

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. 9,629,287

Title: SYSTEM FOR USING CONSTRICTED CONVECTION WITH CLOSED
LOOP COOLING SYSTEM AS THE CONVECTION PLATE

Inter Partes Review No. IPR 2023-00255

PETITIONERS' CORRECTED PETITION FOR INTER PARTES REVIEW
OF
U.S. PATENT NO. 9,629,287

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Alexandria, VA 22313-1450

SEC et al. v. MRI
SEC Exhibit 1033.0001
IPR2023-00255

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Other Authorities

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LIST OF EXHIBITS

Exhibit No.	Description of Document
1001	U.S. Patent 9,629,287 B2 to Dunn (“the ’287 patent”)
1002	Declaration of Robert Smith-Gillespie
1003	Curriculum Vitae of Robert Smith-Gillespie
1004	Certified Translation of Japanese Patent No. 3118907 to Ohta (“Ohta”)
1005	Certified Translation of Japanese Unexamined Patent Publication H8-152604 to Marumoto (“Marumoto”)
1006	International Patent Application No. PCT/FI2006/050145 with Publication No. WO2007116116A1 to Karppanen et al. (“Karppanen”)
1007	U.S. Patent No. 6,798,655 to Nagashima et al. (“Nagashima”)
1008	“Exhibit 22: Infringement Claim Chart for Samsung OH-Series Outdoor Display Products,” produced by Manufacturing Resources International, Inc. in In re Certain Outdoor and Semi-Outdoor Electronic Displays, Products Containing Same, and Components Thereof, Investigation No. 337-TA-1331
1009	Japanese Patent No. 3118907 Ohta (“Ohta”)

Exhibit No.	Description of Document
1010	Japanese Unexamined Patent Publication H8-152604 to Marumoto (“Marumoto “)
1011	Claim Construction Order (D.I. 153) dated October 3, 2018 in <i>Manufacturing Resources Int’l, Inc. v. Civiq Smartscapes, LLC, et al.</i> , Civil Action No. 17-269-RGA (D. Del.)
1012	Memorandum Opinion (D.I. 150) dated September 27, 2018 in <i>Manufacturing Resources Int’l, Inc. v. Civiq Smartscapes, LLC, et al.</i> , Civil Action No. 17-269-RGA (D. Del.)
1013	United Kingdom Patent Application No. GB 2402205A to Yare (“Yare”)
1014	File history for U.S. Patent Application No. 15/180,968
1015	Japanese Patent Application No. 2001-209126 A to Fujimori (“Fujimori”)
1016	Japanese Unexamined Patent Application Publication No. H8-54834 to Kitamura (“Kitamura”)
1017	Certified Translation of Japanese Unexamined Application Publication No. H8-54834 to Kitamura (“Kitamura”)
1018	U.S. Patent 5,748,269 to Harris, et al. (“Harris”)
1019	U.S. Patent No. 5,991,153 to Heady, et al. (“Heady”)

Exhibit No.	Description of Document
1020	Excerpts from the File History of U.S. Application No. 14,508,767
1021	U.S. Patent No. 6,825,828 (“Burke”)
1022	E. Fred Schubert & Jong Kyu Kim, <i>Solid-State Light Sources Getting Smart</i> , 308 <i>Science</i> 1274 (2005) (“Schubert”)
1023	Military Handbook: Reliability Prediction of Electronic Equipment, DEPARTMENT OF DEFENSE, MIL-HDBK-217F (1991) (“MIL-HDBK-217F”)
1024	Allan Webber, <i>Calculating Useful Lifetimes of Embedded Processors</i> , TEXAS INSTRUMENTS INCORPORATED, SPRABX4 (Nov. 2014) (“Webber”)
1025	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”)
1026	ALLAN W. SCOTT, COOLING OF ELECTRONIC EQUIPMENT (John Wiley & Sons, 1974) (“Scott”)
1027	DAVE S. STEINBERG, COOLING TECHNIQUES FOR ELECTRONIC EQUIPMENT (John Wiley & Sons, 1980) (“Steinberg”)
1028	U.S. Patent No. 6,504,713 (“Pandolfi”)

Exhibit No.	Description of Document
1029	U.S. Patent No. 4,327,803 (“Mullejeans”)
1030	U.S. Patent No. 5,002,118 (“Olmstead”)
1031	U.S. Patent No. 6,244,333 to Bergh et al. (“Bergh”)
1032	Memorandum Opinion (D.I. 181) dated March, 5, 2019 in <i>Manufacturing Resources Int’l, Inc. v. Civiq Smartscapes, LLC, et al.</i> , Civil Action No. 17-269-RGA (D. Del.)
<u>1033</u>	<u>Redline of Corrected Petition</u>

Petitioners Samsung Electronics Co., Ltd. and Samsung Electronics America, Inc. (“Samsung” or “Petitioners”) seek *inter partes* review and cancellation of claims 1, 4-5 and 8-23, of U.S. Patent 9,629,287 (“the 287 patent”) (Ex. 1001)⁺. 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, 4-5, and 8-23 of the ’287 patent are unpatentable because each claim 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.

⁺ ~~For purposes of this Petition, citations to patents and patent applications, including the ’287 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 '287 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, 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.

In both the District Court Action and the ITC Action, the Patent Owner also alleges infringement of U.S. Patent Nos. 8,854,595 (“the ’595 patent”), 9,173,322 (“the ’322 patent”), 11,013,142 (“the ’142 patent”) and 10,506,740 (“the ’740 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).)

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).)

On December 7, 2022, Petitioners filed a petition for *inter partes* review of the '142 patent. (See *Samsung Electronics Co. Ltd. and Samsung Electronics America, Inc. v. Manufacturing Resources International, Inc.*, Case No. IPR2023-00221 (PTAB Dec. 7, 2022).)

On December 14, 2022, Petitioners filed a petition for *inter partes* review of the '740 patent. (See *Samsung Electronics Co. Ltd. and Samsung Electronics America, Inc. v. Manufacturing Resources International, Inc.*, Case No. IPR2023-00254 (PTAB Dec. 14, 2022).)

The '287 patent also was asserted by the Patent Owner against Civiq Smartscapes, LLC, Civiq Holdings, LLC, Comark, LLC, and Comark Holdings, LLC in *Manufacturing Resources Int'l, Inc. v. Civiq Smartscapes, LLC, et al.*, Civil Action No. 17-269-RGA (D. Del.) (“the MRI-Civiq Litigation”). Those proceedings were voluntarily dismissed with prejudice by the parties on January 24, 2020.

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

Petitioners provide the following designation of counsel.

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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 '287 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~~104

A. Grounds for Standing

Petitioners certifies that the '287 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:

Ground	Claims	Basis for Rejection
1	12-23	Obvious over Karppanen (Ex. 1006)
2	1, 4-5, 8-12, 14-17, 21-23	Obvious over Nagashima (Ex. 1007) in view of Karppanen (Ex. 1006)
3	1, 4-5, 8-23	Obvious over Ohta (Ex. 1004) in view of Marumoto (Ex. 1005)
4	1, 4-5, 8-23	Obvious over Ohta (Ex. 1004) in view of Marumoto (Ex. 1005) and in further view of Yare (Ex. 1013)
5	12-20	Obvious over Kitamura (Ex. 1017) in view of Harris (Ex. 1018)

Submitted with this Petition is the Declaration of Robert Smith-Gillespie, a qualified technical expert. (Exs. 1002, ¶¶6-18; 1003.)

~~C. List of Claims Challenged~~

~~The '287 patent includes 4 independent claims that are challenged. The following chart lists the claims from the '287 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]. An electronic display assembly comprising: [a]. an electronic display housing; [b] a gas-containing closed loop gas cooling chamber [c] an electronic display positioned within the electronic display housing but outside of the closed loop gas cooling chamber, and [d]an open loop ambient air pathway through the electronic display housing; [e] wherein the electronic display is coolable by a combination of gas circulation within the closed loop gas cooling chamber and ambient air flow through the open loop ambient air pathway in the electronic display housing.~~	~~12[pre]. An electronic display assembly comprising: [a] a housing; [b] a liquid crystal display (LCD) positioned within the housing and having a backlight; [c] wherein the electronic display is coolable by a combination of a closed loop of isolated gas which circulates within the housing and an open loop of ambient air which passes through the housing and along the backlight.~~
~~4. The electronic display assembly of claim 1 wherein: the gas within the closed loop gas cooling chamber is isolated from the open loop of ambient air.~~	~~13. The electronic display assembly of claim 12 wherein: the isolated gas will cool a front surface of the LCD.~~
~~5. The electronic display assembly of claim 1 wherein: the closed loop gas cooling chamber and the ambient air~~	~~14. The electronic display assembly of claim 12 further comprising:~~

~~pathway are configured such that gas circulation within the gas cooling chamber will occur in a direction that is substantially perpendicular to the direction that ambient air will flow through the electronic display housing.~~	~~[a] a rear cooling chamber positioned behind the LCD and containing the closed loop of isolated gas; and [b] wherein the open loop ambient air will contact an exterior surface of the chamber, but is not permitted to enter the chamber.~~
~~8. The electronic display assembly of claim 1 wherein: the closed loop gas cooling chamber is partially defined by a sealed rear plenum that prevents ambient air from entering the plenum.~~	~~15. The electronic display assembly of claim 12 further comprising: one or more electronic components for driving the LCD positioned within the rear cooling chamber.~~
~~9. The electronic display assembly of claim 8 further comprising: one or more electronic devices for operating the electronic display positioned within the sealed plenum.~~	~~16. The electronic display assembly of claim 12 wherein: the open loop of ambient air will contact an exterior surface of the rear cooling chamber while the closed loop of isolated gas will contact an interior surface of the rear cooling chamber.~~
~~10. The electronic display assembly of claim 1 wherein: the electronic display is selected from the group consisting of a liquid crystal display, a light emitting diode display, an organic light emitting diode display, a field emitting display, a cathode ray tube display, and a plasma display.~~	~~17. The electronic display assembly of claim 12 wherein the intended direction of closed loop isolated gas flow is substantially perpendicular to the intended direction of open loop of ambient air flow.~~
~~11[pre].— The electronic display assembly of claim 1 further comprising: [a]. a gas circulating fan for circulating the gas within the closed loop gas cooling chamber, and [b]. a fan for producing a flow of ambient air through the open loop ambient air pathway in the electronic display housing.~~	
~~18[pre]. An electronic display assembly comprising: [a] a housing~~	~~21[pre]. An electronic display assembly comprising: [a] an electronic display housing;~~

~~[b] an electronic display positioned within the housing;~~ ~~[c] a rear cooling chamber positioned behind the electronic display and containing an electrical component which is electrically connected to the electronic display;~~ ~~[d] a front surface on the electronic display which faces an intended viewer and a rear surface on the electronic display which opposes the front surface;~~ ~~[e] wherein the front surface of the electronic display is coolable by a closed loop of isolated gas and the rear surface of the electronic display is coolable by an open loop of ambient air.~~	~~[b] a closed loop of cooling gas adapted for circulation within the electronic display housing;~~ ~~[c] an open loop ambient air pathway through the electronic display housing; and~~ ~~[d] an electronic display positioned within the electronic display housing such that the electronic display is isolated from the closed loop of cooling gas but contactable by ambient air flowing through the open loop ambient air pathway;~~ ~~[e] wherein the electronic display is coolable by a combination of closed loop cooling gas circulation within the electronic display housing, and ambient air flow through the open loop ambient air pathway in the electronic display housing.~~
~~19. The electronic display assembly of claim 18 wherein: the open loop of ambient air is prohibited from mixing with the closed loop of isolated gas when it passes through the housing.~~	~~22. The electronic display assembly of claim 21 wherein:~~ ~~[a] the closed loop of cooling gas is isolated within a continuous loop gas cooling chamber, and~~ ~~[b] the open loop ambient air pathway is configured to direct the ambient air over an exterior surface of the gas cooling chamber when it flows through the electronic display housing.~~
~~20. The electronic display assembly of claim 18 wherein: the open loop of ambient air will pass between the rear surface of the electronic display and an exterior surface of the rear cooling chamber.~~	~~23. The electronic display assembly of claim 22 further comprising: a fan located within the electronic display housing, the fan configured and oriented to move air located within the housing between a surface of the continuous loop gas cooling chamber and a rear surface of the electronic display.~~

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). None of the prior art references used herein were cited during prosecution of U.S. Application No. 15/180,968, which issued as the ’287 patent.

D. ~~E.~~ Considerations Under 35 U.S.C. §314(a)

Under the *Fintiv* factors, the PTAB may consider parallel district court litigation in determining whether to institute under 35 U.S.C. § 314(a). *Apple Inc. v. Fintiv, Inc.*, IPR2020-00019, Paper 11 at 2-3, 6 (PTAB Mar. 20, 2020) (precedential). However, “[t]he PTAB will not discretionarily deny petitions based on applying *Fintiv* to a parallel ITC proceeding.” Memorandum, Interim Procedure for Discretionary Denials in AIA Post-Grant Proceedings with Parallel District Court Litigation, p.7 (Jun. 21, 2022). Because the parallel district court litigation is stayed pending the outcome of the ITC proceeding, the *Fintiv* factors are not applicable here.

IV. CERTIFICATION OF GROUNDS FOR STANDING

Petitioners certify pursuant to 37 C.F.R. § 42.104(a) that the ’287 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 '287 PATENT

A. Level of Ordinary Skill in the Art

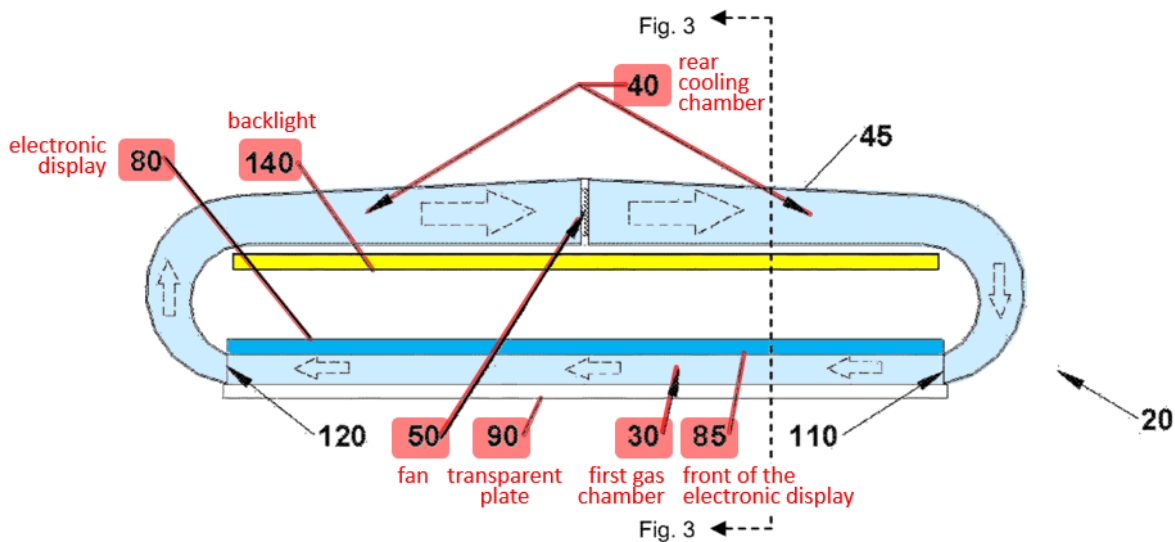
A POSITA as of March 3, 2008 would have possessed a bachelor's degree in a pertinent discipline, such as mechanical engineering, physics, product design, or a related field. (Ex. 1002, ¶37.) The POSITA would also have 2–4 years of experience in working with electronic displays and have an understanding of product design issues and failure modes associated with electronic displays. (*Id.*) Alternatively, a POSITA would have had 5–7 years of experience working with electronic displays and have a similar understanding of product design issues and failure modes associated with electronic displays. (*Id.*)

B. The '287 Patent

The '287 patent (Ex. 1001) issued on April 18, 2017 from Application No. 15/180,968 (“the '968 application”) filed on June 13, 2016, which itself was a Continuation of each of the following applications: (a) No. 14/803/848, filed on July 20, 2015; (b) No. 14/508,767, filed October 7, 2014; (c) No. 13/937,777, filed July 9, 2013; (d) No. 13/605,530, filed September 6, 2012; (e) No. 12/620,330, filed November 17, 2009. (See Ex. 1001, 1:9-54). The '287 patent also claims priority to 7 provisional patent applications, the earliest of which (No. 61/033,064) was filed on March 3, 2008. (*Id.*)

The '287 patent relates to “an isolated gas cooling system and a method for cooling an electronic display.” (Ex. 1001, 2:37-43.) As shown in Figure 2, “the

isolated gas cooling chamber 20 comprises a closed loop which includes a first gas chamber 30 and a rear cooling chamber 40.” (*Id.*, 4:4-7.) Many challenged claims explicitly require that the electronic display be “outside of,” “isolated from” or “behind” the closed loop cooling chamber (as depicted below). (*Id.*, claims 1, 14, 18, 21.) The electronic display 80 front surface 85 is behind the first gas chamber 30. (*Id.*, Fig. 2.) Here, “[t]he first gas chamber 30 includes at least one transparent plate 90 mounted in front of an electronic display 85.” (*Id.*, 4:28-30.)



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

C. Prosecution History

During prosecution, the Examiner rejected claims 1, 4-5, and 8-11 as being anticipated and/or obvious, and allowed claims 12-20 in an office action dated September 22, 2016. (*See* Ex. 1014, (9/22/2016 Non-Final Rejection) at 47-52).

The Examiner relied solely on Japanese Patent Application 2001-209126 A

(“Fujimori”) (Ex. 1015) to support its rejections. The Applicant amended the challenged claims to add the “outside” limitation (and variants), arguing that, in the prior art, the electronic display “is in direct contact with the air circulation current [] – i.e., a closed loop of cooling gas – located therein,” but there is no contact in the amended claims because the display is “outside” the closed loop. (Ex. 1014, pp.60-72.)

The ’287 patent issued on April 18, 2017.

VI. CLAIM CONSTRUCTION

One term in the ’287 patent was construed in the MRI-Civiq Litigation. The Delaware District Court issued a Claim Construction Order dated October 3, 2018 (Ex. 1011), and a Memorandum Opinion dated September 27, 2018 (Ex. 1012).

The District Court construed the terms “closed loop” and “closed gaseous loop” in the ’287 patent and other related MRI patents to mean “gas pathway within a display housing containing gas that is essentially isolated from external air.” (Ex. 1011, p.8 (citing Ex. 1001, 4:9-11).) Solely for purposes of this Petition, Petitioners believe the Board should apply the Delaware District Court’s constructions to the terms “closed loop gas cooling chamber,” “closed loop of isolated gas” and “closed loop of cooling gas” in the challenged claims.

The District Court also gave guidance as to the meaning of other terms in the challenged claims.

Defendants in the MRI-Civiq Litigation contended that the phrase “the front surface of the electronic display is coolable by a closed loop of isolated gas” is indefinite because it is a functional limitation and there are no quantitative metrics in the specification to determine how “coolable” a display needs to be to infringe. (Ex. 1012, pp.15-16.) The District Court disagreed, holding that “any front display surface that is capable of being cooled-however minutely-is included within the scope of the invention.” (*Id.*, p.16.)

The District Court also determined that the phrases “open loop” and “rear surface of the electronic display” should be given their plain and ordinary meaning. (Ex. 1011, p.3, Ex. 1012, pp.6, 9.) As to the phrase “open loop,” the District Court determined that it is not limited to a “gas pathway within a display housing that is open to or accessible to external air.” (Ex. 1012, p.9.)

The District Court reasoned that the phrase “rear surface of the electronic display,” is not limited to only the rear surface of an LCD stack or backlight (in an LCD display) or posterior surface of another display lacking a backlight. (Ex. 1032, pp.2-3.)

The District Court determined that the plain and ordinary meaning of the word “between” in related patent U.S. 9,173,322 is “in the space that separates” and specifically noted that air passed “between” two structures need not come into contact with said structures. (Ex. 1011, pp.9-10.)

Again, solely for purposes of this Petition, Petitioners believe the Board should apply the Delaware District Court’s guidance as to the scope of the terms at issue in the MRI-Civiq Litigation. Petitioners also propose constructions for one other term.^{21,32}

A. “open loop of ambient air which passes through the housing and along the backlight” (Claim 12)

The phrase “open loop of ambient air which passes through the housing and along the backlight” does not require that the ambient air actually contact a surface of the backlight. Rather, this term should be construed to mean “open loop of ambient air which passes through the housing and is in thermal communication with, the backlight.” During prosecution of US 9,089,079 (of which the ’287 patent is a continuation), the examiner rejected a pending claim covering ambient air moving

²¹Claim 15 requires that “one or more electronic components for driving the LCD positioned within the rear cooling chamber.” There is no written description support for this limitation in the specification. Solely for purposes of this Petition, Petitioners give the phrase “electronic components for driving the LCD” its plain and ordinary meaning.

³²There is also no antecedent basis for the phrase “the rear cooling chamber in claim 15.” Solely for purposes of this petition, Petitioners treat the “rear cooling chamber” in claim 15 as any cooling chamber that is rear to the electronic display.

“along the backlight” based on Heady (depicted below) where ambient air flows through a heat exchanger **210** mounted to the side of the display. (Ex. 1020, p.204.) The examiner considered this to be “along the backlight.” (*Id.*) In response, applicant amended the claim to require that the ambient air “contact[] the backlight.” (*Id.*, p.223.) Thus, both the examiner and applicant recognized that the meaning of this limitation is consistent with Petitioner’s proposed construction.

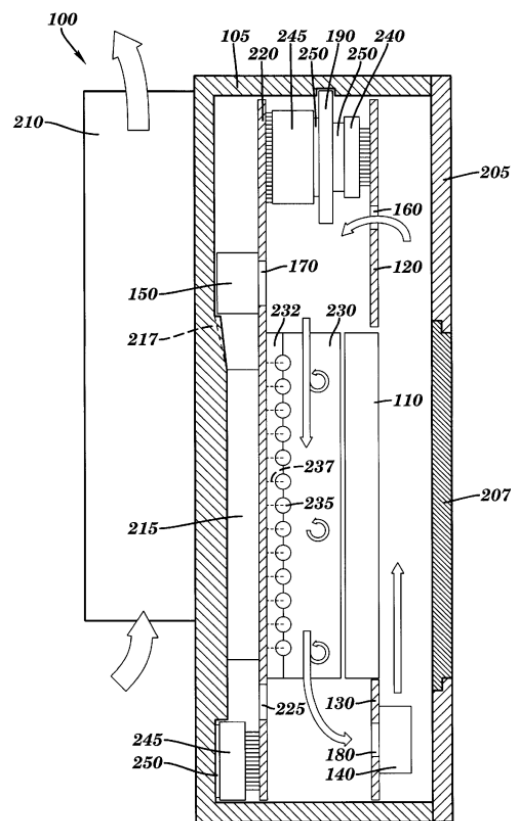


FIG. 3

(Ex. 1019, Fig. 3.)

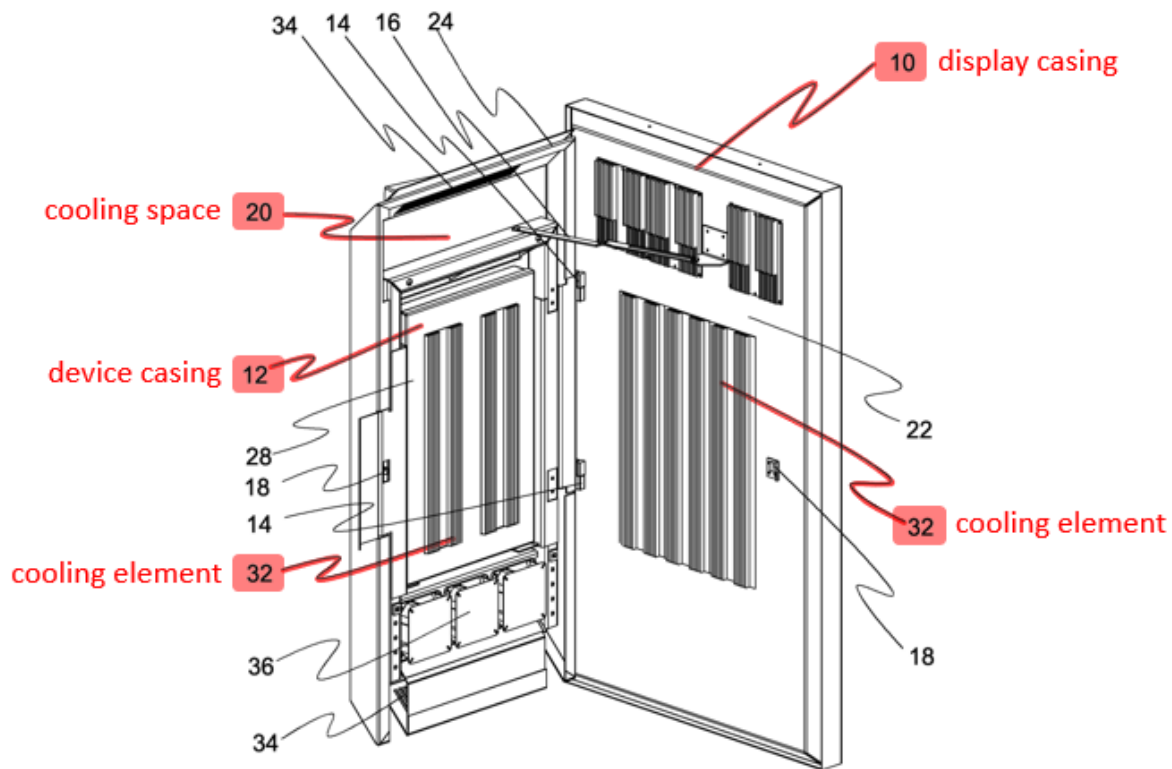
VII. OVERVIEW OF THE PRIOR ART

A. Karppanen

International Patent Application No. PCT/FI2006/050145 with Publication No. WO2007116116A1 (“Karppanen”) (Ex. 1006), entitled “Electronic Information Board” was filed on April 11, 2006 and published on October 18, 2007. Karppanen qualifies as prior art pursuant to pre-AIA 35 U.S.C. §§ 102(a) and 102(e) because it published in English and was filed before the earliest claimed priority date of Mar. 3, 2008.

Karppanen teaches “an electronic information board comprising ... a weatherproof display casing **10**⁴³... and a weatherproof device casing **12** for the electronic equipment needed for controlling the display element. (Ex. 1006, Abstract.) “Between the casings, there is a common cooling space **20** for cooling the devices in the display casing and the device casing,” where both the display and device casing have cooling elements for transferring heat from inside their casings to the cooling space. (*Id.*)

⁴³ References to elements in Karppanen’s patent figures have been bolded.



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

B. Nagashima

U.S. Patent No. 6,798,655 (“Nagashima” (Ex. 1007), entitled “Liquid Cooling System for All-in-One Computer,” issued on September 28, 2004. Nagashima is prior art pursuant to at least pre-AIA 35 U.S.C. § 102(b).

Nagashima is directed to “cooling technology for [] heat generating elements” in a computer integrated “with a liquid crystal display.” (Ex. 1007, 1:8-12.) The computer is cooled by an open loop of air flowing along the rear surface of the display (*Id.*, 5:13-22, 5:61-6:3) and a “heat receiving head 8” placed “in contact with heat generating elements” including the CPU 9, power source circuits, and hard drive

10. (*Id.*, 4:4-11.) The heat receiving head 8 can include a “heat radiating fin” to radiate heat and a “fan ... provided on the heat radiating fin on the heat receiving head ... [which] realizes the effective and rapid radiation of heat from the heat radiating fin.” (Ex. 1007, 7:9-19, Fig. 6A, Fig. 6B.)

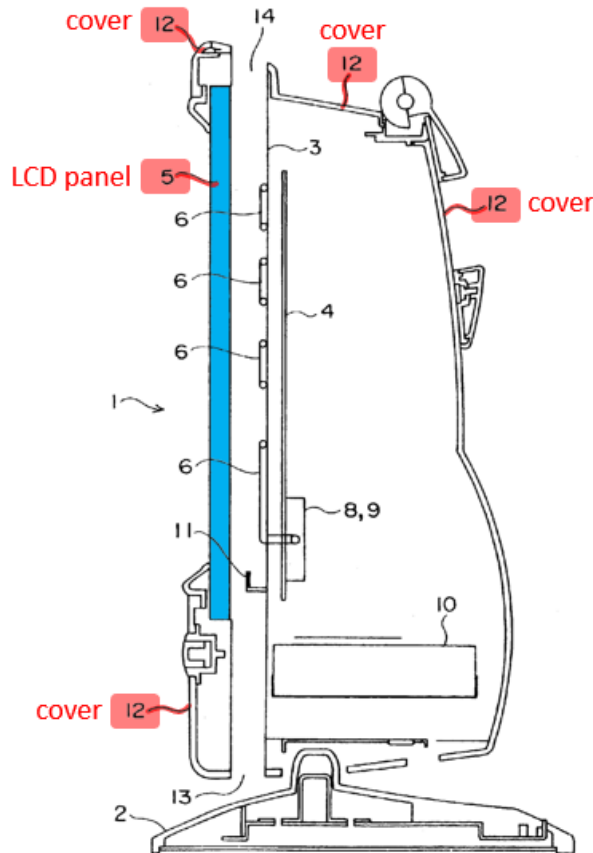


FIG. 6A

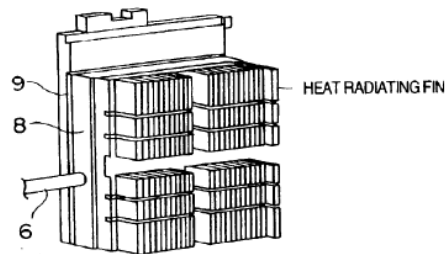
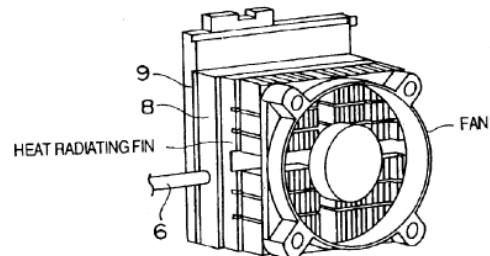


FIG. 6B



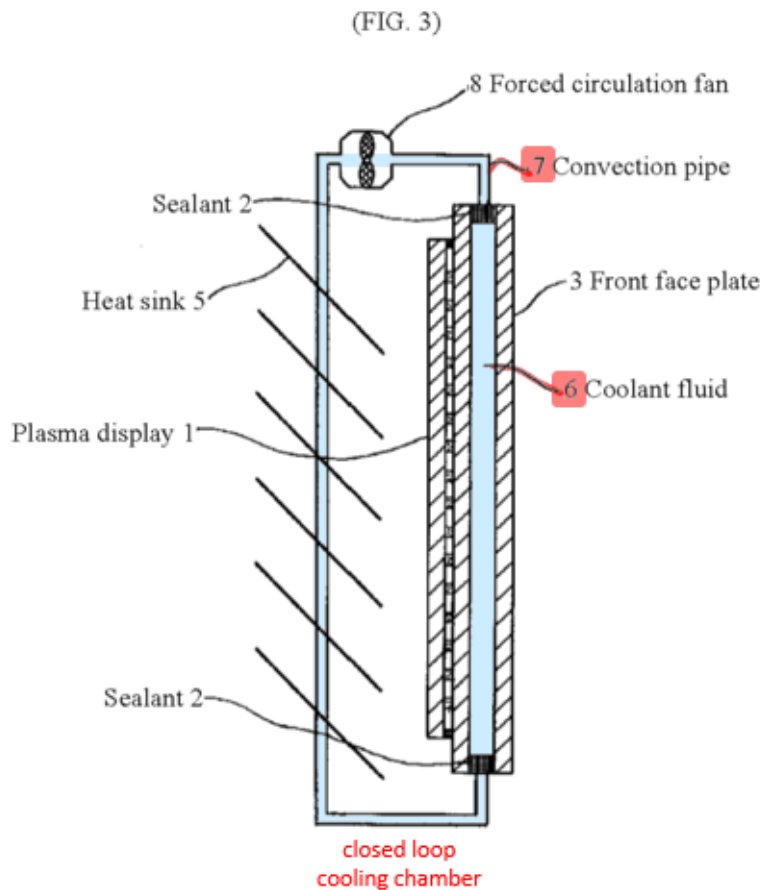
(Ex. 1007, Fig. 1 (annotated), Figs. 6A, 6B.)

C. Ohta

Japanese Patent No. 3118907 (“Ohta”) (Exs. 1004, 1009), ^{§4} titled “Cooling Device for Plasma Display Panel,” published on October 13, 2000. Ohta is prior art pursuant to at least pre-AIA 35 U.S.C. § 102(b).

Ohta discloses a “cooling device for plasma display panel” that includes a “container that is directly mounted at an appropriate space from the plasma display panel so as to form an airtight container between itself and the plasma display panel, and coolant that either flows in/out of this airtight container.” (Ex. 1004, ¶[0006].)

^{§4} Unless otherwise stated, all citations are to the Certified Translation of Ohta (Ex. 1004).



(*Id.*, Fig. 3 (annotated).) Heat from the panel “causes the coolant fluid **6⁶⁵** to warm up, producing convection within the airtight container formed between the front face plate **3** and the display face of the plasma display panel **1**,” wherein “the heat is discharged to the exterior from the heat sink **5**.” (*Id.*, ¶[0012].) Heat sink **5** can then be “forcibly air-cooled” (fan not shown). (*Id.*, ¶[0024].)

⁶⁵ References to elements in Ohta’s patent figures have been bolded.

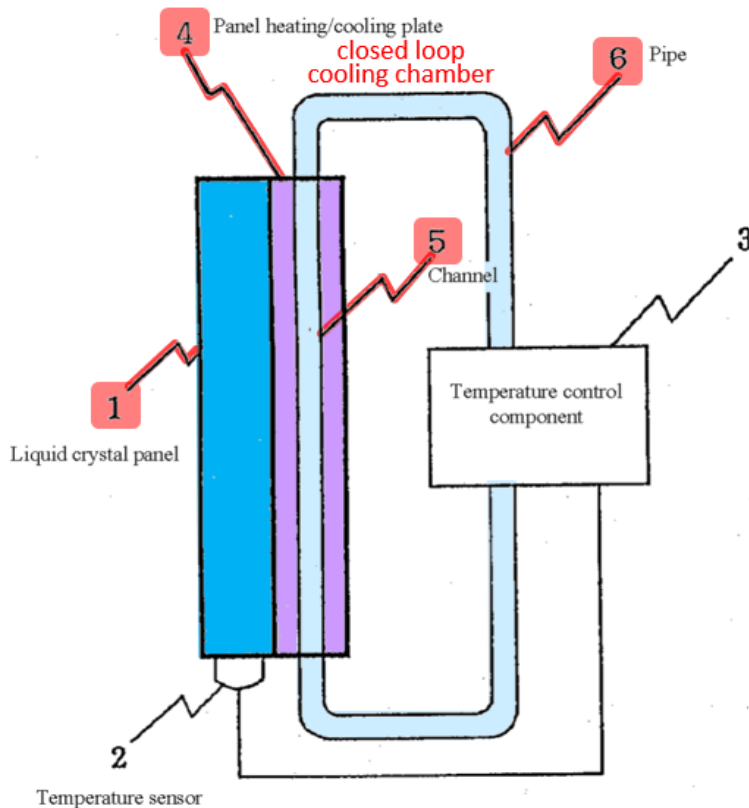
D. Marumoto

Japanese Unexamined Patent Publication H8-152604 (“Marumoto”) (Ex. 1005, 1010),⁷⁶ titled “Heating/Cooling System for Liquid Crystal Panel,” was published on June 11, 1996. Marumoto is prior art pursuant to at least pre-AIA 35 U.S.C. § 102(b).

Marumoto discloses a “heating/cooling plate **4**⁸⁷[] adjoiningly provided on the back face of a liquid crystal panel **1**, and a temperature control component **3** performs control ... raising or lowering the temperature of the heating/cooling material passed through a channel **5** so as to heat or cool the panel heating/cooling plate.” (Ex. 1005, Abstract.)

⁷⁶ Unless otherwise stated, all citations are to the Certified Translation of Marumoto (Ex. 1010).

⁸⁷ References to elements in Marumoto’s patent figures have been bolded.



(*Id.*, Fig. 1 (annotated).) Marumoto discloses that the “heating/cooling material may be a gas or a fluid.” (*Id.*, ¶[0007].)

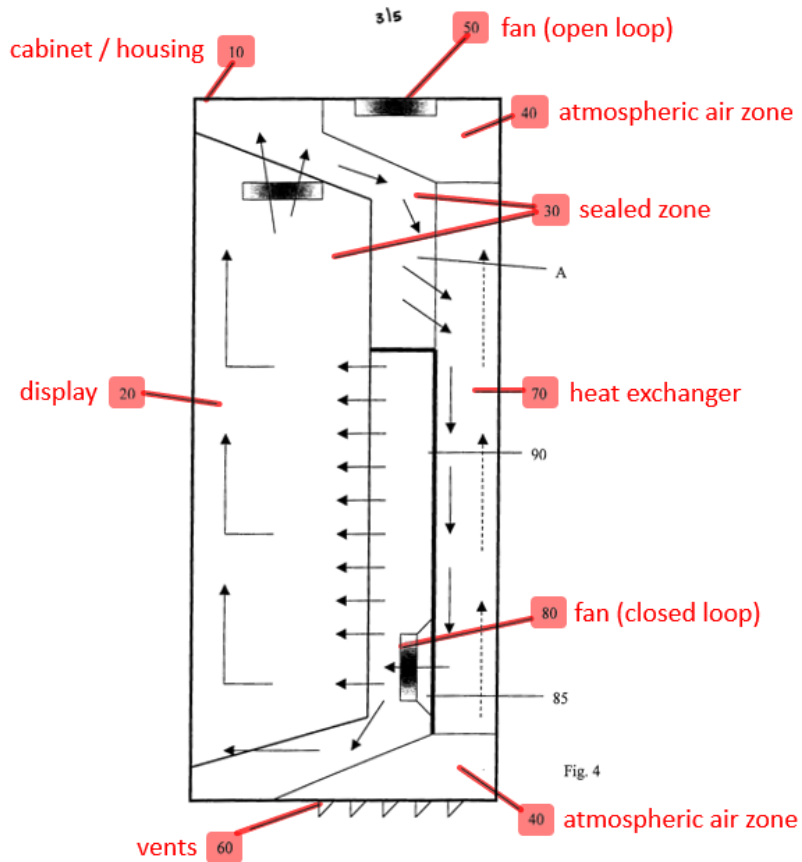
E. Yare

United Kingdom Patent Application No. GB 2402205A by Yare (“Yare”) (Ex. 1013), entitled “A Display System Cabinet and Display System Including Heat Removal Means,” published on December 1, 2004. Yare qualifies as prior art pursuant to at least pre-AIA 35 U.S.C. § 102(b).

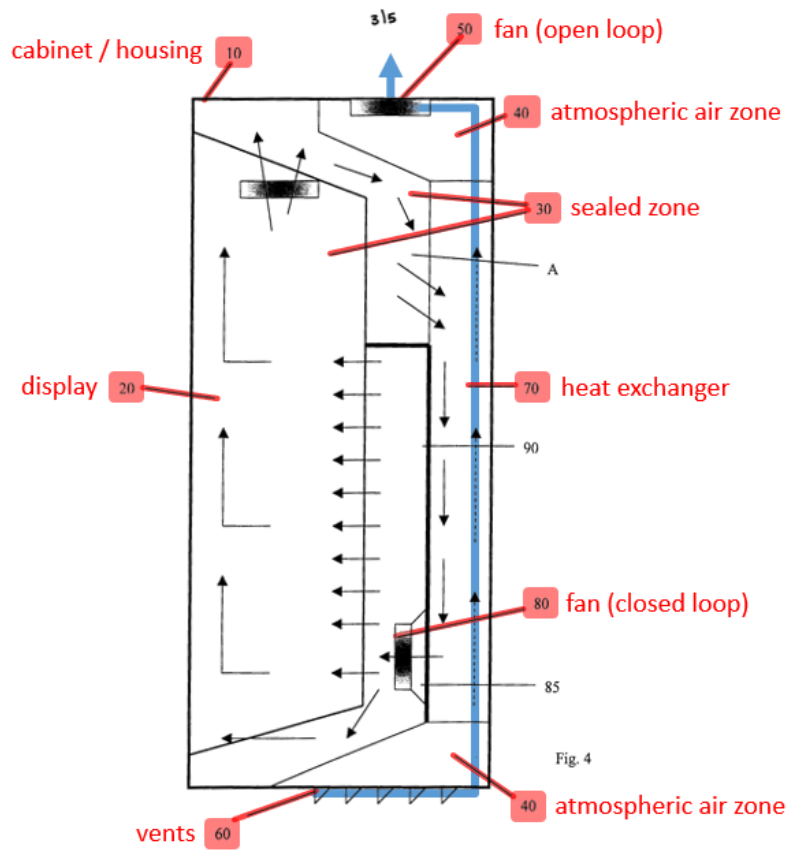
Yare discloses “a cabinet for mounting a display system” that is “particularly suitable for” providing “displays in public places.” (Ex. 1013, 1:4-6.) Yare’s cabinet

can be used with many different types of displays including plasma and LCD displays. (*Id.*, 1:14-15.)

Yare recognizes that displays “can generate a lot of heat” and that “an efficient cooling system” is necessary for such a display to “function normally.” (*Id.*, 1:15-17.) To address this heat problem, Yare’s cabinet **10** has a sealed zone **30** that is sealed from the external environment which contains a display **20** and fans **80**. (*Id.*, 4:1-7, Fig. 1; *see id.*, 2:8-9, 4:31-33.) Heat generated by the display is transferred from the sealed zone **30** to the atmospheric air zone **40** through heat exchanger **70**. (*Id.*, 4:11-22, Figs. 1, 4; *see id.*, 2:19-29.) Ambient air is drawn into the atmospheric air zone **40** through vents **60** by fan **50**. (*Id.*, 4:11-16, Figs. 1-4; *see id.*, 2:8-9.) The heated ambient air may then be released through the fan/exhaust **50**. (*Id.*, 5:2-10, Figs. 1-4.)



(*Id.*, Fig. 4 (annotated).) Ambient air cools one side of the heat exchanger as shown below:



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

F. Kitamura

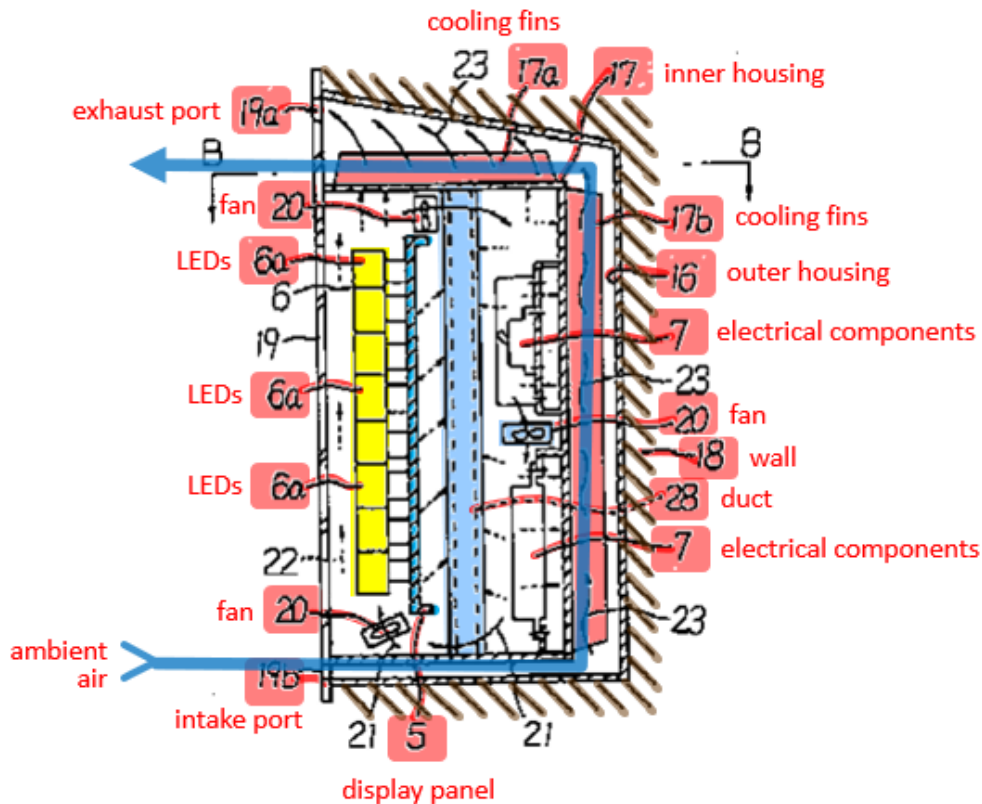
Japanese Unexamined Patent Publication H8-54834 (“Kitamura”) (Ex. 1016; Ex. 1017),⁹⁸ titled “LED Display Device,” was published on February 27, 1996. Kitamura is prior art pursuant to at least pre-AIA 35 U.S.C. § 102(b).

Kitamura discloses an “LED display device” suitable for installation inside the “wall **18**⁴⁹... of a building.” (Ex. 1017, ¶[0011].) An outer housing **16** is

⁹⁸ Unless otherwise stated, all citations are to the Certified Translation of Kitamura (Ex. 1017).

⁴⁹ References to elements in Kitamura’s patent figures have been bolded.

installed in the wall and an inner housing 17 houses the electronic display. (*Id.*) Between the inner and outer casing is an air channel. (*Id.*) Air enters through intake 19b travels around the housing and exits through air exhaust 19a. (*Id.*, ¶¶[0016]-[0017].)

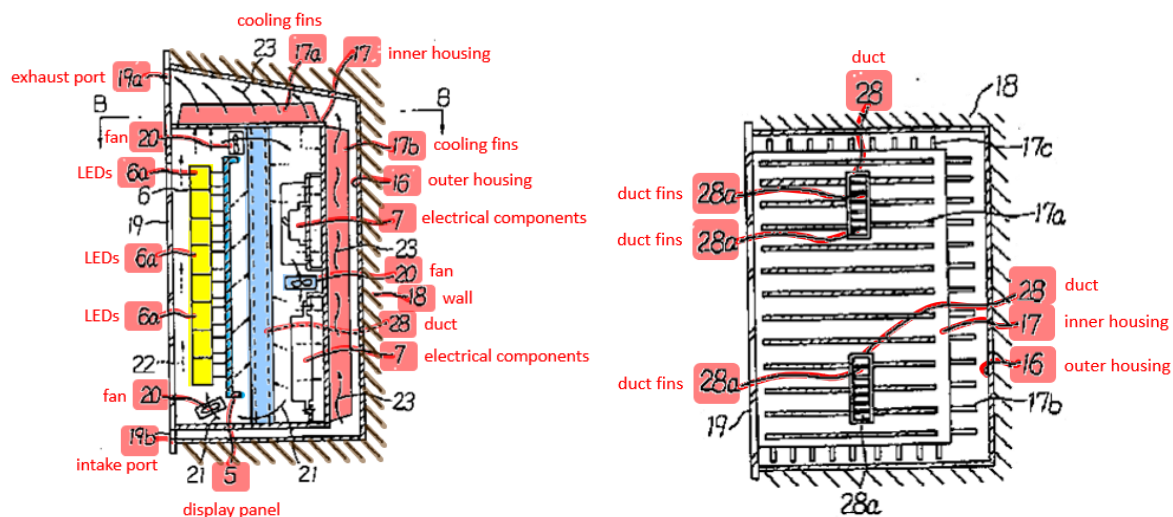


(Ex. 1017, Fig. 4 (annotated).)

Embodiment 3 includes two rectangular tube-shaped ducts 28 which traverse through the chamber where the top and bottom ends open into the space between the inner housing 17 and outer housing 16. (*Id.*, ¶[0021].) Inside each duct 28 are fins 28a. (*Id.*)

The electronic display is a direct-view LED display that includes LED module 6, LEDs 6a and various “electrical parts for control” 7 near the rear of the housing. (*Id.*, 1017, ¶[0014].) Kitamura recognizes that, absent a cooling apparatus, “heat emitted by the LED module 6 and the electrical parts for control 7 will cause the temperature in the housing 2 to increase beyond the operating temperature range” for these components. (*Id.*, ¶[0004].)

To address these heat concerns, during operation, fans 20 circulate heated air uniformly throughout inner housing 17. (*Id.*, ¶[0022].) Heat is then conductively transferred to (i) the fins 28a inside duct 28 and (ii) cooling fins 17a and 17b attached to the outer surface of inner housing 17. (*Id.*, ¶[0023].) Heat is radiated from the fins to the space between the inner housing 17 and outer housing 16 before being discharged through air exhaust 19a by convection. (*Id.*, ¶[0023]; Ex. 1002, ¶99.)

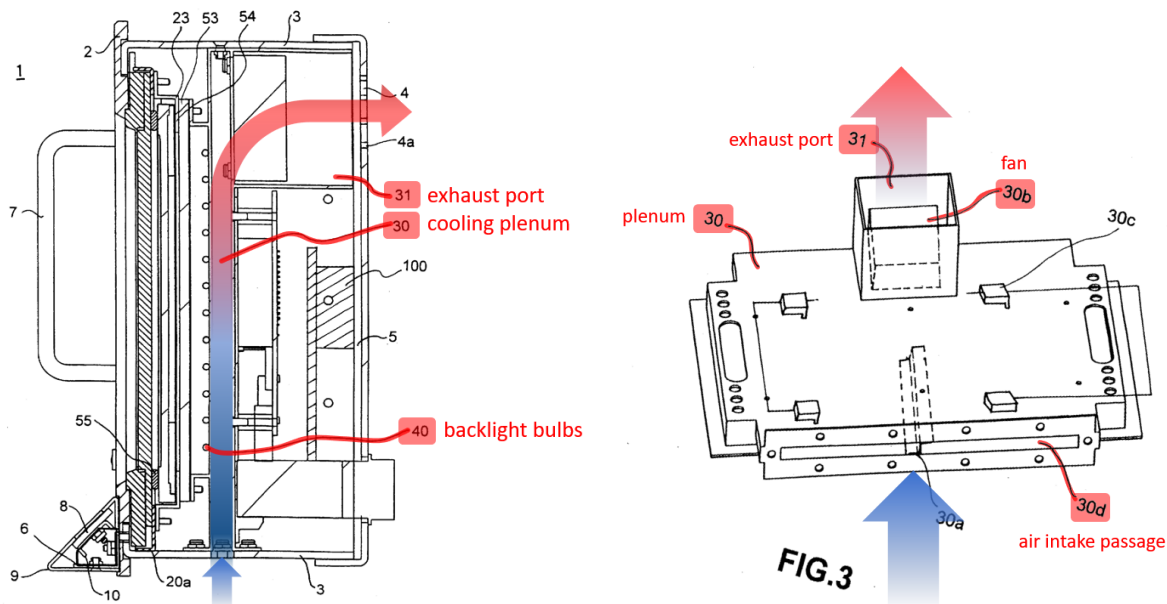


(Ex. 1017, Figs. 4, 5 (annotated).)

G. Harris

U.S. Patent No. 5,748,269 (“Harris”) (Ex. 1018), entitled “Environmentally-Sealed, Convectively-Cooled Active Matrix Liquid Crystal Display,” issued on May 5, 1998. Harris is prior art pursuant to at least pre-AIA 35 U.S.C. § 102(b).

Harris discloses a housing used to “permanently mount[]” a liquid crystal display that includes a “backlighting unit” and a “cooling plenum [] for conductively and convectively cooling the backlighting unit which is mounted directly to a surface of the plenum.” (Ex. 1018, 2:8-26.) Cooling of the backlight is achieved because the plenum **30** “includes a hollow channel” for ambient air flow generated by a fan. (*Id.*, 5:18-23.) “[A]ir enters the plenum **30** through the intake passage/ orifice **30d** along the bottom of the display enclosure **3**, and exits at the air exhaust port **31** of the top of the rear cover **4**.” (*Id.*, 6:26-31.)



(Ex. 1018, Fig. 1, 3 (annotated).)

VIII. GROUND 1 – CLAIMS 12-23 ARE OBVIOUS OVER KARPPANEN

A. Claim 12

Karppanen renders obvious claim 12. (Ex. 1002, ¶¶102-124).

1. 12[pre]

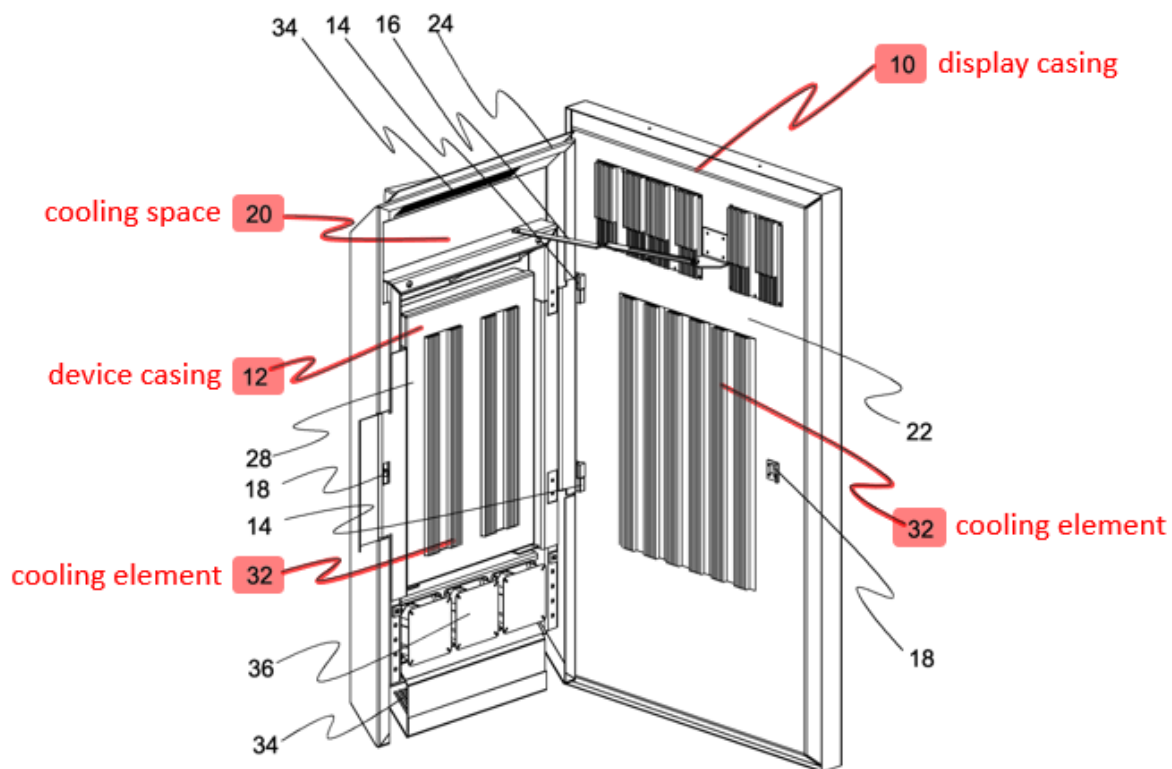
~~12[pre]~~	~~An electronic display assembly comprising:~~
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To the extent the preamble is limiting, Karppanen discloses this limitation. Karppanen’s system includes a display element **26** (e.g., a flat screen LCD display) (Ex. 1006, Abstract, 6:21-24, 8:8-11) which is an “electronic display assembly” (Ex. 1002, ¶104).

2. 12[a]

~~12[a]~~	~~a housing;~~
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Karppanen discloses or renders this limitation obvious. Karppanen teaches “an electronic information board” that includes weatherproof display and device casings (**10** and **12**, respectively). (Ex. 1006, Abstract.) The fully assembled (e.g., closed) housing containing both casings satisfies this limitation. (Ex. 1002, ¶108.)



(Ex. 1006, Fig. 1 (annotated).)

3. 12[b]

12[b]	~~a liquid crystal display (LCD) positioned within the housing and having a backlight;~~
-------	---

Karppanen discloses or renders this limitation obvious. The “electronic information display” in Karppanen can be “a flat display element (26), such as a TFT LCD display or plasma display.” (Ex. 1006, Abstract.) Display element 26 is positioned within the housing. (*Id.*, Fig. 2.)

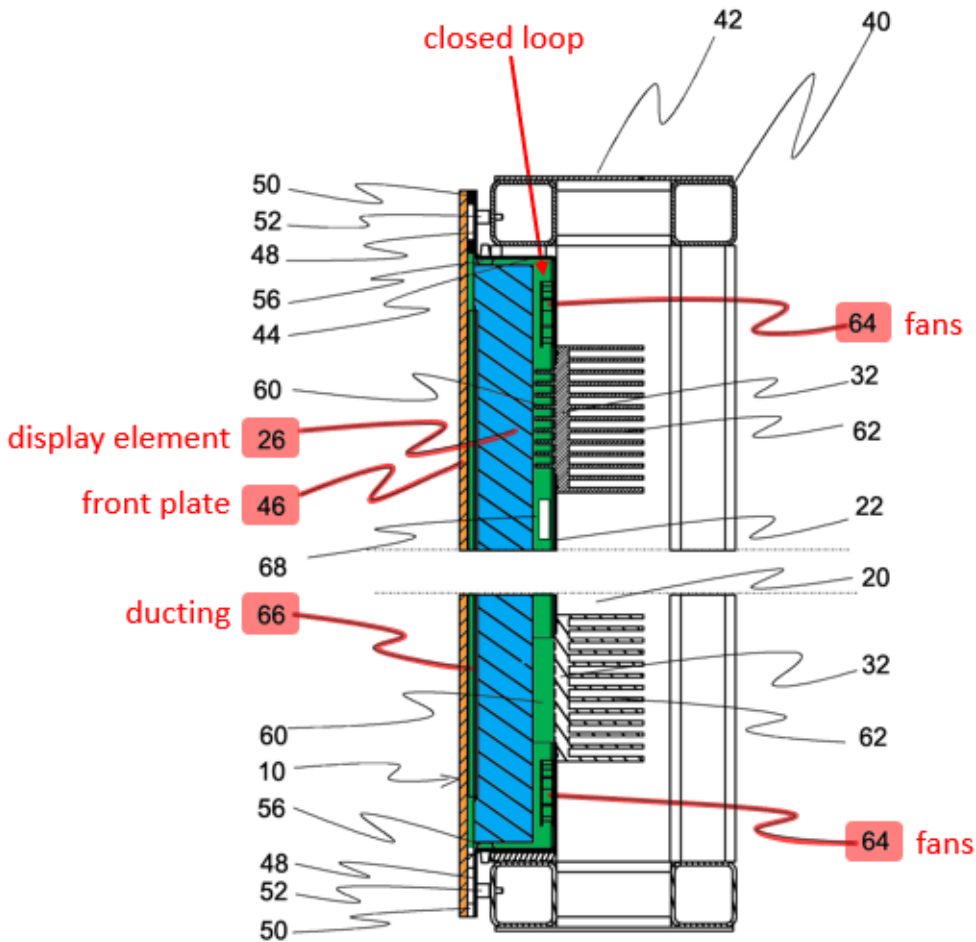
The LCD display embodiment in Karppanen discloses or suggests use of a backlight. For example, Karppanen states that device casing **12** contains “electronic equipment needed in the control of the display element” including “the power supplies of the background light of the display.” (Ex. 1006, 6:21-26, claim 5, Fig. 1.) A POSITA would understand “background light” to refer to a backlight in LCD display **26** because a plasma display does not require any “background light.” (Ex. 1002, ¶112.) Moreover, the display casing includes “cooling elements **32** [e.g., heat sinks] which have a first heat transfer part **60** extending to the inside of the display casing.” (Ex. 1006, 8:13-14.) Karppanen discloses that the first heat transfer part **60** touches both “the heat source” (*id.*, 8:29-32) and “the rear surface of the LCD display” (*id.*, Fig. 2.). A POSITA would understand that, in each case, the LCD backlight is being referenced and, therefore, that Figure 2 depicts an LCD display with a backlight. (Ex. 1002, ¶114.) Moreover, a POSITA would understand that an LCD display necessarily includes a backlight because, an LCD stack, alone lacks any light source. (*Id.*)

4. 12[c]

12[c]	~~wherein the electronic display is coolable by a combination of a closed loop of isolated gas which circulates within the housing and an open loop of ambient air which passes through the housing and along the backlight.~~
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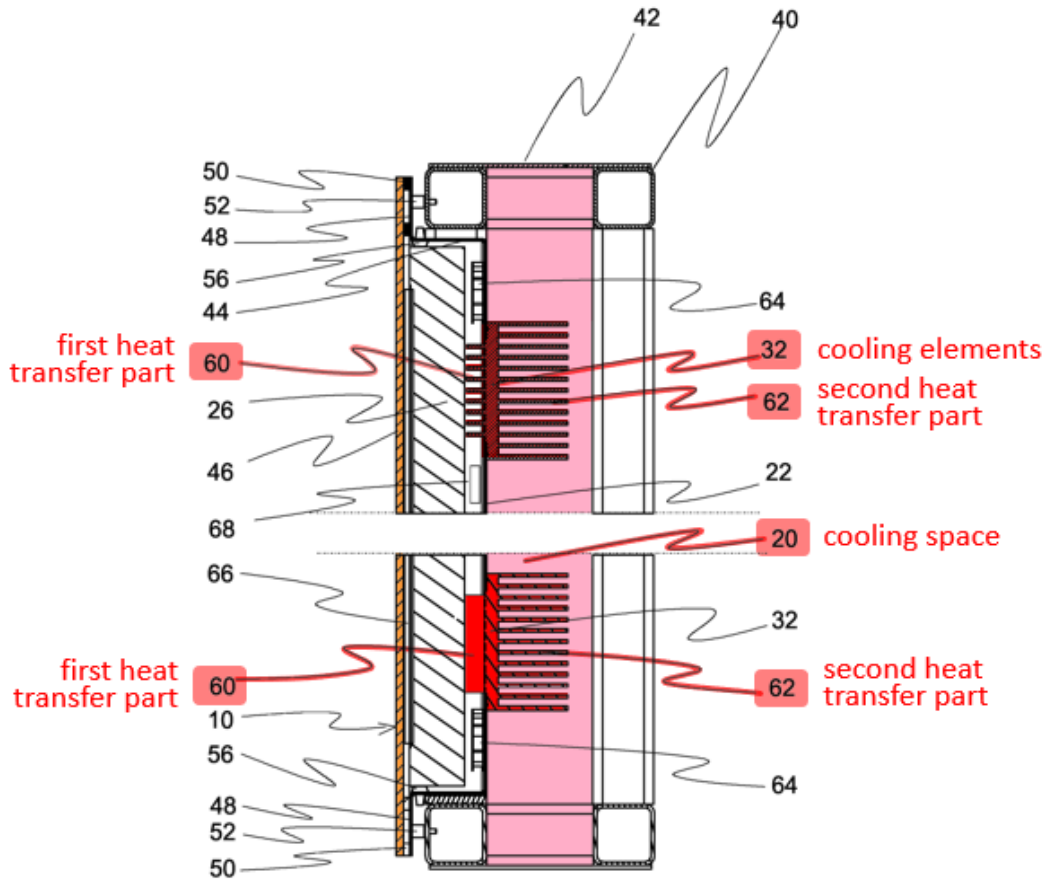
Karppanen discloses or renders this limitation obvious. (*Id.*, ¶116-124.)

The electronic display in Karppanen is placed into a sealed casing. (Exs. 1006, 7:27-38 (discussing components which create a “closed display casing”); 1002, ¶118.) The display is encircled by a closed loop of isolated gas which circulates within the housing. (Ex. 1006, 9:3-8.) “Inside the display casing on the back wall **22** there are fans **64**, which circulate air in the space between the display element [**26**] and the walls of the display casing.” (*Id.*) As shown below, a front plate **46** and ducting **66** create a gap through which air is permitted to pass along the front side of the display (e.g., one half of the closed loop). (*Id.*) The ducting **66** “direct[s] the circulation of air around the display element [**26**].” (*Id.*, 4:32-36.)



(*Id.*, Fig. 2 (annotated).) This closed loop of air “transfer[s] heat from the display casing to the outside of the display casing.” (*Id.*, 3:28-32.) Karppanen thus teaches a closed loop that is capable of cooling the electronic display.

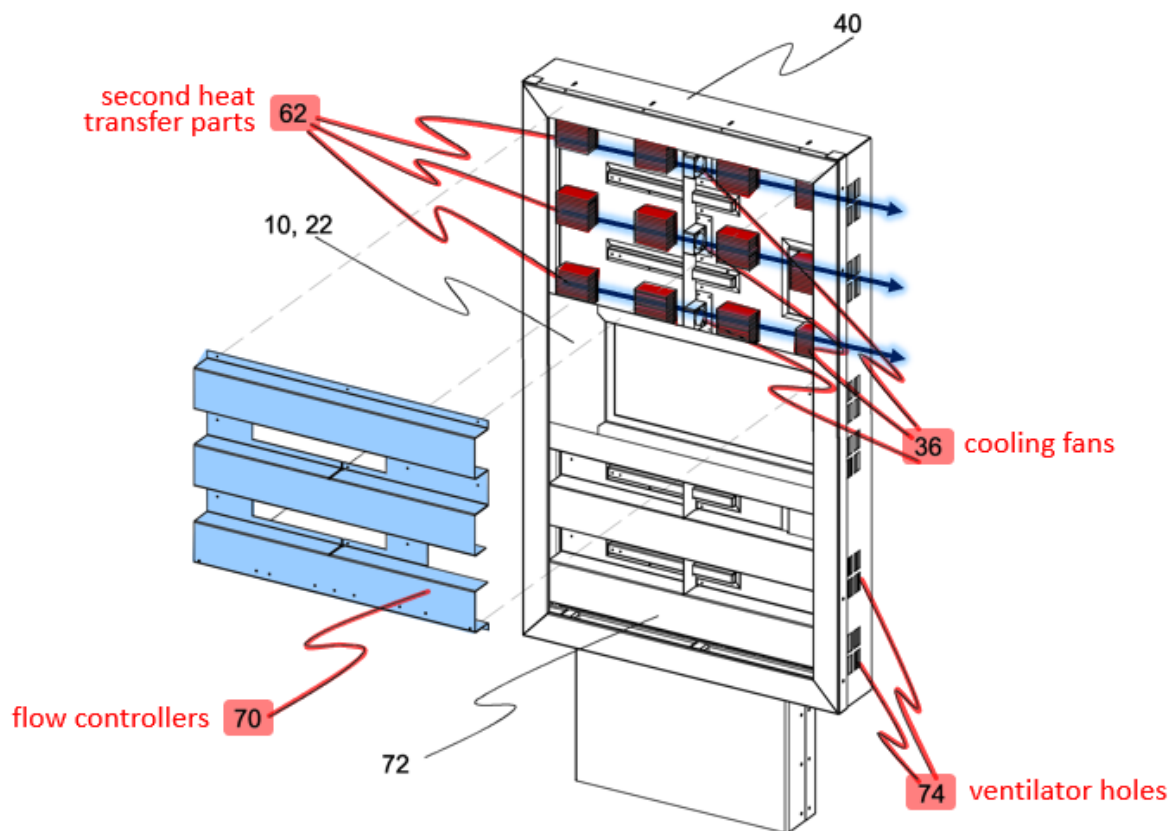
Karppanen also teaches an open loop of ambient air which passes through the housing and along the backlight. Specifically, Karppanen discloses a “cooling space 20” located behind the electronic display as shown below:



(*Id.*, Fig. 2 (annotated).) The closed loop in Karppanen is thermally connected to cooling space **20** through “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.” (*Id.*, 8:13-16.) Heat is transferred from the display to the first heat transfer part **60** (which touches the display inside the closed loop) and then to a second heat transfer part **62** which is in the open loop of ambient air. (*Id.*, 8:16-22 (“The task of the cooling elements is to transfer excess thermal energy from the display casing to the cooling space, from

which it is further conducted by the air flow produced by the cooling fans **36** out from the entire device.”.)

“[F]low controllers **70** made of a shaped metal sheet have been fastened to the back wall **22** of the display casing **10**” to create “horizontal flow ducts **72**, inside which the second heat transfer parts **62** of the cooling elements **32** and the cooling fans **36** fastened to the back wall are placed.” “[V]entilator holes **74** [] enable the air flow produced by the cooling fans to pass along the flow duct through the cooling space **20**.”



(*Id.*, Fig. 3 (annotated).)⁺⁺¹⁰ Because heat is transferred from the LCD to the first heat transfer part **60** which touches the rear surface of the LCD display (*id.*, 8:13-16, 8:29-32), and then from the first heat transfer part **60** to the second heat transfer part **62**, the electronic display is capable of being cooled by the open loop of ambient air which passes through the housing. (*Id.*, 8:13-16, 8:29-36; Ex. 1002, ¶122.)

Finally, Karppanen teaches an open loop of ambient air which passes through the housing and along a backlight. As noted above, Karppanen discloses or at least suggests a backlight for the LCD display. (*Supra*, §VIII.A.3.) The horizontal flow of ambient air in the cooling space **20** is through the housing and, as noted above, the ambient airflow is in thermal communication with the backlight. (Ex. 1002, ¶123)

B. Claim 13

13	~~The electronic display assembly of claim 12 wherein: the isolated gas will cool a front surface of the LCD.~~
----	--

⁺⁺¹⁰ While the configurations in Figure 3 and Figure 1 differ slightly, Karppanen discloses, and a POSITA would understand, that the cooling systems discussed herein can be used in any configuration or embodiment. (Ex. 1006, 3:21-34, 11:17-27; Ex. 1002, ¶121.)

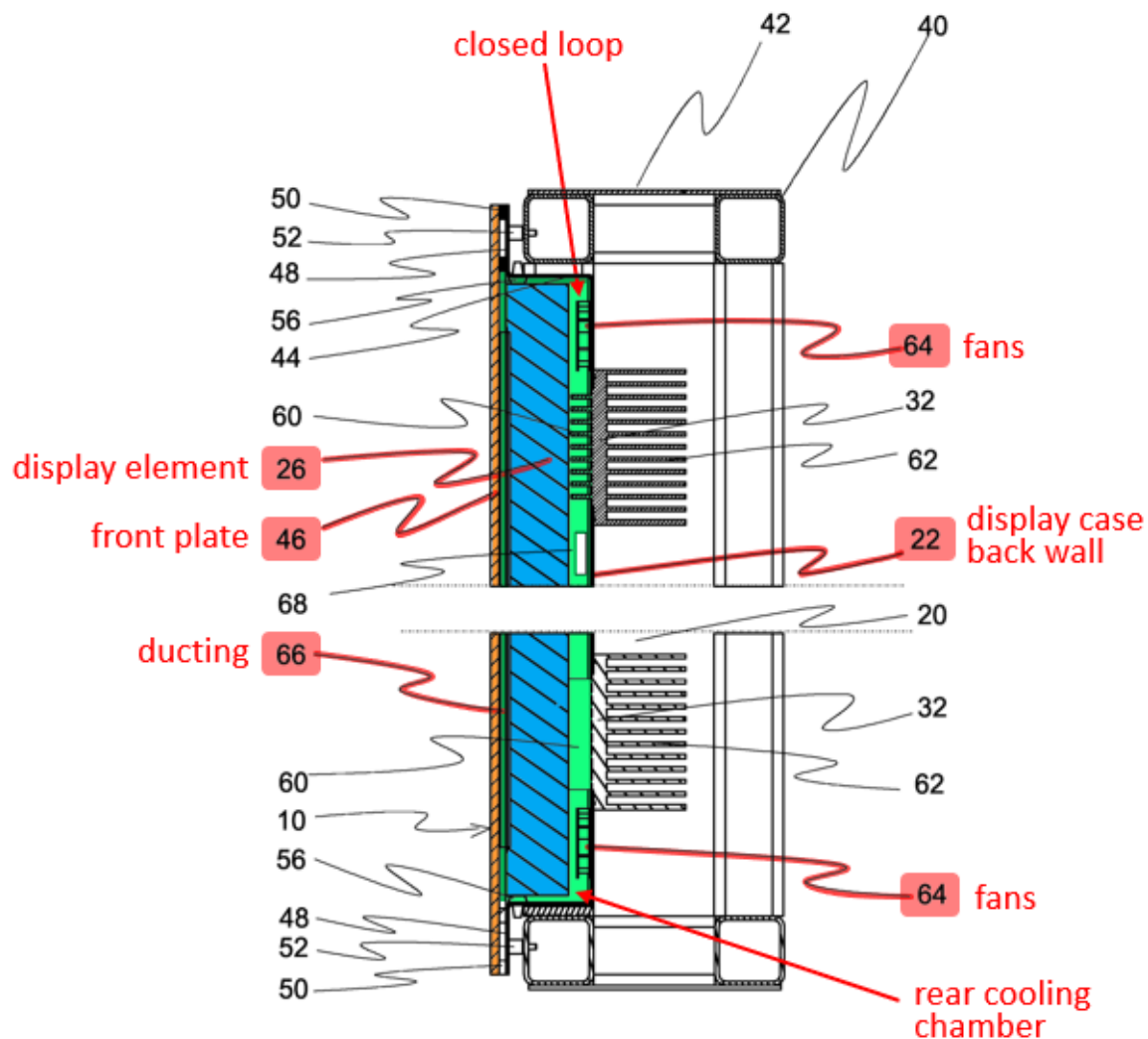
Karppanen discloses or renders this limitation obvious. (*Id.*, ¶¶125-127.) As noted above (*supra* §VIII.A.4), the closed loop of isolated gas which circulates within the housing in Karppanen cools a front surface of the LCD. (Ex. 1006, 9:7-8 (“The fans **64** force the air of the inner casing to flow past the front plate **46** of the device.”).)

C. Claim 14

1. 14[a]

~~14[a]~~	~~The electronic display assembly of claim 12 further comprising: a rear cooling chamber positioned behind the LCD and containing the closed loop of isolated gas;~~
------------------	---

Karppanen discloses or renders this limitation obvious. (Ex. 1002, ¶¶129-131.) As shown in Figure 2, the closed loop includes a first gas chamber located between the front surface of the electronic display **26** and the front plate **46** and a rear cooling chamber located between the rear surface of the electronic display **26** and the display case back wall **22**. (*Id.*, ¶130.)



(Ex. 1006, Fig. 2 (annotated).)

2. 14[b]

14[b]	~~and wherein the open loop ambient air will contact an exterior surface of the chamber, but is not permitted to enter the chamber.~~
-------	--

Karppanen discloses or renders this limitation obvious. (Ex. 1002, ¶¶132-134.) As noted above, Karppanen teaches an open loop of ambient air which passes through “cooling space 20” located behind the electronic display. (*Supra*,

§VIII.A.4.) That open loop ambient air contacts an exterior surface of the rear cooling chamber (e.g., exterior surface of display case back wall **22**). (Ex. 1002, ¶133.)

D. Claim 15

15	~~The electronic display assembly of claim 12 further comprising: one or more electronic components for driving the LCD positioned within the rear cooling chamber.~~
-----------	--

Karppanen teaches or suggests including an electronic component for driving the LCD in the rear cooling chamber. (*Id.*, ¶¶135-137.) For example, Karppanen teaches or suggests an LCD containing a backlight. (*Supra* §VIII.A.3.) A POSITA would understand that a driver or other electrical component like cabling for display element **26** is necessary and that the most obvious and conventional location to place such components in Karppanen is on the rear surface of the display element **26** for at least two reasons. (Ex. 1002, ¶136.) First, as shown above, there is minimal space in the ducting on the front and side surfaces of the display in which the driver or cabling can be placed. (Ex. 1006, Fig. 2.) Second, placing a backlight driver or cabling on the front surface would impede the ability to view the images being displayed. (Ex. 1002, ¶136.) Indeed, Karppanen discloses “the device casing contains at least the control unit of the information board, the power supply of the control unit and the power supply of the background light of the display.” (Ex. 1006,

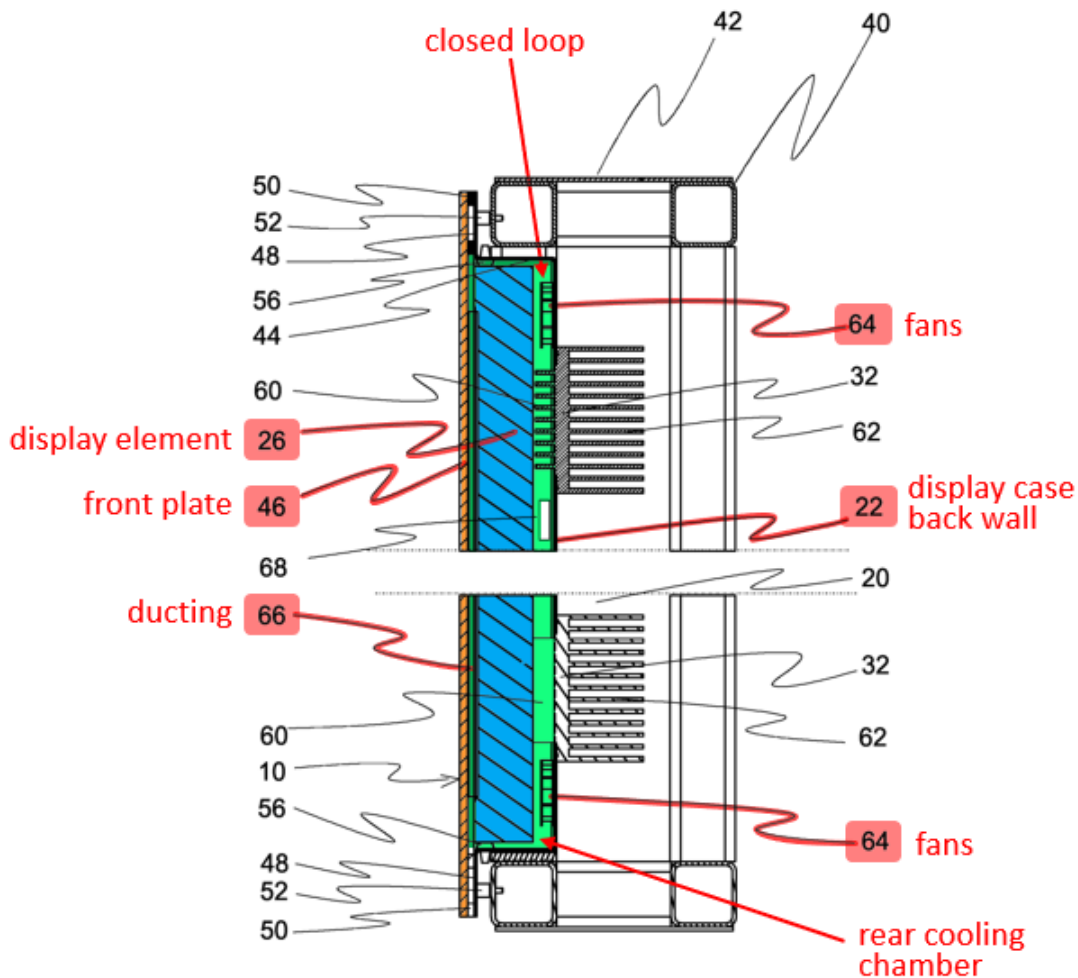
3:32-34.) A POSITA would understand this disclosure to imply that the driver for the backlight is located in the display casing. (Ex. 1002, ¶136.)

A driver located on the rear surface of the display element **26** would be in rear cooling chamber. (*Id.*) Karppanen thus discloses this element.

E. Claim 16

16	~~The electronic display assembly of claim 12 wherein: the open loop of ambient air will contact an exterior surface of the rear cooling chamber while the closed loop of isolated gas will contact an interior surface of the rear cooling chamber.~~
----	---

Karppanen discloses or renders this limitation obvious. (*Id.*, ¶¶138-140.) As noted above, the open loop of ambient air in Karppanen contacts an exterior surface of the rear cooling chamber (*supra*, §VIII.C.2.) and the rear cooling chamber contains the closed loop of isolated gas (*supra*, §VIII.C.1).



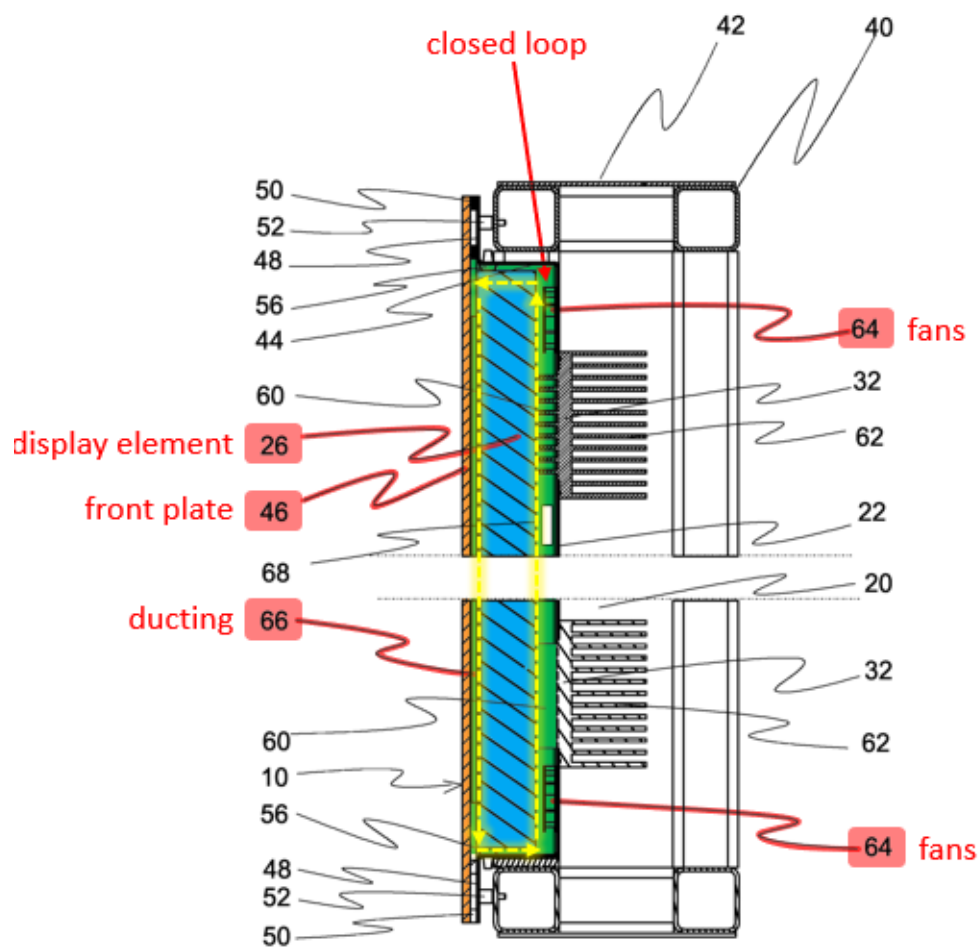
(*Id.*, Fig. 2 (annotated).) The closed loop of isolated gas contacts the interior surface of the rear cooling chamber (e.g., interior surface of display case back wall **22**). (Ex. 1002, ¶139.)

F. Claim 17

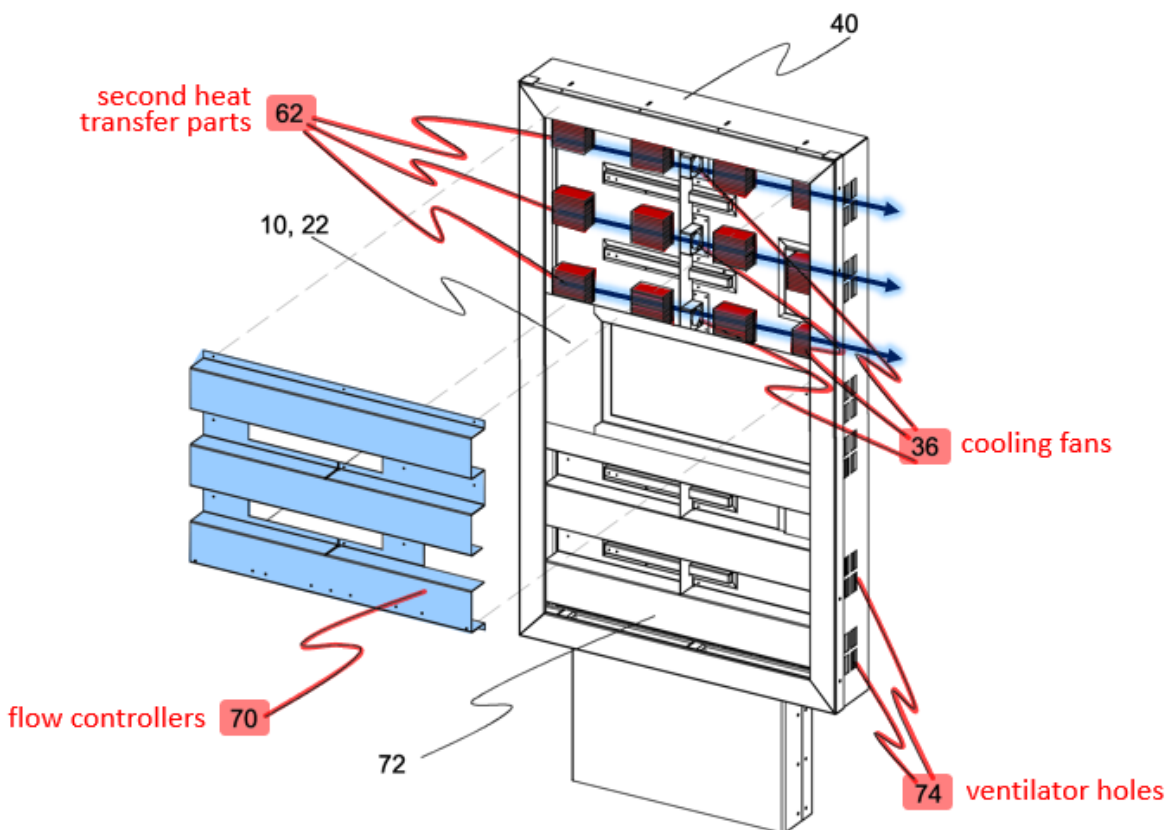
17	The electronic display assembly of claim 12 wherein: the intended direction of closed loop isolated gas flow is substantially perpendicular to the intended direction of open loop of ambient air flow.
----	---

Karppanen discloses or renders this limitation obvious. (*Id.*, ¶¶141-143.) As shown in annotated Figures 2 and 3 below, the closed loop isolated gas flow in Karppanen flows predominantly in a vertical direction along the front and back surfaces of display element **26**. (*See* Ex. 1006, 4:32-36.) Meanwhile, the open loop of ambient air flows in a horizontal direction along “horizontal flow ducts **72**” through ventilator holes **74** located on each side of the electronic information board. (*Id.*, 4:19-22, 11:1:4.) The intended direction of closed loop isolated gas flow is thus substantially perpendicular to the intended direction of open loop ambient air flow. ⁺²¹¹11 (Ex. 1002. ¶143.)

⁺²¹¹11 While the open loop “flow ducts” in Karppanen have been depicted “in a horizontal position,” “it is also possible to form flow ducts ... in a vertical or oblique position.” (*Id.*, 11:13-15.)



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



(Ex. 1006, Fig. 3 (annotated).)

G. Claim 18

Karppanen renders obvious claim 18. (Ex. 1002, ¶¶144-162).

1. 18 ``` [pre] ```

~~18<pre>[pre]</pre>~~	~~An electronic display assembly comprising:~~
-------------------------------	---

To the extent the preamble is limiting, Karppanen discloses this limitation.

(See *supra*, §VIII.A.1; Ex. 1002, ¶145.)

2. 18[a]

18[a]	~~a housing;~~
-------	-----------------------

Karppanen discloses or renders this limitation obvious. (*See supra*, §VIII.A.2, Ex. 1002, ¶147.)

3. 18[b]

18[b]	~~an electronic display positioned within the housing;~~
-------	---

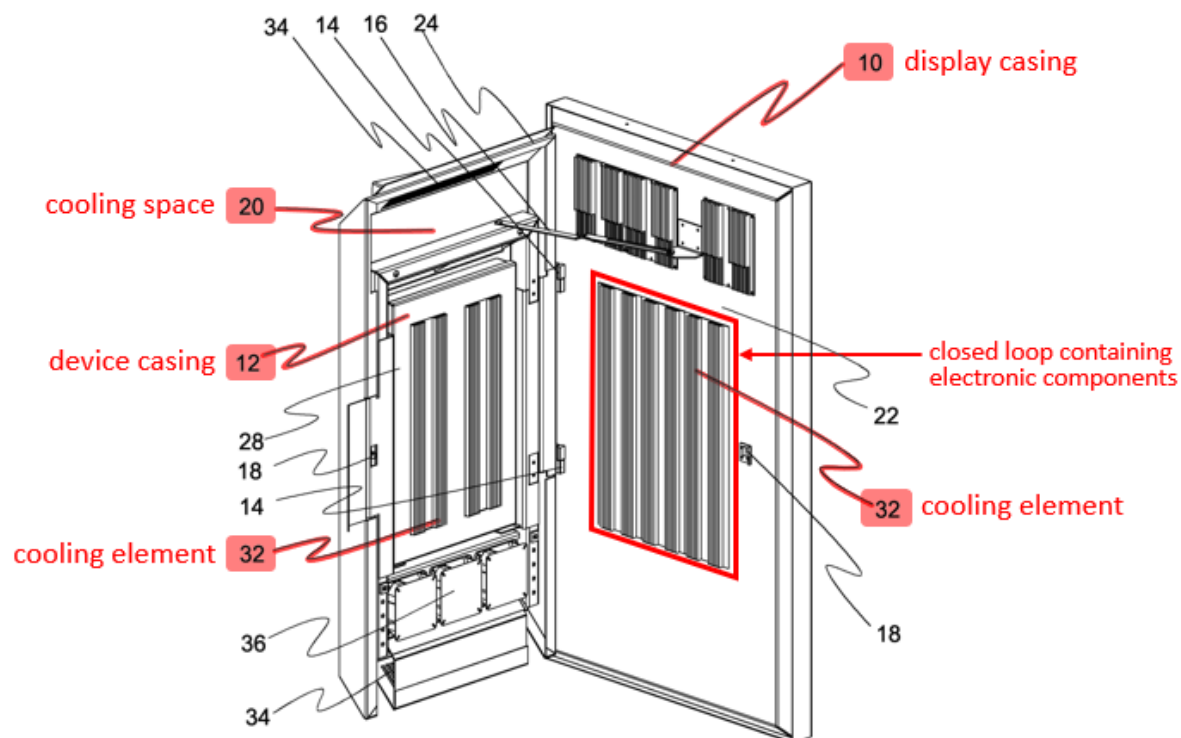
Karppanen discloses or renders this limitation obvious. Karppanen discloses “a flat display element **26**” which can be an LCD, located within a housing. (*See supra*, §VIII.A.3, Ex. 1002, ¶150.)

4. 18[c]

18[c]	~~a rear cooling chamber positioned behind the electronic display and containing an electrical component which is electrically connected to the electronic display;~~
-------	--

Karppanen discloses or renders obvious this limitation in two ways. First, there is a rear cooling chamber located between the rear surface of the electronic display **26** and the display case back wall **22**. (*See supra*, §VIII.C.1.) It would have been obvious to place an electrical component that is electrically connected to the electronic display in the closed loop in order to cool it. (Ex. 1002, ¶153; *supra*, §VIII.D.)

Second, the device casing **12** contains “electronic equipment needed in the control of the display element **[26]**” such as “a programmable control unit ... for controlling the display, and the power supplies of the background light.” (Ex. 1006, 6:24-26.) These components are electrically connected to the display. (Ex. 1002, ¶154.) And as shown in Figure 1, the device casing **12** is positioned behind the electronic display. (Ex. 1006, Fig. 1.) The device case includes its own cooling elements **32** and fans **36** which cool components located therein. (*Id.*, 7:7-22; Ex. 1002, ¶155.) A POSITA would understand that the device case in Karppanen presents a second rear cooling chamber behind the display.



(Ex. 1006, Fig. 1 (annotated).)

5. 18[d]

18[d]	~~a front surface on the electronic display which faces an intended viewer and a rear surface on the electronic display which opposes the front surface;~~
-------	---

Karppanen discloses or renders this limitation obvious. Karppanen discloses a display element **26** having a front surface and a rear surface. (Ex. 1006, Fig. 2.) On the front surface of the display is a “transparent front plate” that “is preferably made of shock-resistant glass.” (*Id.*, 4:25-27.) A POSITA would understand that the front surface of the display in Karppanen faces an intended viewer. (Ex. 1002, ¶158.)

6. 18[e]

18[e]	~~wherein the front surface of the electronic display is coolable by a closed loop of isolated gas and the rear surface of the electronic display is coolable by an open loop of ambient air.~~
-------	--

Karppanen discloses or renders this limitation obvious. (Ex. 1002, ¶¶160-162, *supra*, §§VIII.A.4, VIII.B, VIII.C.)

H. Claim 19

19	~~The electronic display assembly of claim 18 wherein: the open loop of ambient air is prohibited from mixing with the closed loop of isolated gas when it passes through the housing.~~
----	---

Karppanen discloses or renders this limitation obvious. (Ex. 1002, ¶¶163-165; *supra*, §§VIII.A.4, VIII.C.2.)

I. Claim 20

20	~~The electronic display assembly of claim 18 wherein: the open loop of ambient air will pass between the rear surface of the electronic display and an exterior surface of the rear cooling chamber.~~
----	--

Karppanen discloses or renders this limitation obvious. (Ex. 1002, ¶¶166-168) As noted above, Karppanen discloses a rear cooling chamber located in device casing **12**. (*Supra* §VIII.G.4.) The open loop of ambient air in Karppanen passes between the rear surface of the electronic display and an exterior surface of the rear cooling chamber located in device casing **12** (e.g., the space separating rear surface of the electronic display and the rear cooling chamber). (Ex. 1002, ¶167.) Alternatively, to the extent that MRI argues that the ambient air must contact the display to satisfy this limitation, it is nonetheless disclosed in Karppanen by the first and second heat transfer parts (**60** and **62**) attached to the electronic display (*supra*, §VIII.A.4) and the open loop passes through cooling space **20** and contacts the second heat transfer part **62**. (Ex. 1002, ¶161.)

J. Independent Claim 21

Karppanen renders obvious claim 21. (Ex. 1002, ¶¶169-189.)

1. 21[pre]

21[pre]	~~An electronic display assembly comprising:~~
---------	---

To the extent the preamble is limiting, Karppanen discloses this limitation.

(*Supra*, §VIII.A.1; Ex. 1002, ¶170.)

2. 21[a]

21[a]	~~an electronic display housing:~~
-------	---

Karppanen discloses or renders this limitation obvious. As noted above, Karppanen discloses an electronic display housing. (*Supra*, §§VIII.A.2, VIII.A.3; Ex. 1002, ¶¶172-174.)

3. 21[b]

21[b]	~~a closed loop of cooling gas adapted for circulation within the electronic display housing:~~
-------	--

Karppanen discloses or renders this limitation obvious. (Ex. 1002, ¶¶175-178.) In addition to the closed loop that surrounds the electronic display discussed above (*supra*, §VIII.A.4), Karppanen also teaches that a closed loop of air can be used to surround the electrical components located in the device casing. (Ex. 1006, 10:20-22.) Like the display casing, the device casing is also “closed.” (*Id.*, 6:20-21.) By using the same cooling systems in both the display casing **10** and device casing **12**, the cooling “air flow circulates as forced past all the components

becoming warmed.” (*Id.*, 10:22-23.) This closed loop of cooling gas in the device casing **12** is adapted for circulation within the electronic display housing. (Ex. 1002, ¶177.)

4. 21[c]

21[e]	~~an open loop ambient air pathway through the electronic display housing; and~~
-------	---

Karppanen discloses or renders this limitation obvious. (*See supra*, §VIII.A.4, Ex. 1002, ¶¶179-181.)

5. 21[d]

21[d]	~~an electronic display positioned within the electronic display housing such that the electronic display is isolated from the closed loop of cooling gas but contactable by ambient air flowing through the open loop ambient air pathway;~~
-------	--

Karppanen discloses or renders this limitation obvious. (Ex. 1002, ¶¶182-186.) As noted above in element 21[b], the relevant closed loop of cooling gas is located in the device casing **12**. Display element **26** is located in display case **10**. Karppanen thus teaches an electronic display positioned in the electric display housing that is isolated from the closed loop of cooling gas. (Ex. 1002, ¶183.)

The electronic display is meanwhile contactable by ambient air flowing through the open loop ambient air pathway. As noted above, an open loop of air

passes through cooling space **20**. (*Supra*, §VIII.A.4.) Ambient air passes along “plate-like cooling fins” on cooling elements **32**. (Ex. 1006, 8:16-17.) “[W]hen the cooling air flows between the fins, heat is transferred from the cooling fins to the air of the cooling space.” (*Id.*, 8:18-19.) Karppanen teaches that the cooling element is “[p]referably” “fastened to ... the surface of the display element.” (*Id.*, 8:32-36.) As a result, the cooling element **32** is part of the electronic display. (Ex. 1002, ¶185.) Karppanen thus teaches an electronic display that is contactable by ambient air flowing through the open loop ambient air pathway. (*Id.*)

6. 21[e]

21[e]	~~wherein the electronic display is coolable by a combination of closed loop cooling gas circulation within the electronic display housing, and ambient air flow through the open loop ambient air pathway in the electronic display housing.~~
-------	--

Karppanen discloses or renders this limitation obvious. (*Id.*, ¶¶187-189.) As noted above, Karppanen discloses two different closed loop airflow pathways. (*Supra*, §§VIII.A.4, VIII.A.3.) This limitation is disclosed by the closed loop which surrounds the display element **26** and the ambient air flowing through cooling space **20**. (Ex. 1002, ¶188.)

K. Claim 22

1. 22[a]

22[a]	~~The electronic display assembly of claim 21 wherein: the closed loop of cooling gas is isolated within a continuous loop gas cooling chamber, and~~
-------	--

Karppanen discloses or renders this limitation obvious. This limitation is satisfied by the closed loop that surrounds the electronic display. (*Supra*, §VIII.A.4, Ex. 1002, ¶¶191-193.)

2. 22[b]

22[b]	~~the open loop ambient air pathway is configured to direct the ambient air over an exterior surface of the gas cooling chamber when it flows through the electronic display housing.~~
-------	--

Karppanen discloses or renders this limitation obvious. As noted above, the open loop ambient air passes over an exterior surface of display case **10**; specifically, display case back wall **22**. (*Supra*, §VIII.C.2, Ex. 1002, ¶¶194-196.)

L. Claim 23

1. 23[a]

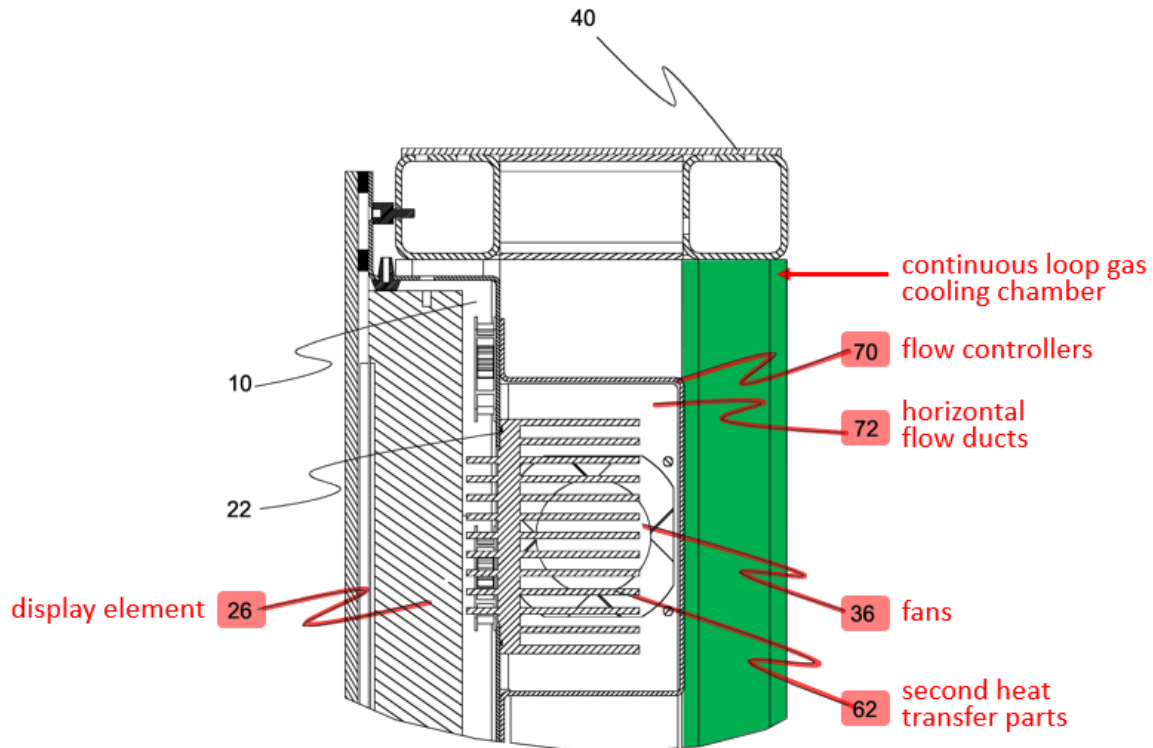
23[a]	~~The electronic display assembly of claim 22 further comprising: a fan located within the electronic display housing,~~
-------	---

Karppanen discloses or renders this limitation obvious. This limitation is satisfied by the fan **36** which generates the open loop air flowing through cooling space **20**. (*Supra*, §§VIII.A.4, Ex. 1002, ¶¶198-200.)

2. 23[b]

23[b]	~~the fan configured and oriented to move air located within the housing between a surface of the continuous loop gas cooling chamber and a rear surface of the electronic display~~
-------	---

Karppanen discloses or renders this limitation obvious. Specifically, as shown in Figure 4, open loop fans **36** move air located within the housing in the cooling space **20** between the external surface of the closed loop in device case **12** and the cooling elements attached to the electric display. (*Supra*, §VIII.J.5, Ex. 1002, ¶¶201-203.)



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

IX. GROUND 2 – CLAIMS 1, 4-5, 8-12, 14-17 AND 21-23 ARE OBVIOUS OVER NAGASHIMA AND KARPPANEN

A. Independent Claim 1

Nagashima in combination with Karppanen renders obvious claim 1.

**1. Element 1

```
[pre]
```**

| | |
|-------------------|---|
| <pre>1[pre]</pre> | ~~An electronic display assembly comprising:~~ |
|-------------------|---|

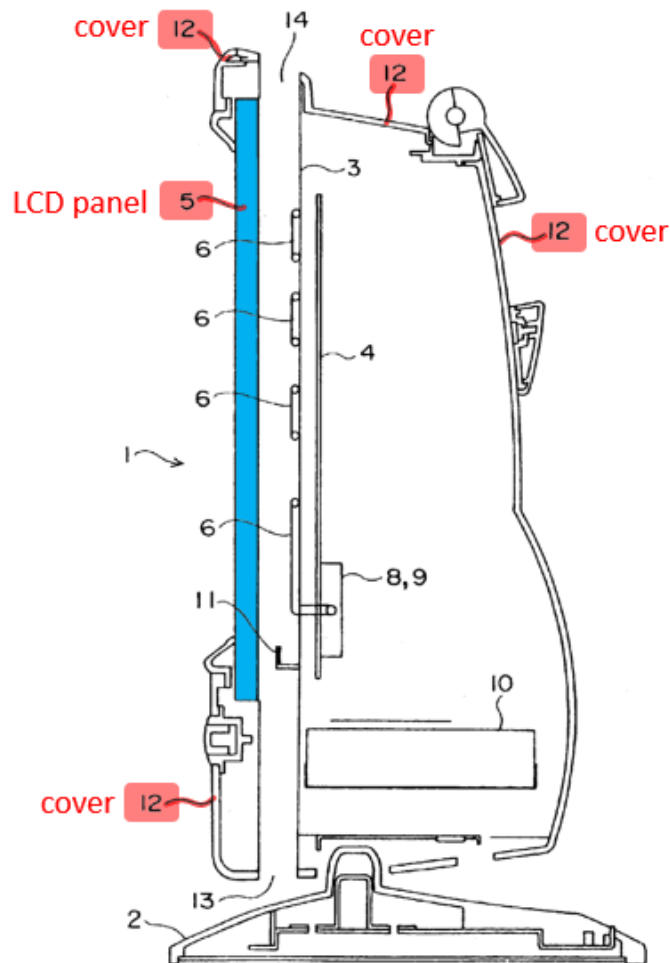
To the extent the preamble is limiting, Nagashima in combination with Karppanen discloses this limitation. Nagashima discloses “a cooling technology”

applied to “a desk-top type computer with an LCD unit” (Ex. 1007, 2:18-22.) which is an “electronic display assembly” (Ex. 1002, ¶¶206-207).

2. Element 1[a]

| | |
|------|---|
| 1[a] | ~~An electronic display housing;~~ |
|------|---|

Nagashima in combination with Karppanen renders this limitation obvious. As shown in Figure 1, Nagashima discloses an LCD panel **5**. (Ex. 1007, 5:14-18.) Cover **12** “cover[s] the whole of the computer body **1**.” (*Id.*, 5:13-14) Cover **12** thus constitutes an electronic display housing. (Ex. 1002, ¶¶209-210.)



(Ex. 1007, Fig. 1 (annotated).)

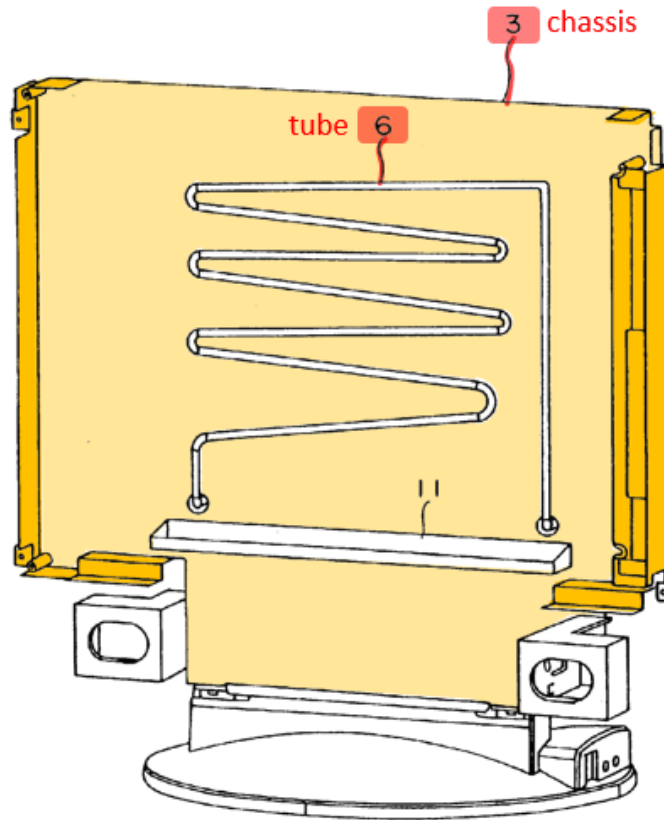
3. Element 1[b]

| | |
|------|--|
| 1[b] | ~~a gas-containing closed loop gas cooling chamber located within the electronic display housing;~~ |
|------|--|

Nagashima in combination with Karppanen renders this limitation obvious.

(Ex. 1002, ¶¶212-219.) Main chassis 3 and cover 12 create a closed loop gas cooling

chamber within the housing. (Ex. 1007, Fig. 1.) Both main chassis **3** and cover **12** are sealed. Nagashima discloses that main chassis **3** can be a unitary body.



(Ex. 1007, Fig. 2 (annotated).) To the extent that the main chassis **3** includes any openings, it would have been obvious to seal any open holes to prevent dust and dirt in the ambient air from entering the rear cooling chamber which contains critical electrical components. (Exs. 1007, 6:11-16; 1002, ¶214.)

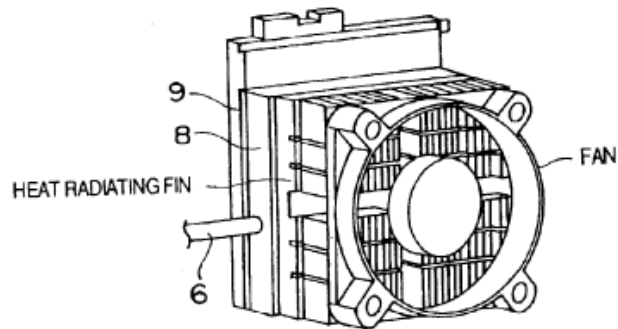
For example, as noted in Ground 1, Karppanen discloses a device casing **12** containing electronic equipment including “the control unit of the information board, the power supply of the control unit and the power supply of the background light.”

(Ex. 1006, 3:32-34.) The device casing **12** may contain a closed loop of air that “circulates as forced past all the components being warmed” during ordinary operation. (*Id.*, 10:20-24.) The device casing **12** is “closed” (*Id.*, 6:20-21) and “weatherproof.” (*Id.*, 4:6-8.) In view of these disclosures, a POSITA would understand that Karppanen discloses a rear cooling chamber containing electronic components that are being cooled by a closed loop of air. (Ex. 1002, ¶216.)

Likewise, cover **12** in Nagashima can be a unitary body with no openings that allow external air to enter. For example, the embodiment disclosed in Figure 13 in Nagashima shows a cover containing no apparent openings. (Exs. 1007, Fig. 13; 1002, ¶217.) If such openings exist, it would have been obvious to combine the teaching in Karppanen to place electronic components in a closed loop cooling system to the display in Nagashima. (*Infra*, §IX.Q.)

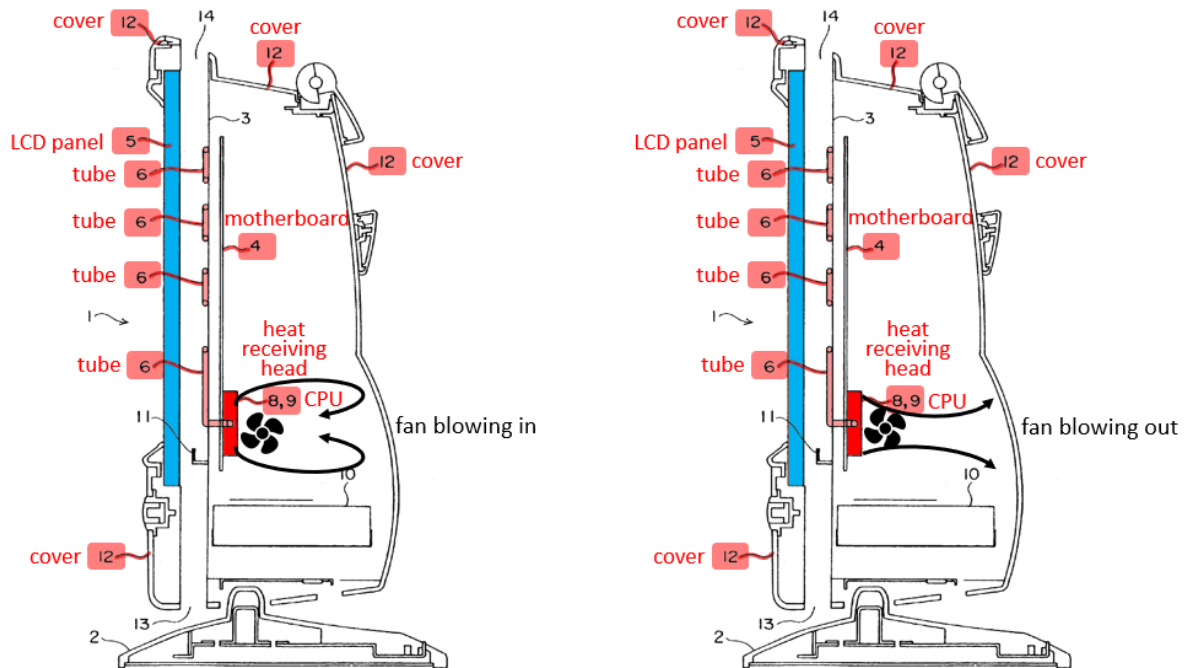
As shown in Figure 1, the “heat receiving head **8**” in Nagashima is located within the rear chamber of electronic display housing. (Ex. 1007, Fig. 1.) A fan may be provided “on the heat radiating fin on the heat receiving head.” (*Id.*, 7:16-17, Fig. 6B.) The fan displaces heat from the heat radiating fin. (*Id.*, 7:18-19.)

FIG. 6B



(*Id.*, Fig. 6B.)

Air flow generated by the fan on the heat receiving head circulates within the chamber created by the cover **12** and rear surface of the chassis **3**. (*Id.*, Fig. 1.) While Nagashima does not disclose the direction in which air flows from the fan on heat receiving head **8**, air is circulated between motherboard **4** and cover **12** regardless of the direction of air flow as shown below.



(Id., Fig. 1 (annotated).)

Patent owner alleges in pending litigation that a cooling fan used to cool microelectronic components in a closed environment creates a closed loop gas cooling chamber. (Ex. 1008, p.8 (alleging that fan directing air to circuit board creates closed loop).) Consistent with Patent owner’s allegations, Nagashima thus discloses a gas-containing closed loop gas cooling chamber located within the electronic display housing. (Ex. 1002, ¶215.)

4. Element 1[c]

| | |
|------|---|
| 1[c] | ~~an electronic display positioned within the electronic display housing but outside of the closed loop gas cooling chamber, and~~ |
|------|---|

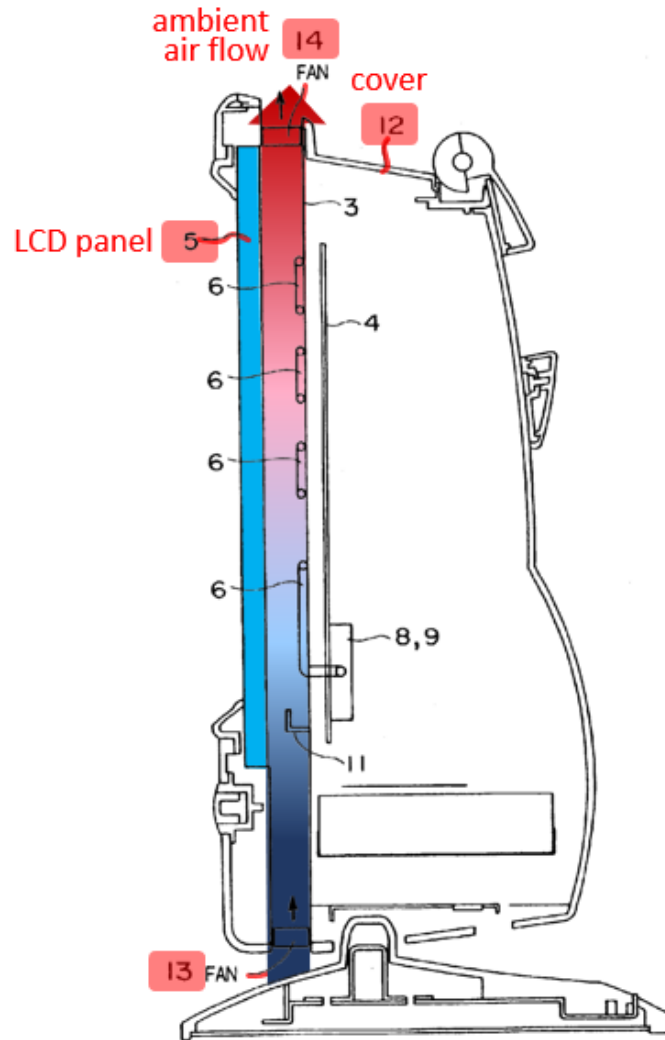
Nagashima in combination with Karppanen renders this limitation obvious.

In the images above, LCD panel **5** is located outside the closed loop gas cooling chamber. (Exs. 1007, Fig. 1; 1002, ¶¶220-221.)

5. Element 1[d]

| | |
|------|---|
| 1[d] | ~~an open loop ambient air pathway through the electronic display housing;~~ |
|------|---|

Nagashima in combination with Karppanen renders this limitation obvious. (Ex. 1002, ¶¶222-224.) “A portion of the cover **12** that corresponds to the lower portion of the space between the LCD panel **5** and the main chassis **3**” includes “an air inlet **13** for air-cooling.” (Ex. 1007, 5:14-19.) Air outlet **14** is formed in an upper portion of the cover **12**. (*Id.*, 5:19-20.) Air flowing through this path creates a “chimney effect” that air-cools heat generating portions. (*Id.*, 5:20-23.) An “air ventilation fan” can be added at the lower, upper or both lower and upper portions of cover **12** to “expedite the movement of air” “between the LCD panel [**5**] and the main chassis [**3**].” (*Id.*, 6:4-11.)



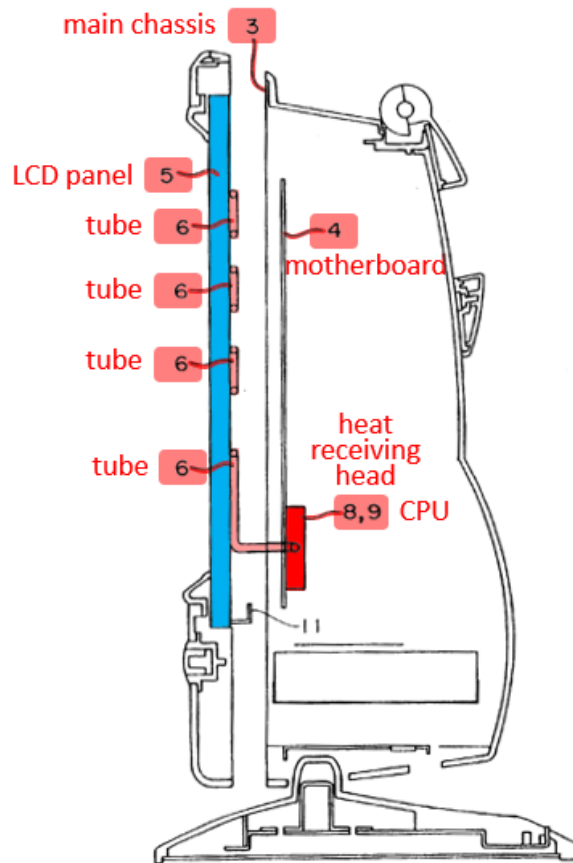
(Ex. 1007, Fig. 10 (annotated).) Air inlet **13** and air outlet **14** constitute an open loop ambient air pathway through the electronic display housing. (Ex. 1002, ¶224.)

6. Element 1[e]

| | |
|------|--|
| 1[e] | ~~wherein the electronic display is coolable by a combination of gas circulation within the closed loop gas cooling chamber and ambient air flow through the open loop ambient air pathway in the electronic display housing.~~ |
|------|--|

Nagashima in combination with Karppanen renders this limitation obvious. (Ex. 1002, ¶¶225-229.) The electronic display is coolable by an open loop ambient air pathway. Ambient air flow through the “chimney” between the LCD panel **5** and main chassis **3** air-cools the display in part because “the back side of the LCD panel has a large area of the metal surface, and heat dissipation can be carried out at high efficiency while utilizing this large area.” (Ex. 1007, 5:13-22, 5:61-63.) And the “provision of [] fans [inside the chimney] enables the transportation of a large volume of cooling air” into the chimney. (*Id.*, 6:11-13.)

Meanwhile, tube **6** is in conductive thermal communication with the rear cooling chamber formed by main chassis **3** and rear cover **12**. (Ex. 1002, ¶226.)



(Ex. 1007, Fig. 4 (annotated).) Specifically, the tube is attached to the display, thereby transferring heat from the display to the rear cooling chamber containing a closed loop generated by the heat receiving head and fan. (Ex. 1002, ¶226.) The closed loop thus cools the display in this embodiment.¹³¹²

¹³¹² A POSITA would understand that the teachings set forth amongst the various embodiments shown in at least Figures 1, 4, 5 and 10 in Nagashima can be used interchangeably and there is no disclosure in Nagashima to the contrary. (Ex. 1002, ¶226.) For example, while air inlet **13** and air outlet **14** are not shown in Figure 4, a

Patent owner alleges in pending litigation that an electronic display is coolable by a gas cooling chamber containing a cooling fan used to cool microelectronic components in a closed environment. (Ex. 1008, p.11.) Consistent with Patent owner's allegations, Nagashima in combination with Karppanen discloses every element in this limitation. (Ex. 1002, ¶227.)

B. Claim 4

| | |
|---|--|
| 4 | ~~The electronic display assembly of claim 1 wherein: the gas within the closed loop gas cooling chamber is isolated from the open loop of ambient air.~~ |
|---|--|

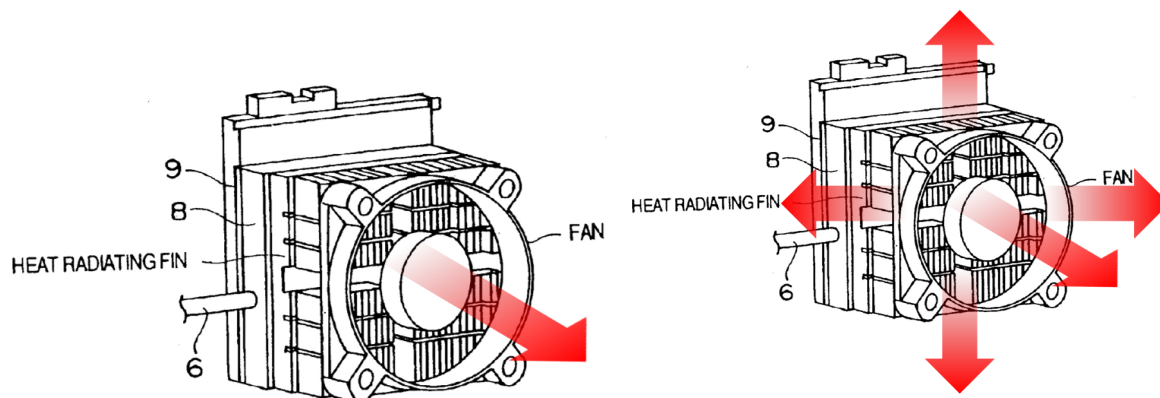
Nagashima in combination with Karppanen renders this limitation obvious. (*Supra*, §IX.A.3; Ex. 1007, Fig. 2; Ex. 1002, ¶230.)

C. Claim 5

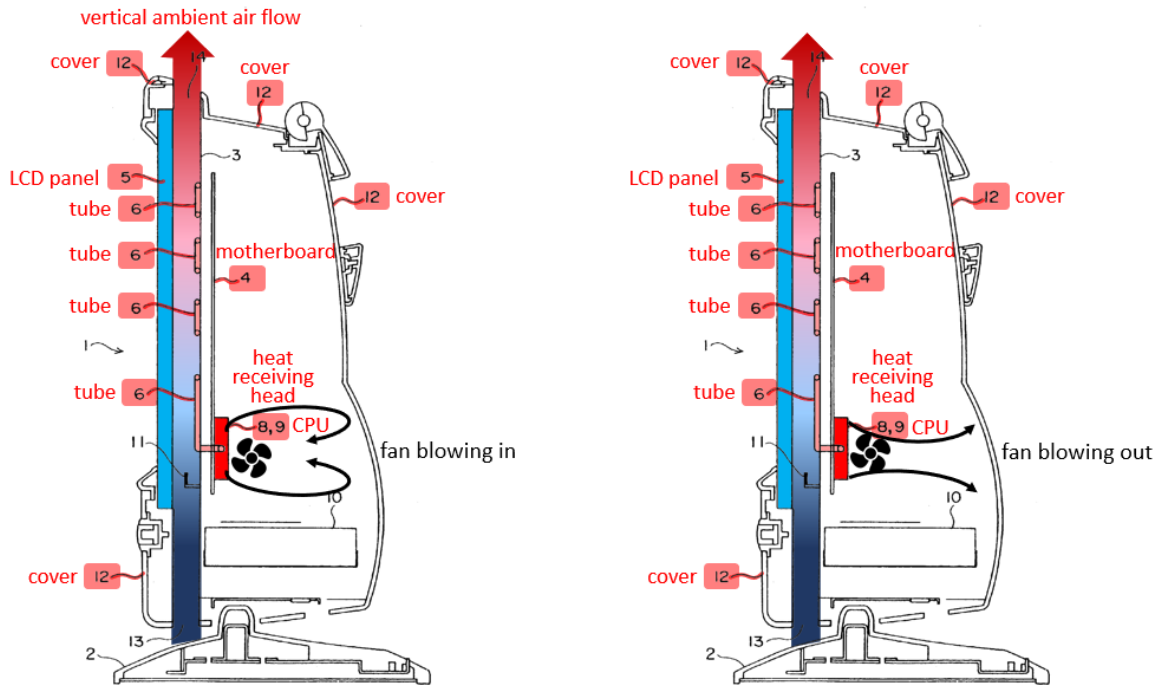
| | |
|---|--|
| 5 | ~~The electronic display assembly of claim 1 wherein: the closed loop gas cooling chamber and the ambient air pathway are configured such that gas circulation within the gas cooling chamber will occur in a direction that is substantially perpendicular to the direction that ambient air will flow through the electronic display housing.~~ |
|---|--|

POSITA would understand, and would be motivated, to include the open loop fan in order to cool the rear of the LCD display and tube 6. (*Id.*)

Nagashima in combination with Karppanen renders this limitation obvious. (Ex. 1002, ¶¶231-232.) Ambient air flows in a vertical direction between air inlet **13** and air outlet **14**. Meanwhile, air flowing from the fan within the gas cooling chamber moves substantially in a horizontal direction regardless whether the fan is forcing air into the fin or drawing it out of the fin. (Ex. 1007, 7:16-17; *supra*, §IX.A.3.) For example, where the fan is forcing air away from the fin, air moves substantially horizontally before contacting cover **12** as shown in the annotated images. (Ex. 1002, ¶232.) But when the fan is forcing air into the fin, the air will be scattered in multiple different directions, two of which (horizontal and lateral) are perpendicular to the direction of the flow of ambient air. (*Id.*) Nagashima in combination with Karppanen thus discloses this limitation.



(Ex. 1007, Fig. 6B (annotated).)



(Ex. 1007, Fig. 1 (annotated).)

D. Claim 8

| | |
|---|--|
| 8 | The electronic display assembly of claim 1 wherein: the closed loop gas cooling chamber is partially defined by a sealed rear plenum that prevents ambient air from entering the plenum. |
|---|--|

Nagashima in combination with Karppanen renders this limitation obvious. (Ex. 1002, ¶¶233-235.) As noted above, the closed loop gas cooling chamber is at least partially defined by main chassis **3** which is a unitary piece of material that seals one side of the rear cooling chamber. (*Supra*, §IX.A.3.) Alternatively, it would have been obvious to modify the main chassis to create a unitary body forming part of the closed loop gas cooling chamber. (*Id.*) In either case, main chassis **3** acts as

a sealed plenum that prevents ambient air from entering the plenum. (Ex. 1002, ¶235.)

E. Claim 9

| | |
|---|--|
| 9 | ~~The electronic display assembly of claim 8 further comprising: one or more electronic devices for operating the electronic display positioned within the sealed plenum.~~ |
|---|--|

Nagashima in combination with Karppanen renders this limitation obvious. Nagashima discloses that “mother board” 4, “CPU 9, [and] the power source circuits,” are each located within the rear cooling chamber created by main chassis 3 and cover 12. (*See* Ex. 1007, 3:53-4:10, 5:13-18.) Each of these components are electronic devices for operating the electronic display. (Ex. 1002, ¶¶236-237.)

F. Claim 10

| | |
|----|---|
| 10 | ~~The electronic display assembly of claim 1 wherein: the electronic display is selected from the group consisting of a liquid crystal display, a light emitting diode display, an organic light emitting diode display, a field emitting display, a cathode ray tube display, and a plasma display.~~ |
|----|---|

Nagashima in combination with Karppanen renders this limitation obvious. (Ex. 1002, ¶¶238-239.) The electronic display in Nagashima is a LCD display. (*Supra*, §IX.A.2.)

G. Claim 11

1. 11[a]

| | |
|-------|---|
| 11[a] | ~~The electronic display assembly of claim 1 further comprising: a gas-circulating fan for circulating the gas within the closed loop gas cooling chamber, and~~ |
|-------|---|

Nagashima in combination with Karppanen renders this limitation obvious.

(*Supra*, §IX.A.3; Ex. 1002, ¶¶241-244.)

2. 11[b]

| | |
|-------|---|
| 11[b] | ~~a fan for producing a flow of ambient air through the open loop ambient air pathway in the electronic display housing.~~ |
|-------|---|

Nagashima in combination with Karppanen renders this limitation obvious.

(*Supra*, §IX.A.5, Ex. 1002, ¶¶245-246.)

H. Independent Claim 12

1. 12[pre]

| | |
|---------|---|
| 12[pre] | ~~An electronic display assembly comprising:~~ |
|---------|---|

To the extent the preamble is limiting, Nagashima in combination with Karppanen discloses this limitation. (*Supra*, §IX.A.1; Ex. 1002, ¶248.)

2. 12[a]

| | |
|-------|-----------------------|
| 12[a] | ~~a housing;~~ |
|-------|-----------------------|

Nagashima in combination with Karppanen renders this limitation obvious.

(*Supra*, §IX.A.2; Ex. 1002, ¶249.)

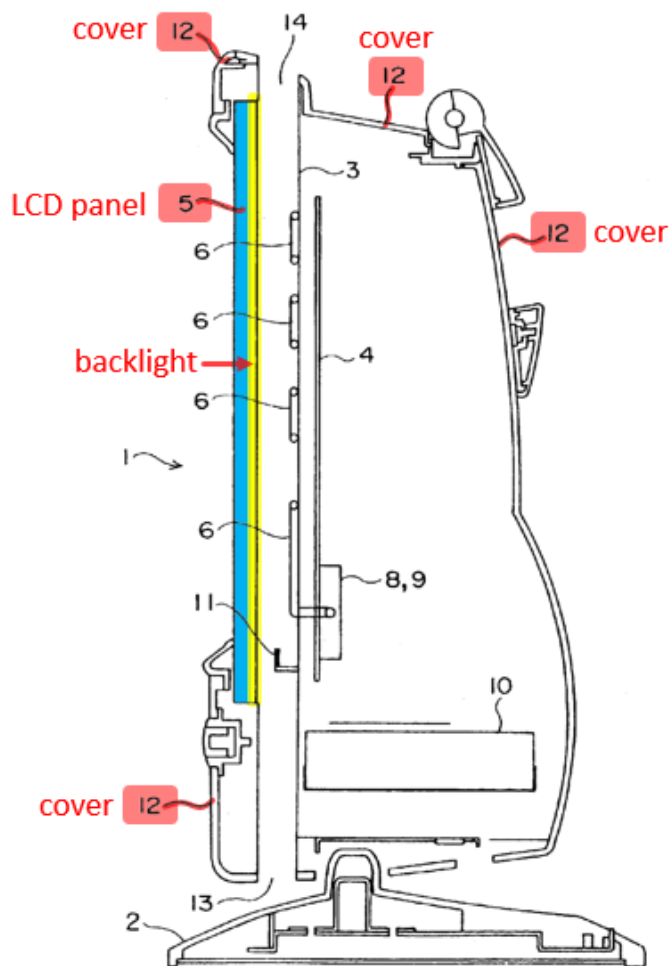
3. 12[b]

| | |
|-------|---|
| 12[b] | ~~a liquid crystal display (LCD) positioned within the housing and having a backlight;~~ |
|-------|---|

Nagashima in combination with Karppanen renders this limitation obvious.

(*Supra*, §IX.A.4; Ex. 1002, ¶¶251-253.)

A POSITA would understand that the LCD display in Nagashima has a backlight. (Ex. 1002, ¶253.) Nagashima discloses that “the LCD panel has a large area of the metal surface, and heat dissipation can be carried out at high efficiency while utilizing this large area.” (Ex. 1007, 5:61-63.) A POSITA would understand that the need for heat dissipation on the metal surface arises from the fact that a backlight is located on the back portion in LCD display 5. (Ex. 1002, ¶253.) To the extent a backlight is not disclosed in Nagashima, it would have been obvious to add a backlight into the LCD display to permit images to be displayed on the screen. (*Id.*)



(Ex. 1007, Fig. 2 (annotated).)

4. 12[c]

| | |
|-------|---|
| 12[c] | <p>wherein the electronic display is coolable by a combination of a closed loop of isolated gas which circulates within the housing and an open loop of ambient air which passes through the housing and along the backlight.</p> |
|-------|---|

Nagashima in combination with Karppanen renders this limitation obvious.

(*Supra*, §IX.A.6.) The ambient air passes through the housing and along the rear

surface of the backlight located in the rear portion of LCD panel **5**. (*Supra*, §IX.H.3; Ex. 1002, ¶¶254-255.)

I. Claim 14

1. 14[a]

| | |
|-------|---|
| 14[a] | ~~The electronic display assembly of claim 12 further comprising: a rear cooling chamber positioned behind the LCD and containing the closed loop of isolated gas;~~ |
|-------|---|

Nagashima in combination with Karppanen renders this limitation obvious. The rear cooling chamber is defined by main chassis **3** and cover **12** and is positioned behind the LCD. (*Supra*, §IX.A.3, Ex. 1002, ¶¶257-258.)

J. 14[b]

| | |
|-------|--|
| 14[b] | ~~and wherein the open loop ambient air will contact an exterior surface of the chamber, but is not permitted to enter the chamber.~~ |
|-------|--|

Nagashima in combination with Karppanen renders this limitation obvious. Nagashima teaches that the open loop ambient air contacts the exterior surface of main chassis **3** but does not enter the rear cooling chamber. (*Supra*, §IX.A.5, §IX.D; Ex. 1002, ¶¶259-260.)

K. Claim 15

| | |
|----|--|
| 15 | ~~The electronic display assembly of claim 12 further comprising: one or more electronic components for driving the LCD positioned within the rear cooling chamber.~~ |
|----|--|

Nagashima in combination with Karppanen renders this limitation obvious. (*Supra*, §IX.E, Ex. 1002, ¶¶261-262.) At least the “mother board (a control circuit board) [4]” and “power source circuits” (Ex. 1007, 3:53-4:10), are electronic components for driving the LCD. (Ex. 1002, 262.)

L. Claim 16

| | |
|----|---|
| 16 | ~~The electronic display assembly of claim 12 wherein: the open loop of ambient air will contact an exterior surface of the rear cooling chamber while the closed loop of isolated gas will contact an interior surface of the rear cooling chamber.~~ |
|----|---|

Nagashima in combination with Karppanen renders this limitation obvious. (Ex. 1002, ¶¶263-264.) As noted above, the closed loop of isolated gas in Nagashima will contact an interior surface of the rear cooling chamber (*supra*, §IX.I.1) and the open loop of ambient air will contact an exterior surface of the rear cooling chamber (*supra*, §IX.J).

M. Claim 17

| | |
|----|--|
| 17 | ~~The electronic display assembly of claim 12 wherein: the intended direction of closed loop isolated gas flow is substantially perpendicular to the intended direction of open loop of ambient air flow.~~ |
|----|--|

Nagashima in combination with Karppanen renders this limitation obvious.

(*Supra*, §IX.C; Ex. 1002, ¶¶265-267.)

N. Independent Claim 21

1. 21[pre]

| | |
|---------|---|
| 21[pre] | ~~An electronic display assembly comprising:~~ |
|---------|---|

To the extent the preamble is limiting, Nagashima in combination with Karppanen discloses this limitation. (*See supra*, §IX.A.1; Ex. 1002, ¶268.)

2. 21[a]

| | |
|-------|---|
| 21[a] | ~~an electronic display housing:~~ |
|-------|---|

Nagashima in combination with Karppanen renders this limitation obvious.

(*Supra*, §IX.A.2; Ex. 1002, ¶269.)

3. 21[b]

| | |
|-------|--|
| 21[b] | ~~a closed loop of cooling gas adapted for circulation within the electronic display housing:~~ |
|-------|--|

Nagashima in combination with Karppanen renders this limitation obvious.

(*Supra*, §IX.A.3; Ex. 1002, ¶¶270-271.)

4. 21[c]

| | |
|-------|---|
| 21[e] | ~~an open loop ambient air pathway through the electronic display housing; and~~ |
|-------|---|

Nagashima in combination with Karppanen renders this limitation obvious.

(*See supra*, §IX.A.5; Ex. 1002, ¶272.)

5. 21[d]

| | |
|-------|--|
| 21[d] | ~~an electronic display positioned within the electronic display housing such that the electronic display is isolated from the closed loop of cooling gas but contactable by ambient air flowing through the open loop ambient air pathway;~~ |
|-------|--|

Nagashima in combination with Karppanen renders this limitation obvious.

The LCD display **5** is isolated from the closed loop of cooling gas (*supra*, §IX.A.4)

and is contactable by ambient air flowing between LCD display **5** and main chassis

3. (Ex. 1002, ¶¶273-274; *supra*, §IX.A.6.)

6. 21[e]

| | |
|-------|--|
| 21[e] | ~~wherein the electronic display is coolable by a combination of closed loop cooling gas circulation within the electronic display housing, and ambient air flow through the open loop ambient air pathway in the~~ |
|-------|--|

| | |
|--|--|
| | ~~electronic display housing.~~ |
|--|--|

Nagashima in combination with Karppanen renders this limitation obvious.

(*Supra*, §IX.A.6; Ex. 1002, ¶276.)

O. Claim 22

1. 22[a]

| | |
|------------------|--|
| ~~22[a]~~ | ~~The electronic display assembly of claim 21 wherein: the closed loop of cooling gas is isolated within a continuous loop gas cooling chamber, and~~ |
|------------------|--|

Nagashima in combination with Karppanen renders this limitation obvious.

(*Supra*, §IX.B; Ex. 1002, ¶¶277-279.)

2. 22[b]

| | |
|------------------|--|
| ~~22[b]~~ | ~~the open loop ambient air pathway is configured to direct the ambient air over an exterior surface of the gas cooling chamber when it flows through the electronic display housing.~~ |
|------------------|--|

Nagashima in combination with Karppanen renders this limitation obvious.

(*Supra*, 16, Ex. 1002, ¶¶280-281.)

P. Claim 23

1. 23[a]

| | |
|-------|---|
| 23[a] | ~~The electronic display assembly of claim 22 further comprising: a fan located within the electronic display housing,~~ |
|-------|---|

Nagashima in combination with Karppanen renders this limitation obvious. The fan which creates the open loop ambient air flow is located within the electronic display housing. (*Supra*, §IX.L; Ex. 1002, ¶¶283-284.)

2. 23[b]

| | |
|-------|---|
| 23[b] | ~~the fan configured and oriented to move air located within the housing between a surface of the continuous loop gas cooling chamber and a rear surface of the electronic display~~ |
|-------|---|

Nagashima in combination with Karppanen renders this limitation obvious. Specifically, the open loop fan moves air between the surface of the continuous loop gas cooling chamber (main chassis **3**) and the rear surface of LCD panel **5**. (*Supra*, §§IX.A.5, IX.O; Ex. 1002, ¶¶285-286.)

Q. Motivation to Combine Nagashima and Karppanen

A POSITA would have been motivated to modify the rear cooling chamber to prevent ambient air from entering (if needed) because such ambient air can include contaminants which could damage vital electronic components. (Ex. 1002, ¶287.) Indeed, Nagashima recognizes that ambient air traveling through the display may

contain such contaminants including “dust and dirt.” (Ex. 1007, 6:13-16.) Because the rear cooling chamber in Nagashima contains critical electronic components (*Id.*, 4:4-22), a POSITA would have been motivated to seal the rear cooling chamber in which these components are housed in order to prevent dust, dirt and other contaminants from entering. (Ex. 1002, ¶287.)

Additionally, modifying Nagashima with Karppanen’s sealed rear closed loop cooling chamber advantageously constrains the flow of air, and ensures proper circulation of air within the chamber. (*Id.*, ¶¶288-290.)

The combination of Nagashima and Karppanen would have been combining known prior art techniques (using a fan to move heated air) according to known methods (employing a closed loop in a sealed chamber) to obtain the predictable results of reliable energy, temperature and pressure efficiency. (*Id.*, ¶291.)

X. GROUND 3 – CLAIMS 1, 4, 5, 8-23 ARE OBVIOUS OVER OHTA AND MARUMOTO

A. Independent Claim 1

1. Element 1[pre]

| | |
|--------|---|
| 1[pre] | ~~An electronic display assembly comprising:~~ |
|--------|---|

To the extent the preamble is limiting, the combination of Ohta and Marumoto discloses or suggests this feature. (Ex. 1002, ¶¶293-297) Ohta discloses a “cooling

device” for a “plasma display panel,” (Ex. 1004, ¶6), which is a type of electronic display (Ex. 1002, ¶294).

2. Element 1[a]

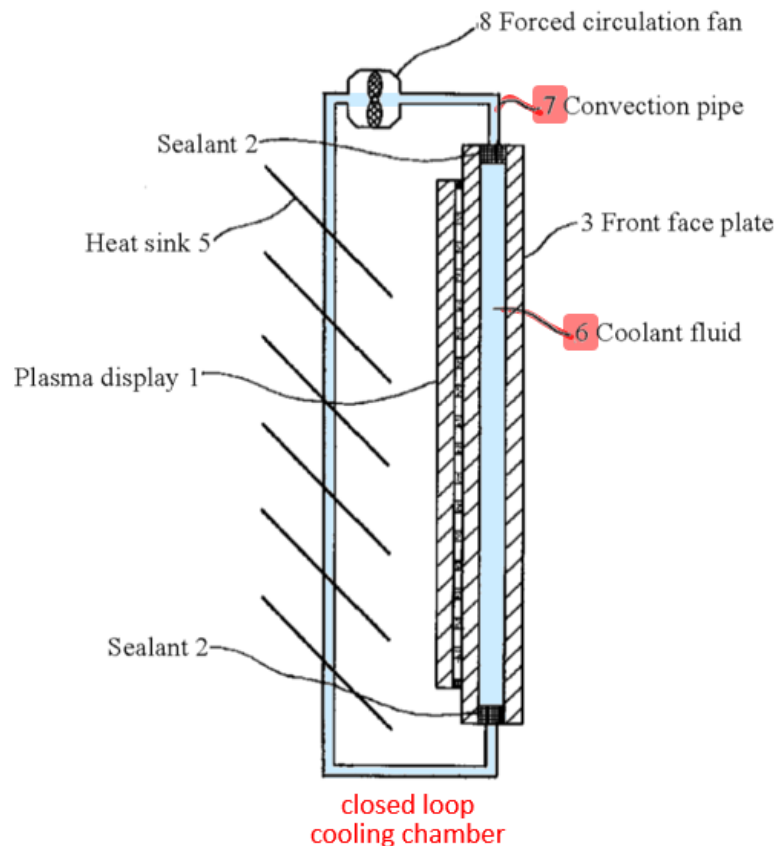
| | |
|-----------------|---|
| ~~1[a]~~ | ~~An electronic display housing;~~ |
|-----------------|---|

Ohta in combination with Marumoto discloses or suggests this feature. (Ex. 1002, ¶¶298-301.) For example, Ohta explains that, in “embodiment example 5” of the “present invention,” the “panel display panel 1 is incorporated with a housing 11.” (Ex. 1004, ¶¶30-31.) As discussed below, “embodiment example 3” discloses nearly all elements in limitations 1[b]-1[e]. While a housing is not explicitly disclosed in “embodiment example 3,” a POSITA would understand that, based on the teaching in “embodiment example 5,” the electronic display and cooling systems taught in Ohta could be included in the same housing. (Ex. 1002, ¶300.) Even if not, a POSITA would be motivated to contain the display and its accompanying cooling system in a single housing to protect both from the environment during outdoor use and to facilitate easier transfer. (*Id.*)

3. Element 1[b]

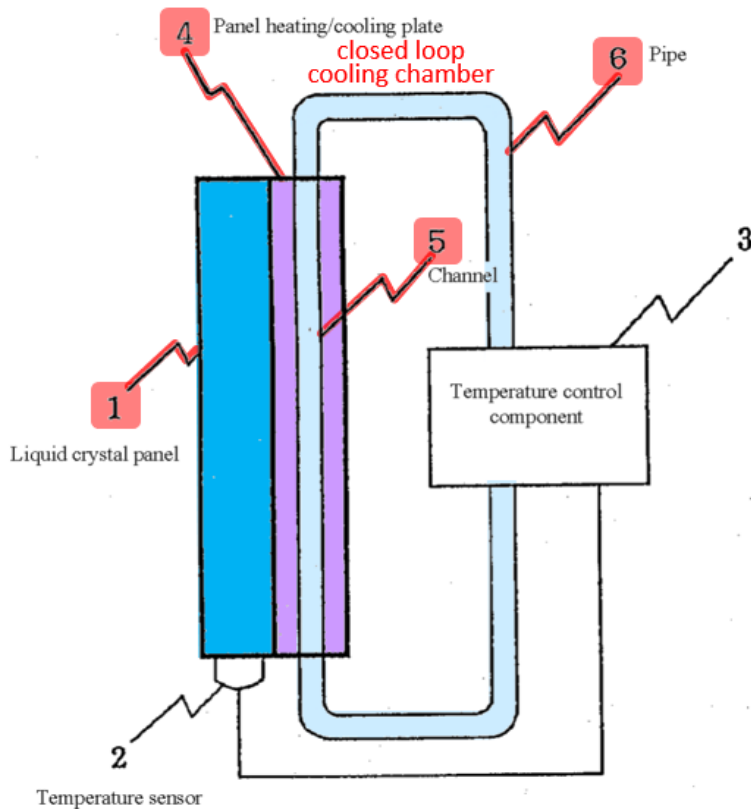
| | |
|-----------------|--|
| ~~1[b]~~ | ~~a gas-containing closed loop gas cooling chamber located within the electronic display housing;~~ |
|-----------------|--|

Ohta in combination with Marumoto discloses this feature. (Ex. 1002, ¶¶302-307.) As shown in Figure 3, Ohta discloses a closed loop cooling chamber located within the electronic display housing.



(Ex. 1004, Fig. 3 (annotated).) The closed loop contains a coolant fluid **6** and “forced circulation fan **8**” which “caus[es] the cooling fluid **6** to circulate within the interior of the” closed loop. (Ex. 1004, ¶[0021].) The container having the closed loop is “sealed” and “airtight.” (*Id.*, ¶[0006].)

Marumoto similarly discloses a closed loop “cooling/heating system for liquid crystal panel” shown in Figure 1 below. (Ex. 1005, ¶[0006], Fig. 1.)

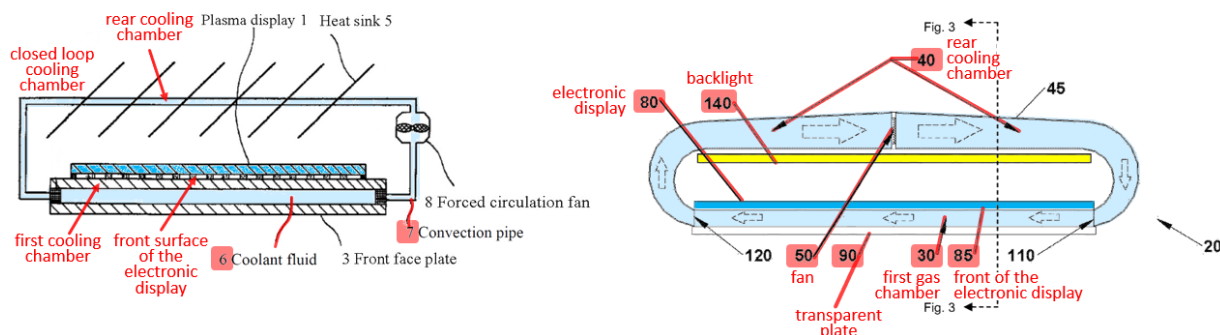


(*Id.*, Fig. 1 (annotated).) Marumoto further teaches that the “heating/cooling material may be a gas or a fluid.” (*Id.*, ¶[0007]). As discussed below (*infra*, X.T), a POSITA would have been motivated to modify the closed loop in Ohta by replacing the cooling fluid with gas. Ohta, as modified by Marumoto, thus discloses this limitation.

4. Element 1[c]

| | |
|------|---|
| 1[c] | ~~an electronic display positioned within the electronic display housing but outside of the closed loop gas cooling chamber, and~~ |
|------|---|

Ohta in combination with Marumoto discloses this feature. (Ex. 1002, ¶¶308-311.) Ohta discloses an electronic display located in a housing (*supra*, §X.A.2) and Ohta in combination with Marumoto teaches a closed loop gas cooling chamber located in the housing (*supra*, §X.A.3). As shown in the annotated figures above, in both Ohta and Marumoto, the electronic display is located outside the closed loop cooling chamber. Indeed, as shown in the images below, the positioning of the electronic display relative to the closed loop cooling chamber in Ohta is identical to the positioning in the '287 patent:



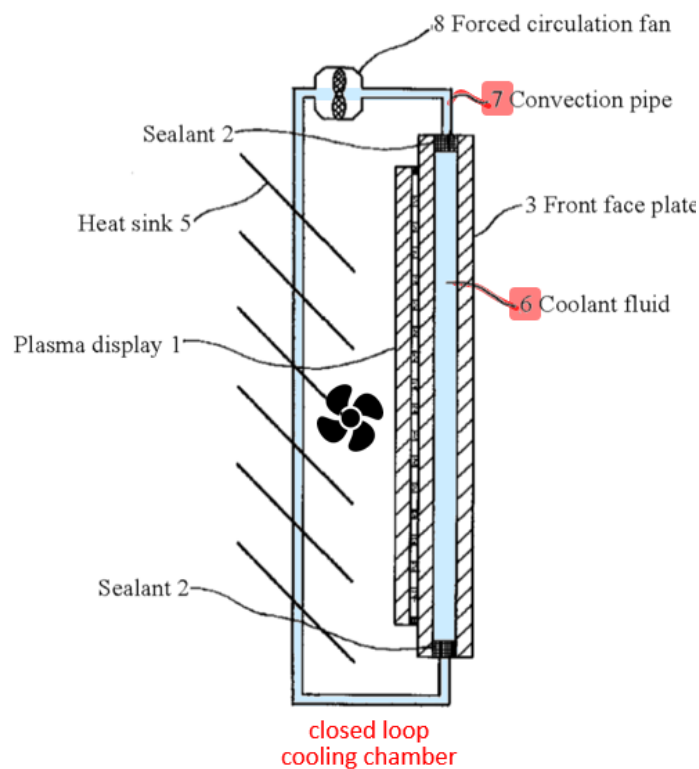
(Compare Ex. 1004, Fig. 3 (annotated), with Ex. 1001, Fig. 2 (annotated).)

5. Element 1[d]

| | |
|------|--|
| 1[d] | an open loop ambient air pathway through the electronic display housing; |
|------|--|

Ohta in combination with Marumoto discloses or suggests this feature. (Ex. 1002, ¶¶312-314.) Ohta “embodiment example 3” includes “heat sinks 5” which can be “forcibly air cooled” (Ex. 1004, ¶¶[0019], [0024].) A POSITA would

understand this disclosure to require cooling of the heat sinks using open loop ambient air provided by a fan. (Ex. 1002, ¶313.) To determine where to position the fan to “air cool” the heat sinks, a POSITA would have considered various locations, including those where other portions of the display system could be advantageously cooled by the flow of ambient air. (*Id.*) An exemplary implementation for the “forcibly air cooled” heat sink is shown below where the fan is depicted as blowing air “through” the heat sinks (and towards the viewer of the page):



(Ex. 1004, Fig. 3 (annotated).) Ohta thus discloses an open loop of ambient air through the electronic display housing. (Ex. 1002, ¶313.)

6. Element 1[e]

| | |
|------|--|
| 1[e] | ~~wherein the electronic display is coolable by a combination of gas circulation within the closed loop gas cooling chamber and ambient air flow through the open loop ambient air pathway in the electronic display housing.~~ |
|------|--|

Ohta in combination with Marumoto discloses or suggests this feature. (Ex. 1002, ¶¶315-318.) Ohta discloses with reference to “embodiment example 3” that when a specified temperature is exceeded, “the forced circulation fan **8** activates, causing the cooling fluid **6** to circulate within” the closed loop “such that the heat from the plasma display panel **1** is expelled to the exterior from the heat sink **5**, thereby cooling the panel.” (Ex. 1004, ¶[0021].) Ohta thus discloses that the display is coolable by the closed loop cooling chamber. Meanwhile, the heat sink **5** is cooled using an open loop ambient air pathway. (*Supra*, §X.A.5.) It would have been obvious to position an open loop fan in a direction that cools both the heat sink and the rear surface of the LCD display containing a backlight in Ohta as modified by Marumoto. (Ex. 1002, ¶317.) The electronic display is thus coolable by a combination of the closed loop and open loop. (*Id.*, ¶318.)

B. Claim 4

| | |
|---|--|
| 4 | ~~The electronic display assembly of claim 1 wherein: the gas within the closed loop gas cooling chamber is isolated from the open loop of ambient air.~~ |
|---|--|

Ohta in combination with Marumoto discloses a closed loop gas cooling chamber. (*Supra*, §X.A.3; Ex. 1002, ¶320.) Meanwhile, Ohta teaches that the closed loop cooling chamber is isolated from the open loop of ambient air as shown in Figure 3 annotated above. (*Supra*, §X.A.5, Ex. 1002, ¶320.)

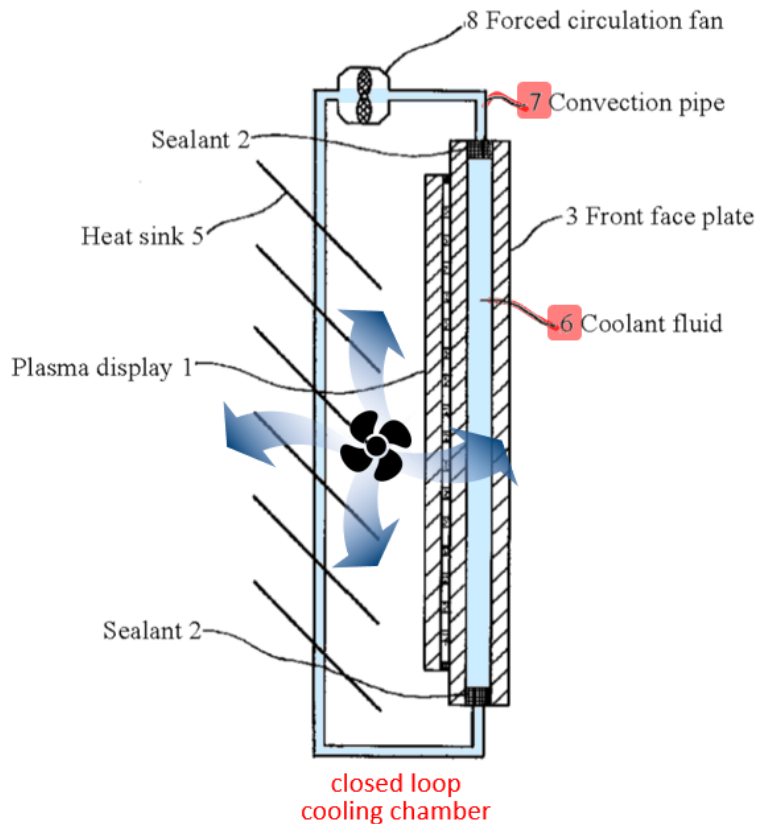
C. Claim 5

| | |
|---|--|
| 5 | ~~The electronic display assembly of claim 1 wherein: the closed loop gas cooling chamber and the ambient air pathway are configured such that gas circulation within the gas cooling chamber will occur in a direction that is substantially perpendicular to the direction that ambient air will flow through the electronic display housing.~~ |
|---|--|

Ohta in combination with Marumoto discloses cooling an LCD display using a closed loop gas cooling chamber. (*Supra*, §X.A.3; Ex. 1002, ¶323.) As shown in Ohta Figure 3, while air within the closed loop gas cooling chamber in Ohta as modified by Marumoto moves in both vertical and horizontal directions, it moves predominantly in a vertical direction. (Ex. 1002, ¶323.)

As noted above (*supra*, §X.A.5), Ohta discloses “forcibly air-cool[ing]” the heat sink using fans. A POSITA would understand that the fan which cools the heat

sinks **5** could be located in multiple different areas to optimize thermal performance. (Ex. 1002, ¶324.) For example, a POSITA would seek to blow ambient air on a substantial portion of the heat sink in order to facilitate removal of heat from the heat sink. (*Id.*) In the case of Ohta, a POSITA would also be motivated to have some ambient air access the rear surface of the LCD display so as to dissipate heat generated by the backlight. (*Id.*) To achieve both goals, a POSITA would be motivated to place the fan in the middle of the display so that air passes along the rear surface of the LCD display and through a portion of the heat sink as shown below. (*Id.*) The ambient air thus flows in a third direction that is perpendicular to the airflow in the closed loop cooling chamber (e.g., toward the viewer) and, again, occurs in a manner similar to what is disclosed in the specification. (*Id.*; Ex. 1001, Fig. 1 (fans **60** blowing air perpendicular to substantially horizontal air flow in closed loop), Figs. 3A-3E.)



(Ex. 1004, Fig. 3 (annotated).)

D. Claim 8

| | |
|---|--|
| 8 | <p>~~The electronic display assembly of claim 1 wherein: the closed loop gas cooling chamber is partially defined by a sealed rear plenum that prevents ambient air from entering the plenum.~~</p> |
|---|--|

As noted above, Ohta in combination with Marumoto discloses a closed loop gas cooling chamber. (*Supra*, §X.A.3.) Ambient air is not permitted to enter the closed loop cooling chamber in either Ohta or Marumoto. (Ex. 1002, ¶327.) A POSITA would thus understand that the entire closed loop in either Ohta or

Marumoto is a sealed plenum. (*Id.*) Alternatively, Ohta teaches a front face plate **3** which operates as a sealed plenum which prevents ambient air from entering the plenum. (*Id.*, ¶328; Ex. 1004, Fig. 3.)

E. Claim 9

| | |
|---|--|
| 9 | ~~The electronic display assembly of claim 8 further comprising: one or more electronic devices for operating the electronic display positioned within the sealed plenum.~~ |
|---|--|

Ohta in combination with Marumoto discloses or suggests this feature. (Ex. 1002, ¶¶330-333.) Ohta teaches that forced circulation fan **8** is located within the closed loop cooling chamber. (Ex. 1004, ¶[0019], Fig. 3.) “The forced circulation fan **8** is furnished with ... an external power supply (which may be shared with the drive circuit of the plasma display panel) to drive the fan[.]” (*Id.*, ¶[0019].) A POSITA would understand that a power supply shared with the drive circuit for the display is an electronic device for operating the display. (Ex. 1002, ¶332.)

F. Claim 10

| | |
|----|---|
| 10 | ~~The electronic display assembly of claim 1 wherein: the electronic display is selected from the group consisting of a liquid crystal display, a light emitting diode display, an organic light emitting diode display, a field emitting display, a cathode ray tube display, and a plasma display.~~ |
|----|---|

Ohta in combination with Marumoto discloses or suggests this feature. (Ex. 1002, ¶¶334-336.) Ohta discloses use of a closed loop cooling chamber and open loop ambient air fan in conjunction with a plasma display. (Exs. 1004, ¶¶18-24; 1002, ¶335.) Marumoto, meanwhile, discloses use of a closed loop gas cooling chamber in conduction with an LCD display. (Exs. 1005, ¶6, Fig. 1; 1002, ¶336.)

G. Claim 11

1. 11[a]

| | |
|-------|---|
| 11[a] | ~~The electronic display assembly of claim 1 further comprising: a gas-circulating fan for circulating the gas within the closed loop gas cooling chamber, and~~ |
|-------|---|

As noted above, Ohta in combination with Marumoto discloses a closed loop gas cooling chamber. (*Supra*, §X.A.3.) And Ohta discloses a forced circulation fan 8 which circulates cooling medium within the closed loop. (Ex. 1004, ¶21.) Ohta and Marumoto thus disclose or suggest a gas circulating fan for circulating the gas within the closed loop gas cooling chamber. (Ex. 1002, ¶¶338-341.)

2. 11[b]

| | |
|-------|---|
| 11[b] | ~~a fan for producing a flow of ambient air through the open loop ambient air pathway in the electronic display housing.~~ |
|-------|---|

Ohta in combination with Marumoto discloses or suggests this feature. As noted above, Ohta discloses a fan that, as modified by Marumoto, produces a flow

of ambient air through the open loop ambient pathway (and onto heat sink 5).

(*Supra*, §X.A.5; Ex. 1002, ¶¶342-344.)

H. Independent Claim 12:

1. 12[pre]

| | |
|--------------------|---|
| ~~12[pre]~~ | ~~An electronic display assembly comprising:~~ |
|--------------------|---|

To the extent the preamble is limiting, Ohta in combination with Marumoto discloses this limitation. (*Supra*, §X.A.1; Ex. 1002, ¶346.)

2. 12[a]

| | |
|------------------|-----------------------|
| ~~12[a]~~ | ~~a housing;~~ |
|------------------|-----------------------|

Ohta in combination with Marumoto renders this limitation obvious. (*Supra*, §X.A.2, Ex. 1002, ¶347.)

3. 12[b]

| | |
|------------------|---|
| ~~12[b]~~ | ~~a liquid crystal display (LCD) positioned within the housing and having a backlight;~~ |
|------------------|---|

Ohta in combination with Marumoto renders this limitation obvious. (Ex. 1002, ¶¶348-352.)

As noted above, Ohta discloses a plasma display positioned within a housing. (*Supra*, §X.A.4.)

Marumoto, meanwhile, discloses a cooling system for a “liquid crystal panel [1]” that “comprises a panel heating/cooling plate [4] which comprises a high heat conductive plate positioned adjacently to the back face of a liquid crystal panel, in the interior of which a channel [5] for heating/cooling material is formed.” (Ex. 1005, ¶[0006], Fig. 1.) Marumoto teaches that a transparent plate 4 can be used “to enable the transmission of a backlight” in “liquid crystal panel 1.” (Exs. 1005, ¶[0012]; 1002, ¶350.)

As discussed in more detail below, a POSITA would have been motivated to replace the plasma display in Ohta with the liquid crystal panel in Marumoto and would have had a reasonable expectation of successfully doing so.

4. 12[c]

| | |
|-------|---|
| 12[c] | ~~wherein the electronic display is coolable by a combination of a closed loop of isolated gas which circulates within the housing and an open loop of ambient air which passes through the housing and along the backlight.~~ |
|-------|---|

Ohta in combination with Marumoto renders this limitation obvious. (Ex. 1002, ¶¶353-356.) Ohta in combination with Marumoto teach an LCD display that is coolable by a closed loop of isolated gas. (*Supra*, §§X.A.3-4, X.A.6, X.H.3.)

In Ohta as modified by Marumoto, the backlight in the liquid crystal panel is located between the electronic display and heat sink 5. It would have been obvious

to modify the open loop of ambient air directed to a heat sink on Ohta to direct the air through the housing, heat sink **5** and the rear surface of the display (which contains the backlight) because, like the heat sink **5**, the backlight generates heat. (*Supra*, §§X.A.4, X.A.6, X.C; Ex. 1002, ¶355.) Indeed, the structure for the example in Marumoto demonstrates that the backlight in a liquid crystal panel should be cooled and would motivate a POSITA to do so. (Ex. 1005, Fig. 1; Ex. 1002, ¶351.)

I. Claim 13

| | |
|----|--|
| 13 | ~~The electronic display assembly of claim 12 wherein: the isolated gas will cool a front surface of the LCD.~~ |
|----|--|

Ohta in combination with Marumoto renders this limitation obvious. (Ex. 1002, ¶¶357-359.) As noted above (*supra*, §X.H.4), the closed loop of isolated gas which circulates in Ohta as modified by Marumoto cools a front surface of the LCD. (Ex. 1004, Fig. 3.)

J. Claim 14

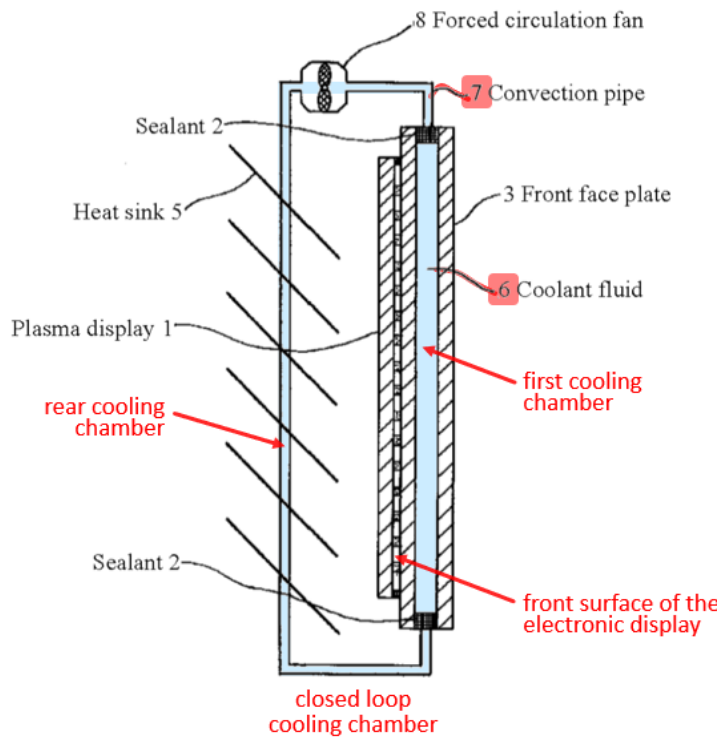
1. 14[a]

| | |
|-------|---|
| 14[a] | ~~The electronic display assembly of claim 12 further comprising: a rear cooling chamber positioned behind the LCD and containing the closed loop of isolated gas;~~ |
|-------|---|

Ohta in combination with Marumoto renders this limitation obvious.

In the depiction of Ohta as modified by Marumoto, there is a rear cooling chamber positioned behind the LCD which contains a closed loop of isolated gas.

(Ex. 1002, ¶¶361-363.)



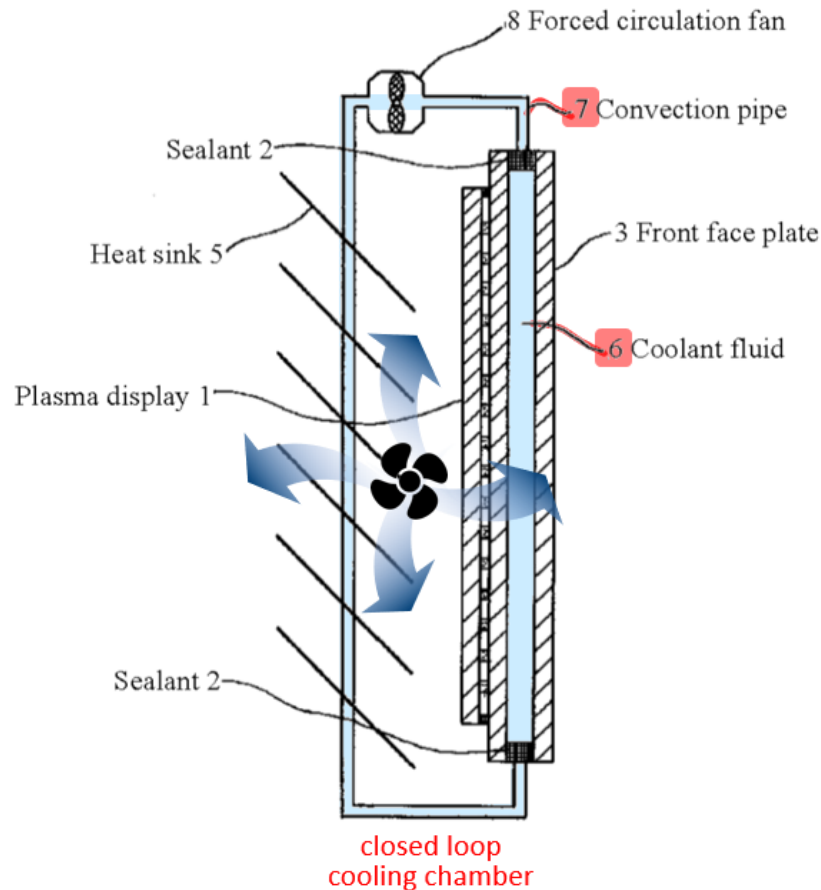
(Ex. 1004, Fig. 3 (annotated).)

2. 14[b]

| | |
|-------|--|
| 14[b] | ~~and wherein the open loop ambient air will contact an exterior surface of the chamber, but is not permitted to enter the chamber.~~ |
|-------|--|

Ohta in combination with Marumoto renders this limitation obvious. (*Supra*, §§X.A.5, X.D, X.H.4; Ex. 1002, ¶¶364-366.) When Ohta is modified by Marumoto as set forth in claim 12[c] above, it would be obvious to direct the open

loop ambient air to contact an exterior surface of the chamber as well as the rear surface of the backlight and heat sinks 5. (Ex. 1002, ¶365.)



(Ex. 1004, Fig. 3 (annotated).)

K. Claim 15

| | |
|----|--|
| 15 | ~~The electronic display assembly of claim 12 further comprising: one or more electronic components for driving the LCD positioned within the rear cooling chamber.~~ |
|----|--|

Ohta in combination with Marumoto renders this limitation obvious. (*Supra*, §X.E; Ex. 1002, ¶367.)

L. Claim 16

| | |
|----|---|
| 16 | ~~The electronic display assembly of claim 12 wherein: the open loop of ambient air will contact an exterior surface of the rear cooling chamber while the closed loop of isolated gas will contact an interior surface of the rear cooling chamber.~~ |
|----|---|

Ohta in combination with Marumoto renders this limitation obvious. (Ex. 1002, ¶¶368-370.)

The closed loop of isolated gas in Ohta will contact an interior surface of the rear cooling chamber (*supra*, §X.J.1; Ex. 1002, ¶369) and the open loop of ambient air will contact an exterior surface of the rear cooling chamber (*supra*, §X.J.2; Ex. 1002, ¶369).

M. Claim 17

| | |
|----|--|
| 17 | ~~The electronic display assembly of claim 12 wherein: the intended direction of closed loop isolated gas flow is substantially perpendicular to the intended direction of open loop of ambient air flow.~~ |
|----|--|

Ohta in combination with Marumoto renders this limitation obvious. (*Supra*, §§X.C, X.H.4, X.J.2, X.L; Ex. 1002, ¶371.)

N. Claim 18

1. 18[pre]

| | |
|---------|---|
| 18[pre] | ~~An electronic display assembly comprising:~~ |
|---------|---|

To the extent the preamble is limiting, Ohta in combination with Marumoto discloses this limitation. (*See supra*, §X.A.1; Ex. 1002, ¶373.)

2. 18[a]

| | |
|------------------|-----------------------|
| ~~18[a]~~ | ~~a housing;~~ |
|------------------|-----------------------|

Ohta in combination with Marumoto renders this limitation obvious. (*See supra*, §X.A.1, Ex. 1002, ¶374.)

3. 18[b]

| | |
|------------------|---|
| ~~18[b]~~ | ~~an electronic display positioned within the housing;~~ |
|------------------|---|

Ohta in combination with Marumoto renders this limitation obvious. (*See supra*, §X.A.1; Ex. 1002, ¶375.)

4. 18[c]

| | |
|------------------|--|
| ~~18[c]~~ | ~~a rear cooling chamber positioned behind the electronic display and containing an electrical component which is electrically connected to the electronic display;~~ |
|------------------|--|

Ohta in combination with Marumoto renders this limitation obvious. (Ex. 1002, ¶¶376-381.) As noted above, Ohta discloses a rear cooling chamber positioned behind the electronic display (e.g., a rear portion of the closed loop chamber) (*supra*, §X.J.1) and that an electrical component is located in the sealed rear cooling chamber (*supra*, §X.E; Ex. 1002, ¶377). Specifically Ohta discloses

that forced circulation fan **8** is located inside the rear cooling chamber along with a power supply for the fan that “may be shared with the drive circuit of the plasma display panel[.]” (Ex. 1004, ¶[0019].) A shared power supply with the drive circuit is electrically connected to the display. (Ex. 1002, ¶378.) To the extent that Ohta does not explicitly disclose that the shared power supply is located in the rear cooling chamber, it would have been obvious to include such a shared power supply in the rear cooling chamber to facilitate cooling. (*Id.*)

Similarly, Marumoto discloses a temperature control component **3** located in the rear cooling chamber of the closed loop. (Ex. 1005, Fig. 1; Ex. 1002, ¶379.) The temperature control component **3** is an electrical component electrically connected to the display through temperature sensor **2**. (*Id.*)

Alternatively, it would have been obvious to place an electrical component that is electrically connected to the electronic display (such as a programmable logic controller or power supply) in the rear chamber of the closed loop in Ohta, as modified by Marumoto, in order to cool it. (Ex. 1002, ¶380; *supra*, §X.K.)

5. 18[d]

| | |
|-------|---|
| 18[d] | ~~a front surface on the electronic display which faces an intended viewer and a rear surface on the electronic display which opposes the front surface;~~ |
|-------|---|

Ohta in combination with Marumoto renders this limitation obvious. Ohta discloses a front surface of an electronic display that faces an intended viewer through front face plate 3. (Exs. 1004; Fig. 3; 1002, ¶383.) Ohta likewise discloses a rear surface on the electronic display that opposes the front surface. (*Id.*)

6. 18[e]

| | |
|-------|--|
| 18[e] | ~~wherein the front surface of the electronic display is coolable by a closed loop of isolated gas and the rear surface of the electronic display is coolable by an open loop of ambient air.~~ |
|-------|--|

Ohta in combination with Marumoto renders this limitation obvious. (Ex. 1002, ¶¶384-385; *see supra*, §§X.H.4, X.I, X.J.) Ohta as modified by Marumoto discloses a closed loop of isolated gas that cools the front surface of the electronic display. (Exs. 1004, ¶21, Fig. 3; 1002, ¶385.)

As noted above, it would have been obvious to modify the open loop fan to direct ambient air onto the rear surface of the electronic display as well as the heat sink. (*Supra*, §X.J.2.)

O. Claim 19

| | |
|----|---|
| 19 | ~~The electronic display assembly of claim 18 wherein: the open loop of ambient air is prohibited from mixing with the closed loop of isolated gas when it passes through the housing.~~ |
|----|---|

Ohta in combination with Marumoto renders this limitation obvious. As noted above, the open loop of ambient air is prohibited from mixing with the closed loop of isolated gas. (*Supra*, §X.J.2; Ex. 1002, ¶¶386-387.)

P. Claim 20

| | |
|----|--|
| 20 | ~~The electronic display assembly of claim 18 wherein: the open loop of ambient air will pass between the rear surface of the electronic display and an exterior surface of the rear cooling chamber.~~ |
|----|--|

Ohta in combination with Marumoto renders this limitation obvious. As noted above, the open loop of ambient air in Ohta as modified by Marumoto passes between the rear surface of the electronic display and an exterior surface of the rear cooling chamber. (*Supra*, §X.J.2; Ex. 1002, ¶389.)

Q. Independent Claim 21

1. 21[pre]

| | |
|---------|---|
| 21[pre] | ~~An electronic display assembly comprising:~~ |
|---------|---|

To the extent the preamble is limiting, Ohta in combination with Marumoto discloses this limitation. (*See supra*, §X.A.1; Ex. 1002, ¶391.)

2. 21[a]

| | |
|-------|---|
| 21[a] | ~~an electronic display housing:~~ |
|-------|---|

Ohta in combination with Marumoto renders this limitation obvious. (*Supra*, §X.A.1; Ex. 1002, ¶392.)

3. 21[b]

| | |
|-------|--|
| 21[b] | ~~a closed loop of cooling gas adapted for circulation within the electronic display housing;~~ |
|-------|--|

Ohta in combination with Marumoto renders this limitation obvious. (*Supra*, §§X.A.3, X.H.4; Ex. 1002, ¶393.)

4. 21[c]

| | |
|-------|---|
| 21[c] | ~~an open loop ambient air pathway through the electronic display housing; and~~ |
|-------|---|

Ohta in combination with Marumoto renders this limitation obvious. (*See supra*, §X.A.5; Ex. 1002, ¶394.)

5. 21[d]

| | |
|-------|--|
| 21[d] | ~~an electronic display positioned within the electronic display housing such that the electronic display is isolated from the closed loop of cooling gas but contactable by ambient air flowing through the open loop ambient air pathway;~~ |
|-------|--|

Ohta in combination with Marumoto renders this limitation obvious. (Ex. 1002, ¶¶395-396.)

As noted above, the plasma display **5** is isolated from the closed loop of cooling gas. (*Supra*, §X.A.4.)

The electronic display in Ohta as modified by Marumoto is contactable by ambient air flowing through the open loop pathway. (Ex. 1002, ¶396; *supra* §§X.A.6, X.H.4.)

6. 21[e]

| | |
|-------|--|
| 21[e] | ~~wherein the electronic display is coolable by a combination of closed loop cooling gas circulation within the electronic display housing, and ambient air flow through the open loop ambient air pathway in the electronic display housing.~~ |
|-------|--|

Ohta in combination with Marumoto renders this limitation obvious. (*Supra*, §X.A.6; Ex. 1002, ¶397.)

R. Claim 22

1. 22[a]

| | |
|-------|--|
| 22[a] | ~~The electronic display assembly of claim 21 wherein: the closed loop of cooling gas is isolated within a continuous loop gas cooling chamber, and~~ |
|-------|--|

Ohta in combination with Marumoto renders this limitation obvious. (*Supra*, §X.B; Ex. 1002, ¶399.)

2. 22[b]

| | |
|-------|--|
| 22[b] | ~~the open loop ambient air pathway is configured to direct the ambient air over an exterior surface of the gas cooling chamber when it flows through the electronic display housing.~~ |
|-------|--|

Ohta in combination with Marumoto renders this limitation obvious. (*Supra*, §X.J.2; Ex. 1002, ¶400.)

S. Claim 23

1. 23[a]

| | |
|-------|---|
| 23[a] | ~~The electronic display assembly of claim 22 further comprising: a fan located within the electronic display housing,~~ |
|-------|---|

Ohta in combination with Marumoto renders this limitation obvious. (*Supra*, §X.Q.4; Ex. 1002, ¶402.)

2. 23[b]

| | |
|-------|---|
| 23[b] | ~~the fan configured and oriented to move air located within the housing between a surface of the continuous loop gas cooling chamber and a rear surface of the electronic display~~ |
|-------|---|

Ohta as modified with Marumoto renders this limitation obvious. (*Supra* at §X.Q.5; Ex. 1002, ¶¶403-404.)

T. Motivation to Combine Ohta and Marumoto

A POSITA would be motivated to modify the teachings from Ohta's closed loop cooling system for a plasma display (*see* Ex. 1004, ¶¶[0006], [0023]), with the teachings from Marumoto's closed loop cooling system for a LCD panel in two ways: (i) to replace the liquid cooling medium in Ohta with gas and (ii) to replace the plasma display in Ohta with an LCD as in Marumoto.

First, a POSITA would have been motivated to replace the liquid closed loop cooling system in Ohta with a gas-based cooling system disclosed in order to reduce maintenance costs, prevent leakage of the liquid cooling fluid and reduce energy costs. (Ex. 1002, ¶406.)

Ohta already contemplates the use of a transparent cooling fluid, and explicitly contemplates using gas for at least an open loop cooling system. (Ex. 1004, ¶¶[0023]-[0024].) The fact that Marumoto discloses that its cooling material "may be a gas or a fluid" (Ex. 1005, ¶[0007]), one example of which is air (i.e. a transparent cooling fluid), underscores that a POSITA would have a reasonable expectation of succeeding in replacing the transparent cooling fluid of Ohta with a transparent gas. (Ex. 1002, ¶408.) Indeed, Ohta discloses in "embodiment example 5" that "outside air [] blown into the" housing can sufficiently cool the display. (Ex. 1004, ¶¶[0030]-[0031].)

And while Ohta teaches that a benefit from using liquid cooling fluid is it can be dyed with pigment to reduce the permeability of the cooling fluid to visible light by 50% (Ex. 1004, ¶[0019]), it also discloses that the “face plate 3 [may be] colored to have roughly 50% permeability to visible light, and using transparent cooling fluid 6.” (Ex. 1004, ¶[0023]). Thus, the transparent liquid cooling fluid can be replaced with gas without degrading system performance, while producing cost savings by removing the need for dyed pigment. (Ex. 1002, ¶408.)

And in both Ohta and Marumoto, the electronic display is located outside the closed loop cooling chamber, reflecting that the substitution of gas/air for a transparent cooling liquid will work in either cooling system. (Ex. 1004, Fig. 3; Ex. 1005, Fig. 1.) The power systems for both Ohta and Marumoto are likewise compatible. (Ex. 1002, ¶408.)

Second, a POSITA would have been motivated to modify the display assembly in Ohta by replacing the plasma display with an LCD display. As noted in Ohta, plasma displays suffer from poor contrast due to reflection of external light onto the display. (Ex. 1004, ¶[0013].) To address this, Ohta resorts to dying the cooling fluid or coloring a face plate to reduce permeability to visible light. (*Id.*, ¶¶[0022]-[0023].) The use of such techniques, however, have the downside of darkening the images being shown on the display. (Ex. 1002, ¶408.) In contrast,

the liquid crystal panel in Marumoto provides strong contrast without the need for colored equipment or dyed fluids. (*Id.*, ¶411.)

The fact that the cooling chamber of the closed loop in Ohta borders the front surface of the plasma display but that the cooling chamber of the closed loop in Marumoto borders the rear surface of the LCD display would not dissuade a POSITA from replacing the plasma display in Marumoto with an LCD display. Rather, a POSITA would recognize the need to cool the front surface of an LCD display to protect it from solar load when placed outdoors. (*Id.*, ¶412.) And the fact that Ohta discloses that at least one fan is place to the rear of the display to “forcibly air cool[]” the heat sink would inform a POSITA that Ohta already discloses a way to cool the backlight of the LCD. (*Id.*)

Finally, the combination of Ohta and Marumoto would have been combining known prior art techniques (employing air to cool a LCD panel located) to obtain the predictable results described above. (*Id.*, ¶413.)

XI. GROUND 4 – CLAIMS 1, 4, 5, 8-23 ARE OBVIOUS OVER OHTA AND MARUMOTO IN FURTHER IN VIEW OF YARE

Ground 3 explains why the combination of Ohta and Marumoto discloses the limitations in claims 1, 4-5 and 8-23. (*Supra*, §X.) Nevertheless, to the extent that the combination of Ohta and Marumoto does not disclose or suggest a housing for use with a combined open and closed loop cooling system, it would have been obvious to include a housing such as that disclosed by Yare (Ex. 1013).

Yare discloses “a cabinet for mounting a display system” that includes a cooling system which can be used with several types of displays including plasma and LCD. (*Supra* §VII.E.) Yare includes a dual open and closed loop cooling system that leverages the use of a heat sink as in Ohta. (Ex. 1002, ¶418.) Yare discloses a variety of benefits derived from its cooling system and housing including that “[d]ue to the design and configuration of the cabinet and components,” the display and cooling system will be “much easier to clean . . . facilitating reduced downtime and maintenance costs[]” and that “should a fire occur in the sealed [closed loop] zone, any smoke created would be contained and the fire should burn out very quickly.” (Ex. 1013, 7:8-20.)

A POSITA would have recognized the predictable benefits of adding the housing disclosed in Yare to Ohta’s and Marumoto’s dual open loop and closed loop system because Yare’s design will accommodate all three systems. (Exs. 1002, ¶419; 1004, Fig. 3; 1005, Fig. 1; 1013, Fig. 1.) Meanwhile, Ohta acknowledges in “embodiment example 5” that an electronic display and cooling system could be included in the same housing. (Ex. 1004, ¶31.)

Moreover, to a POSITA, the combination of Ohta and Marumoto with Yare would have been combining known prior art elements (employing a common housing for a LCD panel leveraging closed loop and open loop cooling techniques) to improve a similar apparatus (the closed loop gas cooling chamber used with a

heat sink forcibly cooled using ambient air) in the same way as Yare describes, to yield predictable results described above. (Ex. 1002, ¶420.)

Finally, a POSITA would have understood that these predictable, beneficial results can be obtained without requiring substantial modifications to any of Ohta's, Marumoto's or Yare's systems. As such, a POSITA would have expected the combination of Ohta, Marumoto and Yare to succeed. (*Id.*, ¶421.)

XII. GROUND 5 – CLAIMS 12-20 ARE OBVIOUS OVER KITAMURA AND HARRIS

A. Claim 12

1. 12[pre]

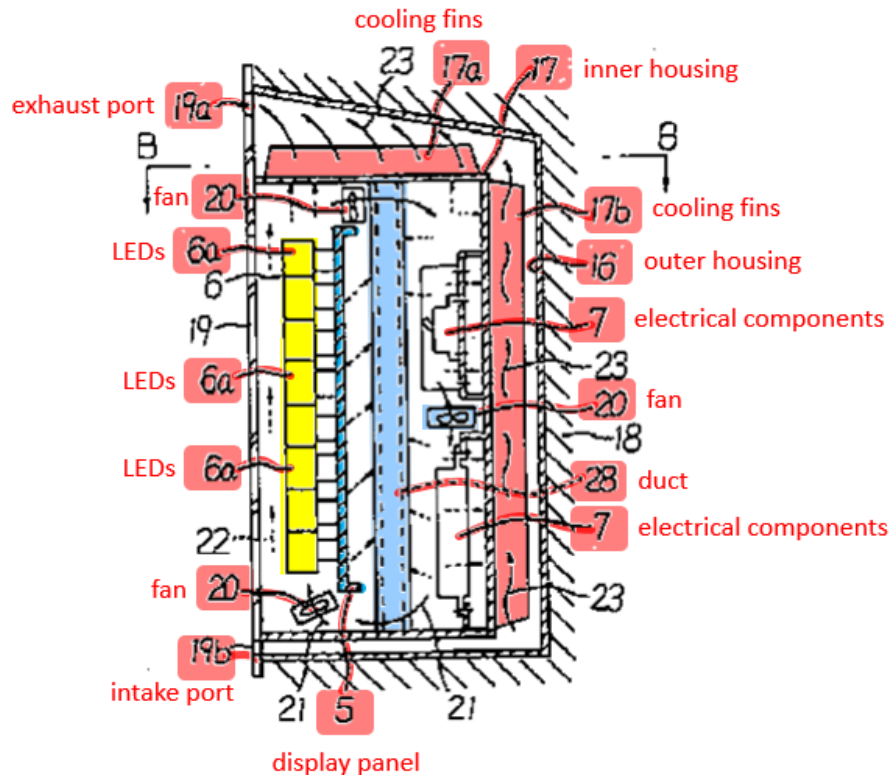
| | |
|--------------------|---|
| ~~12[pre]~~ | ~~An electronic display assembly comprising:~~ |
|--------------------|---|

To the extent the preamble is limiting, Kitamura discloses this limitation. (Ex. 1002, ¶¶423-425.) Kitamura discloses a direct-view LED “electronic display device” that includes display panel 5, LED module 6 and electrical components 7. (Ex. 1017, ¶¶[0014], [0022], Fig. 4). Kitamura thus discloses an “electronic display assembly.” (Ex. 1002, ¶425.)

2. 12[a]

| | |
|------------------|-----------------------|
| ~~12[a]~~ | ~~a housing;~~ |
|------------------|-----------------------|

Kitamura in combination with Harris renders this limitation obvious. (Ex. 1002, ¶¶426-428.) An outer housing 16 is installed in a wall 18 and an inner housing 17 contains the electronic display. (Ex. 1017, ¶¶[0011], [0014], Fig. 4.)



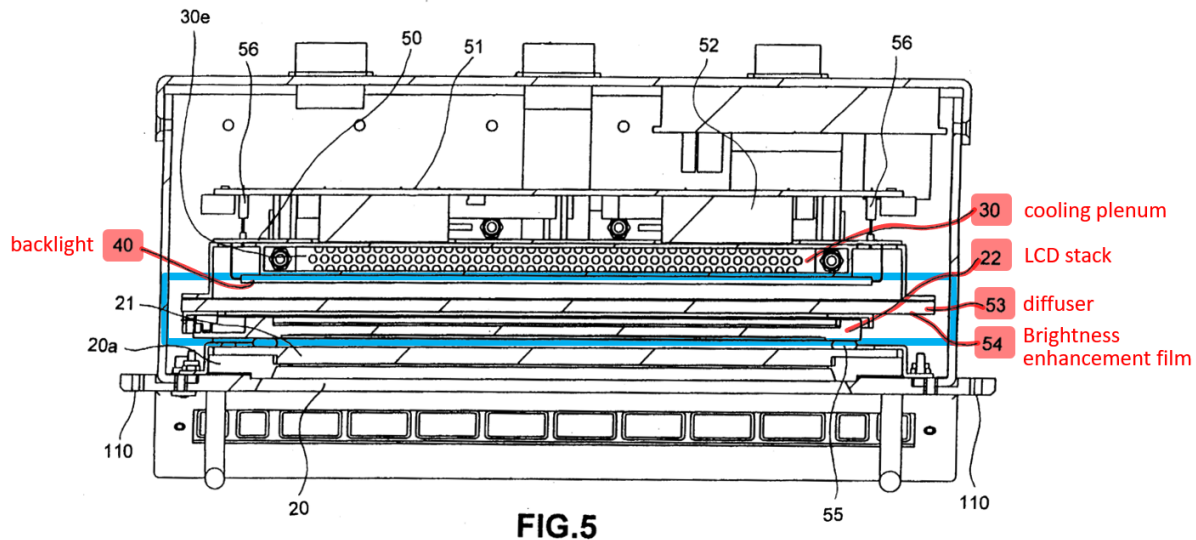
(*Id.*, Fig. 4 (annotated).)

3. 12[b]

| | |
|-------|--|
| 12[b] | a liquid crystal display (LCD) positioned within the housing and having a backlight; |
|-------|--|

Kitamura in combination with Harris renders this limitation obvious. (Ex. 1002, ¶¶429-433.) As noted above, Kitamura discloses a direct-view LED display. Meanwhile, Harris discloses an LCD display positioned within a housing and having

a backlight. Specifically, Harris discloses an “enclosure” that “houses a liquid crystal display” and includes a “backlighting unit [that] backlights the display screen.” (Ex. 1018, 2:8-13.) The LCD display in Harris includes backlight **40** and LCD stack **22**. (Exs. 1018, 5:41-61; 7:31-44; 8:28-35; 1002, ¶431.)



(Ex. 1018, Fig. 5 (annotated).)

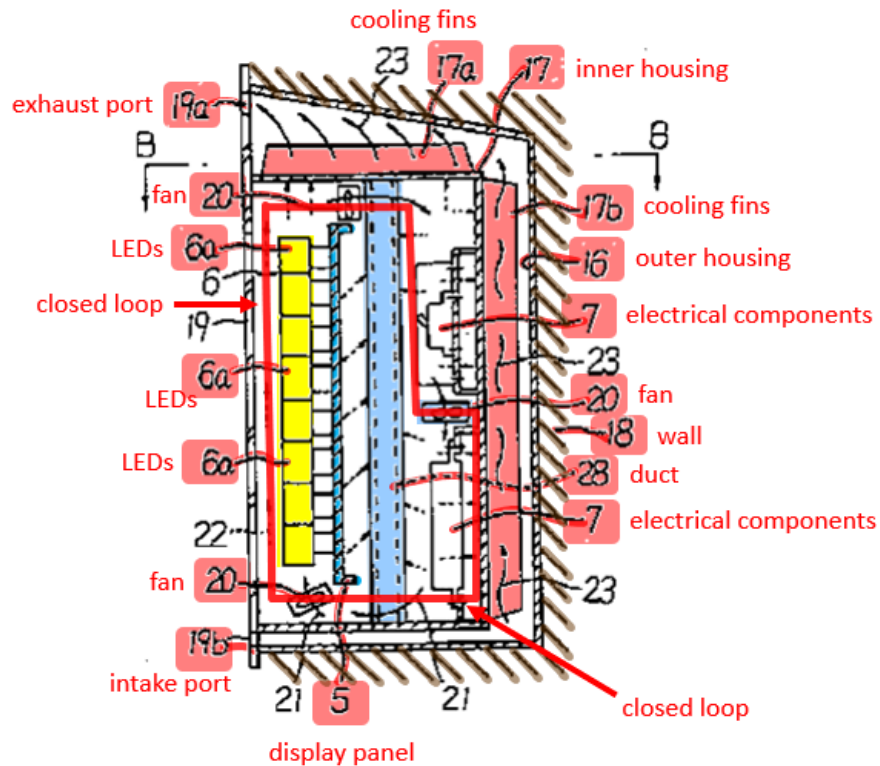
As discussed below, a POSITA at the time of the invention would have been motivated to replace the display portion of the assembly in Kitamura located to the left of duct **28** (e.g., display panel **5** and LED module **6**) with the LCD display and associated cooling apparatus disclosed in Harris in order to improve the overall reliability and functionality of the display. (*Infra*, §XII.J.) Kitamura in combination with Harris thus discloses this limitation.

4. 12[c]

| | |
|-------|---|
| 12[c] | ~~wherein the electronic display is coolable by a combination of a closed loop of isolated gas which circulates within the housing and an open loop of ambient air which passes through the housing and along the backlight.~~ |
|-------|---|

Kitamura in combination with Harris renders this limitation obvious. (Ex. 1002, ¶¶434-441.) Specifically, Kitamura, as modified by Harris includes an electronic display coolable by a combination of a the claimed “closed loop of isolated gas” and “open loop of ambient air.”

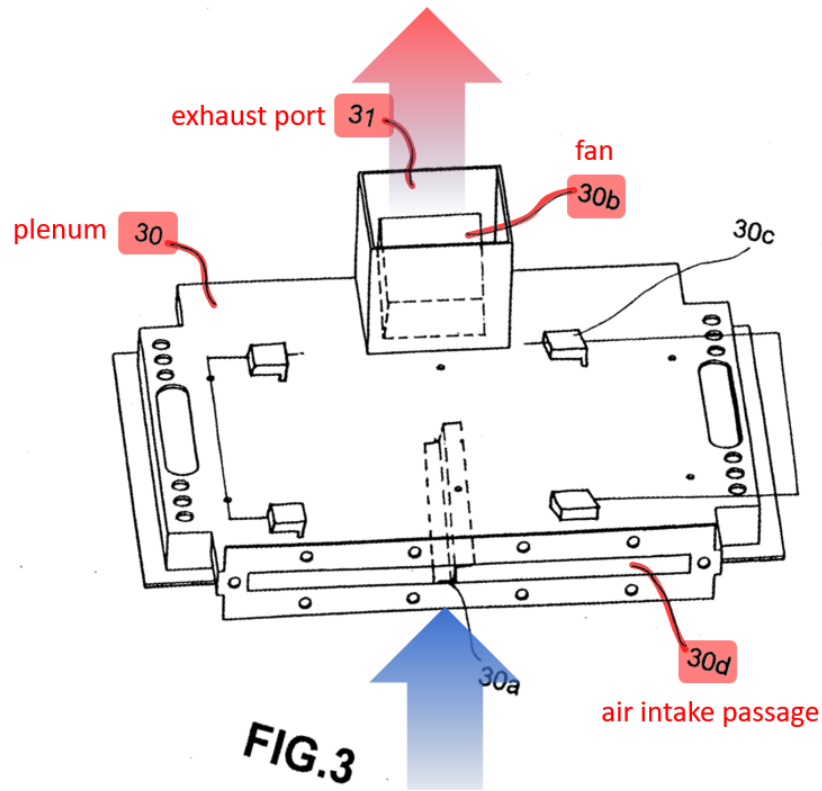
The inner housing **17** in Kitamura is “hermetically sealed” and the display is convectively cooled by the fins located on the outer surface of inner housing **17** and the inner surface of duct **28**. (Ex. 1017, ¶[0024].) The fans **20** create a closed loop circling the direct-view LED display (display panel **5** and LED module **6**) and electrical components **7** as shown below. (Exs. 1017, ¶[0022]; 1002, ¶435.)



(Ex. 1017, Fig. 4 (annotated).)

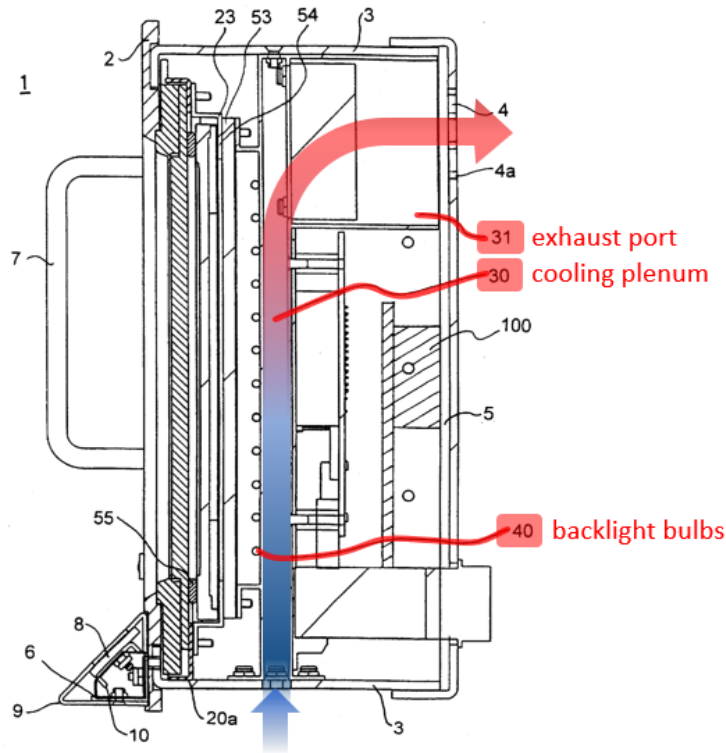
Harris discloses an open loop of ambient air which passes through the housing and along the backlight. The plenum **30** is “a hollow channel [] for airflow” behind the display where “forced convection cooling is used to dissipate the heat removed from the sealed flow path created by the plenum **30**.” (Ex. 1018, 5:18-23, 6:5-9.) The open loop cooling apparatus in Harris includes an air intake passage **30d**, an exhaust port **31**, fan **30b** and a plenum **30**. (Ex. 1018, Fig. 3, 5:18-41.) Fan **30b** is “mounted within the exhaust port **31** for evacuating heat generated by bulbs **40**, through the exhaust port **31**.” (Ex. 1018, 5:39-41.) Ambient air thus enters through

air intake passage **30d** and exhausts through port **31** as shown below. (Ex. 1018, 6:26-31.)



(Ex. 1018, Fig. 3 (annotated).)

The open loop of ambient air in Harris also passes through the housing and along the backlight. The backlight module in Harris is mounted directly to a plenum **30**. (Ex. 1018, 5:41-52, Fig. 1.)



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

Among the reasons for modifying Kitamura with Harris is the structural similarity between the two electronic display assemblies, namely, the cooling plenum **30** in Harris and the duct **28** in Kitamura. (*Infra*, §XII.J.) Just as the LCD backlight in Harris was mounted to the plenum in order to maximize cooling efficiency, a POSITA would be motivated to mount the backlight in a modified version of Kitamura on duct **28**. A POSITA would also modify duct **28** by adding a drawing fan as in Harris in order to cool the backlight while maintaining the sealed environment inside inner housing **17** to protect the display and electrical components. (Ex. 1002, ¶438.)

In addition, Kitamura as modified by Harris would also retain the closed loop of isolated gas in inner housing 17 disclosed in Kitamura that cools electrical components 7 and the display. (*Id.*, ¶439.)

Kitamura as modified by Harris thus discloses each element in this limitation.

B. Claim 13

| | |
|----|--|
| 13 | ~~The electronic display assembly of claim 12 wherein: the isolated gas will cool a front surface of the LCD.~~ |
|----|--|

Kitamura in combination with Harris renders this limitation obvious. (Ex. 1002, ¶¶442-444.) As noted above (*supra*, §XII.A.4), Kitamura as modified by Harris includes a closed loop of isolated gas which, as shown above, cools the front surface of the LCD. (Ex. 1002, ¶443.)

C. Claim 14

1. 14[a]

| | |
|-------|---|
| 14[a] | ~~The electronic display assembly of claim 12 further comprising: a rear cooling chamber positioned behind the LCD and containing the closed loop of isolated gas;~~ |
|-------|---|

Kitamura in combination with Harris renders this limitation obvious. (Ex. 1002, ¶¶446-447.) Kitamura as modified by Harris retains the closed loop of isolated gas taught by Kitamura, including the closed loop of isolated gas located on the rear

side of duct **28**. (*Supra*, §XII.A.4.) A portion of this closed loop is located behind the LCD.

2. 14[b]

| | |
|------------------|--|
| ~~14[b]~~ | ~~and wherein the open loop ambient air will contact an exterior surface of the chamber, but is not permitted to enter the chamber.~~ |
|------------------|--|

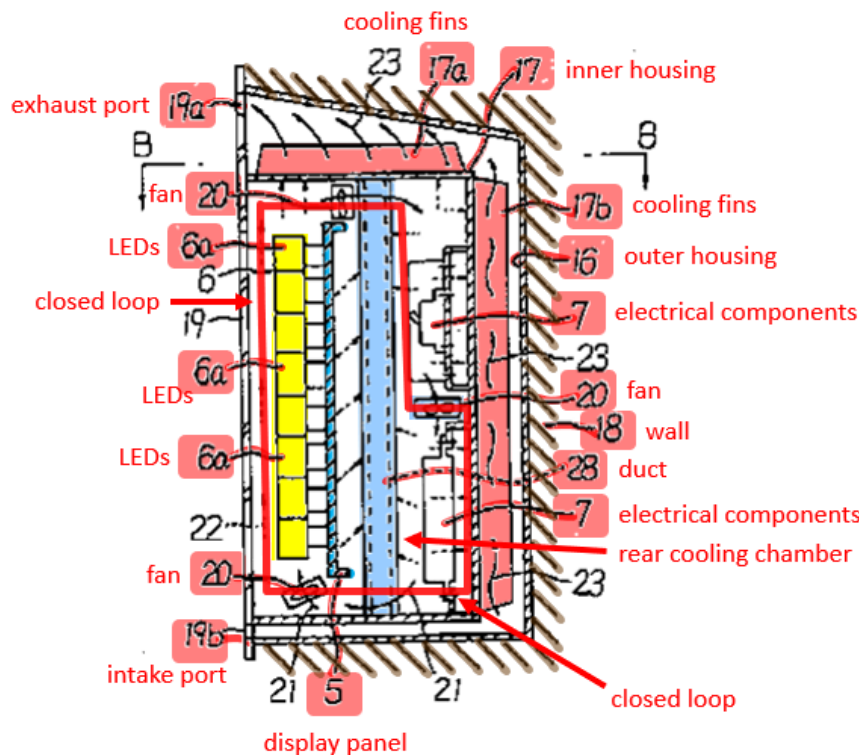
Kitamura in combination with Harris renders this limitation obvious. (Ex. 1002, ¶¶448-449.) The closed loop of isolated gas is located outside duct **28**. The open loop of ambient air traveling through duct **28** thus contacts an exterior surface of the closed loop of isolated gas, but is not permitted to enter the chamber. (*Id.*, ¶449.)

D. Claim 15

| | |
|---------------|--|
| ~~15~~ | ~~The electronic display assembly of claim 12 further comprising: one or more electronic components for driving the LCD positioned within the rear cooling chamber.~~ |
|---------------|--|

Kitamura in combination with Harris renders this limitation obvious. (Ex. 1002, ¶¶450-452.) Kitamura discloses a rear chamber containing “electrical parts for control 7” (Ex. 1017, ¶[0022]) which are cooled by the closed loop of isolated gas created by fans **20**, specifically the portion of the cooling chamber located behind the display as shown below.

Kitamura in combination with Harris renders this limitation obvious. (Ex. 1002, ¶¶453-454.) As noted below, a POSITA would be motivated to modify Kitamura to replace the direct-view LED display with an LCD display and to add a fan to duct 28 to cool the LCD backlight. (*Infra*, XII.J.) The resultant open loop of ambient air contacts an exterior surface of the rear cooling chamber located behind the display. (*Supra*, §XII.C.2.) Meanwhile, the closed loop of isolated gas is permitted to contact an interior surface of the rear cooling chamber.

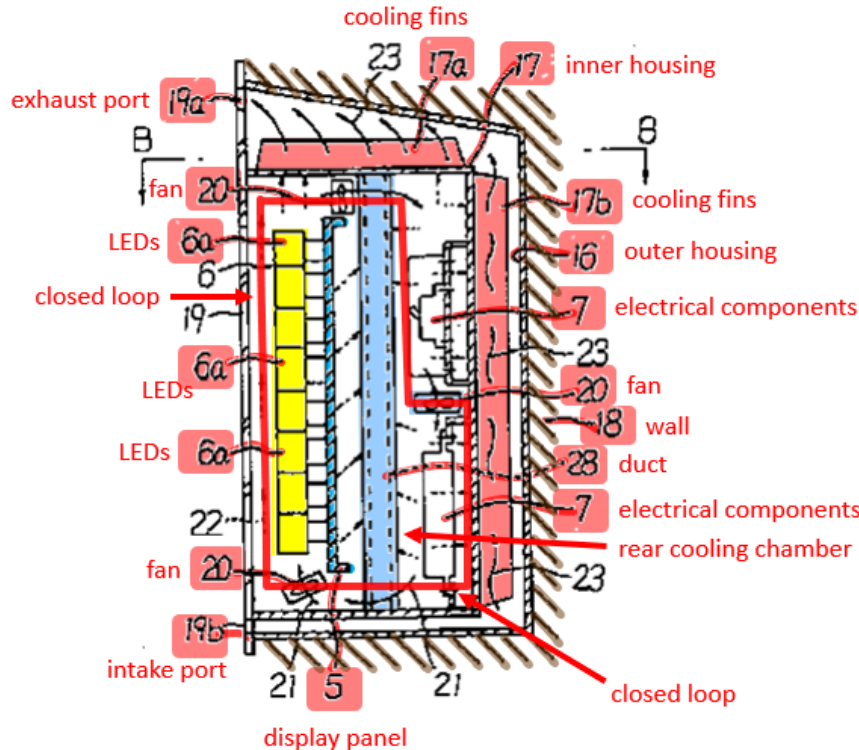


(Ex. 1017, Fig. 4 (annotated); Ex. 1002, ¶454.)

F. Claim 17

| | |
|----|--|
| 17 | ~~The electronic display assembly of claim 12 wherein: the intended direction of closed loop isolated gas flow is substantially perpendicular to the intended direction of open loop of ambient air flow.~~ |
|----|--|

Kitamura in combination with Harris renders this limitation obvious. (Ex. 1002, ¶¶455-457.) The fans **20** in Kitamura cause air to flow in three dimensions around the display and electrical components in the closed loop isolated gas chamber including in a lateral direction across the display and electrical components. (*Id.*, ¶456.) Meanwhile, ambient air flowing through duct **28** in Kitamura as modified with the open loop fan in Harris flows entirely in a vertical direction as shown below. (*Id.*)



(Ex. 1017, Fig. 4 (annotated); Ex. 1002, ¶456.) The intended direction of the closed loop isolated gas flow is thus substantially perpendicular to the intended direction of open loop ambient air flow. (Ex. 1002, ¶456.)

G. Claim 18

1. 18

| | |
|--------------------------|---|
| ~~18<pre></pre>~~ | ~~An electronic display assembly comprising:~~ |
|--------------------------|---|

To the extent the preamble is limiting, Kitamura discloses this limitation. (*See supra*, §XII.A.1; Ex. 1002, ¶459.)

2. 18[a]

| | |
|------------------|-----------------------|
| ~~18[a]~~ | ~~a housing;~~ |
|------------------|-----------------------|

Kitamura in combination with Harris renders this limitation obvious. (*See supra*, §XII.A.2; Ex. 1002, ¶460.)

3. 18[b]

| | |
|------------------|---|
| ~~18[b]~~ | ~~an electronic display positioned within the housing;~~ |
|------------------|---|

Kitamura in combination with Harris renders this limitation obvious. (*See supra*, §XII.A.3; Ex. 1002, ¶461.)

4. 18[c]

| | |
|------------------|--|
| ~~18[c]~~ | ~~a rear cooling chamber positioned behind the electronic display and containing an electrical component which is electrically connected to the electronic display;~~ |
|------------------|--|

Kitamura in combination with Harris renders this limitation obvious. (Ex. 1002, ¶¶462-463.) As noted above, Kitamura discloses a rear cooling chamber positioned behind the electronic display and containing an electrical component, such as a driver. (*Supra*, §XII.D.) A POSITA would understand that such an electrical component is electrically connected to the electronic display. (Ex. 1002, ¶463.)

5. 18[d]

| | |
|-------|---|
| 18[d] | ~~a front surface on the electronic display which faces an intended viewer and a rear surface on the electronic display which opposes the front surface;~~ |
|-------|---|

Kitamura in combination with Harris renders this limitation obvious. (Ex. 1002, ¶¶464-465.) Kitamura discloses an electronic display mounted in, and covered by, a wall in three directions. (Ex. 1017, Fig. 4.) Kitamura includes a front surface (screen 19) facing an intended viewer and a rear surface which opposes the front surface. Such features continue even after Kitamura is modified by Harris. (Ex. 1002, ¶465.)

6. 18[e]

| | |
|-------|--|
| 18[e] | ~~wherein the front surface of the electronic display is coolable by a closed loop of isolated gas and the rear surface of the electronic display is coolable by an open loop of ambient air.~~ |
|-------|--|

Kitamura in combination with Harris renders this limitation obvious. (Ex. 1002, ¶466; *supra*, §§XII.5.4, XII.B, XII.C.2.)

H. Claim 19

| | |
|----|---|
| 19 | ~~The electronic display assembly of claim 18 wherein: the open loop of ambient air is prohibited from mixing with the closed loop of isolated gas when it passes through the housing.~~ |
|----|---|

Kitamura in combination with Harris renders this limitation obvious. (Ex. 1002, ¶¶467-468.) As noted above, the open loop of ambient air is prohibited from mixing with the closed loop of isolated gas. (*Supra*, §§XII.5.4, XII.C.2.)

I. Claim 20

| | |
|----|--|
| 20 | ~~The electronic display assembly of claim 18 wherein: the open loop of ambient air will pass between the rear surface of the electronic display and an exterior surface of the rear cooling chamber.~~ |
|----|--|

Kitamura in combination with Harris renders this limitation obvious. (Ex. 1002, ¶¶469-470.) As noted above, a POSITA would be motivated to add a fan to duct **28** in Kitamura in order to cool a modified version of Kitamura containing an LCD display. (*Supra*, §XII.A.4.) And the backlight of such an LCD display would be mounted to duct **28**. The open loop of ambient air in Kitamura as modified by Harris thus passes between the rear surface of the display and an exterior surface of the rear cooling chamber. (Ex. 1002, ¶470.)

J. Motivation to Combine Kitamura and Harris

A POSITA would have been motivated to combine the teachings in Kitamura and Harris and to modify Kitamura by (i) replacing the direct-view LED display with an LCD and (ii) adding an open loop fan to duct **28** to facilitate cooling of the LCD backlight while retaining the closed loop around the display and electrical components.

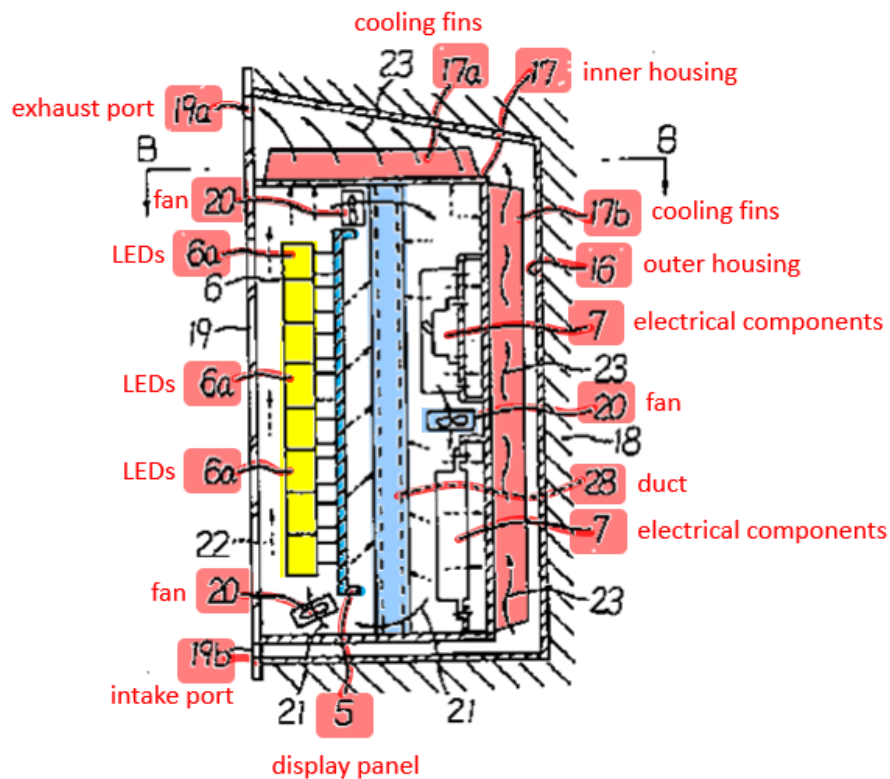
Both Kitamura and Harris disclose electronic displays that are permanently mounted, for example, in the side of a building. (Ex. 1017, ¶[0011]; Ex. 1018, 2:19-26.) A POSITA in March 2008 would have understood that direct-view LED displays have limited utility for information or advertising purposes due to their low resolution. (Ex. 1002, ¶473.) For at least this reason, LED displays are best used in low-information content applications or in large panel arrays that are viewed from a distance, as in a stadium. (*Id.*) A POSITA would have been motivated to improve on the low resolution in LED displays as in Kitamura and would have immediately recognized and embraced the advantages of an LCD panel and backlight as exemplified by Harris because of their superior clarity and resolution. (*Id.*)

And as part of this simple modification to Kitamura's ducting **28**, a POSITA would also add a drawing fan similar to fan **30b** in Harris in order to provide sufficient ambient air to cool the backlight of the LCD display while maintaining the sealed environment inside inner casing **17**. (*Id.*, ¶474.) Harris even provides an explicit suggestion to make this modification, noting it would improve system reliability because Harris's device design "has been certified in a number of different tests to measure its survivability and performance criteria[.]" and proven to satisfy a variety of identified test specifications for "vibration, shock, extreme temperature, [and] humid and dusty environments[.]" (Ex. 1018, 8:42-9:22.) A POSITA would have immediately recognized such a beneficial

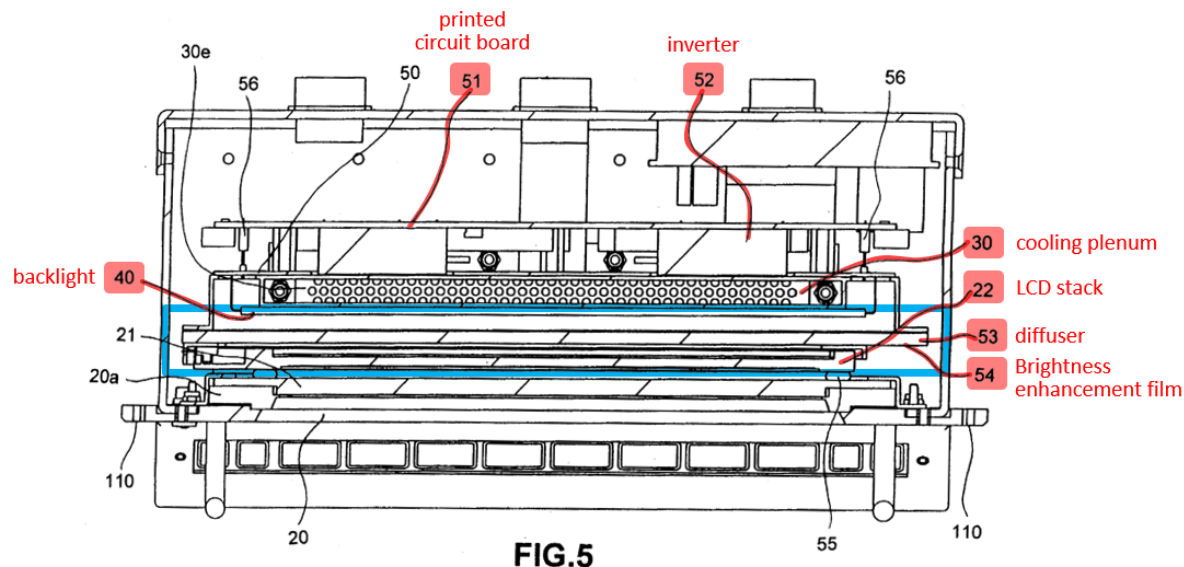
modification can be accomplished without degrading overall system performance.

(Ex. 1002, ¶475.)

Finally, a POSITA would understand that there is a reasonable expectation of success in making these modifications. The similarity between Kitamura's Figure 4 and Harris's Figure 5 in structural features, such as duct **28** in Kitamura and the cooling plenum **30** in Harris and the placement of electrical components behind the electronic display such as electrical components **7** in Kitamura and inverter **52** in Harris, is evident from a cursory inspection of the figures below. Because a POSITA would want to preserve structure of the in-wall unit from Kitamura, they would simply "plug in" Harris's LCD. (*Id.*, ¶473.)



(Ex. 1017, Fig. 4 (annotated).)



(Ex. 1018, Fig. 5 (annotated).)

Modifying Kitamura with Harris's open loop-cooled LCD display and backlight would have involved combining known prior art elements relating to similar structures and similar cooling mechanisms according to known methods to obtain the predictable results of reliable energy, temperature and environmental efficiency. (Ex. 1002, ¶475.)

XIII. 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, ¶¶476-488.)

XIV. 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 15, 2022~~ May 9, 2023

Respectfully submitted,

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XVI. CLAIM APPENDIX OF THE CHALLENGED CLAIMS

- 1[pre] An electronic display assembly comprising:
- 1[a] an electronic display housing;
- 1[b] a gas-containing closed loop gas cooling chamber
- 1[c] an electronic display positioned within the electronic display
housing but outside of the closed loop gas cooling chamber, and
- 1[d] an open loop ambient air pathway through the electronic
display housing;
- 1[e] wherein the electronic display is coolable by a combination
of gas circulation within the closed loop gas cooling chamber and
ambient air flow through the open loop ambient air pathway in the
electronic display housing.
- 4 The electronic display assembly of claim 1 wherein: the gas
within the closed loop gas cooling chamber is isolated from the open
loop of ambient air.
- 5 The electronic display assembly of claim 1 wherein: the
closed loop gas cooling chamber and the ambient air pathway are
configured such that gas circulation within the gas cooling chamber
will occur in a direction that is substantially perpendicular to the

direction that ambient air will flow through the electronic display housing.

8 The electronic display assembly of claim 1 wherein: the closed loop gas cooling chamber is partially defined by a sealed rear plenum that prevents ambient air from entering the plenum.

9 The electronic display assembly of claim 8 further comprising: one or more electronic devices for operating the electronic display positioned within the sealed plenum.

10 The electronic display assembly of claim 1 wherein: the electronic display is selected from the group consisting of a liquid crystal display, a light emitting diode display, an organic light emitting diode display, a field emitting display, a cathode ray tube display, and a plasma display.

11[pre] The electronic display assembly of claim 1 further comprising:

11[a] a gas-circulating fan for circulating the gas within the closed loop gas cooling chamber, and

11[b] a fan for producing a flow of ambient air through the open loop ambient air pathway in the electronic display housing.

12[pre] An electronic display assembly comprising:

- 12[a] a housing;
- 12[b] a liquid crystal display (LCD) positioned within the housing
and having a backlight;
- 12[c] wherein the electronic display is coolable by a combination
of a closed loop of isolated gas which circulates within the housing
and an open loop of ambient air which passes through the housing
and along the backlight.
- 13 The electronic display assembly of claim 12 wherein: the
isolated gas will cool a front surface of the LCD.
- 14[pre] The electronic display assembly of claim 12 further
comprising:
- 14[a] a rear cooling chamber positioned behind the LCD and
containing the closed loop of isolated gas; and
- 14[b] wherein the open loop ambient air will contact an exterior
surface of the chamber, but is not permitted to enter the chamber.
- 15 The electronic display assembly of claim 12 further
comprising: one or more electronic components for driving the
LCD positioned within the rear cooling chamber.

16 The electronic display assembly of claim 12 wherein: the open loop of ambient air will contact an exterior surface of the rear cooling chamber while the closed loop of isolated gas will contact an interior surface of the rear cooling chamber.

17 The electronic display assembly of claim 12 wherein the intended direction of closed loop isolated gas flow is substantially perpendicular to the intended direction of open loop of ambient air flow.

18[pre] An electronic display assembly comprising:

18[a] a housing

18[b] an electronic display positioned within the housing;

18[c] a rear cooling chamber positioned behind the electronic display and containing an electrical component which is electrically connected to the electronic display;

18[d] a front surface on the electronic display which faces an intended viewer and a rear surface on the electronic display which opposes the front surface;

18[e] wherein the front surface of the electronic display is coolable by a closed loop of isolated gas and the rear surface of the electronic display is coolable by an open loop of ambient air.

- 19 The electronic display assembly of claim 18 wherein: the
open loop of ambient air is prohibited from mixing with the closed
loop of isolated gas when it passes through the housing.
- 20 The electronic display assembly of claim 18 wherein: the
open loop of ambient air will pass between the rear surface of the
electronic display and an exterior surface of the rear cooling
chamber.
- 21[pre] An electronic display assembly comprising:
- 21[a] an electronic display housing:
- 21[b] a closed loop of cooling gas adapted for circulation within the
electronic display housing;
- 21[c] an open loop ambient air pathway through the electronic
display housing; and
- 21[d] an electronic display positioned within the electronic display
housing such that the electronic display is isolated from the closed
loop of cooling gas but contactable by ambient air flowing through
the open loop ambient air pathway;
- 21[e] wherein the electronic display is coolable by a combination
of closed loop cooling gas circulation within the electronic display

housing, and ambient air flow through the open loop ambient air pathway in the electronic display housing.

22[pre] The electronic display assembly of claim 21 wherein:

22[a] the closed loop of cooling gas is isolated within a continuous loop gas cooling chamber, and

22[b] the open loop ambient air pathway is configured to direct the ambient air over an exterior surface of the gas cooling chamber when it flows through the electronic display housing.

23 The electronic display assembly of claim 22 further comprising: a fan located within the electronic display housing, the fan configured and oriented to move air located within the housing between a surface of the continuous loop gas cooling chamber and a rear surface of the electronic display.

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 ~~13,992~~13,988 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 15~~May 9,
~~2022~~2023

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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 Power of Attorney, have~~ Exhibit 1033 has been served on
the Patent Owner via Federal Express Next Business Day Delivery ~~on the below~~
~~date,~~ at the following address:

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