

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

MANUFACTURING RESOURCES INTERNATIONAL, INC.
Petitioner

v.

SAMSUNG ELECTRONICS CO., LTD.
Patent Owner

Patent No. 8,842,253
Filing Date: February 28, 2013
Issue Date: September 23, 2014
Liquid Crystal Display Device Having Air Conditioner

Inter Partes Review No. IPR2023-01203

PETITION FOR *INTER PARTES* REVIEW

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LIST OF EXHIBITS

EXHIBIT	DESCRIPTION
1001	U.S. Patent No. 8,842,253 (“the ’253 Patent”)
1002	Prosecution History of U.S. Patent No. 8,842,253
1003	Declaration of Carl D. Meinhart, Ph.D.
1004	Curriculum Vitae of Carl D. Meinhart, Ph.D.
1005	JP2006-163217A to Nagayama (“Nagayama”)
1006	Certified Translation of Nagayama
1007	U.S. 6,493,440 to Gromatzky (“Gromatzky”)
1008	WO 2007/116125 to Karppanen (“Karppanen”)
1009	U.S. 6,104,451 to Matsuoka, et al. (“Matsuoka”)
1010	WO 2008/050660A2 to Utsunomiya (“Utsunomiya”)
1011	U.S. Patent No. 6,825,828 to Burke, et al. (“Burke”)
1012	German Utility Model DE 20 2007 000 047 U1 to Hannemann (“Hannemann”)
1013	Certified Translation of Hannemann

I. Mandatory Notices (37 C.F.R. § 42.8(b))

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

The real party-in-interest is Manufacturing Resources International, Inc. No other entity is controlling, directing, or funding the submission of this petition and any proceeding initiated as a result thereof.

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

The '253 Patent is asserted against Petitioner in the International Trade Commission investigation styled as *Components for Certain Environmentally-Protected LCD Digital Displays and Products Containing Same*, Inv. No. 337-TA-1349 (ITC) (the "ITC Action") filed on December 5, 2022. On or around the time Petitioner files this Petition, Petitioner will also file a Petition challenging the validity of certain claims of U.S. 8,223,311 and RE45,117, which are also asserted against Petitioner in the ITC Action.

C. Designation of Lead and Backup Counsel (37 C.F.R. § 42.8(b)(3)) and Service Information (37 C.F.R. § 42.8(b)(4)).

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Petitioner may be served via email to its lead and backup counsel at the email addresses above.

II. Introduction

The '253 Patent is invalid. The independent claims recite little more than a display in a housing and “a flow control device,” i.e., a fan, that controls air flow across a front channel between the display and a front side of the housing. Each of these elements was well-known in the art and they had been used in combination

for years prior to the '253 Patent's earliest priority date. The challenged claims should be cancelled as obvious.

III. IPR Requirements

A. Standing (37 C.F.R. § 42.104(a))

Petitioner certifies that the '253 Patent is available for IPR and that Petitioner is not barred or estopped from requesting IPR. The '253 Patent issued on September 23, 2014. There is no pending district court litigation, and the Board has “decline[d] to interpret § 315(b) as including ITC complaints.” *Robert Bosch Tool Corp. v SD3, LLC*, IPR2016-01753, Paper 15 at 11 (PTAB March 22, 2017)

B. Fees (37 C.F.R. § 42.103)

This Petition requests review of eighteen (18) claims of the '253 Patent and is accompanied by a payment of \$41,500, which includes the \$19,000 IPR request fee, and the \$22,500 post-institution fee. *See* 37 C.F.R. § 42.15(a). Thus, this Petition meets the fee requirements under 35 U.S.C. § 312(a)(1). The Board is hereby authorized to charge any additional fees required by this action to Deposit Account No. 20-1430.

C. Challenge Under 37 C.F.R. § 42.104(b)

This petition requests cancellation of claims 1-2, 4-12, and 14-20 (the “Challenged Claims”) as rendered obvious under 35 U.S.C. § 103 based on the following prior art references:

- JP2006-163217A to Nagayama (“Nagayama”) (Exs. 1005-1006),

- U.S. 6,493,440 to Gromatzky (“Gromatzky”) (Ex. 1007),
- WO 2007/116125 to Karppanen (“Karppanen”) (Ex. 1008)
- U.S. 6,104,451 to Matsuoka, et al. (“Matsuoka”) (Ex. 1009), and
- WO 2008/050660A2 to Utsunomiya (“Utsunomiya”) (Ex. 1010).

The statutory grounds for the challenge of each claim are set forth below:

Ground	35 U.S.C.	Claims	References
1	103	1-2, 4-7, 9-12, 14-18, and 20	Nagayama in view of Gromatzky, Matsuoka, and the knowledge of a POSITA
2	103	8 and 19	Nagayama, Gromatzky, Matsuoka, Utsunomiya and the knowledge of a POSITA
3	103	1-2, 4-7, 9, 11-12, 14-17, and 20	Karppanen in view of the knowledge of a POSITA
4	103	8 and 19	Karppanen in view of Utsunomiya and the knowledge of a POSITA
5	103	10 and 18	Karppanen in view of Gromatzky and the knowledge of a POSITA

The record establishes a reasonable likelihood of prevailing as to each ground of invalidity with respect to the Challenged Claims.

IV. Background

A. Priority Date and Family

The '253 Patent issued on September 23, 2014 from application number 13/780,137, filed February 28, 2013, which was a continuation of U.S. 8,411,227, which was a continuation of the original U.S. application that issued as U.S. 8,223,311. The original U.S. application (12/478,832) filed June 5, 2009, and claimed priority to Korean application number 10-2008-0055687, filed June 13, 2008. In the ITC Action, Patent Owner has asserted conception on April 22, 2008 and a reduction to practice on May 30, 2008.

B. The Specification, Figures, and Claims of the '253 Patent.

The '253 Patent relates to “a liquid crystal display device with a heat dissipation structure to cool the liquid panel of the device.” Ex. 1001, 1:20-23. The patent discloses an LCD panel within a housing. *Id.*, 4:56-67. The gaps between the LCD panel and front, top, and rear of the housing form three respective channels. *Id.*, 5:20-36. The first channel is defined by the space between a front protection panel and the LCD. *Id.*, 5:20-26. A second channel is defined between the LCD assembly and the top of the housing. *Id.*, 5:28-31. A third channel is defined between the LCD assembly and the rear of the housing. *Id.*, 5:30-32. A fan blows air through the channels, with cool air entering below the LCD screen at the base, passing over the front, top, and then rear of the LCD assembly. *Id.*, 5:45-62,

Fig. 2. Though these three channels are described as discrete channels, no physical barrier physically delineates boundaries between the first, second, and third channels, which form a continuous passageway for air around the LCD assembly.

Id., Fig. 2.

To provide cooling, the '253 patent explains that the air flow rate of the cooling fan may be responsive to a temperature sensor measurement of the air emerging from the channel. *Id.*, 9:42-52. A flow rate controller may be configured to control the cooling fan according to the temperature reading. *Id.*, 8:64-9:2. The sensor is described alternately as measuring air “having passed through the channel,” (*id.*, 3:5-8) and measuring the air “having passed through the first channel.” *Id.*, 3:33-38.

The air flow within the channel may also be turbulent, rather than laminar, which the patent describes as promoting heat removal, supposedly by better mixing of boundary layers. *Id.*, 6:33-41. Turbulence may be achieved by maintaining a minimum flow velocity within the air channel. *Id.*, 9:31-41. The '253 patent describes a front channel width of 5 to 25 mm as particularly desirable. *Id.*, 10:18-22. The specification describes that this range balances the requirements for airflow rate, pressure differential, and turbulence. *Id.*, 7:17-26.

During prosecution, the only substantive rejection was for obviousness-type double patenting over parent patents U.S. 8,411,227 and 8,223,311. After

submitting a Terminal Disclaimer, the application was allowed; however, the Applicant filed an RCE to add additional claims, which were also allowed without rejection.

V. Expert Testimony, Level of Skill in the Art, and Claim Construction

A. Declaration Evidence

This petition is supported by the declaration of Carl D. Meinhart, Ph.D, an expert with extensive experience in the relevant industry. *See* Ex. 1003. Dr. Meinhart has a master's degree and Ph.D. in Theoretical and Applied Mechanics from the University of Illinois at Urbana-Champaign. He is currently a Professor of Mechanical Engineering at the University of California – Santa Barbara (“UCSB”) and have been employed there as a professor, associate professor, or assistant professor since 1996. *See* Exs. 1003, 1004.

B. Person of Ordinary Skill in the Art

A person of ordinary skill in the art of the '253 Patent would have had at least Bachelor of Science degree in mechanical engineering, electrical engineering, or a similar degree with one or two years of graduate school training or one to two years of industry experience in the fields of mechanical design, fluid mechanics, heat transfer, or electronics cooling. Ex. 1003, ¶15.

Lack of work experience could have been remedied by additional education, and vice versa. Such academic and industry experience would be necessary to

appreciate what was obvious and/or anticipated in the industry and what a POSITA would have thought and understood at the time. Ex. 1003, ¶16.

C. Claim Construction

Nothing in the specification or prosecution history of the '253 Patent expressly defines any term appearing in any claim of the '253 Patent. Further, the Board does not need to construe any claim term for purposes of evaluating the prior art in this Petition, and thus for purposes of this proceeding only, Petitioner believes that no claim term requires construction.

VI. Prior Art

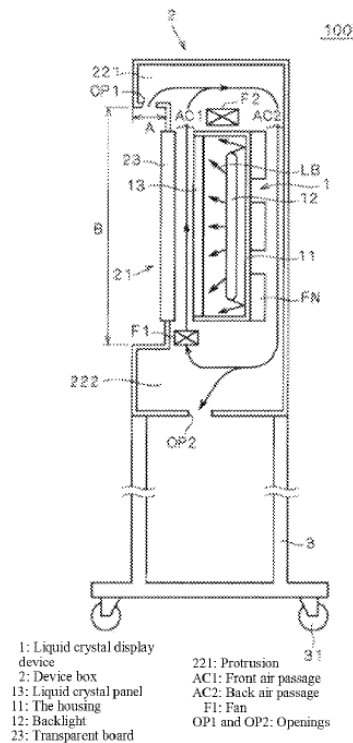
A. Nagayama (Exhibit 1006)

Nagayama was filed on December 10, 2004 and published on June 22, 2006. Nagayama is thus prior art under at least pre-AIA 35 U.S.C. § 102(b).

Nagayama “relates to a display device, and more particularly to an outdoor display device using a flat panel type display device as a display section.” Ex. 1006, [0001]. Nagayama more specifically discloses “[a] display device . . . that can efficiently dissipate heat generated from a flat panel type display device.” *Id.*, [Summary]. “[T]he liquid crystal display device 1 is arranged such that the liquid crystal panel 13 of the liquid crystal display device 1 and the transparent plate 23 do not adhere, and there is a gap (front air passage AC1) between the two.” *Id.*,

[Summary]. Nagayama discloses various embodiments of its display device. For example:

[FIG. 1]



Ex. 1006, Figure 1. “A fan F1, which is a means of generating airflow in the front air passage AC1, is arranged in the vicinity of the opening on the lower side of the front air passage AC1, and is configured to pump air from the lower side into the front air passage AC1.” *Id.*, [0022].

Nagayama further discloses “using a temperature sensor TS” to provide information to a “liquid crystal panel temperature control board TC,” which controls fans “to achieve a preset temperature.” Ex. 1006, [0074], Figure 9.

B. Gromatzky (Exhibit 1007)

Gromatzky was filed on April 23, 2001, and issued on December 10, 2002, and is prior art under pre-AIA 35 U.S.C. § 102(b).

Gromatzky “relates to a thermal management system for a LCD display having a thin depth enclosure, and that may be placed in and outdoor environment and/or device.” Ex. 1007, 2:53-55.

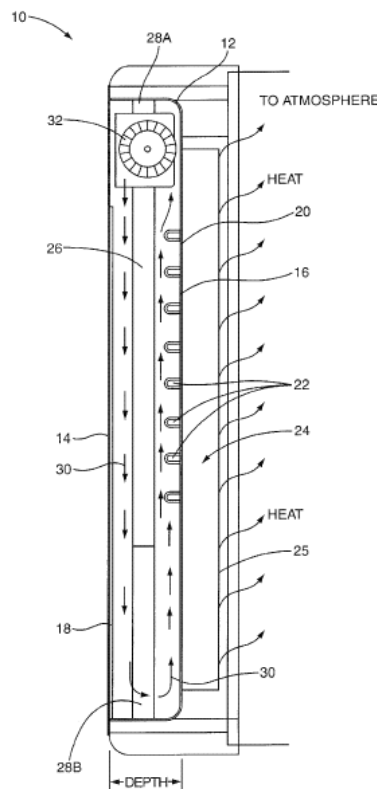


FIG. 1

Ex. 1007, Figure 1. “The LCD display 10 comprises an environmentally-sealed enclosure 12 that has a front portion 14 and a rear portion 16.” Ex. 1007, 2:64-66. “The enclosure 12 includes a transparent lens 18 at the front portion 14 of the enclosure 12 for external viewing of the LCD display 10.” Ex. 1007, 3:10-12.

“To dissipate the heat in the ambient air, thereby cooling the LCD module 26, an airflow path 30 is created around the LCD module 26 by placement of the LCD module 26 between the lens 18 and the backlight assembly 20.” Ex. 1007, 4:32-36. “The front of the LCD module 26 is placed approximately 9.4 millimeters from the lens 18.” Ex. 1007, 4:39-41. “In order to dissipate heat in the ambient air in the enclosure 12, a fan 32 is placed in the airflow path 30.” Ex. 1007, 4:52-53.

C. Karppanen (Exhibit 1008)

Karppanen was filed on February 22, 2007, and published on October 18, 2007, and is prior art to the '253 Patent under at least pre-AIA 35 U.S.C. § 102(a).

Karppanen discloses “an electronic information board comprising a frame (40), a flat display element (30), such as a TFT LCD display or a plasma display, for presenting information, and electronic equipment (62) for controlling the display element.” Ex. 1008, Abstract. As illustrated in Figure 1 of Karppanen, Karppanen discloses that a “display element 30” resides inside a “display casing 50,” which comprises a “back wall 52” and a “transparent front plate 54” that “forms the front surface of the information board.” *Id.*, 6:5-30.

Karppanen also discloses a “cooling system” which “comprises at least one circulating fan for forming an air flow through the display casing” *Id.*, 4:3-10. Karppanen further discloses that the “air flowing through the display [] casing ‘rinses’ the surface[] of ... the display element, whereupon heat transfers

effectively from these devices into the air flowing by.” *Id.*, 4:3-10. Karppanen notes that, “[t]hanks to the placement of the display element,” air can flow between the front surface of the display element and the front plate, “whereby cooling of the display is effective.” *Id.*, at 4:3-10. In particular, Karppanen discloses that such air may be generated by “circulating fans 72.” *Id.*, 7:11-21. Further, the “operation of the circulating fans is controlled with a control unit” in the information board. *Id.*, 8:3-21.

D. Matsuoka (Exhibit 1009)

Matsuoka was filed on March 15, 1999, and issued on August 15, 2000, and is prior art under pre-AIA 35 U.S.C. § 102(b).

Matsuoka describes a “thin display housing with multiple compartments and fans.” Ex. 1009, Title. “A large thin display unit has a chassis structure with a first horizontally or vertically disposed enclosure, a second vertically extending enclosure mounted to the upper side of the first enclosure, and a third vertically extending enclosure mounted above the first enclosure behind the second enclosure.” *Id.*, Abstract. “Further, an air route is formed between the third enclosure and a planar portion of the second enclosure, and an air route is formed between the thin display section and the planar portion of the second enclosure.” *Id.*

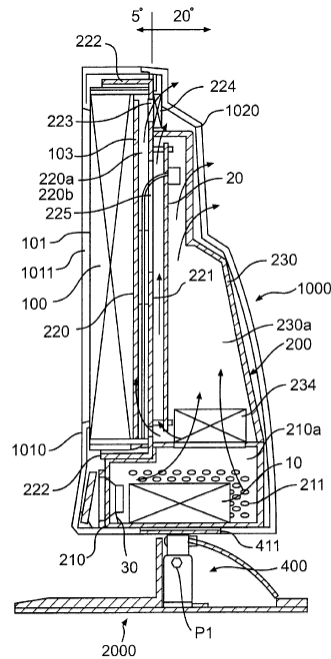


FIG. 1

Ex. 1009, Figure 1. Matsuoka also discloses a “fan mounted adjacent [an] aperture for promoting air flow from the first enclosure to the third enclosure.” *Id.*, claim 8; *see also id.*, 16:44-46.

E. Utsunomiya (Exhibit 1010)

Utsunomiya claims priority to an application filed on October 23, 2006, and the international application was filed on October 11, 2007. Utsunomiya published on May 2, 2008. Thus, Utsunomiya is prior art under at least under pre-AIA 35 U.S.C. § 102(a).

Utsunomiya discloses an apparatus for cooling a heat generating electronic device, such as an LCD display. It further discloses a specific air-flow rate for cooling electronic components. In particular, Utsunomiya includes a graph

showing the relationship between a panel cooling air velocity and the panel operating temperature in 0.8"-SXGA (5000-Im class, 25°C environment). For reducing the panel operating temperature from 70°C to 60°C ($\Delta T = -10^\circ\text{C}$), the air velocity may be simply increased from 4.5 m/s to 8 m/s ($\Delta V = +3.5$ m/s), whereas for reducing from 60°C to 50°C ($\Delta T = -10^\circ\text{C}$), the air velocity must be increased from 8 m/s to 18 m/s ($\Delta V = +10$ m/s), as can be seen from the graph.

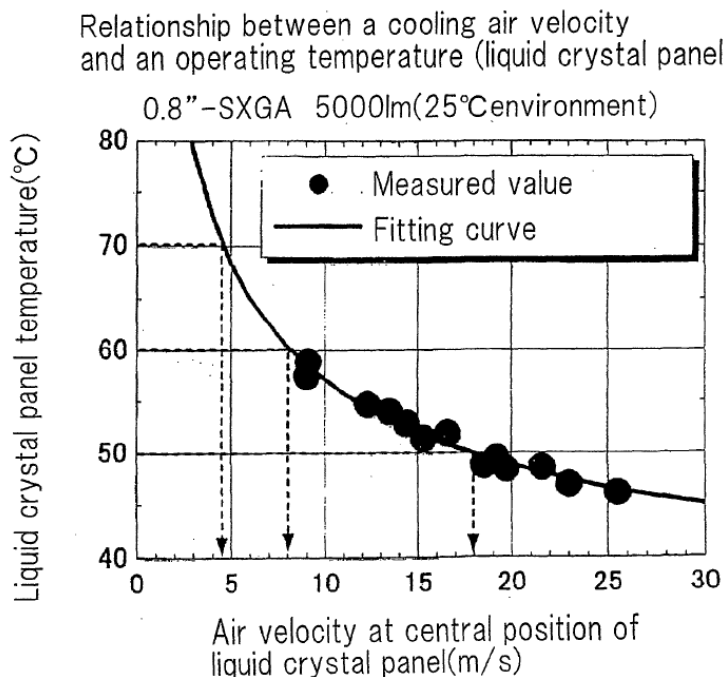


Fig. 4

Ex. 1010, Fig. 4.

VII. A POSITA Would Have Been Motivated to Make the Asserted Combinations

A combination of familiar elements according to known methods which yields no more than predictable results is likely obvious to one of skill in the art. One rationale to support a conclusion of obviousness is the use of a known

technique to improve similar devices (methods, or products) in the same way. MPEP 2143(C). To establish that a combination and/or modification is the use of a known technique to improve similar devices and methods in the same way, it is necessary to establish (1) that the prior art contained a “base” device/method upon which the claimed invention can be seen as an “improvement,” (2) a finding that the prior art contained a “comparable” device/method that is not the same as the base device/method and that has been improved in the same way as the claimed invention, and (3) that the skilled artisan could have applied the known “improvement” technique in the same way to the base device/method with predictable results. *See* MPEP 2143(C).

A. Motivation to Combine Nagayama and Gromatzky

One of skill in the art would have been motivated at the alleged time of invention to combine Nagayama and Gromatzky. Generally, Nagayama and Gromatzky are both directed to the same problem—thermal management in an outdoor display device. Ex. 1003, ¶52; *see also* Ex. 1006, [0001]; Ex. 1007, 2:53-55. And both address thermal management in a similar manner, namely by creating an air channel between a display and a transparent panel or lens and moving air through the channel to dissipate heat. Ex. 1003, ¶52-53; *see also* Ex. 1006, [Summary], [0022]; Ex. 1007, 4:32-36, 4:42-53.

“[A] combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results.” *KSR International Co. v. Teleflex Inc.*, 550 U.S. 398, 401 (2007). Here Nagayama discloses all the elements of most of the Challenged Claims other than the distance between the display and the front transparent plate or lens. Ex. 1003, ¶53. Gromatzky also discloses many of the elements of the challenged claims and also discloses a specific distance between the display and the transparent plate—9.4 millimeters. Ex. 1007, 4:39-41. Gromatzky also discloses specific rationales for using the disclosed distance. First, “so that any protrusion on the lens 18 does not damage the LCD module 26.” Ex. 1007, 4:41-42. And second, “[s]pacing between the lens 18 and the LCD module 26 also allows air to be routed across the LCD module 26 for thermal management.” Ex. 1007, 4:42-44.

One of skill in the art would have been motivated to separate the transparent plate or lens and display of Nagayama by 9.4 millimeters as disclosed in Gromatzky. Ex. 1003, ¶53. Doing so would simply involve combining known elements in the prior to achieve predictable results, namely protecting the display from damage and allowing air to be routed across the display. *Id.* Further, this combination is nothing more than positioning known components at a distance expressly disclosed by Gromatzky and thus is nothing more than a design choice. *Id.*

B. Motivation to Combine Nagayama and Gromatzky with Matsuoka

One of skill in the art would have been further motivated at the alleged time of invention to combine the combination of Nagayama and Gromatzky with Matsuoka. Like Nagayama and Gromatzky, Matsuoka describes a device and method for thermal management in a display device. Ex. 1003, ¶54; Ex. 1009, 1:47-49. Specifically, Matsuoka notes that “dissipation of the heat produced by the backlights and the heat produced by the circuit for driving the back lights poses a problem.” Ex. 1009, 1:46-48. Like Nagayama and Gromatzky, Matsuoka addresses this problem by circulating air past the backlights and circuit using fans. *See, e.g., id.*, 2:29-32.

Nagayama further discloses providing a “partition wall” to help control the sequence of components by which the air flows in the enclosure. Ex. 1006, [0060], Fig. 7. Matsuoka explains that it can be beneficial to divide the housing into multiple separate enclosures and then direct the air in a specific sequence between the enclosure to more effectively cool each of the various components in the housing. For example, in relation to Figures 1 and 3(d), Matsuoka discloses bringing outside air into a first enclosure to cool a power supply and then directing the air into another enclosure that houses the control board. *See* Ex. 1009, Col. 11:21-35. It would have been obvious for one of skill in the art wishing to cool the various components of the display in Nagayama to combine or apply the various

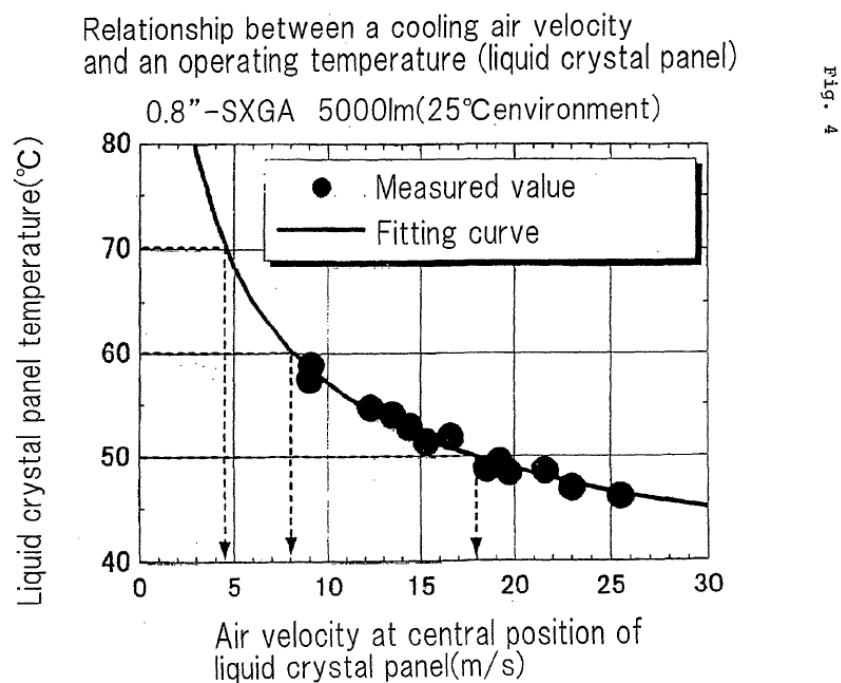
enclosures disclosed in Matsuoka to the housing of Nagayama to provide more discreet control over the provision of cooling air, including the direction of the air flow and the sequence of components over which the air flows. Ex. 1003, ¶¶54-55. Thus, one of skill in the art would be motivated to combine the multiple enclosures of Matsuoka with the display housing of Nagayama (or Gromatzky). Ex. 1003, ¶56.

C. Motivation to Combine Nagayama, Gromatzky, and Matsuoka with Utsunomiya

One of skill in the art would have been motivated to combine Nagayama and Matsuoka as described above in Section VII.B. One of skill in the art would also been motivated to at the alleged time of invention to further combine Utsunomiya with the combination of Nagayama and Matsuoka. Like Nagayama and Matsuoka, Utsunomiya describes thermal management for a liquid crystal device that includes passing air over the device (a projector in the case of Utsunomiya). Ex. 1003, ¶57; Ex. 1010, 1:8-14. Utsunomiya notes that, “the lifetime can be increased by reducing the operating temperature of the liquid crystal units through improvements on the cooling performance.” *Id.*, 5:12-14.

While Nagayama describes using air to cool the device, neither Nagayama nor Matsuoka describe the specific characteristics of the air, such as air velocity, that can be used to cool the display. But one of skill in the art would understand that such characteristics are necessary details for determining the capability and

efficiency of the thermal management techniques described in those references. Ex. 1003, ¶58. Utsunomiya describes such characteristics. *Id.* For example, in relation to Figure 4, Utsunomiya describes the relationship between air velocity and panel operating temperature.



Ex. 1010, Figure 4, 5:20-26. While the specific relationship disclosed in Utsunomiya would likely be somewhat different in the Nagayama cooling channel, one of skill in the art would nonetheless understand that increasing the velocity of air would result in increased cooling of the liquid crystal panel, as taught by Utsunomiya. Ex. 1003, ¶58. Thus, one of skill in the art would be motivated to use the velocities expressly disclosed in Utsunomiya, in the cooling channel of Nagayama. *Id.* Thus, one of skill in the art would be motivated to use a velocity of

at least 8 m/s, for example, in the cooling channel of Nagayama. *Id.* This combination is nothing more than operating known systems at a specific operating speed, as disclosed by Utsunomiya. Ex. 1003, ¶59.

D. Motivation to Combine Karppanen with Utsunomiya

One of skill in the art would have been motivated to combine Karppanen with Utsunomiya. Karppanen describes a display casing 50, including a display element 30, and a “cooling system” which “comprises at least one circulating fan for forming an air flow through the display casing” Ex. 1008, 4:3-10. Karppanen further discloses that the “air flowing through the display [] casing ‘rinses’ the surface[] of ... the display element, whereupon heat transfers effectively from these devices into the air flowing by.” *Id.*, 4:3-10. Karppanen thus expressly discloses using air flow for cooling heat generating components in an enclosed space in a display device, but does not expressly disclose a relationship between the fan speed and cooling of components in the device. Ex. 1003, ¶64.

In a similar field, Utsunomiya discloses an apparatus for cooling a heat generating electronic device, such as an LCD display, and describes a specific relationship between cooling air velocity and operating temperature of a cooled device. *See, e.g.*, 1010, 5:20-25 (“Fig. 4 is a graph showing the relationship between a panel cooling air velocity and the panel operating temperature.... For reducing the panel operating temperature from 70°C to 60°C ($\Delta T = -10^\circ\text{C}$), the air

velocity may be simply increased from 4.5 m/s to 8 m/s ($\Delta V = +3.5$ m/s), whereas for reducing from 60°C to 50°C ($\Delta T = -10^\circ\text{C}$), the air 25 velocity must be increased from 8 mis to 18 mis ($\Delta V = +10$ mis).”); Ex. 1003, ¶64-65.

Karppanen further discloses controlling airflow within the display casing to maintain “the temperature within desired limits.” Ex. 1008, 9:9-11 (“In an information board according to the invention, a circulating air flow running through the device and display casing is generated with the help on which the temperature of the casings is maintained within desired limits.”). Karppanen further discloses that its “control unit controls the operation of the circulating fans 72 based on the measured temperatures in accordance with a predetermined control logic. With the help of the internal cooling air circulation generated with circulating fans, the temperatures of the inner parts of the display casing and the device casing can be standardized and the heat can be effectively transferred away from the inside of the casings.” *Id.*, 9:13-21.

A POSITA would be motivated to modify the “predetermined control logic” of Karppanen’s “control unit [to] control[] the operation of the circulating fans 72” according to the relationship expressly disclosed in Utsunomiya, in particular, to modify the control logic to ensure that the flow velocity of air in the front channel is maintained at 4 m/s or more. Ex. 1003, ¶63-64. As described within Utsunomiya, this would cool components within the enclosed spacing to a

temperature of approximately 70 degrees while operating in an environment at 25 degrees. *See* Ex. 1010, Figure 4.

Operating the fan at this speed would thus reduce operating temperature and thereby increase operating life, as taught by Utsunomiya. *See id.* at p. 5:12-14 (“the lifetime can be increased by reducing the operating temperature of the liquid crystal units through improvements on the cooling performance.”); Ex. 1003, ¶¶63-65. This modification is further suggested by Karppanen’s description of a goal of “provid[ing] an electronic information board which tolerates well external variations of temperature and is thereby suitable for installation outdoors.” Ex. 1008, 3:8-10; Ex. 1003, ¶¶65.

Thus, one of skill in the art would be motivated to use the velocities expressly disclosed in Utsunomiya in the cooling channel of Karppanen. Ex. 1003, ¶¶63-65. This combination is nothing more than operating known systems at a specific operating speed, as disclosed by Utsunomiya. *Id.*

E. Motivation to Combine Karppanen with Gromatzky

One of skill in the art would have been motivated at the alleged time of invention to combine Karppanen and Gromatzky. Generally, Karppanen and Gromatzky are both directed to the same problem—thermal management in an outdoor display device. Ex. 1003, ¶¶60; Ex. 1008, 4:3-10; 1007, 2:53-55. And both address thermal management in a similar manner, namely by creating an air

channel between a display and a transparent panel or lens and moving air through the channel to dissipate heat. Ex. 1003, ¶¶84-85; Ex. 1008, 4:3-10; 1007, 4:32-36, 4:42-53.

“[A] combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results.” *KSR*, 550 U.S. at 401. Here, Karppanen discloses all the elements of most of the Challenged Claims other than the distance between the display and the front transparent plate or lens. Ex. 1003, ¶¶60. In particular, Karppanen describes “an air route is formed between the third enclosure and a planar portion of the second enclosure, and an air route is formed between the thin display section and the planar portion of the second enclosure.” Ex. 1008, Abstract.

Gromatzky also discloses many of the elements of the challenged claims and also discloses a specific distance between the display and the transparent plate—9.4 millimeters. Ex. 1003, ¶¶61; Ex. 1007, 4:39-41. Gromatzky also discloses specific rationales for using the disclosed distance. First, “so that any protrusion on the lens 18 does not damage the LCD module 26.” Ex. 1007, 4:41-42. And second, “[s]pacing between the lens 18 and the LCD module 26 also allows air to be routed across the LCD module 26 for thermal management.” Ex. 1007, 4:42-44.

One of skill in the art would have been motivated to separate the transparent plate or lens and display of Karppanen by 9.4 millimeters as disclosed in

Gromatzky. Ex. 1003, ¶61. Doing so would simply involve combining known elements in the prior art to achieve predictable results, namely protecting the display from damage and allowing air to be routed across the display. *Id.* Further, this combination is nothing more than positioning known components at a distance expressly disclosed by Gromatzky and thus is nothing more than a design choice. *Id.*

VIII. Full Statement of the Reasons for the Relief Requested

A. Ground 1 – Claims 1-2, 4-7, 9-12, 14-18, and 20 are Obvious Under 35 U.S.C. § 103 Over the Combination of Nagayama in view of Gromatzky, Matsuoka, and the Knowledge of a POSITA

Nagayama is directed to thermal management in a display assembly and discloses most of the elements of the Challenged Claims other than the thickness of the transparent panel or lens on at the front of the display device. Gromatzky is similar and discloses many of the same elements and also discloses the thickness of the panel or lens. Matsuoka is also directed to thermal management in a display device and additionally discloses having multiple compartments along with using one or more fans to move air across the display device for cooling. The combination of Nagayama, Gromatzky, and Matsuoka thus renders obvious the Challenged Claims. *See* Ex. 1003, ¶67-106, 113-134, 136-138.

1. Independent Claim 1.

[’253 Claim 1 Preamble] A display device, comprising:

To the extent that the preamble is limiting, Nagayama discloses “[a] display device . . . that can efficiently dissipate heat generated from a flat panel type display device.” Ex. 1006, [Summary]. Similarly, Gromatzky “relates to a thermal management system for a thin depth LCD display enclosure.” Ex. 1007, Abstract. Thus, the combination of Nagayama, Gromatzky, Matsuoka and the knowledge of a POSITA render the preamble of claim 1 obvious. Ex. 1003, ¶¶67-72.

[’253 Claim 1A] a housing;

Nagayama discloses “the outdoor display 100 is broadly divided into a liquid crystal display 1 [and] a device box 2 in which it is stored.” Ex. 1006, [0013]. The “device box” is a housing. Ex. 1003, ¶¶73-77. Similarly, Gromatzky discloses that its “LCD display” “comprises an environmentally-sealed enclosure 12” housing an “LCD module 26,” a “backlight assembly 20,” and a “transparent lens 18” “at the front portion 14 of the enclosure 12 for external viewing of the LCD display 10.” Ex. 1007, at 2:52-3:32; *see also* Ex. 1007, Figs. 1-4.

[’253 Claim 1B] a display assembly enclosed inside the housing to form a front channel between a display panel of the display assembly and a front side of the housing; and

Nagayama discloses “the liquid crystal display device 1 is arranged such that the liquid crystal panel 13 of the liquid crystal display device 1 and the transparent plate 23 do not adhere, and there is a gap (front air passage AC1) between the

two.” Ex. 1006, [Summary], [0020]. The front air passage AC1 between the display panel and the front side of the housing is the recited “channel.” Ex. 1003, ¶78-79. Similarly, Gromatzky discloses “[t]o dissipate the heat in the ambient air, thereby cooling the LCD module 26, an airflow path 30 is created around the LCD module 26 by 35 placement of the LCD module 26 between the lens 18 and the backlight assembly 20.” Ex. 1007, 4:32-36; *see also id.* at 4:52-63, Fig. 1. The airflow path 30 between the LCD module 26 and the lens 18 is the recited “channel.” Ex. 1003, ¶80-81.

[’253 Claim 1C] a flow control device to generate an air flow to the front channel and to control a velocity of the air flow according to a state of the display assembly.

The ’253 patent describes that “[t]he flow control device may be a cooling fan to blow air to the channel.” Ex. 1001:2:5-6. Nagayama discloses “[a] fan F1, which is a means of generating airflow in the front air passage AC1.” Ex. 1006, [0022]; *see also id.* at [0030], Fig. 1. Gromatzky also discloses “[i]n order to dissipate heat in the ambient air in the enclosure 12, a fan 32 is placed in the airflow path 30.” Ex. 1007, 4:52-53; *see also id.*, 5:18-20, Figs. 5, 23. Thus, Nagayama and Gromatzky disclose a flow control device. Ex. 1003, ¶82-84.

Nagayama discloses “control[ling] a velocity of the air flow according to a state of the display assembly.” Nagayama discloses a “temperature control operation of the liquid crystal display.” Ex. 1006, [0074]-[0075]. Therein,

“temperature sensor TS” and “fans F71 and F72” “are controlled by the liquid crystal panel temperature control board TC.” *Id.*, [0073]. “When information about the temperature of the liquid crystal panel 13 measured using a temperature sensor TS attached to the back surface of the liquid crystal panel 13 is given to the liquid crystal panel temperature control board TC, the liquid crystal panel temperature control board TC controls the fans F71, F72 ... to achieve a preset temperature.” *Id.*, [0074]; *see also id.* [0079].

Nagayama further discloses “temperature control by inverter control of the fan.” *Id.*, [0088]. “When the liquid crystal display 1 is activated and the panel temperature begins to rise and the panel temperature reaches a predetermined temperature T0, the fan F71 is activated, but the frequency of the control inverter at that time is low and the number of rotations of fan F71 is also low.” Ex. 1006, [0090]. “The frequency of the control inverter increases as the panel temperature rises.” *Id.*, [0091]. The increase in frequency also increases the rotational speed of the fan and thus the flow of air. *See id.*, [0091]; Ex. 1003, ¶85-87. “[B]y controlling the rotational speed of the fan F71 by the inverter, changes in the panel temperature can be controlled gently, and it is possible to maintain a constant state of the panel temperature.” *Id.*, [0092].

Thus, the combination of Nagayama, Gromatzky, and Matsuoka renders obvious element 1C and claim 1 as a whole. Ex. 1003, ¶88-89.

2. Dependent Claim 2.

[’253 Claim 2] The display device according to claim 1, wherein: the housing partitioned into an upper space and a lower space disposed below the upper space and includes a fan to blow the air to front channel.

Matsuoka discloses, a “thin display housing with multiple compartments and fans.” Ex. 1009, Title.

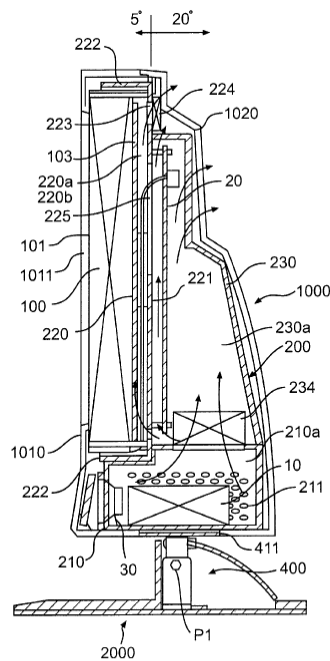


FIG. 1

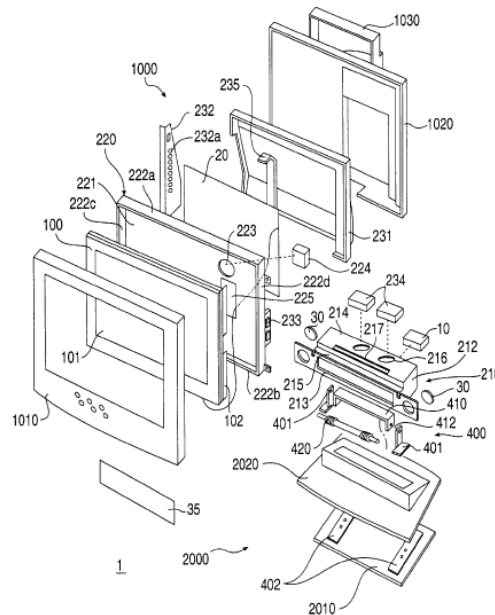


FIG. 2

Ex. 1009, Figures 1 and 2. Matsuoka discloses, “[t]he chassis 200 has a horizontal first enclosure 210.” *Id.*, 3:51-52. This is a lower space. Ex. 1003, ¶91. Matsuoka further discloses, “In FIG. 2, the first enclosure 210 serves as a framework of the Support structure of the chassis 200 for supporting the second enclosure 220 and third enclosure 230.” *Id.*, 5:24-26. The second and third enclosures are upper spaces. Ex. 1003, ¶91.

“Also, as shown in FIG. 1, air is exhausted from the second enclosure 220. Specifically, air in the second unit-storing section 220a is drawn in by the blower 224 mounted to the upper side of the planar portion 221 and exhausted through the first ventilation port 1040.” Ex. 1009, 11:36-40. the air in the second unit-storing Section 220a is supplied from the aperture formed with the mounting portion 225 described with respect to FIG. 7 or other gap to cool the back of the liquid-crystal unit 100 and the inverter board 103.” *Id.*, 11:40-44. Thus, Matsuoka discloses upper and lower spaces and using a fan to move air to cool a display assembly. Ex. 1003, ¶¶90-93. The combination of Nagayama, Gromatzky, and Matsuoka renders obvious claim 2. Ex. 1003, ¶¶94.

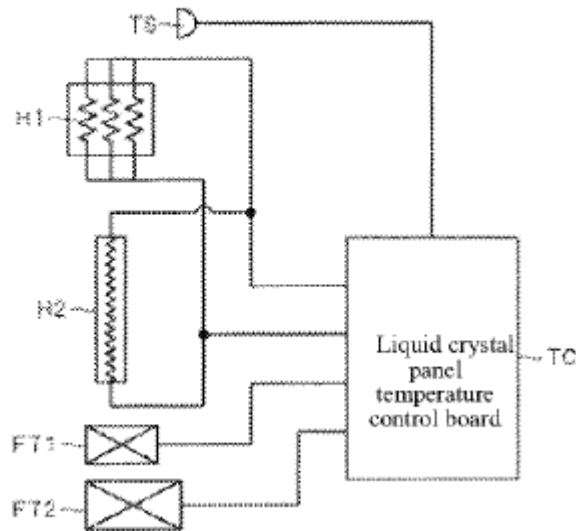
3. Dependent Claim 4.

[’253 Claim 4] The display device according to claim 2, wherein: the flow control device further includes a sensor to measure the state of the display assembly.

See claim 1C. Further, Nagayama discloses a sensor to measure the state of the display assembly: “A temperature sensor TS (temperature measurement means) is attached to the back surface of the liquid crystal panel 13.” Ex. 1006, [0071]; see also Ex. 1003, ¶¶95. Nagayama discloses that “information about the temperature of the liquid crystal panel 13 [is] measured using [the] temperature sensor TS attached to the back surface of the liquid crystal panel 13.” *Id.*, [0074]. The “temperature sensor TS . . . [is] controlled by the liquid crystal panel temperature

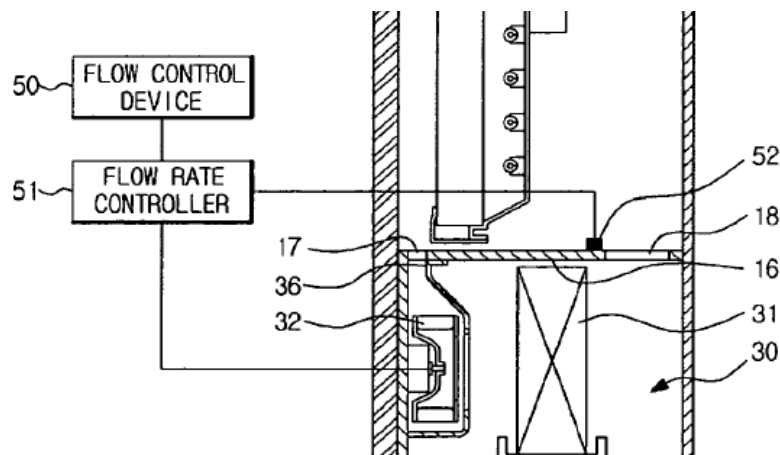
control board TC.” *Id.*, [0073]. “The connection relationship ... is shown in FIG. 10.” *Id.*

[FIG. 10]



Ex. 1006, Figure 10. As shown in Figure 10, the fans F71 and F72 and the temperature sensor TS are in communication with and controlled by the temperature control board TC. The sensor is not integrated with the control board, but integration is not required by this claim element. Ex. 1003, ¶95.

The disclosure in the '253 patent confirms the interpretation of this claim element.



Ex. 1001, Figure 2. As depicted, the flow control device 50 and flow rate controller 51 are in communication with the fan 32 and temperature sensor 52. Similarly, the specification describes this configuration in relation to Figures 2 and 10 as “[t]he flow control device 50 *includes* the cooling fan . . . and the temperature sensor 52.”

Ex. 1001, 10:17.

Thus, the combination of Nagayama, Gromatzky, and Matsuoka renders obvious dependent Claim 4. Ex. 1003, ¶96.

4. Dependent Claim 5.

[’253 Claim 5] The display device according to claim 4, wherein the flow control device further comprises: a flow rate controller to control a flow rate of the air in the fan such that the air in the front channel has a controlled flow velocity.

See claim 4. Further, Nagayama describes controlling the flow rate of air in the fan, such that the air in the front air passage AC1 has a controlled flow velocity, by “inverter control.” Ex. 1006, [0088]-[0092]; Ex. 1003, ¶97. “When the liquid crystal display 1 is activated and the panel temperature begins to rise and the

panel temperature reaches a predetermined temperature T0, the fan F71 is activated, but the frequency of the control inverter at that time is low and the number of rotations of fan F71 is also low.” Ex. 1006, [0090]. “The frequency of the control inverter increases as the panel temperature rises, and the number of revolutions of the fan F71 also increases.” Ex. 1006, [0091]. In other words, the flow rate of the fan, and thus the flow velocity in front air passage AC1, increases as temperature increases based on the control inverter. Ex. 1003, ¶¶97-98.

Thus, the combination of Nagayama, Gromatzky, and Matsuoka renders obvious dependent Claim 5. Ex. 1003, ¶¶99.

5. Dependent Claim 6.

[’253 Claim 6] The display device according to claim 5, wherein: the sensor is a temperature sensor to measure a temperature of the air having passed through the front channel, and to send a resulting signal to the flow rate controller.

Nagayama, in view of the knowledge of a POSITA, renders obvious a temperature sensor that measures the temperature of the air that has passed through the front channel.

Nagayama discloses “the temperature of the liquid crystal panel 13 measured using a temperature sensor TS attached to the back surface of the liquid crystal panel 13 is given to the liquid crystal panel temperature control board TC.” Ex. 1006, [0074]. It would have been obvious to one of skill in the art to mount the temperature sensor TS in the air passage AC1 or elsewhere so as to measure the

temperature of the air having passed through the front channel. Ex. 1003, ¶100-101. For example, it was well known at the time of the alleged invention that temperature sensors could be placed in a variety of locations in a display to measure the temperature of the display as well as the temperature of air surrounding the display, either directly as disclosed in Nagayama or indirectly. *Id.*

For example, U.S. Patent No. 6,825,828 to Burke, *et al.* (“Burke”) issued on November 30, 2004 and is thus prior art to the ’253 patent. Burke describes a backlit LCD monitor and in particular discloses the use of multiple temperature sensors to monitor the status of the display:

As shown in the exemplary embodiment depicted in FIG. 5, the controller 500 also monitors the temperature in the backlit LCD monitor through temperature sensors 502. Multiple temperature sensors 502 may be used in the backlit LCD monitor. For example, one temperature sensor 502 may monitor the temperature in the electronics chamber and another temperature sensor 502 may monitor ambient temperature in the closed air space, or backlight chamber, between the backlight assembly 100 and the cooling assembly 300.

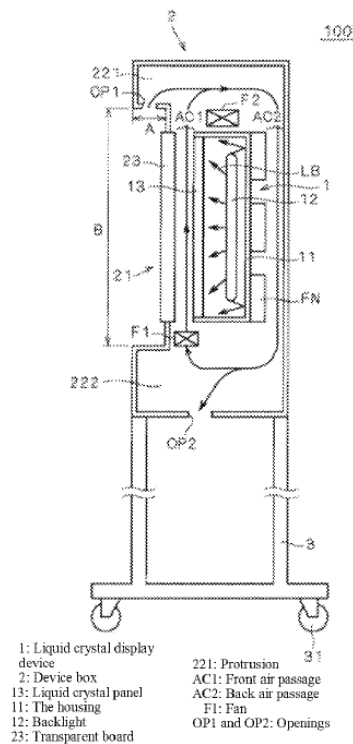
Ex. 1011, 6:24-33.

Similarly, DE 20 2007 000 047 to Hannemann (“Hannemann”) was filed on November 22, 2007, and thus is prior art under at least 35 U.S.C. 102(a) and describes that “[t]he number of the temperature sensors and their physical location within the display unit can vary without modifying the spirit of the invention. Said

sensors can also be used to regulate the cooling or heating.” Ex. 1013, [0019]; *see also* Claim 8 (“The display unit according to any of the above claims, characterized in that the climate control device is connected to a temperature sensor that records the interior temperature, preferably in the upper region of the display unit, and controls the climate control device.”).

Utilizing one or more temperature sensors and the decision of where and how many temperature sensors to utilize are simply a design choice based on the anticipated use case for the device, such as will it be utilized indoors or outdoors. Ex. 1003, ¶102. One of skill in the art would have modified Nagayama based on these known sensors and possible locations in order to monitor the temperature of air flowing by the panel since Nagayama discloses measuring the panel temperature and measuring the temperature of the air is merely an indirect measure of panel temperature. *Id.* Doing so would have simplified the Nagayama temperature sensor since a sensor for measuring the air could be placed almost anywhere in the air flow, thus providing flexibility to the panel designer. *Id.* Further, Nagayama discloses that the air moves through the front channel, around the back of the display, and then through the front channel again.

[FIG. 1]



Ex. 1006, Figure 1.

Further, as illustrated in Figure 10, the fans F71 and F72 and the temperature sensor TS are in communication with and controlled by the temperature control board TC. Thus, the temperature sensor sends a signal to the control board, which then sends a control signal to the fans based at least in part on the signal from the temperature sensor. Ex. 1003, ¶103. Thus, one of skill in the art would understand that Nagayama discloses that the temperature sensor is indirectly “send[ing] a resulting signal to the flow rate controller.” *Id.*

Thus, the combination of Nagayama, Gromatzky, Matsuoka, and the knowledge of a POSITA renders obvious dependent Claim 6. Ex. 1003, ¶104.

6. Dependent Claim 7.

['253 Claim 7] The display device according to claim 2, wherein the front channel comprises: an air inlet to guide air into the channel and an air outlet to discharge air from the channel; and the fan is located near the air inlet.

Nagayama discloses an air inlet “OP1” and an air outlet “OP2” as well as a fan located near the air inlet. “A fan F1, which is a means of generating airflow in the front air passage AC1, is arranged in the vicinity of the opening on the lower side of the front air passage AC1, and is configured to pump air from the lower side into the front air passage AC1.” Ex. 1006, [0022]. “Therefore, the opening OP1 serves as an air intake and the opening OP2 serves as an air outlet.” Ex. 1006, [0031].

Figures 3 and 5 illustrate fans (F11, F31) placed near the opening OP1 and at the beginning of the channel AC1 (Ex. 1006, Figure 3) and immediately next to the opening OP1. Ex. 1006, Figure 5.

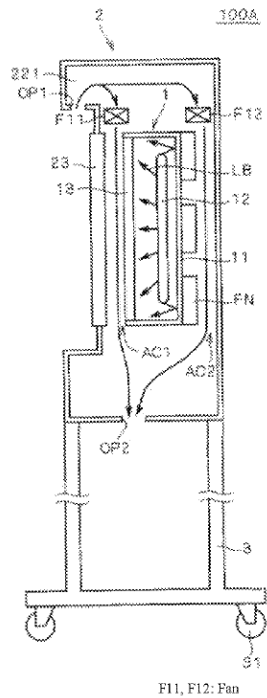


FIG. 3

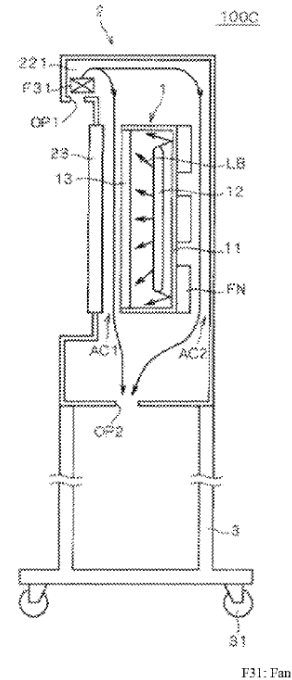


FIG. 5

In relation to Figure 5, Nagayama discloses:

In addition, in the outdoor display 100C shown in Fig. 5, a **fan F31**, which is an airflow generating means, **is arranged in the vicinity of the opening OP1** provided in the protrusion 221 of the device box 2, and by rotating the fan F31 to force the outside air into the device box 2, air entering from the opening OP1 is divided through the front and back air passages AC1 and AC2, respectively, **and air passing through the front and back air passages AC2 as a downward airflow is discharged externally from the opening OP2** at the bottom of the device box 2.

Ex. 1006, [0049] (emphasis added). Thus, the combination of Nagayama, Gromatzky, and Matsuoka renders obvious dependent Claim 7. Ex. 1003, ¶105-106.

7. Dependent Claim 9.

[’253 Claim 9] The display device according to claim 1, wherein the flow control device to generate an air flow to the front channel to control a velocity of the air flow according to a state of the housing.

See claim 6. Further, Nagayama discloses that the velocity of the air through the front channel can be controlled based on the temperature of the display. See claim 4. One of skill in the art would have understood that the temperature sensors could have been placed in various locations and the specific location is merely a design choice. Ex. 1003, ¶113-114.

For example, as discussed in relation to claim 6, Hannemann describes that “[t]he number of the temperature sensors and their physical location within the display unit can vary without modifying the spirit of the invention. Said sensors can also be used to regulate the cooling or heating.” Ex. 1013, [0019]; *see also* Claim 8 (“The display unit according to any of the above claims, characterized in that the climate control device is connected to a temperature sensor that records the interior temperature, preferably in the upper region of the display unit, and controls the climate control device.”).

Utilizing one or more temperature sensors and the decision of where and how many temperature sensors to utilize are simply a design choice based on the anticipated use case for the device, such as will it be utilized indoors or outdoors. Ex. 1003, ¶114. One of skill in the art would have modified Nagayama based on these known sensors and possible locations in order to monitor the temperature of air inside the housing and thus flowing by the panel since Nagayama discloses measuring the panel temperature and measuring the temperature of the air is merely an indirect measure of panel temperature. *Id.* Doing so would have simplified the Nagayama temperature sensor since a sensor for measuring the air could be placed almost anywhere in the air flow, thus providing flexibility to the panel designer. *Id.* Thus, the combination of Nagayama, Gromatzky, and Matsuoka renders obvious dependent claim 9.

8. Dependent Claim 10.

[’253 Claim 10] The display device according to claim 1, wherein: the front channel defined between the display panel assembly and the front side of the housing has a spacing distance in a range of 0.005 to 0.025 m.

Gromatzky discloses a specific distance between the display panel assembly and the front side of the housing—9.4 millimeters. Ex. 1007, 4:39-41. As explained above, it would have been obvious to apply this specific distance to the “front air passage AC1” of Nagayama to protect the liquid crystal panel and to allow air to flow in the front air passage AC1 for thermal management. Ex. 1003,

¶116. Thus, the combination of Nagayama, Gromatzky, and Matsuoka renders obvious dependent claim 10. Ex. 1003, ¶117.

9. Independent Claim 11.

[’253 Claim 11 Preamble] A display device, comprising:

This element is obvious. *See* Claim 1 Preamble; Ex. 1003, ¶118.

[’253 Claim 11] a housing;

This element is obvious. *See* Claim 1A; Ex. 1003, ¶119.

[’253 Claim 11B] a display assembly enclosed inside the housing;

This element is obvious. *See* Claim 1B; Ex. 1003, ¶120.

[’253 Claim 11C] a sensor to measure a temperature of air in the housing;

Nagayama, in view of the knowledge of a POSITA, renders obvious a temperature sensor that measures the temperature of the air that has passed through the front channel. *See also* claim 6.

Nagayama discloses “the temperature of the liquid crystal panel 13 measured using a temperature sensor TS attached to the back surface of the liquid crystal panel 13 is given to the liquid crystal panel temperature control board TC.” Ex. 1006, [0074]. It would have been obvious to one of skill in the art to mount the temperature sensor TS in the air passage AC1 or elsewhere so as to measure the temperature of the air in the housing. Ex. 1003, ¶121. For example, it was well known at the time of the alleged invention that temperature sensors could be placed

in a variety of locations in a display to measure the temperature of the display as well as the temperature of air surrounding the display, such as in the housing, either directly as disclosed in Nagayama or indirectly. Ex. 1003, ¶121.

Nagayama discloses that the velocity of the air through the front channel can be controlled based on the temperature of the display. *See* claim 4. One of skill in the art would have understood that the temperature sensors could have been placed in various locations and the specific location is merely a design choice. Ex. 1003, ¶121.

For example, as discussed in relation to claims 6 and 9, Hannemann describes that “[t]he number of the temperature sensors and their physical location within the display unit can vary without modifying the spirit of the invention. Said sensors can also be used to regulate the cooling or heating.” Ex. 1013, [0019]; *see also* Claim 8 (“The display unit according to any of the above claims, characterized in that the climate control device is connected to a temperature sensor that records the interior temperature, preferably in the upper region of the display unit, and controls the climate control device.”).

Utilizing one or more temperature sensors and the decision of where and how many temperature sensors to utilize are simply a design choice based on the anticipated use case for the device, such as will it be utilized indoors or outdoors. Ex. 1003, ¶121. One of skill in the art would have modified Nagayama based on

these known sensors and possible locations in order to monitor the temperature of air inside the housing and thus flowing by the panel since Nagayama discloses measuring the panel temperature and measuring the temperature of the air in the housing is merely an indirect measure of panel temperature. *Id.* Doing so would have simplified the Nagayama temperature sensor since a sensor for measuring the air could be placed almost anywhere in the air flow, thus providing flexibility to the panel designer. *Id.*

Thus, the combination of Nagayama, Gromatzky, and Matsuoka renders obvious independent claim 11; Ex. 1003, ¶121.

[’253 Claim 11D] a fan configured to blow the air around the display assembly; and

This element is obvious. *See* Claim 1C; Ex. 1003, ¶122-123.

[’253 Claim 11E] a control device to control the fan to maintain a temperature of the housing

This element is obvious. *See* Claims 1C and 6; Ex. 1003, ¶124-125.

[’253 Claim 11F] wherein the sensor transmits a resulting signal to the control device and the control device controls the fan based on the resulting signal.

This element is obvious. *See* Claim 1C and 6. Indeed, Nagayama discloses “*information* about the temperature of the liquid crystal panel 13 measured using a temperature sensor TS attached to the back surface of the liquid crystal panel 13 *is given to the liquid crystal panel temperature control board TC.*” Ex. 1006, [0073], Figure 9. One of skill in the art would understand that the disclosed

“information” is a signal transmitted from the temperature sensor to the control board. Ex. 1003, ¶126. Thus, the combination of Nagayama, Gromatzky, and Matsuoka discloses claim element 11F. Ex. 1003, ¶127.

10. Dependent Claim 12.

[’253 Claim 12] The display device according to claim 11, wherein the display assembly is enclosed inside the housing to form a front channel between a display panel of the display assembly and a front side of the housing.

This element is obvious. *See* Claim 1B; Ex. 1003, ¶128.

11. Dependent Claim 14.

[’253 Claim 14] The display device according to claim 13, wherein the control device controls a flow rate of the air in the fan such that the air in the front channel has a controlled flow velocity.

This element is obvious. *See* Claim 5; Ex. 1003, ¶129-130.

12. Dependent Claim 15.

[’253 Claim 15] The display device according to claim 12, wherein: the front channel comprises an air inlet to guide air into the front channel and an air outlet to discharge air from the front channel; and the fan is located near the air inlet.

This element is obvious. *See* Claim 7; Ex. 1003, ¶131.

13. Dependent Claim 16.

[’253 Claim 16] The display device according to claim 12, wherein the sensor measures the temperature of the air having passed through the front channel and sends the resulting signal to the control device.

This element is obvious. *See* Claim 6; Ex. 1003, ¶132.

14. Dependent Claim 17.

[’253 Claim 17] The display device according to claim 12, wherein the control device generates an air flow to the front channel to control a velocity of the air flow according to a state of the housing.

This element is obvious. *See* Claim 9; Ex. 1003, ¶133.

15. Dependent Claim 18.

[’253 Claim 18] The display device according to claim 12, wherein the front channel defined between the display panel assembly and the front side of the housing has a spacing distance in a range of 0.005 to 0.025 m.

This element is obvious. *See* Claim 10; Ex. 1003, ¶134.

16. Dependent Claim 20.

[’253 Claim 20] The display device according to claim 11, wherein the housing is partitioned into an upper space and a lower space in which the fan is disposed to blow the air to at least one of front side and back side of the display assembly.

This element is obvious. *See* Claim 1C and 2; Ex. 1003, ¶136-138.

B. Ground 2 – Claims 8 and 19 are Obvious Under 35 U.S.C. § 103 Over the Combination of Nagayama, Gromatzky, Matsuoka, Utsunomiya, and the knowledge of a POSITA

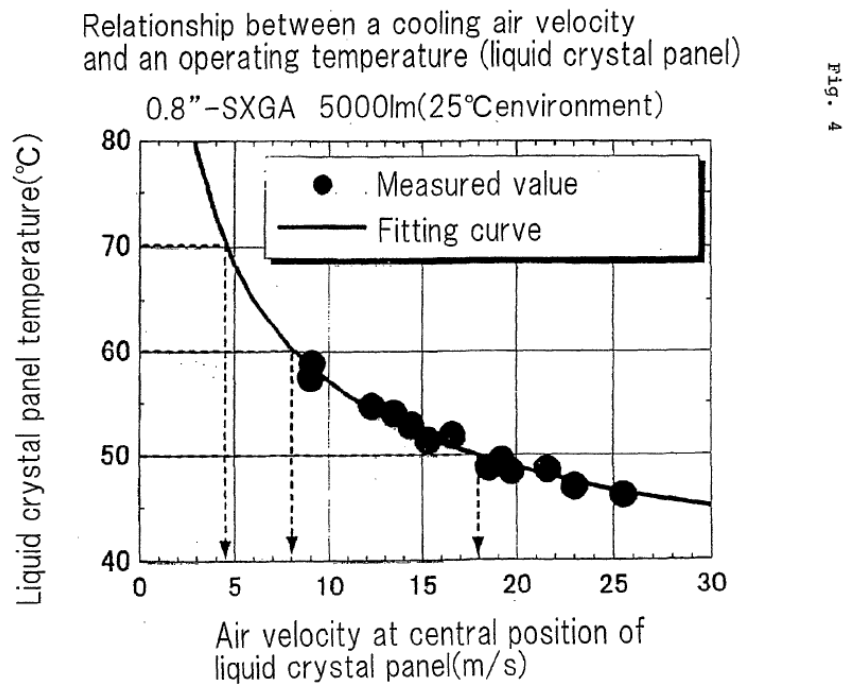
The combination of Nagayama, Gromatzky, Matsuoka, and Utsunomiya renders obvious dependent claims 8 and 19 obvious. *See* Ex. 1003, ¶107-112 & 135.

1. Dependent Claim 8.

[’253 Claim 8] The display device according to claim 2, wherein: the flow rate controller regulates the flow rate of the air in the fan

such that the flow velocity of air in the front channel is maintained at 4 m/s or more.

The combination of Nagayama, Gromatzky, and Matsuoka discloses all of the limitations of dependent claim 2 as demonstrated in Ground 1. The combination of Nagayama, Gromatzky, and Matsuoka, in further view of Utsunomiya discloses the additional limitation that “the flow velocity of air in the front channel is maintained at 4 m/s or more.”



Ex. 1010, Figure 4; *see also* Ex. 1003, ¶108. As can be seen in Figure 4, Utsunomiya discloses that increasing the cooling air velocity significantly cools the display:

Fig. 4 is a graph showing the relationship between a panel cooling air velocity and the panel operating temperature in 0.8"-SXGA (5000-Im class,

25°C environment). For reducing the panel operating temperature from 70°C to 60°C ($\Delta T = -10^\circ\text{C}$), the air velocity may be simply increased from 4.5 m/s to 8 m/s ($\Delta V = +3.5$ m/s), whereas for reducing from 60°C to 50°C ($\Delta T = -10^\circ\text{C}$), the air velocity must be increased from 8 m/s to 18 m/s ($\Delta V = +10$ m/s), as can be seen from the graph.

Ex. 1010, 5:20-26; *see also* Ex. 1003, ¶107-108. Utsunomiya explains that to cool a panel temperature of 70 degrees C in a 25 degrees C environment to 60 degrees, the air velocity must increase from 4.5 meters per second to 8 meters per second. Ex. 1003, ¶107-109. As described above, it would have been obvious to combine the specific cooling air velocity described in Utsunomiya with the cooling channel of Nagayama. Ex. 1003, ¶109-111. Thus, the combination of Nagayama, Gromatzky, Matsuoka, and Utsunomiya renders obvious dependent claim 8. Ex. 1003, ¶112.

2. Dependent Claim 19.

[’253 Claim 19] The display device according to claim 12, wherein the control device regulates a flow rate of the air in the fan such that a flow velocity of the air in the front channel is maintained at 4 m/s or more.

See Ground 1, Claim 12 and Ground 2, Claim 8; Ex. 1003, ¶135.

C. Ground 3 – Claims 1-2, 4-7, 9, 11-12, 14-17, and 20 are Obvious Under 35 U.S.C. § 103 Over Karppanen in view of the knowledge of a POSITA

As explained below, Karppanen in view of the knowledge of a POSITA discloses renders obvious all the elements of claims 1-2, 4-7, 9, 11-12, 14-17, and 20. *See* Ex. 1003, ¶¶140-175, 180-184, 187-203, & 205-207.

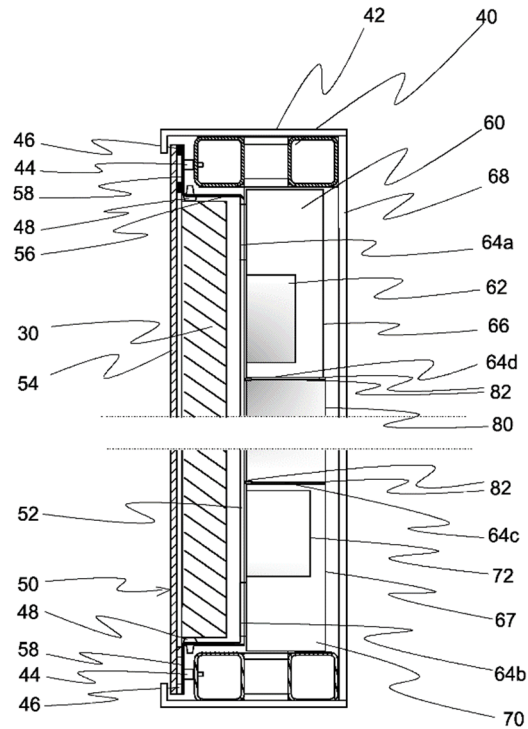
1. Independent Claim 1.

[’253 Claim 1 Preamble] A display device, comprising:

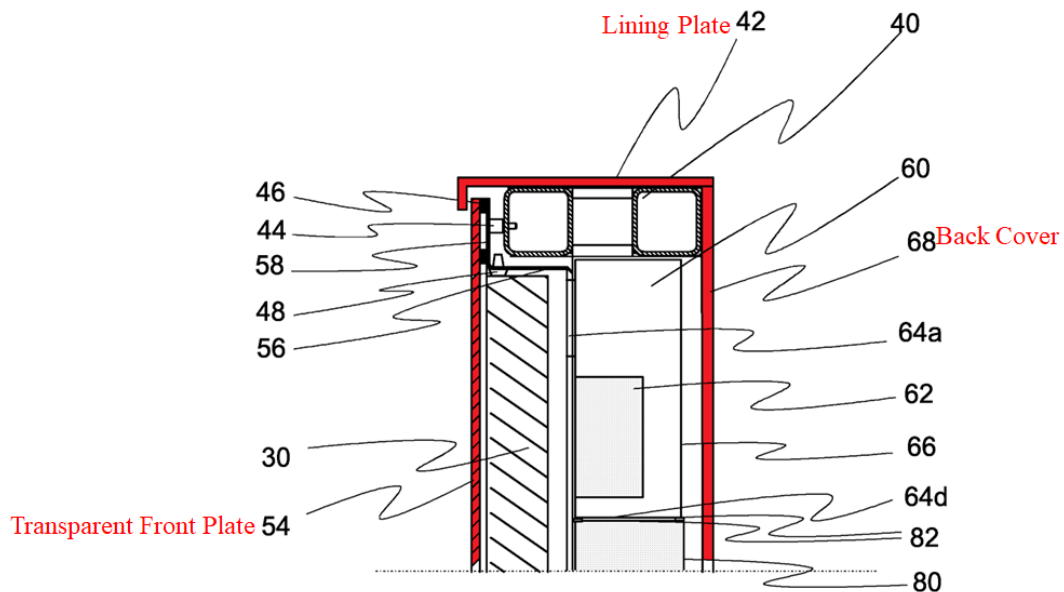
Karppanen disclose a display device. *See* Ex. 1008, Abstract (“The[] invention relates to an electronic information board comprising a frame (40), a flat display element (30), such as a TFT LCD display or a plasma display, for presenting information”); Ex. 1003, ¶141.

[’253 Claim 1A] a housing;

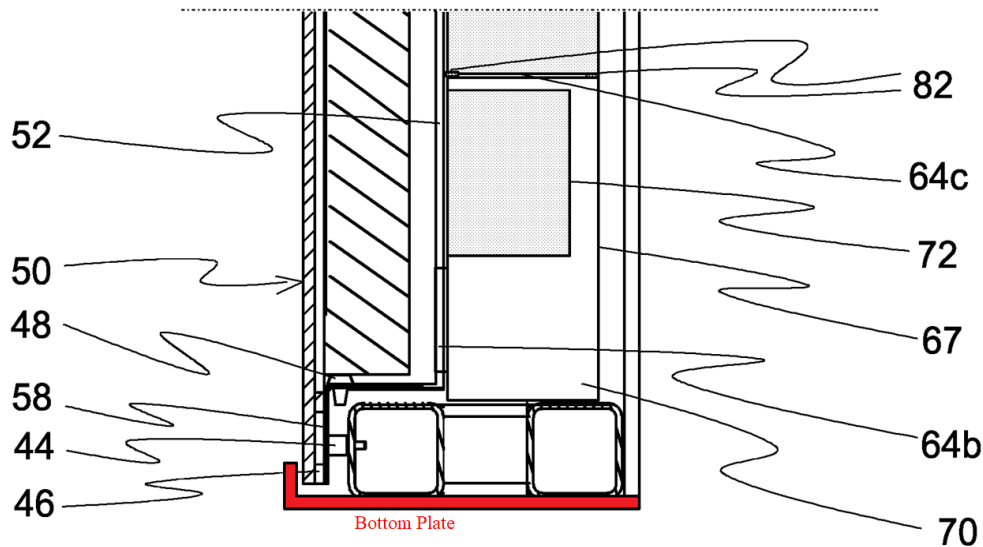
Karppanen discloses a housing. As illustrated in Figure 1, Karppanen discloses that a “display element 30” resides inside a “display casing 50,” which comprises a “back wall 52” and a “transparent front plate 54” that “forms the front surface of the information board.” Ex. 1008, 6:5-30.



Ex. 1008, Fig. 1. Karppanen further discloses a housing formed by “transparent front plate 54,” “lining plate 42,” “back cover 68,” as shown in the annotated figure below:



Ex. 1008, Fig. 1 (annotated); Ex. 1003, ¶143-145. The bottom plate, which is not labeled in Figure 1 is shown in the annotated Figure below:

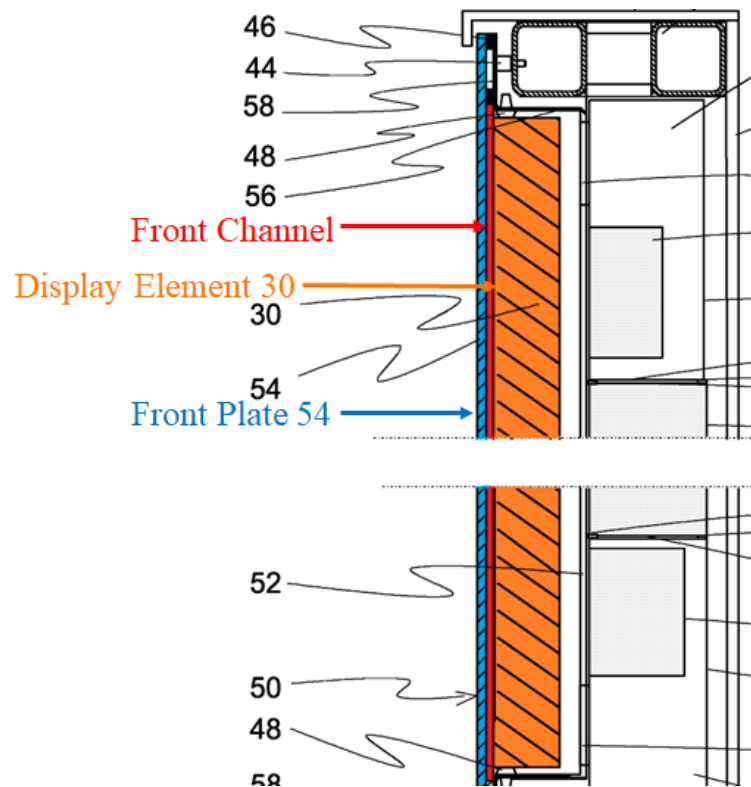


Ex. 1008, Fig. 1 (annotated); Ex. 1003, ¶144.

[’253 Claim 1B] a display assembly enclosed inside the housing to form a front channel between a display panel of the display assembly and a front side of the housing; and

Karppanen discloses that the display element 30 is arranged in the display casing 50 “so that between the front surface of the display element and the front plate ... there is a gap enabling circulation of air.” Ex. 1008, 2:31-4:2; *id.*, 6:23-26 (“Inside the display casing there is a display element 30 which has been supported at its edges by support elements 48 to the edge part of the display casing in such a way that there remains a gap enabling the circulation of air between the walls of the display casing and the outer surface of the display element.”). A POSITA

would understand that this “gap” is the claimed front channel as shown in annotated Figure 1, below:



Ex. 1008, Fig. 1 (annotated); Ex. 1003, ¶147.

[’253 Claim 1C] a flow control device to generate an air flow to the front channel and to control a velocity of the air flow according to a state of the display assembly.

Karppanen also discloses a “cooling system” which “comprises at least one circulating fan for forming an air flow through the display casing” Ex. 1008, 4:3-10; Ex. 1003, ¶150. Karppanen further discloses that the “air flowing through the display [] casing ‘rinses’ the surface[] of ... the display element, whereupon heat transfers effectively from these devices into the air flowing by.” Ex. 1008, 4:3-10. Karppanen notes that, “[t]hanks to the placement of the display element,”

air can flow between the front surface of the display element and the front plate, “whereby cooling of the display is effective.” *Id.*, 4:3-10. In particular, Karppanen discloses that such air may be generated by “circulating fans 72.” *Id.*, 7:11-21; 8:6-9 (“There are circulating fans 72 inside the fan casing with the help of which a closed cooling air circulation is generated through the fan casing 70, cross-flow cell 80, device casing 60 and display casing 50.”). “When the circulating fans are in operation, the air flows from the fan casing through the third flow hole 64c to the cross-flow cell, from the cross-flow cell through the fourth flow hole 64d to the device casing 60, from the device casing through the first flow hole 64a to the upper part of the display casing 50 and through the second flow hole 64b in the lower part of the display casing back to the fan casing, after which a new circuit begins.” *Id.*, 8:9-14; Ex. 1003, ¶150.

Karppanen further discloses controlling airflow within the display casing to maintain “the temperature within desired limits.” *Id.*, 9:9-11 (“In an information board according to the invention, a circulating air flow running through the device and display casing is generated with the help on which the temperature of the casings is maintained within desired limits.”). “In the device and display casing are placed transducers (not shown in the figures) that measure the temperature and are connected to the control unit in the device casing of the information board. The control unit controls the operation of the circulating fans 72 based on the measured

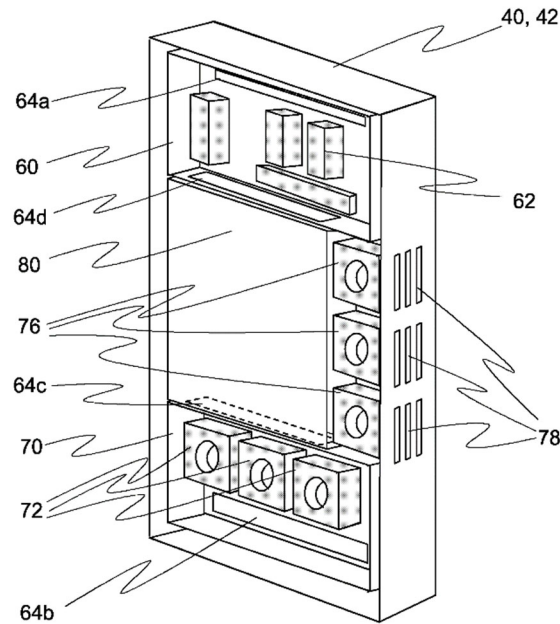
temperatures in accordance with a predetermined control logic. With the help of the internal cooling air circulation generated with circulating fans, the temperatures of the inner parts of the display casing and the device casing can be standardized and the heat can be effectively transferred away from the inside of the casings.” *Id.*, 9:13-21; Ex. 1003, ¶153.

A POSITA would understand that measuring the temperature of the device and display casing and utilizing that information to control the operation of the circulating fans based on predetermined control logic discloses “a flow control device to generate an air flow to the front channel and to control a velocity of the air flow according to a state of the display assembly.” Ex. 1003, ¶153-155

2. Dependent Claim 2.

[’253 Claim 2] The display device according to claim 1, wherein: the housing partitioned into an upper space and a lower space disposed below the upper space and includes a fan to blow the air to front channel.

Karppanen discloses that its housing is partitioned into an upper space and a lower space. In particular, Karppanen discloses with respect to Figure 2 that “[t]here are circulating fans 72 inside the fan casing with the help of which a closed cooling air circulation is generated through the fan casing 70, cross-flow cell 80, device casing 60 and display casing 50.” Ex. 1008, 8:6-9. Under one interpretation, the device casing 60 is the upper space and the lower space is the fan casing 70.



Ex. 1008, Fig. 2; Ex. 1003, ¶158-159.

In a second interpretation, Karppanen further explains “[w]hen the circulating fans are in operation, the air flows from the fan casing through the third flow hole 64c to the cross-flow cell, from the cross-flow cell through the fourth flow hole 64d to the device casing 60, from the device casing through the first flow hole 64a to the *upper part of the display casing 50* and through the second flow hole 64b in the *lower part of the display casing back to the fan casing*, after which a new circuit begins.” Ex. 1008, 8:9-14 (emphasis added); Ex. 1003, ¶160-162.

Karppanen further discloses a front channel, explaining that “[t]hanks to the placement of the display element,” air can flow between the front surface of the display element and the front plate, “whereby cooling of the display is effective.” Ex. 1008, 4:3-10. Thus claim 2 is obvious in view of Karppanen. Ex. 1003, ¶162.

3. Dependent Claim 4.

[’253 Claim 4] The display device according to claim 2, wherein: the flow control device further includes a sensor to measure the state of the display assembly.

Karppanen discloses a “transducer,” i.e., a sensor to measure the state, e.g., the temperature of the display assembly. “In the device and display casing are placed transducers (not shown in the figures) that measure the temperature and are connected to the control unit in the device casing of the information board.” Ex. 1008, 9:13-16; Ex. 1003, ¶164.

4. Dependent Claim 5.

[’253 Claim 5] The display device according to claim 4, wherein the flow control device further comprises: a flow rate controller to control a flow rate of the air in the fan such that the air in the front channel has a controlled flow velocity.

Karppanen discloses that its “control unit controls the operation of the circulating fans 72 based on the measured temperatures in accordance with a predetermined control logic. With the help of the internal cooling air circulation generated with circulating fans, the temperatures of the inner parts of the display casing and the device casing can be standardized and the heat can be effectively transferred away from the inside of the casings.” Ex. 1008, 9:13-21. A POSITA would recognize that Karppanen’s disclosure of “control[ing] operation of the circulating fans 72 based on the measured temperatures in accordance with a predetermined control logic” discloses or suggests controlling the speed of the

fans, i.e., their operation, in order to control a flow rate of the air such that the air in the front channel has a controlled flow velocity. Ex. 1003, ¶166.

5. Dependent Claim 6.

[’253 Claim 6] The display device according to claim 5, wherein: the sensor is a temperature sensor to measure a temperature of the air having passed through the front channel, and to send a resulting signal to the flow rate controller.

Claim 6 is obvious in view of Karppanen. Karppanen discloses controlling airflow within the display casing to maintain “the temperature within desired limits.” Ex. 1008, 9:9-11 (“In an information board according to the invention, a circulating air flow running through the device and display casing is generated with the help on which the temperature of the casings is maintained within desired limits.”). Karppanen further discloses that these transducers are placed “in the display casing” and that the transducers transmit temperature signals to the controller, which “controls the operation of the circulating fans 72 based on the measured temperatures in accordance with a predetermined control logic.” *Id.*, 9:16-17; Ex. 1003, ¶168.

To the extent Karppanen does not expressly disclose that the transducers measure air discharged from the front channel, a POSITA would recognize that the transducers could be positioned in a different location within the display casing. In particular, a POSITA could position the transducers to measure air temperature of air flowing in the casing and would be positioned to measure the temperature of air

discharged from the front channel. A POSITA would recognize that such a placement aligns with Karppanen's express description "control[ing] the operation of the circulating fans 72 based on the measured temperatures" as determined by the transducers. Ex. 1008, 9:14-17; Ex. 1003, ¶169-170.

For example, as discussed above with respect to Ground 1, Claim 6, Burke describes a backlit LCD monitor and in particular discloses the use of multiple temperature sensors to monitor the status of the display:

As shown in the exemplary embodiment depicted in FIG. 5, the controller 500 also monitors the temperature in the backlit LCD monitor through temperature sensors 502. Multiple temperature sensors 502 may be used in the backlit LCD monitor. For example, one temperature sensor 502 may monitor the temperature in the electronics chamber and another temperature sensor 502 may monitor ambient temperature in the closed air space, or backlight chamber, between the backlight assembly 100 and the cooling assembly 300.

Ex. 1011, 6:24-33; *see also* Ex. 1013, [0019] & Claim 8; Ex. 1003, ¶169-170.

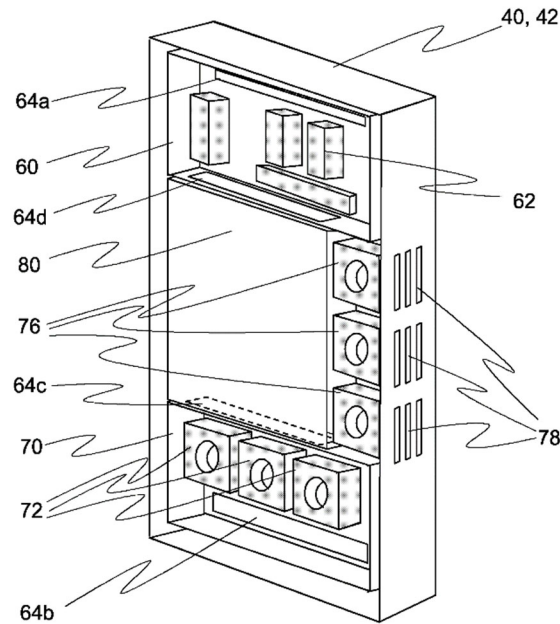
Utilizing one or more temperature sensors and the decision of where and how many temperature sensors to utilize are simply a design choice based on the anticipated use case for the device, such as will it be utilized indoors or outdoors. Ex. 1003, ¶169. One of skill in the art would have modified Karppanen based on these known sensors and possible locations in order to monitor the temperature of air flowing by the panel since Karppanen discloses measuring the panel

temperature and measuring the temperature of the air is merely an indirect measure of panel temperature. Ex. 1003, ¶169-170. Doing so would have simplified Karppanen's temperature sensors since a sensor for measuring the air could be placed almost anywhere in the air flow, thus providing flexibility to the designer. *Id.* Thus, this claim is obvious.

6. Dependent Claim 7.

[’253 Claim 7] The display device according to claim 2, wherein the front channel comprises: an air inlet to guide air into the channel and an air outlet to discharge air from the channel; and the fan is located near the air inlet.

Claim 7 is obvious in view of Karppanen. With respect to Figure 2, Karppanen explains “[w]hen the circulating fans are in operation, the air flows from the fan casing through the third flow hole 64c to the cross-flow cell, from the cross-flow cell through the fourth flow hole 64d to the device casing 60, from the device casing through the first flow hole 64a to the upper part of the display casing 50 and through the second flow hole 64b in the lower part of the display casing back to the fan casing, after which a new circuit begins.” Ex. 1008, 8:9-14.



Karppanen, Fig. 2. As shown in Figure 2 above, the circulating fans 72 are located near the second flow hole 64b in the lower part of the display casing. Air flows in a circuit from flow hole 64b to flow hole 64c, through the “the cross-flow cell” 80, through cross flow hole 64d, and then through flow hole 64a where the air returns to flow hole 64b. Ex. 1003, ¶172.

Based on this disclosure, a POSITA would recognize that Karppanen discloses an airflow pathway starting at 64b by circulating fans 72, and then flowing to 64c, from there to 64d, from there to 64a, and from there returns to 64b. Ex. 1003, ¶172. A POSITA would recognize that 64b could be an inlet. *Id.* For example, a POSITA would recognize that because airflow in this design follows a circuit, any point could be the inlet, and 64b is near the circulating fans 72. Ex. 1003, ¶173-174 Similarly, a POSITA would recognize that circulating fans 72

could be reversed in which case 64b would also act as an inlet. Ex. 1003, ¶173-174.

7. Dependent Claim 9.

[’253 Claim 9] The display device according to claim 1, wherein the flow control device to generate an air flow to the front channel to control a velocity of the air flow according to a state of the housing.

Karppanen discloses that its “control unit controls the operation of the circulating fans 72 based on the measured temperatures in accordance with a predetermined control logic. With the help of the internal cooling air circulation generated with circulating fans, the temperatures of the inner parts of the display casing and the device casing can be standardized and the heat can be effectively transferred away from the inside of the casings.” Ex. 1008, 9:13-21. A POSITA would recognize that Karppanen’s disclosure of “control[ing] operation of the circulating fans 72 based on the measured temperatures in accordance with a predetermined control logic” discloses or suggests controlling the velocity of airflow, e.g., by controlling the speed of the fans, in order to control a flow rate of the air. Ex. 1003, ¶181. Karppanen further discloses that these transducers are place “in the display casing” and that the transducers transmit temperature signals to the controller, which “controls the operation of the circulating fans 72 based on the measured temperatures in accordance with a predetermined control logic.” Ex. 1008, 9:16-17; Ex. 1003, ¶181-183.

8. Independent Claim 11.

[’253 Claim 11 Preamble] A display device, comprising:

This element is obvious. *See* Claim 1 Preamble. Ex. 1003, ¶187.

[’253 Claim 11] a housing;

This element is obvious. *See* Claim 1A; Ex. 1003, ¶188.

[’253 Claim 11B] a display assembly enclosed inside the housing;

This element is obvious. *See* Claim 1B; Ex. 1003, ¶189.

[’253 Claim 11C] a sensor to measure a temperature of air in the housing;

This element is obvious. *See* Claim 6; Ex. 1003, ¶190.

[’253 Claim 11D] a fan configured to blow the air around the display assembly; and

This element is obvious. *See* Claim 1C; Ex. 1003, ¶192.

[’253 Claim 11E] a control device to control the fan to maintain a temperature of the housing

This element is obvious. *See* Claims 1C and 6; Ex. 1003, ¶194. A POSITA would further recognize that Karppanen teaches maintaining a temperature of the housing because Karppanen expressly disclose “an information board” that controls “circulating air flow running through the device” so that “the temperature of the casings is maintained within desired limits.” Ex. 1008, 9:9-11; *see also id.* 9:16-20 (“The control unit controls the operation of the circulating fans 72 based on the measured temperatures in accordance with a predetermined control logic.

With the help of the internal cooling air circulation generated with circulating fans, the temperatures of the inner parts of the display casing and the device casing can be standardized”). A POSITA would recognize that maintaining temperature within desired limits discloses maintaining a temperature of the housing. Ex. 1003, ¶194.

[’253 Claim 11F] wherein the sensor transmits a resulting signal to the control device and the control device controls the fan based on the resulting signal.

See Claim 1C; Ex. 1003, ¶196. Karppanen discloses that its “control unit controls the operation of the circulating fans 72 based on the measured temperatures in accordance with a predetermined control logic.” Ex. 1008, 9:13-21. A POSITA would recognize that the transducer sends signals associated with measured temperatures to the control unit, which then controls the circulating fans based on those measurements. *Id.* 9:14-16 (“In the device and display casing are placed transducers (not shown in the figures) that measure the temperature and are connected to the control unit in the device casing of the information board.”); Ex. 1003, ¶196.

9. Dependent Claim 12.

[’253 Claim 12] The display device according to claim 11, wherein the display assembly is enclosed inside the housing to form a front channel between a display panel of the display assembly and a front side of the housing.

This element is obvious. See Claim 1B; Ex. 1003, ¶198.

10. Dependent Claim 14.

[’253 Claim 14] The display device according to claim 13, wherein the control device controls a flow rate of the air in the fan such that the air in the front channel has a controlled flow velocity.

This element is obvious. *See* Claim 5; Ex. 1003, ¶199.

11. Dependent Claim 15.

[’253 Claim 15] The display device according to claim 12, wherein: the front channel comprises an air inlet to guide air into the front channel and an air outlet to discharge air from the front channel; and the fan is located near the air inlet.

This element is obvious. *See* Claim 7; Ex. 1003, ¶200.

12. Dependent Claim 16.

[’253 Claim 16] The display device according to claim 12, wherein the sensor measures the temperature of the air having passed through the front channel and sends the resulting signal to the control device.

This element is obvious. *See* Claim 6; Ex. 1003, ¶201.

13. Dependent Claim 17.

[’253 Claim 17] The display device according to claim 12, wherein the control device generates an air flow to the front channel to control a velocity of the air flow according to a state of the housing.

This element is obvious. *See* Claim 9; Ex. 1003, ¶202.

14. Dependent Claim 20.

[’253 Claim 20] The display device according to claim 11, wherein the housing is partitioned into an upper space and a lower space in which the fan is disposed to blow the air to at least one of front side and back side of the display assembly.

This element is obvious. *See* Claim 1C and 2; Ex. 1003, ¶205-206.

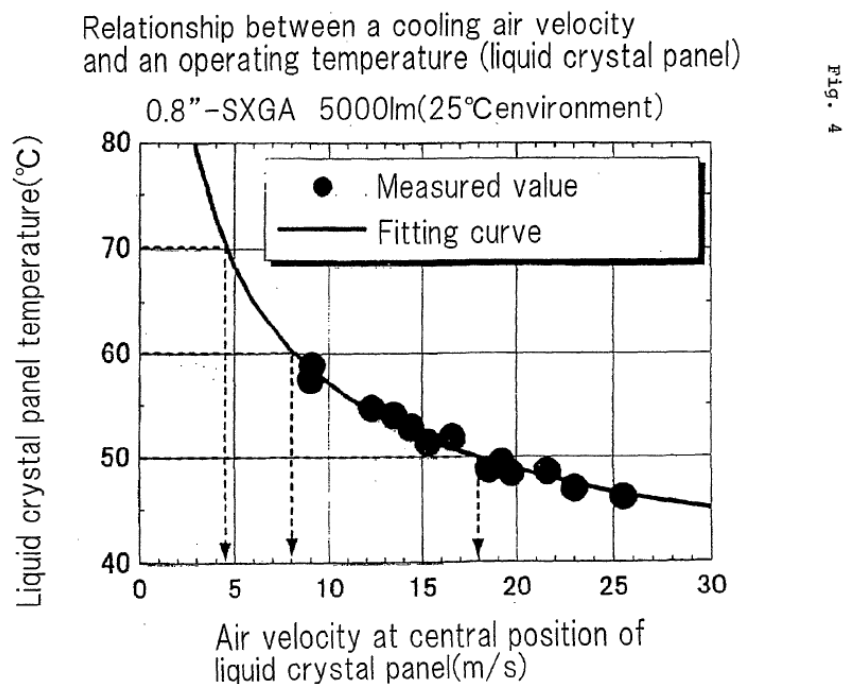
D. Ground 4 – Claims 8 and 19 are Obvious Under 35 U.S.C. § 103 Over the Combination of Karppanen in view of Utsunomiya and the knowledge of a POSITA

Karppanen discloses all the elements of the independent claims and further discloses varying the velocity of the air based on the temperature of the display. Utsunomiya discloses the specific characteristics of the cooling air, including the velocity of the air in the housing. The combination of Karppanen and Utsunomiya renders dependent claims 8 and 19 obvious. *See* Ex. 1003, ¶176-179 & 204.

1. Dependent Claim 8.

[’253 Claim 8] The display device according to claim 2, wherein: the flow rate controller regulates the flow rate of the air in the fan such that the flow velocity of air in the front channel is maintained at 4 m/s or more.

Karppanen discloses the limitations of dependent claim 2 as demonstrated in Ground 3. The combination of Karppanen in view of Utsunomiya discloses the additional limitation that “*the flow velocity of air in the front channel is maintained at 4 m/s or more.*”



Ex. 1010, Figure 4. As can be seen in Figure 4, Utsunomiya discloses that increasing the cooling air velocity significantly cools the display:

Fig. 4 is a graph showing the relationship between a panel cooling air velocity and the panel operating temperature in 0.8"-SXGA (5000-lm class, 25°C environment). For reducing the panel operating temperature from 70°C to 60°C ($\Delta T = -10^\circ\text{C}$), the air velocity may be simply increased from 4.5 m/s to 8 m/s ($\Delta V = +3.5$ m/s), whereas for reducing from 60°C to 50°C ($\Delta T = -10^\circ\text{C}$), the air velocity must be increased from 8 m/s to 18 m/s ($\Delta V = +10$ m/s), as can be seen from the graph.

Ex. 1010, 5:20-26. As described above, it would have been obvious to combine the specific cooling air velocity described in Utsunomiya with the cooling channel of Karppanen. Ex. 1003, ¶176-178. Thus, the combination of Karppanen and Utsunomiya renders obvious dependent claim 8.

2. Dependent Claim 19.

['253 Claim 19] The display device according to claim 12, wherein the control device regulates a flow rate of the air in the fan such that a flow velocity of the air in the front channel is maintained at 4 m/s or more.

See Ground 3, Claim 12 and Ground 4, Claim 8; Ex. 1003, ¶204.

E. Ground 5 – Claims 10 and 18 are Obvious Under 35 U.S.C. § 103 Over the Combination of Karppanen in view of Gromatzky and the knowledge of a POSITA

Karppanen discloses all the elements of the independent claims and further discloses varying the velocity of the air based on the temperature of the display. Gromatzky discloses a specific distance between the display panel assembly and the front side of the housing—9.4 millimeters. The combination of Karppanen and Gromatzky renders dependent claims 10 and 18 obvious. See Ex. 1003, ¶185-186 & 203.

1. Dependent Claim 10.

['253 Claim 10] The display device according to claim 1, wherein: the front channel defined between the display panel assembly and the front side of the housing has a spacing distance in a range of 0.005 to 0.025 m.

Gromatzky discloses a specific distance between the display panel assembly and the front side of the housing—9.4 millimeters. Ex. 1007, 4:39-41. As explained above, it would have been obvious to apply this specific distance to the display element and front plate of Karppanen to protect the display element and to

allow air to flow in the front channel for thermal management. Ex. 1003, ¶185. Thus, the combination of Karppanen and Gromatzky renders obvious dependent claim 10.

15. Dependent Claim 18.

[’253 Claim 18] The display device according to claim 12, wherein the front channel defined between the display panel assembly and the front side of the housing has a spacing distance in a range of 0.005 to 0.025 m.

This element is obvious. *See* Ground 3, Claim 12 and Ground 4, Claim 10; Ex. 1003, ¶203.

IX. Any Secondary Considerations Cannot Overcome the Clear Evidence of Obviousness.

Petitioner is aware that Patent Owner has disclosed purported secondary considerations of non-obviousness in the ITC Action. Patent Owner’s purported evidence of secondary considerations is presented in its Response to Final Invalidity and Unenforceability Contentions (“Contentions”).

The Contentions identify the following purported secondary considerations of non-obviousness: (A) unexpected results, (B) long-felt need and failure of others, (C) copying by competitors, (D) industry praise, and (E) commercial success. The Contentions themselves and the evidence that purports to support the Contentions are designation Confidential Business Information, and thus cannot be disclosed in this proceeding absent authorization by Patent Owner. However, none

of these purported secondary considerations finds a nexus to any purportedly novel element in any claim. As the Federal Circuit has explained, when objective evidence results from something that is not “both claimed and *novel* in the claim, there is no nexus to the merits of the claimed invention.” *In re Huai-Hung Kao*, 639 F.3d 1057, 1068 (Fed. Cir. 2011) (emphasis original); *ClassCo, Inc. v. Apple, Inc.*, 838 F.3d 1214, 1220 (Fed. Cir. 2016) (“A nexus may not exist where, for example, the merits of the claimed invention were ‘readily available in the prior art.’” (quoting *Richdel, Inc. v. Sunspool Corp.*, 714 F.2d 1573, 1580 (Fed. Cir. 1983))).

Further, while Petitioner bears the ultimate burden of persuasion on establishing invalidity, the initial burden of production secondary considerations in this proceeding must fall to Patent Owner. *Pfizer, Inc. v. Apotex, Inc.*, 480 F.3d 1348, 1360 (Fed. Cir. 2007) (“[O]nce a challenger has presented a prima facie case of invalidity, the patentee has the burden of going forward with rebuttal evidence.”). Thus, Petitioner must come forward with secondary considerations in this proceeding before Petitioner can respond to those secondary considerations.

In any event, the Board—at the institution phase—has repeatedly held that evidence of secondary considerations presented by the Patent Owner should be addressed in a trial where the parties may develop, and the Board may consider, a full record. *See, e.g., Tristar Products, Inc. v. Choon’s Design, LLC*, IPR2015-

01883, Paper No. 6 at 26 (PTAB Mar. 9, 2016). That is the appropriate course here, especially given that “the inventions represent[] no more than ‘the predictable use of prior art elements according to their established functions,’” and, thus any “secondary considerations are inadequate to establish nonobviousness as a matter of law.” *Wyers v. Master Lock Co.*, 616 F.3d 1231, 1246 (Fed. Cir. 2010) (quoting *KSR*, 550 U.S. at 417).

X. Discretionary Denial is Inappropriate Under Section 314(a)

As discussed above, the '253 Patent has not been asserted in a district court litigation. While there is a corresponding ITC proceeding involving the '253 Patent, “[t]he PTAB will not discretionarily deny petitions based on applying Fintiv to a parallel ITC proceeding.” Dir. Vidal, *Interim Procedure for Discretionary Denial in AIA Post-Grant Proceedings with Parallel District Court Litigation* (Jun. 21, 2022).

XI. Denial Under Section 325(d) is Inappropriate.

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 relied upon in a rejection during prosecution of U.S. Application No. 13/780,137, which issued as the '253 patent. An EP equivalent of Gromatzky was submitted to the Office in an IDS, but no other reference relied upon herein is listed on the face of the '253 Patent.

XII. Conclusion

In view of the foregoing, there is a reasonable likelihood that Petitioner will prevail with respect to claims 1-2, 4-12, and 14-20 of the '253 Patent.

Respectfully submitted,

By: /s/ John C. Alemanni
John C. Alemanni
Reg. No. 47,384

CERTIFICATE OF WORD COUNT

The undersigned certifies pursuant to 37 C.F.R. § 42.24(d) that the foregoing **Petition for Inter Partes Review** excluding any table of contents, mandatory notices, certificates of service or word count, or appendix of exhibits or claim listing, contains 13,768 words according to the word-processing program used to prepare this paper (Microsoft Word). Petitioner certifies that this **Petition for Inter Partes Review** does not exceed the applicable type-volume limit of 37 C.F.R. § 42.24(a).

Dated: July 14, 2023

By: By: /s/ John C. Alemanni
John C. Alemanni
Reg. No. 47,384

CERTIFICATE OF SERVICE

The undersigned hereby certifies that on the date below a copy of this **Petition for *Inter Partes* Review** has been served by Priority Mail Express® upon the following:

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With a courtesy copy sent via email to litigation counsel in *Components for Certain Environmentally-Protected LCD Digital Displays and Products Containing Same*, Inv. No. 337-TA-1349 (ITC).

Dated: July 14, 2023

By: /s/ John C. Alemanni
John C. Alemanni
Reg. No. 47,384

APPENDIX A – CLAIM LISTING

Claim	Recitation
1pre	A display device, comprising:
1a	a housing;
1b	a display assembly enclosed inside the housing to form a front channel between a display panel of the display assembly and a front side of the housing; and
1c	a flow control device to generate an air flow to the front channel and to control a velocity of the air flow according to a state of the display assembly.
2	The display device according to claim 1, wherein: the housing partitioned into an upper space and a lower space disposed below the upper space and includes a fan to blow the air to front channel.
4	The display device according to claim 2, wherein: the flow control device further includes a sensor to measure the state of the display assembly.
5	The display device according to claim 4, wherein the flow control device further comprises: a flow rate controller to control a flow rate of the air in the fan such that the air in the front channel has a controlled flow velocity.
6	The display device according to claim 5, wherein: the sensor is a temperature sensor to measure a temperature of the air having passed through the front channel, and to send a resulting signal to the flow rate controller.
7	The display device according to claim 2, wherein the front channel comprises: an air inlet to guide air into the channel and an air outlet to discharge air from the channel; and the fan is located near the air inlet.
8	The display device according to claim 2, wherein: the flow rate controller regulates the flow rate of the air in the fan such that the flow velocity of air in the front channel is maintained at

	4 m/s or more.
9	The display device according to claim 1, wherein the flow control device to generate an air flow to the front channel to control a velocity of the air flow according to a state of the housing.
10	10. The display device according to claim 1, wherein: the front channel defined between the display panel assembly and the front side of the housing has a spacing distance in a range of 0.005 to 0.025 m.
11pre	11. A display device, comprising:
11a	a housing;
11b	a display assembly enclosed inside the housing;
11c	a sensor to measures a temperature of air in the housing;
11d	a fan configured to blow the air around the display assembly; and
11e	a control device to control the fan to maintain a temperature of the housing
11f	wherein the sensor transmits a resulting signal to the control device and the control device controls the fan based on the resulting signal.
12	The display device according to claim 11, wherein the display assembly is enclosed inside the housing to form a front channel between a display panel of the display assembly and a front side of the housing.
14	The display device according to claim 13, wherein the control device controls a flow rate of the air in the fan such that the air in the front channel has a controlled flow velocity.
15	15. The display device according to claim 12, wherein: the front channel comprises an air inlet to guide air into the front channel and an air outlet to discharge air from the front channel; and the fan is located near the air inlet.
16	The display device according to claim 12, wherein the sensor measures the temperature of the air having passed through the front channel and sends the resulting signal to the control device.

17	The display device according to claim 12, wherein the control device generates an air flow to the front channel to control a velocity of the air flow according to a state of the housing.
18	The display device according to claim 12, wherein the front channel defined between the display panel assembly and the front side of the housing has a spacing distance in a range of 0.005 to 0.025 m.
19	The display device according to claim 12, wherein the control device regulates a flow rate of the air in the fan such that a flow velocity of the air in the front channel is maintained at 4 m/s or more.
20	The display device according to claim 11, wherein the housing is partitioned into an upper space and a lower space in which the fan is disposed to blow the air to at least one of front side and back side of the display assembly.