

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

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

v.

MANUFACTURING RESOURCES INTERNATIONAL, INC.
Patent Owner

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

Title: CONSTRICTED CONVECTION COOLING SYSTEM FOR AN
ELECTRONIC DISPLAY

Inter Partes Review No. IPR 2023-00221

[PETITIONERS' CORRECTED](#) PETITION FOR INTER PARTES REVIEW

OF

U.S. PATENT NO. 11,013,142

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SEC et al. v. MRI
SEC Exhibit 1027.0001
IPR 2023-00221

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LIST OF EXHIBITS

Exhibit No.	Description of Document
1001	U.S. Patent No. 11,013,142 to Dunn (“the ’142 patent”)
1002	Declaration of Robert Smith-Gillespie
1003	Curriculum Vitae of Robert Smith-Gillespie
1004	International Patent Application No. PCT/FI2006/050145 with Publication No. WO2007116116A1 to Karppanen et al. (“Karppanen”)
1005	U.S. Patent No. 6,392,727 to Larson et al. (“Larson”)
1006	United Kingdom Patent Application No. GB 2402205A to Yare (“Yare”)
1007	U.S. Patent No. 6,825,828 to Burke et al. (“Burke”)
1008	E. Fred Schubert & Jong Kyu Kim, <i>Solid-State Light Sources Getting Smart</i> , 308 <i>Science</i> 1274 (2005) (“Schubert”)
1009	Military Handbook: Reliability Prediction of Electronic Equipment, DEPARTMENT OF DEFENSE, MIL-HDBK-217F (1991) (“MIL-HDBK-217F”)
1010	Allan Webber, <i>Calculating Useful Lifetimes of Embedded Processors</i> , TEXAS INSTRUMENTS INCORPORATED, SPRABX4 (Nov. 2014) (“Webber”)

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Exhibit No.	Description of Document
1011	LIAN-TUU YEH & RICHARD C. CHU, THERMAL MANAGEMENT OF MICROELECTRONIC EQUIPMENT: HEAT TRANSFER THEORY, ANALYSIS METHODS, AND DESIGN PRACTICES (Dereje Agonafer ed., 2002) (“Yeh & Chu”)
1012	ALLAN W. SCOTT, COOLING OF ELECTRONIC EQUIPMENT (John Wiley & Sons, 1974) (“Scott”)
1013	DAVE S. STEINBERG, COOLING TECHNIQUES FOR ELECTRONIC EQUIPMENT (John Wiley & Sons, 1980) (“Steinberg”)
1014	U.S. Patent No. 5,748,269 to Harris et al. (“Harris”)
1015	U.S. Patent No. 6,504,713 to Pandolfi et al. (“Pandolfi”)
1016	U.S. Patent No. 4,327,803 to Mullejeans et al. (“Mullejeans”)
1017	U.S. Patent No. 5,002,118 to Olmstead et al. (“Olmstead”)
1018	U.S. Patent No. 6,244,333 to Bergh et al. (“Bergh”)
1019	U.S. Patent No. 4,896,218 to Vick (“Vick”)
1020	U.S. Patent No. 6,020,945 to Sawai et al. (“Sawai”)
1021	U.S. Patent No. 3,858,965 to Sumita (“Sumita”)

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Exhibit No.	Description of Document
1022	File History for U.S. Patent Application No. 16/933,932
1023	<i>Claim Construction Order, Mfg. Resource Intl., Inc. v. Civiq Smartsapes, LLC</i> , Civil Action No. 17-269-RGA (D. Del. Oct. 3, 2018)
1024	U.S. Patent No. 8,854,572 to Dunn (the “’572 patent”)
1025	U.S. Patent No. 9,629,287 to Dunn (the “’287 patent”)
1026	U.S. Patent No. 9,173,325 to Dunn (the “’325 patent”)
<u>1027</u>	<u>Redline of Corrected Petition</u>

Petition for *Inter Partes* Review of
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Petitioners Samsung Electronics Co., Ltd. and Samsung Electronics America, Inc. (“Samsung” or “Petitioners”) seek *inter partes* review and cancellation of claims 1-15 of U.S. Patent 11,013,142 (“the ’142 patent”) (Ex. 1001)¹. Petitioners’ request is supported by the Expert Declaration of Robert Smith-Gillespie (Ex. 1002), and other exhibits submitted herewith.

This Petition and supporting exhibits demonstrate that there is a reasonable likelihood that claims 1-15 of the ’142 patent are unpatentable because each claim would either is anticipated, or would have been obvious to a person of ordinary skill in the art (“POSITA”) in light of the prior art references discussed herein. Accordingly, Petitioners request that the Board institute an *inter partes* review.

¹ For purposes of this Petition, citations to patents and patent applications, including the ’142 patent, are in the form a:bb – c:dd, where “a” and “c” are column numbers, and “bb” and “dd” are line numbers.

I. MANDATORY NOTICES

A. Real Parties-in-Interest (37 C.F.R. § 42.8(b)(1))

The real parties-in-interest are 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

B. Related Matters (37 C.F.R. § 42.8(b)(2))

The '142 patent is at issue in *Manufacturing Resources, Inc. v. Samsung Electronics Co., Ltd., et al.*, Case No. 2:22-cv-00320, pending in the district court for the Eastern District of Texas (“the District Court Action”), and in *In re Certain Outdoor and Semi-Outdoor Electronic Displays, Products Containing Same, and Components Thereof*, Investigation No. 337-TA-1331, pending before the International Trade Commission (“the ITC Action”).

In both the District Court Action and the ITC Action, the Patent Owner also alleged infringement of U.S. Patent No. 8,854,595 (“the '595 patent”) by Petitioners. On November 22, 2022, Petitioners filed a petition for *inter partes* review of the '595 patent. (See *Samsung Electronics Co. Ltd. and Samsung Electronics America, Inc. v. Manufacturing Resources International, Inc.*, Case No. IPR2023-00199 (PTAB Nov. 22, 2022).) The '142 patent claims priority through a series of continuations and continuations-in-part to the '595 patent.

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In both the District Court Action and the ITC Action, the Patent Owner also alleged infringement of U.S. Patent No. 9,173,322 (“the ’322 patent”) by Petitioners. On December 5, 2022, Petitioners filed a petition for *inter partes* review of the ’322 patent. (See *Samsung Electronics Co. Ltd. and Samsung Electronics America, Inc. v. Manufacturing Resources International, Inc.*, Case No. IPR2023-00220 (PTAB Dec. 5, 2022).)

C. Lead And Back-Up Counsel (37 C.F.R. § 42.8(b)(3))

Petitioners provide the following designation of counsel.

LEAD COUNSEL	BACK-UP COUNSEL
Sanjeet Dutta Registration No. 46,145 Goodwin Procter LLP 601 Marshall Street Redwood City, CA 94063 Email: sdutta@goodwinlaw.com Tel: (650) 752-3100 Fax: (650) 853-1038	Douglas J. Kline Reg. No. 35,574 Goodwin Procter LLP 100 Northern Avenue Boston, MA 02210 Email: dkline@goodwinlaw.com Tel: (617) 570-1000 Fax: (617) 523-1231
	Srikanth Reddy Pro hac vice application to be filed sreddy@goodwinlaw.com Goodwin Procter LLP 100 Northern Avenue Boston, MA 02210 Tel: (617) 570 1000 Fax: (617) 523-1231

	Naomi Birbach Registration No. 67,113 Goodwin Procter LLP 620 Eighth Avenue New York, NY 10018 Email: nbirbach@goodwinlaw.com Tel. 212-813-8800 Fax 212-355-3333
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D. Service Information (37 C.F.R. § 42.8(b)(4))

This Corrected Petition is being served by email on lead and back-up counsel designated in Patent Owner's Power of Attorney, Paper 6, and by Federal Express to the attorney of record for the '142 patent, Standley Law Group. Please direct all correspondence to counsel at the contact information above.

II. Fee Payment

Petitioners authorize the U.S. Patent & Trademark Office to charge Deposit Account No. 506989 for the fee set in 37 C.F.R. § 42.15(a) for this Petition and further authorizes any additional fees to be charged to this Deposit Account.

III. Requirements Under 37 C.F.R. §§ ~~42.204~~42.104

A. Grounds for Standing

Petitioners certify that the '142 patent is available for IPR and that Petitioners are not barred or otherwise estopped.

B. Identification of Challenge and Statement of Relief Requested

Petitioners request institution of IPR based on the following grounds:

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Ground	Claims	Basis for Challenge
1	1-15	Obviousness over Karppanen (Ex. 1004) in view of Larson (Ex. 1005)
2	1-15	Obviousness over Yare (Ex. 1006) in view of Larson (Ex. 1005)

Submitted with this Petition is the Declaration of Robert Smith-Gillespie, a qualified technical expert. (Exs. 1002, ¶¶6-17; 1003.)

~~C. List of Claims Challenged~~

~~The '142 patent includes 15 claims. The following chart lists the claims from the '142 patent challenged by Petitioners, and their dependency upon the independent claims (the elements of which are provided letters for further reference in this Petition):~~

~~1[pre]~~	~~A cooling system for an electronic image assembly, the cooling system comprising:~~
~~1[a]~~	~~a housing for the electronic image assembly;~~
~~1[b]~~	~~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;~~
1[e]	~~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;~~
1[d]	~~an open loop airflow pathway for ambient air passing through said housing and behind said electronic image assembly;~~
1[e]	~~at least one air circulation device positioned to force the circulating gas through the closed loop airflow pathway when activated; and~~
1[f]	~~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.~~
2	~~The cooling system of claim 1 further comprising: at least one film having anti-reflection properties located at said cover panel.~~
3	~~The cooling system of claim 1 further comprising: a heat exchanger located rearward of the electronic image assembly,~~

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3[a][1]	~~wherein a first portion of said heat exchanger forms part of said open loop airflow pathway, and~~
3[a][2]	~~wherein a second portion of said heat exchanger forms part of said closed loop airflow pathway.~~
4[a]	~~The cooling system of claim 3 further comprising: an inlet located at a first portion of said housing for ingesting said ambient air into said open loop airflow pathway; and~~
4[b]	~~an exhaust located at a second portion of said housing for exhausting said ambient air from said open loop airflow pathway.~~
5	~~The cooling system of claim 1 wherein: said at least one polarizer comprises a linear polarizer.~~
6[pre]	~~A cooling system for an electronic image assembly, the cooling system comprising:~~
6[a]	~~a housing for the electronic image assembly;~~
6[b]	~~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;~~
6[c]	~~an open loop airflow pathway passing through the housing behind the electronic image assembly;~~

6[d]	~~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;~~
6[e]	~~an inlet located at a first portion of said housing for ingesting ambient air into said open loop airflow pathway;~~
6[f]	~~an exhaust located at a second portion of said housing for exhausting said ambient air from said open loop airflow pathway;~~
6[g]	~~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;~~
6[h]	~~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;~~
6[i]	~~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~~

6[i]	~~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.~~
7[a]	~~The cooling system of claim 6 wherein: said air circulation device comprises one or more fan assemblies; and~~
7[b]	~~said gas circulation device comprises one or more fan assemblies.~~
8	~~The cooling system of claim 6 wherein: at least one of said one or more solar energy reduction layers comprise a polarizer.~~
9	~~The cooling system of claim 8 wherein: said polarizer comprises a linear polarizer.~~
10	~~The cooling system of claim 6 wherein: at least one of said one or more solar energy reduction layers comprise a film having anti-reflection properties.~~
11[a]	~~The cooling system of claim 6 wherein: at least a first one of said one or more solar energy reduction layers comprise a polarizer; and~~

~~11[b]~~	~~at least a second one of said one or more solar energy reduction layers comprise a film having anti-reflection properties.~~
~~12[pre]~~	~~A method for cooling an electronic image assembly, said method comprising the steps of:~~
~~12[a]~~	~~placing said the electronic image assembly within a housing;~~
~~12[b]~~	~~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;~~
~~12[c]~~	~~forcing ambient air through a second airflow pathway within said housing, wherein said second airflow pathway extends behind said electronic image assembly; and~~
~~12[d]~~	~~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.~~
13	~~The cooling method of claim 12 wherein: at least one of said one or more solar energy reduction layers comprise a polarizer.~~
14	~~The cooling method of claim 13 wherein: at least one of said one or more solar energy reduction layers comprise a film having anti-reflection properties.~~
15	~~The cooling method of claim 12 further comprising the steps of: 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.~~

C. ~~D.~~ **Considerations under 35 U.S.C. §325(d)**

This Petition does not present “the same or substantially the same prior art or arguments previously were presented to the Office.” 35 U.S.C. §325(d). The Karppanen, Yare, and Larson prior art references were cited on the face of the ’142 patent as having been sent to the examiner by the applicant, but were otherwise not discussed during prosecution. As explained below, the *Advanced Bionics* framework and *Becton, Dickinson* factors favor institution. (*See infra*, §XI.)

IV. CERTIFICATION OF GROUNDS FOR STANDING

Petitioners certify pursuant to 37 C.F.R. § 42.104(a) that the '142 patent for which review is sought is available for *inter partes* review and that Petitioners are not barred or estopped from requesting an *inter partes* review challenging the patent claims on the grounds identified in this petition.

V. OVERVIEW OF THE '142 PATENT

A. Level of Ordinary Skill in the Art

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.*)

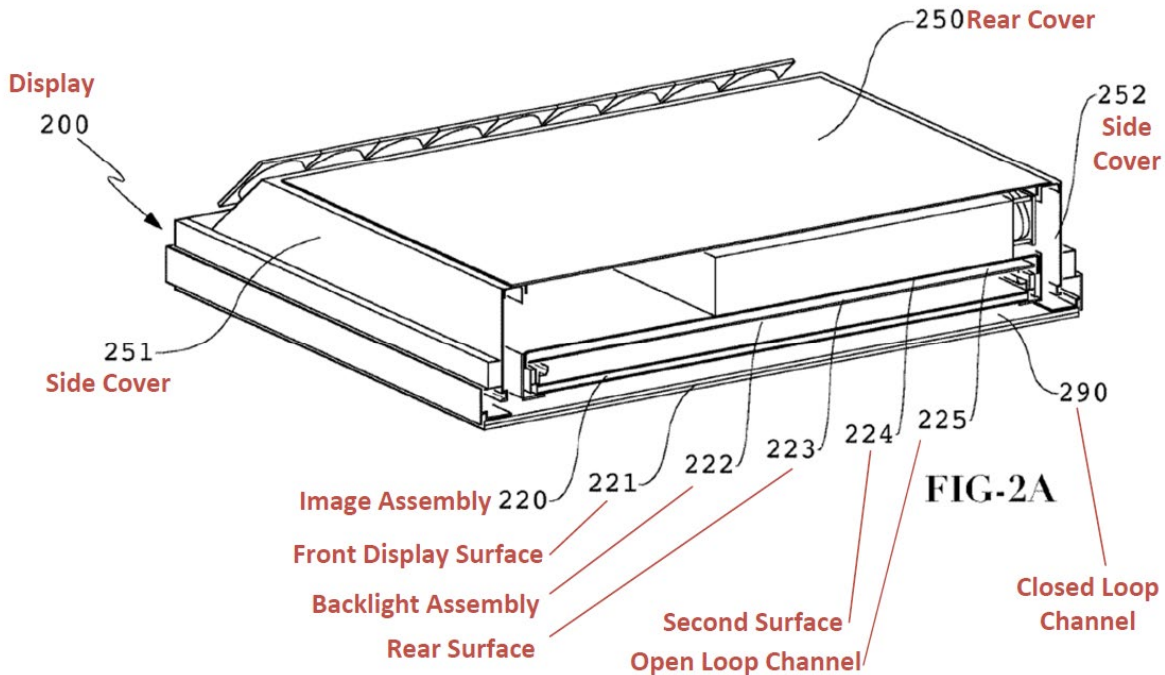
B. The '142 Patent

The '142 patent describes cooling systems for electronic displays using two separate air flow paths. (Ex. 1001, 1:60-62, 2:41-42.) The image assembly **220** can include any “flat/thin panel displays,” such as an LCD with a backlight

assembly **222**. (*Id.*, 5:54-60, 6:13-20.)

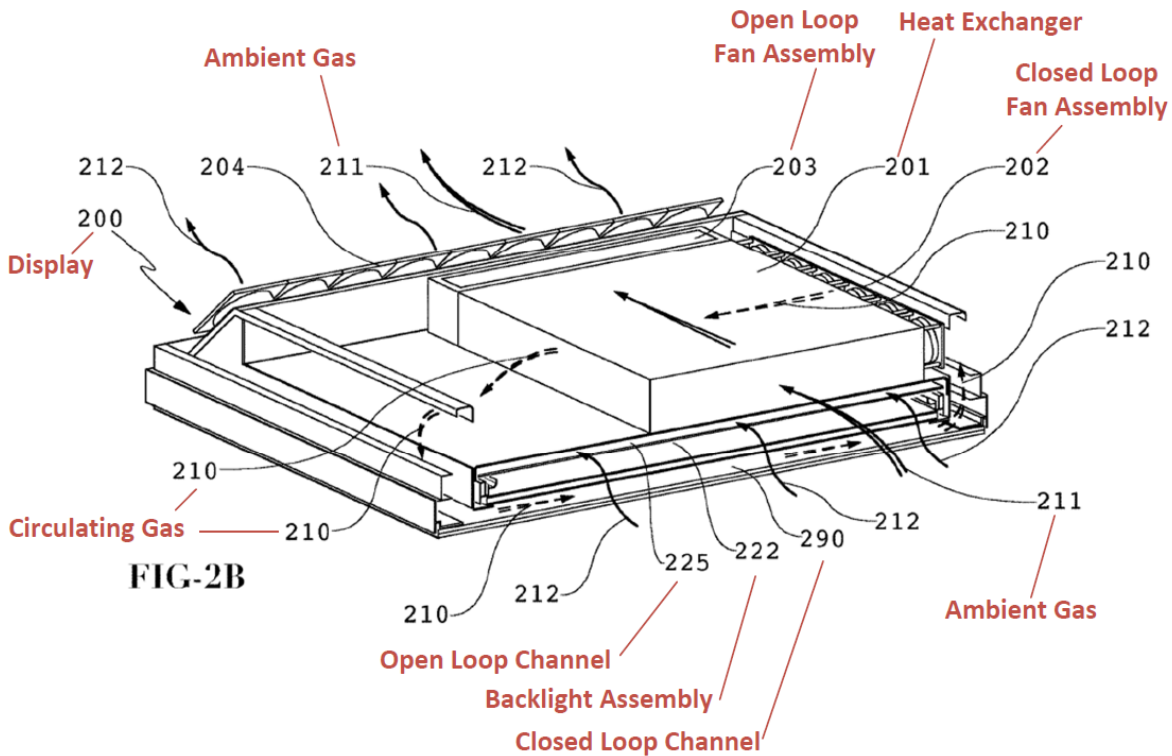
A first cooling path is a closed loop path that “travels across [a] front surface of [an] image assembly, continues to [a] rear of the [electronic] display where it may enter a heat exchanger, [and] finally returning to [a] front surface of the image assembly.” (*Id.*, 2:44-47.) A second path is an open loop path that “may draw ambient gas (ex. ambient air) through the rear of the [electronic] display (sometimes through a heat exchanger, behind [the] image assembly, or both) and then exhausts it out.” (*Id.*, 2:47-51.) A heat exchanger can be used to “transfer heat” from the closed loop to the open loop. (Exs. 1002, ¶76; 1001, 2:51-52, 2:44-51, FIG. 2B.)

The electronic display **200** includes a transparent display surface **221**. (Ex. 1001, 5:50-53, 5:60-67, FIG. 2A; *see id.*, Abstract, claim 1, claim 6.) The front display surface **221** “is placed in front of the image assembly **220**, defining a [closed loop] channel **290** through which [] circulating gas may flow. (*Id.*, 5:60-66, FIG. 2A.) The front display surface **221** may include “several layers for polarizing light, reducing glare or reflections, and protecting the internal display components.” (*Id.*, 5:60-66, FIG. 2A; Ex. 1002, ¶77.)



(*Id.*, FIG. 2A (annotated); Ex. 1002, ¶78.)

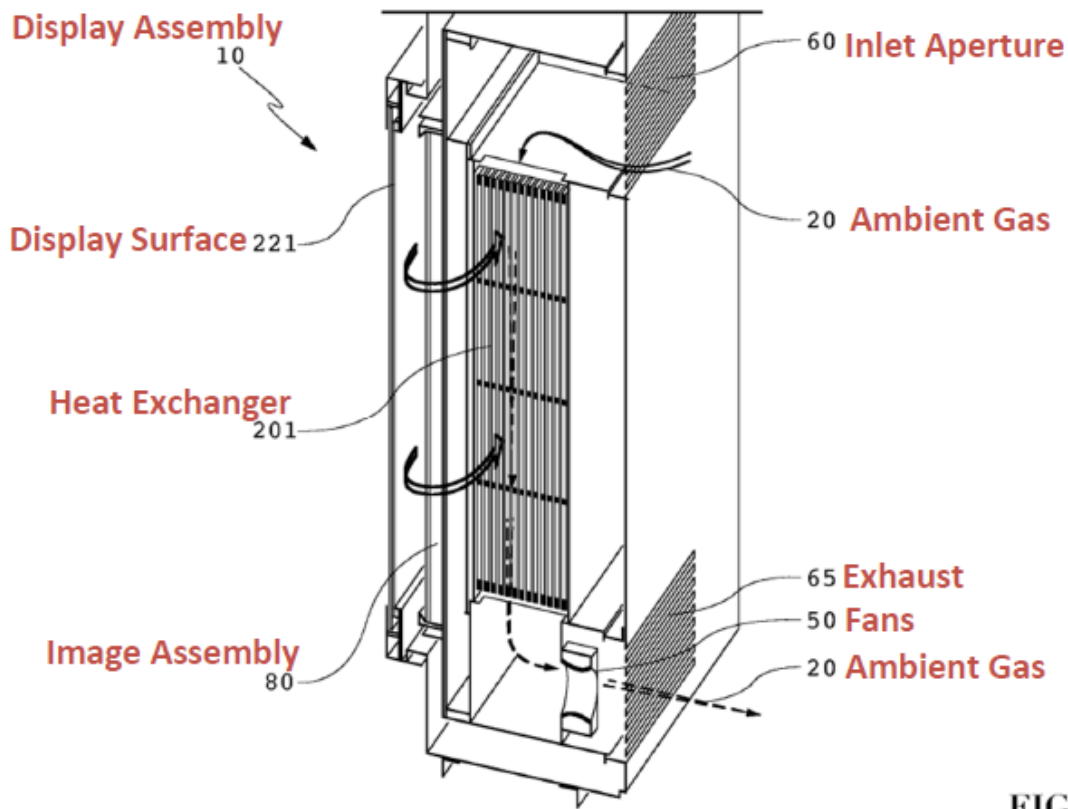
The electronic display includes “[a] closed loop fan assembly **202** [which] may be used to propel the circulating gas **210** around the closed loop [path]” and “[a] first open loop fan assembly **203** [which] may be used to draw ambient gas **211** through the heat exchanger **201**.” (Ex. 1001, 6:37-40.) The two paths do not mix to prevent open loop contaminants from mixing with the closed loop. (*Id.*, 6:52-62, FIG. 2B.)



(*Id.*, FIG. 2B (annotated).)

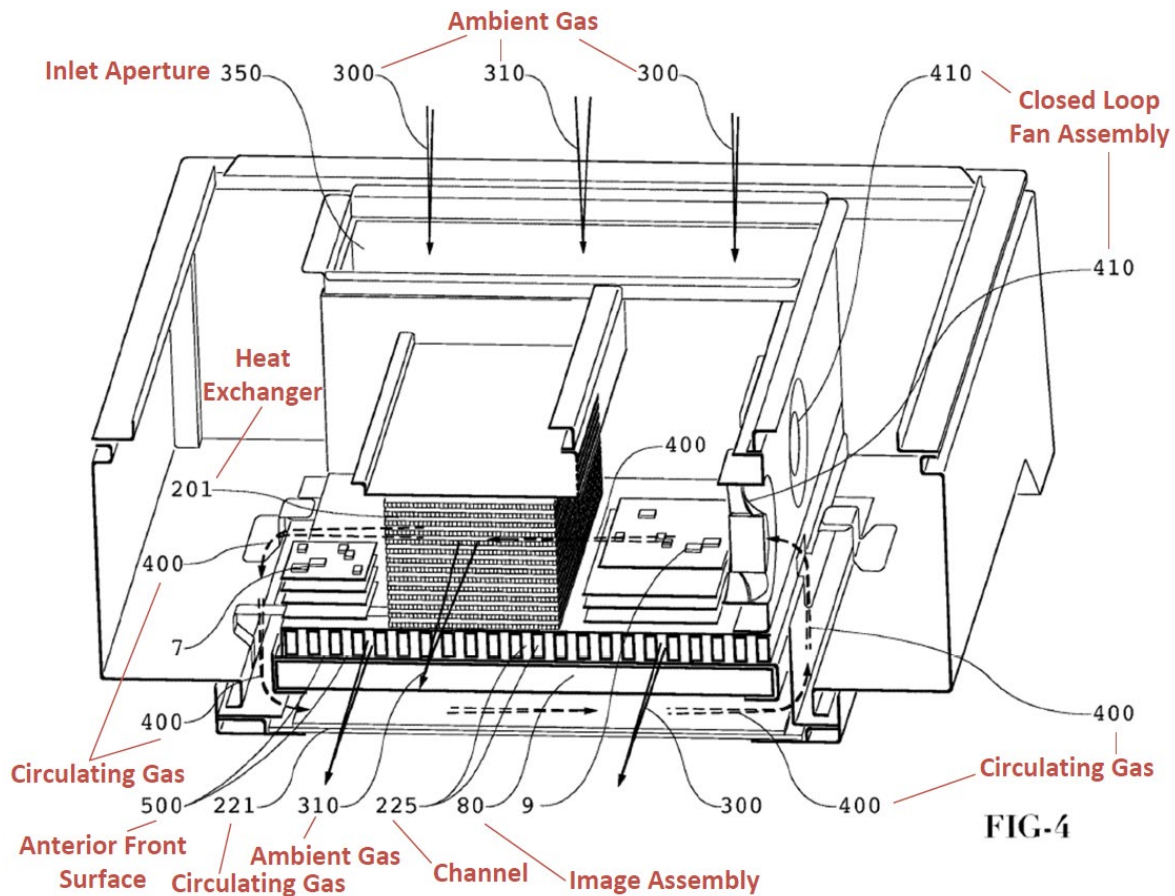
The fan assemblies may be used as inlets, exhausts and exits for the closed and open loop paths. (Ex. 1002, ¶76; *see* Ex. 1001, 2:41-51, 3:20-49, 5:15-22, FIGs. 1, 2A-2B.)

The '142 patent also describes removing heat from the display assembly **10** by directing circulating gas between the front display surface **221** and the image assembly **80**. (Exs. 1001, 6:63-68, 7:1-40, FIG. 3; 1002, ¶80.)



(*Id.*, FIG. 3 (annotated).)

Additionally, the '142 patent describes removing at least a portion of heat absorbed from the image assembly **80** and front display surface **221** by forcing circulating gas **400**, between the front display surface **221** and the image assembly **80**, and, subsequently, forcing circulating gas **400** through the heat exchanger **201**. (Ex. 1001, 7:41-47, FIG. 4 Ex. 1002, ¶81.)



(*Id.*, FIG. 4 (annotated).)

To further cool the image assembly **80**, the '142 patent describes removing distributed heat to a plurality of ribs and to thermally-conductive surfaces using the ambient gas **300**. (Ex. 1001, 7:51-60, 8:3-23, FIG. 4 Ex. 1002, ¶82.)

C. Prosecution History

During prosecution, the Examiner rejected claims 1-20 as being obvious in light of the prior art in office actions dated September 30, 2020, and December 12, 2021. (*See* Ex. 1022, pp. 124-133, 320-34.). In a December 12, 2021 final

rejection, claims 5-7 were indicated as reciting allowable subject matter, and claims 11-20 were found allowable. (*Id.*, pp.128-30.) In response, the Patent Owner amended claim 1 to recite the subject matter of claim 5 and the intervening claims. (*Id.*, pp.111-22.)

VI. CLAIM CONSTRUCTION

Independent claims 1, 6, and 12 of the '142 patent recite a “closed loop” pathway for “circulating gas/air.” (*See* Ex. 1001, 9:64-10:3, 10:7-9, 10:56-58, and 11:30-12:6.) The terms “closed loop” and “closed gaseous loop” recited in the claims of U.S. Patent Nos. 8,854,572 (“the '572 patent”), 9,629,287 (“the '287 patent”), and 9,173,325 (“the '325 patent”) were construed by a Court in a case filed by the Patent Owner. (Ex. 1023, 1.) The '142 patent is related to the '572, '287, and '325 patents in that they all have a common ancestry, including at least, U.S. Patent Application No. 12/620,330 (the “'330 application”). (*See* Exs. 1001; 1024; 1025; 1026, face pages.) And like the '142 patent, the subject matter in the '572 patent, the '287 patent and the '325 patent each relates to cooling of electronic displays using closed and open loops. (Ex. 1002, ¶¶91-92; *see* Exs. 1001, 2:41-44; 1024, 3:33-42, 3:53-55, FIGS. 1, 2; 1025, 3:51-54, 4:4-7, FIGS. 1, 2; 1026, 3:50-53, 4:56-59, 5:5-6, 7:33-36, FIGS. 1, 2C, 3C.)

The structure of the closed loops in the '142, '572, and '287 patents is similar, i.e., the closed loop pathways in all four patents surround a display element

/ image assembly. (Ex. 1002, ¶¶93-94; *see* Exs. 1001, 2:44-47; 6:13-15, 6:37-38, FIGS. 2A, 2B; 1024, 3:33-35, 3:39-42, 3:53-55, FIGS. 1, 2; 1025, 3:51-54, 3:57-60, 4:4-7, FIGS. 1, 2.) The structures of the closed loops of the '142 patent and the '325 patent are even more similar, i.e., in both patents, the closed loop gas circulates around the image assembly passing via a gap between a front plate and the front of the image assembly, and also passes through a heat exchanger. (Ex. 1002, ¶¶95-96; *see* Exs. 1001, 3:22-35, FIG. 1; 1026, 4:56-62, FIGS. 2A, 2C.) Because the “subject matter” relating to the closed loop in the '142 patent is the same as in the '572 patent, '287 patent, and '325 patent, , the Court’s prior construction of “closed loop” is instructive for the '142 patent. *See, e.g., E.I. du Pont De Nemours & Co. v. Unifrax I LLC*, 921 F.3d 1060, 1069 (Fed. Cir. 2019) (noting that a continuation-in-part is nonetheless intrinsic evidence where “the subject matter [of the patent-in-suit] is common to the continuation-in-part application”).

The District Court construed “closed loop” as “gas pathway within a display housing containing gas that is essentially isolated from external air.” (Ex. 1023, p.1.) This is a proper construction of the “closed loop” recited in the '142 patent as well, in light of the specification and the prosecution history. (Ex. 1002, ¶98.) 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), 3:30-29, 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.323-24 (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. Therefore, the Court construction of “closed loop” should apply to the claims at issue in this Petition and should be adopted by the Board. However, the construction of this term should not affect the applicability of the cited prior art.

For the purposes of this Petition, all other claim terms from the ’142 patent should be given their plain and ordinary meaning.² Petitioners reserve their right to respond to any claim construction arguments Patent Owner makes in response to this Petition.

² Nothing in this Petition should be construed as an admission that the claims, read in light of the specification and the prosecution history, inform a POSITA with reasonable certainty about the scope of the invention. Petitioners reserve their rights to assert that the claims of the ’142 patent are invalid for indefiniteness.

VII. OVERVIEW OF THE PRIOR ART

A. Karppanen

International Patent Application No. PCT/FI2006/050145 (IA-'145) (Publication No. WO2007116116A1) ("Karppanen") (Ex. 1004), entitled "Electronic Information Board" was filed on April 11, 2006 and published on October 18, 2007. Therefore, Karppanen qualifies as prior art to the '142 patent under pre-AIA 35 U.S.C. §§ 102(a) and 102(e) because the IA-'145 designated the United States, and published in English before and was filed before the earliest claimed priority date of Mar. 3, 2008 for the '142 patent. (Ex. 1004, face page.)

Karppanen discloses an outdoor "electronic information board" that leverages an electronic "display" such as a TFT LCD display. (*Id.*, Abstract.)

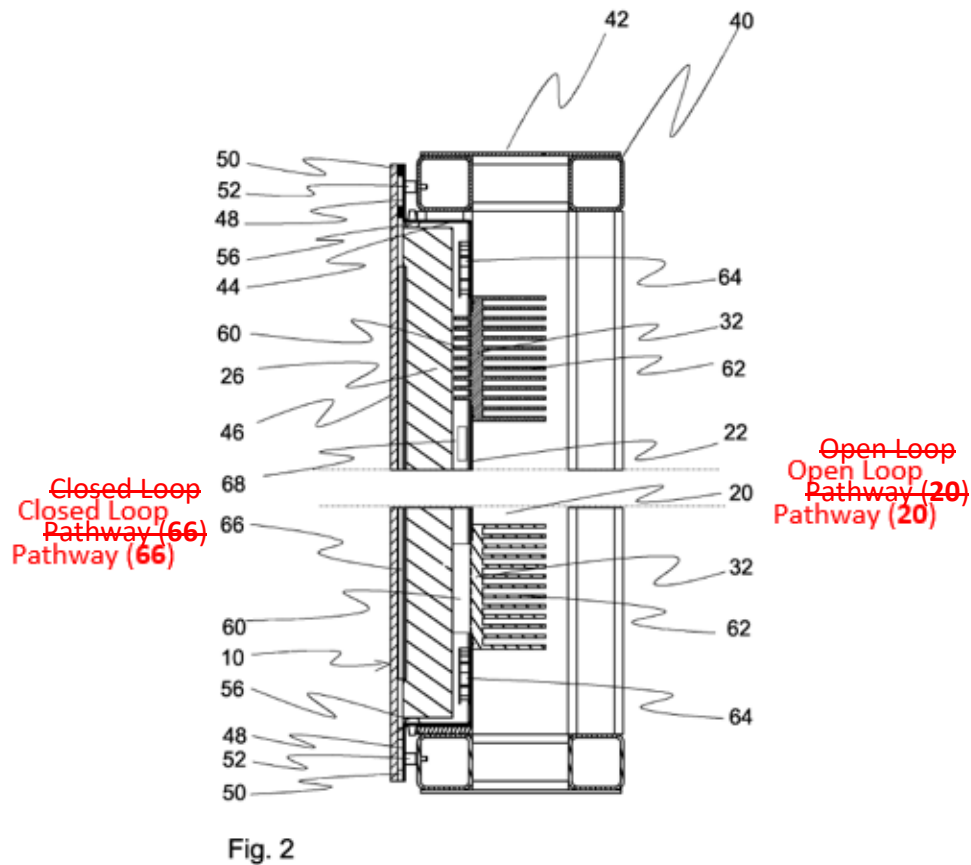
According to Karppanen, "the temperatures of the display devices easily rise too high" in hot environments and "it is important that the temperatures at different points inside the display device can be kept as constant as possible." (*Id.*, 1:25-32; *see also id.*, 3:10-13, 5:33-37, 2:18-29.)

To address this issue, Karppanen discloses an electronic display unit having a frame, a display casing, a device casing, a flat display element (such as an LCD or LED display), and cooling equipment. (*Id.*, 1:3-5, 3:21-32, claim 23.) The display casing **10** includes a back wall **22**, a transparent front plate **46**, and edge parts with fasteners, which together form a "closed" casing. (*Id.*, 7:31-38.)

Karppanen circulates air within the closed display casing. Fans **64** may be used to facilitate air circulation in the display casing (*id.*, 4:32-34, 9:3-9) and air ducts may be “arranged between the walls of the casing and the display element for directing the circulation of air around the display element” in order to cool it. (*Id.*, 4:34-36; Ex. 1002, ¶110.)

Karppanen discloses that the interior of the overall system contains a cooling space between the display casing and the device casing, and that cooling elements can conduct the heat generated by the display device into the cooling space. (Ex. 1004, 3:36-4:17.) Specifically, the back wall of the display casing (**10**) may include a plate-like “heat transfer part” and “cooling fins or conduction elements” to facilitate heat transfer from inside the display casing (**10**) to the cooling space (**20**). (*Id.*, 8:13-16, 8:29-9:3, FIG. 2; Ex. 1002, ¶111.)

Heat in the cooling space may then be transmitted to the external environment using ambient air flow and cooling fans **36**. (Ex. 1004., 8:19-22.) The cooling space **20** may have “ventilator slots or holes on opposite sides of the cooling space for enabling air flow from the outside . . . to the cooling space and from the cooling space back to the outside.” (*Id.*, 4:19-23, 7:9-19.) Figure 2 depicts the cooling pathways inside an exemplary embodiment:



(*Id.*, FIG. 2; Ex. 1002, ¶113.)

B. Larson

U.S. Patent No. 6,392,727 (“Larson”) (Ex. 1005), entitled “Reduced Reflectance Polarized Display,” issued on May 21, 2002 from Application No. 09/224,591, filed on December 31, 1998. Larson qualifies as prior art to the ’142 patent under at least pre-AIA 35 U.S.C. § 102(b) because it was published more than one year before the earliest claimed priority date of Mar. 3, 2008 for the ’142 patent.

Larson describes a “polarized display” including a polarizer disposed adjacent to a cover glass in front of the display. (Ex. 1005, Abstract.) The polarizer is used to transmit light intended to be transmitted by the display, and absorb reflected light, e.g., ambient light that may affect the display quality. (*Id.*) The polarized display is intended to reduced reflectance in the display output, maintain high contrast, high illumination levels, and be less expensive to produce. (*Id.*, 1:62-66; Ex. 1002, ¶115.)

Referring to FIG. 2. Larson discloses “a display 2” having “a cover glass 4; a front gap 9; a front polarizer 8;” “a liquid crystal layer 12;” “an auxiliary polarizer 20; and a backlight 18.” (*Id.*, 2:33-39, 3:13-19, FIG. 2.)

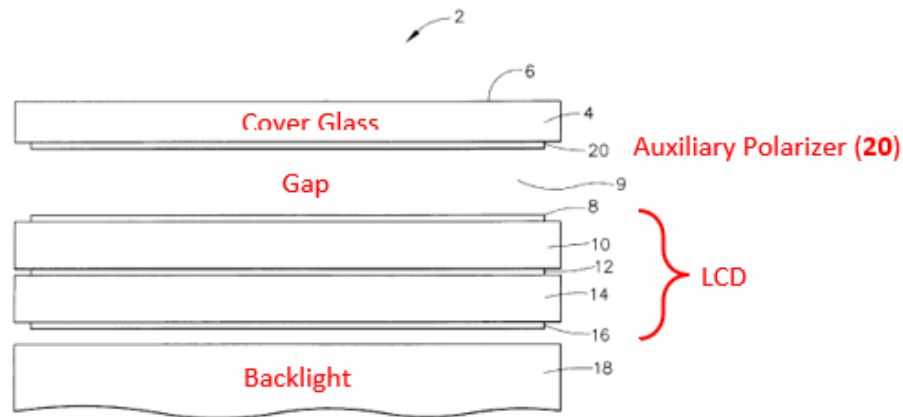


FIG. 2

(*Id.*, FIG. 2; Ex. 1002, ¶118.)

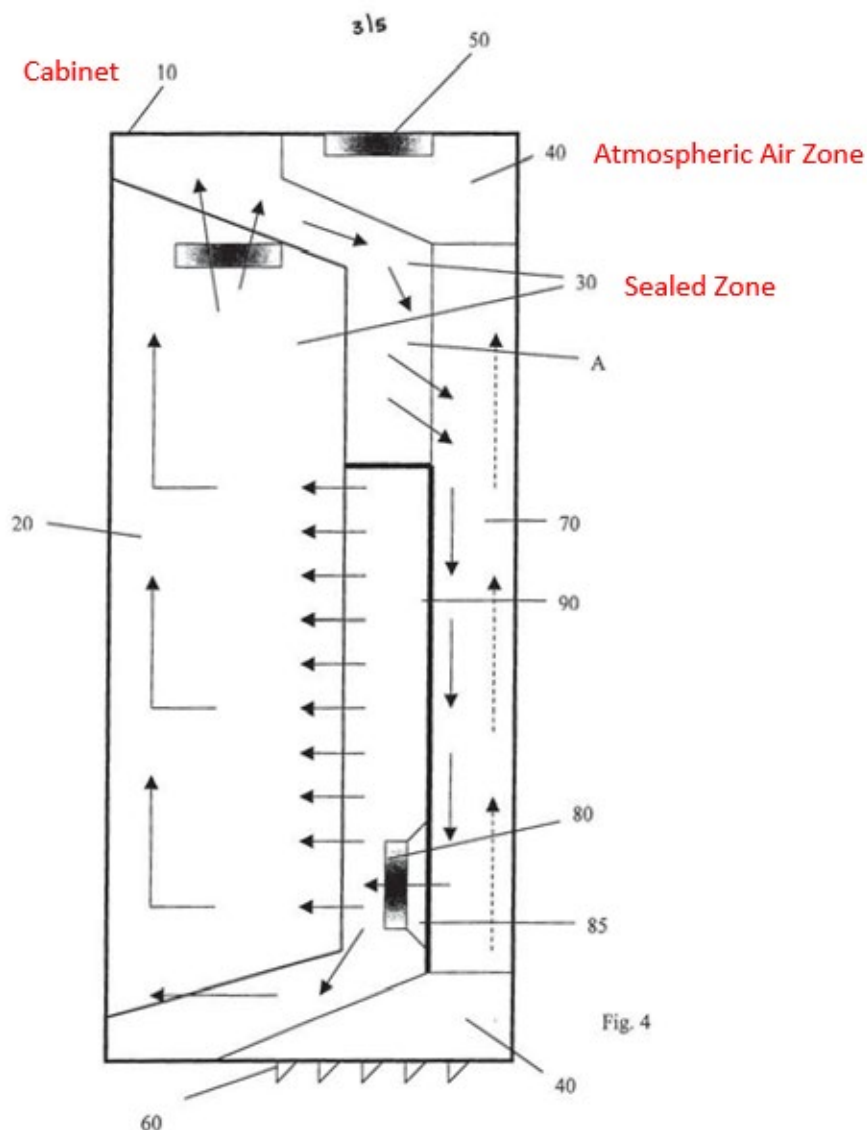
C. Yare

United Kingdom Patent Application No. GB 2402205A by Yare (“Yare”)

(Ex. 1006), entitled “A Display System Cabinet and Display System Including Heat Removal Means,” published on Dec. 1, 2004. Yare qualifies as prior art to the ’142 patent under at least pre-AIA 35 U.S.C. § 102(b) because it published more than one year before the earliest claimed priority date, Mar. 3, 2008, of the ’142 patent.

Yare discloses “a cabinet for mounting a display system” where the cabinet has “improved cooling facilities” and is “particularly suitable for” providing “displays in public places.” (Ex. 1006, 1:4-6.) A display according to Yare can be a “plasma, LCD or rear projection” display. (*Id.*, 1:14-15.) Yare recognizes that such a display “can generate a lot of heat” and that “an efficient cooling system” is necessary. (*Id.*, 1:15-17; *see id.* at 1:19-23; Ex. 1002, ¶123.)

To address cooling, Yare discloses a cabinet **10** having a sealed zone **30** that is sealed from the external environment, and contains a display **20**. (Ex. 1006, 4:1-7, Figure 1; *see id.*, 2:8-9.) The sealed zone includes fans **80**. (*Id.*, 4:31-33, Figures 1 & 4; *see id.*, 2:9-10.) In addition, the cabinet **10** includes an atmospheric air zone **40** and a heat exchanger **70** for transferring heat from the sealed zone **30** to the atmospheric air zone **40**. (*Id.*, 4:11-22, FIGs. 1, 4; *see id.*, 2:19-29; Ex. 1002, ¶124.)



(Ex. 1006, FIG. 4.) Thus, air flows in the sealed and atmospheric air zones, with the aid of the heat exchanger, are not mixed and can effectively cool the display.

(Ex. 1002, ¶125.) The atmospheric air zone includes vents **60** and a fan/exhaust **50** for drawing ambient air into the atmospheric air zone. (Ex. 1006, 4:11-16, FIGs. 1-4; *see id.*, 2:8-9.) The heated ambient air may then be released outside the

cabinet **10** by the fan/exhaust **50**. (*Id.*, 5:2-10, 4:11-15, FIGs. 1-4.)

VIII. GROUND 1 – CLAIMS 1-15 ARE OBVIOUS OVER KARPPANEN AND LARSON

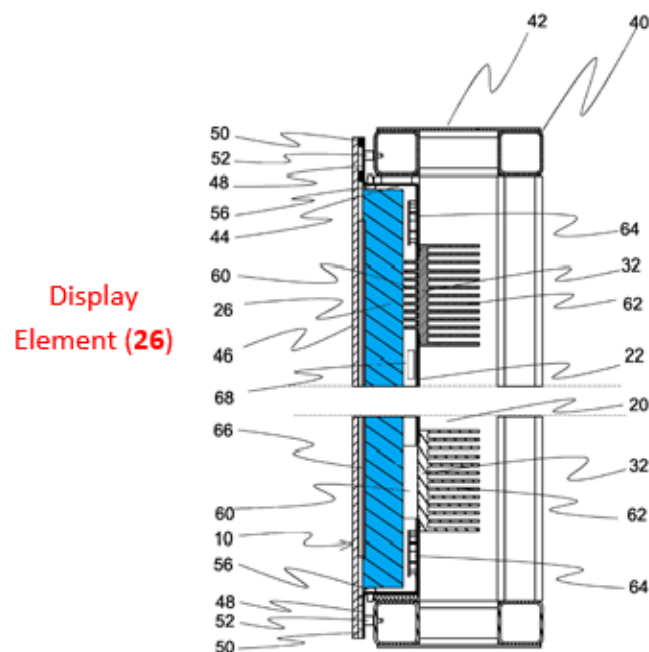
A. Independent Claim 1

1. Element 1[pre]

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

To the extent the preamble is limiting, Karppanen discloses this claim element. Karppanen’s system includes a display element **26** (e.g., a flat screen LCD display) (an “**electronic image assembly**”). Karppanen’s system includes a closed display casing **10** having cooling elements **32**, and an open cooling space **20**, for cooling the display element **26** (“**cooling system**”). (Ex. 1002, ¶¶140-145.)

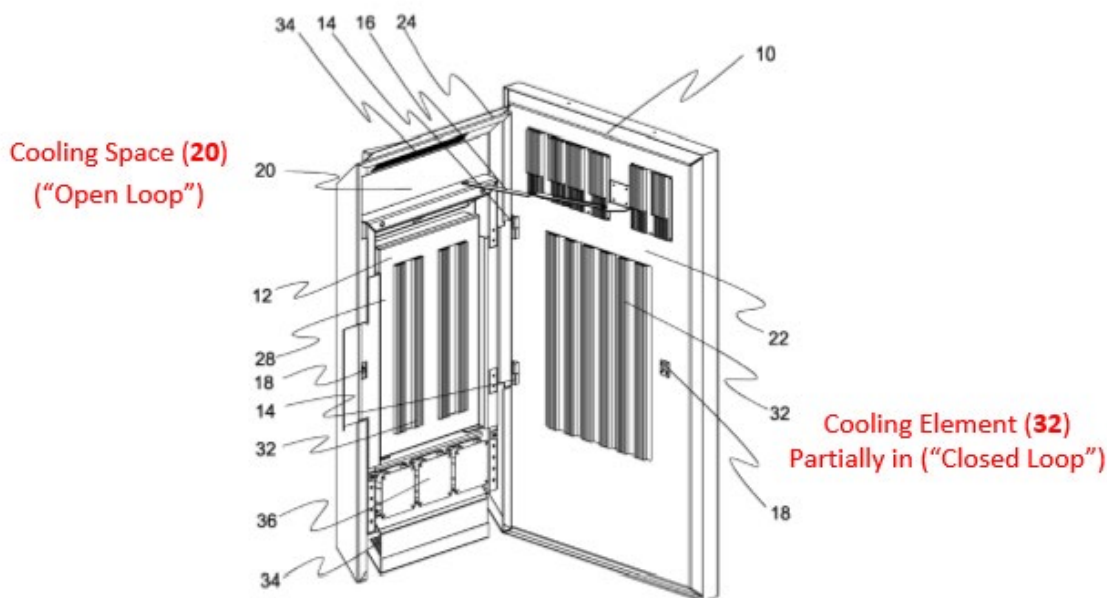
Karppanen discloses “an electronic information board” having “a flat display element (**26**), such as a TFT LCD display . . . and electronic equipment for controlling the display element.” (Ex. 1004, Abstract.) Figure 1 “is a perspective drawing” of an electronic information board “depicted obliquely from behind” (*id.*, 6:4-5, 6:16-17), and Figure 2 “is a cross-sectional drawing.” (*Id.*, 6:7-8, 7:27-28.)



(*Id.*, FIG. 2 (annotated).)

The display element **26**, highlighted blue in annotated Figure 2 above, is “**an electronic image assembly.**” This is consistent with the ’142 patent. (Exs. 1002, ¶143; 1001, 5:54-60 (stating that the “the image assembly **220** may comprise” an **LCD**” and “any other **flat/thin panel displays**”), FIG. 2A.) Thus, the display element **26** (Ex. 1004, 6:21-26, 8:4-9, FIG. 1.) is “**an electronic image assembly.**”

As explained in the claim elements that follow, Karppanen includes a cooling system that includes both a closed loop air flow and an open loop air flow” (*Id.*, Abstract).



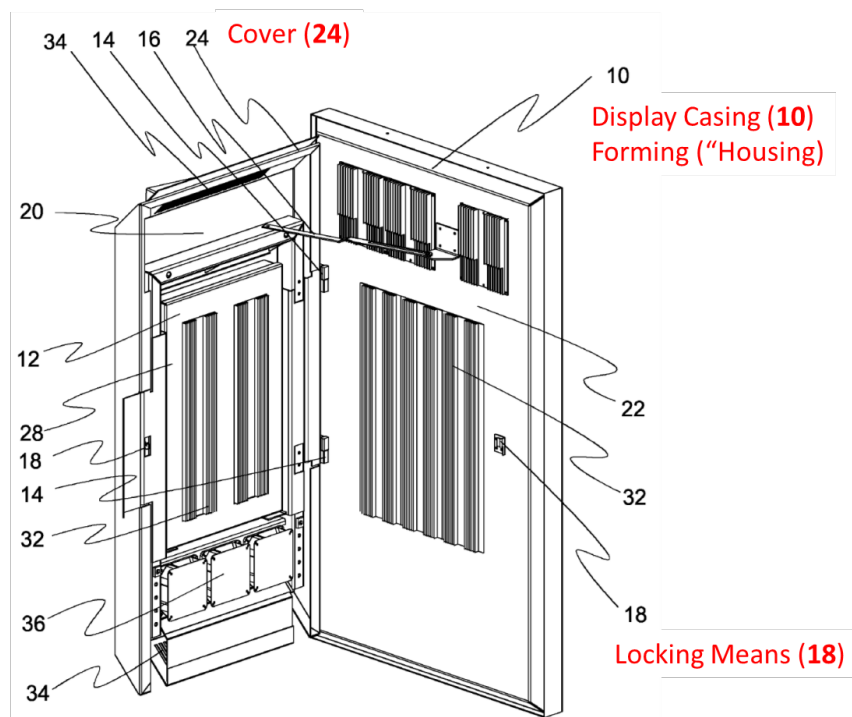
(*Id.*, FIG. 1 (annotated).)

2. Element 1[a]

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

Karppanen discloses this claim element because Karppanen's system includes a "**housing for the electronic image assembly**" formed by a cover and a display casing. (Ex. 1002, ¶¶146-150.)

Karppanen's "information board has a closed display casing **10**" containing the display element **26**, "a cover **24**," and a "closed device casing **12**" "fastened to the bottom of the cover [**24**]." (Ex. 1004, 6:16-24, FIG. 1.)



(*Id.*, FIG. 1 (annotated).)

The cover **24** and the display casing **10** form a “**housing**” for the display element **26** (“**the electronic image assembly**”). Thus, Karppanen discloses this claim element. (Ex. 1002, ¶150.)

3. Element 1[b]

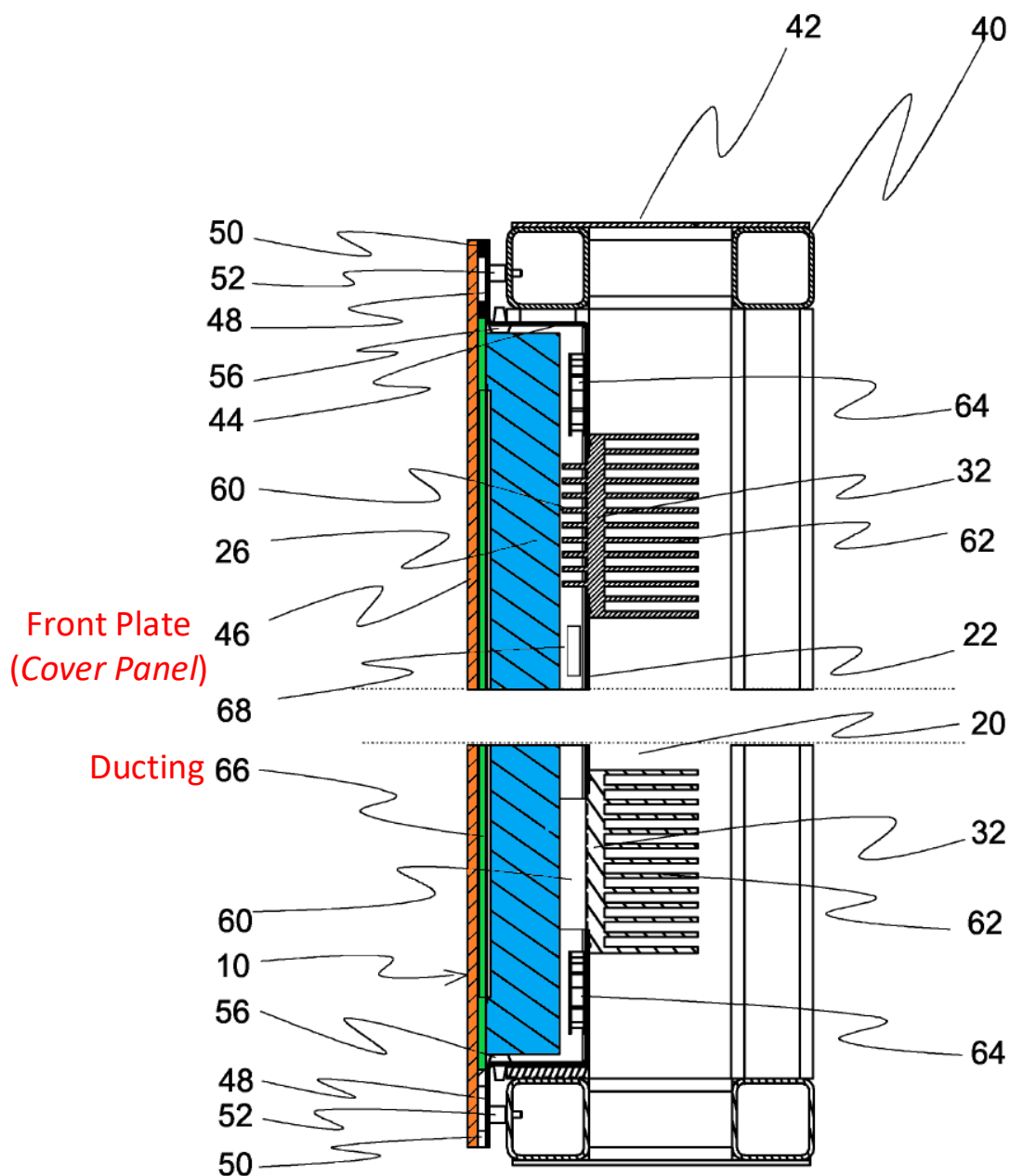
1[b]	~~a cover panel forming a forward portion of the housing, wherein the cover panel is located forward of, and at least some distance from, the electronic image assembly and is configured to permit viewing of images displayed at the electronic image assembly through said cover panel;~~
------	---

Karppanen discloses this claim element because Karppanen’s display casing

10 has a transparent front plate, i.e., “**a cover panel**,” in front of and at some distance from the display element **26**. (Ex. 1002, ¶¶151-154.)

Karppanen’s “display casing **10** compris[es] a back wall **22** [and] a **transparent front plate 46**” “preferably made of shock-resistant glass.” (Ex. 1004, 7:31-8:2, FIG. 2.) The display casing **10** forms a part of the “**housing**.” (*See supra*, §VII.A.1; Ex. 1002, ¶152.) Figure 1 shows that the front plate **46** forms a front part of the display casing **10** and is thus “**a cover panel forming a forward portion of the housing**.” (Exs. 1002, ¶152; 1004, FIG. 1.)

Karppanen further discloses that “**ducting 66**” facilitates “air flow **circulating the display element**” and that “fans **64 force the air** of the inner casing **to flow past the front plate 46** of the device.” (Ex. 1004, 9:3-8, FIG. 2.)



(*Id.*, FIG. 2 (annotated).)

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). Thus, Karppanen

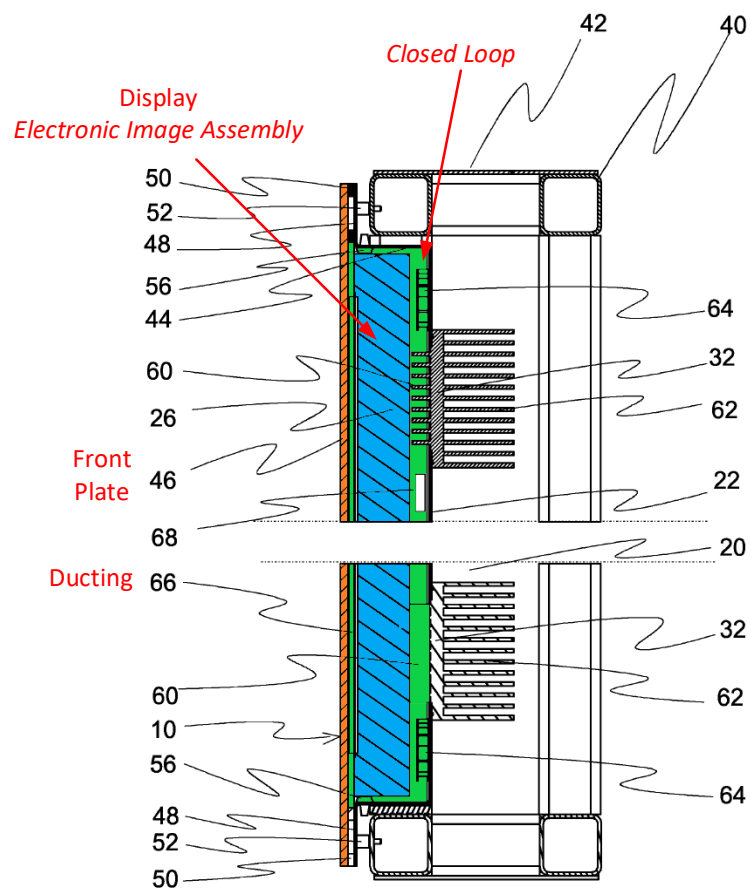
teaches this claim element. (Ex. 1002, ¶154.)

4. Element 1[c]

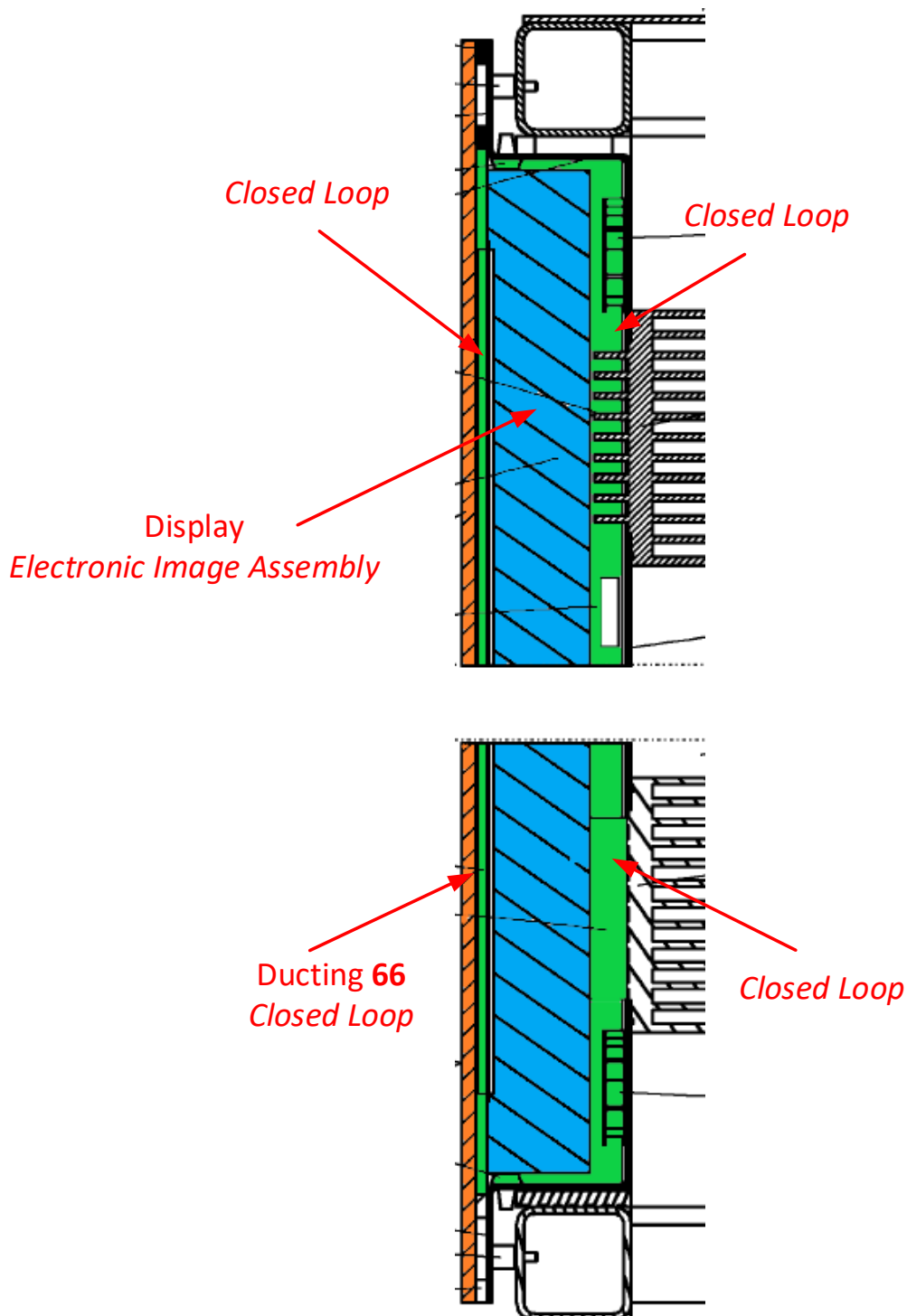
1[c]	~~a closed loop airflow pathway passing through the housing, wherein said closed loop airflow passes around said electronic image assembly and is configured to accommodate circulating gas, and wherein at least a portion of said closed loop airflow pathway extends between said electronic image assembly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

Karppanen discloses this claim element because Karppanen’s system includes a closed cooling path formed by ducting **66** within the display casing **10**. (Ex. 1002, ¶¶155-161.)

Karppanen’s system includes a “weatherproof” “**closed** display casing 10” having a “back wall **22** [and] a transparent front plate **46**.” (Ex. 1004, 4:6-8, 6:17-19, 7:31-34, FIGs. 1, 2.) “[F]ans **64**” “circulate air in the space between the display element [**26**] and the walls [**22**] of the display casing,” “**ducting 66**” facilitates “air flow **circulating** the display element,” and “fans **64** force the air of the inner casing **to flow past the front plate 46 of the device**.” (*Id.*, 9:3-8, FIG. 2.)



(*Id.*, FIG. 2 (annotated).)



(*Id.*, FIG. 2 (partial, zoomed-in, annotated).)

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.)

The two versions of annotated Figure 2 above show that the closed pathway (highlighted green) is formed around the display element **26** (highlighted blue), i.e., **“around said electronic image assembly.”** Additionally, because air is a gas, as defined in the ’142 patent (Ex. 1001, 5:24-25 (“air may be used as the gas for both loops”)), the closed pathway **“is configured to accommodate circulating gas.”** (Ex. 1002, ¶160.)

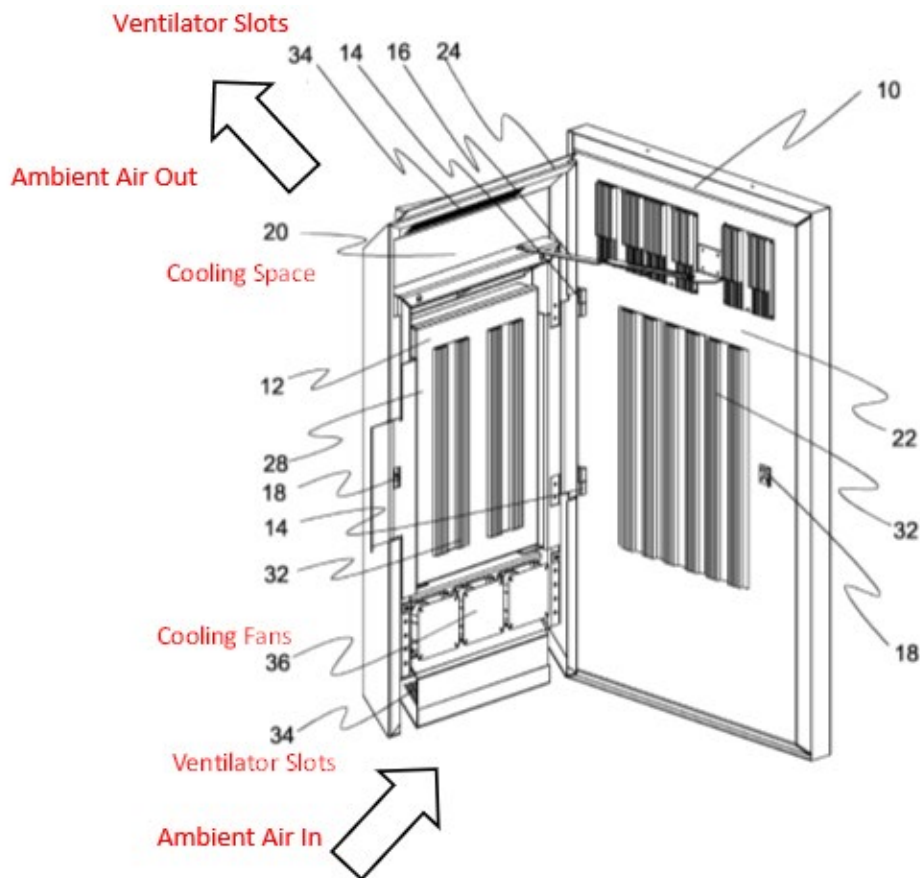
Annotated Figure 2 also shows that the closed pathway (**“closed loop airflow pathway”**) includes the ducting **66** (highlighted green) which is in front of the display element **26** (highlighted blue). Therefore, **“at least a portion of said closed loop airflow pathway extends between said electronic image assembly and said cover panel.”** Thus, Karppanen teaches this claim element. (*Id.*, ¶161.)

5. Element 1[d]

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

Karppanen discloses this claim element because Karppanen's system provides an open "cooling space **20**" that has "ventilator slots" allowing ambient air to enter and exit. (Ex. 1002, ¶¶162-165.) Karppanen states: "[i]n normal use, the display casing [**10**] and the device casing [**12**] are turned against each other to a closed position" where "there remains a **cooling space 20** between" the two casings. (Ex. 1004, 7:7-11, FIGs. 1, 2.)

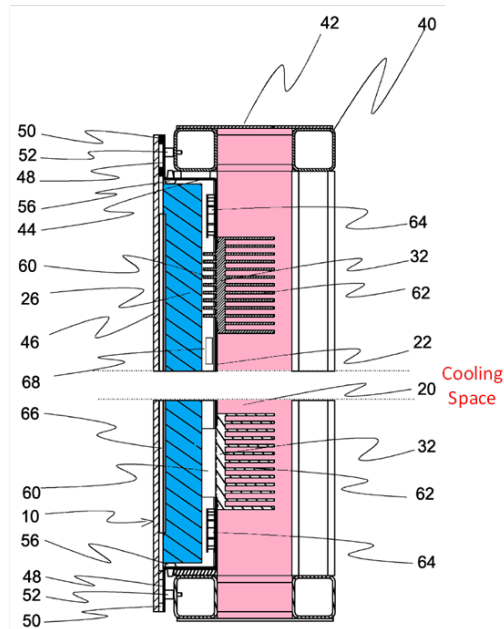
Karppanen states: "[i]n the first edge of the cover **24** pointed downward and the second edge pointed upward there are ventilator slots **34**, which enable the movement of air from the outside of the device to the cooling space and from the cooling space back to the outside of the device" and that "[i]n the cover **24** there are cooling fans **36**, by which the circulation of air through the cooling space [**20**] is regulated." (*Id.*, 7:16-22, FIG. 1.)



(*Id.*, FIG. 1 (annotated).)

Karppanen’s cooling space **20** is an “open loop” because air from the atmosphere is drawn in inside the cooling space **20**, passes therethrough, and is exhausted, i.e., looped back, to the atmosphere. (Ex. 1004, 7:16-22, FIG. 1.) This is consistent with the ’142 patent. (See Ex. 1001, 4:4-17, FIG. 1 (ambient gas/air “is ingested into” and “expelled out of the display housing”).) Thus, the cooling space [20] is “**an open loop airflow pathway for ambient air.**” (Ex. 1002, ¶164.) Because the “cooling space **20** [is] between the display casing [10] and the device

casing [12],” and is “delimited by the cover **24** and the display casing [10]” (Ex. 1004, 7:9-11, FIG. 2), the ambient air passing through the cooling space **20** “pass[es] through said housing.” (Ex. 1002, ¶164.)



(Ex. 1004, FIG. 2 (annotated).)

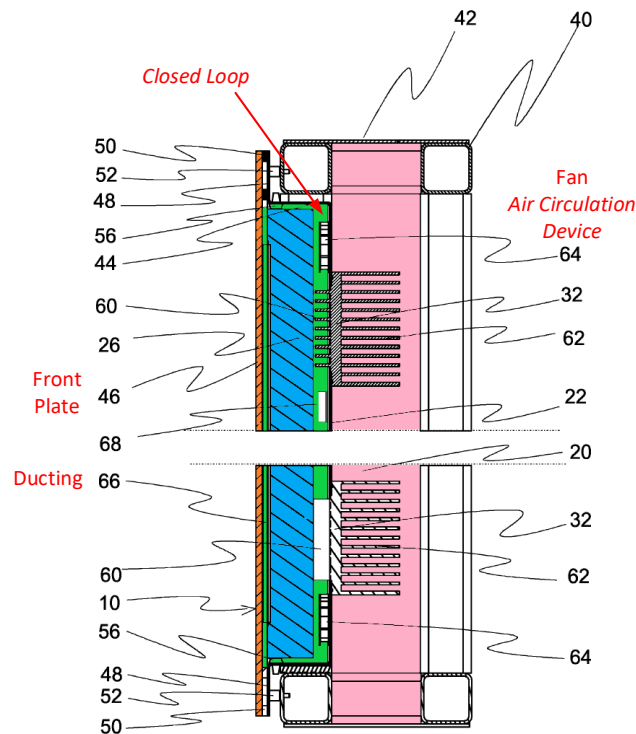
Annotated Figure 2 above shows that the cooling space **20** (highlighted pink) (“an open loop airflow pathway”) is behind the display element **26** (highlighted blue), i.e., “behind said electronic image assembly.” Accordingly, Karppanen teaches this claim element. (Ex. 1002, ¶165.)

6. Element 1[e]

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

Karppanen discloses this claim element because Karppanen's system includes fans **64** that force the air circulating in the closed pathway, i.e., **"to force the circulating gas through the closed loop airflow pathway when activated."** (Ex. 1002, ¶¶166-168.)

Karppanen discloses "fans **64**, which circulate air in the space between the display element [26] and the walls of the display casing" and additionally "force the air of the inner casing to flow past the front plate **46** of the device." (Ex. 1004, 9:3-8, FIG. 2.)



(*Id.*, FIG. 2 (annotated).)

Thus, Karppanen teaches this claim element. (Ex. 1002, ¶168.)

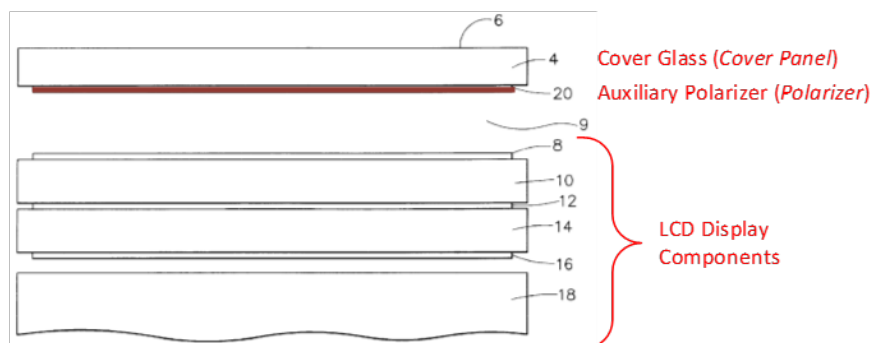
7. Element 1[f]

1[f]	~~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.~~
------	---

The combination of Karppanen and Larson teaches this claim element because Larson discloses a polarizer disposed between a cover glass and an LCD display. (Ex. 1002, ¶¶169-178.)

In general, Larson discloses a polarizer as an “absorbing layer[]” that can absorb ambient light and provide a “high contrast output at high ambient illumination levels.” (Ex. 1005, 1:11-17, 1:22-27, 2:33-39, FIG. 1.)

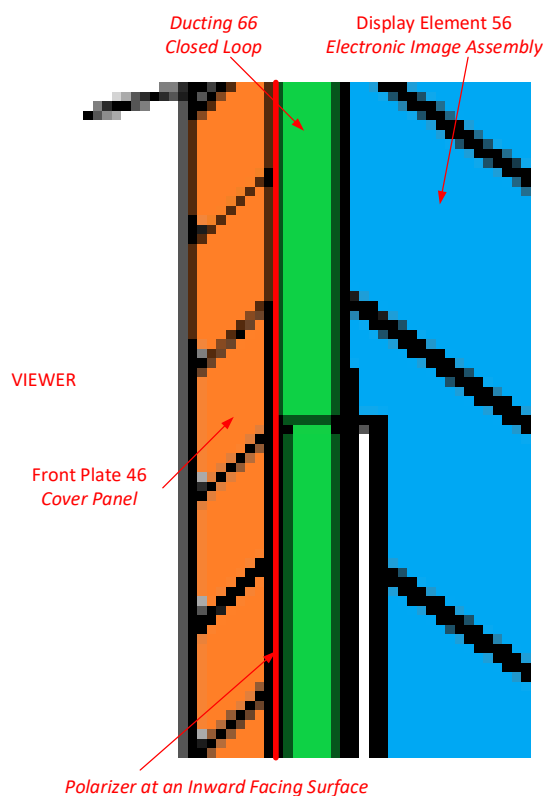
Referring to FIG. 2, a display 2 includes: “a **cover glass 4**; a **front gap 9**,” and “an **auxiliary polarizer 20**.” (*Id.*, 2:33-39, FIG. 2.) An “**auxiliary polarizer 20**” “may be bonded to the cover glass 4” “between the front gap 9 and the cover glass 4.” (*Id.*, 3:13-19, FIG. 2.)



(*Id.*, FIG. 2 (annotated).)

Because the auxiliary polarizer may be bonded to the cover glass 4 (a “**cover panel**”), Larson discloses “**at least one polarizer located at an inward facing surface of said cover panel.**” (Ex. 1002, ¶174.) Therefore, Larson teaches this claim element.

A POSITA would have modified Karppanen’s system to include Larson’s polarizer at the glass front plate 46, as shown below:



(Ex. 1004, FIG. 2 (partial, modified per Larson’s FIG. 2, annotated).) Thus, the combination of Karppanen and Larson teaches this claim element. (Ex. 1002, ¶¶177-178.)

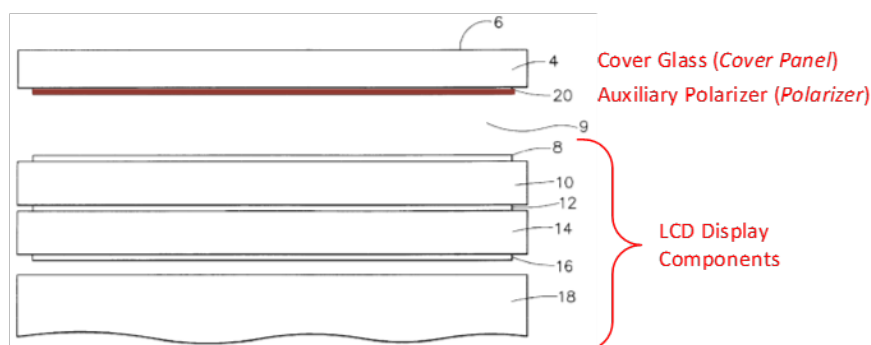
Therefore, Karppanen in view of Larson discloses each and every element of claim 1 and renders obvious claim 1. (*Id.*, ¶179.)

B. Claim 2

2	~~The cooling system of claim 1 further comprising: at least one film having anti-reflection properties located at said cover panel.~~
---	---

Larson teaches this claim element because Larson discloses a cover glass having an antireflective coating. (Ex. 1002, ¶¶180-183.)

Larson’s Figure 1 discloses “a conventional polarized display 2, such as a liquid crystal display (LCD), [that] includes a cover glass 4 having an **antireflective coating 6**,” that “may be added to one or **both sides of the cover glass 4**.” (Ex. 1005, 1:22-24, 1:33-36, FIG. 1.) Additionally, Larson’s Figure 2 discloses “a display 2” having “a cover glass 4,” and states that “the **rear surface of the cover glass 4 [i.e., “cover panel”]** may include an **antireflection coating, film.**” (*Id.*, 2:32-36, 2:46-51, FIG. 2.)



(*Id.*, FIG. 2 (annotated).)

Thus, Larson discloses “**at least one film having anti-reflection properties located at said cover panel**” that a POSITA would have applied to Karppanen’s display in the manners described above. (Ex. 1002, ¶183; *supra*, §VIII.A; *infra* §VIII.P.)

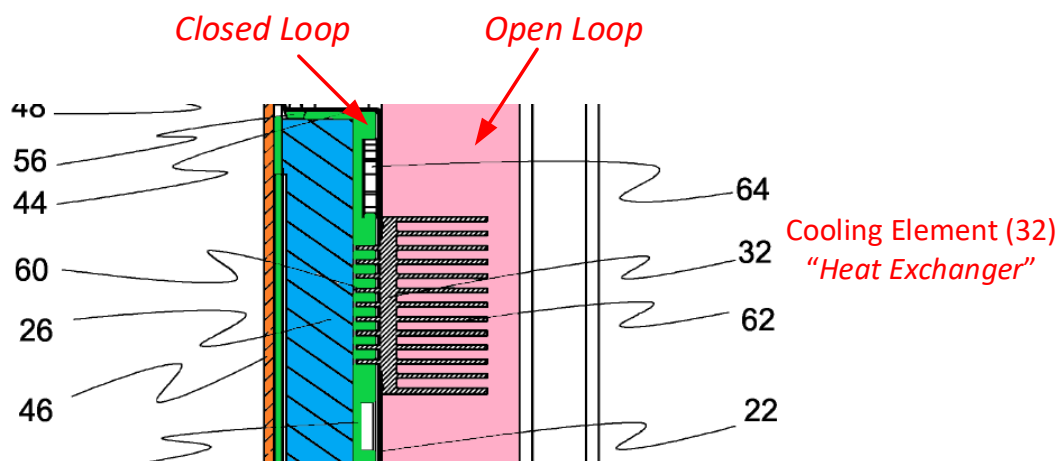
C. Claim 3

1. Element 3[a]

3[a]	~~The cooling system of claim 1 further comprising: a heat exchanger located rearward of the electronic image assembly;~~
------	--

Karppanen discloses this claim element because Karppanen’s system includes a cooling element **32**, “**a heat exchanger**,” that is disposed behind the display element **26**. (Ex. 1002, ¶¶184-186.)

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.*, FIG. 2 (partial, annotated).)

The cooling element **32** is located behind the display element **26** (“**the electronic image assembly**”). Thus, Karppanen discloses this claim element. (Ex. 1002, ¶186.)

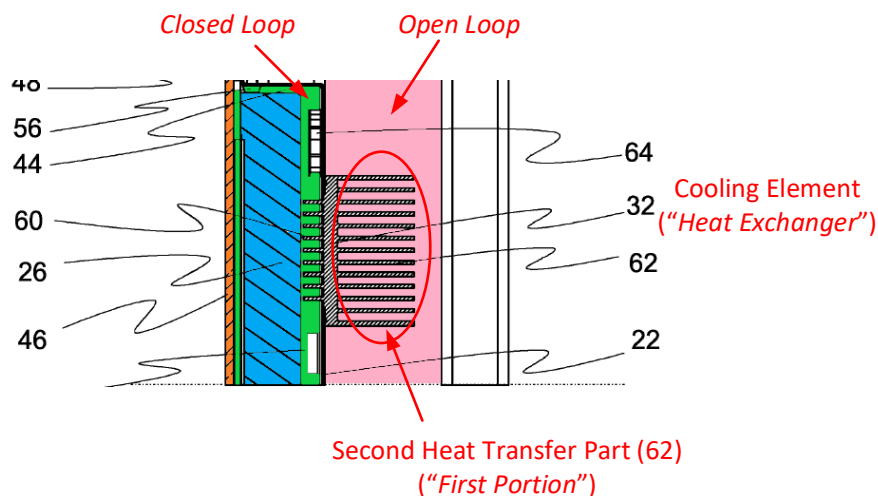
2. Element 3[a][1]

3[a][1]	~~wherein a first portion of said heat exchanger forms part of said open loop airflow pathway, and~~
---------	---

Karppanen discloses this claim element because the second heat transfer part **62** (“**first portion**”) of the cooling element **32** (“**heat exchanger**”) forms part of the cooling space **20**, i.e., “**said open loop airflow pathway.**” (Ex. 1002, ¶¶187-190.)

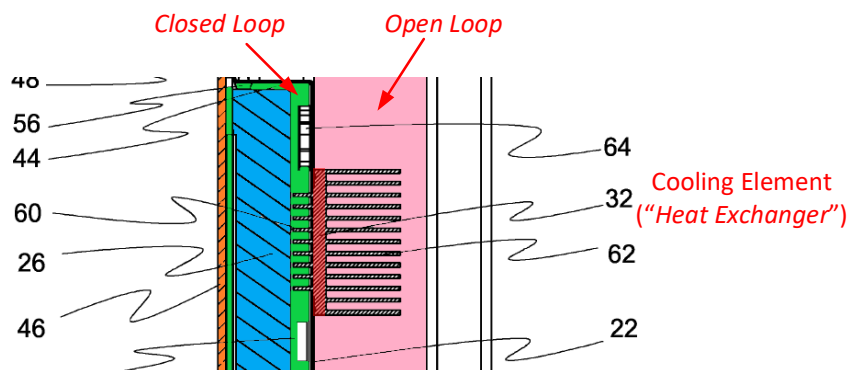
The cooling elements **32** (“**heat exchanger**”) includes a second heat transfer part **62**. (*Id.*, 8:13-16, FIG. 2.) “The second heat transfer part [**62**] comprises a

number of plate-like cooling fins placed side by side. The operation of the cooling fins is based on the phenomenon that when the cooling air flows **between** the fins, heat is transferred from the cooling fins to the air of the cooling space [20].” (*Id.*, 8:16-19, FIG. 2.)



(*Id.*, FIG. 2 (partial, annotated).)

The second heat transfer part **62**, having the plate-like cooling fins, is located within the cooling space **20**. Also, the portion (highlighted red in annotated Figure 2 below) of the cooling element **32** defines in part a wall of the cooling space **20**.



(*Id.*, FIG. 2 (partial, annotated).)

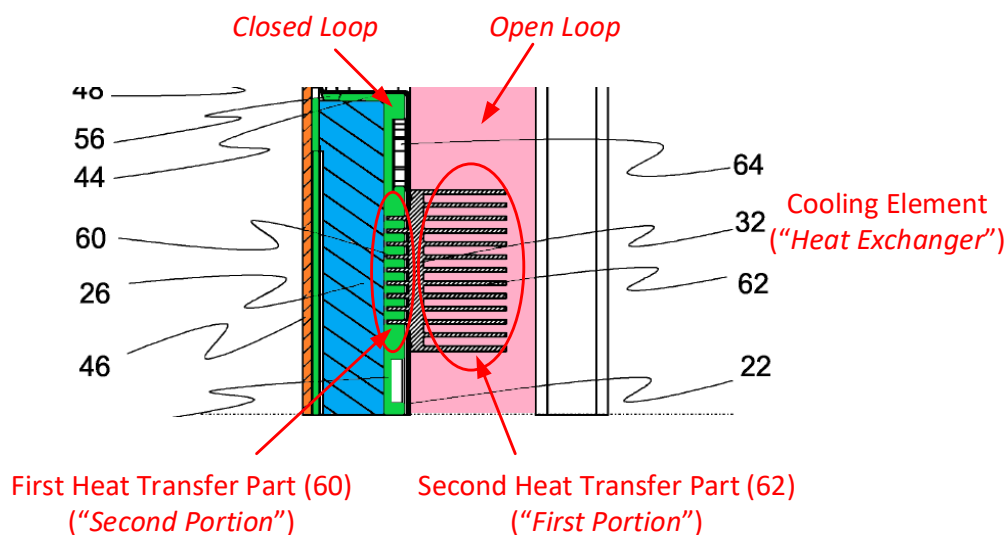
Because the air in the cooling space **20** circulates between the “plate-like cooling fins,” and additionally touches the cooling element **32** “**a first portion of said heat exchanger forms part of said open loop airflow pathway.**” Thus, Karppanen teaches this claim element. (Ex. 1002, ¶190.)

3. Element 3[a][2]

3[a][2]	~~wherein a second portion of said heat exchanger forms part of said closed loop airflow pathway.~~
---------	--

Karppanen discloses this claim element because the first heat transfer part **60** of the cooling element **32** forms part of the closed pathway within the display casing **10**, i.e., “**said closed loop airflow pathway.**” (Ex. 1002, ¶¶191-193.)

Regarding the first heat transfer part **60** of the cooling element **32** (“**said heat exchanger**”), Karppanen discloses that “[t]he first heat transfer part may comprise **cooling fins.**” (Ex. 1004, 8:29-30, FIG. 2.)



(*Id.*, FIG. 2 (partial, annotated).)

Because the air flowing through the closed pathway circulates between the fins of the first heat transfer part **60** of the cooling element **32**, “**a second portion of said heat exchanger forms part of said closed loop airflow pathway.**” Thus, Karppanen teaches this claim element. (Ex. 1002, ¶193.)

D. Claim 4

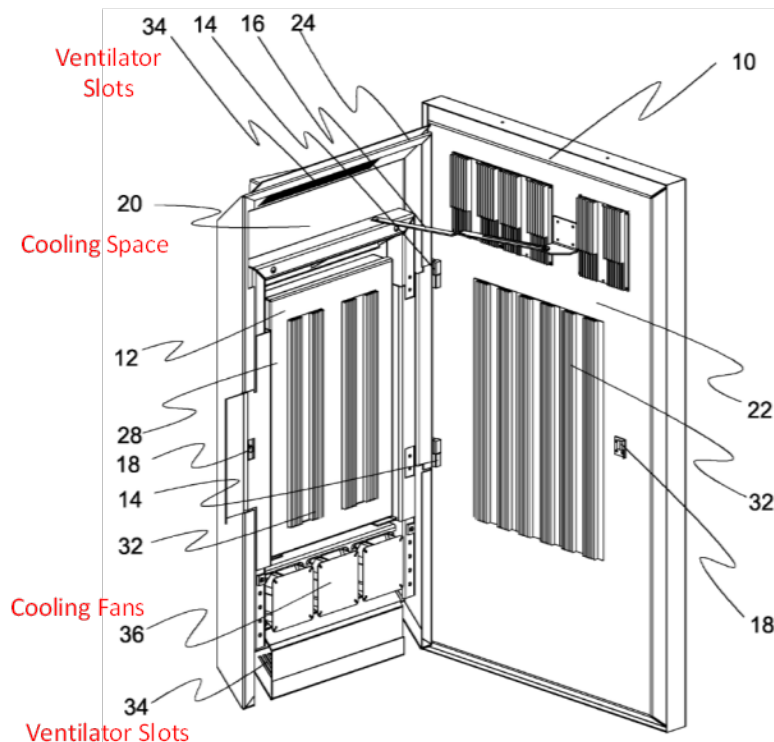
1. Element 4[a]

4[a]	~~The cooling system of claim 3 further comprising: an inlet located at a first portion of said housing for ingesting said ambient air into said open loop airflow pathway; and~~
------	--

Karppanen teaches this claim element because in Karppanen’s system, the cover **24**, that forms the “**housing**” includes vents **34** (“**an inlet**”) at the bottom (“**a**

first portion of said housing”) for ingesting ambient air into the cooling space **20**
 (“**said open loop airflow pathway**”). (Ex. 1002, ¶¶194-196.)

“In the first edge of the cover **24** ... there are **ventilator slots 34**, which
enable the **movement of air from the outside of the device to the cooling space,**”
and “[i]n the cover **24** there are **cooling fans 36**, by which the **circulation of air**
through the cooling space [20] is regulated.” (Ex. 1004, 7:16-22, FIG. 1.)



(*Id.*, FIG. 1 (annotated).)

The ventilator slots **34** is “**an inlet**” in the bottom, i.e., “the **first edge of the cover 24,**” (“**housing**”) that “enable the movement of air from the outside of the device (“**ingesting ambient air**”) to the cooling space [20]” (“**open loop airflow**

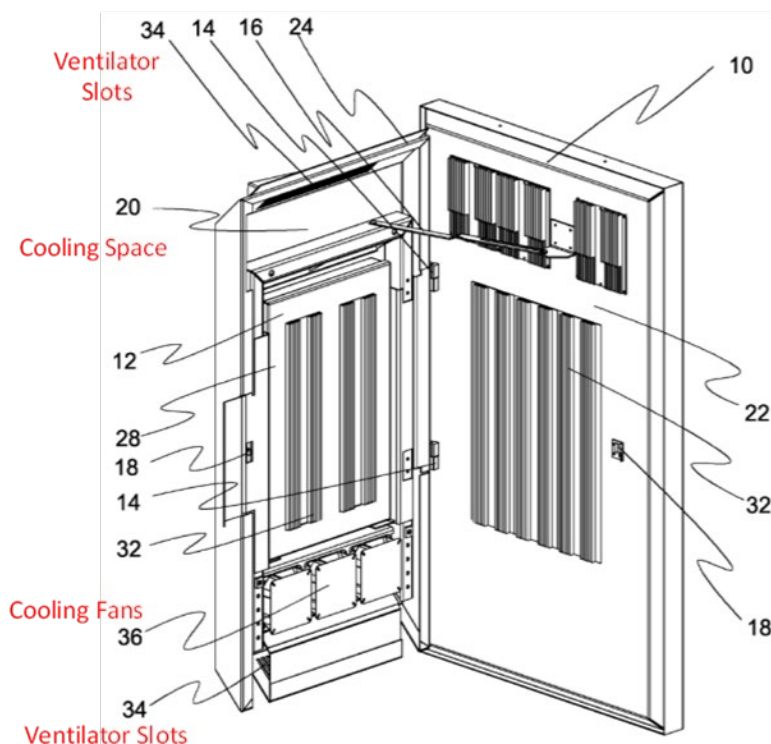
pathway”). Thus, Karppanen teaches this claim element. (Ex. 1002, ¶196.)

2. Element 4[b]

4[b]	~~an exhaust located at a second portion of said housing for exhausting said ambient air from said open loop airflow pathway.~~
------	--

Karppanen teaches this claim element because in Karppanen’s system, the cover **24**, that forms the “**housing**” includes vents **34** (“**an exhaust**”) at the top (“**a second portion of said housing**”) for exhausting ambient air from the cooling space **20** (“**said open loop airflow pathway**”). (Ex. 1002, ¶¶197-199.)

Karppanen discloses that in “the second edge” of the cover **24** “there are ventilator slots **34**, which enable the movement of air” “from the cooling space back to the outside of the device” and that “there are cooling fans **36**, by which the circulation of air through the cooling space [**20**] is regulated.” (Ex. 1004, 7:16-22, FIG. 1.)



(*Id.*, FIG. 1 (annotated).)

Thus, through the ventilator slots **34** in the top, i.e., “the second edge of the cover **24**,” (“**second portion of said housing**”) air is exhausted from the cooling space **20** (“**said open loop airflow pathway**”). Thus, Karppanen teaches this claim element. (Ex. 1002, ¶199.)

E. Claim 5

5	The cooling system of claim 1 wherein: said at least one polarizer comprises a linear polarizer.
---	--

Larson teaches this claim element because Larson’s auxiliary polarizer 20 can be a linear polarizer. (Ex. 1002, ¶¶200-202.)

“[A] **linear auxiliary polarizer 20** is disposed adjacent to the cover glass 4.” (Ex. 1005, 4:32-34, FIG. 4; *see id.*, 4:30-32.) Thus, Larson teaches the limitation recited in this claim.

F. Independent Claim 6

1. Elements 6[pre] and 6[a]

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

Claims elements 6[pre] and 6[a] are identical, respectively, to claim elements 1[pre] and 1[a]. For the reasons provided in Ground 1 for claim elements 1[pre] and 1[a], Karppanen teaches these claim elements. (Ex. 1002, ¶204; *supra* §§VIII.A.1, VIII.A.2.)

2. Element 6[b]

6[b]	~~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;~~
------	--

The difference between claim elements 6[b] and 1[b] is shown below:³

a transparent cover panel forming a ~~forward~~front portion of the

³ The comparisons below use the same formatting.

housing, ~~wherein~~ the transparent 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;~~

Karppanen’s “front plate 46” is disclosed as the cover panel and it is “transparent.” (Ex. 1004, 7:31-35, FIG. 2.) For the reasons provided in Ground 1 for claim element 1[b], Karppanen teaches this claim element. (*Supra* §VIII.A.3; Ex. 1002, ¶¶206-207.)

3. Element 6[c]

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

This claim element is substantially the same as element 1[d]:

an open loop airflow pathway ~~for ambient air~~ passing through ~~said~~the housing ~~and~~ behind ~~said~~the electronic image assembly;

For the reasons provided in element 1[d], Karppanen teaches this claim element. (Ex. 1002, ¶¶208-209; *supra* §VIII.A.5.)

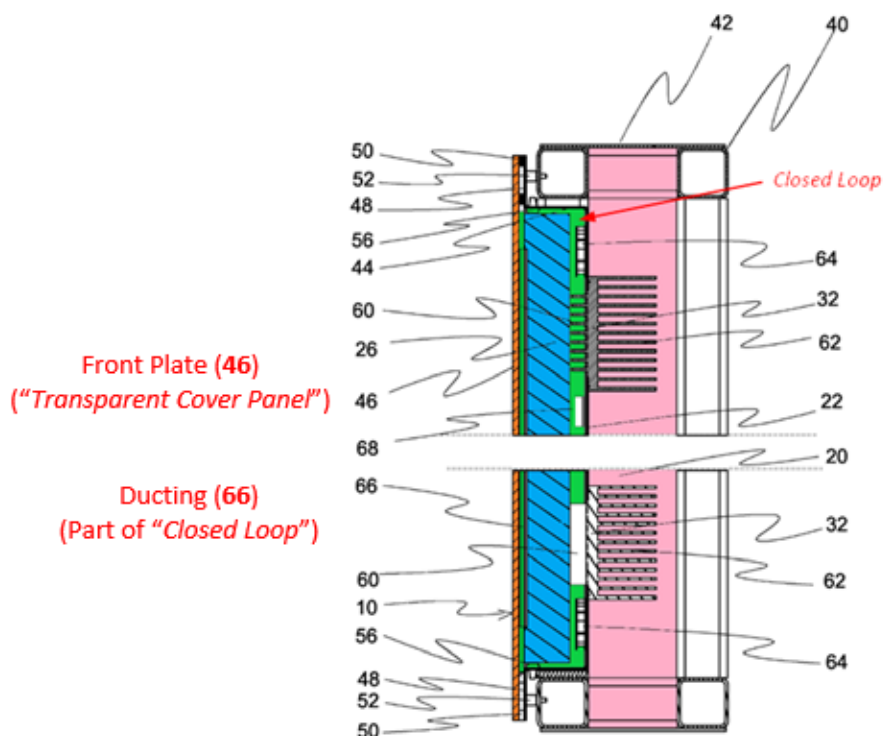
4. Element 6[d]

6[d]	~~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;~~
------	--

This claim element is substantially the same as element 1[c]:

a closed loop ~~airflow~~gas circulation pathway ~~passing~~
~~through~~contained within 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~~gas circulation pathway
~~extends~~passes between said transparent cover panel and said
electronic image assembly ~~and said cover panel~~;

Although 1[c] recites “airflow” and 6[d] recites “gas circulation,” air is a gas, and flow of air is “gas circulation.” (Ex. 1002, ¶211.) Moreover, while 1[c] recites a “pathway **passing through** the housing,” 6[d] recites “pathway **contained within** the housing.” Karppanen’s closed loop is contained within the housing and passes between the front plate and the display. (*Id.*, ¶¶211-213; *supra*, §VIII.A.2.)



(Ex. 1004, FIG. 2 (annotated).)

For the reasons provided for claim element 1[c], Karppanen teaches this claim element. (Ex. 1002, ¶214; *supra* §VIII.A.4.)

5. Element 6[e]

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

This claim element recites substantially the same limitations that 4[a] recites:

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

For the reasons provided for claim element 4[a], Karppanen teaches this claim element. (Ex. 1002, ¶¶215-216; *supra* §VIII.D.1.)

6. Element 6[f]

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

This claim element is identical to 4[b]. For the reasons provided for claim element 4[b], Karppanen teaches this claim element. (Ex. 1002, ¶217; *supra* §VIII.D.2.)

7. Element 6[g]

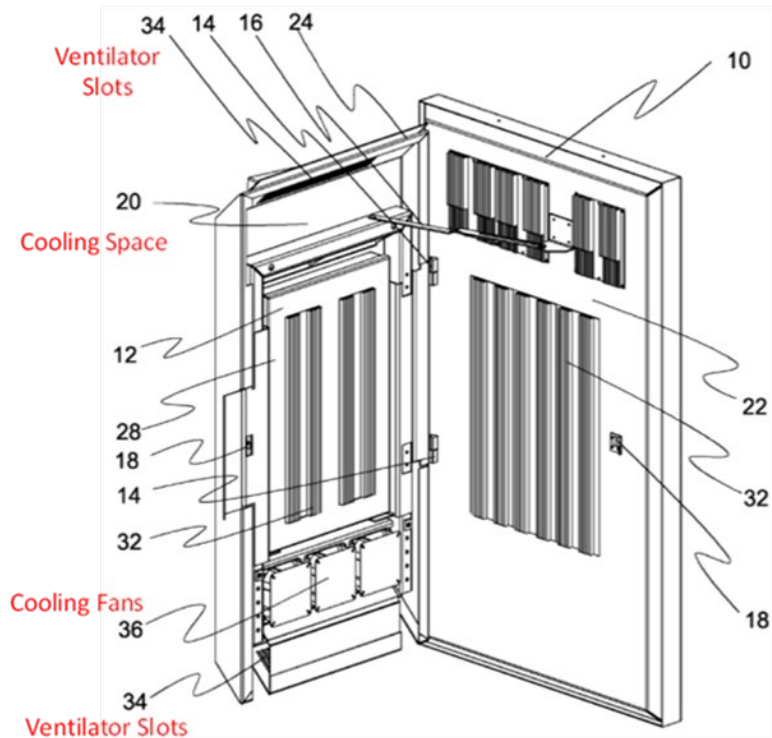
6[g]	~~an air circulation device positioned along said open loop airflow pathway between said inlet and said exhaust, wherein said air circulation device is configured to force said ambient air through the open loop airflow pathway when activated;~~
------	---

Karppanen discloses this claim element because Karppanen’s system includes fans **36** to force ambient air through the cooling space **20**. (Ex. 1002, ¶¶218-221.)

Karppanen’s cooling space [20] is “**an open loop airflow pathway for ambient air.**” (*Id.*, ¶219; *supra*, §VIII.A.5.) The bottom ventilator slots **34** are the “**inlet**” and the top ventilator slots **34** are the “**exhaust.**” (Ex. 1002, ¶219; *supra*, §VIII.D.) Karppanen teaches “**cooling fans 36**, by which the circulation of air

through the cooling space [20] is regulated.” (Ex. 1004, 7:21-22, FIG. 1.)

Annotated Figure 2 below shows that fans 36 are located within the cooling space 20, and between the bottom and top ventilator slots 34. (Ex. 1002, ¶219.)



(Ex. 1004, FIG. 2 (annotated).)

Thus, Karppannen teaches this claim element. (Ex. 1002, ¶221.)

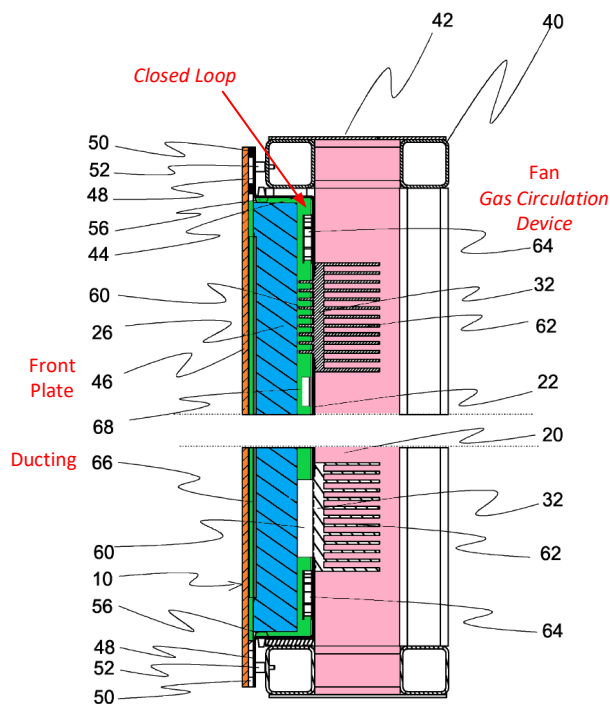
8. Element 6[h]

6[h]	~~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;~~
------	---

This claim element is substantially the same as 1[e]:

~~at least one air~~a gas circulation device positioned along said closed
loop gas circulation pathway to force ~~the~~ circulating gas
~~through~~around the closed loop ~~airflow~~gas circulation pathway when
activated;~~and~~

Although 1[e] recites “air circulation” and claim element 6[h] recites “gas circulation,” air is a gas. (Ex. 1002, ¶223.) Annotated Figure 2 shows that Karppanen’s circulation fan **64** is positioned within (i.e., along) the closed loop. (*Id.*)



(Ex. 1004, FIG. 2 (annotated).)

Finally, while 1[e] recites “to force the circulating gas **through** the closed loop,” claim element 6[h] recites “to force circulating gas **around** the closed loop.”

Air (i.e., gas) forced “through” a **closed** loop would circulate “around” the closed loop, because it is a loop. (Ex. 1002, ¶224.) For the reasons provided in Ground 1 for 1[e], Karppanen teaches this claim element.

9. Element 6[i]

6[i]	~~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~~
------	---

This claim element is substantially the same limitations as claim 3:

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~~gas circulation pathway~~;~~ and

For the reasons provided for claim 3, Karppanen teaches this claim element.

(Ex. 1002, ¶¶226-227; *supra* §VII.C.)

10. Element 6[j]

6[j]	~~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~~
------	---

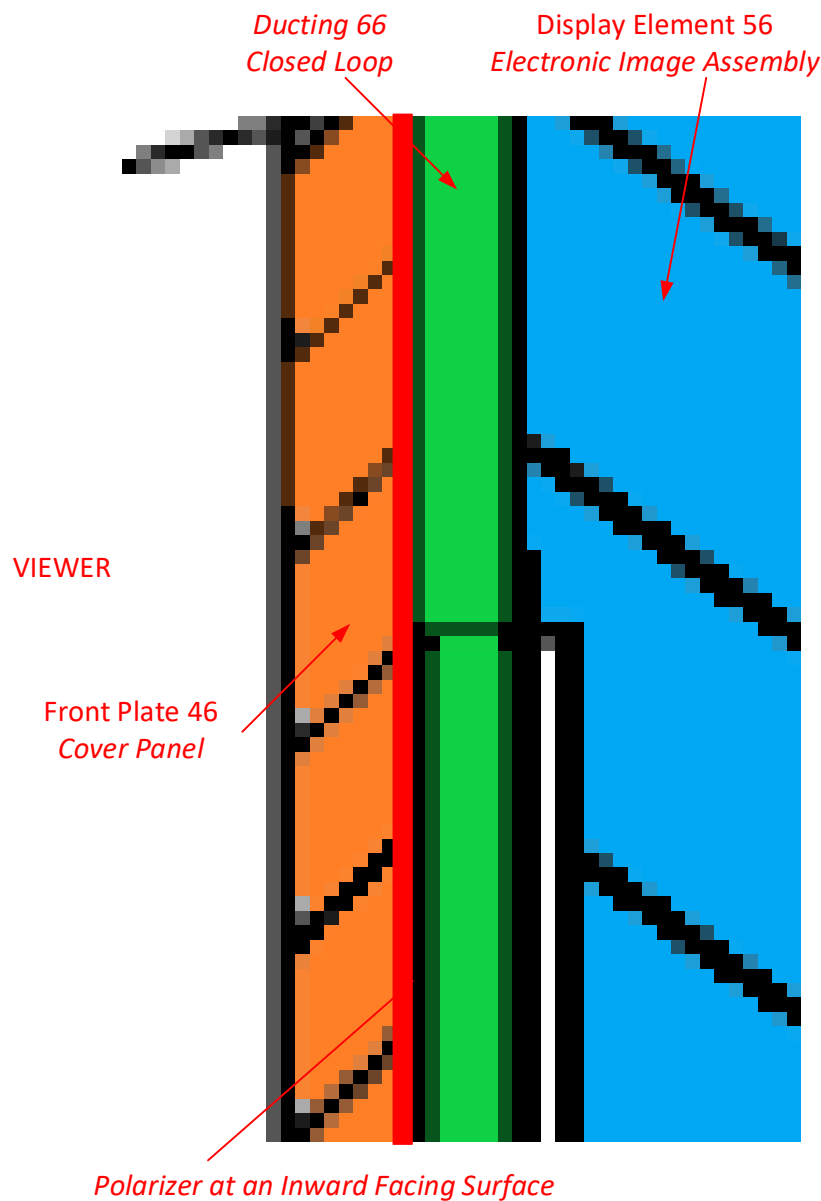
	~~between said transparent cover panel and said electronic image assembly or thermally interacting with said electronic image assembly.~~
--	--

Larson teaches this claim element for the reasons provided for 1[f]. (Ex. 1002, ¶¶228-235.)

A “polarizer” recited in 1[f] is a “solar energy reduction layer.” (*Id.*, ¶229.) For instance, claim 8, which depends from claim 6, recites “at least one of said one or more solar energy reduction layers comprise a polarizer.”

Also, because Larson’s polarizer **20** is located “at an inward facing surface of said cover panel,” that polarizer, i.e., “solar energy reduction layer,” is located “at said transparent cover panel.” (*Id.*, ¶230; *supra* §VIII.A.7.)

In the annotated, partial Figure 2 below, from a viewer’s point of view, Karppanen’s transparent plate **46** (highlighted orange) is located in the front, a portion of the closed loop (highlighted green) is provided after the front transparent plate **46**, and the display element **26** (highlighted blue) is located after the closed loop. Larson’s polarizer **20** (marked red), is provided at the “inward facing surface of” Karppanen’s transparent front plate **46**, and is thus located **before** the closed loop and the display element **26**. (Ex. 1002, ¶231.)



(Ex. 1004, FIG. 2 (partial, annotated); Ex. 1002, ¶231.)

Larson’s polarizer **20** is “configured to **prevent** at least some sunlight striking said cover panel **from traveling beyond**” the polarizer **20** at least because it is absorbing. (*Supra*, §VIII.A.7.) Therefore, Larson’s polarizer **20** would

prevent at least some sunlight striking the transparent front plate **46** from reaching:

(1) a portion of the closed loop located between the front plate **46** and the display element **26**, and (2) the display element **26**. (Ex. 1002, ¶232.)

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.)

Therefore, the polarizer **20** and/or the antireflection coating **6** teach the limitations recited in 6[j]. (*Id.*, ¶¶234-235.)

In summary, Karppanen in view of Larson discloses each and every element of claim 6 and renders obvious claim 6. (*Id.*, ¶236.)

G. Claim 7

1. Element 7[a]

7[a]	~~The cooling system of claim 6 wherein: said air circulation device comprises one or more fan assemblies; and~~
------	---

Karppanen teaches this claim element. (Ex. 1002, ¶237.) Specifically, the air circulation device that Karppanen discloses are cooling fans **36**. (Ex. 1004, 7:21-22, FIG. 1; *supra*, §VIII.F.8.) Thus, Karppanen’s air circulation device

includes “**one or more fan assemblies.**” (Ex. 1002, ¶237.)

2. Element 7[b]

7[b]	~~said gas circulation device comprises one or more fan assemblies.~~
------	--

Karppanen teaches this claim element. (Ex. 1002, ¶238.) The gas circulation devices that Karppanen discloses are fans **64**. (Ex. 1004, 9:3-5, FIG. 1; *supra*, §VIII.F8.) Thus, Karppanen’s gas circulation device includes “**one or more fan assemblies.**” (Ex. 1002, ¶238.)

H. Claim 8

8	~~The cooling system of claim 6 wherein: at least one of said one or more solar energy reduction layers comprise a polarizer.~~
---	--

Larson teaches this claim element. As discussed for 6[j], the “solar energy layer” that Larson discloses is auxiliary polarizer **20** and/or antireflection coating **6**. (Ex. 1005, 2:33-39; Ex. 1002, ¶239; *supra* §VIII.F.10.)

I. Claim 9

9	~~The cooling system of claim 8 wherein: said polarizer comprises a linear polarizer.~~
---	--

Claim 9 is identical to claim 5. For the reasons provided for claim 5, Karppanen in view of Larson teaches this claim. (Ex. 1002, ¶240; *supra* §VIII.E.)

J. Claim 10

10	~~The cooling system of claim 6 wherein: at least one of said one or more solar energy reduction layers comprise a film having anti-reflection properties.~~
----	---

Larson teaches this claim element. (Ex. 1002, ¶241.) As explained for 6[j], a “solar energy reduction layer[]” is Larson’s auxiliary polarizer **20**. (*Supra* §VIII.F.10.) Larson further states that “the auxiliary polarizer **20** may [] include **antireflective material**.” (Ex. 1005, 4:9-13, FIG. 2.) As also noted in 6[j] “antireflection coating[] **6** may be added to one or **both sides** of the cover glass **4**.” (*Id.*, 1:34-36, FIG. 1.) Thus, Larson teaches this claim. (Ex. 1002, ¶241.)

K. Claim 11: Elements 11[a] and 11[b]

11[a]	~~The cooling system of claim 6 wherein: at least a first one of said one or more solar energy reduction layers comprise a polarizer; and~~
11[b]	~~at least a second one of said one or more solar energy reduction layers comprise a film having anti-reflection properties.~~

These claim elements are identical, in substance, to claims 8 and 10, respectively. Therefore, for the reasons provided for claim 8 and 10, Larson teaches this claim element. (Ex. 1002, ¶¶242-243; *supra* §§VIII.H, VIII.J.)

L. Independent Claim 12

1. Element 12[pre]

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

This preamble corresponds to element 1[pre]:

A method for cooling ~~system for~~ an electronic image assembly, ~~the cooling system~~said method comprising the steps of:

To the extent the preamble of claim 12 is limiting, Karppanen discloses this preamble for the reasons provided for element 1[pre]. (Ex. 1002, ¶247; *supra* §VIII.A.1.)

2. Element 12[a]

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

This claim element corresponds to claim element 1[a]:

~~a housing for~~placing said the electronic image assembly within a housing;

Karppanen discloses this claim element for the reasons provided for 1[a] under Ground 1. (Ex. 1002, ¶249; *supra* §VIII.A.2.)

3. Element 12[b]

12[b]	~~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;~~
-------	---

~~Claim element 12[b] and the limitations of 1[b] and 1[c] are compared below (without marking insubstantial differences, such as “the” and “said”). Here and in other side-by-side comparisons below, the limitations added to the claim element at issue are shown in blue (left column), and the limitation not present in the element at issue are shown in red (right column).~~

~~Limitation of Claim Element~~ ~~12[b]~~	~~Limitation of Claim Elements~~ ~~1[b] and 1[c]~~
~~<u>forcing circulating air through a</u> closed loop airflow pathway <u>within</u> said housing;~~	~~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~~

~~Limitation of Claim Element~~ ~~12[b]~~	~~Limitation of Claim Elements~~ ~~1[b] and 1[c]~~
	~~gas, and~~
~~wherein at least a portion of said closed-loop airflow pathway extends between an electronic image assembly and a cover panel~~	~~wherein at least a portion of said closed loop airflow pathway extends between said electronic image assembly and said cover panel~~
~~forming a <u>front</u> portion of said housing and <u>spaced apart</u> from said electronic image assembly,~~	~~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~~
~~wherein said cover panel is configured to permit viewing of images displayed at the electronic image assembly through said cover panel;~~	~~and is configured to permit viewing of images displayed at the electronic image assembly through said cover panel;~~

The differences: “front portion” and “forward portion”; and “spaced apart from” and “located . . . at least some distance from” are insubstantial. (Ex. 1002, ¶251.)

Karppanen’s closed loop is within the display case **10**, i.e., the housing. (*Id.*; *supra*, §VIII.A.4.) Claim element 12[b] recites “forcing circulating air through,” and claim element 1[e] recites “at least one air circulation device positioned to force the circulating gas through the closed loop airflow pathway when activated,” which forces the circulating air through the closed loop. (Ex. 1002, ¶251; *supra* §VIII.A.6.)

For the reasons provided for 1[b], 1[c], and 1[e] under Ground 1, Karppanen in view of Larson teaches all of the limitations of 12[b]. (Ex. 1002, ¶252.)

4. Element 12[c]

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

~~Claim element 12[c] and the limitations of 1[d] are compared below (without marking insubstantial differences).~~

~~Limitation of Claim Element~~ 12[c]	~~Limitation of Claim Element~~ 1[d]
~~forcing ambient air through a second airflow pathway within said housing, wherein said second airflow~~	~~an open loop airflow pathway for ambient air passing through said housing and behind said electronic~~

Limitation of Claim Element 12[e]	Limitation of Claim Element 1[d]
~~pathway extends behind said electronic image assembly; and~~	~~image assembly;~~

The difference between “a second airflow pathway within said housing” and “an open loop airflow pathway . . . passing through said housing” is insubstantial. Likewise, “an open loop airflow pathway . . . behind said electronic image assembly” is in substance the same as “a second airflow pathway [that] extends behind said electronic image assembly.” (Ex. 1002, ¶254.)

Claim element 12[c] recites “forcing ambient air through a second airflow pathway” and claim element 6[g] recites “an air circulation device positioned along said open loop airflow pathway . . . said air circulation device is configured to force said ambient air through the open loop airflow pathway when activated.” (*Id.*, ¶255.) For the reasons provided for claims elements 1[d] and 6[g] under Ground 1, Karppanen in view of Larson teaches element 12[c]. (*Id.*, ¶256; *supra* §§VIII.A.5, VIII.F.7.)

5. Element 12[d]

12[d]	~~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.
--	---

Claim element 12[d] and the limitations of 6[j] are compared below:

Limitation of Claim Element 12[d]	Limitation of Claim Element 6[j]
~~providing one or more solar energy reduction layers at an inward facing surface of said cover panel, wherein~~	~~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 reduce an amount of solar energy transferred to said circulating air in at least said portion of said closed loop airflow pathway.~~	~~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~~

~~Limitation of Claim Element~~ ~~12[d]~~	~~Limitation of Claim Element~~ ~~6[j]~~
	~~assembly or thermally interacting with said electronic image assembly.~~

Claim element 1[f] recites: “at least one polarizer located at an inward facing surface of said cover panel.” “[R]educ[ing] an amount of solar energy transferred to said circulating air” is in substance the same as “prevent[ing] a portion of solar energy entering said transparent cover panel from thermally interacting with the circulating gas at said portion. Therefore, the combination of Karppanen and Larson teaches this claim element for the reasons provided in Ground 1 for claim elements 1[f] and 6[j]. (Ex. 1002, ¶258; *supra* §§VIII.A.7, VIII.F.10.)

Therefore, Karppanen in view of Larson discloses each and every element of claim 12 and renders obvious claim 12. (*Id.*, ¶259.)

M. Claim 13

~~13~~	~~The cooling method of claim 12 wherein: at least one of said one or more solar energy reduction layers comprise a polarizer.~~
---------------	---

This claim is identical to claim 8. For the reasons provided for claim 8 above, Karppanen in view of Larson teaches this claim. (*Id.*, ¶260; *supra* §VIII.H.)

N. Claim 14

14	~~The cooling method of claim 13 wherein: at least one of said one or more solar energy reduction layers comprise a film having anti-reflection properties.~~
----	--

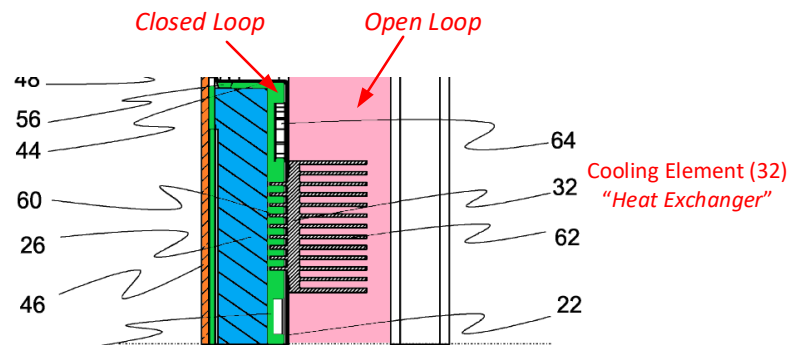
This claim is identical to claim 10. For the reasons provided for claim 10 above, Karppanen in view of Larson teaches this claim. (Ex. 1002, ¶261; *supra* §VIII.J.)

O. Claim 15

15	~~The cooling method of claim 12 further comprising the steps of: 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.~~
----	---

Karppanen teaches this claim. (Ex. 1002, ¶¶262-264.) Karppanen teaches the “heat exchanger” of 6[i], which forms a part of both the open and closed loop pathways. (*Id.*, ¶262; *supra*, §VIII.F.9.)

Because the heat exchanger is common to both, the gas/air circulating in the closed loop and the gas/air moving through the open loop would exchange heat via the heat exchanger.



(Ex. 1004, FIG. 2 (partial, annotated).)

Therefore, Karppanen teaches this claim element. (Ex. 1002, ¶264.)

P. Motivation to Combine

As explained above, Karppanen teaches a cooling technique with two cooling paths that do not mix. The cooling technique cools an electronic display (e.g., an LCD display) within a housing. One of Karppanen's cooling paths is air flowing in a gap between front glass and the display. Larson teaches using polarizers (and other anti-reflective layers) in systems (like Karppanen's) with such a gap. Larson teaches that the polarizer enhances the viewing experience. Larson's polarizer also absorbs at least some light thereby enhancing cooling. A POSITA would have been motivated to include Larson's polarizer in Karppanen's display. (*Id.*, ¶126.)

Karppanen and Larson describe systems in closely related fields, namely, electronic displays. (*Id.*, ¶127.) For example, both Karppanen and Larson teach using LCD displays. (Exs. 1004, Abstract, 8:5-9, FIG. 1; 1005, 1:22-27 (disclosing

a conventional LCD display), FIG. 1, 2:33-39 (disclosing a conventional LCD display in combination with a polarizer))

Karppanen states that its display can be installed outdoors. (Ex. 1004, 3:10-13 (stating an “objective of the invention is to provide an electronic information board, which tolerates well external variations of temperature and is thereby **suitable for installation outdoors**”), 5:33-34 (stating an “advantage of the invention is that it is suitable for **use** both **outdoors** and indoors”).)

A POSITA would have understood that when used outdoors during daytime, Karppanen’s display system would be exposed to ambient light or sunlight. (Ex. 1002, ¶129.) Larson describes that “it is difficult to maintain high contrast output at high ambient illumination levels,” and discloses further that “polarized light displays” can maintain high contrast. (Ex. 1005, 1:11-17, 1:22-32 (disclosing “a **conventional** polarized display”), FIG. 1.) Therefore, a POSITA would have recognized that the use of polarization in Karppanen’s system can beneficially improve the contrast of the display, when used outdoors during daytime, which is the environment that Karppanen is intended for. (Ex. 1002, ¶129.)

In Karppanen’s electronic information board, a display casing includes a transparent front plate **46**, and a display element **26**, such as an LCD display, located behind the transparent front plate **46**. (Ex. 1004, 7:31-34, 8:4-9, FIG. 2.) The front plate **46** is separated from the display **26** by a gap or ducting **66** through

which air is circulated. (*Id.*, 9:5-8, FIG. 2.)

Larson discloses a similar display structure, identifies a problem with that structure, and provides a solution. (Ex. 1002, ¶131.) Specifically, the conventional polarized display that Larson discloses includes a “cover glass **4**” and a “front polarizer **8**” on a “substrate **10**” over “a liquid crystal layer **12**.” (Ex. 1005, 1:22-27, FIG. 1.) Larson states that “[t]he cover glass **4** is separated from the front polarizer **8** by a **gap 9**, typically filled with air.” (*Id.*, 1:27-28, FIG. 1.)

Larson identifies a problem with such structures, stating that “[r]eflectances associated with the boundaries between the cover glass **4**, the gap **9**, and the front polarizer **8** are especially pronounced.” (*Id.*, 1:30-32.) 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**. (Ex. 1002, ¶132.)

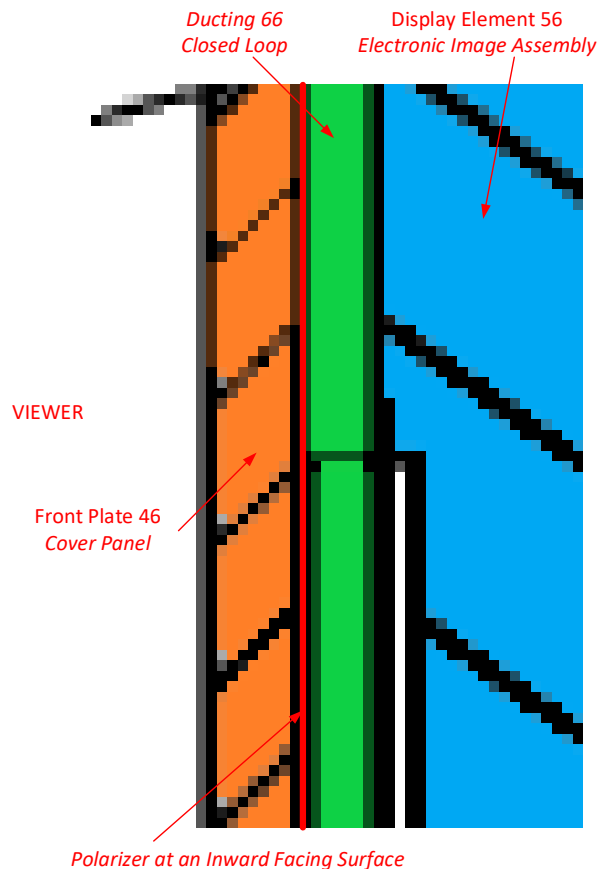
As one solution to this problem, Larson states that “the rear surface of the cover glass **4** may include an antireflection coating, film, sheet, or any other form of antireflection material,” and that such a material can “reduce reflections at the boundary between the cover glass **4** and . . . the front gap **9**.” (Ex. 1005, 2:50-56.) As another solution, Larson discloses an embodiment in which “the display includes [an] auxiliary polarizer **20** between the front gap **9** and the cover glass **4**.” (*Id.*, 3:13-15, FIG. 2; *see id.*, 2:33-39.) Larson also states the “auxiliary polarizer

20 is an absorbing polarizer,” that “is preferably aligned in the same direction as the front polarizer **8**” so as to “minimizes the attenuation of light coming from the backlight **18**.” (*Id.*, 3:19-24; Ex. 1002, ¶133.)

Larson further states: “[r]eflected light, however, initially passes through the cover glass and is polarized by the auxiliary polarizer **20**” and that “[b]y 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%.” (Ex. 1005, 3:25-30.) Moreover, per Larson “[t]his 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.*, 3:30-34.)

Thus, in light of Larson, a POSITA would have recognized that Karppanen’s display may also have a high reflectance problem at the boundary between the front plate **46** which, like Larson’s cover glass **4**, is preferable made of glass, and the ducting **66**, i.e., the air gap similar to Larson’s gap **9**. (Ex. 1002, ¶135.) A POSITA would have further understood that this problem can be minimized by providing an anti-reflective coating on the rear surface of the front plate **46** and/or by providing an polarizer between the ducting **66**, i.e., the air gap, and the front plate **46**, where such a polarizer may be disposed on the rear surface of the front plate **46**. (*Id.*) This is shown in Karppanen’s zoomed-in, annotated Figure. 2

below which demonstrates where a POSITA would employ Larson's polarizer.



(Ex. 1004, FIG. 2 (partial, zoomed-in, and annotated); Ex. 1002, ¶135.)

A POSITA would have recognized at least three predictable benefits of these modifications obtained by combining Karppanen and Larson. In fact, Larson describes two of these benefits. (Ex. 1002, ¶136.) First, the reflectance at the gap can be minimized by the anti-reflective coating and the absorbing polarizer, that may absorb a portion of the reflected light. (Ex. 1005, 3:30-34.) Second, the use of the polarizer can reduce the reflectance requirements of the anti-reflective

coating, film, or sheet. (*Id.*) Third, 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. (Ex. 1002, ¶136.)

Moreover, to a POSITA, the combination of Karppanen and Larson would have been combining known prior art elements according to known methods (providing anti-reflective coating and/or a polarizer on a transparent plate) to obtain the predictable results described above. A POSITA would have also understood this combination to be the use of known techniques (using anti-reflective materials and/or polarizers) to improve a similar apparatus (Karppanen's display system) in the same way as Larson describes, to yield predictable results described above. (Ex. 1002, ¶137.)

Additionally, a POSITA would have understood that these predictable, beneficial results can be obtained without requiring substantial changes or modifications to either Karppanen's or Larson's processes, and without adversely affecting the disclosed display systems. A POSITA would have also been able to apply known, conventional manufacturing techniques, such as adhesives. As such, a POSITA would have expected the combination of Karppanen and Larson to succeed. For these reasons, it would have been obvious to one of ordinary skill in the art to combine Karppanen and Larson. (*Id.*, ¶138.)

IX. GROUND 2 – CLAIMS 1-15 ARE OBVIOUS OVER YARE AND LARSON

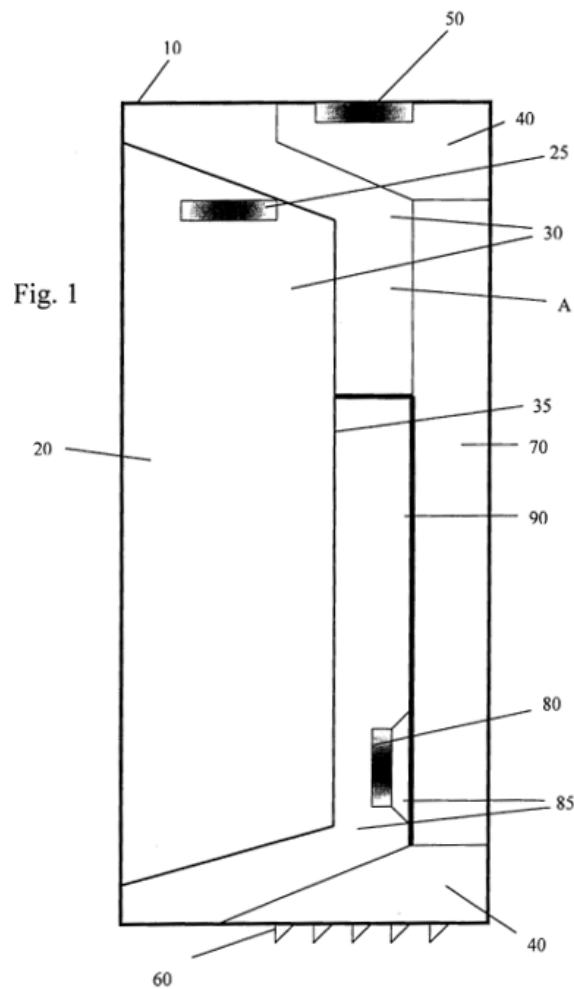
A. Independent Claim 1

1. Element 1[pre]

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

To the extent it is limiting, Yare teaches the preamble because Yare discloses a cabinet **10** having “improved cooling facilities” (i.e., a “**cooling system**”) and a display **20** (e.g., an LCD display). Larson discloses a **conventional** LCD display as a stack of layers, i.e., “**an electronic image assembly.**” (*Id.*, ¶¶281-284.)

Yare discloses “[a] cabinet **10** is arranged to contain a **display 20** for displaying information, advertisements or other visual media. The display [**20**] is sealed within the cabinet in a sealed zone **30.**” (Ex. 1006, 4:4-6, FIGs. 1, 4.)



(*Id.*, FIG. 1 (fans **50**, **80** and zones **30**, **40** form a cooling system).)

Yare also states that “[t]he present invention relates to a cabinet for mounting a display system, the **cabinet having improved cooling facilities** and which is particularly suitable for use in providing large scale displays in public places.” (*Id.*, 1:4-6.) Additionally, Yare states that “[v]arious forms of display system may be used, for example plasma, **LCD**, TFT, CRT, LED, rear projection or any similar technology.” (*Id.*, 6:31-32.)

A POSITA would have known that an LCD is an assembly of several components including a liquid crystal layer and a backlight. (*See, e.g.*, Ex. 1005, 1:22-27 (disclosing conventional LCD having such components), FIG. 1.) Therefore, a POSITA would have understood Yare’s display **20**, that can be an LCD, as “**an electronic image assembly.**” (Ex. 1002, ¶283.)

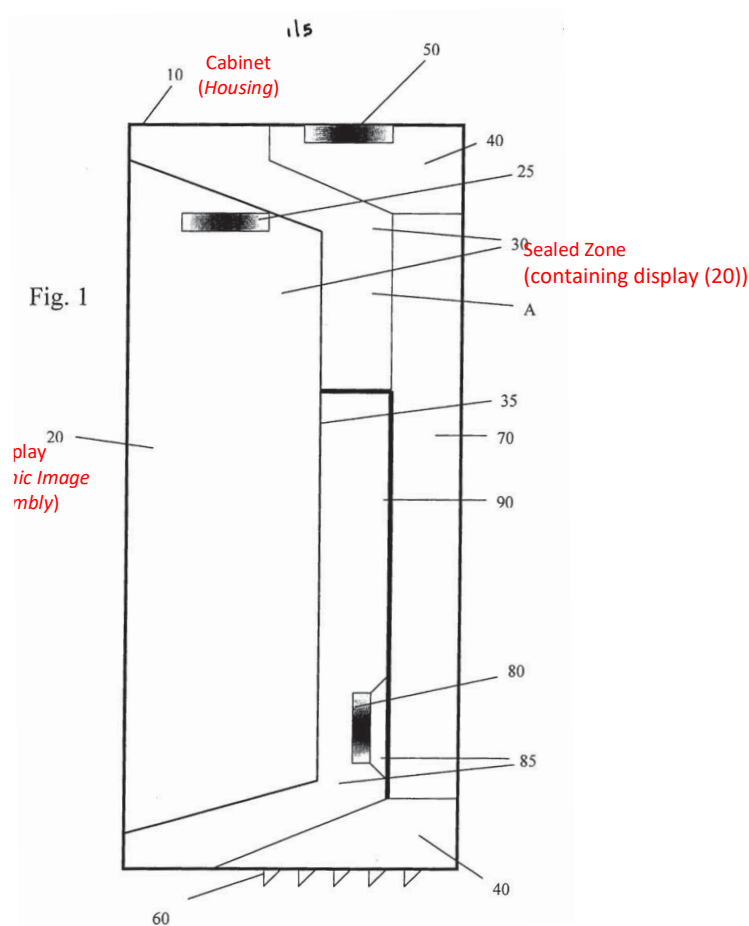
Thus, Yare discloses a cabinet **10** having improved cooling facilities, i.e., “[a] **cooling system**” for a display **20** such as an LCD display, i.e., “**an electronic image assembly.**” Accordingly, Yare teaches the preamble of claim 1. (Ex. 1002, ¶284.)

2. Element 1[a]

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

Yare discloses this claim element because Yare’s cabinet **10**, which contains a display **20**, is “**a housing for the electronic image assembly.**” (Ex. 1002, ¶¶285-287.)

Yare states: “[t]he present invention relates to a cabinet for mounting a display system.” (Ex. 1006, 1:4-6.) Yare also states: “[a] cabinet **10** is arranged to **contain a display 20** for displaying information, advertisements or other visual media.” (*Id.*, 4:4-6, FIG. 1.)



(*Id.*, FIG. 1 (annotated).)

Thus, Yare discloses this claim element. (Ex. 1002, ¶287.)

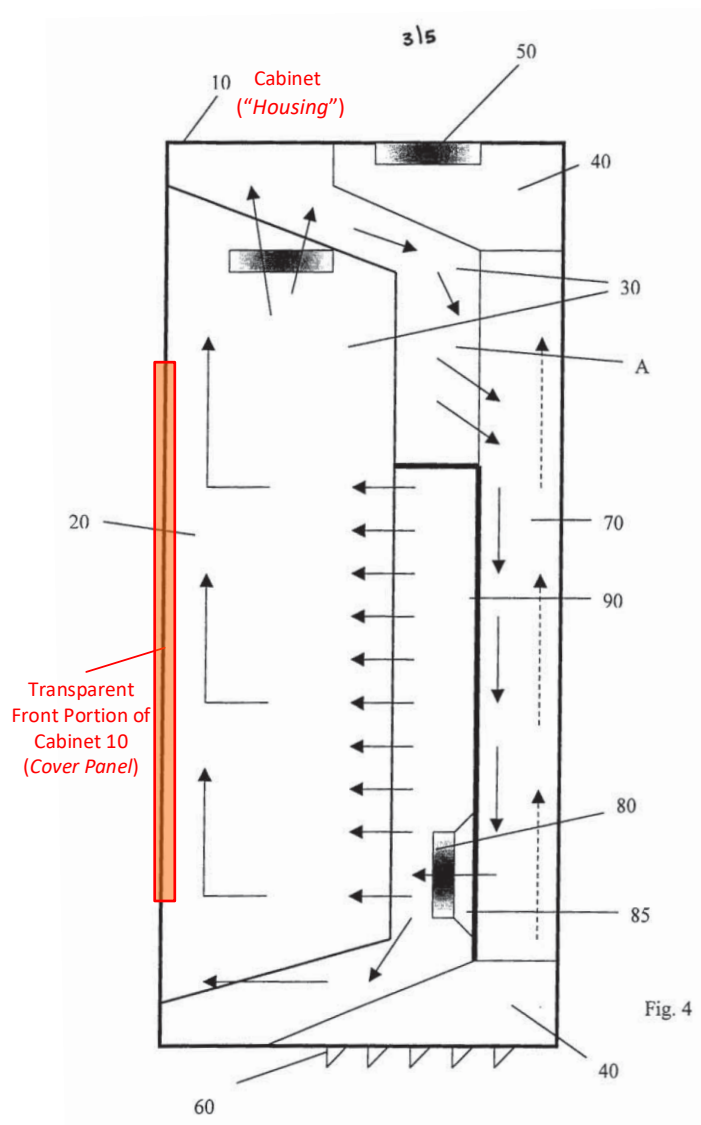
3. Element 1[b]

1[b]	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;
------	---

Yare individually and in combination with Larson discloses this claim element. (Ex. 1002, ¶¶288-299.)

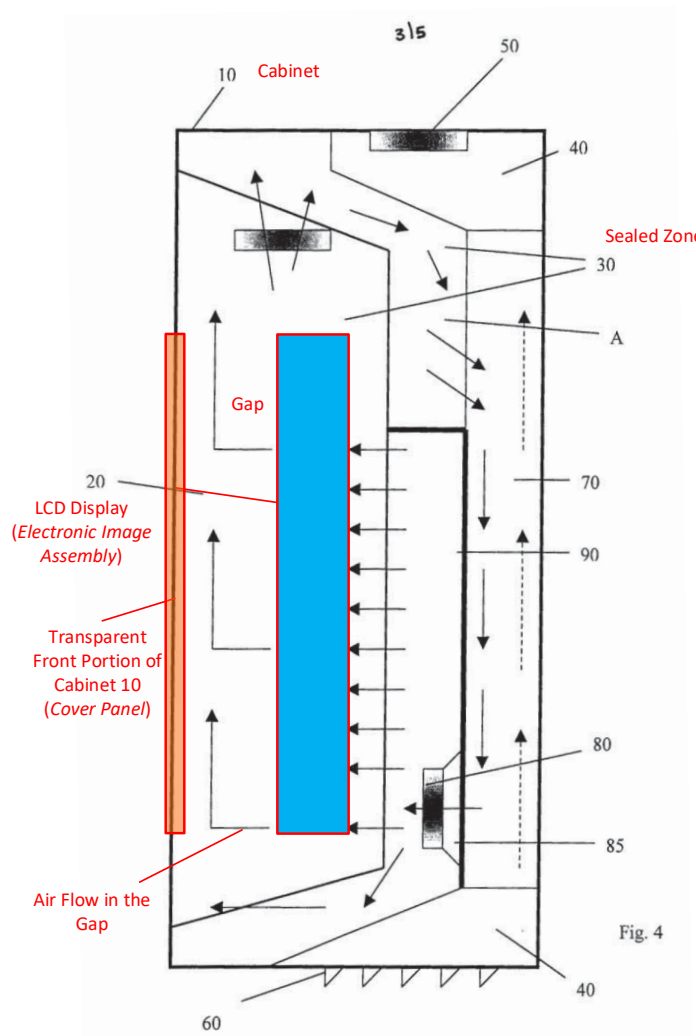
A POSITA would have understood that at least a portion of the front part of Yare's cabinet **10** would be transparent, to allow viewers to view contents displayed on the display **20**. (*Id.*, ¶289; *see* Ex. 1006, 4:4-5 (disclosing cabinet **10** containing display **20**), 1:4-6, FIGs. 1, 4.) A POSITA would have understood that the LCD (or other display) included within cabinet **10** could not be viewed otherwise. (Ex. 1002, ¶289.)

The transparent front portion at the front of the cabinet **10**, shown in annotated Figure 4 below, is “**a cover panel forming a forward portion of the**” cabinet **10**, i.e., the “**housing.**” (*Id.*, ¶290.)



(Ex. 1006, FIG. 4 (annotated).)

In Yare's system, the display cabinet **10** includes a sealed zone **30**, and the display **20** is located within the sealed zone **30**. (*Id.*, 4:4-6.) Yare also depicts in Figure 4 "solid arrows show[ing] movement of air in the sealed zone 30." (*Id.*, 4:25-27, FIG. 4.)

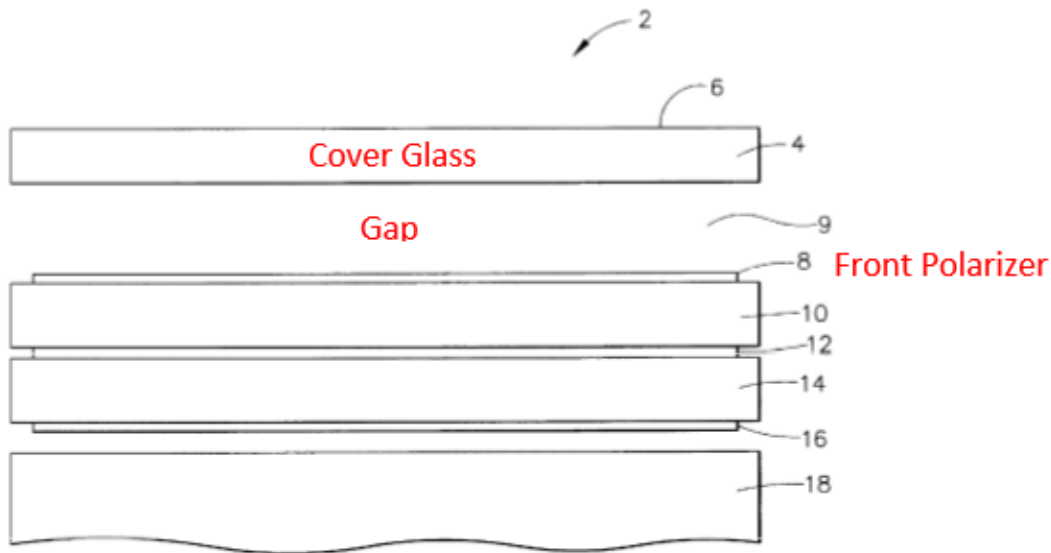


(*Id.*, FIG. 4 (annotated to show the display 20); Ex. 1002, ¶291.)

Yare's figures do not show the location of the display. However, the "L"-shaped arrows in Figure 4 indicate that a part of the air flow within the sealed zone 30 occurs in front of the display 20. Therefore, a POSITA 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**. (Ex. 1002, ¶292.) Therefore, Yare teaches or at least suggests this claim element. (*Id.*)

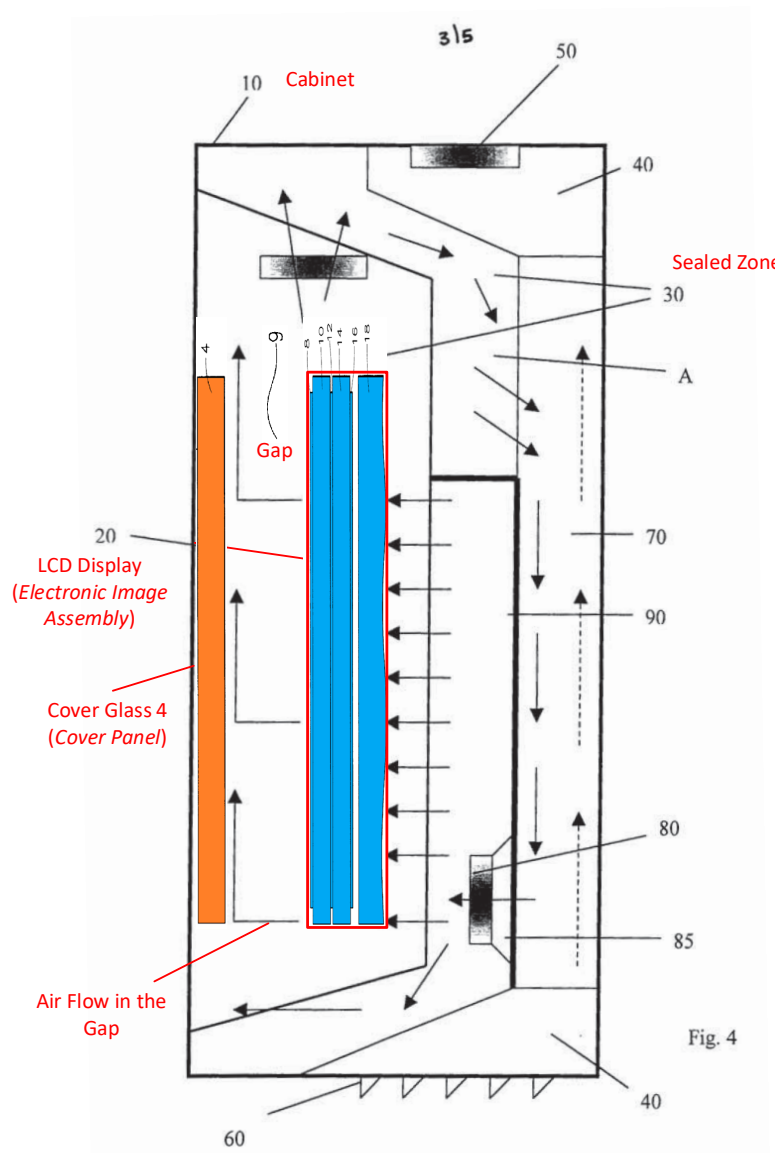
Nevertheless, Larson discloses that the LCD is spaced from the front glass. Larson teaches “**a conventional polarized display 2**, such as a liquid crystal display (**LCD**),” having “a cover glass **4**” and the components of an LCD including a front polarizer whereby “[t]he cover glass **4** is **separated from** the front polarizer **8** by a **gap 9**, typically **filled with air**.” (Ex. 1005, 1:22-28)



(*Id.*, FIG. 1 (annotated).)

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. Such a configuration is shown below by combining Larson’s FIG. 1 with Yare’s Figure

4, annotated. (Ex. 1002, ¶297.)



(Ex. 1006, FIG. 4 (annotated and modified according to Larson, FIG. 1); Ex. 1002, ¶297.)

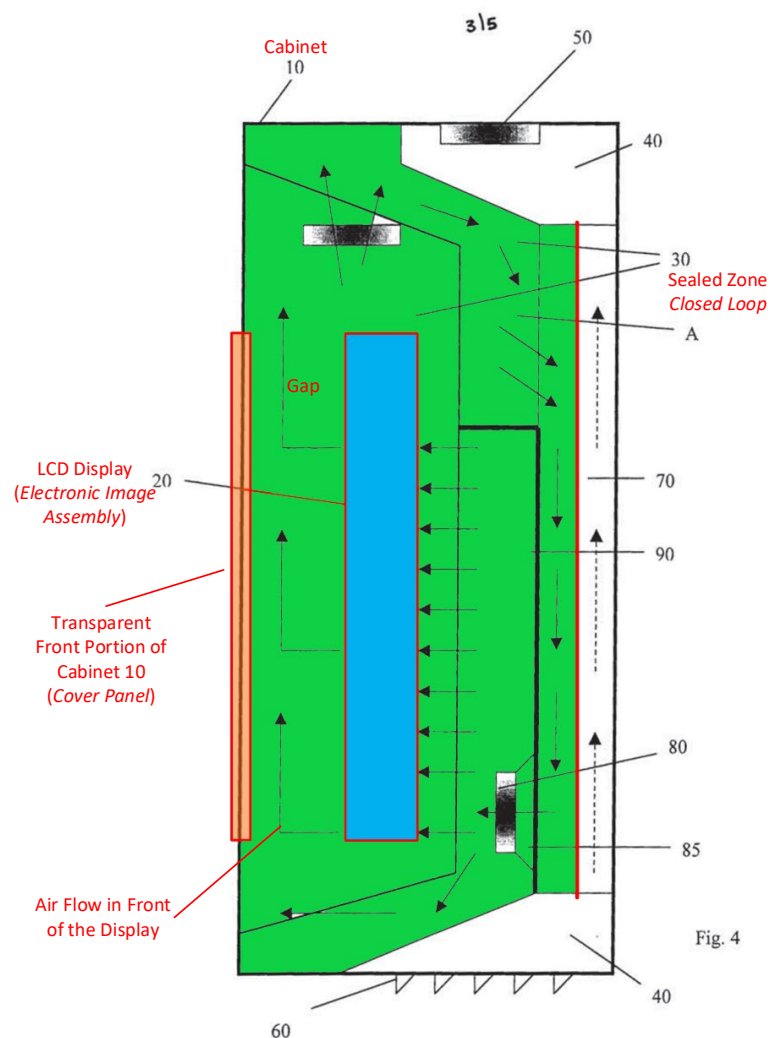
Thus, Yare alone, and also in combination with Larson, teaches this claim element. (Ex. 1002, ¶299.)

4. Element 1[c]

1[c]	~~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;~~
------	---

Yare discloses this claim element because Yare’s cabinet **10** includes a sealed zone **30** through which air is circulated around the display **20**, without contamination from atmospheric air, dust, etc. (*Id.*, ¶¶300-306.)

Yare states that the “display [**20**] is sealed within the cabinet in a **sealed zone 30.**” and that “**the air is sealed** within the sealed zone **30.**” (Ex. 1006, 4:5-6, FIGs. 1, 4.) Yare’s “sealed zone **30** is cooled without the ingress of atmospheric air,” (*id.*, 6:1-2), and “[t]he **sealed zone 30 and atmospheric air zone 40, are sealed from each other** to prevent the passage of air, dirt and the like.” (*Id.*, 4:19-20, FIGs. 1, 4). “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.**” (*Id.*, 5:1-2).



(*Id.*, Figure 4 (annotated); Ex. 1002, ¶303.)

In the annotated Figure 4 above, the transparent front portion of the cabinet 10 is highlighted orange, the display 20 is highlighted blue, and the sealed zone 30 is highlighted green. Because the sealed zone 30 is contained within the cabinet 10 (the “housing”), and because the sealed zone 30 and the 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**”).

A portion of the airflow in the sealed zone **30** extends along a pathway between the front of the display **20** (“**electronic image assembly**”) and the transparent front portion of the cabinet **10** (“**cover panel**”). (*Id.*, ¶305.) 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.*; *supra* IX.A.3.)

Thus, Yare individually and also in combination with Larson teaches this claim element. (Ex. 1002, ¶306.)

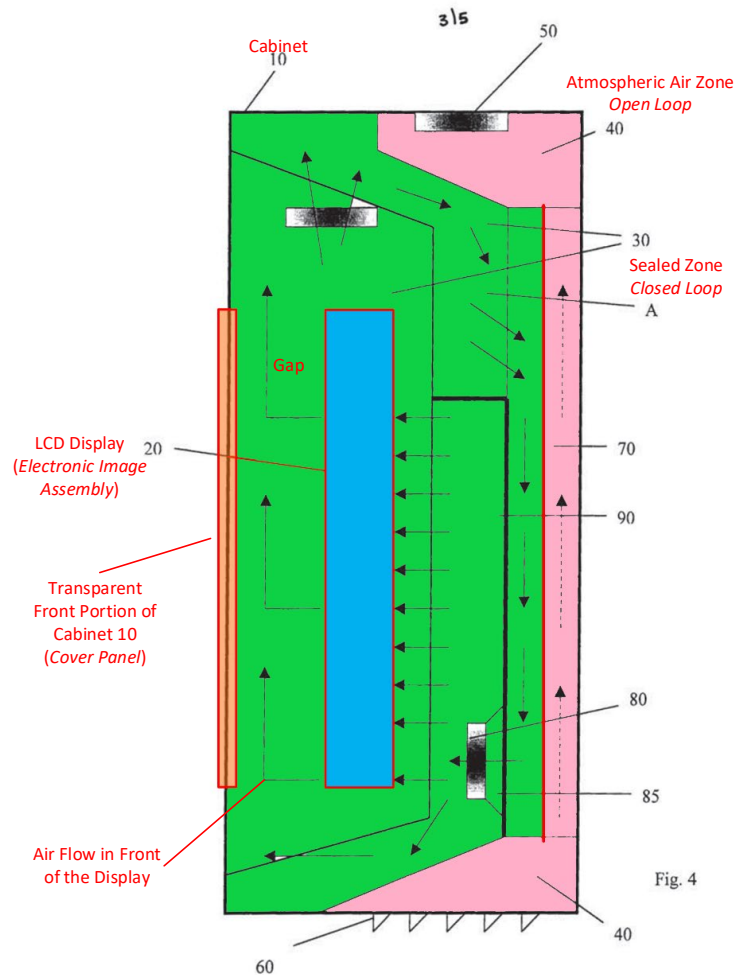
5. Element 1[d]

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

Yare discloses this claim element because Yare’s system includes an atmospheric zone **40** within the display cabinet **10**. (Ex. 1002, ¶¶307-311.)

Yare’s cabinet **10** “includes an **atmospheric air zone 40**” where “[a]ir from the outside” “is drawn through vents **60** into the atmospheric air zone **40** by fans **50**” and “then expelled from the cabinet **10**,” and is thus looped back to the

atmosphere (*Id.*, ¶308; Ex. 1006, 4:11-16, FIGs. 1-4.) Therefore, the atmospheric air zone **40** is an “open loop airflow pathway.” This is consistent with the ’142 patent. (*See* Ex. 1001, 4:4-17, FIG. 1.)



(*Id.*, Figure 4 (annotated).)

In the annotated Figure 4 above, the atmospheric air zone **40** (“an open loop airflow pathway for ambient air passing through said housing”) is highlighted

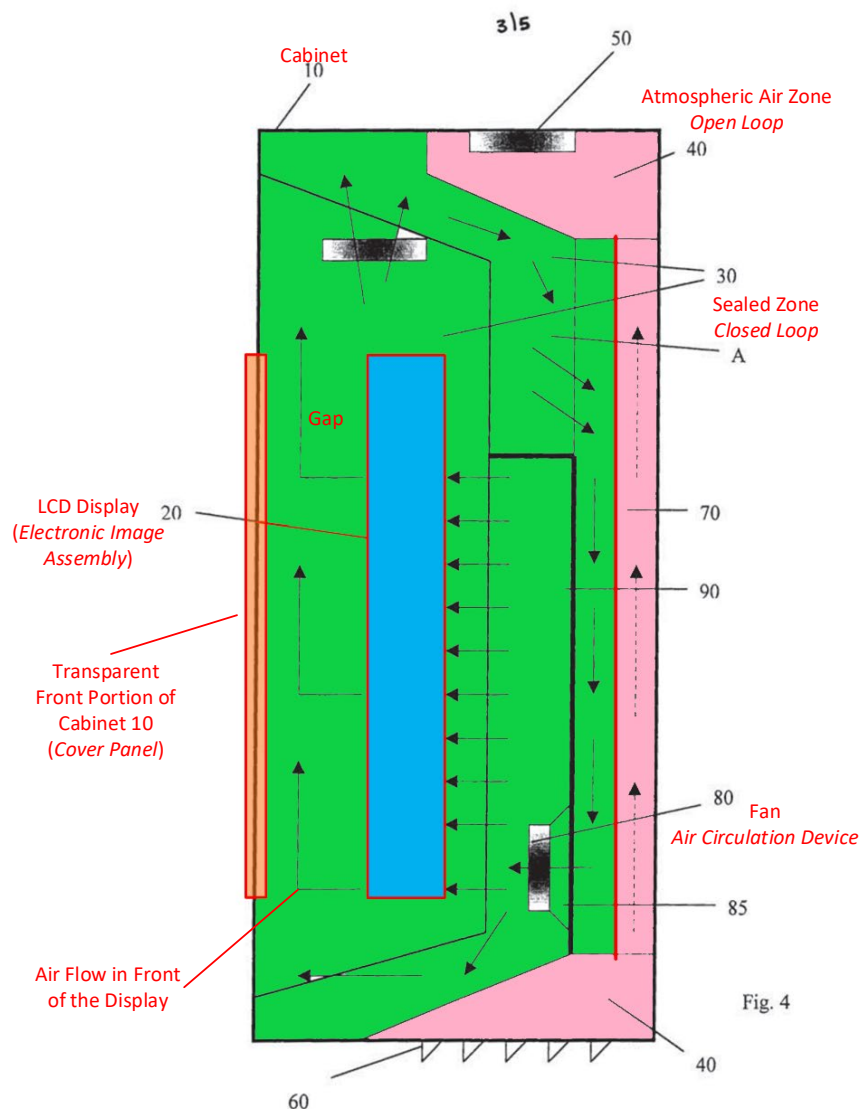
pink. The atmospheric air zone **40** is behind the display **20** (“**said electronic image assembly**”). (Ex. 1002, ¶310.) Thus, Yare teaches this claim element. (*Id.*, ¶311.)

6. Element 1[e]

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

Yare discloses this claim element because Yare’s display cabinet **10** includes fans **80** and **25** within the sealed zone **30** (the “**closed loop airflow pathway**”). (Ex. 1002, ¶¶312-315.)

Yare states: “[t]he cabinet **10** includes a heat exchanger **70** mounted on a baffle plate **90**. Also mounted on the baffle plate **90** are **fans 80**.” (Ex. 1006, 4:18-19, FIGs. 1, 4.) “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**.” (*Id.*, 5:1-2.)



(*Id.*, FIG. 4 (annotated).)

Because “[a]ir is circulated **within the sealed zone 30** due to operation of the fans 80,” (*id.*, 5:1-2), a fan 80 is “at least one air circulation device positioned to force” the air sealed within the sealed zone 30, i.e., “the circulating gas through the closed loop airflow pathway when activated.” (Ex. 1002,

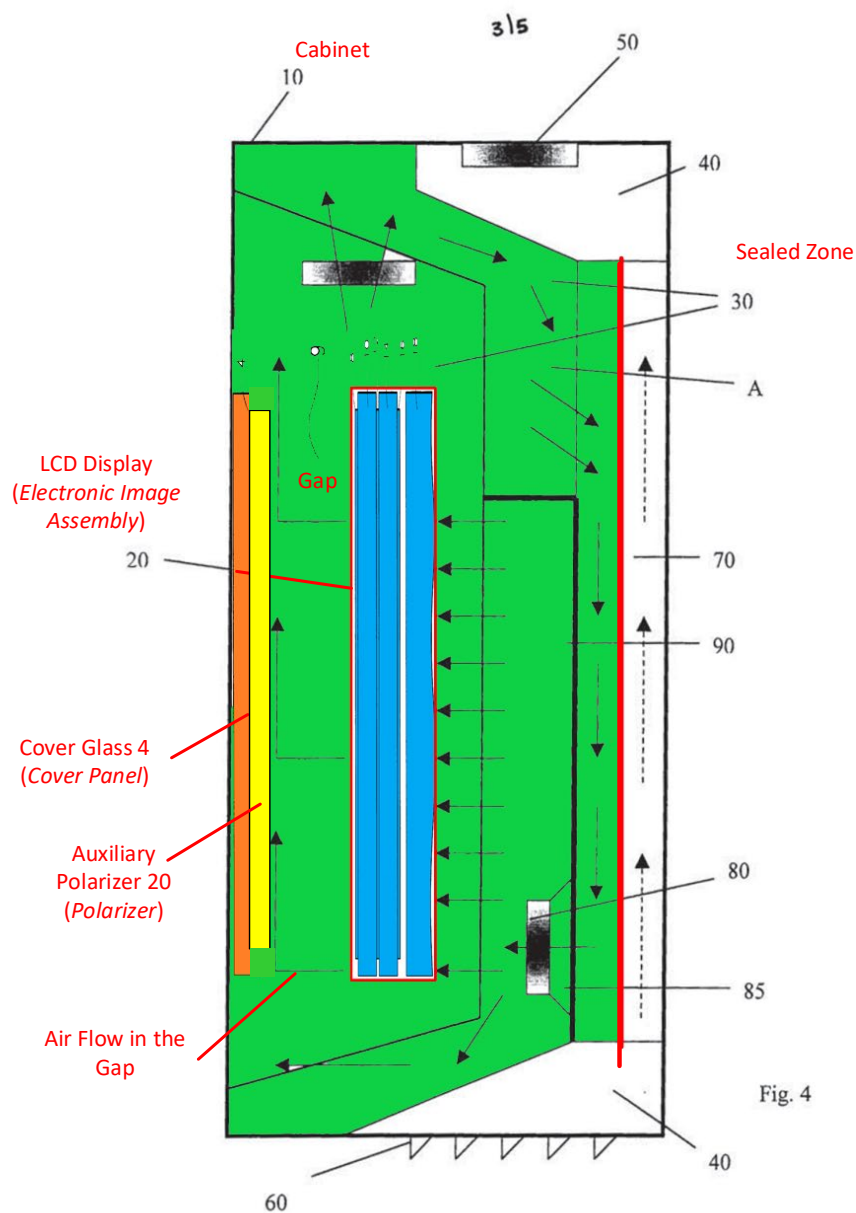
¶314.) Thus, Yare teaches this claim element. (*Id.*, ¶315.)

7. Element 1[f]

1[f]	~~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.~~
------	---

Yare in combination with Larson teaches this claim element because, as discussed for this claim element under Ground 1, Larson discloses a polarizer disposed between a cover glass and an LCD display. (*Id.*, ¶¶316-326; *supra* §VIII.A.7.)

Yare's system, modified to incorporate Larson's polarized display, is shown below.



(Ex. 1006, FIG. 4 (incorporating Larson's FIG. 2 and annotated); Ex. 1002, ¶322.)

In the system depicted above, the auxiliary polarizer **20** (highlighted yellow) is located at the inward surface of the cover glass **4** (highlighted orange). Because the auxiliary polarizer **20** is an “absorbing polarizer” “of a similar type as the front

polarizer **8**,” the auxiliary polarizer may also absorb at least some of the ambient light, e.g., the sunlight striking the cover glass **4** (a “**cover panel**”). Accordingly, the auxiliary polarizer **20** may “**prevent at least some sunlight striking said cover panel from traveling beyond said at least one polarizer.**” As such, Yare in combination with Larson teaches this claim element. (Ex. 1002, ¶¶323-325.)

Therefore, Yare in view of Larson discloses each and every element of claim 1 and renders obvious claim 1. (*Id.*, ¶326.)

B. Claim 2

2	~~The cooling system of claim 1 further comprising: at least one film having anti-reflection properties located at said cover panel.~~
---	---

Larson teaches the limitation recited in this claim for the reasons provided under Ground 1 for claim 2. (*Id.*, ¶327; *supra* §VIII.B.)

C. Claim 3:

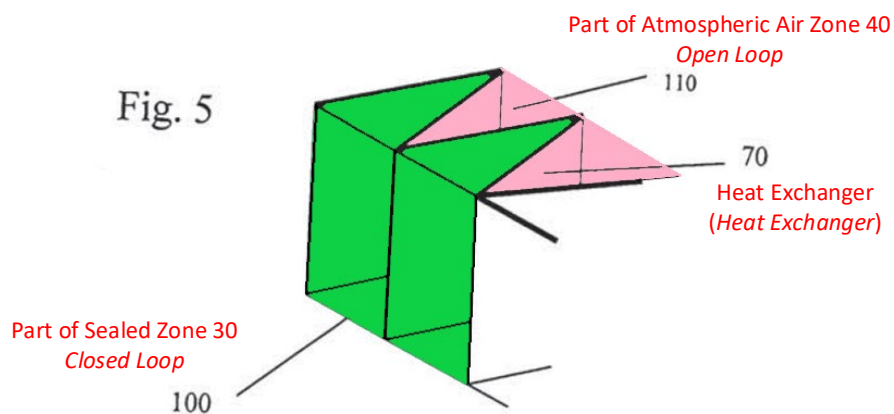
1. Element 3[a]

3[a]	~~The cooling system of claim 1 further comprising: a heat exchanger located rearward of the electronic image assembly,~~
------	--

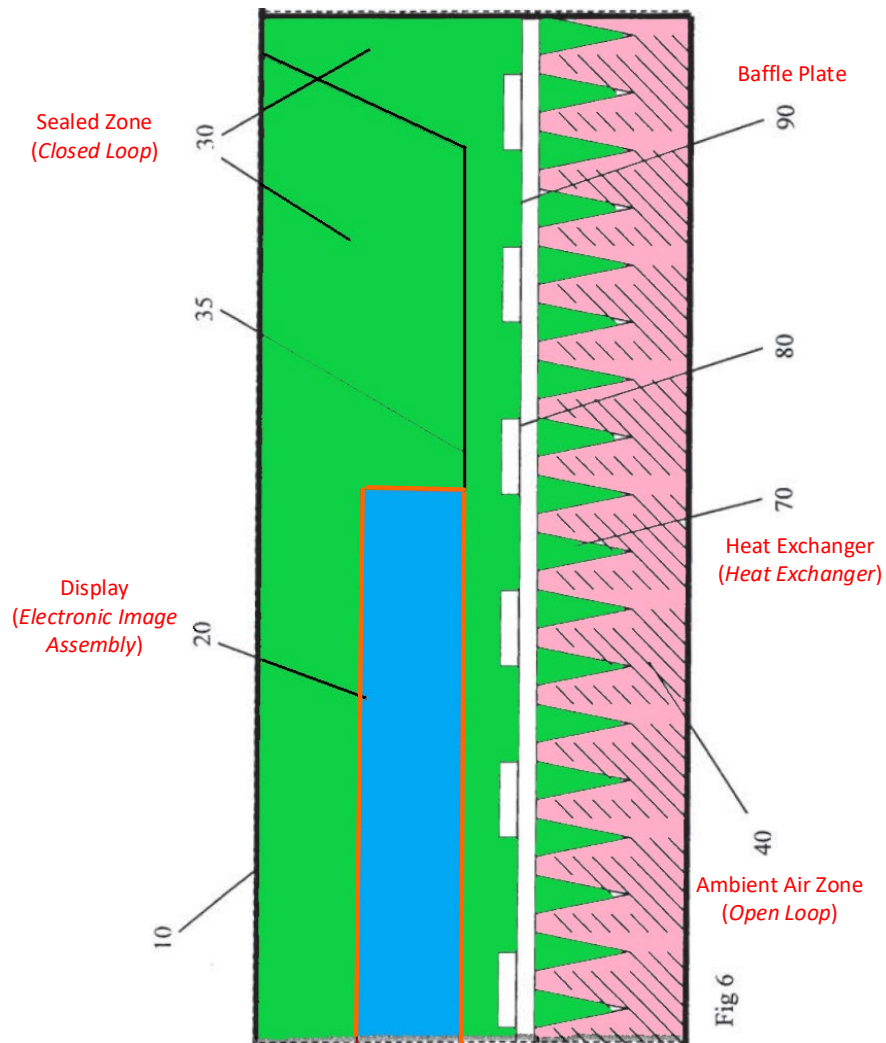
Yare discloses this claim element because Yare’s system includes a heat exchanger **70**. (Ex. 1002, ¶¶328-330.)

Yare states that “[t]he cabinet **10** includes a **heat exchanger 70 mounted on a baffle plate 90.**” (Ex. 1006, 4:18, FIGs. 1, 4, 6.) Yare’s “**heat exchanger 70** is

formed from corrugated metal, thereby increasing the surface area **in contact with both the atmospheric air zone 40 and the sealed zone 30**. The heat exchanger is sealed at the top and the bottom on the inner side to **prevent atmospheric air 110 and the re-circulating air 100 within the sealed zone [30] from mixing**. (*Id.*, 6:7-11, FIGs. 5, 6.)



(*Id.*, FIG. 5 (annotated).)



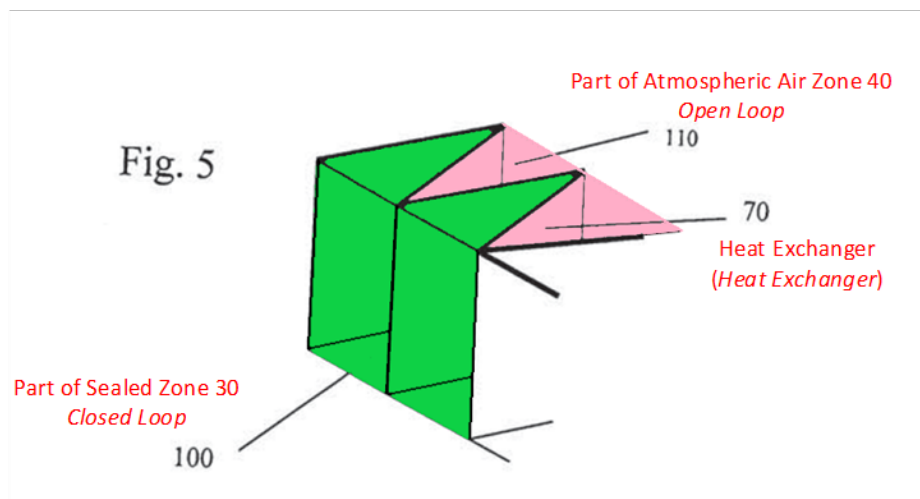
(*Id.*, FIG. 6 (annotated).)

The corrugated heat exchanger 70 is located rearward of the display 20 (highlighted blue) (“**the electronic image assembly**”). Thus, Yare discloses this claim element. (Ex. 1002, ¶330.)

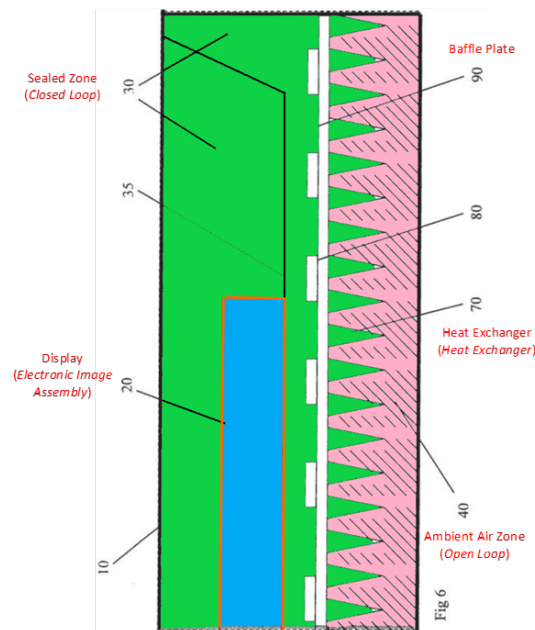
2. Element 3[a][1]

3[a][1]	~~wherein a first portion of said heat exchanger forms part of said open loop airflow pathway, and~~
---------	---

Yare discloses this claim element because the rear side of the heat exchanger 70 (“a first portion of said heat exchanger”) forms a part of the atmospheric air zone 40, i.e., “said open loop airflow pathway.” (*Id.*, ¶¶331-333.)



(Ex. 1006, FIG. 5 (annotated); *see id.*, 6:7-11, FIG. 6.)



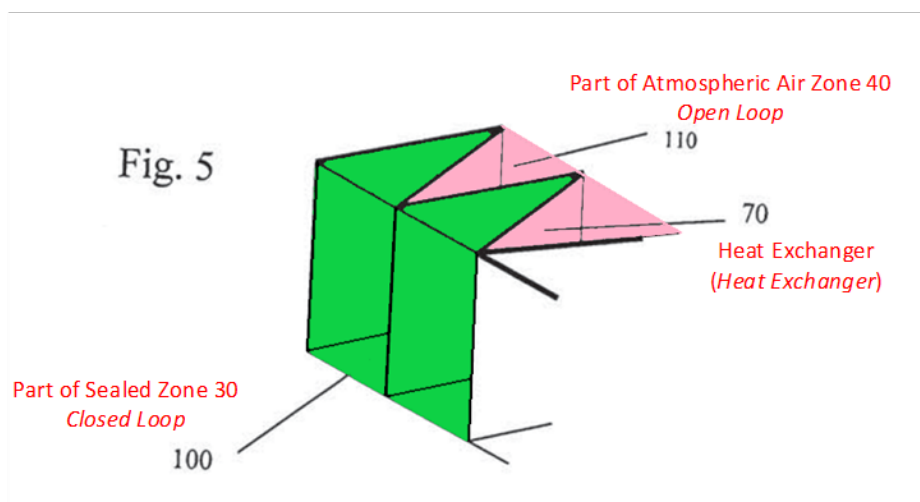
(*Id.*, FIG. 6 (annotated).)

Annotated Figures 5 and 6 show that the rear (right) side (“**a first portion**”) of the corrugated heat exchanger **70** (“**said heat exchanger**”) forms a part of the atmospheric air zone **40** (highlighted pink), i.e., “**said open loop airflow pathway.**” Thus, Yare teaches this claim element. (Ex. 1002, ¶333.)

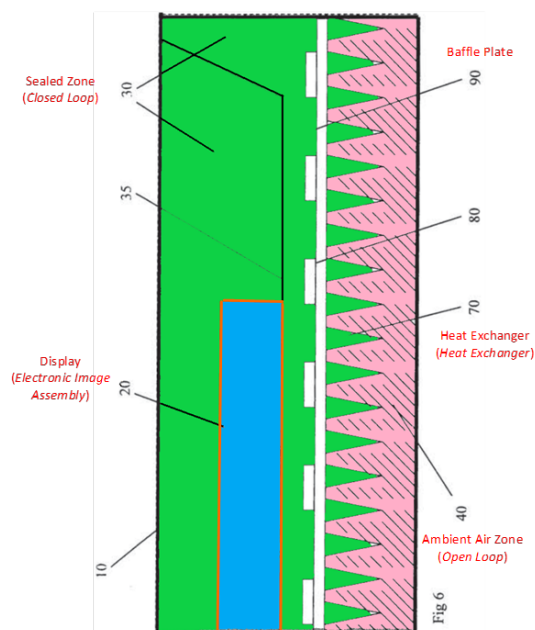
3. Element 3[a][2]

3[a][2]	~~wherein a second portion of said heat exchanger forms part of said closed loop airflow pathway.~~
---------	--

Yare discloses this claim element because the front side of the heat exchanger **70** (“**a second portion of said heat exchanger**”) forms a part of the sealed air zone **30**, i.e., “**said closed loop airflow pathway.**” (*Id.*, ¶¶334-338.)



(Ex. 1006, FIG. 5 (annotated); *see id.*, 6:7-11, FIG. 6.)



(*Id.*, FIG. 6 (annotated).)

As explained above, Yare teaches that the heat exchanger is preferably mounted to baffle plate **90**. The heat exchanger of the claim can include the Baffle plate which would absorb heat. Regardless, the baffle plate restricts, but does not

block air flow and the closed loop airflow would be in contact with Yare’s identified heat exchanger. Annotated Figures 5 and 6 show that the front (left) side (“**a second portion**”) of the corrugated heat exchanger **70** (“**said heat exchanger**”) forms a part of the sealed zone **30** (highlighted green), i.e., “**said closed loop airflow pathway.**” Thus, Yare teaches this claim element. (Ex. 1002, ¶337.)

D. Claim 4:

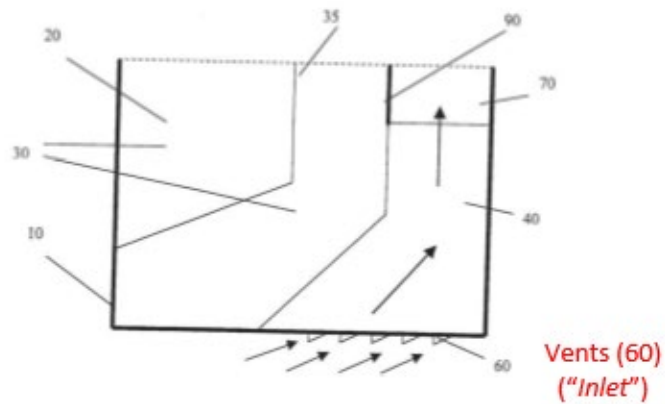
1. Element 4.a

4[a]	~~The cooling system of claim 3 further comprising: an inlet located at a first portion of said housing for ingesting said ambient air into said open loop airflow pathway; and~~
------	--

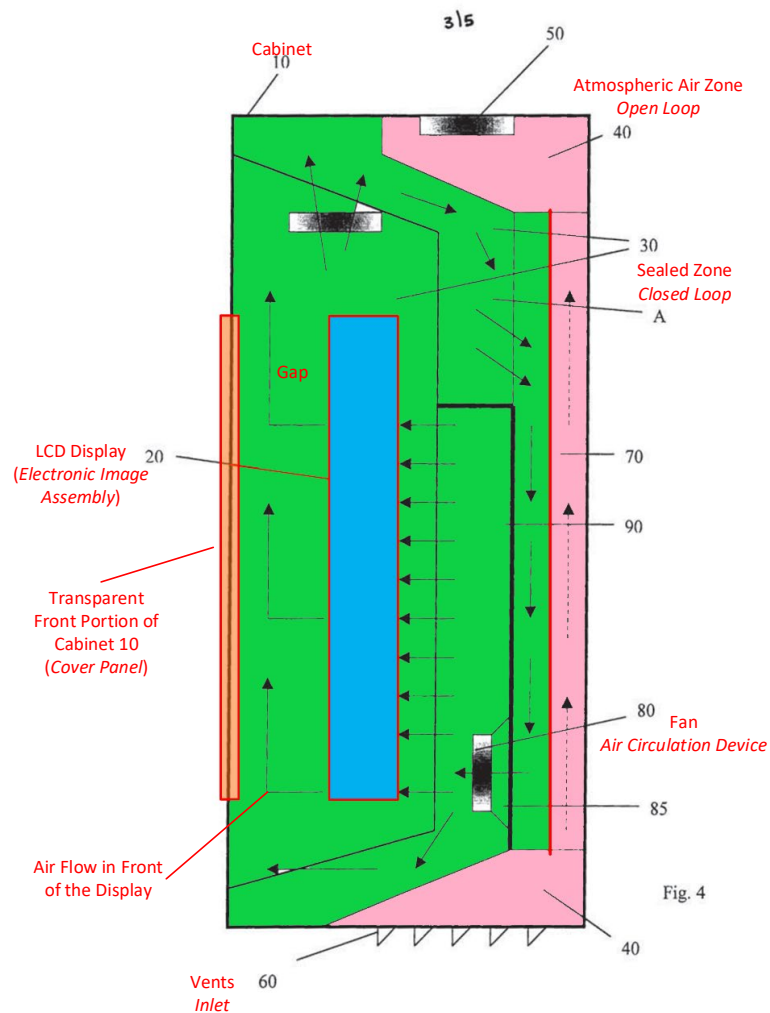
Yare teaches this claim element because Yare’s system includes vents 60 for drawing outside air into the atmospheric air zone **40** (“**open loop airflow pathway**”). (*Id.*, ¶¶339-341.)

Yare discloses that “[a]ir from the outside of the cabinet 10 is drawn through vents **60 into the atmospheric air zone 40** by fans **50**” and “is then expelled from the cabinet **10**.” (Ex. 1006, 4:11-14, FIGs. 1-4.)

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(*Id.*, FIG. 2.)



(*Id.*, FIG. 4 (annotated).)

Vents **60** provide “**an inlet located at**” the bottom of the cabinet **10** (“**a first portion of said housing**”) “for ingesting” outside air (“**said ambient air**”) into the atmospheric air zone **40** (“**said open loop airflow pathway**”). Thus, Yare teaches this claim element. (Ex. 1002, ¶341.)

2. Element 4[b]

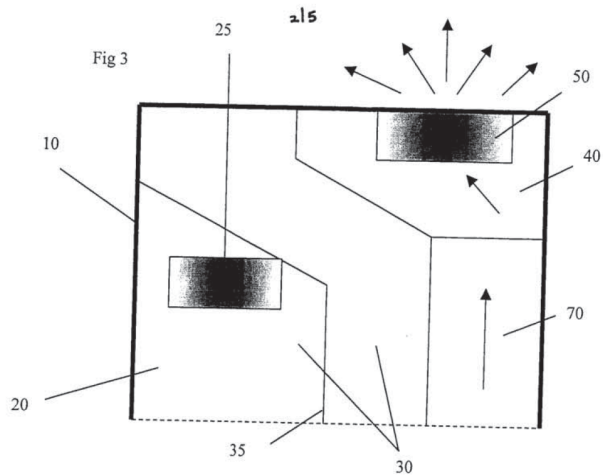
4[b]	~~an exhaust located at a second portion of said housing for exhausting said ambient air from said open loop airflow pathway.~~
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Yare teaches this claim element because Yare’s system includes fans **50** for expelling air from the atmospheric air zone **40** (“**open loop airflow pathway**”). (*Id.*, ¶¶342-346.)

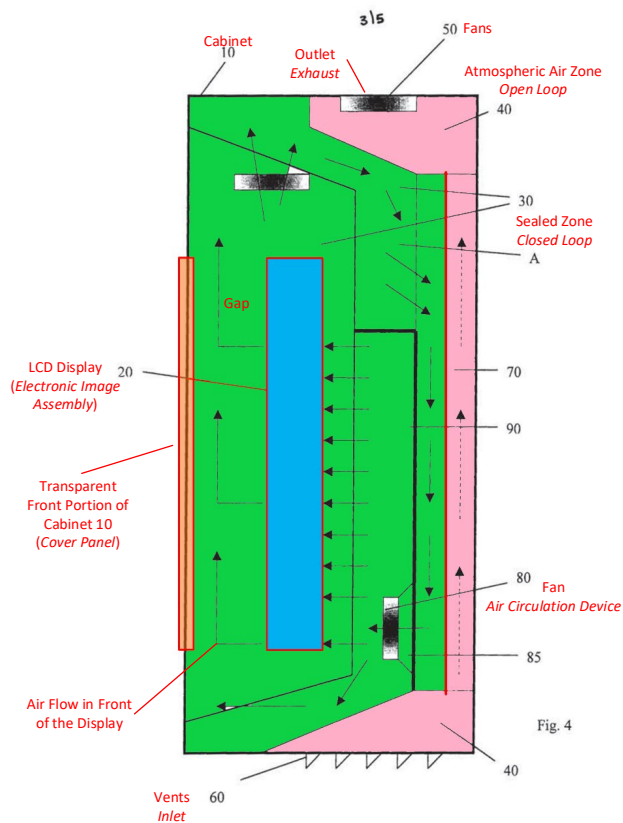
In Yare’s system, “[a]ir from the outside of the cabinet **10** is drawn through vents **60** into the atmospheric air zone **40** by fans **50**” and “**is then expelled from the cabinet 10 through the fans 50. Arrows in figures 2 and 3 show the passage of air through the vents 60 into the atmospheric air zone 40 and out through the fans 50, respectively.**” (Ex. 1006, 4:11-16, FIGs. 1-4.)

A POSITA would have understood that for the fans **50** to expel air from the cabinet **10**, an outlet would be provided in the cabinet **10**, and would have recognized that outlet as an “**exhaust.**” (Ex. 1002, ¶344.)

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(Ex. 1006, Figure 3.)



(*Id.*, FIG. 4 (annotated).)

The outlet (“**an exhaust**”) at the top of the cabinet **10** (“**a second portion of said housing**”) is provided for expelling air from the atmospheric air zone **40** (“**for exhausting said ambient air**”) from the atmospheric air zone **40** (“**said open loop airflow pathway**”). Thus, Yare teaches this claim element. (Ex. 1002, ¶345.)

E. Claim 5

5	~~The cooling system of claim 1 wherein: said at least one polarizer comprises a linear polarizer.~~
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Larson teaches the limitation recited in this claim for the reasons provided under Ground 1 for claim 5. (*Id.*, ¶347; *supra* §VII.E.)

F. Independent Claim 6

1. Elements 6[pre]-6[a]

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

Claims elements 6[pre] and 6[a] are identical, respectively, to claim elements 1[pre] and 1[a]. Therefore, for the reasons provided for claim elements 1[pre] and 1[a], Yare individually and in combination with Larson teaches these claim elements. (Ex. 1002, ¶349; *supra* §§IX.A.1-2.)

2. Element 6[b]

6[b]	~~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;~~
------	--

This claim element recites substantially the same limitations that claim element 1[b] recites, as discussed in Ground 1.

A POSITA would have understood that at least a portion of the front surface of Yare’s cabinet **10** would be transparent (i.e., “**transparent cover panel**”), to allow viewing of the display **20**. (*Id.*, ¶352) Additionally, in the discussion for claim element 1[b], Larson’s “cover glass **4**” is disclosed as the “**cover panel**.” (*Id.*, ¶352; *supra* §IX.A.3.)

Therefore, for the reasons provided in Ground 2 for claim element 1[b], Yare individually and in combination with Larson teaches this claim element. (Ex. 1002, ¶¶350-353; *supra* §IX.A.3.)

3. Element 6[c]

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

This claim element recites substantially the same limitations that claim element 1[d] recites, as discussed in Ground 1. Therefore, for the reasons provided in Ground 2 for claim element 1[d], Yare teaches this claim element. (Ex. 1002,

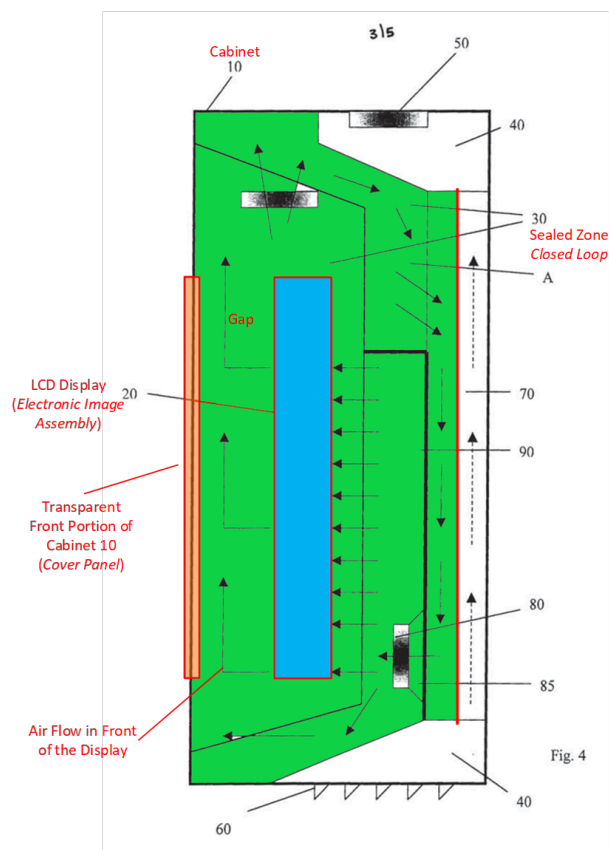
¶355; *supra* §IX.A.5.)

4. Element 6[d]

6[d]	~~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;~~
------	--

This claim element recites substantially the same limitations that claim element 1[c] recites, as discussed in Ground 1.

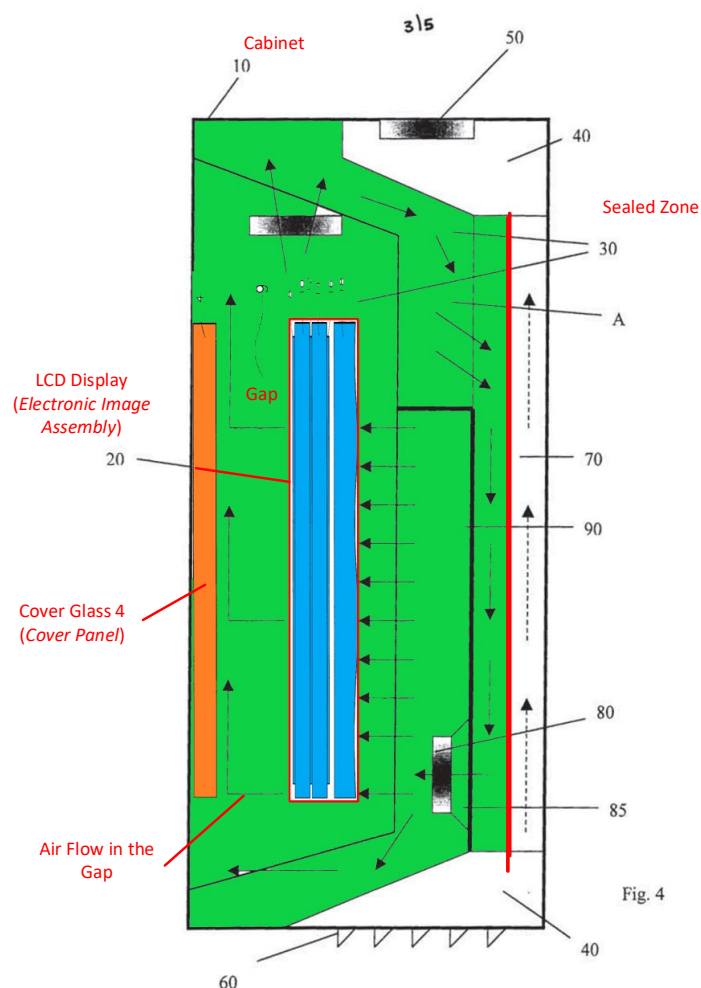
While element 1[c] recites a “pathway **passing through** the housing,” claim element 6[d] recites “pathway **contained within** the housing.” (Ex. 1002, ¶357.)



(Ex. 1006, FIG. 4 (annotated).)

Annotated Figure 4 shows that the closed loop (highlighted green) is contained entirely within the cabinet 10 (“housing”), and that the “closed loop gas circulation pathway” (highlighted green) “passes between” the transparent front portion of the cabinet 10 (highlighted orange) (“said transparent cover panel”) and the display 20 (highlighted blue) (“said electronic image assembly”). (Ex. 1002, ¶357.)

Yare’s system incorporating Larson’s LCD display is shown below.



(Exs. 1006, FIG. 4 (modified according to Larson, FIG. 1); 1002, ¶360.)

For the reasons provided in Ground 2, claim element 1[c], Yare individually and also in combination with Larson teaches this claim element. (Ex. 1002, ¶362; *supra* §IX.A.4.)

5. Element 6[e]

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

This claim element recites substantially the same limitations that claim element 4[a] recites, as discussed in Ground 1. Therefore, for the reasons provided above for claim element 4[a], Yare teaches this claim element. (Ex. 1002, ¶364; *supra* §IX.D.1.)

6. Element 6[f]

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

This claim element is identical to claim element 4[b]. Therefore, for the reasons provided above for claim element 4[b], Yare teaches this claim element. (Ex. 1002, ¶365; *supra* §IX.D.2.)

7. Element 6[g]

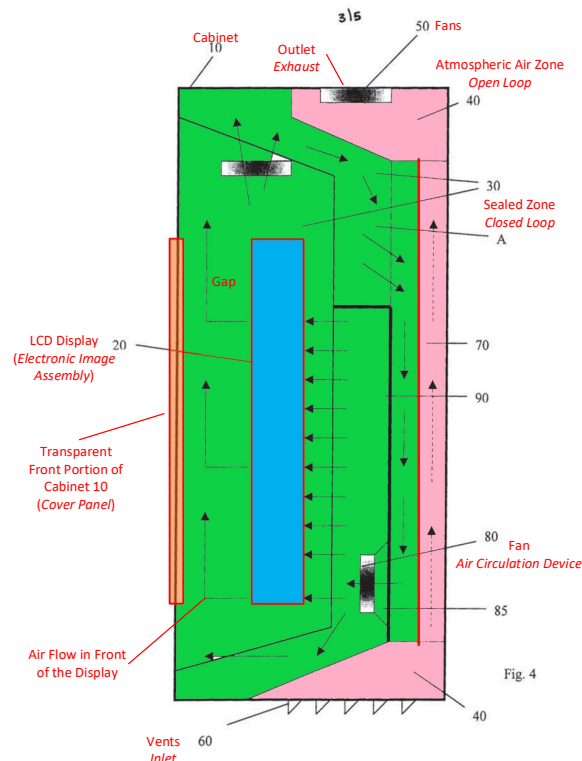
6[g]	~~an air circulation device positioned along said open loop airflow pathway between said inlet and said exhaust, wherein said air circulation device is configured to force said ambient air through the open loop airflow pathway when activated;~~
------	---

Yare discloses this claim element because Yare’s system includes fans **50** to force ambient air through the atmospheric air zone **40**. (Ex. 1002, ¶¶366-370.)

Yare’s atmospheric air zone **40** is “**an open loop airflow pathway for ambient air,**” and as discussed for claim 4, the bottom vents **60** are the “**inlet**” and

outlets for expelling air at the top of the cabinet **10** are the “**exhaust.**” (*Supra*, §§IX.A.5; Ex. 1006, 4:11-16, FIGs. 1-4.)

Accordingly, a fan **50** is “**an air circulation device.**” Annotated Figure 4 below shows that fans **40** are located within the atmospheric air zone **40**, and between the bottom vents **60** and top outlet. (Ex. 1002, ¶368.)



(Ex. 1006, FIG. 4 (annotated).)

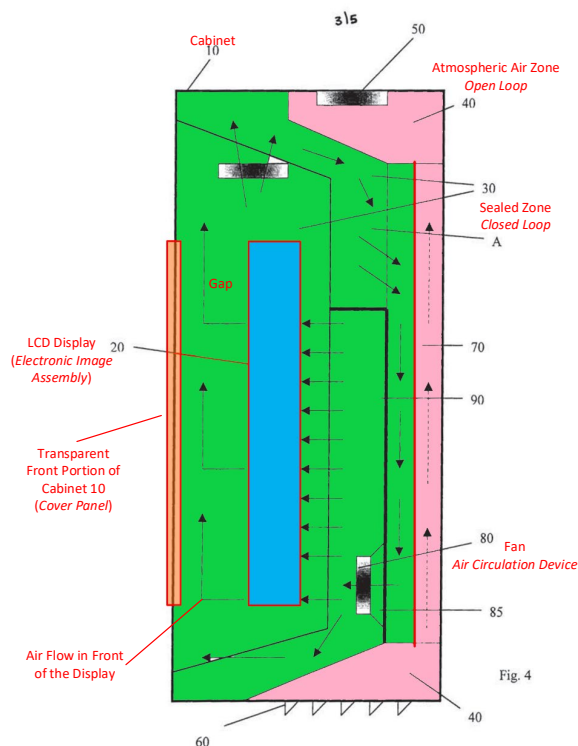
Therefore, the fans **50** “**said air circulation device is configured to force said ambient air through**” the atmospheric zone **50**, i.e., “**the open loop airflow pathway when activated.**” Thus, Yare teaches this claim element. (Ex. 1002, ¶370.)

8. Element 6[h]

6[h]	~~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;~~
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This claim element recites substantially the same limitations that 1[e] recites, as discussed in Ground 1.

Although claim element 1[e] recites “air circulation” and claim element 6[h] recites “gas circulation,” air is a gas, and flow of air in a closed loop is “gas circulation.” Moreover, Figure 4 annotated below shows that Yare’s air or gas circulation device, fan **80**, is positioned within the closed loop (highlighted green), and thus, it is “positioned along said closed loop.” (*Id.*, ¶372.)



(Ex. 1006, FIG. 4 (annotated).)

Finally, while 1[e] recites “to force the circulating gas **through** the closed loop,” 6[h] recites “to force circulating gas **around** the closed loop.” Air (i.e., gas) forced “through” a **closed** loop would circulate “around” the closed loop.

Therefore, for the reasons provided in Ground 2 for 1[e], Yare teaches this claim element. (Ex. 1002, ¶373; *supra* §IX.A.6.)

9. Element 6[i]

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

This claim element recites substantially the same limitations that claim 3 recites, as discussed under Ground 1. Therefore, for the reasons provided in Ground 2 for claim 3, Yare teaches this claim element. (Ex. 1002, ¶376; *supra* §IX.C.)

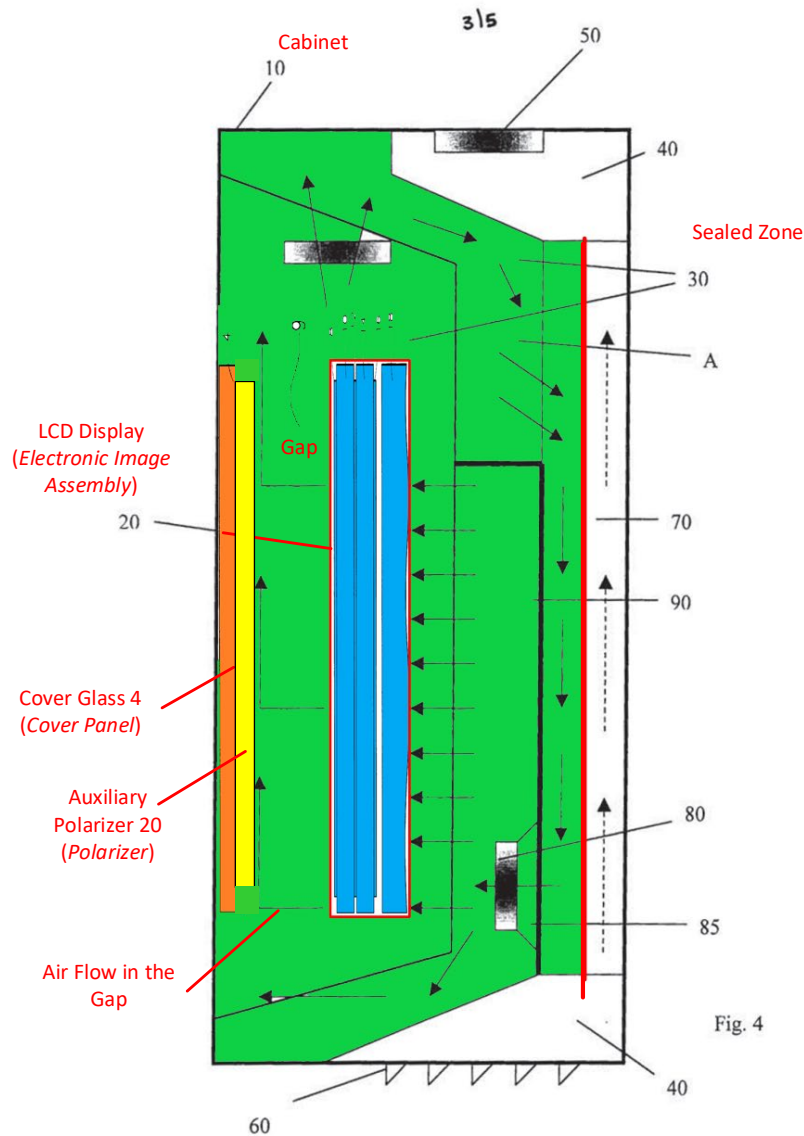
10. Element 6[j]

6[j]	~~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.~~
------	---

Yare in combination with Larson teaches this claim element for the reasons provided for claim element 1[f]. (Ex. 1002, ¶¶377-384.)

A polarizer is a “solar energy reduction layer.” (*Id.*, ¶378.) Because Larson’s auxiliary polarizer **20** is located “**at** an inward facing surface of said cover panel” (*supra*, §IX.A.7), it is located “**at** said transparent cover panel.” (Ex. 1002, ¶378.)

It is also thus located **before** the closed loop and the display **20**. (*Id.*, ¶379.)



(Ex. 1006, FIG. 4 (annotated and incorporating Larson’s FIG. 2).)

Larson’s auxiliary polarizer **20** and antireflection layer **6** are “configured to **prevent** at least some sunlight striking said cover panel **from traveling beyond**” the polarizer **20**. (Ex. 1002, ¶380; *supra*, §IX.A.7.) As such, the combination of

Yare and Larson teaches this claim element, as discussed above for claim element 1[f]. (Ex. 1002, ¶383.)

Therefore, Yare in view of Larson discloses each and every element of claim 6 and renders obvious claim 6.

G. Claim 7:

1. Element 7[a]

7[a]	~~The cooling system of claim 6 wherein: said air circulation device comprises one or more fan assemblies; and~~
------	---

Yare teaches this claim element. Specifically, the air circulation device that Yare discloses are fans **50**. (Ex. 1006, 4:11-14 (stating that “[a]ir from the outside” “is drawn” “by fans **50**”), FIGs. 1-4.) Thus, Yare’s air circulation device includes “**one or more fan assemblies.**” (Ex. 1002, ¶385.)

2. Element 7[b]

7[b]	~~said gas circulation device comprises one or more fan assemblies.~~
------	--

Yare teaches this claim element. Specifically, the gas circulation device that Yare discloses are fans **80**. Yare states that “[a]ir is circulated within the sealed zone **30** due to operation of the **fans 80.**” (Ex. 1006, 5:1-2.) Thus, Yare’s gas circulation device includes “**one or more fan assemblies.**” (Ex. 1002, ¶386.)

H. Claim 8

8	~~The cooling system of claim 6 wherein: at least one of said one or more solar energy reduction layers comprise a polarizer.~~
---	--

Larson teaches this claim element. As discussed for claim element 6[j], the “solar energy layer” that Larson discloses is the “auxiliary polarizer **20**.” (Ex. 1005, 2:33-39 (disclosing “a display **2**” comprising “**an auxiliary polarizer 20**”); Ex. 1002, ¶387; *supra* §IX.F.10.)

I. Claim 9

9	~~The cooling system of claim 8 wherein: said polarizer comprises a linear polarizer.~~
---	--

Larson teaches this claim element as discussed above for claim 5. (Ex. 1002, ¶388; *supra*, §§VIII.E, IX.E.)

J. Claim 10

10	~~The cooling system of claim 6 wherein: at least one of said one or more solar energy reduction layers comprise a film having anti-reflection properties.~~
----	---

Larson teaches this claim element as discussed above for Ground 1. (Ex. 1002, ¶389; *supra*, §VIII.J.)

K. Claim 11: Elements 11[a]-11[b]

11[a]	~~The cooling system of claim 6 wherein: at least a first one of said one or more solar energy reduction layers comprise a polarizer; and~~
11[b]	~~at least a second one of said one or more solar energy reduction layers comprise a film having anti-reflection properties.~~

These claim elements are substantially identical to claims 8 and 10, respectively. Therefore, for the reasons provided above for claims 8 and 10, Larson teaches this claim element. (Ex. 1002, ¶¶390-391; *supra* §§IX.H, IX.J.)

L. Independent Claim 12

1. Elements 12[pre]-12[a]

12[pre]	~~A method for cooling an electronic image assembly, said method comprising the steps of:~~
12[a]	~~placing said the electronic image assembly within a housing;~~

As explained above, 12[pre] and 12[a] correspond to 1[pre] and 1[a], respectively. Therefore, Yare individually and in combination with Larson teaches 12[pre]-12[a] for the reasons provided under above for 1[pre]-1[a]. (Ex. 1002, ¶¶393-395; *supra* §§IX.A.1-2.)

2. Element 12[b]

12[b]	~~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;~~
-------	---

As explained above, claim element 12[b] corresponds to 1[b], 1[c], and 1[e]. Therefore, Yare individually and in combination with Larson teaches this claim element for the reasons provided above for 1[b], 1[c], and 1[e]. (Ex. 1002, ¶396; *supra* §§IX.A.3, IX.A.4, IX.A.6.)

3. Element 12[c]

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

As explained above, claim element 12[c] corresponds to 1[d] and 6[g]. Therefore, Yare individually and in combination with Larson teaches this claim element for the reasons provided above for 1[d] and 6[g]. (Ex. 1002, ¶397; *supra* §§IX.A.5, IX.F.7.)

4. Element 12[d]

12[d]	~~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.~~
-------	--

It is discussed under Ground 1, that this claim element is substantially the same as claims elements 1[f] and 6[j]. Therefore, Yare in combination with Larson teaches this claim element for the reasons provided for claim elements 1[f] and 6[j], under Ground 2. (Ex. 1002, ¶398; *supra* §§IX.A.7, IX.F.10.)

Therefore, Yare in view of Larson discloses each and every element of claim 12 and renders obvious claim 12.

M. Claim 13

13	~~The cooling method of claim 12 wherein: at least one of said one or more solar energy reduction layers comprise a polarizer.~~
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This claim is identical to claim 8. Therefore, for the reasons provided for claim 8, Larson teaches this claim. (Ex. 1002, ¶400; *supra* §IX.H.)

N. Claim 14

14	~~The cooling method of claim 13 wherein: at least one of said one or more solar energy reduction layers comprise a film having anti-reflection properties.~~
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This claim is identical to claim 10. Therefore, for the reasons provided for claim 10, Larson teaches this claim. (Ex. 1002, ¶401; *supra* §IX.J.)

O. Claim 15

15	~~The cooling method of claim 12 further comprising the steps of: 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.~~
----	---

Yare teaches this claim. As discussed for claim element 6[i], Yare teaches a “heat exchanger.” (Ex. 1002, ¶402; *supra*, §IX.F.9.)

Because a single heat exchanger 70 forms a “part of [the] open loop airflow pathway,” and a “part of [the] closed loop gas circulation pathway,” the heat exchanger is common to both the open loop and closed pathways and transfers heat therebetween. Therefore, Yare teaches this claim. (Ex. 1002, ¶403.)

P. Motivation to Combine

As explained above, Yare teaches a display cabinet that houses an LCD

display for a wide variety of viewing environments, including outdoors. Yare's cabinet includes a cooling system that teaches the closed and open loop air flows.

Yare is non-specific about where the LCD is located inside of the cabinet.

However, it is clear from Yare's disclosure that the LCD would not be in contact with the front of the cabinet, as indicated by "L"-shaped airflow pathway in Figure 4. Otherwise it would suffer from design defects such as a screen that gets too hot and fogs. Nevertheless, it would have been obvious to place the LCD screen with a gap between the screen and the front transparent area to resolve these design defects, as Larson teaches. (Ex. 1002, ¶266.)

Likewise, Yare's transparent surface may not include a polarizer or solar reduction layer, but Larson does and a POSITA would have been motivated to implement Larson's teaching to improve the viewing experience and to help Yare's existing cooling goals. (*Id.*, ¶267.)

A POSITA would have been motivated to combine Yare and Larson because they both describe systems and devices in closely related fields, namely, electronic displays, such as LCD displays. In particular, Yare discloses a cabinet for such displays as an "LCD display." (Ex. 1006, Abstract, 3:17-18, FIGs. 1, 4.) Like Yare, Larson also discloses an LCD display, stating "[t]he Subject matter of the present invention is particularly suited for use in connection with displays, such as LCDs." (Exs. 1005, 2:25-26; 1002, ¶268.)

Yare states that its cabinet and display system are “particularly suitable for use in providing large scale displays in public spaces.” (Ex. 1006, 1:4-6.)

A POSITA would have understood that when used in outdoor or other heavily lit public spaces, Yare’s display system would be exposed to ambient light or sunlight. Larson describes that “it is difficult to maintain high contrast output at high ambient illumination levels,” and discloses further that “polarized light displays” can maintain high contrast. (Ex. 1005, 1:11-17, 1:22-32 (disclosing “a **conventional** polarized display”), FIG. 1.) Therefore, a POSITA would have recognized that the use of polarization in Yare’s system can beneficially improve the contrast of the display, when used outdoors during daytime. (Ex. 1002, ¶270.)

Larson discloses a conventional polarized display structure, identifies a problem with that structure, and provides a solution. Specifically, the conventional polarized display that Larson discloses includes a “cover glass **4**” and a “front polarizer **8**.” (Ex. 1005 at 1:22-27, FIG. 1.) Larson states that “[t]he cover glass **4** is separated from the front polarizer **8** by a **gap 9**, typically filled with air.” (*Id.*, 1:27-28, FIG. 1.) The air gap **9** is similar to the gap between a front surface of Yare’s cabinet and the natural location of its unillustrated display **20**. (*See* Ex. 1006, Figure 4; Ex. 1002, ¶271.)

Larson identifies a problem with such structures, stating that “[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.) A POSITA would have recognized that the problem of reflectance at the boundaries may exist in Yare’s system as well. (Ex. 1002, ¶272.)

As one solution to this problem, Larson states that “the rear surface of the cover glass **4** may include an antireflection coating, film, sheet, or any other form of antireflection material,” and that such a material can “reduce reflections at the boundary between the cover glass **4** and . . . the front gap **9**.” (Ex. 1005, 2:50-56.) Larson also discloses “[an] auxiliary polarizer **20** between the front gap **9** and the cover glass **4**.” (*Id.* 3:13-15, FIG. 2; *see id.*, 2:33-39.) Larson’s “auxiliary polarizer **20** is an absorbing polarizer.” (*Id.*, 3:19-24; Ex. 1002, ¶273.)

Thus, in light of Larson, a POSITA would have recognized that Yare’s display may also have a high reflectance problem at the boundary between the front surface of the cabinet **10** and the gap through which air flow can occur, i.e., the air gap similar to Larson’s gap **9**. A POSITA would have further understood that this problem can be minimized by providing an anti-reflective coating on the rear surface of the front surface of the cabinet **10** and/or by providing a polarizer between the air gap and the front surface of the cabinet **10**. (Ex. 1002, ¶275.)

A POSITA would have recognized at least three predictable benefits of these modifications obtained by combining Yare and Larson, including two described by Larson. First, the reflectance at the gap can be minimized by the polarizer/anti-

reflective coating. (Ex. 1005, 3:30-34). Second, the use of the polarizer can reduce the reflectance requirements. (*Id.*) Third, a POSITA would have also recognized that an absorbing polarizer can absorb at least some polarizations of the ambient light, which can help improve contrast and reduce the heating of the display. (Ex. 1002, ¶277.)

Moreover, to a POSITA, the combination of Yare and Larson would have been combining known prior art elements according to known methods (providing anti-reflective coating and/or a polarizer on a transparent surface) to obtain the predictable results described above. A POSITA would have also understood this combination to be the use of known techniques (using anti-reflective materials and/or polarizers) to improve a similar apparatus (Yare's display system) in the same way as Larson describes, to yield predictable results described above. In the alternative, a POSITA would have found this combination of a simple replacement of one known element (the transparent front portion of Yare's cabinet) with another (Larson's glass cover **4** having the auxiliary polarizer **20**). (*Id.*, ¶278.)

Additionally, a POSITA would have understood that these predictable, beneficial results can be obtained without requiring substantial changes or modifications to either Yare's or Larson's processes, and without adversely affecting the disclosed display systems. A POSITA would have also been able to apply known, conventional manufacturing techniques, such as bonding layers. As

such, a POSITA would have expected the combination of Yare and Larson to succeed. For these reasons, it would have been obvious to one of ordinary skill in the art to combine Yare and Larson. (*Id.*, ¶279.)

X. SECONDARY CONSIDERATIONS

Petitioners are not aware of any evidence of secondary considerations of nonobviousness, such as commercial success, alleged long felt but unresolved need, alleged failure of others, or copying by others. (Ex. 1002, ¶¶405-417.)

XI. *ADVANCED BIONICS* FRAMEWORK FAVORS INSTITUTION

1. The prior art relied upon was not relied upon by the examiner or otherwise used. “The Board frequently holds that a reference that ‘was neither applied against the claims nor discussed by the Examiner ***does not weigh in favor*** of exercising . . . discretion under § 325(d) to deny a petition.” *Amazon.com, Inc. v. M2M Sols. LLC*, IPR2019-01205, Paper 14 at 16 (PTAB Jan. 27, 2020). The spirit of that finding resonates here considering the arguments above are particularly strong and the two references that were cited during prosecution were included among hundreds of references with no indication that the Examiner meaningfully considered them. Indeed, the examiner faulted the applicant for citing “a mountain of largely irrelevant [material] . . . [and indicated] that only a cursory review was made of the cited references.” (Ex. 1022, pp.322-23.) Neither Karppanen nor Yare, nor Larson was used by the Examiner in rejecting any claims.

2. *The combinations differ from those previously considered.* As noted in the summary of the prosecution history, just prior to the notice of allowance the claims were amended to include new claim elements requiring that the closed loop passed around the electronic image assembly and that the open air pathway passes through said housing behind the electronic image assembly. The open air pathway element was added for the very reason that the examiner told the applicant that the prior art considered did not teach it. (Ex. 1022, pp.331-32.) As explained above, both Karppanen and the uncited Yare clearly teach this claim element.

Because the art was not meaningfully considered and because it is materially different than the art that the examiner did consider, the Board need not reach part 2 of the *Advanced Bionics* framework. Nonetheless, each of *Becton*, *Dickinson* factors (c), (e), and (f) favor Petition at least because if the examiner had meaningfully considered the combination of Karppanen and Larson the patent would not have issued. The arguments in this Petition are compelling in that regard especially in view of Ground 1⁴ which shows that the combination teaches the closed loop, the open loop, and Larson's polarizer which a POSITA would have been modified to add to Karppanen in view of its benefits – enhancing the viewing experience and advancing Karppanen's overall goal to keep the display cool.

⁴ Larson is only a secondary reference in Ground 2.

XII. CONCLUSION

For the reasons set forth above, Petitioners respectfully submit that they have established a reasonable likelihood of success of showing that the challenged claims are unpatentable, and hence should be cancelled.

Date: ~~December 7, 2022~~ May 9, 2023 Respectfully submitted,

/Sanjeet Dutta/
Sanjeet Dutta
Registration No. 46,145
Goodwin Procter LLP
601 Marshall Street
Redwood City, CA 94063
Email: sdutta@goodwinlaw.com
Tel: (650) 752-3100
Fax: (650) 853-1038

XIII. CLAIM APPENDIX OF THE CHALLENGED CLAIMS

- 1[pre] A cooling system for an electronic image assembly, the
cooling system comprising:
- 1[a] a housing for the electronic image assembly;
- 1[b] 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;
- 1[c] 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;
- 1[d] an open loop airflow pathway for ambient air passing
through said housing and behind said electronic image assembly;
- 1[e] at least one air circulation device positioned to force the
circulating gas through the closed loop airflow pathway when
activated; and

1[f] 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.

2 The cooling system of claim 1 further comprising: at least one film having anti-reflection properties located at said cover panel.

3 The cooling system of claim 1 further comprising: a heat exchanger located rearward of the electronic image assembly,

3[a][1] wherein a first portion of said heat exchanger forms part of said open loop airflow pathway, and

3[a][2] wherein a second portion of said heat exchanger forms part of said closed loop airflow pathway.

4[a] The cooling system of claim 3 further comprising: an inlet located at a first portion of said housing for ingesting said ambient air into said open loop airflow pathway; and

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

5 The cooling system of claim 1 wherein: said at least one polarizer comprises a linear polarizer.

- 6[pre] A cooling system for an electronic image assembly, the cooling system comprising:
- 6[a] a housing for the electronic image assembly;
- 6[b] 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;
- 6[c] an open loop airflow pathway passing through the housing behind the electronic image assembly;
- 6[d] 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;
- 6[e] an inlet located at a first portion of said housing for ingesting ambient air into said open loop airflow pathway;
- 6[f] an exhaust located at a second portion of said housing for exhausting said ambient air from said open loop airflow pathway;
- 6[g] 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;

6[h] 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;

6[i] 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

6[j] 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.

7[a] The cooling system of claim 6 wherein: said air circulation device comprises one or more fan assemblies; and

7[b] said gas circulation device comprises one or more fan assemblies.

8 The cooling system of claim 6 wherein: at least one of said
one or more solar energy reduction layers comprise a polarizer.

9 The cooling system of claim 8 wherein: said polarizer
comprises a linear polarizer.

10 The cooling system of claim 6 wherein: at least one of said
one or more solar energy reduction layers comprise a film having
anti-reflection properties.

11[a] The cooling system of claim 6 wherein: at least a first one of
said one or more solar energy reduction layers comprise a
polarizer; and

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

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

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

12[b] 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;

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

12[d] 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.

13 The cooling method of claim 12 wherein: at least one of said
one or more solar energy reduction layers comprise a polarizer.

14 The cooling method of claim 13 wherein: at least one of said
one or more solar energy reduction layers comprise a film having
anti-reflection properties.

15 The cooling method of claim 12 further comprising the steps
of: 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.

CERTIFICATE OF WORD COUNT

Pursuant to 37 C.F.R. § 42.24(d), the undersigned certifies that this Petition for *Inter Partes* Review complies with the type-volume limits of 37 C.F.R.

§ 42.24(a)(1)(i) because it contains ~~13,970~~13,939 words according to the word-processing system used to prepare this Petition, excluding the words in the Table of Contents, Table of Authorities, List of Exhibits, Mandatory Notices, Certification Under §42.24(d), and Certificate of Service, as set forth in 37 C.F.R. § 42.24(a)(1).

Date: ~~December 7, 2022~~May 9, 2023 /Sanjeet Dutta /
Sanjeet Dutta
Registration No. 46,145
Goodwin Procter LLP
601 Marshall Street
Redwood City, CA 94063
Email: sdutta@goodwinlaw.com
Tel: (650) 752-3100
Fax: (650) 853-1038

CERTIFICATE OF SERVICE

The undersigned certifies that a true and correct copy of the foregoing
Corrected Petition together with ~~all exhibits identified in the above Table of~~
~~Exhibits and Petitioner's Powers of Attorney, have~~ Exhibit 1027 has been served on
the Patent Owner via Federal Express Next Business Day Delivery ~~on the below~~
~~date,~~ at the following address:

STANDLEY LAW GROUP LLP
6300 Riverside Drive
Dublin, OH 43017

and has been served by email upon the following:

John C. Alemanni – jalemanni@kilpatricktownsend.com
Carl Sanders – csanders@kilpatricktownsend.com
Michael T. Morlock – mmorlock@kilpatricktownsend.com
Courtney Dabbieri – cdabbieri@kilpatricktownsend.com

Respectfully submitted,
GOODWIN PROCTER LLP

Date: ~~December 7~~ May 9,
~~2022~~ 2023

By: /Sanjeet Dutta/
Sanjeet Dutta