation from ambient air. Given that understanding of “closed loop,” we are persuaded that Karppanen discloses limitation [1c] because Petitioner’s assertions are supported by the cited evidence.

e) Limitation [1d]

Claim 1 recites: “an open loop airflow pathway for ambient air passing through said housing and behind said electronic image assembly.” Ex. 1001, 10:4–6. Petitioner asserts that Karppanen discloses this open loop airflow pathway because Karppanen’s system includes cooling space that has ventilator slots to allow ambient air to enter and exit the system. Pet. 31 (citing Ex. 1004 ¶¶ 162–165). Petitioner specifically cites (*id.*) to the following portions of Karppanen:

In normal use, the display casing [10] and the device casing [12] are turned against each other to a closed position and locked to each other by locking means 18 on one side of the casings. In the closed position, there remains a cooling space 20 between the display casing and the device casing, delimited by the cover 24 and the display casing (Fig. 2).

Ex. 1004, 7:7–11.

In the first edge of the cover 24 pointed downward and the second edge pointed upward there are ventilator slots 34, which enable the movement of air from the outside of the device to the cooling space and from the cooling space back to the outside of the device. When required, the ventilator slots can be provided with filters in order to prevent the access of impurities to the ventilation space. In the cover 24 there are cooling fans 36, by which the circulation of air through the cooling space is regulated.

Id. at 7:16–22.

On page 32 of the Petition, Petitioner provides an annotated version of Figure 1 of Karppanen, reproduced below:

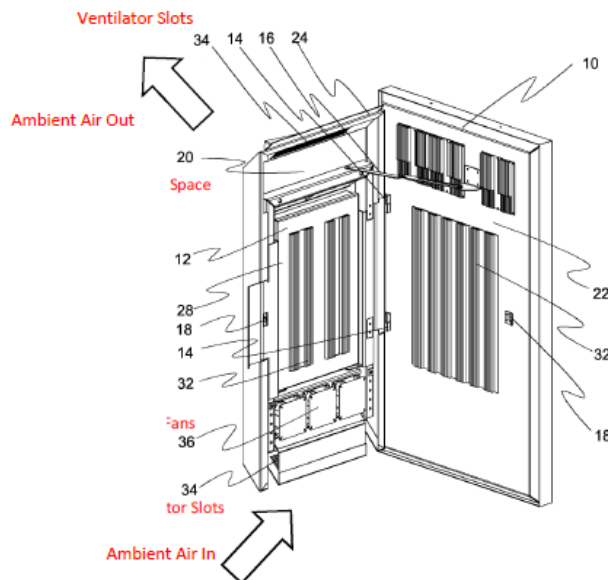


Figure 1 is a perspective view of an electronic information board according to Karppanen.
Ex. 1004, 6:4–5 (color annotations added by Petitioner).

Petitioner explains that cooling space 20 is in an open loop because air from the atmosphere is drawn inside cooling space 20, passes therethrough, and is exhausted, i.e., looped back, to the atmosphere. Pet. 32 (citing Ex. 1001, 7:16–22). Also, Petitioner explains that because cooling space 20 is between display casing 10 and device casing 12 and is delimited by cover 24 and display casing 10, ambient air passing through cooling space 20 passes through the housing as is required by limitation [1d]. *Id.* at 32–33 (citing Ex. 1001, 7:9–11; Ex. 1002 ¶ 164).

On page 33 of the Petition, Petitioner provides an annotated version of Figure 2 of Karppanen, reproduced below:

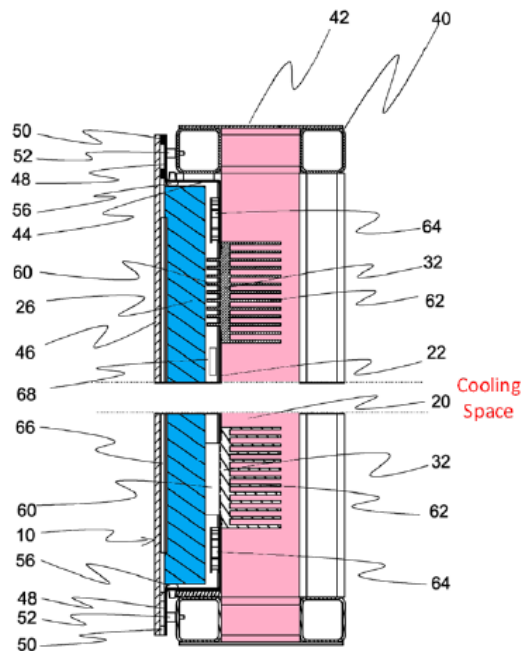


Figure 2 is a cross-section of an embodiment of Karppanen's electronic information board. Ex. 1004, 6:7–8 (color annotations by Petitioner).

Petitioner explains that cooling space 20 (highlighted pink) as an open loop airflow pathway is located behind display element 26 (highlighted blue) as electronic image assembly, as claimed. Pet. 33 (citing Ex. 1002 ¶ 165).

With regard to these assertions, Patent Owner does not present counter-arguments. Petitioner's assertions are supported by the cited evidence. We are persuaded that Karppanen discloses limitation [1d].

f) Limitation [1e]

Claim 1 recites: "at least one air circulation device positioned to force the circulating gas through the closed loop airflow pathway when activated." Ex. 1001, 10:7–9. Petitioner asserts that Karppanen discloses this claim element because Karppanen's system includes fans 64 which force the air circulating in the closed pathway. Pet. 33–34.

On page 40 of the Petition, Petitioner produces an annotated version of Figure 2 of Karppanen, reproduced below:

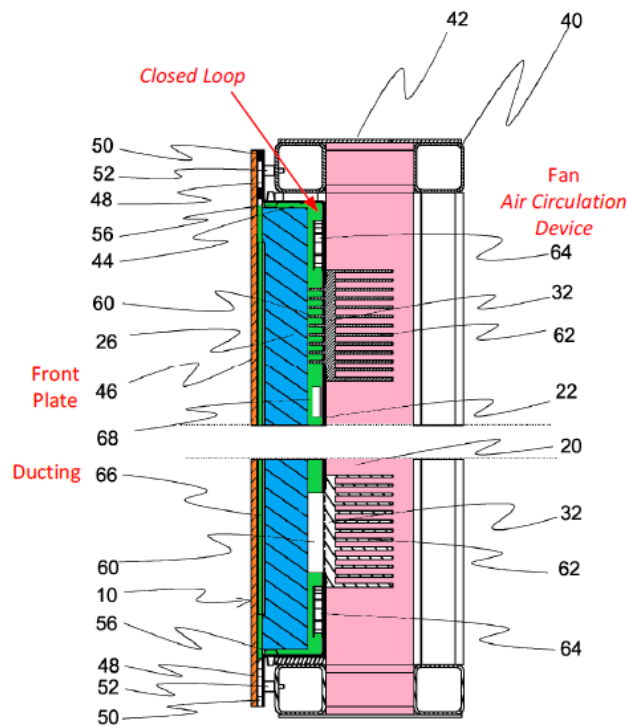


Figure 2 is a cross-section of an embodiment of Karppanen's electronic information board. Ex. 1004, 6:7–8 (color annotations by Petitioner).

Petitioner explains that Karppanen discloses fans 64 which circulate air in the space between display element 26 (highlighted blue) and the walls of the display casing and which force the air of the inner casing to flow past front plate 46 (highlighted orange). Pet. 34 (citing Ex. 1004, 9:3–8, Fig. 2). The closed loop passage way is highlighted in green. *Id.* at 35–36.

With regard to these assertions, Patent Owner does not present counter-arguments. Petitioner’s assertions are supported by the cited evidence. We are persuaded that Karppanen discloses limitation [1e].

g) Limitation [1f]

Claim 1 recites: “at least one polarizer located at an inward facing surface of said cover panel and configured to prevent at least some sunlight striking said cover panel from traveling beyond said at least one polarizer.” Ex. 1001, 10:10–13. Petitioner asserts the combined teachings of Karppanen and Larson teach this polarizer, “because Larson discloses a polarizer disposed between a cover glass and an LCD display.” Pet. 34–35 (citing Ex. 1002 ¶¶ 169–178). Petitioner asserts that Larson discloses a polarizer as an absorbing layer that absorbs ambient light and provides a “high contrast output at high ambient illumination levels.” *Id.* at 35 (citing Ex. 1005, 1:11–17, 1:22–27, 2:33–39). Notwithstanding Patent Owner’s arguments to the contrary, discussed below, we are persuaded that the combination of Karppanen and Larson teaches limitation [1f].

On page 35 of the Petition, Petitioner presents an annotated version of Larson’s Figure 2, reproduced below:

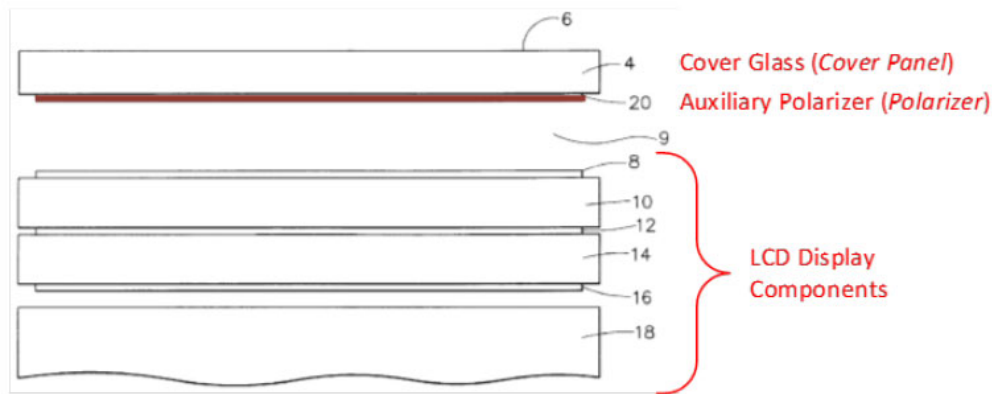
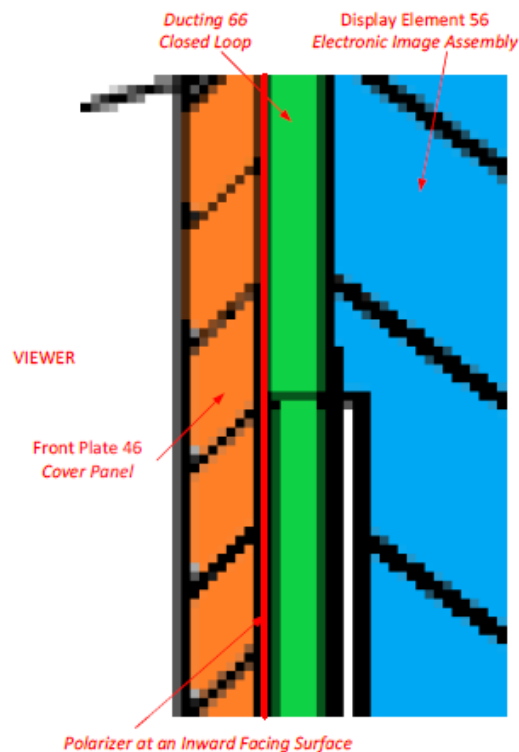


Figure 2 shows a polarized display of Larson. Ex. 1005, 2:16–17.

Petitioner has colored the polarizer layer red and labeled the cover glass, the polarizer layer, and other components.

Petitioner explains that, as shown in Larson’s Figure 2, display 2 includes cover glass 4, front gap 9, and auxiliary polarizer 20. Pet. 35 (citing Ex. 1005, 2:33–39). Petitioner further explains that Larson describes auxiliary polarizer 20 may be bonded to cover glass 4 between front gap 9 and cover glass 4. *Id.* (citing Ex. 1005, 3:13–19). Petitioner still further explains that because auxiliary polarizer 20 is bonded to cover glass 4 which is a cover panel, Larson discloses “at least one polarizer located at an inward facing surface of said cover panel.” *Id.* (citing Ex. 1002 ¶ 174).

Petitioner asserts that one with ordinary skill in the art would have modified Karppanen’s system to include Larson’s auxiliary polarizer 20 on Karppanen’s front plate 46, as shown in an illustration on page 36 of the Petition, reproduced below (Pet. 36):



The figure is a partial modified and annotated version of Larson’s Figure 2 showing Petitioner’s proposed application of Larson’s polarizer to Karppanen’s system. Pet. 35–36.

As shown in the illustration, the added polarizer is highlighted in red; glass front plate 46 is highlighted in orange; the closed loop is highlighted in green; and the electronic image assembly is highlighted in blue.

Petitioner presents several reasons why one with ordinary skill in the art would have modified Karppanen as discussed above in light of Larson. Pet. 57–63. One relates to a reflectance problem described by Larson at the boundaries between Larson’s cover glass 4, air gap 9, and polarizer 8. *Id.* at 59 (citing Ex. 1005, 1:30–32). In that regard, Larson states: “[r]eflectances associated with the boundaries between the cover glass 4, the gap 9, and the front polarizer 8 are especially pronounced.” Ex. 1005, 1:30–32.

Petitioner explains that Larson describes two solutions for the reflectance problem, one that applies an antireflective coating to the rear surface of cover glass 4, and one that includes auxiliary polarizer 20 between front gap 9 and cover glass 4. Pet. 60 (citing Ex. 1005, 2:50–56, 3:13–15). According to Petitioner, one of ordinary skill in the art would have understood that these two solutions may be used separately or together, as Petitioner uses the conjunctive/disjunctive term “and/or” to refer to these solutions when discussing the understanding of one with ordinary skill in the art. *Id.* at 61. Larson supports this understanding. In particular, Larson states: “The addition of the antireflection coating to the rear of the cover glass 4 tends to reduce reflections at the boundary between the cover glass 4 and the auxiliary polarizer 20 or, if the auxiliary polarizer is omitted, the front gap 9.” Ex. 1005, 2:52–56 (emphasis added).

Petitioner explains that “[a] POSITA would have recognized that the problem of reflectance at the boundaries may exist in Karppanen’s system as well, due to the ducting 66, i.e., the air gap between the front plate 46 and the display element 26.” Pet. 59 (citing Ex. 1002 ¶ 132). Petitioner further explains that including a polarizer would minimize reflectance at the gap and reduce the need for any anti-reflective coating. *Id.* at 62.

Notwithstanding Patent Owner’s contrary arguments discussed below, we are persuaded that an ordinarily skilled artisan would have incorporated Larson’s auxiliary polarizer and/or antireflective coating into Karppanen’s system to mitigate the reflectance problem in an LCD and to improve

contrast.¹² We also are persuaded that one with ordinary skill in the art would have understood the proposed combination as use of known techniques (anti-reflective materials and/or polarizer) to improve a similar apparatus in the same way to yield predictable results, and would have expected the combination to succeed. Pet, 62–63; Ex. 1002 ¶¶ 137–38.

Patent Owner asserts that there is no motivation to combine the teachings of Karppanen and Larson. PO Resp. 50. Specifically, Patent Owner states that Karppanen and Larson are “directed to different fields of art,” and asserts:

[A] POSITA would not look to a reference discussing optical phenomena to solve the solution of heating. Larson relates to methods and apparatuses for reducing unwanted reflections in LCD displays. Ex. 1005 (Larson), 1:5-9. Karppanen, by contrast, “relates to an electronic information board . . . used by advertisers to pass on information.” Ex. 1004 (Karppanen) 1:3–8. Though Karppanen makes a cursory reference that the display in the display casing may be an LCD panel, Karppanen does not discuss the LCDs at issue by those panels at length. Karppanen also does not discuss any details regarding the front cover glass and its composition.

PO Resp. 50.

¹² Petitioner presents another rationale for modifying Karppanen in light of Larson, i.e., that “a POSITA would have also recognized that an absorbing polarizer can absorb at least some polarizations of the ambient light, such as sunlight, which can help improve the contrast and reduce the heating of the display caused by the sunlight.” Pet. 62 (citing Ex. 1002 ¶ 136). We are not persuaded by this rationale because it appears to be based on the *ipse dixit* of Mr. Smith-Gillespie, who provides no supporting explanation or evidence. See Ex. 1002 ¶ 136. Still, we are persuaded by Petitioner’s other reasons for the combination.

Patent Owner's argument that Karppanen and Larson are directed to different fields, i.e., Karppanen for reducing heating in electronic information boards and Larson for reducing unwanted reflections in LCD displays, is misplaced. Karppanen describes that its display element is preferably a TFT LCD display (Ex. 1004, 8:7–8), and Larson describes lighting issues such as excessive reflectance generally associated with multiple layers of materials in an LCD (Ex. 1005, 1:22–32). Because Karppanen and Larson both pertain to solving problems with an LCD, we do not agree that they are directed to different fields.

Patent Owner further asserts:

The motivations offered by Petitioner's expert provide nothing more than hindsight rationalization. Each of the justifications point to a benefit claimed by the '142 Patent as a reason a person of ordinary skill in the art would have been motivated to combine Larson with Karppanen. *See* Ex. 1002 (Smith-Gillespie Dec.) ¶ 178 (“assisting with the cooling of air in the cooling duct of the closed loop system”); ¶ 136 (“A POSITA would have also recognized that an absorbing polarizer absorbs at least some polarizations of the ambient light, such as sun light, which can help improve the contrast and reduce the heating of the display caused by the sunlight.”). These motivations do not point to any disclosure within [Karppanen] that would prompt a person of ordinary skill to look to the optical reflectance field of LCD displays, rather than the cooling systems field, for an additional cooling solution. In particular where [Karppanen] already provide[s] a solution to the problem of cooling.

Id. at 51.

All of these Patent Owner arguments, however, are unavailing. Patent Owner does not consider certain advantages Larson expressly describes for

having a polarizer on an LCD, e.g., to solve a reflectance problem.

Ex. 1005, 3:13–30. In that regard, Larson states:

The auxiliary polarizer 20 may be bonded to the cover glass 4 or otherwise retained in display 2, and may be coated with an antireflective coating on one or both surfaces. The auxiliary polarizer 20 is an absorbing polarizer, preferably of a similar type as the front polarizer, and is preferably aligned in the same direction as the front polarizer 8. Alignment of the polarizers 8, 20 in the same direction minimizes the attenuation of light coming from the backlight 18. This allows maximum transmission of the light with little to no attenuation of the light. Reflected light, however, initially passes through the cover glass and is polarized by the auxiliary polarizer 20. By removing one of the polarizations before it reaches the gap 9, the reflections from each of the interfaces between the auxiliary polarizer 20 and front polarizer 8 are reduced by around 50%. This allows for reduced overall reflections, or can be used to reduce the reflectance requirements for any antireflection coatings which may be applied to the front and auxiliary polarizers 8, 20.

Id. at 3:15–34. Larson also states: “By selecting an auxiliary polarizer 20 with somewhat lower transmittance, the functionality of a conventional attenuating contrast enhancement filter can be achieved without additional elements or cost.” *Id.* at 3:39–43.

The specification of the ’142 patent does mention adding polarizing layers to reduce glare or reflections. Ex. 1001, 5:63–65 (“The front display surface 221 may be any transparent material (glass, plastic, or composite) and may optionally comprise several layers for polarizing light, reducing glare or reflections.”). However, it is not improper hindsight in light of the ’142 patent specification to incorporate into Karppanen a polarizer and/or antireflectant layer as taught by Larson, because Larson specifically

describes the benefits for doing so, i.e., solving a reflectance problem and improving contrast. Ex. 1005, 2:52–56, 3:13–43.

Regarding application of hindsight, the following explanation from the U.S. Court of Customs and Patent Appeals is instructive:

Any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning, but so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made and does not include knowledge gleaned only from applicant's disclosure, such a reconstruction is proper.

In re McLaughlin, 443 F.2d 1392, 1395 (CCPA 1971).

Larson states: “The reflectance at each boundary between the layers adds to the overall reflectance of the display. Reflectances associated with the boundaries between the cover glass 4, the gap 9, and the front polarizer 8 are especially pronounced.” Ex. 1005, 1:29–32. On that basis, Petitioner is correct that “a POSITA would have recognized that the problem of reflectance at the boundaries may exist in Karppanen’s system as well, due to the ducting 66, i.e., the air gap between the front plate 46 and the display element 26.” Pet. 59 (citing Ex. 1002 ¶ 132).

Patent Owner asserts that the motivations stated by Petitioner “do not point to any disclosure within [Karppanen] that would prompt a person of ordinary skill to look to the optical reflectance field of LCD displays, rather than the cooling systems field, for an additional cooling solution. In particular where [Karppanen] already provide[s] a solution to the problem of cooling.” PO Resp. 51. But Petitioner’s rationale for the combination need not be confined to the same issue addressed in Karppanen (i.e., cooling) in order to be persuasive. We are persuaded that an ordinarily skilled artisan would have considered Larson’s teachings to solve problems identified by

Larson that are associated with LCDs given that Karppanen expressly pertains to LCDs. *See In re Dillon*, 919 F.2d 688, 693 (Fed. Cir. 1990) (en banc) (overruling-in-part *In re Wright*, 848 F.2d 1216 (Fed. Cir. 1988)) (“it is not necessary in order to establish a prima facie case of obviousness that both a structural similarity between a claimed and prior art compound (or a key component of a composition) be shown and that there be a suggestion in or expectation from the prior art that the claimed compound or composition will have the same or similar utility as the one newly discovered by applicant.”).

For the foregoing reasons, we are persuaded by Petitioner that the combination of Karppanen and Larson teaches limitation [1f]. We are also persuaded by Petitioner that there is proper motivation to combine the teachings of Karppanen and Larson, as discussed above, in the manner proposed by Petitioner.

h) Secondary Considerations of Nonobviousness

Patent Owner submits evidence of nonobviousness pertaining to alleged satisfaction of long-felt need, failure of others, copying by Petitioner, industry praise, commercial success, and licensing of the '142 patent.

PO Resp. 52–65. It is well established that in order to be accorded substantial weight to secondary considerations in an obviousness analysis, the evidence of secondary considerations must have a nexus to the claims, i.e., there must be a legally and factually sufficient connection between the evidence and the patented invention. *Fox Factory, Inc. v. SRAM, LLC*, 944 F.3d 1366, 1373 (Fed. Cir. 2019); *Henny Penny Corp. v. Frymaster LLC*, 938 F.3d 1324, 1332 (Fed. Cir. 2019).

A patentee is entitled to a presumption of nexus “when the patentee shows that the asserted objective evidence is tied to a specific product and that product embodies the claimed features, and is coextensive with them.” *Fox Factory*, 944 F.3d at 1373. Objective evidence of nonobviousness must be commensurate in scope with the claims. *In re Kulling*, 897 F.2d 1147, 1149 (Fed. Cir. 1990). Where nexus cannot be presumed, “the patent owner is still afforded an opportunity to prove nexus by showing that the evidence of secondary considerations is the ‘direct result of the unique characteristics of the claimed invention.’” *Fox Factory*, 944 F.3d at 1373–74. Patent Owner bears the burden of establishing that a nexus exists between the evidence of secondary considerations and the patented invention. *Id.* at 1373.

Further, copying as an objective indicia of nonobviousness “requires evidence of *efforts to replicate a specific product*, which may be demonstrated through internal company documents, direct evidence such as disassembling a patented prototype, photographing its features, and using the photograph as a blue print to build a replica, or access to the patented product combined with substantial similarity to the patented product.” *Wyers v. Master Lock Co.*, 616 F.3d 1231, 1246 (Fed. Cir. 2010) (emphasis added).

(1) *Alleged Failure of Others*

Patent Owner argues that Samsung “failed to identify an effective solution” to the “enormous thermal challenge” for outdoor displays, and “failed repeatedly in its effort to develop outdoor LCD displays.” PO Resp. 54. Specifically, Patent Owner asserts that Petitioner “began its outdoor LCD display development starting at least by 2005.” *Id.* at 54–55 (citing

Ex. 2029, 45:22–46:11). This assertion is not disputed by Petitioner. Patent Owner asserts that “Samsung was not able to introduce an actual display product to the market.” *Id.* at 55 (citing Ex. 2029 (Petitioner employee Sung Ki Kim’s deposition transcript), 46:7–15). We see no such testimony by Mr. Sung Ki Kim in the cited deposition transcript. Mr. Sung Ki Kim actually testified that Petitioner launched an outdoor LCD display product “around 2010 through 2012.” Ex. 2029, 46:16–47:2.

Patent Owner suggests that Petitioner’s product in the “2010 to 2012 timeframe” was a failure because Petitioner “resorted to using air-conditioning to provide cooling.” PO Resp. 55. The assertion is not adequately supported by record evidence, because what constitutes an “effective solution” is not specified by Patent Owner. Patent Owner’s statement of Petitioner failing to identify an “effective solution” is subjective and leaves much to speculation.

Petitioner introduced another product (“OHD product”) in 2013–2015. Ex. 2029, 49:9–17. Patent Owner asserts that Petitioner’s OHD product was a failure because Mr. Sung Ki Kim testified that in the OHD product the generated heat “was not being taken out well” which resulted in a rise in temperature and [REDACTED] PO Resp. 55 (citing Ex. 2029, 51:1–9). We do not read Mr. Sung’s testimony as indicating that the OHD product always produced [REDACTED] when used outdoors. Rather, when read in context, we understand the testimony as indicating that the OHD product may become overheated in some circumstances and produce [REDACTED]

As noted above, the meaning of “effective solution” is not specified by Patent Owner. Effectiveness at a particular level is not claimed. There is

no showing by Patent Owner that Petitioner's products failed for lack of claimed features. Further, the introduction of the OHD product does not mean the previously introduced product "in the 2010 to 2012 timeframe" was a failure.

We are not persuaded by Patent Owner that Petitioner had "a **decade of failures** between 2005 and 2015." *See* PO Resp. 55. Patent Owner has not shown that Petitioner experienced any "failure" in attempting to provide an "effective solution" for outdoor displays or to develop outdoor LCD displays.

(2) *Alleged Satisfaction of Long-Felt Need*

Patent Owner asserts:

Around the early 2000s, larger LCDs of 32-inches and above began to appear in the market. Those larger display screens faced new thermal challenges, particularly when used in an outdoor environment. *See, e.g.*, Exs. 2026, 2038, 2047. Samsung itself explains that companies had "wanted their messages outdoors" but "were challenged by a variety of issues during the early years."

PO Resp. 53. Patent Owner characterizes this need as "for displays with effective cooling to enable use outdoors." Sur-reply 19.¹³

¹³ We find Patent Owner's articulation of the alleged long-felt need to be vague and subjective. No specific measure is indicated for determining what is or is not "effective." In addition, we note that Patent Owner acknowledges (PO Resp. 54–55) prior art from Samsung showing it was known to cool displays for outdoor use. *See, e.g.*, Ex. 2033 ¶ 3 (Samsung patent application directed to "a display device that is usable outdoors and prevents . . . a rise in temperature of a display part"); Ex. 2035, 1:18–20, 2:32–47 (Samsung patent directed to "a liquid crystal display device to be installed outdoors" that includes a heat radiating member and fans). This undermines Patent Owner's articulation of the alleged need.

Patent Owner fails to show how the claimed invention satisfied the alleged need for effective outdoor cooling. *See Sjolund v. Musland*, 847 F.2d 1573, 1582 (Fed. Cir. 1988) (holding that a proponent of objective evidence of long-felt need must show that “the *claimed invention* satisfied a long felt need”).

Patent Owner states in conclusory fashion that “[d]espite the demand for outdoor displays, no one (including Samsung, despite having begun attempting to develop outdoor displays at least by 2005) was successful until Mr. Dunn and Mr. Hubbard conceived of their invention.” PO Resp. 65. Patent Owner cites no evidence for this proposition. Thus, Patent Owner’s assertions regarding Mr. Dunn’s and Mr. Hubbard’s invention satisfying the alleged need are based on unsupported attorney argument. Accordingly, “we conclude that the nexus between the claimed invention and the purported long-felt, unmet need is too attenuated to provide a persuasive rationale for nonobviousness.” *In re Karpf*, 758 F. App’x 960, 965 (Fed. Cir. 2019).

Additionally, regarding providing a solution to an unsolved problem in the art, the Court of Customs and Patent Appeals stated: “an allegation to this effect [solving an unsolved problem] is not evidence of unobviousness unless it is shown, as was not done here, that the widespread efforts of skilled workers having knowledge of the prior art had failed to find a solution to the problem.” *In re Allen*, 324 F.2d 993, 997 (CCPA 1963) (citing *Toledo Pressed Steel Co. v. Standard Parts, Inc.*, 307 U.S. 350, 356 (1939)). There has been no showing by Patent Owner that “widespread efforts” of skilled workers having knowledge of the prior art had failed to find a solution to the problem.

(3) *Alleged Copying by Petitioner*

As further objective evidence that the challenged claims are nonobvious, Patent Owner contends that Petitioner's 75- and 85-inch OHF products copied the system of claim 1. PO Resp. 55–59; Sur-reply 22–23. Patent Owner cites two documents and testimony from Samsung employees regarding Samsung's teardown and analysis of large-format and mid-sized versions of [REDACTED] products. PO Resp. 59 (citing Ex. 2029, 139:7–16 (Sung Ki Kim); Ex. 2030 (Sungsu Lee), 184:15–191:8; Ex. 2031, 77:13–81:16 (Wunkil Lee); Exs. 2042 (slide deck for [REDACTED] 86- inch product teardown compared to Petitioner's 85-inch OHF product), 2043 (photos for [REDACTED] 55-inch product teardown).

Patent Owner also purports to provide a claim chart (Ex. 2036) and corresponding testimony from Dr. Pokharna to show how Petitioner's 75- and 85-inch OHF products infringe or practice claims 1, 6, and 10 of the '142 patent. PO Resp. 55 (citing Ex. 2036; Ex. 2024 ¶¶ 186–187).¹⁴ Patent Owner puts forth evidence from a Petitioner installation guide for Petitioner's 75- and 85-inch OHF products to show how a cooling fan is used to take in outside air to lower the internal temperature and discharge the hot air. PO Resp. 57 (citing Ex. 2053).

Patent Owner also provides a claim chart to show how its own 75-inch and 86-inch display products meet all of the elements of claim 1 of the '142 patent. PO Resp. 58 (citing Ex. 2054 (claim chart)).

¹⁴ Exhibit 2036 is not a claim chart of the '142 patent. Rather, it is a certified translation of Korean Unexamined Patent Application KR 10-2006-0016469.

Patent Owner contends the evidence it presented is probative objective evidence of copying because copying merely “requires duplication of features of the patentee’s work based on access to that work.” Sur-reply 22 (quoting *Institut Pasteur & Universite Pierre Et Marie Curie v. Focarino*, 738 F.3d 1337, 1347–48 (Fed. Cir. 2013)).

Petitioner counters that Petitioner had already fully designed the cooling scheme for its allegedly copied OHF products by the time of Petitioner’s teardown and analysis of [REDACTED] products. Reply 20 (citing Ex. 1035, 612:11–13, 613:14–25, 614:1–18; Ex. 2040; Ex. 2042, 65 (showing photographs and test results of Petitioner’s 85-inch product within the teardown comparison slide deck document)). Petitioner also argues that Patent Owner has not identified any features of [REDACTED] products that Petitioner allegedly copied. *Id.* (citing *Iron Grip Barbell Co., Inc. v. USA Sports, Inc.*, 392 F.3d 1317, 1325 (Fed. Cir. 2004)). Petitioner notes that “comparative product analysis is a common industry practice.” Reply 20–21 (citing Ex. 1035, 611:6–22; Ex. 1030, 292 n. 117; Ex. 1036, 159:10–24).

We agree with Petitioner that the evidence of record includes a comparison chart between Petitioner’s products and [REDACTED] products—and in particular their large-size products (85-inch of Petitioner and 86-inch of [REDACTED])—which suggests that allegedly copied products were already designed at the time of Petitioner’s competitive teardown and analysis of [REDACTED] products. *See* Ex. 2042, 65; *cf.* Ex. 1035, 613:14–25 (Mr. Lee testifying that the same comparison chart indicates that the large-format Petitioner 85-inch product has been completed due to its inclusion in this chart). Thus, the evidence of record

does not support that Samsung copied the torn-down products when making its OHF products.

Also, Petitioner’s engineer, Mr. Sungsu Lee, has testified that the March 24, 2016 date on the slide deck that is Exhibit 2042 is incorrect, because “[t]here is a label that is attached to the product which would show the product date. And the date is – comes later than the [March 24, 2016] date that is indicated on this [date page].” Ex. 1035, 611:23–612:5. The date shown on the product label referred to by Mr. Sungsu Lee reads “MFG Oct 2016.” Ex. 2042, 34, 69. Petitioner asserts that it sold the 85-inch OHF product in 2016. Reply 20 (citing Ex. 2040). That assertion is not disputed by Patent Owner. It is unrealistic that Petitioner obtained a product manufactured in October 2016 to do a tear down analysis and then copied the design to make its own product in time to make sales of the copied product still in 2016.

Further, even if we were to assume that Petitioner had access to [REDACTED] products prior to making its own products, the record does not include evidence or analysis from Patent Owner showing any feature of [REDACTED] product that Petitioner allegedly duplicated. Nor has Patent Owner put forth evidence of substantial similarity between Petitioner’s products and [REDACTED] products. *See Medtronic, Inc. v. Teleflex Innovations S.a.r.l.*, 70 F.4th 1331, 1340 (Fed. Cir. 2023) (“Evidence of access and substantial similarity *is* evidence of copying.”). “Copying requires *duplication of features of the patentee’s work* based on access to that work, lest all infringement be mistakenly treated as copying.” *Institut Pasteur*, 738 F.3d at 1347–48 (emphasis added).

In its Sur-reply, Patent Owner points to the fact that Petitioner's products used a heat exchanger as evidence of copying. Sur-reply 22. But that assertion is too general. Patent Owner has not shown that the heat exchanger in Petitioner's products is of the same type as that in [REDACTED] products, i.e., comprising enclosed channels or tubes, which are the only type of heat exchangers specifically described in the specification of the '142 patent. Further, many of the challenged claims do not recite a heat changer, e.g., independent claims 1 and 12.

At best, Patent Owner has put forth assertions and some evidence of infringement, which are insufficient to show duplication.¹⁵ See PO Resp. 55 (“Samsung’s 75- and 85-inch OHF and subsequent products practice claims 1, 6, and 10 of the ’142 Patent.”); Ex. 2024 ¶ 187.

For these reasons, we accord Patent Owner’s evidence of copying little weight.

(4) *Alleged Industry Praise*

As evidence of industry praise for the '142 patent, Patent Owner cites an email from Samsung employee Romulus Stoian to Mr. Dunn, a co-inventor of the '142 patent, in which Mr. Stoian called what Mr. Dunn had done at MRI “impressive and unique.” PO Resp. 63 (citing Ex. 2001). Patent Owner also cites Mr. Stoian’s statement that MRI had entered “a virgin space.” *Id.* Patent Owner further cites testimony in the ITC from

¹⁵ Although Patent Owner purports to include infringement claim charts for Petitioner’s “Large-Sized Products” at Exhibit 2036, this exhibit does not include any claim charts for the '142 patent. Rather, it is a certified translation of Korean Unexamined Patent Application KR 10-2006-0016469. As such, Patent Owner’s only support for the alleged infringement is Dr. Pokharna’s testimony at paragraph 187 of his declaration.

John Palmer, “a Samsung customer and integrator of the Samsung OH displays for end users,” who “testified that Samsung’s products were requested by customers (and believed by Palmer to be superior) because of their built-in cooling systems.” *Id.* at 65 (citing Ex. 2032, 118:6–119:8).

Petitioner calls Mr. Stoian’s email “generic” and argues that it “does not identify any specific technical feature of [Patent Owner]’s products, let alone a specific product that embodies, and is coextensive with, the elements of the Challenged Claims.” Reply 23. Petitioner also argues that Patent Owner mischaracterizes John Palmer’s testimony to the extent it does not indicate whether patented features are responsible for the success of the cooling system. *Id.*

We agree with Petitioner that Patent Owner has not established a nexus between its proffered evidence of industry praise and the challenged claims. For example, while Mr. Stoian’s email is certainly laudatory of Mr. Dunn and Patent Owner, the passages cited by Patent Owner are tied to Patent Owner’s “*new business model* based on turnkey solutions for DOOH [Digital Out-Of-Home displays].” Ex. 2001 (emphasis added). Further, the email does not mention any features of the challenged claims. *See id.* And nothing in the record ties Mr. Stoian’s (and by extension, Petitioner’s) laudatory statements to the challenged claims. Similarly, Mr. Palmer praised Petitioner’s displays, and he insinuated that Petitioner’s displays function well in hot and cold conditions, but none of his ITC testimony is tied to any particular feature of the challenged claims. *See* Ex. 2032, 118:6–119:8. In the absence of any nexus evidence tying the asserted industry praise to the challenged claims, we accord Patent Owner’s proffered evidence of praise little to no weight.

(5) *Licensing*

Patent Owner argues that third parties have “recognized [Patent Owner]’s innovations by licensing the ’142 Patent and paying royalties for use of the claimed inventions.” PO Resp. 64. In particular, Patent Owner cites licensing and joint venture agreements between Patent Owner and “[Petitioner]’s primary competitor LG.” *Id.* (citing Exs. 2049, 2050). Patent Owner also cites other licenses with Megatech and [REDACTED] *Id.* (citing Exs. 2051, 2052).

Petitioner argues that Patent Owner does not attempt to establish a nexus between the licensing activity and the ’142 patent. Reply 24. According to Petitioner, Patent Owner’s licenses [REDACTED] [REDACTED] or additionally list numerous other intellectual property rights.” *Id.* (citing Exs. 2049, 2051, 2052; *Shoes by Firebug LLC v. Stride Rite Children’s Grp., LLC*, 962 F.3d 1362, 1372–73 (Fed. Cir. 2020)).

Of the agreements cited by Patent Owner, the [REDACTED]
[REDACTED]
[REDACTED] See Ex. 2052, 1–3. The Megatech license [REDACTED]
[REDACTED]
[REDACTED]⁶ See Ex. 2051,
10. Patent Owner’s license and joint venture agreements with LG appear to be [REDACTED]
[REDACTED] See, e.g., Ex. 2049, 1–2 [REDACTED]

¹⁶ Patent Owner acknowledges that a later Provisional Application, i.e., Provisional Application No. 61/138,736, is the first application in the priority chain of the ’142 patent “to disclose and teach the integration of a heat exchanger.” PO Resp. 21.

[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED] Because the agreements encompass intellectual property rights beyond the '142 patent, the agreements on their face do not establish a nexus to the challenged claims. *See Shoes by Firebug*, 962 F.3d at 1372.

For the foregoing reasons, we accord Patent Owner's evidence of licensing little or no weight.

(6) *Alleged Commercial Success*

Patent Owner relies on increased sales of its own products:

MRI's own sales increased in mid- to late-2008—shortly after the claimed priority date of the '142 Patent—confirming the commercial success is tied to the novel aspects of the '142 Patent. Ex. 2044. MRI's commercial success has continued to the present, with sales of its large-format products alone totaling over [REDACTED] between 2018 and 2022. Exs. 2045, 2046. Federal Circuit precedent holds sales of this magnitude alone show commercial success. *See e.g., J.T. Eaton & Co. v. Atlantic Paste & Glue Co.*, 106 F.3d 1563, 1566, 1572, (Fed. Cir. 1997) (affirming a finding that “sales evidence . . . shows [strong commercial] success,” where the “sales evidence” consisted solely of the patentee's “\$17 million of sales from 1979 through 1984, and its \$4 million of annual sales from 1985 through 1989.”)

PO Resp. 59–60.

Patent Owner asserts that its 75-inch and 86-inch products “practice” the '142 Patent. PO Resp. 58. We understand Patent Owner to be relying on a presumption of nexus between the increased sales and the claimed invention, which “applies for objective indicia when the patentee shows that

the asserted objective evidence is tied to a specific product and that product ‘embodies the claimed features, and is coextensive with them.’” *Polaris Indus., Inc. v. Arctic Cat, Inc.*, 882 F.3d 1056, 1072 (Fed. Cir. 2018) (quoting *Brown & Williamson Tobacco Corp. v. Philip Morris Inc.*, 229 F.3d 1120, 1130 (Fed. Cir. 2000)).

Patent Owner provides no analysis other than a claim chart for claim 1 of the ’142 patent (Ex. 2054) to support its assertion that MRI’s 75- and 86-inch large-format displays “are coextensive with the ’142 Patent.” PO Resp. 58. Our reviewing court has rejected “attempt[s] to reduce the coextensiveness requirement to an inquiry into whether the patent claims broadly cover the product that is the subject of the evidence of secondary considerations.” *Fox Factory*, 944 F.3d at 1377.

Patent Owner also relies on sales of Petitioner’s products and asserts:

Samsung also achieved significant success with its outdoor electronic displays. The integration of the effective cooling system first developed by [REDACTED]—which was available to Samsung through a tear down of [REDACTED] technology and disclosures in patents named on the [REDACTED] on the product Samsung tore down—led to success of the OHF series. All other models of Samsung’s outdoor displays also use the same cooling system copied from [REDACTED] and claimed in the ’142 Patent. Ex. 2039. Samsung’s market share grew from [REDACTED] (before entering the outdoor display market) to [REDACTED] (in 2017 after launch of the Accused Products) to [REDACTED] (by 2020). Ex. 2041, at 29–30.

PO Resp. 60.

Petitioner notes that the market share information relied on by Patent Owner “includes Samsung products beyond those that MRI alleges practice the Challenged Claims.” Reply 23. Patent Owner does not dispute that

clarification by the Petitioner. *See* Sur-reply. On this basis alone, the market share information lacks nexus to the challenged claims.

Patent Owner asserts that “Samsung’s 75- and 85- inch OHF and subsequent products practice claims 1, 6, and 10 of the ’142 Patent.” PO Resp. 55. Patent Owner also asserts that these Petitioner products are “coextensive” with the claims of the ’142 patent, and notes in particular the presence in these products of what Petitioner refers to as “Magic Glass,” which “contains both an anti-reflective film and front polarizer that prevent a portion of solar radiation from thermally interacting with the closed loop gas or LCD stack.” *Id.* at 56.

Patent Owner purports to provide an infringement claim chart (Ex. 2036) to support its assertion that Samsung’s products “are coextensive with the claims of the ’142 patent.” PO Resp. 55–56. However, as noted above, Exhibit 2036 is not a claim chart of the ’142 patent. Patent Owner also refers to Exhibit 2039, identified in Patent Owner’s Exhibit List as an infringement claim chart for the ’142 patent (PO Resp. vi; Paper 50). PO Resp. 60. However, Exhibit 2039 is an infringement claim chart for U.S. Patent No. 10,506,740, not the ’142 patent.

Petitioner correctly states (Reply 21) that coextensiveness requires more than a showing that the claims cover a product practicing the patents. *See Fox Factory*, 944 F.3d at 1377. Petitioner identifies additional areas where Petitioner’s and Patent Owner’s products may not be coextensive with the claimed invention. Reply 22. Petitioner asserts:

As the ALJ found, both Samsung’s and MRI’s products have numerous unclaimed features. Ex. 1030, 296–97. Indeed, Samsung’s marketing documents identify a number of “features” and “highlights” such as “Magical Protection Glass,” “Slim

Design,” “IP56” certification, “excellent visibility” with a high contrast ratio, and “Remote Management.” *See, e.g.*, Exs. 1037, 1038. Likewise, MRI’s products identify a number of features unrelated to the Challenged Claims such as “Unsurpassed Image Quality,” “Extreme Outdoor Durability,” “Intelligent Self-Optimization,” and “IoT Empowered Architecture.” *See e.g.*, Ex. 1039. These features are important to customers and drive sales. Ex. 1040, 312:4–314:22, 316:16–321:4. Accordingly, these products are not coextensive with the Challenged Claims.

Id. at 22.

In its Sur-reply, Patent Owner responds:

[A]lmost all of the “features” and “highlights” that Samsung identifies (at 22) are, in fact, features or benefits of MRI’s invention discussed in the ’142 Patent, including the cover glass with solar reduction layer which Samsung terms “Magic Glass” (Ex. 1001, 5:63–6:12), “slim design” (*id.*, 5:11–14), water and dust resistant “IP56” certification (*id.*, 5:28–49), and “excellent visibility” (*id.*, 5:25–28, 9:25–35). And providing “Extreme Outdoor Durability” by protecting against overheating is a key feature of the invention.

Sur-reply 23–24.

Although the specification of the ’142 patent does describe “[a]n optional filter may be used to ensure that the air (either in the closed or open loop) stays free of contaminants,” and “the heat exchanger (and the optional path behind the image assembly or backlight) is properly sealed so that any contaminants in the ambient gas would not enter sensitive portions of the display,” the claims require neither the filter nor the sealing. Ex. 1001, 5:35–43. With respect to providing excellent visibility, that characteristic appears to derive from the display being free from contaminants and, thus, we note again that the claims require neither the filter nor the sealing.

Patent Owner asserts that even if there were other product features, it is not necessary that the patented invention be solely responsible for the commercial success, in order for this factor to be given weight. Sur-reply 24 (citing *Oren Techs., LLC v. Proppant Express Investments LLC*, No. 2019-1778, 2021 WL 3120819, at *7 (Fed. Cir. July 23, 2021)). Here, the unclaimed features are so numerous, with many specifically noted in the specification of the '142 patent, that it is appropriate to accord the evidence of commercial success little to no weight.

Patent Owner further argues in its Sur-reply:

Finally, regardless of whether there is a presumption, the evidence shows that the success of MRI's and Samsung's products is attributable to the effective cooling systems. Indeed, there was no market for outdoor LCD displays until MRI's patented inventions and a market would not exist but for the inventions. Ex. 2001, 2025. This is shown by the White Paper in which Samsung observed that "[t]he many barriers that limited how digital screens could be used outdoors and in direct sunlight have all come down." Ex. 2025, 2. Earlier adopters failed, but "years of insights and experience" and "engineering advances" made putting screens outdoors "entirely possible." *Id.* Samsung recognized that **MRI was the "pioneer" who "entered into a virgin space"** and Samsung wanted to form a "collaboration in the outdoor space." Ex. 2001. This is strong evidence that the market for outdoor displays is attributable to MRI's pioneering technology. *Id.* Marketing documents show that thermal management was the leading focus of Samsung's effort to sell to its largest customer. Ex. 2038, 8–27. And Samsung customer John Palmer, who is an integrator for Samsung OH displays for end users, testified that customers requested Samsung displays because of their cooling systems. Ex. 2032, 118:6–119:8. *This evidence ties the commercial success to the claimed inventions.*

Sur-reply 24–25 (emphasis added). These assertions are too general to be meaningful in directly establishing nexus between the alleged

commercial success to the claimed invention. Patent Owner simply assumes that the alleged commercial success is the direct result of the unique characteristics of the claimed invention. But that is what Patent Owner has to prove, where nexus cannot be presumed. *Fox Factory*, 944 F.3d at 1373–74.

Further, we disagree with Patent Owner’s statement that its sales increased shortly after the claimed priority date of the ’142 patent confirms the commercial success is tied to the novel aspects of the ’142 patent. PO Resp. 59. The alleged tie is mere speculation not proven by evidence.

Based on all of these considerations, we find that the evidence of record does not support coextensiveness between the challenged claims and any of Petitioner’s or Patent Owner’s commercially successful products. Thus, Patent Owner is not entitled to a presumption of nexus. And because Patent Owner has not otherwise directly shown nexus, we accord Patent Owner’s evidence of commercial success little weight.

(7) *Conclusion on Secondary Considerations*

For the foregoing reasons, we accord Patent Owner’s objective evidence of nonobviousness little to no weight.

i) *Conclusion for Claim 1*

We have considered the entirety of the evidence before us, both for and against obviousness, and weighed the evidence accordingly. The evidence of obviousness outweighs the evidence of nonobviousness. Petitioner has shown by a preponderance of the evidence that claim 1 would have been obvious over Karppanen and Larson.

5. *Dependent Claim 2*

Claim 2 depends from claim 1 and further recites: “further comprising at least one film having anti-reflective properties located at said cover panel.” Ex. 1001, 10:14–15.

Petitioner asserts that Larson teaches this additional limitation because Larson discloses a cover glass having an antireflective coating. Pet. 36 (citing Ex. 1002 ¶¶ 180–183). Petitioner notes that Larson describes that antireflective coating 6 may be added to one or both sides of cover glass 4. *Id.* at 36–37 (citing Ex. 1005, 1:22–24, 1:33–36, Fig. 1). Petitioner further notes that Larson describes that the rear surface of cover glass 4 may include an antireflection coating. *Id.* at 37. Petitioner asserts that one of ordinary skill in the art would have applied Larson’s antireflective coating to Karppanen’s cover panel, in the manner described by Larson. *Id.* (citing Ex. 1002 ¶ 183). Petitioner also relies on the same rationale for combining Larson with Karppanen that we discussed above in the context of claim 1. *Id.*

With regard to claim 2, Patent Owner argues a lack of motivation to combine and presents objective evidence of nonobviousness. PO Resp. 50–65.

The same analysis from claim 1 regarding the rationale for the combination of Karppanen and Larson and the evidence of secondary considerations of nonobviousness applies equally to claim 2. *See supra* § II.D.4.h(1)–(7). We also find that Larson discloses the added limitation of claim 2 and determine that one of ordinary skill in the art would have wanted to incorporate Larson’s teaching of applying an anti-reflective coating to Karppanen’s front plate 46.

We have considered the entirety of the evidence before us, both for and against obviousness, and weighed the evidence accordingly. The evidence of obviousness outweighs the evidence of nonobviousness. Petitioner has shown by a preponderance of the evidence that claim 2 would have been obvious over Karppanen and Larson.

6. *Claim 3*

Claim 3 depends from claim 1 and recites:

a heat exchanger located rearward of the electronic image assembly,
wherein a first portion of said heat exchanger forms part of said open loop airflow pathway, and
wherein a second portion of said heat exchanger forms part of said closed loop airflow pathway.

Ex. 1001, 10:17–22.

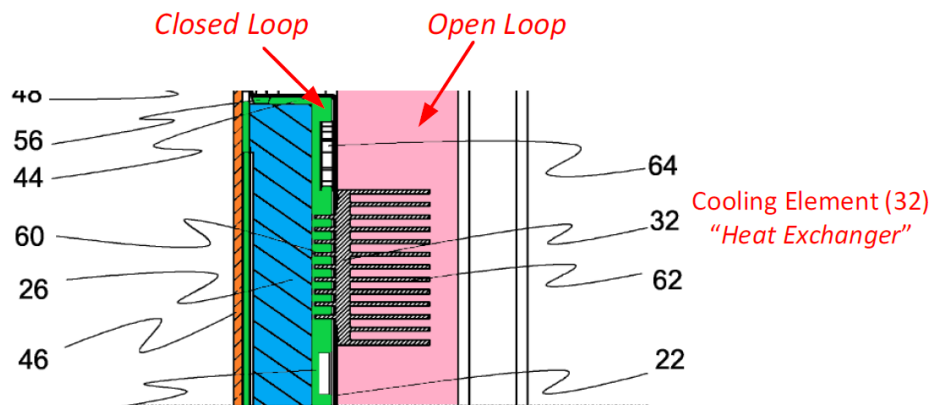
Petitioner asserts that the additional limitations of claim 3 are disclosed by Karppanen. Pet. 37–41. Petitioner’s explanations in this regard are supported by the cited evidence, notwithstanding contrary arguments from Patent Owner, discussed below.

With regard to a heat exchanger located rearward of the electronic image assembly, Petitioner states that Karppanen’s cooling element 32 is a heat exchanger disposed behind display element 26. Pet. 37 (citing Ex. 1002 ¶¶ 184–186). Petitioner explains:

Karppanen states: “[i]n the back wall of the display casing there are cooling elements **32**, which have a first **heat transfer part 60** extending to the inside of the display casing and a second **heat transfer part 62** extending to the cooling space **20** outside the display casing.” (Ex. 1004, 8:13–16, FIG. 2.) The “task of the cooling elements is to **transfer excess thermal energy from the display casing [10] to the cooling space [20]**, from which it is further conducted by the air flow produced by the cooling fans

36 out from the entire device.” (*Id.*, 8:19–22, FIG.2.) Thus, the cooling element 32 is “a heat exchanger.”

Id. at 38. On page 38 of the Petition, Petitioner provides the following annotated partial version of Karppanen’s Figure 2:



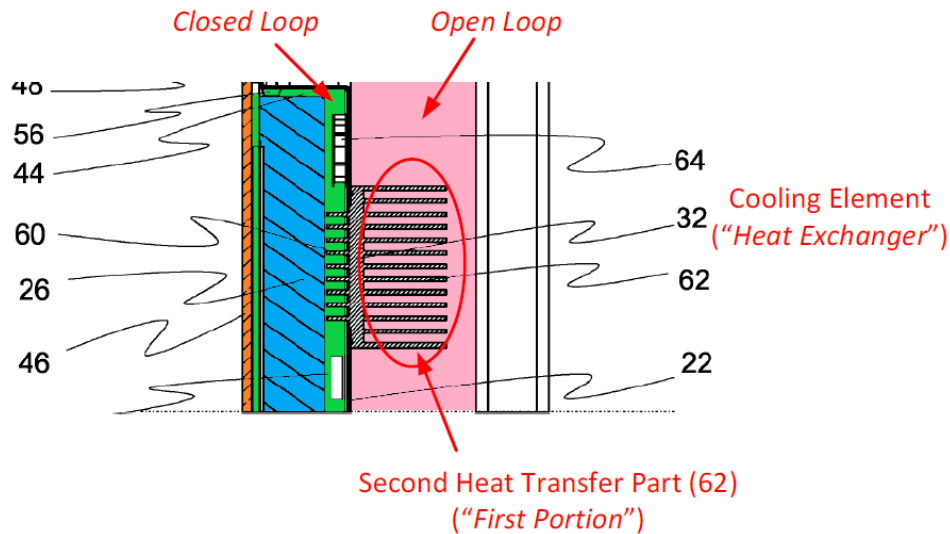
Karppanen’s Figure 2 is a cross-sectional view of an electronic information board. Ex. 1004, 6:7–8.

Petitioner has labeled the closed loop, the open loop, and element 32.

Petitioner notes that cooling element 32 is located behind display element 26 which is the electronic image assembly. Pet. 38 (citing Ex. 1002 ¶ 186).

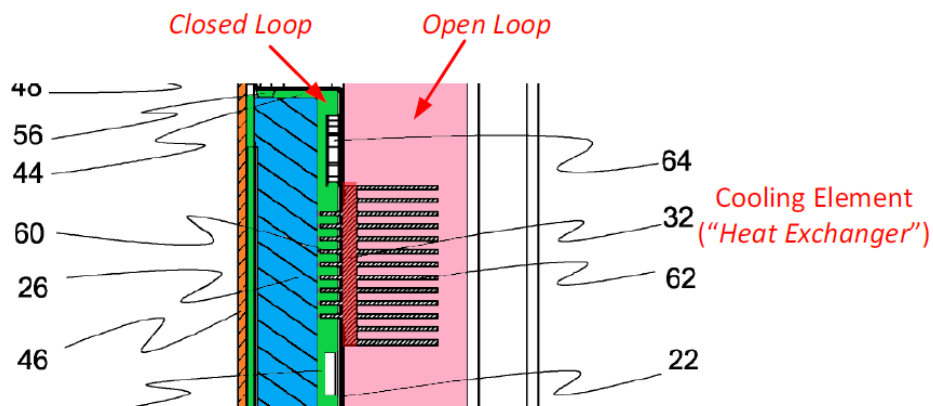
We note, in particular, with respect to Karppanen’s element 32 being a heat exchanger, that Mr. Smith-Gillespie testifies: “Together, elements 32, 60 (inner cooling fins), and 62 (outer cooling fins) form a heat exchanger unit which transfers heat from the inner space to the outer space with the assistance of cooling fan 64 (inner space) and cooling fan 36 (outer space).” Ex. 1002 ¶ 189. Karppanen also describes that “by [cooling elements 32] heat is transferred from the inside of the device casing and the display casing to the cooling air in the cooling space 20.” Ex. 1004, 7:12–14. We find that Karppanen’s cooling element 32 is a heat exchanger located behind an electronic image assembly.

With regard to a first portion of the heat exchanger forming a part of the open loop airflow pathway, Petitioner produces on page 39 of the Petition the following annotated partial version of Karppanen's Figure 2:



Karppanen's Figure 2 is a cross-sectional view of an electronic information board. Ex. 1004, 6:7–8. Petitioner has labeled the closed loop, the open loop, element 32, and heat transfer part 62.

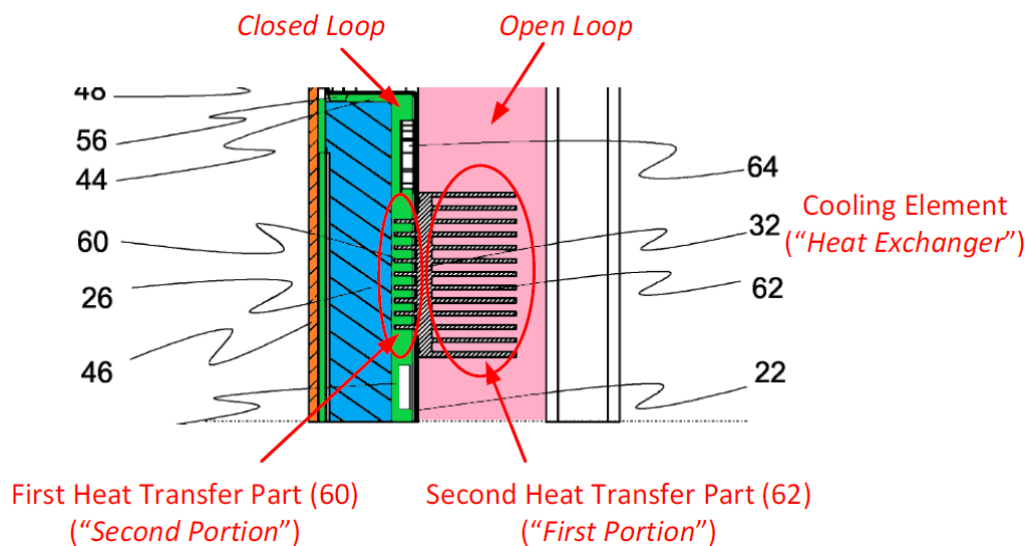
Petitioner additionally produces on page 40 of the Petition the following annotated partial version of Karppanen's Figure 2:



Karppanen's Figure 2 is a cross-sectional view of an electronic information board. Ex. 1004, 6:7–8. Petitioner has labeled the closed loop, the open loop, element 32, colored red a wall of element 32.

Petitioner explains that the red wall of element 32 defines in part a wall of cooling space 20 which is the open loop pathway. Pet. 40. Petitioner further explains that because air in the open loop circulates between the fins which are second heat transfer part 62 (claimed first portion) of element 32, and additionally touches cooling element 32, a first portion of the heat exchanger forms a part of the open loop airflow pathway. Pet. 39–40 (citing Ex. 1002 ¶ 190).

With regard to a second portion of the heat exchanger forming a part of the closed loop airflow pathway, Petitioner produces on page 41 of the Petition the following annotated partial version of Karppanen's Figure 2:



Karppanen's Figure 2 is a cross-sectional view of an electronic information board. Ex. 1004, 6:7–8. Petitioner has labeled the closed loop, the open loop, element 32, heat transfer part 60 and heat transfer part 62.

Petitioner explains that because air in the closed loop circulates between the fins of the first heat transfer part 60 (claimed second portion) of element 32, a second portion of the heat exchanger forms a part of the closed loop airflow pathway. Pet. 41–40 (citing Ex. 1002 ¶ 193).

Patent Owner asserts that Karppanen does not disclose a “heat exchanger.” PO Resp. 31. Patent Owner contends that a “heat exchanger” must be a device that includes enclosed channels or tubes. *Id.* at 20; Sur-reply 13–14. In Section II.B.2 above, we construed the term “heat exchanger,” addressed Patent Owner’s argument, and rejected Patent Owner’s construction. Our reasoning need not be repeated here. A “heat exchanger” does not have to include enclosed channels or tubes.

Patent Owner argues that Karppanen’s cooling element 32 is a finned wall or a heat sink. PO Resp. 32–35. The argument is unavailing. Also as discussed above in Section II.B.2, the record evidence does not establish that a heat sink and a heat exchanger are mutually exclusive, i.e., without overlap in any circumstance, and similarly, the same is true for a finned wall and a heat exchanger. The issue is whether element 32 is a heat exchanger, not whether element 32 is a finned wall or a heat sink.

Mr. Smith-Gillespie testifies: “Together, elements 32, 60 (inner cooling fins), and 62 (outer cooling fins) form a heat exchanger unit which transfers heat from the inner space to the outer space with the assistance of cooling fan 64 (inner space) and cooling fan 36 (outer space).” Ex. 1002 ¶ 189. Karppanen also describes that “by [cooling elements 32] heat is transferred from the inside of the device casing and the display casing to the cooling air in the cooling space 20.” Ex. 1004, 7:12–14. We find that Karppanen’s cooling element 32 is “a heat exchanger located rearward of the electronic image assembly,” as is recited in claim 3. Ex. 1002 ¶ 189; Ex. 1004, 7:12–14, 8:13–16, 8:29–30, 9:1–5, Fig. 2.

Patent Owner further notes that in one embodiment Karppanen’s element 32 is a Peltier device which is an active device which pumps heat

and thus is not a heat exchanger. PO Resp. 35. Petitioner, however, has not relied on that embodiment of element 32 to meet the recited “heat exchanger.”

Patent Owner also suggests that the claim language further recites that the heat exchanger “must **form** the loop pathways.” Sur-reply 6–7. That is incorrect. Claim 3 only requires that a portion of the heat exchanger “forms *part of* said open loop airflow pathway,” and a second portion of the heat exchanger “forms *part of* said closed loop airflow pathway.” Ex. 1001, 10:19–22 (emphasis added). This is true for Karppanen’s element 32 as the heat exchanger.

As shown in the annotated figures above, the closed loop path passes through the part 60 fins of element 32, and the open loop path passes through the part 62 fins of element 32. Therefore, part 60 fins form a part of the closed loop pathway because they partially define the boundary and shape of the closed loop pathway, and part 62 fins form a part of the open loop pathway because they partially define the boundary and shape of the open loop pathway.

For the foregoing reasons, we are persuaded that Karppanen discloses the additional limitations of claim 3.

Our analysis regarding the rationale for the combination Karppanen and Larson and the evidence of secondary considerations of nonobviousness discussed above for claim 1 applies equally to claim 3. *See supra* § II.D.4.h(1)–(7).

We have reviewed the totality of the evidence before us, both for and against obviousness. The evidence of obviousness outweighs the evidence of nonobviousness. Petitioner has shown by a preponderance of the

evidence that the subject matter of claim 3 would have been obvious over Karppanen and Larson.

7. *Claim 4*

Claim 4 depends from claim 3 and further recites:

an inlet located at a first portion of said housing for ingesting said ambient air into said open loop airflow pathway; and

an exhaust located at a second portion of said housing for exhausting said ambient air from said open loop airflow pathway.

Ex. 1001, 10:23–29.

With regard to the claimed inlet, Petitioner explains that Karppanen teaches this added limitation because in Karppanen’s system, cover 24 that forms the housing includes vents 34 (“inlet”) at its bottom for ingesting ambient air into the cooling space that is the open loop airflow pathway. Pet. 41–42 (citing Ex. 1002 ¶¶ 194–196; Ex. 1004, 7:16–22; Fig. 1).

With regard to the claimed exhaust, Petitioner explains that Karppanen teaches this added limitation because in Karppanen’s system, cover 24 that forms the housing includes vents 34 (“an exhaust”) at its top for exhausting ambient air from the cooling space 20 that is the open loop airflow pathway. Pet. 42–44 (citing Ex. 1002 ¶¶ 197–199; Ex. 1004, 7:16–22; Fig. 1).

Petitioner’s assertions are supported by the cited evidence. We find that Larson discloses the added limitations of claim 4. Patent Owner argues a lack of motivation to combine Karppanen and Larson and presents objective evidence of nonobviousness. PO Resp. 50–65. Our analysis regarding the rationale for the combination of Karppanen and Larson and the

evidence of secondary considerations of nonobviousness, discussed above for claim 1, also applies to claim 4. *See supra* § II.D.4.h(1)–(7).

We have considered the entirety of the evidence before us, both for and against obviousness, and weighed the evidence accordingly. The evidence of obviousness outweighs the evidence of nonobviousness. Petitioner has shown by a preponderance of the evidence that claim 4 would have been obvious over Karppanen and Larson.

8. *Claim 5*

Claim 5 depends from claim 1 and further recites: “wherein: said at least one polarizer comprises a linear polarizer.” Ex. 1001, 10:30–31.

Petitioner explains that Larson’s auxiliary polarizer 20 can be a linear polarizer. Pet. 44 (citing Ex. 1002 ¶¶ 200–202, Ex. 1005, 4:30–34, Fig. 4). Patent Owner argues a lack of motivation to combine Karppanen and Larson and presents objective evidence of nonobviousness. PO Resp. 50–65.

We find that Larson discloses the added limitation of claim 5. Our analysis regarding the rationale for the combination of Karppanen and Larson and the evidence of secondary considerations of nonobviousness, discussed above for claim 1, also applies to claim 5. *See supra* § II.D.4.h(1)–(7). We have considered the entirety of the evidence before us, both for and against obviousness, and weighed the evidence accordingly. The evidence of obviousness outweighs the evidence of nonobviousness. Petitioner has shown by a preponderance of the evidence that claim 5 would have been obvious over Karppanen and Larson.

9. *Independent Claim 6*

Petitioner addresses claim 6 on pages 44–52 of the Petition. Petitioner notes substantial similarities between claims 1 and 6. Pet. 44–52. For

instance, Petitioner asserts that recitation [6 pre] and limitation 6[a] are identical, respectively, to recitation [1 pre] and limitation [1a]. Pet. 44. Petitioner notes non-substantive differences. For example, where claim 1 recites “forward portion,” claim 6 recites “front portion” (*id.*); where claim 1 recites “closed loop airflow pathway,” claim 6 recites “closed loop gas circulation pathway” (*id.* at 45); where claim 1 recites “extends between,” claim 6 recites “passes between” (*id.*); where claim 1 recites “air circulation device,” claim 6 recites “gas circulation device” (*id.* at 48); where claim 1 recites a pathway “passing through the housing,” claim 6 recites a pathway “contained within the housing” (*id.* at 46); where claim 1 recites “circulating gas through the closed loop,” claim 6 recites “circulating gas around the closed loop” (*id.* at 49). Petitioner explains that circulating gas *through* the closed loop is the same as circulating gas *around* the closed loop, because the path is a loop. *Id.* (citing Ex. 1002 ¶ 224).

Petitioner explains that limitation [6c] is essentially the same as limitation [1d]. Pet. 45. Petitioner explains that limitation [6d] is essentially the same as limitation [1c]. *Id.* at 45–46. Petitioner explains that limitation [6h] is essentially the same as limitation [1e]. *Id.* at 48–49.

Patent Owner does not dispute the above-noted comparison by Petitioner of similarities between claim 1 and claim 6. We are persuaded thereby and proceed further on that basis. Essentially the same elements will not be discussed again. The same analysis and reasoning from claim 1 apply for the corresponding counterparts in claim 6.

Petitioner specifically accounts for limitations that are present in claim 6 but not in claim 1. *Id.* at 44–52. Limitation 6[b] requires the cover panel to be “transparent.” Petitioner explains that Karppanen’s “front plate

46,” which Petitioner relies on as the cover panel, is described as “transparent.” *Id.* at 45 (citing Ex. 1004, 7:31–35). Patent Owner does not dispute that Karppanen’s front plate 46 is described as being transparent. We are persuaded that Karppanen’s front plate 46, relied on by Petitioner as the claimed cover panel, is transparent.

Limitation [6e] recites: “an inlet located at a first portion of said housing for ingesting ambient air into said open loop airflow pathway.” Petitioner explains that in Karppanen’s system, cover 24 (which forms a part of the housing) includes vents 34 (“an inlet”) at the bottom (“a first portion of said housing”) for ingesting ambient air into cooling space 20 (“said open loop airflow pathway”). Pet. 41 (citing Ex. 1002 ¶¶ 194–196), 46–47 (relying on analysis from claim 4). On page 42 of the Petition, Petitioner provides an annotated version of Figure 1 of Karppanen, reproduced below:

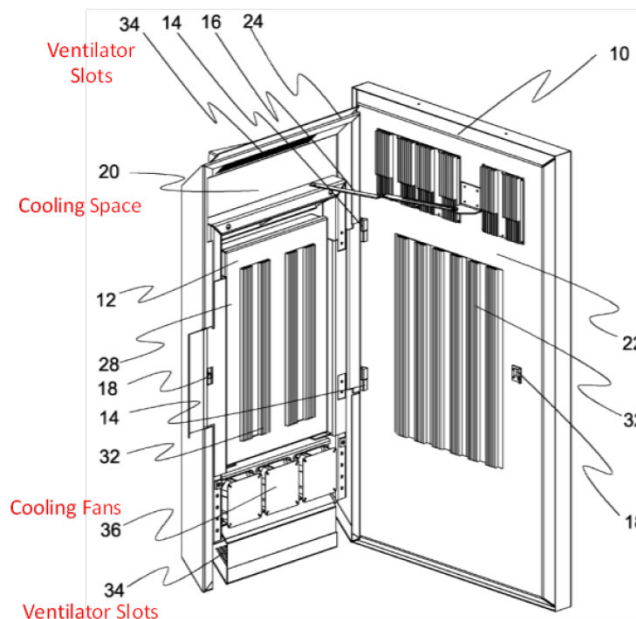


Figure 1 is a perspective view of an electronic information board according to Karppanen. Ex. 1004, 6:4–5 (color annotations added by Petitioner).

Petitioner additionally cites to Karppanen which describes:

In the first edge of the cover 24 pointed downward and the second edge pointed upward there are ventilator slots 34, which enable the movement of air from the outside of the device to the cooling space and from the cooling space back to the outside of the device When required, the ventilator slots can be provided with filters in order to prevent the access of impurities to the ventilation space. In the cover 24 there are cooling fans 36, by which the circulation of air through the cooling space is regulated.

Ex. 1004, 7:16–22 (cited at Pet. 42).

With regard to these assertions, Patent Owner does not present counterarguments. Petitioner’s assertions are supported by the cited evidence. We are persuaded that Karppanen discloses limitation [6e].

Limitation [6f] recites: “an exhaust located at a second portion of said housing for exhausting said ambient air from said open loop airflow pathway.” Ex. 1001, 10:48–50. Petitioner explains that in Karppanen’s system, cover 24 (which forms a part of the housing) includes vents 34 (“an exhaust”) at the top (“a second portion of said housing”) for exhausting ambient air from cooling space 20 (“said open loop airflow pathway”). Pet. 42–43 (citing Ex. 1002 ¶¶ 197–199), 47 (relying on analysis from claim 4). With regard to these assertions, Patent Owner does not present counterarguments. Petitioner’s assertions are supported by the cited evidence. We are persuaded that Karppanen discloses limitation [6f].

Limitation [6g] recites: “an air circulation device positioned along said open loop airflow pathway between said inlet and said exhaust, wherein said air circulation device is configured to force said ambient air through the open loop airflow pathway when activated.” Ex. 1001, 10:51–55. Petitioner explains that “Karppanen’s system includes fans 36 to force ambient air

through the cooling space 20.” Pet. 47 (citing Ex. 1002 ¶¶ 218–221). Petitioner already explained, in the context of limitation [1d], that cooling space 20 is in an open loop pathway because air from the atmosphere is drawn in inside cooling space 20, passes therethrough, and is exhausted to the atmosphere. *Id.* at 32 (citing Ex. 1001, 7:16–22; Ex. 1002 ¶ 164). Patent Owner does not dispute these assertions of Petitioner, which we find to be supported by the cited evidence. We are persuaded that Karppanen discloses limitation [6g].

Limitation [6i] recites: “a heat exchanger located rearward of the electronic image assembly, wherein a first portion of said heat exchanger forms part of said open loop airflow pathway, and wherein a second portion of said heat exchanger forms part of said closed loop gas circulation pathway.” Ex. 1001, 10:59–63. Petitioner notes that this claim element is substantially the same as those recited in claim 3. Pet. 49–50. In that regard, Patent Owner does not disagree.

Petitioner asserts “[f]or the reasons provided for claim 3, Karppanen teaches this claim element [6i].” Pet. 50 (citing Ex. 1002 ¶¶ 226–227). Patent Owner presents the same arguments as it presents for claim 3. PO Resp. 31–40. Patent Owner argues that Karppanen’s element 32 is not a heat exchanger because it does not include enclosed channels or tubes, and because it is a finned wall or a heat sink. *Id.* at 31–37. Patent Owner also argues that Karppanen’s element 32 does not form either the open loop airflow pathway or the closed loop airflow pathway. *Id.* at 37–40. We have already addressed and rejected these arguments in our analysis of claim 3. Our reasoning need not be repeated here.

For the same reasons discussed above for claim 3, we are persuaded that Karppanen discloses limitation [6i].

Limitation [6j] recites:

one or more solar energy reduction layers located at said transparent cover panel, wherein each of said one or more solar energy reduction layers is configured to prevent a portion of solar energy entering said transparent cover panel from thermally interacting with the circulating gas at said portion of said closed loop gas circulation pathway passing between said transparent cover panel and said electronic image assembly or thermally interacting with said electronic image assembly.

Ex. 1001, 10:64–11:6. Petitioner explains that the “polarizer” of limitation [1f] discussed above satisfies the requirements of limitation [6j]. Pet. 50.

Petitioner asserts that Larson’s polarizer is a solar energy reduction layer. *Id.* (citing Ex. 1002 ¶ 229). Petitioner also notes that claim 8 of the ’142 patent recites: “at least one of said one or more solar energy reduction layers comprise a polarizer.” *Id.* Petitioner explains that because Larson’s polarizer 20 is located “at an inward facing surface of said cover panel,” it is located “at said transparent cover panel.” *Id.* at 50 (citing Ex. 1002 ¶ 230).

On page 51 of the Petition, Petitioner provides an annotated version of part of Karppanen’s Figure 2, reproduced below, showing the position of a polarizer added according to the teachings of Larson as explained above in the context of limitation [1f]:

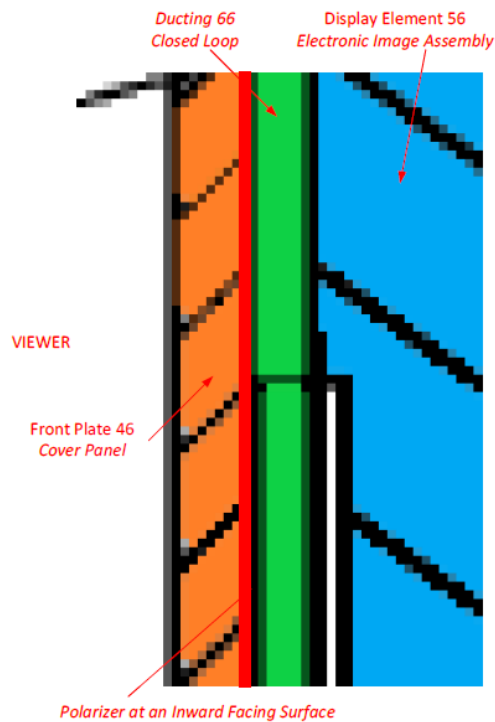


Figure 2 is a cross-section of an embodiment of Karppanen’s electronic information board. Ex. 1004, 6:7–8 (color annotations by Petitioner).

In this figure, transparent front plate 46 is colored orange, a portion of the closed loop is colored green, the display element is colored blue, and Larson’s polarizer 20 (added to Karppanen) is colored red. Pet. 50. Petitioner asserts that the polarizer is configured to prevent at least some sunlight striking the cover panel from traveling beyond the cover panel, because the polarizer is an absorbing polarizer. *Id.* at 51–52. Petitioner asserts that Larson discloses a polarizer as an absorbing layer that can absorb ambient light and provide a “high contrast output at high ambient illumination levels.” *Id.* at 35 (citing Ex. 1005, 1:11–17, 1:22–27, 2:33–39).

Alternatively, Petitioner asserts:

Moreover, Larson discloses that an “antireflection coating[] 6 may be added to one or **both sides** of the cover glass 4.” (Ex. 1005, 1:34–36, FIG. 1.) The antireflection coating can

also block some wavelengths, i.e., some incident solar energy from entering the cover glass **4** (“**said transparent cover panel**”) from reaching the gap **9**, i.e., the front portion of the closed loop in Karppanen’s system. (Ex. 1002, ¶ 233.)

Id. at 52.

According to Petitioner, either Larson’s polarizer 20 or antireflection coating 6, when incorporated into Karppanen’s system, satisfies the claimed one or more solar energy reduction layers. *Id.* Petitioner discusses motivation to combine the teachings of Karppanen and Larson on pages 57–63 of the Petition, as we have already discussed above in the context of limitation [1f].

Patent Owner presents the same arguments it made for claim 1 with respect to alleged lack of motivation to combine teachings of Karppanen and Larson. PO Resp. 50–52. We have discussed and rejected those arguments when discussing claim 1 above. Our reasoning need not be repeated here. We are persuaded that the combination of Karppanen and Larson, i.e., adding either Larson’s polarizer 20 or Larson’s antireflection coating 6 to Karppanen’s system, teaches limitation [6j].

Our analysis regarding the rationale for the combination Karppanen and Larson and the evidence of secondary considerations of nonobviousness discussed above for claim 1 applies equally to claim 6. *See supra* § II.D.4.h(1)–(7).

We have reviewed the totality of the evidence before us, both for and against obviousness. The evidence of obviousness outweighs the evidence of nonobviousness. Petitioner has shown by a preponderance of the evidence that claim 6 would have been obvious over Karppanen and Larson.

10. *Claim 7*

Claim 7 depends from claim 6 and further recites:

wherein:

said air circulation device comprises one or more fans
assemblies; and

said gas circulation device comprises one or more fan
assemblies.

Ex. 1001, 11:7–11.

Petitioner cites Karppanen’s cooling fans 36 for teaching the air circulation device. Pet. 52 (citing Ex. 1002 ¶ 237; Ex. 1004, 7:21–22; Fig. 1). Petitioner also cites Karppanen’s fans 64 for teaching the gas circulation device. *Id.* at 53 (citing Ex. 1002 ¶ 238; Ex. 1004, 9:3–5; Fig. 1). Patent Owner argues a lack of motivation to combine Karppanen and Larson and presents objective evidence of nonobviousness. PO Resp. 50–65.

We find that Larson discloses the added limitations of claim 7. Our analysis regarding the rationale for the combination of Karppanen and Larson and the evidence of secondary considerations of nonobviousness, discussed above for claim 1, also applies to claim 7. *See supra* § II.D.4.h(1)–(7).

We have considered the entirety of the evidence before us, both for and against obviousness, and weighed the evidence accordingly. The evidence of obviousness outweighs the evidence of nonobviousness. Petitioner has shown by a preponderance of the evidence that claim 7 would have been obvious over Karppanen and Larson.

11. Claim 8

Claim 8 depends from claim 6 and further recites: “wherein: at least one of said one or more solar energy reduction layers comprise a polarizer.” Ex. 1001, 11:12–14.

Petitioner asserts that Larson teaches this limitation because, as Petitioner discussed for limitation [6j], the solar energy layer that Larson discloses is auxiliary polarizer 20 and/or antireflection coating 6. Pet. 53 (citing Ex. 1002 ¶ 239; Ex. 1005, 2:33–39). Patent Owner argues a lack of motivation to combine Karppanen and Larson and presents objective evidence of nonobviousness. PO Resp. 50–65.

We find that Larson discloses the added limitation of claim 8. Our analysis regarding the rationale for the combination of Karppanen and Larson and the evidence of secondary considerations of nonobviousness, discussed above for claim 1, also applies to claim 8. *See supra* § II.D.4.h(1)–(7).

We have considered the entirety of the evidence before us, both for and against obviousness, and weighed the evidence accordingly. The evidence of obviousness outweighs the evidence of nonobviousness. Petitioner has shown by a preponderance of the evidence that claim 8 would have been obvious over Karppanen and Larson.

12. Claim 9

Claim 9 depends from claim 8 and further recites: “wherein: said polarizer comprises a linear polarizer.” Ex. 1001, 11:15–16.

Petitioner explains: “Claim 9 is identical to claim 5. For the reasons provided for claim 5, Karppanen in view of Larson teaches this claim.” Pet. 53 (citing Ex. 1002 ¶ 240).

Our discussion of claim 5 above equally applies to claim 9. Patent Owner argues a lack of motivation to combine Karppanen and Larson and presents objective evidence of nonobviousness. PO Resp. 50–65.

We find that Larson discloses the added limitation of claim 9. Our analysis regarding the rationale for the combination of Karppanen and Larson and the evidence of secondary considerations of nonobviousness, discussed above for claim 1, also applies to claim 9. *See supra* § II.D.4.h(1)–(7).

We have considered the entirety of the evidence before us, both for and against obviousness, and weighed the evidence accordingly. The evidence of obviousness outweighs the evidence of nonobviousness. Petitioner has shown by a preponderance of the evidence that claim 9 would have been obvious over Karppanen and Larson.

13. Claim 10

Claim 10 depends from claim 6 and further recites: “wherein: at least one of said one or more solar energy reduction layers comprise a film having anti-reflection properties.” Ex. 1001, 11:17–19.

Petitioner asserts that Larson teaches this limitation because, as Petitioner discussed for limitation [6j], a solar energy layer Larson discloses is auxiliary polarizer 20 and Larson describes that auxiliary polarizer 20 may include antireflective material. Pet. 53 (citing Ex. 1002 ¶ 241; Ex. 1005, 4:9–13; Fig. 2). Petitioner further notes that Larson describes that an antireflection coating may be added to one or both sides of cover glass 4. *Id.* (citing Ex. 1005, 1:34–36, Fig. 1).

Patent Owner argues a lack of motivation to combine Karppanen and Larson and presents objective evidence of nonobviousness. PO Resp. 50–

65. We find that Larson discloses the added limitation of claim 10. Our analysis regarding the rationale for the combination of Karppanen and Larson and the evidence of secondary considerations of nonobviousness, discussed above for claim 1, also applies to claim 10. *See supra* § II.D.4.h(1)–(7).

We have considered the entirety of the evidence before us, both for and against obviousness, and weighed the evidence accordingly. The evidence of obviousness outweighs the evidence of nonobviousness. Petitioner has shown by a preponderance of the evidence that claim 10 would have been obvious over Karppanen and Larson.

14. Claim 11

Claim 11 depends from claim 6 and further recites:

wherein:

at least a first one of said one or more solar energy reduction layers comprise a polarizer; and

at least a second one of said one or more solar energy reduction layers comprise a film having anti-reflection properties.

Ex. 1001, 11:20–25.

Petitioner explains: “These claim elements are identical, in substance, to claims 8 and 10, respectively. Therefore, for the reasons provided for claims 8 and 10, Larson teaches this claim element.” Pet. 54 (citing Ex. 1002 ¶ 242–243).

Our discussion of claims 8 and 10 above equally applies to claim 11. Patent Owner argues a lack of motivation to combine Karppanen and Larson and presents objective evidence of nonobviousness. PO Resp. 50–65.

We find that Larson discloses the added limitations of claim 11. Our analysis regarding the rationale for the combination of Karppanen and Larson and the evidence of secondary considerations of nonobviousness, discussed above for claim 1, also applies to claim 11. *See supra* § II.D.4.h(1)–(7).

We have considered the entirety of the evidence before us, both for and against obviousness, and weighed the evidence accordingly. The evidence of obviousness outweighs the evidence of nonobviousness. Petitioner has shown by a preponderance of the evidence that claim 11 would have been obvious over Karppanen and Larson.

15. Independent Claim 12

Claim 12 is a method claim. Ex. 1001, 11:26–12:16. Petitioner addresses claim 12 on pages 54–56 of the Petition. The steps of claim 12 correspond to functions performed by various elements of claims 1 and 6. Petitioner relies on its analysis of claims 1 and 6 to explain the alleged unpatentability of claim 12. Pet. 54–56.

For instance, Petitioner asserts Karppanen discloses [12pre] “for the reasons provided for element 1[pre].” *Id.* at 54. Petitioner also asserts: “Karppanen discloses [limitation [12a]] for the reasons provided for 1[a] under Ground 1.” *Id.* Petitioner further asserts: “For the reasons provided for 1[b], 1[c], and 1[e] under [alleged obviousness over Karppanen and Larson], Karppanen in view of Larson teaches all of the limitations of 12[b].” *Id.* at 55

As another example, Petitioner asserts: “For the reasons provided for claim elements 1[d] and 6[g] under [alleged obviousness over Karppanen and Larson], Karppanen in view of Larson teaches element 12[c].” *Id.* at

55–56. As still another example, Petitioner asserts: “the combination of Karppanen and Larson teaches [limitation [12d] for the reasons provided in [alleged obviousness over Karppanen and Larson] for claim elements 1[f] and 6[j].” *Id.* at 56.

Patent Owner does not present counter arguments for these claims other than those it has presented for claims 1 and 6. We have addressed and rejected those arguments in the context of claims 1 and 6.

Our analysis regarding the rationale for the combination of Karppanen and Larson and the evidence of secondary considerations of nonobviousness discussed above for claims 1 and 6 also applies to claim 12. *See supra* § II.D.4.h(1)–(7).

We have reviewed the totality of the evidence before us, both for and against obviousness. The evidence of obviousness outweighs the evidence of nonobviousness. Petitioner has shown by a preponderance of the evidence that claim 12 would have been obvious over Karppanen and Larson.

16. Claim 13

Claim 13 depends from claim 12 and further recites: “wherein: at least one of said one or more solar energy reduction layers comprise a polarizer.” Ex. 1001, 12:17–19.

Petitioner explains: “This claim is identical to claim 8. For the reasons provided for claim 8 above, Karppanen in view of Larson teaches this claim.” Pet. 56 (citing Ex. 1002 ¶ 261).

Our discussion of claim 8 above equally applies to claim 13. Patent Owner argues a lack of motivation to combine and presents objective evidence of nonobviousness. PO Resp. 50–65.

We find that Larson discloses the added limitation of claim 13. Our analysis regarding the rationale for the combination of Karppanen and Larson and the evidence of secondary considerations of nonobviousness, discussed above for claim 1, also applies to claim 13. *See supra* § II.D.4.h(1)–(7).

We have considered the entirety of the evidence before us, both for and against obviousness, and weighed the evidence accordingly. The evidence of obviousness outweighs the evidence of nonobviousness. Petitioner has shown by a preponderance of the evidence that claim 13 would have been obvious over Karppanen and Larson.

17. Claim 14

Claim 14 depends from claim 13 and further recites: “wherein: at least one of said one or more solar energy reduction layers comprise a film having anti-reflection properties.” Ex. 1001, 12:20–22.

Petitioner explains: “This claim is identical to claim 10. For the reasons provided for claim 10 above, Karppanen in view of Larson teaches this claim.” Pet. 56 (citing Ex. 1002 ¶ 261).

Our discussion of claim 10 above equally applies to claim 14. Patent Owner argues a lack of motivation to combine and presents objective evidence of nonobviousness. PO Resp. 50–65.

We find that Larson discloses the added limitation of claim 14. Our analysis regarding the rationale for the combination of Karppanen and Larson and the evidence of secondary considerations of nonobviousness, discussed above for claim 1, also applies to claim 14. *See supra* § II.D.4.h(1)–(7).

We have considered the entirety of the evidence before us, both for and against obviousness, and weighed the evidence accordingly. The evidence of obviousness outweighs the evidence of nonobviousness. Petitioner has shown by a preponderance of the evidence that claim 14 would have been obvious over Karppanen and Larson.

18. *Claim 15*

Claim 15 depends from claim 12 and further recites:

thermally transferring heat between said circulating air in said closed loop airflow pathway and said ambient air in said second airflow pathway at a heat exchanger common to said closed loop airflow pathway and said second airflow pathway.

Ex. 1001, 12:25–29. Petitioner accounts for the limitations of claim 15 on page 57 of the Petition. Pet. 57. Petitioner refers back to its accounting of the “heat exchanger” recited in limitation [6i] of claim 6. *Id.* Our discussion of limitation [6i] above in the context of claim 6 equally applies here. Petitioner’s assertions are supported by the cited evidence, despite Patent Owner’s arguments to the contrary, discussed below.

Patent Owner argues that Karppanen’s element 32 is not a heat exchanger because it does not include enclosed channels or tubes, and because it is a finned wall or a heat sink. PO Resp. 31–37. These are the same arguments Patent Owner made for claim 3, and we have discussed and rejected these arguments in our analysis of claim 3 above. Our reasoning need not be repeated here.

Patent Owner also argues that Karppanen’s element 32 does not form either the open loop airflow pathway or the closed loop airflow pathway. *Id.* at 37–40. However, no language of claim 15 conveys that the heat changer

must form any portion of the open loop airflow pathway or the closed loop airflow pathway. Patent Owner does not identify any such express language in claim 15 or explain how any express language should be understood as such. Accordingly, the argument is without merit.

Our analysis regarding the rationale for the combination Karppanen and Larson and the evidence of secondary considerations of nonobviousness discussed above for claim 1 also applies to claim 15. *See supra* § II.D.4.h(1)–(7).

We have reviewed the totality of the evidence before us, both for and against obviousness. The evidence of obviousness outweighs the evidence of nonobviousness. Petitioner has shown by a preponderance of the evidence that claim 15 would have been obvious over Karppanen and Larson.

E. Alleged Obviousness of Claims 1–15 over Yare and Larson

1. Overview of Yare

Yare relates to a display cabinet including a sealed airtight compartment for mounting a display system, and a heat transfer means such as a heat exchanger to dissipate heat from the airtight compartment to the surrounding environment through thermal communication with an unsealed atmospheric zone. Ex. 1006, code (57). Yare states that its cabinet has improved cooling facilities and is particularly suitable for use in providing large scale displays in public places. Ex. 1006, 1:4–6. Specifically, Yare describes:

In a preferred embodiment, a zone of the cabinet containing the display system is sealed to the external environment. The sealed zone includes an internal cooling system that is not open to atmospheric air. Atmospheric air is drawn into a separate zone

that allows heat to be exchanged between the two zones. Heat is then removed by expulsion of the heated atmospheric air from the casing.

Id. at 2:8–12.

Regarding the zone into which atmospheric air is drawn, Yare describes:

The display cabinet may further comprise an atmospheric zone, the heat transfer means being arranged to communicate heat from the substantially atmospherically sealed zone to the atmospheric zone.

The atmospheric zone may include air transfer means arranged to draw air from outside the cabinet and expel air in the atmospheric zone heated by the heat transfer means.

The air transfer means may include one or more fans.

The heat transfer means may comprise a heat exchanger.

Id. at 2:19–29.

Regarding the sealed zone, Yare describes:

The substantially atmospherically sealed zone may include air circulation means arranged to circulate air along the heat transfer means.

The air circulation means may include a baffle plate.

The substantially atmospherically sealed zone may include air pressurisation means arranged to project air within the atmospherically sealed zone [to] circulate air along the mounted display.

The air pressurisation means may include one or more fans.

Id. at 3:1–11.

Figure 4 of Yare, annotated by Petitioner and appearing on page 26 of the Petition, is reproduced below:

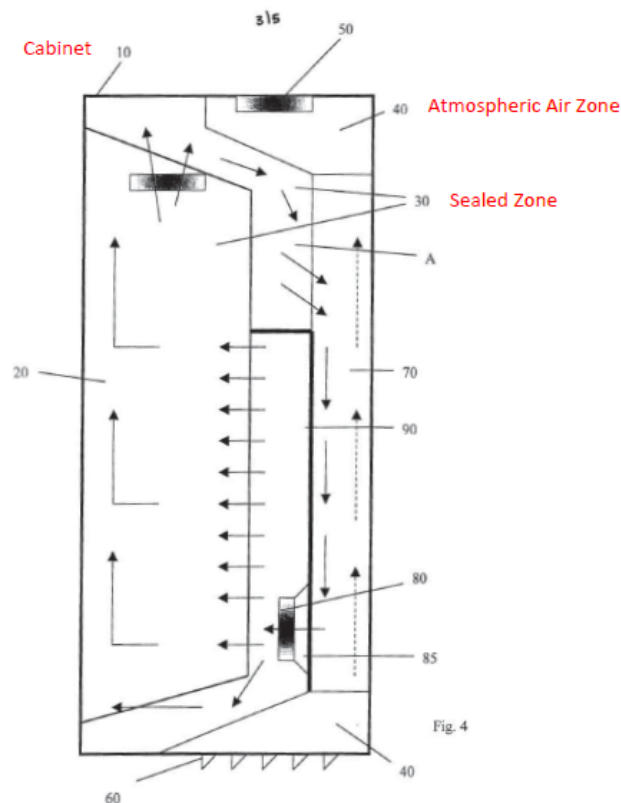


Figure 4 is a partial cross-sectional view of a system according to Yare, with color annotations by Petitioner labeling the cabinet, the atmospheric air zone, and the sealed zone. Ex. 1006, 3:25–27.

In the above-reproduced Figure, “[d]otted arrows show movement of air in the atmospheric air zone 40 whilst solid arrows show movement of air in the sealed zone 30.” Ex. 1006, 4:25–27.

Yare describes:

Air is drawn through the atmospheric air zone 40 by fans 50. As the air is drawn through the atmospheric air zone 40 it passes across one or more surfaces of the heat exchanger 70. Similarly, air within the sealed zone 30 is drawn into the heat exchanger 70 behind the baffle plate 90 by the fans 80 at point A and passes across one or more other surfaces of the heat exchanger 70.

Air is circulated within the sealed zone 30 due to operation of the fans 80 within the cabinet and fans 25 within the display 20. Air coming into contact with hot components of the display 20

absorbs some of the heat. Due to operation of the fans 25 and 80 and orientation of the baffle plate 90, air within the sealed zone 30 is directed along one or more surfaces of the heat exchanger 70 around the baffle plate 90. Heat is transferred by the heat exchanger 70 from hot air in the sealed zone 30 to cooler atmospheric air within the atmospheric air zone 40. Heated air in the atmospheric air zone 40 is eventually ejected from the cabinet via exhausts in the fans 50.

The cooled air in the sealed zone is then forced through the fans 80 at the base of the heat exchanger 70 into a pressure zone 85.

As air is forced into the pressure zone 85, existing air in the pressure zone 85 is forced through vents in the rear portion 35 of the display 20. The air circulates around the display 20, aided by standard internal cooling system of the display 20. In the illustrated embodiment, the internal cooling system includes the fans 25. The air is heated by hot components as it circulates, and is drawn upwards by the fans 25 within the display unit and blown out of the rear portion 35 for the cycle to continue.

Id. at 4:29–5:20.

2. *Independent Claim 1*

a) *Recitation [1 pre]*

In its preamble, claim 1 recites: “A cooling system for an electronic image assembly, the cooling system comprising.” Ex. 1001, 9:55–56.

Petitioner asserts that Yare discloses such a cooling system. Pet. 63.

Specifically, Petitioner asserts Yare discloses cabinet 10 having “improved cooling facilities,” which is a cooling system, and display 20. *Id.* (citing Ex. 1002 ¶¶ 281–284). Petitioner notes that Yare describes a number of different display systems may be used, including an LCD display system.

Id. at 64 (citing Ex. 1006, 6:31–32). Petitioner identifies Yare’s LCD as the claimed electronic image assembly. *Id.* at 65.

b) Limitation [1a]

Claim 1 recites: “a housing for the electronic image assembly.”

Ex. 1001, 9:57. Petitioner asserts that Yare discloses limitation [1a] because Yare’s cabinet 10 contains display 20. Pet. 65 (citing Ex. 1002 ¶¶ 285–287; Ex. 1006, 1:4–6, 4:4–6). Yare states that display system 20 “may include one or more of a plasma display, an LCD display, a TFT display, a CRT display, an LED display, a projection display.” Ex. 1006, code (57).

c) Limitation [1b]

Claim 1 recites “a cover panel forming a forward portion of the housing, wherein the cover panel is located forward of, and at least some distance from, the electronic image assembly and is configured to permit viewing of images displayed at the electronic image assembly through said cover panel.” Ex. 1001, 9:58–63.

Petitioner asserts that Yare individually and also in combination with Larson discloses limitation [1a]. Pet. 66.

With respect to Yare individually, Petitioner asserts that one with ordinary skill in the art would have understood that at least a portion of the front part of Yare’s cabinet 10 would be transparent to allow viewers to view contents displayed on display 20, because one with ordinary skill in the art would have understood that the LCD or other type of display could not be viewed otherwise. *Id.* at 66–67 (citing Ex. 1002 ¶ 289; Ex. 1006, 1:4–6, 4:4–5).

On page 69 of the Petition, Petitioner provides an annotated version of Figure 4 of Yare, reproduced below:

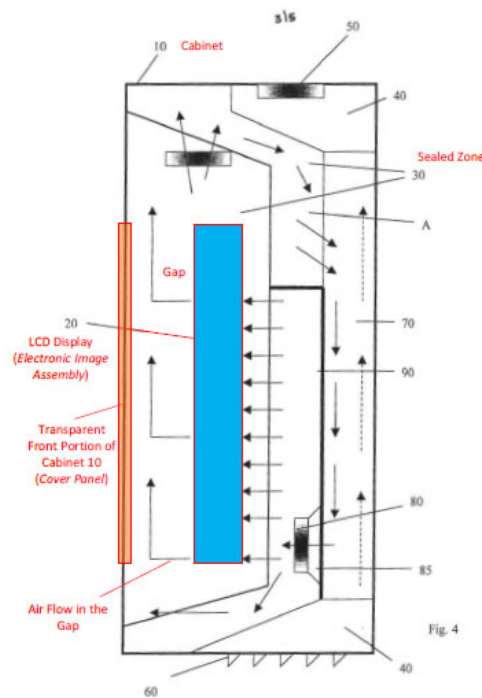


Figure 4 of Yare shows a partial cross section of Yare’s display system. Ex. 1006, 3:25–27. Petitioner has modified the figure to show a specific location in cabinet 10 for display 20.

Petitioner asserts that the transparent front portion at the front of cabinet 10, highlighted in orange in the annotated figure above, is a cover forming a forward portion of the housing (cabinet 10). *Id.* at 67 (citing Ex. 1002 ¶ 290). Petitioner explains that although Yare’s figures do not actually show the location of display 20 within cabinet 10, Petitioner has depicted in the annotated figure a location spaced apart from the front portion of cabinet 10 because the “L” shaped arrows “indicate that a part of the air flow within the sealed zone 30 occurs in front of the display 20 [highlighted in blue].” *Id.* at 69.

Petitioner asserts one with ordinary skill in the art “would understand that the transparent portion of the display cabinet 10 is not in contact with,

but is spaced apart from the display 20, which would allow an airflow in the front of the display 20.” *Id.* at 69–70 (citing Ex. 1002 ¶ 292). Petitioner asserts that Yare “teaches or at least suggests” limitation [1b]. *Id.* at 70.

Alternatively, Petitioner asserts: “In light of Larson’s teachings, a POSITA would have understood that a front portion of Yare’s cabinet 10 can be glass, such as Larson’s cover glass 4, that is separated by a gap from Yare’s display 20, that can be a conventional LCD.” Pet. 70.

d) Limitation [1c]

Claim 1 further recites: “a closed loop airflow pathway passing through the housing, wherein said closed loop airflow passes around said electronic image assembly and is configured to accommodate circulating gas, and wherein at least a portion of said closed loop airflow pathway extends between said electronic image assembly and said cover panel.” Ex. 1001, 9:64–10:3. Petitioner asserts Yare discloses this closed loop pathway because “Yare’s cabinet 10 includes a sealed zone 30 through which air is circulated around the display 20, without contamination from atmospheric air, duct, etc.” Pet. 72 (citing Ex. 1002 ¶¶ 300–306).

On page 73 of the Petition, Petitioner produces an annotated and modified version of Figure 4 of Yare, reproduced below:

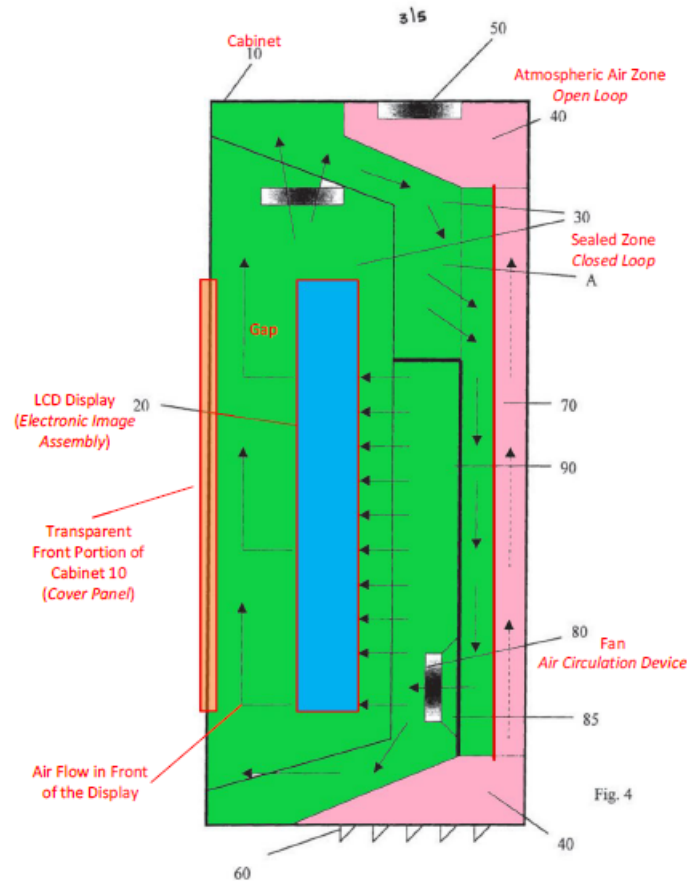


Figure 4 of Yare shows a partial cross section of Yare’s display system. Ex. 1006, 3:25–27.

Petitioner has modified Figure 4 to show a specific location in cabinet 10 for display 20.¹⁷

Petitioner notes that Yare describes: “Air is circulated within the sealed zone 30 (highlighted green) due to operation of the fans 80 within the cabinet and fans 25 within the display 20.” Pet. 72 (citing Ex. 1006, 5:1–2).

¹⁷ In discussing limitation [1b], Petitioner explains that although actual Figure 4 of Yare does not show the location of the display 20 within cabinet 10, the “L” shaped arrows “indicate that a part of the air flow within the sealed zone 30 occurs in front of the display 20 [highlighted in blue].” Pet. 69.

Petitioner also explains:

Because the sealed zone 30 [highlighted green] is contained within the cabinet 10 (the “**housing**”), and because sealed zone 30 and ambient air zone 40 are sealed from each other, the sealed zone 30 is a “gas pathway within a display housing containing gas that is essentially isolated from external air,” (Ex. 1023, p.1) i.e., a “**closed loop airflow pathway passing through**” the cabinet 10 (“**the housing**”), that surrounds the display 20 (“**passes around said electronic image assembly**”).

Pet. 73–74.

Petitioner further explains that a portion of the air flow in sealed zone 30 extends along a pathway between the front of display 20 and the transparent front portion of cabinet 10. *Id.* at 74 (citing Ex. 1002 ¶ 305). Petitioner further states: “To the extent Yare does not explicitly depict a cover panel at some distance from the display 20, Larson discloses such a configuration, that can be included in Yare’s system, as discussed above for 1[b].” *Id.*

Patent Owner, on the other hand, asserts that all of Yare’s figures show that display 20 abuts the front of cabinet 10. PO Resp. 42. As illustration, and in support of its assertion, Patent Owner presents an annotated version of Yare’s Figure 1 (PO Resp. 43):

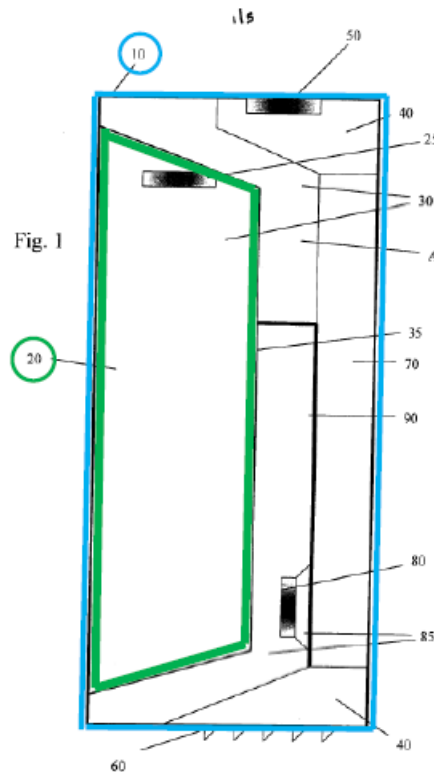


Figure 1 is a cross section of a system according to an embodiment of Yare. Ex. 1006, 3:25–26. Patent Owner has colored cabinet 10 in blue and display 20 in green.

We need not decide whether display 20 abuts the front of cabinet 10 as Patent Owner contends, or is offset from the front of cabinet 10 as Petitioner asserts, because, in either case, display 20 is not the LCD itself. For the same reason, we also need not reach Petitioner’s alternative contention that placing display 20 at a location spaced apart from the front of cabinet 10 would have been obvious over Yare and Larson. Placing display 20 at such an offset location does not help Petitioner.

Petitioner misreads display system 20 in Yare as itself an LCD, rather than as a configured system containing an LCD and other parts such as a fan. *See* Ex. 1005, code (57), 5:1–2. Given that display system 20 is not itself an LCD but merely contains an LCD, Petitioner’s contentions about airflow

“around the display 20” are not consistent with Yare’s disclosures. Indeed, Petitioner in the Petition does not discuss airflow within element 20.¹⁸

We agree with Patent Owner that “Petitioner and its expert confuse the display system 20—which is an electronic display [including within it an LCD]—with an electronic image assembly.” PO Resp. 44. In Petitioner’s modified version of Yare’s Figure 4, produced on page 73 of the Petition and reproduced above, the depicted airflow is external to display 20 (shown as a blue rectangle) and does not represent airflow within display 20 and passing around an LCD. We also agree with Patent Owner that “[a] proper reading of Yare makes it clear that there is no information regarding how air flows within the electronic display 20 in the sealed zone, and whether the display 20 is configured to allow sealed zone 30 air to travel between any front transparent cover panel and the electronic image assembly.” *Id.* at 47.

Accordingly, Petitioner has not shown that Yare and Larson together teach limitation [1c].

e) Limitation [1e]

Claim 1 recites: “at least one air circulation device positioned to force the circulating gas through the closed loop airflow pathway when activated.” Ex. 1001, 10:7–9. Petitioner asserts that Yare discloses this limitation because Yare’s display cabinet 10 includes fans 80 and 25 within sealed zone 30 that is the closed loop airflow pathway. Pet. 76 (citing Ex. 1002 ¶¶ 312–315).

¹⁸ During oral hearing, counsel for Petitioner expressly acknowledged that the LCD is a component within element 20 and that element 20 has its own casing. Paper 52, 30:12–14.

However, because Petitioner has not shown that Yare discloses the “closed loop airflow pathway” of limitation [1c], Petitioner also has not shown an air circulation device positioned to force circulating gas through the closed loop airflow pathway. We are not persuaded that Yare teaches or would have suggested limitation [1e].

f) Conclusion

Even without considering the objective evidence of nonobviousness submitted by Patent Owner, we determine that for reasons discussed above, Petitioner has not shown that Yare and Larson would have rendered obvious the subject matter of claim 1. Petitioner has not proven by a preponderance of the evidence that claim 1 would have been obvious over Yare and Larson.

3. Claims 2–5

Claims 2–5 depend, directly or indirectly, from claim 1. Ex. 1001, 10:14–31. The deficiency of Petitioner’s analysis for claim 1, as discussed above, applies equally to claims 2–5, without need to consider Patent Owner’s objective evidence of nonobviousness. Petitioner has not proven by a preponderance of the evidence that claims 2–5 would have been obvious over Yare and Larson.

4. Independent Claim 6

Limitation [6d] reads as follows:

[6d] a closed loop gas circulation pathway contained within the housing, wherein a portion of said closed loop gas circulation pathway passes between said transparent cover panel and said electronic image assembly;

Ex. 1001, 10:41–44. It is substantially similar to limitation [1c]:

[1c] a closed loop airflow pathway passing through the housing, wherein said closed loop airflow passes around said electronic image assembly and is configured to accommodate circulating gas, and *wherein at least a portion of said closed loop airflow pathway extends between said electronic image assembly and said cover panel;*

Id. at 9:64–10:3 (emphasis added).

Limitation [6h] reads as follows:

[6h] a gas circulation device positioned along said closed loop gas circulation pathway to force circulating gas around the closed loop gas circulation pathway when activated;

Id. at 10:56–58. It is substantially similar to limitation [1e]:

[1e] at least one air circulation device positioned to force the circulating gas through the closed loop airflow pathway when activated;

Id. at 10:7–9.

For the same reasons discussed above with respect to limitations [1c] and [1e], Petitioner has not shown that limitations [6d] and [6h] are disclosed or would have been suggested by Yare and Larson. Petitioner has not proven by a preponderance of the evidence that claim 6 would have been obvious over Yare and Larson.

5. *Claims 7–11*

Claims 7–11 all depend, directly or indirectly, from claim 6.

Ex. 1001, 11:7–25. The deficiency of Petitioner’s analysis for claim 6, as discussed above, applies equally to claims 7–11. Petitioner has not proven by a preponderance of the evidence that claims 7–11 would have been obvious over Yare and Larson.

6. *Independent Claim 12*

Limitation [12b] reads as follows:

[12b] forcing circulating air through a closed loop airflow pathway within said housing, wherein at least a portion of said closed loop airflow pathway extends between an electronic image assembly and a cover panel forming a front portion of said housing and spaced apart from said electronic image assembly, wherein said cover panel is configured to permit viewing of images displayed at the electronic image assembly through said cover panel;

Ex. 1001, 11:30–12:7. It is substantially similar to limitations [1c] and [1e]:

[1c] a closed loop airflow pathway passing through the housing, wherein said closed loop airflow passes around said electronic image assembly and is configured to accommodate circulating gas, and wherein at least a portion of said closed loop airflow pathway extends between said electronic image assembly and said cover panel;

Ex. 1001, 9:64–10:3.

[1e] at least one air circulation device positioned to force the circulating gas through the closed loop airflow pathway when activated;

Id. at 10:7–9.

For the same reasons discussed above with respect to limitations [1c] and [1e], Petitioner has not shown that limitation [12b] is disclosed or would have been suggested by Yare and Larson. Petitioner has not proven by a preponderance of the evidence that claim 12 would have been obvious over Yare and Larson.

7. *Claims 13–15*

Claims 13–15 all depend, directly or indirectly, from claim 6.

Ex. 1001, 12:17–29. The deficiency of Petitioner’s analysis for claim 12, as

discussed above, applies equally to claims 13–15. Petitioner has not proven by a preponderance of the evidence that claims 13–15 would have been obvious over Yare and Larson.

III. CONCLUSION

We determine that Petitioner has proved by a preponderance of the evidence that claims 1–15 of the '142 patent are unpatentable.¹⁹

In summary:

Claims	35 U.S.C. §	References/Basis	Claims Shown Unpatentable	Claims Not shown Unpatentable
1–15	103	Karppanen, Larson	1–15	
1–15	103	Yare, Larson		1–15
Overall Outcome			1–15	

¹⁹ Should Patent Owner wish to pursue amendment of the challenged claims in a reissue or reexamination proceeding subsequent to the issuance of this Decision, we draw Patent Owner's attention to the April 2019 *Notice Regarding Options for Amendments by Patent Owner Through Reissue or Reexamination During a Pending AIA Trial Proceeding*. See 84 Fed. Reg. 16,654 (Apr. 22, 2019). If Patent Owner chooses to file a reissue application or a request for reexamination of the challenged patent, we remind Patent Owner of its continuing obligation to notify the Board of any such related matters in updated mandatory notices. See 37 C.F.R. § 42.8(a)(3), (b)(2).


IPR2023-00221

Patent 11,013,142 B2

IV. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that claims 1–15 of the '142 patent are unpatentable; and

FURTHER ORDERED that, because this is a Final Written Decision, parties to the proceeding seeking judicial review of the decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.

IPR2023-00221
Patent 11,013,142 B2

FOR PETITIONER:

Sanjeet Dutta
Douglas J. Kline
Naomi Birbach
GOODWIN PROCTOR LLP
sdutta@goodwinlaw.com
dkline@goodwinlaw.com
nbirbach@goodwinlaw.com

FOR PATENT OWNER:

John C. Alemanni
Carl Sanders
Michael T. Morlock
Courtney Dabbieri
David A. Reed
Andrea A. Anderson
KILPATRICK TOWNSEND & STOCKTON LLP
jalemanni@kilpatricktownsend.com
csanders@kilpatricktownsend.com
mmorlock@kilpatricktownsend.com
cdabbieri@kilpatricktownsend.com
dreed@kilpatricktownsend.com
andie.anderson@ktslaw.com