

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

MANUFACTURING RESOURCES INTERNATIONAL, INC.,
Petitioner,

v.

SAMSUNG ELECTRONICS CO. LTD.,
Patent Owner.

IPR2023-01201
Patent RE45,117 E

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

LEE, *Administrative Patent Judge*.

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

I. INTRODUCTION

Manufacturing Resources International, Inc. (“Petitioner”) filed a Petition requesting an *inter partes* review of claims 1, 2, and 5 (“challenged claims”) of U.S. Patent No. RE45,117 E (Ex. 1001, “the RE ’117 patent”). Paper 1. Samsung Electronics Co., Ltd. (“Patent Owner”) filed a Preliminary Response. Paper 6 (“Prelim. Resp.”). Petitioner filed an authorized Preliminary Reply. Paper 7 (“Prelim. Reply”). Patent Owner filed an authorized Preliminary Sur-reply. Paper 8 (“Prelim. Sur-reply”).

We have authority to determine whether to institute an *inter partes* review. *See* 35 U.S.C. § 314 (2018); 37 C.F.R. § 42.4(a) (2023). An *inter partes* review may not be instituted unless the information presented in the Petition “shows that there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition.” 35 U.S.C. § 314(a). Upon consideration of the contentions and the evidence of record before us, we conclude Petitioner has not shown a reasonable likelihood that it would prevail in establishing unpatentability of any challenged claim of the RE ’117 patent.

Accordingly, we decline to institute *inter partes* review.

II. BACKGROUND

A. *Real Parties in Interest*

Petitioner identifies only itself as real party in interest. Pet. 83–84. Patent Owner identifies Samsung Electronics Co. Ltd., Samsung Electronics America, Inc., Samsung Research America, Inc., and Samsung International, Inc. as real parties in interest. Paper 3, 2.

B. Related Matters

The parties identify the following proceeding before the U.S. International Trade Commission as a related matter (Pet. 84; Paper 3, 2): *Components for Certain Environmentally Protected LCD Digital Displays and Products Containing Same*, Inv. No. 337-TA-1349 (USITC).

Petitioner has also filed petitions for *inter partes* review related to other patents owned by Patent Owner in IPR2023-01202 and IPR2023-01203. *See* Pet. 84.

C. The RE '117 Patent

The RE '117 patent relates to minimizing temperature increases in a panel type display device. Ex. 1001, 1:20–24. In prior art display devices, a display panel and circuit boards are mounted in the same space within the interior of a case, which causes a temperature increase problem due to inter-heating between the display panel and the circuit boards. *Id.* at 1:43–51. For solving that problem, the RE '117 patent provides a panel type display device, which includes: a case, a display panel mounted in an interior of the case, at least one circuit board which controls the display panel, a first cooling fluid path which cools the display panel, and a second cooling fluid path which cools the circuit board, wherein the first and second cooling fluid paths are separated from each other. *Id.* at 1:60–67. Figure 1 of the RE '117 patent is reproduced below:

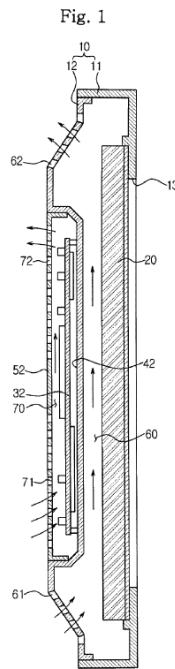


Figure 1 is a sectional view of a panel type display device according to one embodiment of the RE '117 patent.

As illustrated, the display panel includes case 10, display panel 20 mounted at an inner front of case 10, and a plurality of circuit boards 31, 32, and 33 mounted at the rear of case 10 (only circuit board 32 is shown).

Ex. 1001, 2:54–57. Case 10 includes front case 11 coupled to display panel 20 at a front thereof and having opening 13 formed at a screen portion, and rear case 12 an edge portion of which is coupled to front case 11 at a rear of display panel 20. *Id.* at 2:58–61.

Figure 1 illustrates two separate cooling fluid paths, path 60 for cooling display panel 20 and path 70 for cooling the circuit boards. Ex. 1001, 3:24–33. Paths 60 and 70 have separate air inlets and outlets. *Id.* Inlets 61 are for path 60 and holes 71 and 72 are for path 70. *Id.* Outlets 62 are exclusively for path 60. *Id.* The separate outlet for path 67 is shown by arrows but not designated with a reference numeral. Referring to Figure 1, the RE '117 patent states that

“the first and second cooling fluid paths 60 and 70 are separated from one another.” *Id.* at 3:32–33.

In another aspect of the RE '117 patent, the case includes front and rear cases coupled to each other, and the rear case includes a circuit board mounting part provided on an outer surface of the rear case such that the circuit board is mounted in the circuit board mounting part. Ex. 1001, 2:1–5. Figure 2 of the RE '117 patent is reproduced below:

Fig. 2

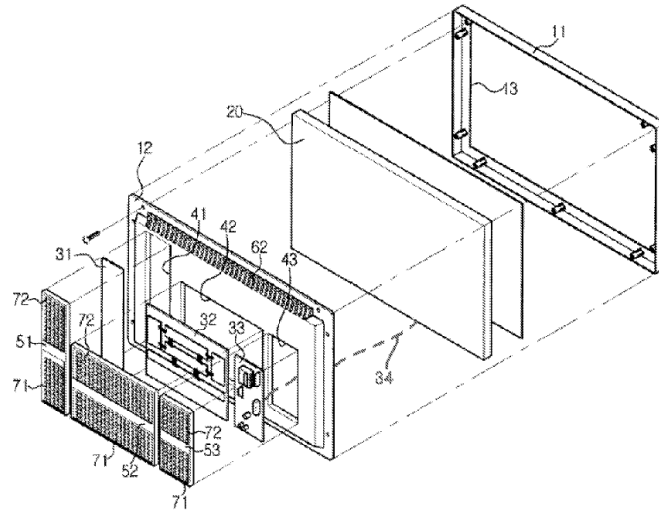


Figure 2 is an exploded perspective view of the panel type display device according to the embodiment shown in Figure 1. *Id.* at 2:40–42. The '117 patent describes Figure 2 as follows:

As illustrated in Figure 2, circuit board mounting parts 41, 42 and 43 for respectively mounting the circuit boards 31, 32 and 33 are provided on a rear surface of the rear case 12. Each of the circuit board mounting parts 41, 42 and 43 has an open rear while being recessed in a predetermined depth from rear to front of the rear case 12 such that the circuit boards 31, 32 and 33 can be received in the circuit board mounting parts 41, 42 and 43, respectively. Further, covers 51, 52 and 53 for covering the circuit board mounting parts 41, 42 and 43 are mounted thereon, respectively.

. . . Further, as illustrated in FIG. 2, a plurality of air flow holes 71 and 72 through which air can flow in internal spaces of the circuit board mounting parts 41, 42 and 43 are formed on the covers 51, 52 and 53 for respectively covering the circuit board mounting parts 41, 42 and 43.

Id. at 3:3–23.

D. Illustrative Claim

Claim 1 is independent. Claim 2 depends from claim 1, and claim 5 depends from claim 2. Claim 1 is reproduced below:

1. [1Pre] A panel display device, comprising:
 - [1a] a case;
 - [1b] a display panel mounted in an interior of the case;
 - [1c] at least one circuit board which controls the display panel;
 - [1d] a first cooling fluid path which cools the display panel; and
 - [1e] a second cooling fluid path which cools the circuit board,
 - [1f] wherein the first and second cooling fluid paths are separated from each other, and
 - [1g] wherein the case includes a circuit board mounting part provided on a rear surface of the case and partitioned from a space in which the display panel is mounted such that the circuit board is received in the circuit board mounting part,
 - [1h] the first cooling fluid path includes a space between a rear surface of the display panel and an inner surface of the case, and
 - [1i] the second cooling fluid path includes an internal space of the circuit board mounting part.

Ex. 1001, 4:34–50.¹

¹ The bracketed heading labels correspond to those used by Petitioner to reference the claim elements. *See* Pet. 37–56. We use the same labels here for ease of reference, understanding, and consistency.

E. Prior Art and Declaration Evidence

Petitioner relies on the following evidence:²

Name	Patent Document	Exhibit
Kaneko ³	US Pub. App. 2002/0014840 A1	1014
Karppanen ⁴	WO 2007/116116 A1	1009
Takahashi ⁵	JP 2003-75858	1010
Nagayama ⁶	JP 2006-163217	1012

Petitioner also relies on a Declaration of Carl D. Meinhart, Ph.D.

Ex. 1003. Patent Owner's Preliminary Response relies on a Declaration of Bruce W. Smith, Ph.D. Ex. 2001.

F. The Asserted Grounds of Unpatentability

Petitioner asserts that claims 1, 2, and 5 of the RE '117 patent are unpatentable on the following grounds (Pet. 37, 62):

² The RE '117 patent is reissued from U.S. Patent No. 7,667,964, issued on Feb. 23, 2010, from Application No. 11/872,057, filed Oct. 15, 2007, which claims priority to KR 10-2007-0002081, filed Jan. 8, 2007. Ex. 1001, codes (64) (30).

³ Published Feb. 7, 2002.

⁴ Published October 18, 2007. Ex. 1009, code (43).

⁵ Published March 12, 2003. Ex. 1010, code (43). A certified English translation has been provided by Petitioner. Ex. 1011. Hereinafter, citations to Takahashi are made with reference to the certified English translation.

⁶ Published June 22, 2006. Ex. 1012, code (43). A certified English translation has been provided by Petitioner. Ex. 1013. Hereinafter, citations to Nagayama are made with reference to the certified English translation.

Claims Challenged	35 U.S.C. §	References/Basis
1, 2, 5	103(a) ⁷	Karppanen, Takahashi
1, 2, 5	103(a)	Nagayama, Kaneco

III. ANALYSIS

A. *Legal Standards*

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

The question of obviousness is resolved on the basis of underlying factual determinations, including (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of skill in the art; and (4) where in evidence, so-called secondary considerations.⁸ *See Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

B. *Level of Ordinary Skill in the Art*

Citing testimony from Dr. Meinhart, Petitioner contends a person of ordinary skill in the art would have “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

⁷ The Leahy-Smith America Invents Act (“AIA”), Pub. L. No. 112–29, 125 Stat. 284, 287–88 (2011), amended 35 U.S.C. §§ 102, 103, and 112. Because the RE ’117 patent claims priority to an application filed before March 16, 2013 (the effective date of the relevant amendments), the pre-AIA versions apply.

⁸ The preliminary record does not include any evidence of secondary considerations of nonobviousness.

in the fields of mechanical design, fluid mechanics, heat transfer, or electronics cooling.” Pet. 15. Petitioner further notes that “[l]ack of work experience could have been remedied by additional education and vice versa.” *Id.* at 16.

Patent Owner has not in the Preliminary Response articulated its own statement of the level of ordinary skill in the art. Nor has Patent Owner disputed Petitioner’s articulation of the level of ordinary skill in the art.

We adopt Petitioner’s statement of the level of ordinary skill in the art, except that we delete the qualifier “at least,” which renders the statement vague by rendering the scope of ordinary skill unbounded at the top. This level of ordinary skill appears consistent with what is reflected by the content of the applied prior art references. *Cf. Okajima v. Bourdeau*, 261 F.3d 1350, 1354–55 (Fed. Cir. 2001) (the applied prior art may reflect an appropriate level of skill).⁹

C. Claim Interpretation

We use the same claim construction standard that would be used to construe a claim in a civil action under 35 U.S.C. § 282(b), including construing the claim in accordance with the ordinary and customary meaning of such claim as understood by one of ordinary skill in the art and the prosecution history pertaining to the patent. 37 C.F.R. § 42.100(b) (2023). The claim construction standard set forth in *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc) is applicable.

⁹ In his Declaration, Patent Owner’s expert, Dr. Smith, provides a slightly different statement of the level of ordinary skill in the art. Ex. 2001 ¶ 27. Dr. Smith states that a person of ordinary skill in the art would have had “2–4 years of experience in working with electronic displays.” *Id.* However, Patent Owner’s Preliminary Response does not refer to this testimony and does not dispute Petitioner’s statement of the ordinary skill in the art. In any event, our conclusions would not change even if Dr. Smith’s expression of the level of ordinary skill in the art were adopted.

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

The specification may reveal a special definition given to a claim term by the patentee, or the specification or prosecution history may reveal an intentional disclaimer or disavowal of claim scope by the inventor. *Id.* at 1316. “There are only two exceptions to this general rule: 1) when a patentee sets out a definition and acts as his own lexicographer, or 2) when the patentee disavows the full scope of a claim term either in the specification or during prosecution.” *Thorner v. Sony Comput. Entm’t Am. LLC*, 669 F.3d 1362, 1365 (Fed. Cir. 2012).

If an inventor acts as his or her own lexicographer, the definition must be set forth in the specification with reasonable clarity, deliberateness, and precision. *Renishaw PLC v. Marposs Societa’ per Azioni*, 158 F.3d 1243, 1249 (Fed. Cir. 1998). The inventor may also disavow the full scope of a claim term via language in the specification or the prosecution history. *Poly-Am., L.P. v. API Indus., Inc.*, 839 F.3d 1131, 1136 (Fed. Cir. 2016).

Only those claim terms that are in controversy need to be construed, and only to the extent necessary to resolve the controversy. *Realtime Data, LLC v. Iancu*, 912 F.3d 1368, 1375 (Fed. Cir. 2019) (“The Board is required to construe ‘only those terms . . . that are in controversy, and only to the extent

necessary to resolve the controversy.” (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999))).

1. “*display panel*”

According to Petitioner, “display panel” means “a flat type screen on which images are displayed, such as a Liquid Crystal Display or Plasma Display Panel.” *Id.* at 17. Patent Owner asserts that Petitioner improperly limits “display panel” to only a “screen” on which images are displayed. Prelim. Resp. 8. Patent Owner states, however, that “construction of this term does not impact the issues in this proceeding.” *Id.* Patent Owner does not dispute Petitioner’s position that “display panel” includes Liquid Crystal Display and Plasma Display Panel. Therefore, it is not necessary to construe “display panel” for purposes of this decision.

2. “*circuit board mounting part*”

Petitioner proposes a construction for “circuit board mounting part” which appears in each of claims 1, 2, and 5. Pet. 19–25. Our decision, however, does not depend on any construction of the term “circuit board mounting part.” Thus, it is not necessary to construe this term.

3. “*separated from each other*”

This term appears in claim 1, which recites in limitation [1f]: “wherein the first and second cooling fluid paths are separated from each other.” Ex. 1001, 4:40–41. The parties’ arguments suggest disagreement as to the meaning of “separated from each other” as applied to the two cooling fluid paths. Patent Owner proposes that “first and second cooling fluid paths are separated from each other” should be construed to mean “first and second cooling fluid paths do not mix.” Prelim. Resp. 14 n.2. Because the first and second cooling fluid paths are within the panel display device, we understand

Patent Owner to be proposing the meaning that first and second cooling paths do not mix within the panel display device.

We find it necessary to construe “separated from each other.” For the reasons discussed below, we interpret “separated from each other” to mean the first and second cooling fluid paths do not mix within the panel display device.

The RE '117 patent explains that in prior art display devices, a temperature increase problem is caused by inter-heating between the display panel and the circuit boards. Ex. 1001, 1:43–51. For solving that problem, the RE '117 patent provides a first cooling fluid path which cools the display panel and a second fluid cooling path which cools circuit boards, which paths are separated from one another. *Id.* at 1:60–67.

As shown in Figure 1, reproduced below, cooling fluid paths 60 and 70 have separate air inlets and outlets and do not mix within the panel display device (Ex. 1001, 3:24–33):

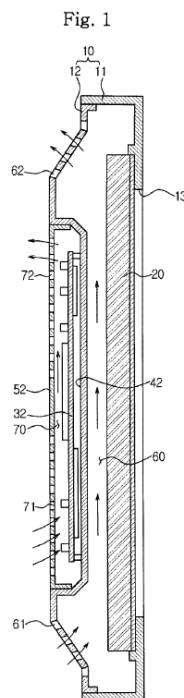


Figure 1 is a sectional view of a panel type display device according to the RE '117 patent. Referring to Figure 1, the RE '117 patent states that “the first and second cooling fluid paths 60 and 70 are separated from one another.”

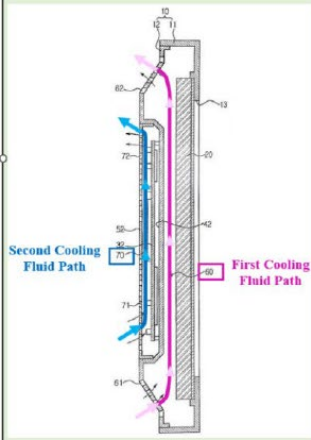
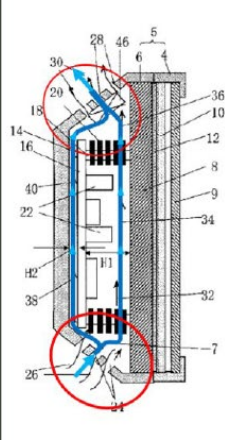
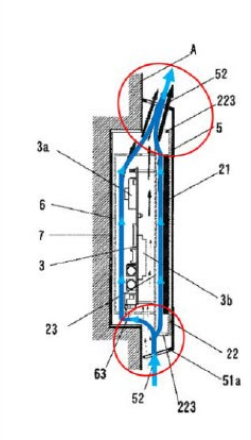
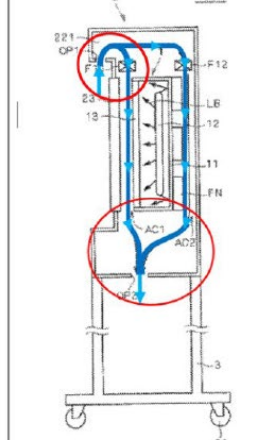
Ex. 1001, 3:32–33.

In the Description of the Related Art section of the Specification, the RE '117 patent distinguishes Japanese Unexamined Patent Application Publication No. 2006-162641 (hereinafter “JP '641 publication”) as disclosing a prior device that suffers from an inter-heating problem between the display panel and the circuit boards, and states:

[I]n such a display device, a display panel and circuit boards, from which heat is produced, are mounted in the same space, such as the interior of a case. For this reason, there is a problem in that the internal temperature of the case is increased due to inter-heating between the display panel and the circuit boards. Such a temperature increase causes the surface temperature of the display panel to be increased. In the case of an LCD panel, the temperature increase causes deterioration of the liquid crystal.

Ex. 1001, 1:43–51.

Neither party provided an English translation of the JP '641 publication. But an English-language abstract of it is in the prosecution history. Ex. 1002, 151. On page 2 of the Preliminary Response, Patent Owner provides a side-by-side comparison of four annotated figures, taken from each of the RE '117 patent, JP '641 publication, Takahashi, and Nagayama, respectively (Prelim. Resp. 2), reproduced below:

'117 Patent's Invention	The Prior Art as Disclosed by the '117 Patent (JP '641)	Ground 1 (Takahashi)	Ground 2 (Nagayama)
[1f] <u>separate</u> cooling paths	<u>Mixed cooling paths: No separate cooling paths</u>		
			

The illustration shows colored cooling paths within each of the RE '117 patent, JP '641 publication, Takahashi, and Nagayama, and red circled areas within JP '641 publication, Takahashi, and Nagayama, where the two paths overlap within the overall panel display device. Prelim. Resp. 2.

Petitioner asserts that claim 1 should not be limited to the embodiment disclosed in Figure 1, especially since “the text of the '117 patent does not limit the entry/exit of the cooling paths.” Prelim. Reply 2. However, given that the goal of the RE '117 patent is to avoid inter-heating by providing separate cooling fluid paths, as discussed above, it is not consistent with the Specification to have mixing of the two cooling fluid paths within the panel display device. We are not reading an extraneous limitation from the Specification into the claim. Rather, we are interpreting the limitation “separated from each other” in light of the Specification, which is the single best guide to the meaning of a disputed term. *Phillips*, 415 F.3d at 1315.

Further, Patent Owner’s expert, Dr. Smith, testifies with respect to the JP '641 publication that one of ordinary skill in the art “would have understood

that the ‘inter-heating’ problem arises in part from the fact that the two cooling paths share the same entrance and exit.” Ex. 2001 ¶ 79. In its Preliminary Reply, Petitioner states that “[t]he ’117 patent’s discussion of JP2006-162641 has nothing to do with separate air entry/exit as Dr. Smith alleges.” Prelim. Reply 3.

We disagree with Petitioner, whose assertion is mere attorney argument and not supported by expert testimony. In contrast, Dr. Smith explains his position by noting that “[t]he ’117 patent states that the type of arrangement described in JP ’641 leads to ‘inter-heating between the display panel and the circuit boards.’” Ex. 2001 ¶ 79 (citing Ex. 1001, 1:45–49). Petitioner does not deny that there is mixing of cooling paths in the JP ’641 publication. Further, Petitioner’s expert, Dr. Meinhart, expressly acknowledges that the RE ’117 patent explains “that the paths are separate to keep the heat from one path from influencing the heat from the other path.” Ex. 1003 ¶ 125. That testimony is consistent with the testimony of Patent Owner’s expert, Dr. Smith.

In its Preliminary Reply, Petitioner argues: “Claim 11 prohibits air flow between paths and claim 23 adds ‘entirely’ to modify ‘separated.’ This means that ‘separated’ in claim 1 allows for mixing at some point, which includes at the entry/exit, or the language in claims 11 and 23 is superfluous.” Prelim. Reply 1–2. Specifically, claim 11 is independent and recites “wherein the first and second cooling fluid paths are separated from each other such that air flow from the second cooling fluid path to the first cooling fluid path is prohibited.” Ex. 1001, 5:60–63. Claim 23 depends from claim 11 and recites “wherein the first and second cooling fluid paths are entirely separated from each other such that air flow from the second cooling fluid path to the first cooling fluid path [is] entirely prohibited.” *Id.* at 7:9–13.

Petitioner’s argument is unavailing for several reasons. First, the doctrine of claim differentiation is not strict or absolute, and can be overridden by “strong evidence of meaning supplied by the specification,” such as is the case here. *See Atlas IP, LLC v. Medtronic, Inc.*, 809 F.3d 599, 607 (Fed. Cir. 2015). Second, “patentees often use different language to capture the same invention.” *Id.* Thus, to the extent that the patentees have used different formulations to claim the concept of separation in the RE ’117 patent, we do not automatically ascribe significance to those differences. Third, there are other differences between claim 1 and claim 11, which means our construction does not lead to any two claims having the exact same scope.¹⁰ Fourth, the doctrine of claim differentiation generally does not apply to claims which have no dependent relationship with each other, such as is the case here. *See Atlas IP*, 809 F.3d at 606–07; *Liebel-Flarsheim Co. v. Medrad, Inc.*, 358 F.3d 898, 910 (Fed. Cir. 2004). Neither claim 11 nor claim 23 depends from claim 1. Although claim 23 does depend from claim 11, claim 11 itself already expressly recites that air flow from the second cooling fluid path to the first cooling fluid path is *separated* such that air flow between the two paths is *prohibited*. *See* Ex. 1001, 5:60–63. What “entirely prohibited” in claim 23 adds to “prohibited” in claim 11, and what “entirely separated” in claim 23 adds to “separated” in claim 11, is at best ambiguous. Nor does the specification of the RE ’117 patent elucidate what that difference may be. Thus, we find that the differences

¹⁰ For instance, claim 11 recites not a “case” as does claim 1, but a “front case” and a “rear case.” Ex. 1001, 5:48–53. Claim 11 also additionally recites a circuit substrate, which includes a circuit board with a heat generating side having a plurality of electronic components mounted thereto, and recites that the heat generating side of the circuit board face in a direction away from the display panel. *Id.* at 5:54–56, 5:67–6:3.

in language between claims 11 and 23 do not tip the scale or otherwise impact the result in favor of Petitioner regarding the meaning of “separated from each other” in claim 1.

Based on the foregoing, we interpret “separated from each other” in limitation [1f] to mean the two cooling fluid paths do not mix within the panel display device.

*D. Alleged Obviousness of Claims 1, 2, and 5
over Karppanen and Takahashi*

1. Overview of Karppanen

Karppanen is an international patent application titled “Electronic Information Board.” Ex. 1009, code (54). It relates to an electronic information board comprising a frame, a flat display element for presenting information, and electronic equipment for controlling the display element. *Id.* at 1:3–5. The flat display element can be a TFT LCD (thin film transistor liquid crystal display) or plasma display. *Id.* at 3:21–23. The information board has a display casing for the display element and a device casing for the electronic equipment needed for controlling the display element. *Id.* at 3:28–30. “Cooling elements have also been arranged in the display casing for transferring heat from the display casing to the outside of the display casing.” *Id.* at 3:30–32.

Karppanen describes:

TFT LCD displays are used to some extent in the implementation of public electronic information boards. The problem is that when used in environments having high temperatures, the temperature of the display devices easily rise too high. On the other hand, in cold environments there is the danger that the temperatures of the display devices fall too low. In both situations it is important that the temperatures at different points inside the display device can be kept as constant as possible. Then the display device operates in the widest possible range of operating temperatures, and local

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temperatures do not cause exceeding of the specifications given to
the display element.

Ex. 1009, 1:24–32.

Figure 2 of Karppanen is reproduced below:

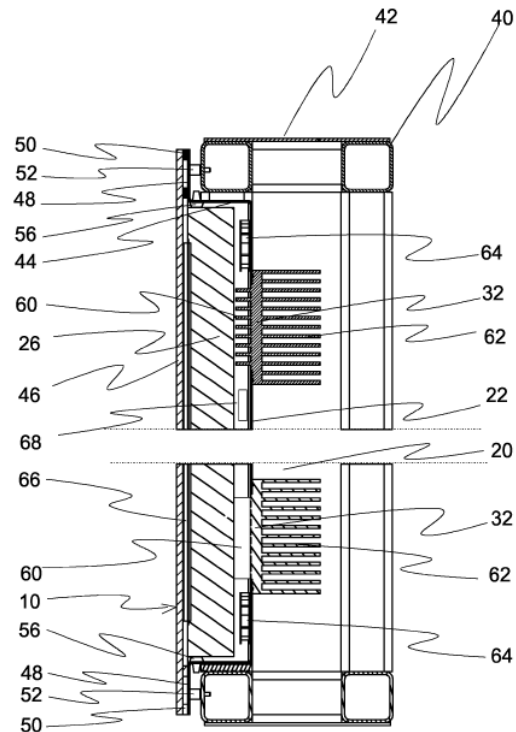


Fig. 2

Figure 2 is a cross-sectional view of one embodiment of Karppanen's electronic information board (Ex. 1009, 6:7–8)

The information board has frame 40 to an edge of which is fastened lining plate 42. Ex. 1009, 7:27–30. Display casing 10 comprises backwall 22, transparent front plate 46, and edge part 44. *Id.* at 7:31–32. Edge part 44 has flange-like fastening collar 48 running in the direction of the front plate and is fastened to the frame by fastening means 52. *Id.* at 7:32–34. Transparent front plate 46 is fastened to the fastening collar of the edge parts by means of sealing elements 50 so that the edge parts of the front plate and the back wall form a closed display casing. *Id.* at 7:35–38.

Inside the display casing is display element 26. Ex. 1009, 8:4. In the backwall of the display casing, there are cooling elements 32 which have first heat transfer part 60 extending to the inside of the display casing and second

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

Inside the display casing on back wall 22 are fans 64 which circulate air in the space between display element 26 and the walls of display casing 10. Ex. 1009, 9:3–5. Ducting 66 are arranged between display casing 10 and display element 26 so that air flow circulating the display element and equalizing the temperatures can be effected by fans 64 which force the air of the inner casing to flow past front plate 46 of the device. *Id.* at 9:5–8.

Karppanen describes that from cooling space 20 thermal energy is conducted by air flow produced by cooling fans out of the entire device. Ex. 1009, 8:19–22. In one embodiment, “there are ventilator slots or holes on the opposite sides of the cooling space for enabling air flow from the outside of the information board to the cooling space and from the cooling space back to the outside of the information board.” *Id.* at 4:19–22. Karppanen describes that

“[i]n the cooling space there is preferably at least one cooling fan for circulating air through the cooling space.” *Id.* at 44:22–23.

Figure 1 of Karppanen is reproduced below:

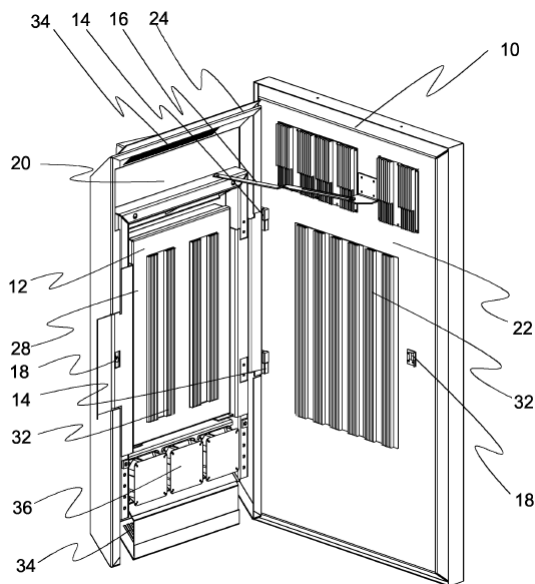


Figure 1 is a perspective view of an electronic information board according to Karppanen (Ex. 1009, 6:4–5)

“The information board has a closed display casing 10, to the back wall 22 of which a cover 24 opening on hinges 14 has been connected.” Ex. 1009, 6:17–19. “A closed device casing 12 has been fastened to the bottom of the cover. The display element 26 of the information board (Fig. 2) has been placed inside the display casing, and the electronic equipment needed in the control of the display element have been placed inside the device casing.” *Id.* at 6:20–24. Karppanen describes:

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

Id. at 7:7–11.

2. *Overview of Takahashi*

Takahashi relates to a heat dissipation structure of a wall embedded liquid crystal panel unit containing a liquid crystal panel together with a drive circuit. Ex. 1011 ¶ 1. Takahashi seeks to provide a heat dissipation structure for a wall embedded liquid crystal panel unit that can release heat generated from the internal mounting parts even in the absence of ventilation on the back side of the mounting surface. *Id.* ¶ 7.

Figures 3 and 4 of Takahashi are reproduced below:

[Figure 3]

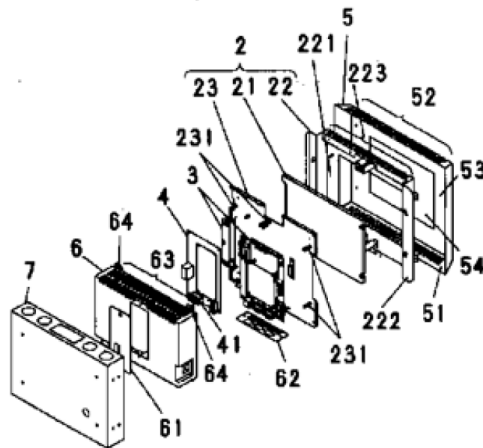


Figure 3 is an exploded perspective view of a wall embedded liquid crystal panel unit of Takahashi, viewed from its rear side. Ex. 1011 ¶ 14.

[Figure 4]

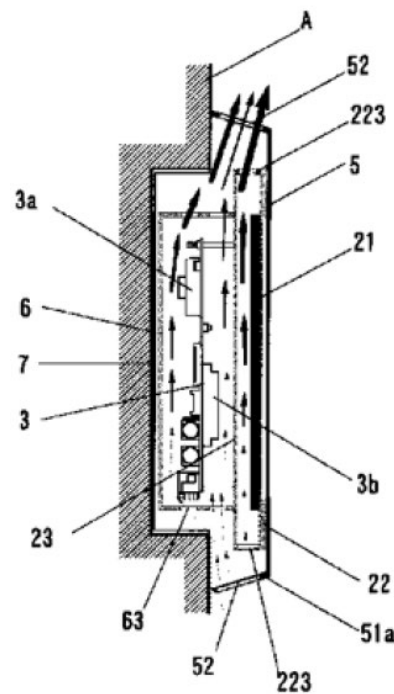


Figure 4 illustrates the heat dissipation structure of Takahashi's wall embedded liquid crystal panel unit. *Id.*

Takahashi's wall embedded crystal panel unit is mounted on mounting surface A, such as a wall, and includes drive circuit board 3 which drives liquid crystal panel 2, power supply circuit board 4 providing power to circuit board 3 and liquid crystal panel 2, front cover 5, and rear cover 6 which is threadedly coupled to front cover 5 via coupling piece 64. Ex. 1011 ¶¶ 15, 23.

Liquid crystal panel 2 consists of liquid crystal panel body 21, front liquid crystal panel cover 22, and rear liquid crystal panel cover 23. Ex. 1011 ¶ 16. The rear surface of liquid crystal panel cover 23 is formed of a generally rectangular shaped metal plate. *Id.* ¶ 18. A plurality of spacers 231 are mounted to the rear surface of liquid crystal panel cover 23. *Id.*

Through spacers 231, circuit board 3 which includes circuits 3a and 3b (Ex. 1011 ¶ 20) are mounted to the rear side of rear liquid crystal panel cover

23. *Id.* Rear liquid crystal panel cover 23 creates a partition which separates liquid crystal panel body 21 on one side thereof from the two open spaces on either side of circuit board 3. *Id.*

3. *Independent Claim 1*

Limitation [1d] recites: “a first cooling fluid path which cools the display panel.” Ex. 1001, 4:38.

Limitation [1e] recites: “a second cooling fluid path which cools the circuit board.” *Id.* at 4:39.

Limitation [1f] recites: “wherein the first and second cooling fluid paths are separated from each other.” *Id.* at 4:40–41.

Petitioner asserts that “Karppanen discloses a first cooling fluid path which cools the display panel.” Pet. 42. Petitioner explains:

Karppanen discloses “the display element is supported at its edges to the edge part of the display casing by support elements so as to form a gap enabling the circulation of air between the walls of the display casing and the outer surface of the display element,” which is a first cooling fluid path which cools the display panel.

Id. at 42–43 (citing Ex. 1009, 4:39–32). Petitioner further asserts that “[t]here is a secondary airflow in the display case 10 between the front plate 46 and the display element 26,” and that “[e]ach of these (primary and secondary) airflows independently constitute the claimed ‘first cooling fluid path.’” *Id.* at 44.

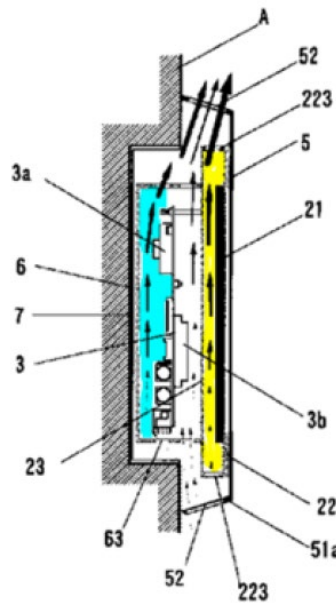
Petitioner further asserts that Karppanen teaches “a second cooling fluid path which cools the circuit board.” *Id.* at 45. Petitioner states that “Karppanen teaches that ‘device casing (12) for the electronic equipment needed for controlling the display element,’” and that “[a]t the relevant time, it was widespread common knowledge (and a POSITA [person of ordinary skill in the art] would know) that electronic equipment invariably comprises circuit boards and that it would be obvious to do so.” *Id.* at 46. According to Petitioner,

Karppanen also explains that the device case 12 cooling is achieved in a similar way to the display case 10 cooling: “The warming and cooling of components in the device casing 12 can be implemented by a corresponding cooling solution as described above in connection with the display casing. Then the cooling or warming air flow circulates as forced past all the components becoming warmed.” Ex. 1009, 10:20-23. And, Karppanen teaches that cooling fans 36 are mounted in the cover 24 of the device case 12.

Id. at 46. Petitioner concludes that Karppanen therefore teaches “a second cooling fluid path which cools the circuit board.” *Id.* at 45.

For limitation [1f], Petitioner states that “Karppanen illustrates that the first and second cooling fluid paths are separated from each other.” Pet. 47 (citing Ex. 1003 ¶¶ 118–119; Ex. 1009, code (57), 1:24–32, 2:18–29, 2:21–3:6, 3:8–15, 3:21–34, 3:38–4:3, 8:4–11, 9:3–13, 10:20–23, claim 1). Petitioner notes Karppanen’s illustration of separate casings with separate cooling spaces for the display and its associated electronic equipment. *Id.* at 48 (citing Ex. 1003 ¶¶ 120–121; Ex. 1009, code (57), 7:9–11, Figs. 1, 2).

Despite its seeming reliance on Karppanen for teaching limitation [1f], Petitioner makes the following statement: “Karppanen does not, however, expressly state that the paths are separate. Takahashi cures this *deficiency*.” Pet. 49 (emphasis added). The Petition then continues for two pages explaining why Takahashi discloses limitation [1f]. *Id.* at 49–50. Specifically, Petitioner asserts that Takahashi illustrates “distinct air flow (cooling fluid) paths.” *Id.* at 49. Petitioner provides the following annotated version of Figure 4 of Takahashi:



Id. Figure 4 illustrates the heat dissipation structure of Takahashi's wall embedded liquid crystal panel unit. Ex. 1012 ¶ 14. Petitioner identifies the arrows as showing flow paths and has colored blue a section passed through by one flow path and yellow a section passed through by another flow path. Pet. 49.

Petitioner asserts that the annotated figure shows that “the flow paths shown by the arrows in Takahashi are separated by circuit board 3 (and elements 3a and 3b), as well as by a third path (the arrows left uncolored that are between the yellow and blue sections).” Pet. 49. According to Petitioner, a person of ordinary skill in the art would have understood “that the fluid cooling paths of Takahashi are separated by at least rear surface liquid crystal panel cover 23.” *Id.* at 50 (citing Ex. 1003 ¶¶ 124–125). Petitioner further contends that a person of ordinary skill in the art “would have been motivated to include separate cooling paths in Karppanen's device, such as those described in Takahashi, to efficiently cool the heat producing components.” *Id.* (citing Ex. 1003 ¶ 126). In support of its proposed combination, Petitioner notes that both

references seek to solve problems in display devices arising from temperature increases. *Id.*

Patent Owner notes Petitioner’s admission that Karppanen does not expressly disclose separate cooling paths. Prelim. Resp. 13 (citing Pet. 49). Patent Owner further notes Petitioner’s reliance on Takahashi for teaching separate cooling paths. *Id.* Patent Owner argues that Takahashi does not teach cooling paths that are “separate from each other.” *Id.* (citing Ex. 2001 ¶¶ 73–74). In particular, Patent Owner cites Takahashi’s common vent openings 52 that are used by both of its cooling paths. *Id.* at 13–14 (citing Ex. 1011 ¶¶ 25–27, Fig. 4); *see also id.* at 19–20 (citing Ex. 2001 ¶¶ 79–80 (arguing that Takahashi’s air flows mix)).

In light of our construction of “separated from each other” above (*see supra* § III.C.3), we agree with Patent Owner’s arguments. Specifically, we agree with Patent Owner that Petitioner does not rely on Karppanen alone for teaching limitation [1f] (Prelim. Resp. 13). Although Petitioner puts forth certain unpatentability contentions for limitation [1f] based on Karppanen (*see* Pet. 47–48), Petitioner acknowledges that Karppanen does not expressly disclose limitation [1f]. Pet. 49 (citing Ex. 1003 ¶ 122). In its Preliminary Reply, Petitioner did not further address limitation [1f].

Petitioner also proposes a modification of Karppanen “to include separate cooling paths in Karppanen’s device, such as those described in Takahashi.” Pet. 50 (citing Ex. 1003 ¶ 126). We hold Petitioner to its proposed modification of Karppanen based on Takahashi because “the petitioner’s petition, not the Director’s discretion, is supposed to guide the life of the litigation.” *SAS Inst., Inc. v. Iancu*, 138 S. Ct. 1348, 1356 (2018); *see also Sirona Dental Sys. GmbH v. Institut Straumann AG*, 892 F.3d 1349, 1356 (Fed. Cir. 2018) (“It would . . .

not be proper for the Board to deviate from the grounds in the petition and raise its own obviousness theory.”). Petitioner is master of its Petition, and so we evaluate only the obviousness rationale that is clearly expressed in the Petition, i.e., that Takahashi teaches limitation [1f] and thus cures the “deficiency” of Karppanen. *See* Pet. 49–50. We also decline to evaluate limitation [1f] based solely on Petitioner’s analysis for Karppanen, because that is not the ground put forth by Petitioner and because Petitioner has not given reasonable notice to Patent Owner that it relies on Karppanen alone to meet limitation [1f].

Turning now to Petitioner’s analysis for limitation [1f] based on Karppanen and Takahashi, we have determined above in Section III.C.3. that “separated from each other” in limitation [1f] requires that the two cooling fluid paths do not mix within the panel display device. Petitioner’s obviousness rationale relies expressly on Takahashi’s cooling paths. *See* Pet. 50. As is evident from Petitioner’s annotated version of Takahashi’s Figure 4 above, the two cooling fluid paths of Takahashi passing through sections colored blue and yellow, as relied on by Petitioner, mix within the panel display device. They mix once just after entry into the device and once just prior to exit from the device. Liquid crystal panel 23 does not extend completely from the air inlet to the air outlet, each designated by reference numeral 52. This permits the two cooling paths to mix above and below liquid crystal panel 23 within the panel display device.

Takahashi itself even describes that “heat in the panel unit body is dissipated by forming *a vent path* through the vent openings 52 in the front cover 5, as shown in FIG. 4.” Ex. 1011 ¶ 23 (emphasis added). That single vent path includes all of the airflow arrows shown in Figure 4. Dr. Smith testifies that as shown in Takahashi’s Figure 4, “all of the air in the device

enters through vents 52 at the bottom and exits through vents 52 at the top.”

Ex. 2001 ¶ 73. Petitioner has not disputed that assertion. We credit this testimony of Dr. Smith. Because the two cooling paths of Takahashi mix within the display device near the entrance and exit vents 52, Petitioner has not sufficiently shown that Takahashi discloses first and second cooling fluid paths that are separate from each other.

For the foregoing reasons, Petitioner has not made an adequate showing for limitation [1f], even for institution purposes. Accordingly, Petitioner has not shown a reasonable likelihood that it would prevail in establishing obviousness of claim 1 over Karppanen and Takahashi.

4. Dependent Claims 2 and 5

Claim 2 depends from claim 1 and claim 5 depends from claim 1.

Ex. 1001, 4:51–55, 5:1–5. The deficiency of Petitioner’s analysis for claim 1, discussed above, equally applies to claims 2 and 5. Accordingly, Petitioner has not shown a reasonable likelihood that it would prevail in establishing obviousness of either claim 2 or claim 5 over Karppanen and Takahashi.

*E. Alleged Obviousness of Claims 1, 2, and 5
over Nagayama and Kaneco*

1. Overview of Nagayama

Nagayama relates to “an outdoor display device using a flat panel type display device as a display section.” Ex. 1013 ¶ 1. Figure 1 of Nagayama is reproduced below:

[FIG. 1]

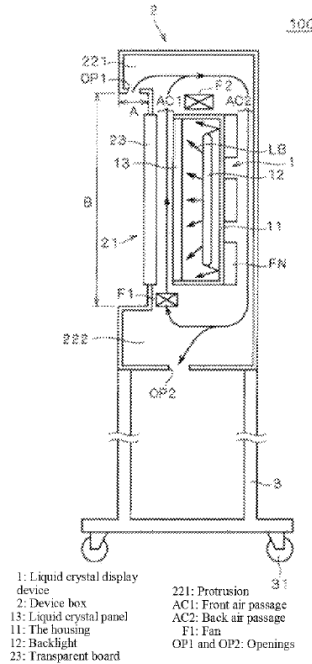


Figure 1 is a cross-sectional view of a configuration of an embodiment of an outdoor display device according to Nagayama. Ex. 1013 ¶ 113.

Liquid crystal device 1 includes liquid crystal panel 13, backlight 12, and housing 11 that houses backlight 12 and the drive circuit of liquid crystal panel 13. Ex. 1013 ¶ 15. The wall facing liquid crystal panel 13 of device box 2 is fitted with polycarbonate transparent plate 23, and the image displayed on liquid crystal panel 13 can be viewed externally through transparent plate 23. *Id.* ¶ 17.

There is a gap between liquid crystal panel 13 and transparent plate 23, referred to as front passage “AC1.” Ex. 1013 ¶ 20. There is also a gap between the back side of liquid crystal device 1, opposite liquid crystal panel 13, and the wall surface of device box 2 facing it, referred to as back air passage “AC2.” Fan F1 is provided in the vicinity of an opening on the lower side of front air passage AC1 and operates to pump air into front air passage AC1. *Id.* ¶ 22. The front surface of liquid crystal panel 13 is cooled by the air sent into front

air passage AC1 by fan F1. *Id.* ¶ 29. The sent air “becomes an upward current and is discharged from the upper opening of the front air passage AC1.” *Id.* ¶ 30. That air is then mixed with fresh air that flows in from the opening OP1, then cooled, then passed through back air passage AC2, and then again sent by fan F1 into the front air passage AC1. *Id.* Fan F2 is provided above liquid crystal display device 1 to facilitate inflow of air from the opening “OP1.” *Id.* ¶ 22.

Thus, an air circulation path is formed within device box 2, where “air corresponding to the inflow from the opening OP1 is expelled from the opening OP2 to prevent excessively high pressure within the device box 2.” Ex. 1013 ¶ 31. “[T]he opening OP1 serves as an air intake and the opening OP2 serves as an air outlet.” *Id.*

Figure 3 of Nagayama is reproduced below:

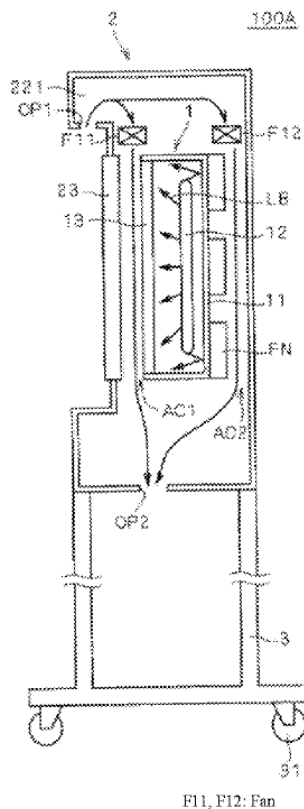


Figure 3 is a cross-sectional view of another configuration of an embodiment of an outdoor display device according to Nagayama. Ex. 1013 ¶ 113.

Nagayama states: “In FIG. 3, the same configuration as the outdoor display device 100 shown in FIG. 1 is marked with the same sign, and duplicate explanations are omitted.” Ex. 1013 ¶ 41. Nagayama further states: “As shown in FIG. 3, in the outdoor display 100A, a fan F11 (first fan) is arranged in the vicinity of the upper opening of the front [] passage AC1 and a fan F12 (second fan) is arranged in the vicinity of the upper opening of the back air passage AC2.” *Id.* ¶ 42. Nagayama explains:

By using fans F11 and F12 arranged in this way [FIG. 3], air entering through opening OP1 is fed by fan F11 to the front air passage AC1 and by fan F12 to the back air passage AC2. The delivered air is then discharged into a downward airflow from the opening on the lower side of each of the front and back air passages AC1 and AC2 and out of the opening OP2 on the bottom side of the device box 2.

Id. ¶ 43.

2. Overview of Kaneco

Kaneco relates to a structure for dissipating heat generated in a drive unit of a plasma display panel in a plasma display panel device. Ex. 1014 ¶ 2.

Kaneco discloses a plasma display panel device including a plasma display panel and a drive circuit for driving the plasma display panel, and a plurality of circuit boards. *Id.* at code (57). Electronic components making up the drive circuit are mounted on the plurality of circuit boards. *Id.* Figure 1 of Kaneco is reproduced below:

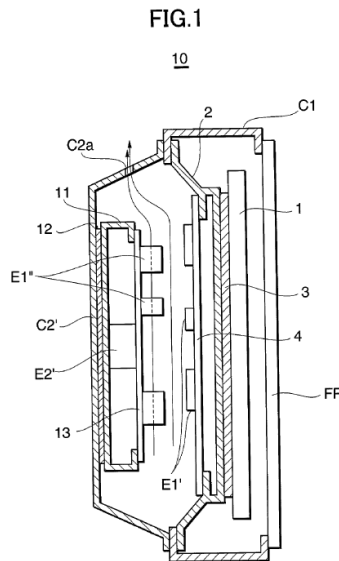


Figure 1 illustrates a lateral sectional view of an embodiment of Kaneco's plasma display panel device. *Id.* ¶ 41.

Kaneco refers to its plasma display panel device as a “PDP device.” Ex. 1014 ¶ 52. As illustrated in Figure 1, PDP 1 is secured on chassis 2 by adhesive tape 3. *Id.* On the back face of chassis 2, circuit board 4 making up a drive circuit for driving PDP 1 is installed and electrically connected to PDP 1 through a flexible cable which is not shown. *Id.* Kaneco describes that PDP1 and circuit board 4 are housed in a casing made up of side case C1, rear case C2', and front panel FP. *Id.* ¶ 53. Kaneco further describes: “On an inner wall face of the rear case C2' opposing the circuit board 4, a heat dissipative chassis 11 formed of metal such as aluminum is fixed through a thermal conductor 12. A circuit board 13 is installed on and supported by the heat-dissipative chassis 11.” *Id.* ¶ 56.

Electronic components E1' are mounted on circuit board 4, and electronic components E1'' are mounted on circuit board 13. *Id.* ¶¶ 55, 57. Also, on the back face of circuit board 13, opposing rear case C2', high heat generating modules are mounted. *Id.* ¶ 57. Kaneco describes that electronic components

E1' exhibit less heat generating property, electronic components E1'' significantly exhibit heat generating property, and modules E2' are high heat generating components. *Id.* ¶¶ 55, 57, 59.

Regarding the flow of heated air, Kaneco describes:

[I]n the PDP device 10, the air heated by the heat generation of the electronic component E1'' and the high heat-generating module E2' moves upward through the heat-dissipating paths formed between the electronic components E1'' and between the modules E2', and then is exhausted from the exhaust hole C2a, provided in the upper portion of the rear case C2', to the outside of the casing. Moreover, the heat generated by the high heat-generating module E2' is transferred through the heat-dissipative chassis 11 and the thermal conductor 12 to the rear case C2' to be dissipated therefrom into the atmosphere.

Ex. 1014 ¶ 62.

A slightly different embodiment of Kaneco is illustrated in Figure 4, reproduced below:

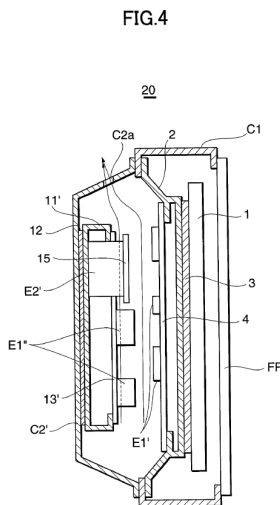


Figure 4 illustrates a lateral sectional view of a second embodiment of Kaneco's plasma display panel device. *Id.* ¶ 44. This embodiment is substantially the same as the Figure 1 embodiment, except for what is illustrated in Figure 5. *Id.* ¶¶ 64–67. Figure 5 of Kaneco is reproduced below:

FIG.5

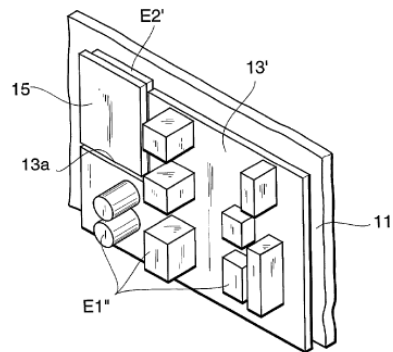


Figure 5 is a perspective view illustrating certain circuit boards in the Figure 4 embodiment. *Id.* ¶ 45.

Circuit board 13' is formed with notch 13a in the upper left corner. Ex. 1014 ¶ 64. Kaneco describes:

While a high heat-generating module E2' is secured to and has a back face in close contact with the heat-dissipative chassis 11', it is disposed in the notch 13a of the circuit board 13'. Further, the module E2' is mounted on a circuit board 15 such that a face thereof opposing the circuit board 4 faces the circuit board 15.

Id. ¶ 67.

3. Independent Claim 1

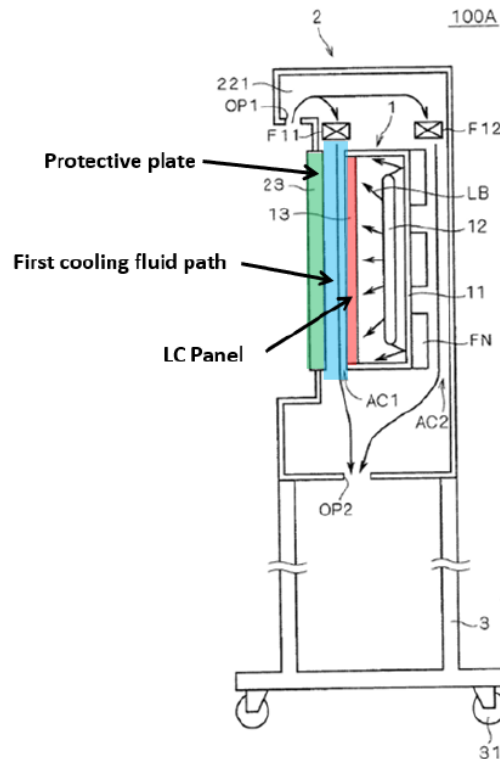
Limitation [1d] recites: “a first cooling fluid path which cools the display panel.” Ex. 1001, 4:38.

Limitation [1e] recites: “a second cooling fluid path which cools the circuit board.” *Id.* at 4:39.

Limitation [1f] recites: “wherein the first and second cooling fluid paths are separated from each other.” *Id.* at 4:40–41.

Petitioner asserts Nagayama discloses a first cooling fluid path which cools the display panel (limitation [1d]). Pet. 67. Petitioner provides the following annotated version of Figure 3 of Nagayama (*id.* at 68):

【 図 3 】



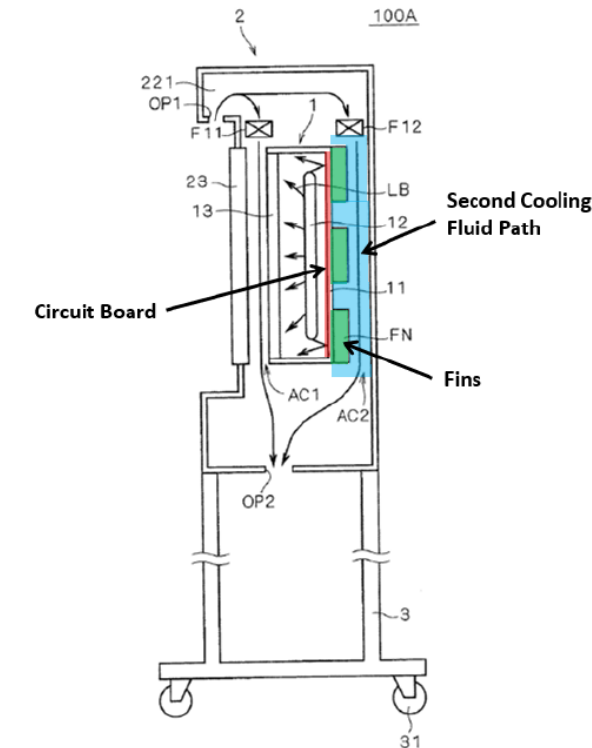
The figure is a cross-sectional view of the configuration of an outdoor display device according to Nagayama, annotated by Petitioner to show the first cooling fluid path. Ex. 1013 ¶ 113; Pet. 68. Petitioner asserts:

In annotated Nagayama, Fig. 3 . . . , the first cooling path AC1 (blue) can be seen between the LC panel 13 (red) and the transparent plate 23 (green). Nagayama states this explicitly at [0029]: “Therefore, a gap is provided between the liquid crystal panel 13 and the transparent plate 23 to form the front air passage AC1, and a configuration is adopted to cool the front surface of the liquid crystal panel 13 by sending air to the front air passage AC1 by the fan F1.”

Pet. 68.

Petitioner further asserts Nagayama illustrates a second cooling fluid path which cools the circuit board (limitation [1e]). Pet. 69. Petitioner provides the following annotated version of Figure 3 of Nagayama (*id.* at 70):

【 図 3 】



The figure is a cross-sectional view of the configuration of an outdoor display device according to Nagayama, annotated by Petitioner to show the second cooling fluid path. Ex. 1013 ¶ 113; Pet. 69–70. Petitioner asserts:

As can be seen in annotated Fig 3 . . . , in accordance with the Nagayama teaching above, the circuit boards (red) must be in the housing 11, but behind the BLU reflector (to avoid blocking the light). Thus, the circuit boards (red) are located as shown. Cooling path AC2 (blue) extracts heat from the (green) fins (FN) and cools the circuit boards (red).

Id. at 69–70.

Petitioner states “[a]lthough Nagayama illustrates two cooling fluid paths, Nagayama does not explicitly teach this limitation. This *deficiency* is cured by Kaneco.” Pet. 70 (emphasis added). These statements are made by Petitioner in its discussion of limitation [1e]. *Id.* at 69–73. Petitioner does not

rely on the teachings of Kaneco to account for limitation [1f], as discussed below.

Petitioner further asserts Nagayama as modified by Kaneco teaches “wherein the first and second cooling fluid paths are separated from each other” (limitation [1f]). Pet. 73–74. Petitioner asserts:

In reference to Figure 3, Nagayama discloses “in the outdoor display 100A, a fan F11 (first fan) is arranged in the vicinity of the upper opening of the front air passage AC1 and a fan F12 (second fan) is arranged in the vicinity of the upper opening of the back air passage AC2.” Ex. 1013, [0042]. The first cooling fluid path, AC1 is separate from the second cooling fluid path, AC2, so air can be “independently” pumped into the paths. *Id.* at [0043]–[0045]; *see also id.* at [0046]–[0050], Figs. 4–5, [0051]–[0057], Fig. 6. Further, Nagayama discloses, “Fan F11 can be referred to as a liquid crystal panel cooling fan...and the fan F12 can be referred to as a housing cooling fan because it cools the housing 11.” *Id.* at [0044]. Ex. 1003, ¶203.

Id. Petitioner concludes that therefore “Nagayama’s design includes two separate cooling fluid paths.” *Id.* at 74. Notably, Petitioner does not rely on Kaneco for teaching the separateness of the cooling fluid paths. *See id.*

Patent Owner asserts that “[a]s shown in Figure 3, both AC1 and AC2 include air flow that enters through opening OP1, and mixes together before being exhausted at opening OP2.” Prelim. Resp. 36. Patent Owner also asserts that a person of ordinary skill in the art “would have understood that AC1 and AC2, to the extent they constitute two cooling fluid paths, are not separate from each other.” *Id.* at 37. Dr. Smith testifies to the same. Ex. 2001 ¶¶ 116–117 (cited at Prelim. Resp. 37).

Petitioner’s contentions for the “separate” limitation rely on Nagayama’s circulation pathways flowing through passages AC1 and AC2. *See* Pet. 73–74 (“The first cooling fluid path, AC1 is separate from the second cooling fluid

path, AC2, so air can be ‘independently’ pumped into the paths”). The pathway for passage AC1 includes air entering via Nagayama’s opening OP1 and moving through Nagayama’s fans before entering passage AC1. *See* Pet. 67 (quoting Ex. 1013 ¶ 29) (“[A] gap is provided between the liquid crystal panel 13 and the transparent plate 23 to form the front air passage AC1, and a configuration is adopted to cool the front surface of the liquid crystal panel 13 by sending air to the front air passage AC1 by the fan F1”); Ex. 1003 ¶ 189 (quoting Ex. 1013 ¶ 43) (“[A]ir entering through opening OP1 is fed by fan F11 to the front air passage AC1”). The pathway for passage AC2 likewise includes air entering via Nagayama’s opening OP1 and moving through Nagayama’s fan before entering passage AC2. *See* Pet. 67 (quoting Ex. 1013 ¶ 32) (“[A]n air current is also generated in the rear air passage AC2”). Nagayama additionally explains that

a circulation path of air is formed within the device box 2, but air corresponding to the inflow from the opening OP1 is expelled from the opening OP2 to prevent excessively high pressure within the device box 2. Therefore, the opening OP1 serves as an air intake and the opening OP2 serves as an air outlet.

Ex. 1013 ¶ 31 (cited at Pet. 67, 73). Thus, Petitioner maps the recited “first cooling fluid path” and “second cooling fluid path” to Nagayama’s circulation pathways including (1) air entering via opening OP1; (2) air moving through Nagayama’s fans; (3) air moving through passages AC1 and AC2, respectively; and (4) air exiting through opening OP2.

Having considered Petitioner’s cited evidence regarding Nagayama’s circulation pathways in light of our construction above (*see supra* § III.C.3), we do not agree that these pathways teach the “separated from each other” limitation of claim 1. Nagayama’s pathways include a common entrance opening OP1 and common exit opening OP2. *See* Ex. 1013 ¶ 31, Fig. 3.

Accordingly, we credit Dr. Smith's testimony that air mixes within Nagayama's device after opening OP1 and before opening OP2. Ex. 2001 ¶¶ 116–117. Therefore, Nagayama's circulation pathways including AC1 and AC2 do not teach the "separate from each other" limitation of claim 1 under our construction above because these pathways mix near the entrance and exit within Nagayama's device.

For the foregoing reasons, Petitioner has not made an adequate showing that Nagayama discloses limitation [1f], even for institution purposes. Accordingly, Petitioner has not shown a reasonable likelihood that it would prevail in establishing obviousness of claim 1 over Nagayama and Kaneco.

4. *Dependent Claims 2 and 5*

Claim 2 depends from claim 1 and claim 5 depends from claim 1. Ex. 1001, 4:51–55, 5:1–5. The deficiency of Petitioner's analysis for claim 1, discussed above, equally applies to claims 2 and 5. Accordingly, Petitioner has not shown a reasonable likelihood that it would prevail in establishing obviousness of either claim 2 or claim 5 over Nagayama and Kaneco.

IV. CONCLUSION

For the foregoing reasons, we determine that Petitioner has not shown a reasonable likelihood that it would prevail in establishing that at least one of claims 1, 2, and 5 of the RE '117 patent is unpatentable.

V. ORDER

It is ORDERED that no *inter partes* review is instituted in this proceeding.

IPR2023-01201
Patent RE45,117 E

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