

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

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

Petitioner

v.

MANUFACTURING RESOURCES INTERNATIONAL, INC.,

Patent Owner

U.S. Patent No. 9,173,322

Filing Date: October 7, 2014

Issue Date: October 27, 2015

Title: Constricted Convection Cooling System for an Electronic Display

Inter Partes Review No. IPR2023-00220

Declaration of Michael N. Gershowitz

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I, David H. Williams, declare as follows:

I. Introduction

1. My education, experience, and qualifications are set forth in my curriculum vitae, attached as Appendix A to the end of my declaration. I also provide the following summary.

2. I received a Bachelor of Science degree in Electrical Engineering from Rensselaer Polytechnic Institute in New York in 1976. In 1977, I received a Master of Engineering degree also from Rensselaer. I received my Professional Engineering License from New York State in 1982, and from the State of California in 2015.

3. After receiving my master's degree, I worked for Grumman Aerospace Corporation as a Digital Design Engineer from 1977 until 1982. My responsibilities included designing flight and Electronic Counter Measures training simulation systems, developing advanced computer image generation systems, and serving as an instructor for internal professional development courses in microprocessor design.

4. After Grumman, I joined Philips Semiconductors, where I was a Senior Field Applications Engineer from 1982 to 1999. There, I developed hardware reference designs for digital video encoder and decoder products, hardware and firmware for systems based on 8051 microprocessor-based systems, programmable logic devices, simulation models, and other responsibilities. Also, during this time, I was involved

in the support of designs that utilized LCD technology for microcontroller user interfacing.

5. From 1999 to 2004, I worked at Zilog as the Director of their MicroDevices business unit. There I oversaw the launch of over 100 microcontroller products, an achievement that was recognized with industry awards from EE Times (Top 10 processors) and Frost and Sullivan (Market Penetration). I also oversaw the reduction of cost of Zilog's development tools by 75%, established an in-house EMI laboratory, and provided various training programs, several of which included LCD technology.

6. From 2004 to 2007, I worked at Oki Semiconductor as the Senior Director of Marketing and Applications. I guided their Japanese development teams to bring three new ARM-based ASSP devices to market and oversaw the development of other development kits aimed at the low-cost market.

7. From 2010 to 2015, I was the Vice President of Integrated Solutions at Bridgelux, an LED manufacturer then based in Livermore, California. My responsibilities included setting up and gaining accreditation for an engineering laboratory that included LM-79 photometric test facilities, created the Smart Lighting system architecture and prototypes (which ultimately led to twelve issued US patents), developed luminaire system level evaluation methods for quality assurance and failure analysis, defined near field testing methods for improved Color

Angular Uniformity (CAU), Luminous Intensity Uniformity, High Flux Density and minimized self-absorption, and engineered key features to enhance manufacturability and reduce production costs of the Outdoor Lighting Module (OLM) product family. Of particular relevance to this matter was work that I both oversaw and performed personally on the thermal management of LED components in lighting fixtures and display backlighting. The LED arrays manufactured by Bridgelux at that time were based on Metal Clad Printed Circuit Board (MCPCB) technology, and the thermal management techniques I employed were integral to this MCPCB technology. Additionally, during this time, and due to my level of expertise in luminaire design and safety considerations, I became professionally involved with the Underwriters Laboratory (UL) 8750 standards technical panel (STP). UL8750, titled “STANDARD FOR SAFETY Light Emitting Diode (LED) Equipment for use in Lighting Products”. This standard is the primary basis for safety evaluation of LED luminaire products manufactured in North America. My role as a voting member of the STP is to offer proposed changes to the standard as well as review, modify and vote on for acceptance changes to the standard proposed by others.

8. From February 2015 to July 2015, I was a Senior Research Scientist at Rensselaer in their Lighting Research Center. There, I developed an apparatus and measurement procedure for evaluating the performance of commercially available

color tunable LED products, and developed and taught a short course on wireless lighting control technology. Of particular relevance to this matter was work that performed for the thermal management and temperature stabilization of LED sources during photometric measurements.

9. Starting in January 2016, I have been the Vice President of Solutions Engineering at Enlighted, an Internet of Things (“IoT”) company focusing on making buildings smarter, by automating lighting control, heating/AC systems, conference room functionality, energy conservation, and others. My role is managing and developing the wireless sensor network inside Enlighted-capable buildings, including lighting controls and indoor location services.

10. I am also the owner of Gershowitz Consulting LLC, my consulting firm that I started in 2008. In addition to serving as a testifying expert, my consulting experience also includes performing technical due diligence, industrial design, and various other hardware and software design. Several of these designs include LCD display technology, embedded PC technology which included integral LCD video display, and the thermal management of these systems.

11. I am a named inventor on twelve patents in the domain of LEDs and LED lighting systems, many of which involve circuit design for LED applications, and two additional patents in other technology areas. Of particular relevance to this matter, two of my inventions for which patents were granted (9,164,001 – Using

LED die to measure temperature inside silicone that encapsulates an LED array and 9,247,594 - LED array member and thermally decoupled integrated control module assembly) specifically addresses the matter of temperature measurement and thermal management of LED devices.

12. I am a member of the Institute of Electrical and Electronic Engineers (IEEE), and a voting member of the Underwriters Laboratory UL8750 Standards Technical Panel—the Standard for Safety for Light Emitting Diode (LED) Equipment for Use in Lighting Products, and a member of the Illumination Engineering Society (IES). I served on the IEEE’s Consultant’s Network of Silicon Valley (CNSV) Board of directors from 2015 through 2022 and was the chairman of the board of the in 2016.

II. Information Considered

13. I have considered the following documents in preparing my declaration, including any other document that I cite within it:

Exhibit	Description
N/A	Petition for <i>Inter Partes</i> Review of U.S. Patent No. 9,173,322
Ex. 1001	U.S. Patent No. 9,173,322
Ex. 1002	Declaration of Robert Smith-Gillespie
Ex. 1004	U.S. Patent Application Publication No. 2006/0199514 to Kimura (“Kimura”)
Ex. 1005	U.S. Patent No. 7,800,706 to Kim et al. (“Kim”)
Ex. 1006	U.S. Patent Publication No. 2006/0132699 to Cho (“Cho”)

Ex. 1008	Japanese Unexamined Patent Application Publication No. H11-68363 to Takahashi (“Takahashi”)
Ex. 1010	Korean Unexamined Patent Application Publication No. 10-2006-0016469 to Na (“Na”)
Ex. 1023	Custom Luxeon Design Guide, LUMILEDS FUTURE ELECTRONICS, Application Brief AB12 (Nov. 2004)
Ex. 1024	Thermal Design Using: Luxeon Power Light Sources, PHILLIPS LUMILEDS LIGHTING COMPANY, Application Brief AB05 (June 2006)
Ex. 1026	Japanese Patent No. 2006-330196 to Tachikawa (“Tachikawa”)
Ex. 1028	Japanese Unexamined Patent Application Publication No. 10-2003-162228 to Kochiyama (“Kochiyama”)
Ex. 1034	File History for U.S. Patent Application No. 12/411,925
Ex. 2003	U.S. Prov. App. No. 61/039,454
Ex. 2004	Samsung’s Opening Claim Construction Brief, ITC Inv. No. 337-TA-1331 (Feb. 1, 2023)
Ex. 2005	Order No. 13: Construing Certain Terms of the Asserted Claims of the Patents at Issue, ITC Inv. No. 337-TA-1331 (May 15, 2023)
Ex. 2007	U.S. Patent No. 5,636,072
Ex. 2008	U.S. Prov. App. No. 61/039,454
Ex. 2009	Samsung’s Opening Claim Construction Brief, ITC Inv. No. 337-TA-1331 (Feb. 1, 2023)
Ex. 2010	Order No. 13: Construing Certain Terms of the Asserted Claims of the Patents at Issue, ITC Inv. No. 337-TA-1331 (May 15, 2023)
Ex. 2011	Excerpt from Samsung’s Pre-Hearing Brief, ITC Inv. No. 337-TA-1331 (June 5, 2023)

Ex. 2013	Evidentiary Hearing Transcript (Pages 838 through 1135), ITC Inv. No. 337-TA-1331 (June 29, 2023)
Ex. 2016	The New Oxford American Dictionary, Second Edition (2005)
Ex. 2017	Meriam-Webster's Collegiate Dictionary, Eleventh Edition (2008)

14. In addition to the documents above, in forming the opinions expressed below, I have also considered:

- a. My own knowledge and experience based upon my work in the fields of electronic product design including high power LED arrays and LED emitter technology and the design of thermal management systems for these products, as described above and in my CV; and
- b. The level of skill of a POSITA at the time of the alleged invention of the '322 Patent.

III. Obviousness

15. I understand that a patent claim is deemed invalid as “obvious” if it would have been obvious to a person of ordinary skill in the art at the time the invention was made. I also understand that under 35 U.S.C. § 103, a patent is invalid if the differences between the subject matter sought to be patented 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. Obviousness may be shown by considering more than one item of

prior art in combination with others or based on a single prior art reference in combination with the general state of the art.

16. I understand that a conclusion of obviousness may be based upon a combination of prior art references. However, I also understand that a patent composed of several elements may not be proved obvious merely by demonstrating that each of its elements was independently known in the art. I further understand that there must be an appropriate articulation of a reason to combine the elements from the prior art in the manner claimed, and obviousness cannot be based on a hindsight combination of components selected from the prior art using the patent claims as a roadmap.

17. In determining whether an invention is obvious, I understand that obviousness is determined from the perspective of a person of ordinary skill in the art of the invention. In undertaking this analysis, it is important to consider four issues: (1) the scope and content of the prior art, (2) the differences between the prior art and the claim under consideration, (3) the level of ordinary skill in the art, and (4) any “secondary considerations” of non-obviousness.

18. In evaluating the scope and content of the prior art, I understand that the inquiry is whether the prior art was reasonably relevant to the particular problem faced by the inventor(s) in making the invention covered by the patent claims. I understand that such relevant prior art includes prior art in the field of the invention

and also prior art from other fields that a person of ordinary skill would look to when attempting to solve the problem. I further understand that, to determine obviousness, the courts look to the interrelated teachings of multiple patents, the effects of demands known to the design community or present in the marketplace, and the background knowledge possessed by a person having ordinary skill in the art.

19. In determining the differences between the invention covered by the patent claims and the prior art, I understand that the prior art references are not looked at in isolation. Rather, the claimed invention as a whole must be considered, and it must be determined whether or not it would have been obvious in light of all of the prior art.

20. I further understand that obviousness is determined from the perspective of a person of ordinary skill in the art, and that such a person is presumed to know all prior art, not just what the inventor may have known. The person of ordinary skill faced with a problem is able to apply his or her experience and ability to solve the problem and also look to any available prior art to help solve the problem.

21. I understand that one rationale for determining obviousness of a claimed invention is that some reason within the prior art would have led one of ordinary skill to modify the prior art reference or to combine prior art teachings to arrive at the claimed invention. Such reasons include the following:

- a. combining prior art elements according to known methods to yield

- predictable results;
- b. simple substitution of one known element for another to obtain predictable results;
- c. use of a known technique to improve similar devices (methods or products) in the same way;
- d. applying a known technique to a known device (method or product) ready for improvement to yield predictable results;
- e. “obvious to try” – choosing from a finite number of identified, predictable solutions, with a reasonable expectation of success;
- f. known work in one field of endeavor may prompt variations of it for use in either the same field or a different one based on design incentives or other market forces if the variations would have been predicable to one of ordinary skill in the art; and
- g. some teaching, suggestion, or motivation in the prior art that would have led one of ordinary skill to modify the prior art reference or to combine prior art teachings to arrive at the claimed invention.

22. In determining whether or not the invention would have been obvious to one of ordinary skill in the art at the time the invention was made, I understand that you must consider whether or not the combination is more than the predictable use of prior art elements according to their established functions. If a technique has been

used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique would have been obvious unless the actual application is beyond that person's skill. In answering this question, I understand that it will often be necessary to consider: any apparent reason to combine the known elements in the manner of the patent claims; teachings of multiple references; the effects of demands that were known to the community or that were present in the marketplace; and the background knowledge possessed by persons of ordinary skill in the art.

23. I understand that it is important to identify a reason that would have prompted a person of ordinary skill in the art to combine the elements as the invention does. Advances that would have occurred anyway in the ordinary course of development of the art may have been obvious, but consideration need not be limited to the same problem or same prior art elements, or same solution adopted by the inventor. I also understand that obviousness may not be shown if the proposed modification or combination would change the principle of operation of the prior art being modified, such as rendering the prior art unsatisfactory for its intended purpose.

24. I further understand that it is appropriate to consider the level of common sense and creativity of persons of ordinary skill in the art, that familiar items may have obvious uses beyond their primary purposes, and that a person of ordinary skill in the art may be able to fit the teachings of multiple patents and/or references

together like the pieces of a puzzle.

25. I further understand that in certain circumstances, the fact that a combination was obvious to try might show that it was obvious under § 103. For example, when there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions, a person of ordinary skill has good reason to pursue the known options within his or her technical grasp. If this leads to the anticipated success, it is likely, but not necessarily, the product not of innovation but of ordinary skill and common sense.

26. I understand that the reason to select and combine features, the predictability of the results of doing so, and a reasonable expectation of success may be found in the teachings of the prior art references themselves, in the nature of any need or problem in the field that was addressed by the patent, in the knowledge of persons having ordinary skill in the field at the time, as well as in common sense or the level of creativity exhibited by persons of ordinary skill in the art. I further understand that there need not be an express or explicit suggestion to combine references.

27. I further understand that if the combination of known elements yielded unexpected or unpredictable results, or if the prior art teaches away from combining the known elements, then this evidence would make it more likely that the claim that successfully combined those elements was not obvious. I further understand that if a reference teaches away from the invention when it would have discouraged a

person of ordinary skill in the art from practicing the claimed invention, or when such a person would be led in a different direction than practicing the claimed invention.

28. I understand that a prior art reference must be considered in its entirety, i.e., as a whole, including portions that would lead away from the claimed invention. I further understand that, when considering a disclosure or reference, it is proper to take into account not only specific teachings of the reference but also the inferences which one skilled in the art would reasonably be expected to draw from the reference.

29. In addition, I understand that objective indications of non-obviousness must also be considered. The presence of any of these indications may suggest that the invention was not obvious. I understand that no factor alone is dispositive, and that the invention as a whole must be considered for obviousness or non-obviousness. I also understand that these objective indications are only relevant to obviousness if there is a connection, or nexus, between them and the invention of the patent claims. I understand that these objective indications include:

- a. commercial success of the products or methods covered by the patent claims;
- b. a long-felt need for the invention;
- c. failed attempts by others to make the invention;

- d. copying of the invention by others in the field;
- e. unexpected results achieved by the invention;
- f. praise of the invention by the alleged infringer or others in the field;
- g. the taking of licenses under the patent by others;
- h. expressions of surprise by experts and those skilled in the art at the making of this invention; and
- i. the patentee proceeded contrary to accepted wisdom of the prior art.

30. I have been informed by counsel that there must be a nexus or a connection between the evidence showing these factors and the inventions of the asserted claims, if this evidence is to be given weight in arriving at a conclusion on the obviousness issue; for example, if commercial success is due to market position, advertising, promotion, salesmanship, or the like, or is due to features of the products other than those described in the asserted claims, then any commercial success may have no relation to the issue of obviousness.

31. I have been informed by counsel that, in my determination of obviousness, I must consider whether the Patent Owner has demonstrated not only that such secondary considerations exist, but also whether Patent Owner has proven that there is sufficient nexus between these considerations and the claimed invention – in other words whether the claimed inventions in the patent contributed to these secondary considerations rather than the considerations being due to other features of the

allegedly accused products, or any other actions taken in producing and marketing the accused products.

32. I have been informed by counsel that Patent Owner has the burden of proving any secondary consideration by a preponderance of the evidence, i.e., that Patent Owner must produce evidence which, considered in the light of all the facts, leads one to believe that what Patent Owner claims is more likely true than not; but that I should keep in mind, that Apple continues to bear the ultimate burden of proving invalidity by a preponderance of the evidence.

IV. Claim Construction

33. I have been informed and understand that in an *inter partes* review claim terms are construed according to their ordinary and customary meaning as understood by one of ordinary skill in the art in view of the specification and the prosecution history of the patent.

34. I have been asked to provide my opinion on the proper construction of the term “constricted convection plate.” In my opinion, the proper construction is the construction used in the ITC proceeding of “a plate configured to form part of a constructed convection channel.” ITC Markman Order, p. 35. The ’322 Patent describes numerous embodiments of cooling arrangements for display devices, all of which involve positioning a “constricted convection plate” to help define a “constricted convection channel.” See, e.g., ’322 Patent, 2:43-59, 4:39-51, 4:66-

5:13, 5:34-6:13, Figures 5A-5F. Thus, the constricted convection plate's purpose, as discussed in the '322 Patent, is to help create the constricted convection channel. If the words "constricted convection" in the phrase are to carry any meaning, the plate must be used to assist in constricted convection, which is accomplished by defining a constricted convection channel. Therefore, it is my opinion that the proper construction of "constricted convection plate" is "a plate configured to form part of a constructed convection channel."

V. Level of Skill in the Art

35. I am informed and understand that a person of ordinary skill in the art is a hypothetical person presumed to have known the relevant art at the time of the alleged invention. I am informed and understand that factors that may be considered in determining the level of ordinary skill in the art may include: (A) the type of problems encountered in the art; (B) prior art solutions to those problems; (C) the rapidity with which innovations are made; (D) the sophistication of the technology; and (E) the educational level of active workers in the field.

36. In my opinion, a person of ordinary skill in the art ("POSITA") of the '322 Patent would have had a bachelor's degree in a relevant field, such as mechanical or electrical engineering, physics, applied physics, or a related field. In addition, a POSITA would also have had 2-4 years of experience in working with electronic products, including thermal management associated with electronic products. A

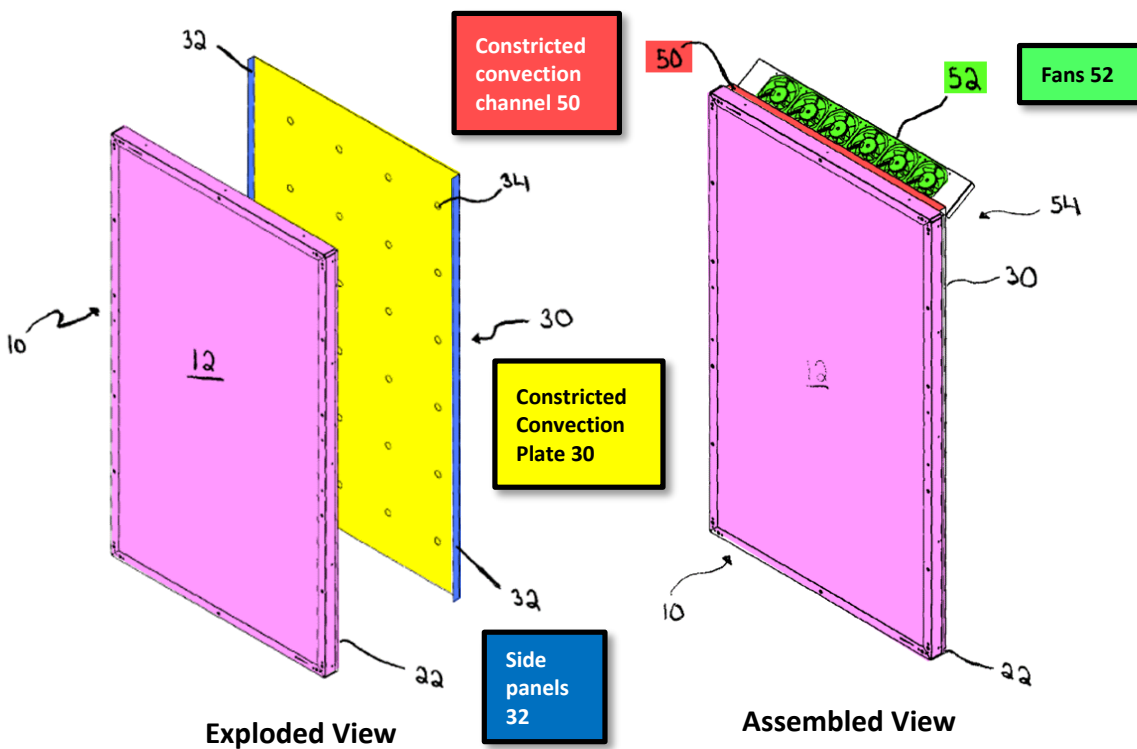
POSITA without such a degree would have had 4-6 years of experience in the field and would have developed a similar understanding of thermal management associated with electronic products.

VI. The '322 Patent

37. The '322 Patent describes a system for cooling a typical electronic display having a posterior display surface. Ex. 1001 at Abstract, 2:43-59, 4:39-41.

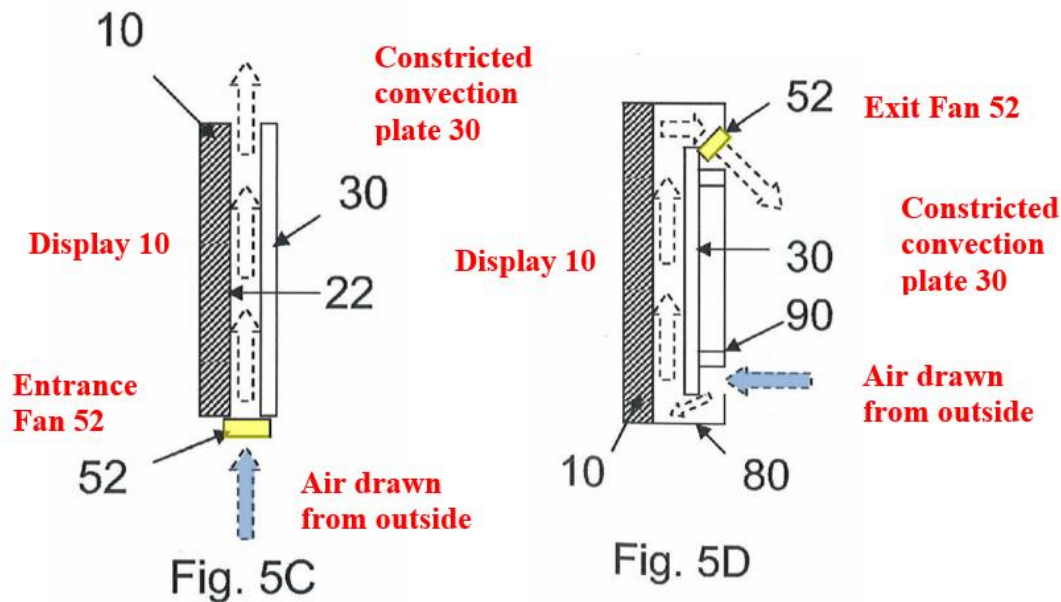
38. At the time of the invention, “the market [wa]s demanding larger screen sizes for displays” with “some outdoor applications call[ing] for seventy inch screens and above.” See Ex. 1001, 2:8-29. Further, “[m]odern displays [we]re required to be extremely bright,” which caused the backlight assembly, in particular, to “generate a significant amount of heat.” Id. at 4:1-15. Whereas cooling “systems of the past generally attempt[ed] to remove heat from the electronic components in a display through as many sidewalls of the display as possible,” the '322 Patent took a starkly different approach by using fans to direct cooling air through a narrow channel immediately behind the display to remove heat directly and specifically from the electronic display’s posterior display surface. Ex. 1001 at 1:53-55, 6:17-19, 6:30-37.

39. This “constricted convection channel” is formed behind the posterior surface of the thin panel display using a constricted convection plate as depicted in the annotated Fig. 5C and 5D from the '322 Patent below:



40. In some embodiments, the '322 Patent further teaches electronics “hardware located behind the constricted convection plate 30” that is accessible through access apertures on the constricted convection plate that are preferably plugged before use. Id. at 6:24-29

41. The operation of the cooling system is further diagrammed in Figs. 5C and 5D of the patent below with Fig. 5D also showing how housing 80 and septum 90 direct the flow of air. Ex. 1001 at 6:1-13.



42. Although the small cross-sectional area of the narrow airflow path limits the volume of cooling air flowing through the system, the '322 patent teaches that “the narrowing of the airflow path” by the constricted convection channel “increases the effectiveness of the heat transfer” from the display to the air. Ex. 1001 at Ex. 2003 (U.S. Prov. App. No. 61/039,454), ¶ 32.

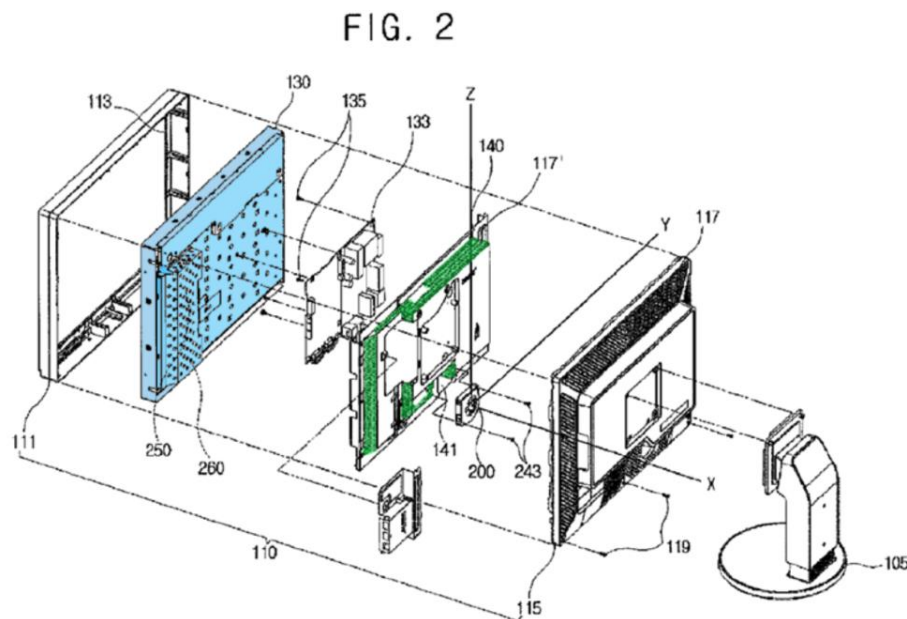
VII. Prior Art

43. It is my understanding that each of the references cited below are prior art. I have provided brief overviews of the primary references used for each of the grounds I address below.

A. Kim – U.S. Patent No. 7,800,706

44. Kim describes a display device that has an LCD panel in a casing with a shield cover over its backlight unit. The shield cover is combined with a fan to supply

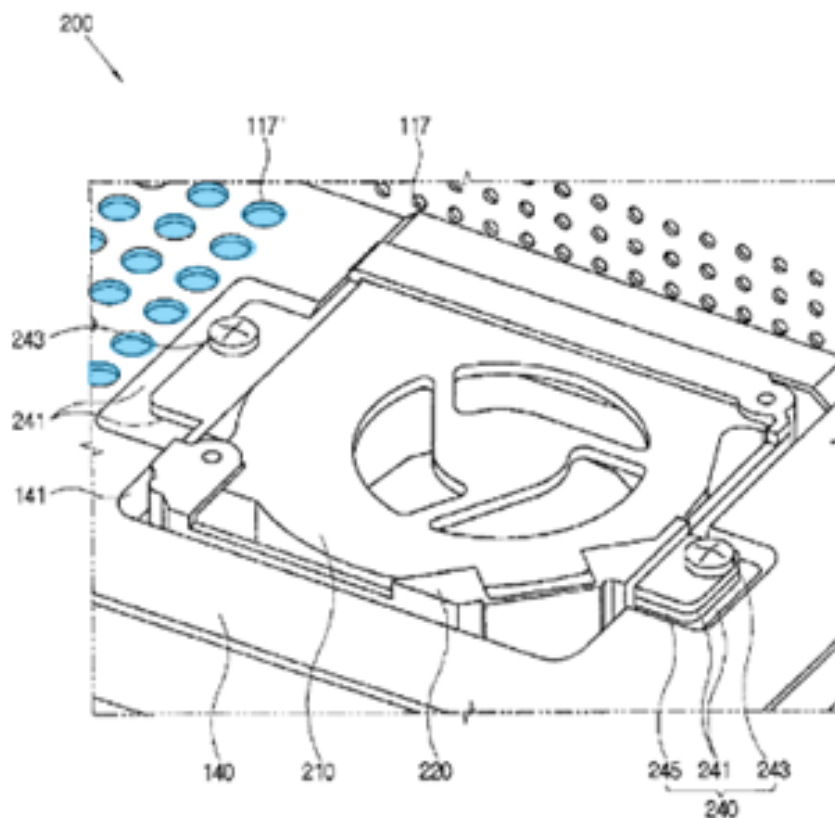
cooling to the backlight. Kim, Abstract. Kim's focus is to provide improved cooling with less vibration and noise. Kim, 1:45-52. Kim describes the display devices as "generally a TV or computer monitor" where noise and vibration would be problematic. Kim, 3:6-68. Therefore, Kim combines a cooling fan with the shield cover to provide cooling air to a circuit board 133 and the LCD backlight 130. Kim, Fig. 2 (annotated) below. A large number of air slits 117' are formed in the edge of the shield cover 140 to allow air to freely flow from the fan outward past the backlight unit (blue) through the sides via the slits 117 (green) in the rear cover 115.



45. Kim states that "[t]he air which flows through the heat generating parts is discharged to the outside (in a 'Y' or 'Z' direction shown in FIG. 2) through the plurality of air slits 117' of the shield cover 140 and the plurality of air slits 117 of the rear casing 115 so that heat generated from the heat generating parts is emitted."

Kim, 7:57-62. The labels for intake direction ‘X’ and exhaust directions ‘Y’ and ‘Z’ directions are shown above in annotated Figure 2, and arrows have been added to show the direction of air flow as described in Kim.

46. Kim’s air slits 117’ can be seen in greater detail in Kim’s Fig. 4 shown below, with air slits 117’ on Kim’s porous shield cover 140 highlighted blue.

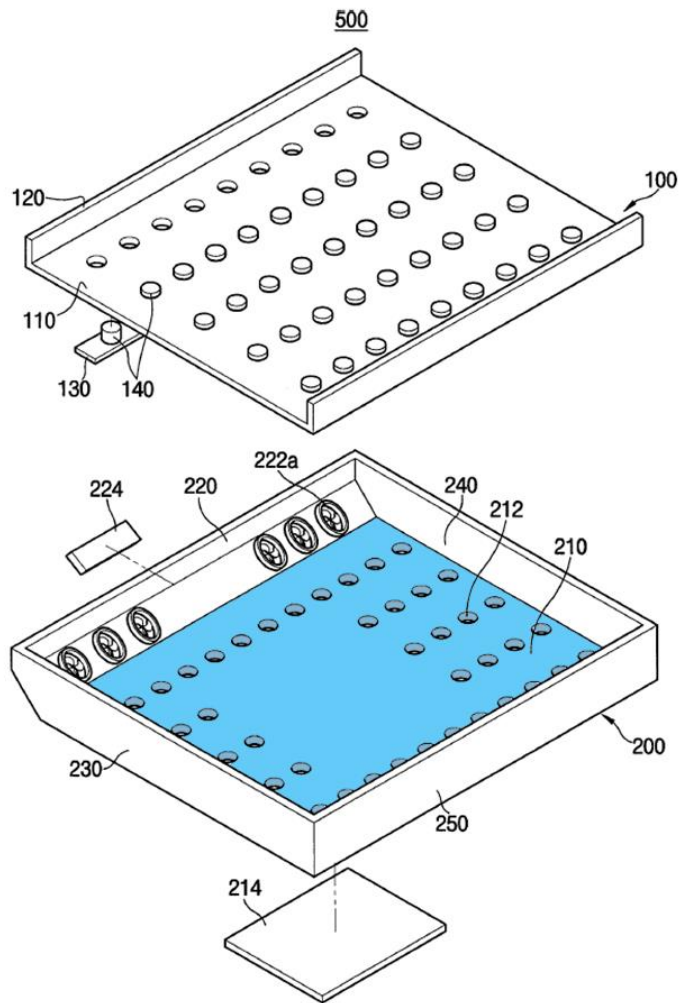


B. Na – Korean Patent Application Publication No. 10-2006-0016469

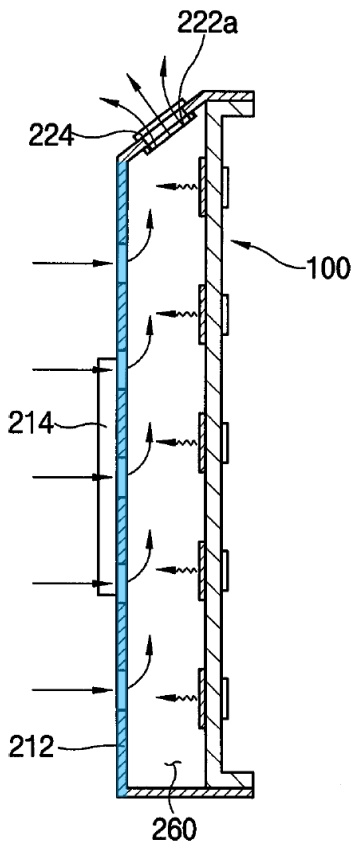
47. Na describes a backlight unit that is incorporated into a display device that provides cooling functionality internally within the backlight unit itself. For example, Na’s Figure 1 is an exploded perspective view of backlight unit 500. Na,

p. 3. Na teaches that its “backlight unit 500 includes an areal light source device 100 and a storage container 200.” Na, p. 4. “The areal light source device 100 includes a reflective plate 110, a sidewall 120, a driving substrate 130, and a plurality of light emitting diode light sources 140.” Na, p. 4. “The storage container 200 includes a bottom plate 210, a first sidewall 220, a second sidewall 230, a third sidewall 240, and a fourth sidewall 250.” Na, p. 4. The bottom plate 210 of backlight unit 500 has been highlighted blue in Figure 1 below. As can be seen, a large number of through-holes 212 have been formed in the bottom plate 210, which “function as an intake unit through which external air is sucked.” Na, p. 4.

FIG. 1

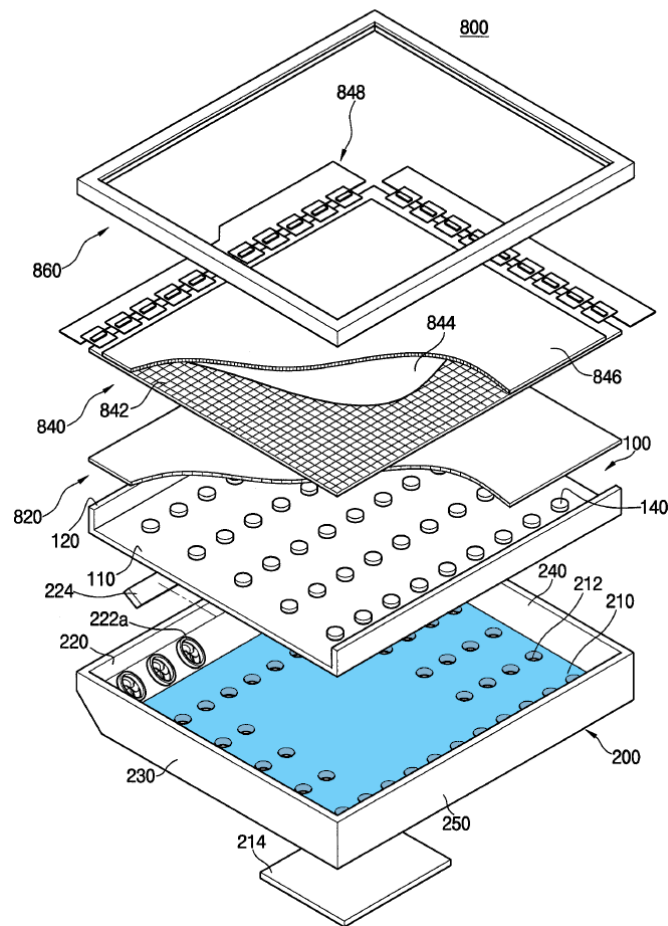


48. Na's Figure 3 "is a side view for explaining a cooling process of the backlight unit of FIG. 1." Na, p. 5. "[L]ow-temperature air cooler than the high-temperature air in the inner space 260 is introduced from the outside of the backlight unit 500 through the through-holes 212" to cool the inside of backlight unit 500. Na, p. 5.



49. Na's Fig. 13 "is an exploded perspective view illustrating a liquid crystal display device having the backlight unit of FIG. 1" wherein "liquid crystal display device 800 includes a backlight unit 500" that "has the same structure and function as the backlight unit shown in FIG. 1." Ex. 1010, 8. An annotated version of Fig. 13 (has been reproduced and annotated below) with shows bottom plate 210 of backlight unit 500 highlighted blue consistent with Fig. 1 above to illustrate that the bottom plate 210 is both the rear-facing surface of the backlight assembly as well as the display assembly.

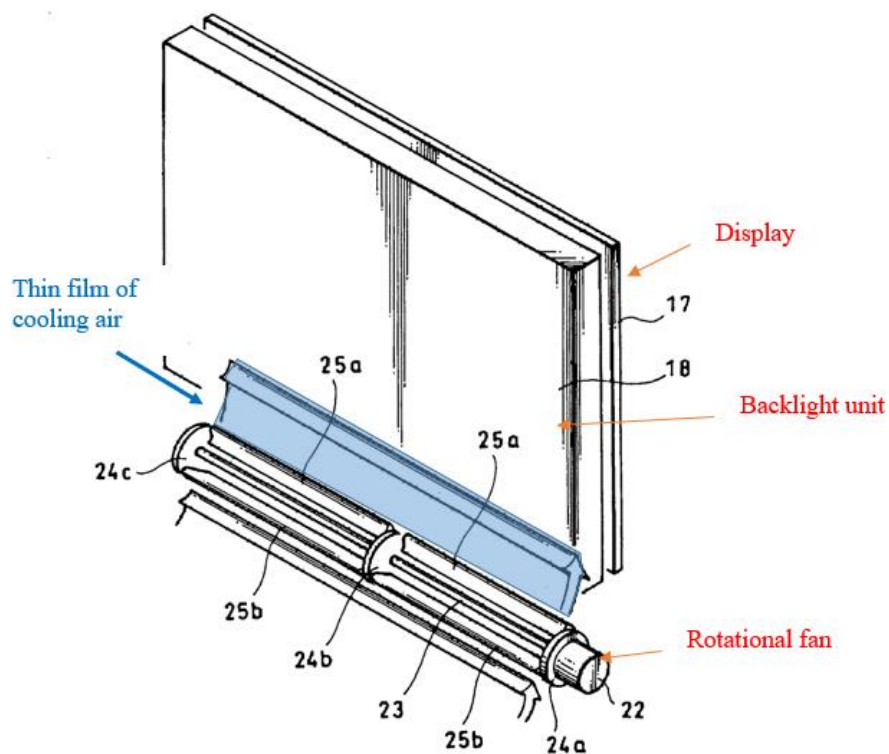
FIG. 13



C. Kimura – U.S. Patent Publication No. 2006/0199514

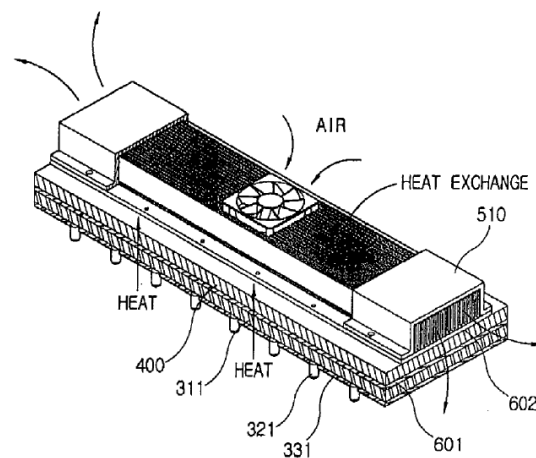
50. Kimura describes a cooling fan with a unique design for cooling a backlight unit that has high efficiency and less noise during operation. Kimura, Abstract. The single fan uses a rotational shaft with at least two vanes that have parallel shafts rotating together that generate air flow perpendicular to the shaft. Kimura, ¶¶ 12, 45. The stated goal of the invention is to create quieter operation for use in home television applications. Kimura, ¶ 3.

51. Kimura's design is shown below. Kimura, Fig. 10 annotated. Kimura teaches that—unlike other fans that “generate airflows in all directions of the rotating surfaces” (id. at [0010])—the action of its fan “can generate an air flow in one direction perpendicular to a rotational shaft 1.” Id. at [0045]. Kimura describes the generated airflow of its invention as a “fine wind in the form of a film.” Id. at [0024]. Kimura's Fig. 10 illustrates “how the backlight of a liquid crystal display panel is cooled” using this thin film of air. Id. at [0077]. Kimura further teaches that the “mechanism that controls the angles of the veins” is the “means for realizing the concept.” Id. at [0056].



D. Cho – U.S. Patent Publication No. 2006/0132699

52. 1. Cho describes a self-contained cooling apparatus that can be attached to the rear of a display device to aid in cooling an LCD display device. Cho, ¶¶ 13-14. For example, Cho describes “a cooling apparatus having a good cooling efficiency” and “a liquid crystal display device having an effectively cooled backlight unit.” Cho, ¶ 11. The cooling apparatus comprises “a casing, a heat sink, and a cooling fan.” Cho, ¶ 13. “The casing comprises a first opening and a second opening to provide an air path.” Cho, ¶ 13. “The heat sink is received in the casing and includes a recession part,” and “[t]he cooling fan is disposed in the recession part.” Cho, ¶ 13. Figure 5 is a partially-cut-away perspective view of a cooling apparatus described in Cho placed behind a liquid crystal display device 1. Cho, ¶ 24.



53. 2. When the cooling assembly is affixed to the rear of a display device, such as shown in Figure 7A, heat generated by the LCD is conducted to heat sink 530, which includes fins 532. The cooling fan rotates 520 to flow air into heat sink

530 through first opening 511. Cho, ¶ 56. The air flow travels along an air path formed by the casing 510 and the heat sink 530, through and over the fins 532 of the heat sink, until the air flow discharges through the second opening 512. Id. ¶ 56. To assist with air flow, the fins 532 are arranged to be parallel to the air flow path. Cho, Figure 5.

VIII. Patentability of Claims 1-5, 7-9, 12, 13, and 16

54. Having reviewed the Petition, it is my opinion that each of claims 1-5, 7-9, 12, 13, and 16 of the '322 Patent is patentable. The Petition does not establish any of these patents is invalid. The following sections provide my detailed opinions regarding the specific invalidity grounds set forth in the Petition.

A. Kim Grounds – Claims 1-5, 7, and 8

1. Ground 1 – Claims 4 and 7 are patentable over Kim in view of Hong

55. It is my opinion that Kim in view of Hong does not render claims 4 or 7 obvious.

a. Kim in view of Hong does not make obvious a “constricted convection plate.”

56. The Petition and Mr. Smith-Gillespie assert that Kim’s “constricted convection plate” is a “shield cover 140.” Petition, pp. 36-37; Ex. 1002.085, ¶ 130. However, this shield cover is not a constricted convection plate. The '322 Patent describes positioning a plate posterior to the posterior display surface to create its

constricted convection channel. '322 Patent, 5:25-33. This plate can be sized appropriately for the full size of the display or have a smaller size to only cover a portion of the display. '322 Patent, 5:25-33. In each case, however, the constricted convection plate provides a surface to allow air to flow between the constricted convection plate and the posterior display surface from the entrance of a constricted convection channel to the exit to remove heat, such as shown in Figure 5B-5F:

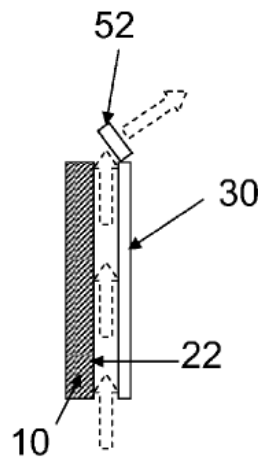


Fig. 5B

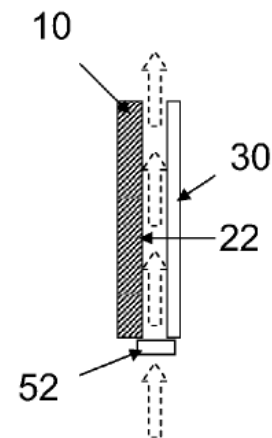


Fig. 5C

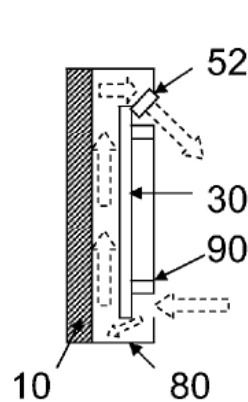


Fig. 5D

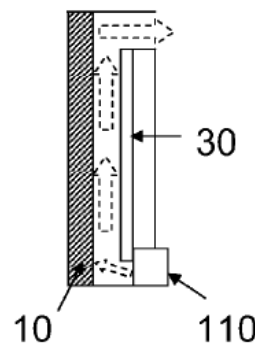


Fig. 5E

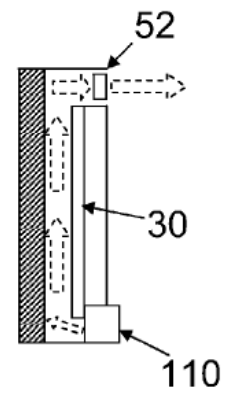
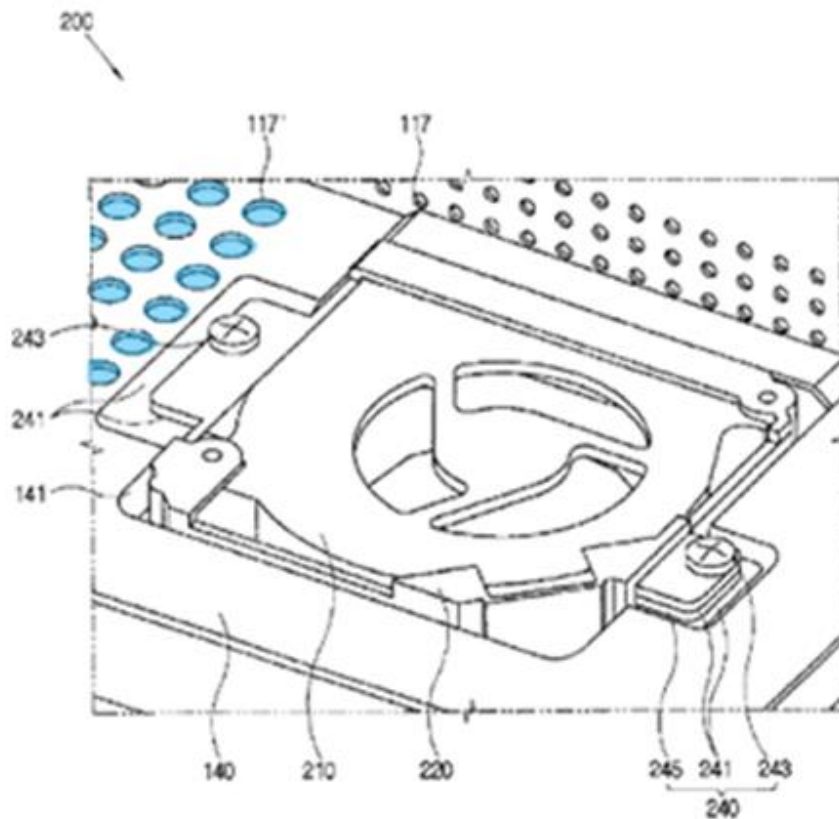


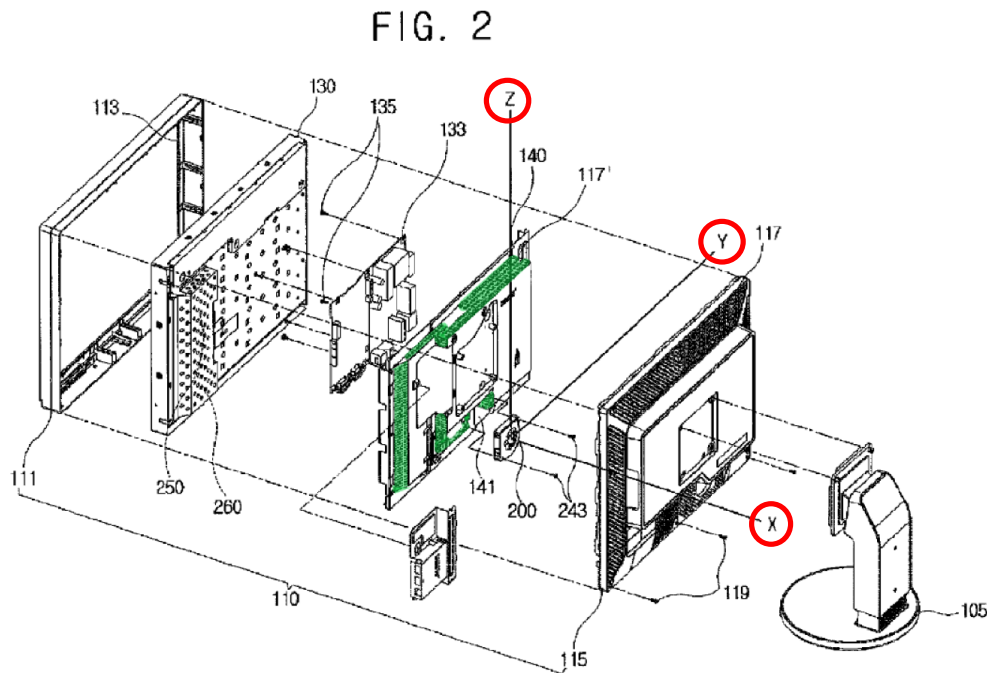
Fig. 5F

57. In each of the embodiments shown in Figures 5B-5F, the constricted convection plate 30 is a plate that defines a channel for air to enter via an entrance until leaving the channel through an exit. And while the '322 Patent describes that a constricted convection plate may be provided with access apertures, these apertures are designed to “allow access to hardware located behind the constricted convection plate 30,” not to provide additional airflow paths into or out of the constricted convection channel. Thus, in those embodiments where access apertures are provided, the '322 Patent teaches that the access apertures may be closed before operation, a POSITA would understand that the integrity of a constricted convection channel can be compromised by these additional opening, and so they should be closed before operation. '322 Patent, 6:24-29.

58. In contrast to a constricted convection plate as disclosed by the '322 Patent, Kim's shield cover 140 does not form a constricted convection channel. Instead, Kim's shield cover is riddled with “air slits 117” to allow “flowing air produced by the cooling fan 210 [to] come[] in and out.” Kim, 4:58-61.



59. As can be seen in Figure 4, reproduced above, the shield cover 140 includes a large number of these air slits 117' such that air can flow freely through the shield cover at virtual any location and either the X, Y or Z directions, as shown in Kim's Figure 2:



60. As I discussed above, a constricted convection plate refers to a plate providing a surface to guide airflow from an entrance of a channel to the exit of the channel. In Kim, however, cooling air drawn in by a fan moves freely behind the shield cover and through any of the air slits 117' on the top, bottom, or sides of the Kim device.

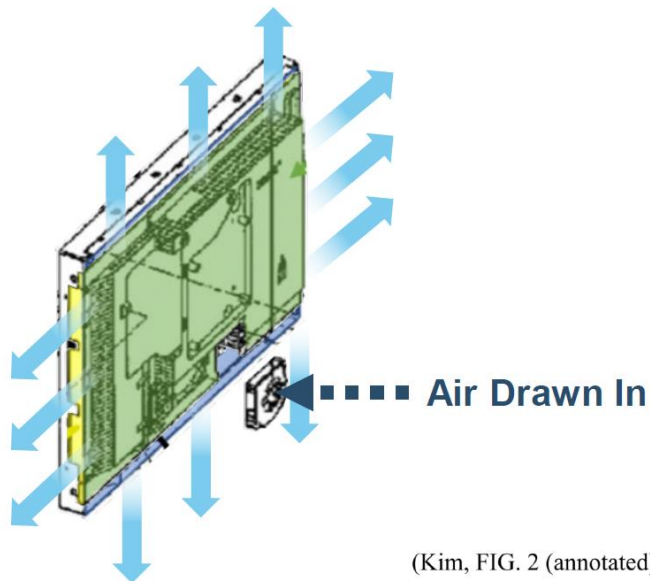
61. A person of skill in the art understands that a “constricted convection channel,” as used in the '322 Patent, indicates a narrow path for the directional flow of a fluid (i.e., from an entrance to an exit). In cooling systems, a channel is a path, through which a heat transfer fluid can flow, that travels from a source to a destination to extract heat from whatever abuts or impinges on the channel. This is consistent with the dictionary definition of “channel” as “a narrow gap or passage”

or “a tubular passage or duct for liquid.” Ex. 2016. A POSITA would understand that the constricted convection plate forms a constricted convection channel that would enclose the cross-section of the fluid path on all four sides (i.e., the posterior surface, constricted convection plate, and two side elements (such as the two side panels 32 of the '322 patent) that collectively encompass a full 360 degrees) consistent with the disclosed embodiments, so the flow is directed to an exit. By creating additional entrances or exits into the walls of the path, fluid flow through the path may be disrupted, escaping or entering in a disorderly fashion, e.g., by creating turbulence or other resistance to fluid flow within the channel.

62. The '322 Patent adheres to the POSITA's understanding of a channel, which is illustrated above with respect to example embodiments shown in Figures 5B-5F of the '322 Patent, each of which includes a single entrance and directs air directionally to an exit. '322 Patent, Figures 5B-5F. And as discussed above, while the constricted convection plate may have one or more apertures 34 to allow servicing of components within the display device, these apertures are preferably blocked off (or flow through them is otherwise mitigated) before the display device is put back into use after, for example, servicing is complete. '322 Patent, 6:6:24-29. Thus, a constricted convection plate according to the '322 Patent is contiguous and defines only a single entrance and directs air to the exit to the defined constricted convection channel.

63. Referring again to Figures 5B-5F of the '322 Patent (shown above), in each of these embodiments, the constricted convection plate 30 provides a contiguous surface to allow air to flow between the constricted convection plate and the posterior display surface uninterrupted from the entrance of a constricted convection channel to the exit to provide a “uniform flow of air.” '322 Patent, 3:2-4.

64. Kim's shield cover 140 cannot produce such a uniform flow of air. Instead, Kim describes the function of its shield cover as being essentially porous to allow air to easily flow from the heat generating parts out of the device through the air slits of the shield cover, as well as air slits formed on the rear casing of its display. Kim, 7:57-62. For example, Kim states that “[t]he air which flows through the heat generating parts is discharged to the outside (in a ‘Y’ or ‘Z’ direction shown in FIG. 2) through the plurality of air slits 117’ of the shield cover 140 and the plurality of air slits 117 of the rear casing 115 so that heat generated from the heat generating parts is emitted.” Kim, 7:57-62. Further, because of these air slits 117’, no coherent directional flow of air is generated through a channel. Instead, air escapes through whatever available air slit 117’ is nearby. In addition, the shield cover 140 includes air slits 117’ to allow air to escape in upward, downward, leftward, and rightward directions, such as is illustrated in the following modified version of Figure 2 to illustrate the general directions in which air may escape through air slits 117’:



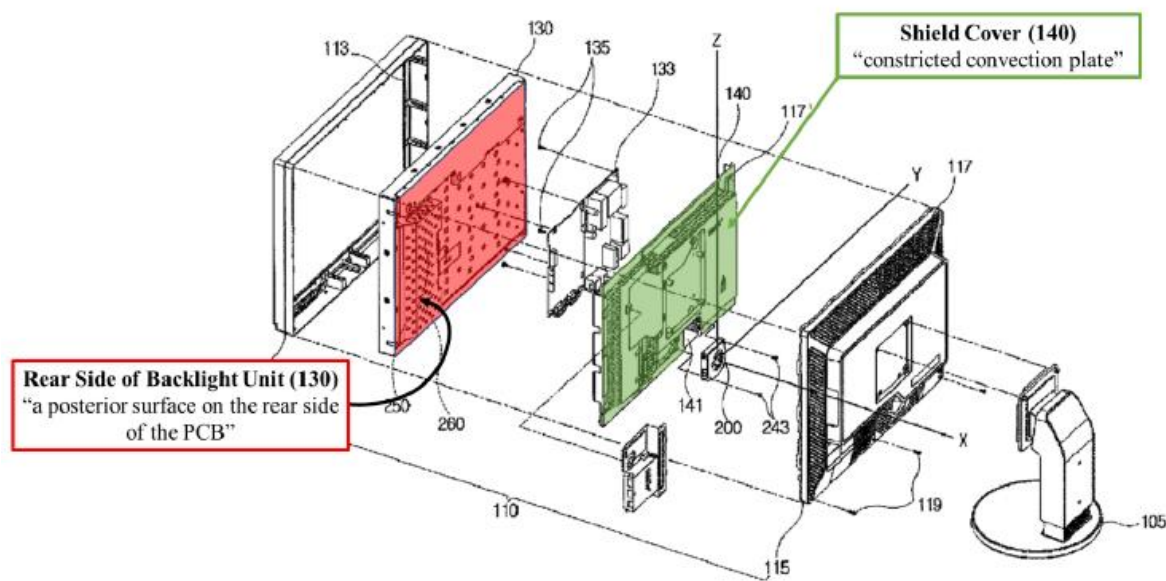
65. Thus, not only is the shield cover not a constricted convection plate because it includes the air slits 117' discussed above, it does not contribute to defining a constricted convection channel having an entrance and an exit. And as Petitioner acknowledges, the constricted convection plate defines a constricted convection channel to remove heat from the posterior display surface or the posterior surface, depending on the specific claim language. ITC Markman Order, p. 37 (citing Petitioner's Markman Brief, p. 17). Instead, air may escape from any available air slit 117' and in any available direction. Further, because the air slits 117' are integral to Kim's cooling strategy, it is my opinion that POSITA would not be motivated to eliminate the air slits 117'. In particular, this would significantly reduce the effectiveness of Kim's cooling system, likely risking thermal damage to the display panel.

66. Therefore, Kim does not disclose or make obvious a “constricted convection plate.” I do not see that either the Petition or Mr. Smith-Gillespie provide any analysis of Hong disclosing a “constricted convection plate.” Therefore, the combination of Kim and Hong do not make obvious the claimed “constricted convection plate.”

b. Kim does not disclose or make obvious that “the constricted convection plate is substantially parallel to the posterior display surface.”

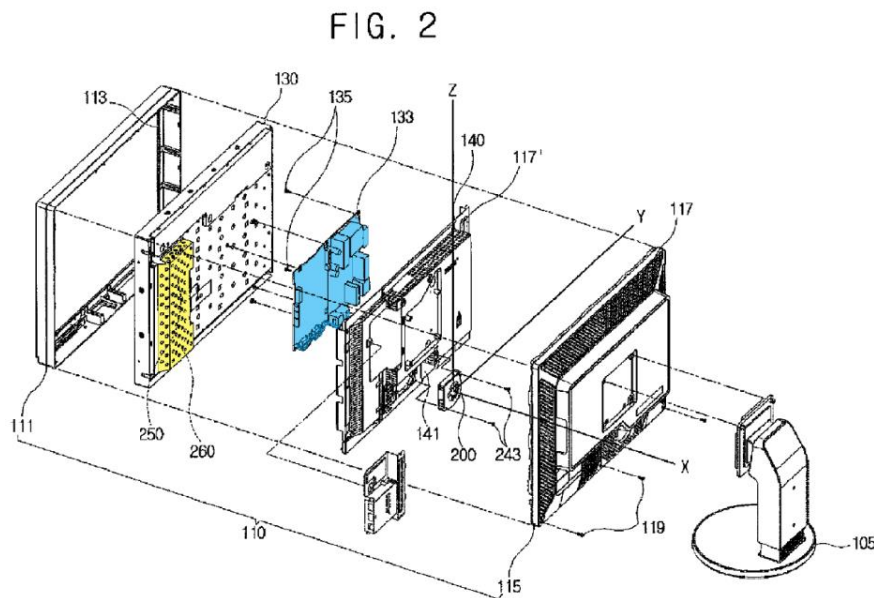
67. The Petition asserts that Kim’s shield cover is “placed behind and substantially parallel with the posterior surface” of the backlight unit 130; however, the only citation to the relative orientations between the shield cover 140 and the backlight unit 130 is their depiction in Figure 5. Petition, p. 37 (citing annotated Figure 5). However, nothing in Kim suggests that any of its figures, including Figure 2 cited by Mr. Smith-Gillespie, are drawn to scale or representative of the actual dimensions or sizes of these components. The Petition and Mr. Smith-Gillespie cite to portions of Kim’s column 4; however, these excerpts only reference disclosure that “the shield cover 140 may be formed in diverse shapes such that the flowing air produced by the cooling fan 210 can be efficiently guided.” Ex. 1002.087, ¶ 131 (quoting Kim, 4:59-63); see also Petition, p. 37 (citing Kim 4:52-55). Merely guiding flowing air does not imply a parallel relationship between the backlight unit 130 and the shield cover 140.

68. Further, I note that Figure 2, cited by Mr. Smith-Gillespie illustrates that the backlight unit 130 itself does not have a uniform rear surface, but instead has protrusions and different elevations, such as circuit board 133, power supply 250, controller 260, and the unlabeled component protruding rearward from the upper portion of the backlight unit. Ex. 1002.086, ¶ 131 (citing annotated Figure 2).



69. Mr. Smith-Gillespie shades all of these features as being the rear side of the backlight unit 130, but does not address the non-uniform shape of the rear surface with respect to the shield cover 140. For example, Mr. Smith-Gillespie does not acknowledge that the posterior surface of Kim's backlight assembly 130 is not flat, but instead includes a variety of different elevations, including the yellow highlighted portion above, as well as the circuit board 133 (shaded blue) that is

affixed to it by screws 135:



70. In view of these deficiencies, it is my opinion that a POSITA would not understand Kim to disclose or make obvious “the constricted convection plate is substantially parallel to the posterior display surface.”

c. A POSITA would not be motivated to combine Kim with Hong

71. In addition, a POSITA considering the Kim device would not consider modifying it based on the Hong reference. Mr. Smith-Gillespie asserts that a POSITA “would be motivated to use Hong’s thermally efficient design of mounting LEDs on a metal core PCB in place of the PCB in Kim in order to permit Kim’s cooling chamber to transfer the heat of Kim’s backlight more efficiently.” Ex. 1002.095, ¶ 181. However, metal-core PCBs (MCPCBs) were more costly than

conventional PCBs, which would have increased the cost of the Kim device. This would suggest to the POSITA to avoid using MCPCBs, unless the increased cooling was warranted for a particular application. Ex. 2009 (Samsung LED backlit display with a MCPCB cost approximately \$1700).

72. Further, the Kim monitor is designed for conventional indoor applications, such as a standard user workstation. Such devices operate in climate-controlled environments with typical indoor lighting, and thus do not employ high-power backlights that may be used in outdoor applications, where the screen may be in direct sunlight and difficult to view where increased backlight brightness may be desirable.

73. Instead, I do not see that Mr. Smith-Gillespie provides any basis for imposing such high-power LED backlights on the Kim device. Thus, his basis for combining Kim with Hong is to replace the conventional backlight in Kim with a high-power LED backlight, which would then suggest using an MCPCB to effectively sink the heat generated by these alternate backlights. As I noted above, Kim's device is a conventional workstation monitor that a POSITA would not expect would need high-power backlights for its intended use cases. Instead, Mr. Smith-Gillespie does not provide any reason for using high-power backlights. Ex. 1002.095-098, ¶¶ 181-185. He just assumes that they should be used. But if such high-power backlights are not used, there is no need to employ the MCPCB because the Kim device adequately

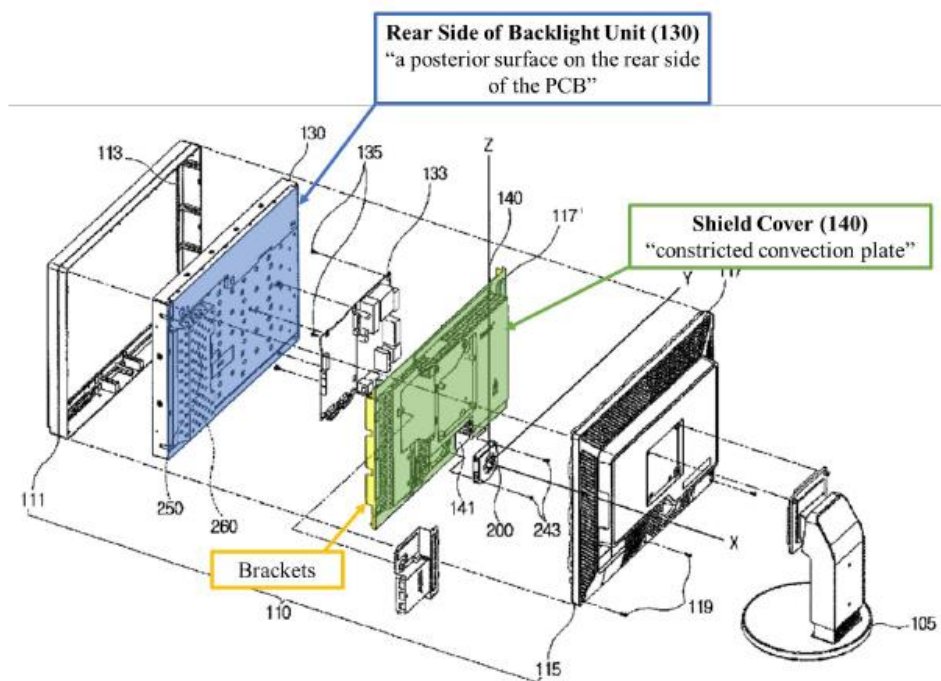
cools itself. Thus, a POSITA would not expect the device to use high-power LED backlights, as proposed by Mr. Smith-Gillespie, and would have no motivation to employ a MCPCB from a design such as Hong's.

74. I also note that Hong explains that heat sinks should be placed adjacent to the LED strips to draw heat out of the system. Hong, ¶ 15, 38-39. However, as a result, it teaches placing a driving circuit for the display in a different location so as to avoid the heat radiated by the heat sink. Hong, ¶ 15. However, such an arrangement would conflict with Kim's disclosure that its own driving circuit 133 should be positioned on the rear of the backlight, i.e., where Hong's heat sink is located, with the other heat generating parts of the Kim device. Kim, 7:53- 8:5. However, this conflicts with Hong's guidance to separate the LED heat sink from the driving circuit. Hong, ¶ 15, 38-39 In my opinion, Hong teaches this separation to prevent overheating of the driving circuit based on the heat absorbed and radiated by the heat sink. Thus, a POSITA would not be motivated to incorporate Hong's LED backlight into the Kim device because it would require considerable effort to reconcile the significant heat output by Hong's LED backlight while in proximity to Kim's own driving circuit 133 and other heat generating parts. Thus, the POSITA would not have a reasonable expectation of success in designing a suitable cooling system for the modifications to Kim proposed by the Petition and Mr. Smith-Gillespie.

2. Ground 2 – Claim 5 is patentable over Kim, Hong, and Tachikawa

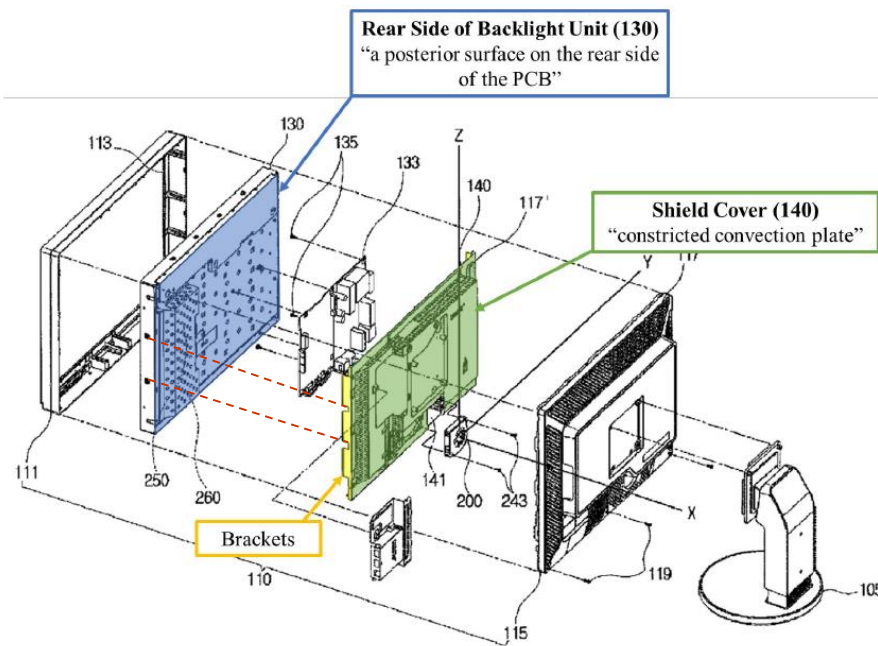
75. As I discussed above with respect to claim 4, Kim does not disclose or make obvious a “constricted convection plate.” However, Kim also does not disclose or make obvious the claimed “at least one bracket which connects the posterior surface with the constricted convection plate.”

76. The Petition and Mr. Smith-Gillespie identify “brackets” on the side of the shield cover as corresponding to the “at least one bracket” recited in claim 5:



Petition, pp. 43-44 (annotated Figure 5 shown above). However, claim 5 recites that at least one bracket “connects the posterior surface with the constricted convection plate.” The identified “brackets” do not connect to the “posterior surface” identified by the Petition. The Petition identifies the rear side of the backlight unit as the

“posterior surface on the rear side of the PCB,” as recited in claim 4. But the brackets slide in alongside of the backlight unit 130, as illustrated by the additional red dashed lines in the further annotated Figure 2 shown below:



77. The dashed lines illustrate that the notches formed in the identified “brackets” align with corresponding features on the side of the backlight unit 130 to allow the two components to be mated together. And Mr. Smith-Gillespie acknowledged that these features align when the display is assembled. Smith-Gillespie Transcript, 1058:1-24, 1059:14-20. By using such a configuration, these “brackets” are positioned so that they are not impeding airflow within the region behind the backlight unit 130. But importantly, these brackets do not “connect[] the posterior surface with the constricted convection plate.” While the backlight unit 130 itself

may be connected to the shield cover 140, its rear side is not.

78. The Petition implicitly acknowledges this configuration because it instead proposes modifying the Kim device to use a bracket configuration taught by Tachikawa to allow “easy disassembly of Kim’s display without compromising its cooling ability” and that “connecting Kim’s rear casing, shield cover, stand, and brackets together would improve the stability of Kim’s display system.” Petition, p. 47. However, a POSITA would not look to Tachikawa when considering the Kim device.

79. First, neither Kim nor Tachikawa discusses any design considerations regarding serviceability. In addition, Kim does not discuss any aspects of its design that would benefit from added stability or strength. Instead, the Kim device itself is easily serviceable: the rear casing is connected by screws or other fasteners, such as “snaps or hooks,” which can easily be removed to access the interior of the device. Kim, 4:16-23. Further, Kim’s device has a form factor of a conventional consumer desktop display screen with a large base 105 that will more than adequately support the display screen for its user without the use of additional brackets, such as those discussed in Tachikawa. Tachikawa, ¶ 19. Thus, a POSITA would have no motivation to consider modifying the Kim device to incorporate the brackets discussed by Tachikawa.

80. For at least these reasons, it is my opinion that claim 5 is patentable over Kim,

Hong, and Tachikawa.

3. Ground 3 – Claim 8 is patentable over Kim, Hong, and Takahashi

81. It is my opinion that Kim, Hong, and Takahashi do not make obvious the claimed “plurality of access apertures on the constricted convection plate” as recited in claim 8.

82. The Petition proposes modifying Kim’s shield cover to add one or more “through-holes” from Takahashi, which supposedly provide the claimed “access apertures.” Petition, p. 49; Ex. 1002.106-107, ¶ 168. A POSITA would not consider the through-holes in Takahashi to be “access apertures,” but in addition, the proposed combination involves blocking the these through-holes to prevent air escaping through them. Preventing air from escaping through through-holes in Kim’s shield cover is entirely contrary to Kim’s approach to cooling its display device. Therefore, claim 8 is patentable over the proposed combination of references.

83. The Petition and Mr. Smith-Gillespie both identify through-holes in an air guide plate to be a “plurality of access apertures through the constricted convection plate.” Petition, pp. 49-50; Ex. 1002.106-107, ¶ 168. However, the access apertures described by the ’322 Patent allow “allow access to hardware found on the display posterior 22; without the need to remove the constricted convection plate 30.” ’322

Patent, 5:5-12. However, Takahashi's through-holes are formed in its air guide plate 8 only enable access to screws used to remove an attachment screw 10 that would otherwise be hidden by the air guide plate 8. Takahashi, ¶ 10. The through-holes would not enable access to hardware without the need to remove the constricted convection plate because the through-holes are provided specifically to enable removing a substrate in the Takahashi device to allow for service of hardware. Takahashi, ¶¶ 2, 10.

84. Further, Takahashi explicitly teaches that these through-holes should be plugged during operation, because “in the event that a through-hole 8a is provided, a problem is that cooling efficiency is reduced.” Takahashi, ¶ 2. This directly conflicts with Kim's teaching to use a multitude of air slits, i.e., through-holes through the shield cover, to enable cooling of the device. Kim, 7:53-62. A POSITA would not consider Takahashi to be combinable with Kim because they use fundamentally different cooling strategies: Kim uses a large number of air slits to vent heat into the environment, while Takahashi uses a sealed chamber to direct air past heat-generating components. Takahashi, Abstract (“The objective is to provide a heat dissipation structure for electronics that can prevent air leakage even when a through-hole is provided in the air guide plate.”) (emphasis added); ¶ 3. Thus, Takahashi teaches blocking any through-holes to maintain the integrity of its air guide plate because otherwise, its cooling efficiency would be reduced. Kim teaches

the opposite: provide a large number of through-holes in its shield cover to enable easy venting of heat into the environment.

85. Therefore, claim 8 is patentable over Kim, Hong, and Takahashi.

4. Ground 4 – Claims 1-3 are patentable over Kim and Tachikawa

86. As I discussed above, Kim does not disclose or make obvious a “constricted convection plate,” which is recited in claim 1. See Section VIII.A.1.a above. In addition, Kim does not disclose or make obvious “the constricted convection plate is substantially parallel to the posterior display surface” as recited in claim 3 for at least the same reasons I discussed above with respect to claim 4. See Section VIII.A.1.b. Finally, as I discussed above with respect to claim 5, a POSITA would not be motivated to combine Kim and Tachikawa. See Section VIII.A.2.

87. Therefore, each of claims 1-3 is patentable over Kim and Tachikawa.

B. Na Grounds – Claims 4, 7-13, and 16

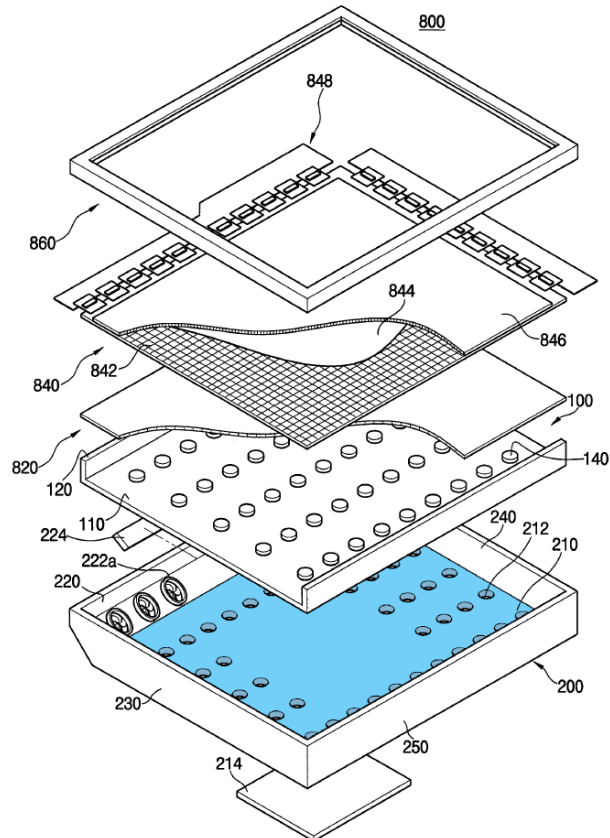
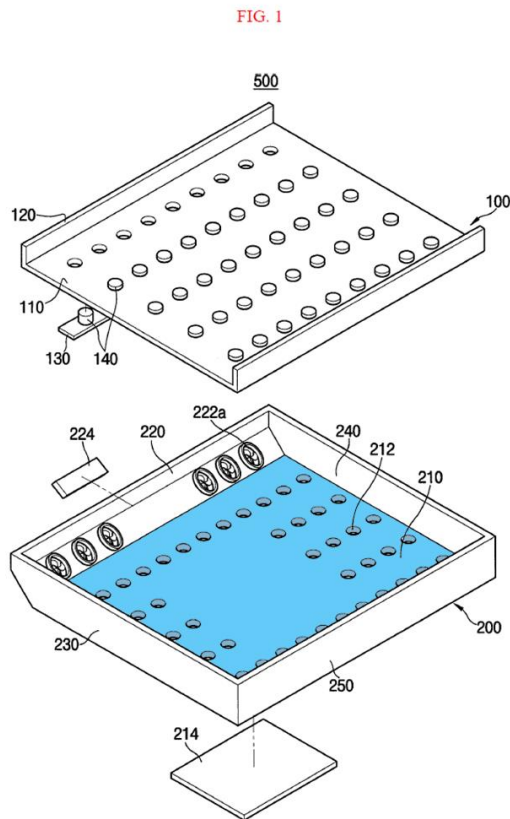
1. Ground 5 – Claims 4, 8-10, and 16 are patentable over Na

a. Claim 9 – Na does not disclose or make obvious a “constricted convection plate behind the posterior surface of the display.”

88. The Petition and Mr. Smith-Gillespie identify Na’s bottom plate 210 as being a “constricted convection plate” that is “covering a majority of” the rear-facing side of areal light source **100**(“the posterior display surface”).” Petition, pp. 68-69; Ex. 1002.133, ¶ 223-226. In addition, they identify the “rear-facing side of areal light

source 100” as “the posterior display surface.” However, both the areal light source 100 and the bottom plate 210 (colored blue) of Na’s backlight are internal to Na’s display assembly:

FIG. 13



But what is shown in these two figures are the components of a backlight unit, which are internal to a display assembly: “the present invention provides a backlight unit including a light generator and a storage container.” Na, p. 3. Thus, Na describes a cooling system that, unlike that described and claimed in the ’322 Patent, is internal to the display assembly itself. Na, p. 8 (“According to the present exemplary

embodiment, components directly performing a cooling function are formed in the storage container of the backlight unit.”).

89. Na itself describes that Figure 13 (shown above) illustrates its backlight unit as part of a display assembly. Na, p. 8 (“Referring to FIG. 13, a liquid crystal display device 800 includes a backlight unit 500, a liquid crystal display panel 840, and a chassis 860.”). Thus, rather than the areal light source 100 being a posterior surface of the display, it is *internal* to Na’s display device. In contrast, a posterior surface of a display assembly is on the exterior of the display assembly; every embodiment described in the ’322 Patent has a posterior display surface that is an exterior surface of the display. Thus, in the context of the ’322 Patent, a posterior display surface is an exterior surface, not an interior one.

90. I note that Mr. Smith-Gillespie omits mention of the backlight unit 500 when describing Na’s LCD device 800, and instead asserts that it “comprises liquid display panel 840 and areal light source device 100.” Ex. 1002.131, ¶ 220. But as I noted above, this is not how Na describes its LCD device 800. Further, a POSITA considering Na would therefor understand that its display device 800 includes the entirety of the backlight unit 500, not merely the internal areal light source 100 identified by Mr. Smith-Gillespie.

91. Further, a POSITA knew at the time the ’322 Patent was filed that a backlight unit is a part of a display assembly, and thus, an interior component of the backlight

unit would not be a posterior surface of a display. Instead, the POSITA would consider the exterior posterior surface of the display as being the “posterior surface of the display.” In the Na display assembly, the outer or exterior surface of the bottom plate 210 forms the rear outer surface of the “storage container 200” of Na’s “backlight unit 500,” which is a part of Na’s “liquid crystal display device 800.” Thus, a POSITA considering the Na device would identify the exterior surface of the bottom plate 210 as being the “posterior surface of the display.” Na, Fig. 13. No POSITA would consider the “areal light source 100” to be the “posterior surface” of Na’s display. Thus, any constricted convection plate would be posterior to the outer or exterior surface of the bottom plate 210; it would not be the bottom plate 210 itself, as identified by the Petition and Mr. Smith-Gillespie. Petition, pp. 68-69; Ex. 1002.133-134, ¶¶ 223-226 (referring to Ex. 1002.122-126, ¶¶ 204-206).

92. Therefore, it is my opinion that Na does not disclose or make obvious “a constricted convection plate behind the posterior surface of the display” as recited in claim 9.

b. Claim 16 – Na does not disclose or make obvious “the electronic display comprises an LED backlight LCD display where the posterior surface is the rear surface of a backlight assembly.”

93. While claim 16 recites that the “posterior surface is the rear surface of a backlight assembly,” the Petition identifies the “areal light source 100” as the rear

surface of Na's backlight assembly. Petition, p. 71; Ex. 1002.139, ¶ 237. However, Na's backlight assembly is its backlight unit 500, 600, which include both the areal light source 100 and the storage container 200, 300. Na, p. 4. Thus, the rear surface of Na's backlight assembly is the rear surface of the storage container 200, 300, not the areal light source 100, which is contained within the storage container 200, 300. Na, p. 4; see also Na, Figs. 1-14. Thus, the Petition has identified a component internal to Na's backlight unit, not the rear surface of the backlight unit.

94. Therefore, claim 16 is patentable over Na.

c. Claim 4 – Na does not disclose or make obvious “a posterior surface on the rear side of the PCB” or “a constricted convection plate placed behind ... the posterior surface of the PCB.”

95. The Petition identifies the “outmost [sic] surface of the rear side of the portion of driving substrate 130 facing the inner space 260” of Na's driving substrate as being the “posterior surface on the rear side of the PCB.” Petition, pp. 59-60; Ex. 1002.121-122, ¶¶ 202. However, I note that claim 4 recites “a posterior surface **on the** rear side of the PCB.” (emphasis added) This is similar to the recitation in claim 9 (“the posterior surface of the electronic display”), but also recites that a posterior surface be affixed to, or otherwise positioned against, the rear side of the PCB.

96. I understand that when construing claim terms, I should read the claim so that all terms contribute to the claim. Here, claim 4 recites that there is a “posterior

surface ***on the*** rear side of the PCB,” (emphasis added) which means that there must be a component on the rear side of the PCB that provides a posterior surface that is separate from simply the “rear side of the PCB” itself. If the posterior surface was the rear side of the PCB, the claim would have said so, such as the language found in claim 9 that recites “the posterior surface of the electronic display” rather than the posterior surface on the rear side of the electronic display. In contrast, Na does not disclose any posterior surface on the rear side of its PCB. Instead, Na directly transfers heat from its “driving substrate” using air flow. Na, pp. 5-6; Figs. 3, 6. Further, neither the Petition nor Mr. Smith-Gillespie identifies and posterior surface distinct from Na’s driving substrate.

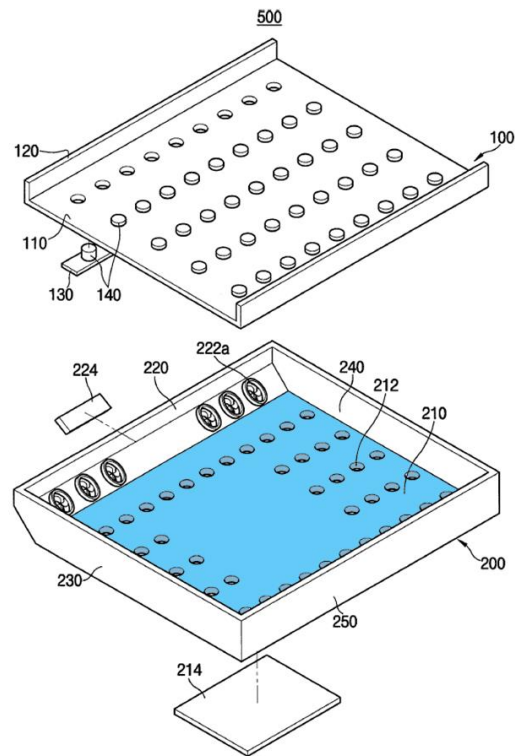
97. Therefore, claim 4 is patentable over Na.

d. Claims 4 and 9 – Na does not disclose or make obvious “a constricted convection plate.”

98. As I discussed above with respect to claim 9, Na does not disclose a “constricted convection plate.” However, even if the “posterior display surface” recited in claim 9 could be the internal areal light source 100, Na’s bottom plate 210 is not a constricted convection plate as asserted by the Petition. Petition, pp. 61-62; Ex. 1002.122-126, ¶ 205.

99. Unlike the constricted convection plate of the ’322 Patent, Na’s bottom plate 210 has multiple “through-holes 212” formed in it (bottom plate 210 shown in blue):

FIG. 1



100. However, as I discussed above with respect to Kim, a constricted convection plate defines a constricted convection channel that has an entrance and an exit to allow air to flow in a single direction from the entrance to the exit. Section VIII.A.1.a. Here, the proposed constricted convection plate includes multiple through-holes that allow air to flow into the cooling chamber formed on the interior of Na's device. Na, p. 4 ("Air may move through the through-holes 212. In the present exemplary embodiment, the through-holes 212 function as an intake unit through which external air is sucked."). Thus, Na only teaches a cover with ventilation holes. Na's bottom plate 210 does not constrict air flow. To the contrary,

the large number of through-holes are designed to allow the free flow of air through the bottom plate. Therefore, Na's bottom plate is not a constricted convection plate.

101. Therefore, claims 4 and 9 are patentable over Na in view of Kim.

**e. Claim 9 – Na does not disclose or make obvious
“where no electronics are mounted to the posterior
surface of the electronic display.”**

102. While the Petition identifies the “areal light source” as the posterior surface of the electronic display,” this is contrary to Na's own description of its device. Petition, pp. 66-67; Ex. 1002.131-132, ¶ 220. Na describes that its “liquid crystal display device 800 includes a backlight unit 500, a liquid crystal display panel 840, and a chassis 860.” Na, p. 8. Mr. Smith-Gillespie agrees that the display device 800 includes an LCD panel 840, but disagrees with Na that the full backlight unit 500 is part of the display device. Instead, he selects only the areal light source 100 to be a part of the display, but not the remainder of the backlight unit 500, including the bottom plate 210. Ex. 1002.131-132, ¶ 220. A POSITA considering Na would consider the combination of the backlight unit and the LCD display panel 840 to be the electronic display because the full backlight unit 500, including its internal cooling mechanism, is needed for the display device 800 to operate properly. Na, pp. 3-4. Thus, the “posterior surface of the electronic display” is the rear surface of the backlight unit 500, which is the bottom plate 210. *See, e.g.*, Na, Figure 1. And with respect to claim 9, Na discloses that a driving circuit 214, which is an

electronics component, is mounted to the rear surface of the bottom plate 210. Na, p. 4, Figures 1 and 3. Therefore, Na does not disclose or make obvious “where no electronics are mounted to the posterior surface of the electronic display” as recited in claim 9.

2. Ground 6 – Claims 7, 12, and 13 are patentable over Na and Kim

103. Each of these claims is patentable because, as I discussed above, claims 4 and 9 are patentable over Na and Kim.

104. In addition, a POSITA would not be motivated to modify Na’s device to employ the housing from Kim as proposed by the Petition. Petition, pp. 71-73. The Petition asserts that Na’s “first and second driving circuits 214 and 224 are exposed to ambient air” and that it would have been obvious to add a housing, such as Kim’s, to protect these driving units “by adding an external housing behind bottom plate 210 and enclosing the display.” Petition, pp. 72-73; Ex. 1002.140-141, ¶ 243. However, if the problem to be solved was protecting the first and second driving circuits 214 and 224 from ambient air, Kim’s housing does not solve this problem, because Kim’s housing is vented to allow ambient air to blow across the exterior portions of its display, not through the interior as in Na. Kim, Figures 2, 5; Na, Figures 1-3.

105. In addition, because Na’s driving circuit is affixed to the rear side of the

bottom plate 210, which contains the through-holes used to ventilate the interior of the backlight unit 500, a housing such as Kim's would not protect the driving circuits 214, 224 while simultaneously allowing ambient air into contact with the bottom plate 210. Na, Figures 1-3. Instead, Kim's housing would allow ambient air to flow over the driving circuits 214, 224 as well as into the interior of Na's backlight unit. 106. Therefore, a POSITA would not be motivated to combine Na with Kim to provide the claimed housing. Therefore, it is my opinion that claims 7, 12, and 13 are each patentable over Na in view of Kim.

3. Ground 7 – Claim 11 is patentable over Na and Tachikawa

107. The Petition relies on Tachikawa as disclosing the claimed “at least one bracket;” however, the Petition identifies brackets in Tachikawa that are used to mount the Tachikawa device to a “stand member.” Petition, p. 77 (““Each of the two brackets 20 is connected to a stand member (not shown)...”) (quoting Tachikawa, ¶ 19. However, claim 11 recites “at least one bracket which connects the posterior surface with the constricted convection plate.” Tachikawa's brackets do not connect a “posterior surface with the constricted convection plate;” instead they mount the rear of the “cabinet” to a stand. Tachikawa, ¶ 19.

108. The Petition does not attempt to reconcile the distinction between mounting the “cabinet” to a “stand” with the claimed at least one bracket “which connects the posterior surface with the constricted convection plate.” Instead, it states that “[t]he

addition of Tachikawa's stand and bracket arrangement would provide support to Na's display without compromising its cooling ability." Petition, p. 78. Even if this is true, it does not explain how such brackets would connect a posterior surface with a constricted convection plate, other than Mr. Smith-Gillespie's opinion that a "POSITA would have envisioned, based on the teachings from Tachikawa, that the rear side surface of Na's areal light source 100 would be fitted with brackets via a set of attachments to bottom surface 210 and an installation surface." Ex. 1002.148-149, ¶ 259. But there is no explanation regarding modifying Tachikawa's teaching of mounting the rear side of a "cabinet" to a "stand" to instead connect the internal areal light source 100 to the bottom plate 210. The bottom plate is not a stand, nor is the internal areal light source 100 a "cabinet." And I see no reason a POSITA would be motivated to make such a modification to Na based on the teachings in Tachikawa.

109. Therefore, it is my opinion that claim 11 is patentable over Na and Tachikawa.

C. Kimura Grounds – Claims 1-5, 7-9, 12, 13, and 16

1. Ground 8 – Claims 9, 12, 13, and 16 are patentable over Kimura

a. Kimura does not disclose or make obvious a "constricted convection plate."

110. The Petition asserts that Kimura's "driving circuit 19" corresponds to the "constricted convection plate" found in claims 9, 12, and 13. Petition, pp. 81-82.

However, Kimura only references driving circuit 19 once and then only to describe its location in the Kimura device, i.e., that it is positioned behind the backlight. Kimura, ¶ 78. No functionality related to cooling, defining a cooling channel, or airflow is attributed to the driving circuit 19. Further, one of ordinary skill would never consider a PCB, or Kimura's driving circuit 19 specifically, to be a plate. Furthermore, and as I discussed above with respect to Kim, nothing in Kimura's Figures is indicated as being drawn to scale or otherwise representative of the actual dimensions or sizes of the components of its display device. Thus, its depiction in Figure 9 only illustrates its relative positioning.

111. The Petition asserts that “Kimura explains that the “entire backlight is cooled uniformly” because of a “film” of air formed over “the rear surface of the backlight unit 18” by fan 20,” and that “[i]n other words, the driving circuit 19 allows the “film” of air to be formed on the posterior surface.” Petition, pp. 81-82. However, this entirely misunderstands Kimura's disclosure. Kimura discloses a fan that is specially designed to generate a thin film of air by itself:

As described above, the cooling fan according to the present invention can circulate air in the form of a rectangular film in a single direction that is perpendicular to the rotational shaft.

Kimura, ¶ 90. Thus, Kimura teaches that the film of air is generated simply by the design and control of the fan, irrespective of the presence of any other components,

such as the driving circuit 19. *See, e.g.*, Kimura, claims 1, 7, ¶¶ 12, 18, 24-25, 30, 45, 78, 90.

112. In particular, when describing Figure 9, Kimura only references the backlight when discussing the generated “film” of air that flows over and cools the backlight:

By circulating a wind generated by rotationally driving the cooling fan 20 in the form of a “film” to the rear surface of the backlight unit 18, the entire backlight unit 18 is cooled uniformly.

Kimura, ¶ 78; see also ¶ 30 (the fan generates a film of air to cool the flat panel display). It makes no reference to the driving circuit 19 as contributing to the creation of any film of air, as proposed by the Petition. Instead, Kimura’s fan generates such a film of air, irrespective of the presence of the driving circuit. Kimura, ¶¶ 30, 78. Instead, it is my opinion that the driving circuit is depicted as being positioned away from the backlight only to allow the film of air to flow over the backlight unimpeded and does not constitute a constricted convection plate. Therefore, it is my opinion that the Petition’s assertion that “the driving circuit 19 allows the ‘film’ of air to be formed on the posterior surface” is factually incorrect and entirely contradicted by Kimura’s own disclosure.

113. Therefore, it is my opinion that Kimura does not disclose or make obvious a “constricted convection plate.”

b. Kimura does not disclose or make obvious “a constricted convection plate ... covering a majority of the posterior display surface.”

114. As I discussed above with respect to the “constricted convection plate” in claim 9, Kimura provides no disclosure to suggest that its driving circuit 19 is involved in creating the “film of air” used to cool Kimura’s device. Section VIII.C.1.a. The Petition asserts that a POSITA “would have been motivated to optimize the display cooling capability by enlarging Kimura’s ‘driving circuit 19’ to cover the entire rear surface of the display so that ‘the entire backlight is cooled uniformly,’ with a reasonable expectation of success.” Petition, p. 83. However, this conclusion is predicated on the faulty conclusion that the driving circuit 19 creates the film of air. Instead, Kimura’s fan configuration alone creates the film of air. Thus, the sizing of the driving circuit is untethered from any need to create any uniform airflow. Moreover, even if the driving circuit were enlarged and placed near the backlight as Mr. Smith-Gillespie proposes, that would disrupt uniform cooling and not promote it. Air forced between the driving circuit (which generates heat) and the backlight (which generates heat) would remove heat from both, and the further that cooling air traveled between the two the hotter the air would become and the less heat it would remove from surfaces further from the entrance. Because air is traveling from the bottom of the backlight to the top, the top of the display would necessarily become hotter than the bottom of the display and uniform cooling would

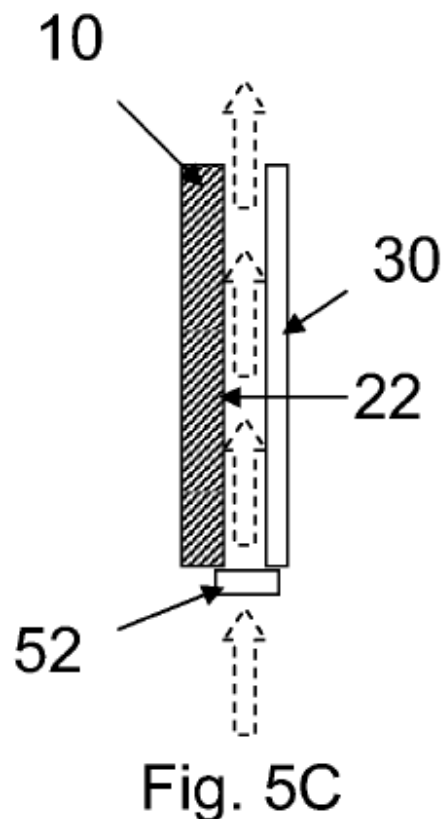
not be achieved. Therefore, one of ordinary skill would understand that moving the driving circuit *away* from the backlight would promote more uniform cooling of the display whereas placing it close to the backlight and enlarging it would cause less uniform cooling of the display. Because Kimura promotes uniform cooling, Kimura teaches away from the claimed invention.

115. Further, in the context of a flat panel televisions, to which Kimura is directed, driving circuits are sized to be much smaller than the full size of the display panel assembly to reduce the size of the display device as a whole. Kimura, ¶¶ 3 (“The present invention relates to a cooling fan that can be favorably used in a flat panel display apparatus such as a thin-screen television and to an image display apparatus.”), 5. I note that both Kim and Na, which also involve flat panel displays, use driving circuits that are considerably smaller than the display. See, e.g., Kim, Fig. 2 (circuit board 133); Na, Fig. 2 (first driving circuit unit 214), see also Na, Figs. 1 (214), 3 (214). In addition, Mr. Smith-Gillespie acknowledged that such smaller driving circuits were used. Smith-Gillespie Transcript, p. 1086:17-20.

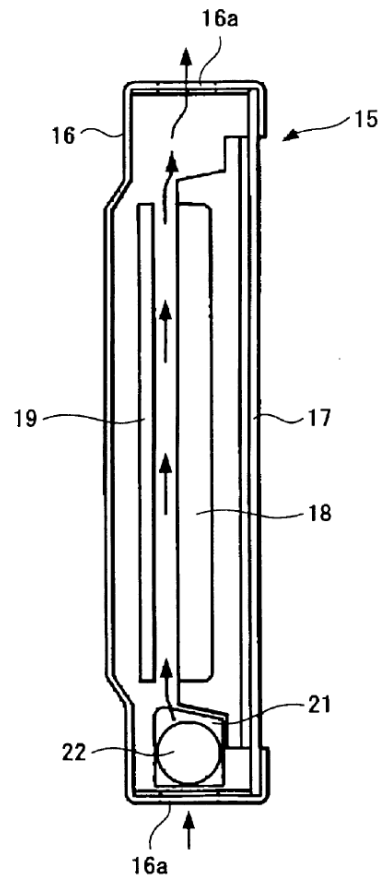
116. Therefore, it is my opinion that Kimura does not disclose or make obvious “a constricted convection plate ... covering a majority of the posterior display surface.”

- c. **Kimura does not disclose or make obvious a “means for forcing air between the constricted convection plate and the posterior surface of the electronic display.”**

117. The Petition asserts that Kimura's fan is equivalent to the fan 52 of the '322 Patent; however, this overlooks the fact that the positioning of the Kimura fan is different than the fan 52 in the '322 Patent. Petition, pp. 83-84. Kimura's fan configuration is that of a "forcing fan" as described by Dr. Smith-Gillespie in his ITC declaration. See Ex. 2010, p. 13, ¶ 39. Specifically, the fan 52 in the '322 patent when configured as a forcing fan directly abuts the channel. '322 Patent, Fig. 5C. Therefore, air propelled by the fan 52 can *only* travel, *i.e.*, the air is forced, into the constricted convection channel defined by the constricted convection plate and the posterior surface of the electronic display:



'322 Patent, Figure 5C. However, Kimura's configuration includes a gap between the fan 22 and the backlight unit 18:



Kimura, Figure 9.

The presence of the gap in Kimura has the potential to change the airflow significantly from that taught by the '322 patent.

118. Therefore, it is my opinion that Kimura does not disclose or make obvious a “means for forcing air between the constricted convection plate and the posterior surface of the electronic display.”

d. Kimura does not disclose or make obvious “the means for forcing air ... comprises a plurality of fans placed near the entrance aperture” as recited in claim 13.

119. Claim 13 recites the “the means for forcing air” recited in claim 9 “comprises a plurality of fans placed near the entrance aperture.” However, Kimura only employs a single fan, not a plurality of fans as asserted by the Petition. Petition, p. 87. While Kimura allows shorter vanes to be used, there is no disclosure in Kimura to support the notion that using shorter vanes creates additional fans. Kimura, ¶ 88. Instead, such a configuration remains a single fan, but with multiple shorter vanes. Kimura, ¶ 88. This is consistent with Kimura’s own reference to the embodiment shown in Figure 11 as including only a single fan: “the cooling fan shown in Figure 11.” Kimura ¶ 88 (cited by the Petition, p. 87) (emphasis added). Further, a POSITA is well-aware that it is conventional for a fan to have multiple vanes. Indeed, fans almost universally have multiple vanes—fans commonly include three or four vanes or “blades.” Thus, increasing the number of vanes does not change the number of fans.

120. In addition, the Petition misreads paragraph 90 of Kimura as suggesting using multiple shorter fans: “Because increasing the length of shaft 23 increases the wind-producing area (see Ex. 1004, ¶[0090]), a POSITA would have been motivated to use a plurality of shorter rotating fans for wide displays instead of a single long fan to: (i) “increase the wind-producing area,” and (ii) to prevent vane deformation

during operation.” Petition, p. 88. However, Kimura is only explaining that by increasing the length of its shaft, and thereby the fan, the area covered by the fan increases, which means more air can be moved but at a lower rotational speed as compared to a conventional fan, i.e., it is explaining the advantages of its design over conventional fans. Kimura, ¶¶ 90-92. Further, substituting multiple shorter fans (including their respective motors) in place of the longer fan would result in gaps in air flow across the backlight, thereby not uniformly cooling the backlight, which Kimura teaches is an advantage of its design. Kimura, ¶ 78.

121. Further, the assertions about paragraph 90 are internally inconsistent: the Petition asserts that “because increasing the length of shaft 23 increases the wind producing area (see *id.*, ¶90 (“since it is possible to increase the wind-producing area by increasing the length”)), a POSITA would have been motivated to use a plurality of shorter rotating fans for wide displays as opposed to a single long fan to: (i) “increase the wind-producing area.” Petition, p. 88; Ex. 1002.164, ¶ 292. However, if a longer shaft “increases the wind-producing area,” it would not suggest using multiple shorter fans to “increase the wind-producing area.” Instead, Kimura expressly teaches using a single longer rotating shaft of a single fan, even if a larger number of shorter vanes were used on the single fan. Therefore, the Petition’s assertions that Kimura discloses or suggests using multiple fans are incorrect.

122. Therefore, it is my opinion that Kimura does not disclose or make obvious a

“the means for forcing air ... comprises a plurality of fans placed near the entrance aperture” as recited in claim 13.

2. Ground 9 – Claims 1-3 and 11

**a. Kimura does not disclose or make obvious a
“constricted convection plate.”**

123. As I discussed above with respect to claim 9, it is my opinion that Kimura does not disclose or make obvious a constricted convection plate. Section VIII.C.1.a.

**b. Kimura and Kochiyama do not disclose or make
obvious “at least one bracket which connects the
posterior display surface with the constricted
convection plate.”**

124. The Petition asserts “Kochiyama’s screw and screw boss to be the claimed ‘bracket,’” however, it does not identify any component in Kochiyama as corresponding with either a “posterior display surface” or a “constricted convection plate.” Petition, pp. 90-91. However, neither a screw nor a “screw boss” is a bracket. While a screw may be used to attach a bracket to another component, the screw itself (as well as the screw hole or screw boss) is not a bracket. The expansive definition of “bracket” proposed by Mr. Smith-Gillespie of anything that “provide[s] a connection (fixing of) two parts to one another” is simply overly broad. Ex. 1002.169, ¶ 306. A bracket is not anything that may be used to connect two parts, a definition that would encompass any and all fasteners, such as nails or staples. A POSITA would not understand such fasteners, including screws and bosses, to be

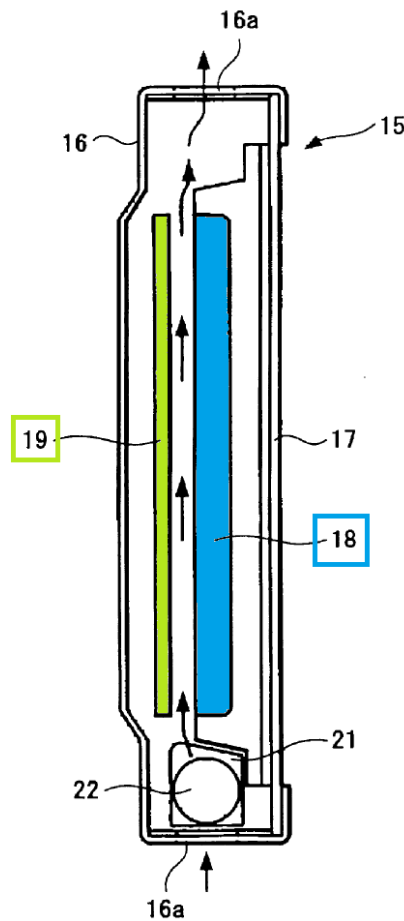
brackets. Therefore, the Petition has not established that Kimura and Kochiyama make obvious “at least one bracket which connects the posterior display surface with the constricted convection plate.”

125. Therefore, claims 1-3 and 11 are patentable over Kimura in view of Koshiyama.

126.

c. A POSITA would not be motivated to modify Kimura to employ Kochiyama’s bracket.

127. The Petition asserts that a POSITA would be motivated to use Kochiyama’s bracket to couple Kimura’s driving circuit 19 to its backlight unit 18 because the modification “would produce predictable results without interfering with Kimura’s cooling method.” Petition, p. 94. However, based on the arrangement of driving circuit 19 and the backlight unit 18, it is not apparent how inserting a bracket into the airflow generated by the fan 22 would not disrupt that airflow:



It is readily apparent from Figure 9 that the region between the driving circuit 19 (shaded green) and the backlight unit 18 (shaded blue) would be at least partially obstructed by any bracket coupling the two together. Because Kimura's fan is specifically designed to generate a film of air the entire length of its fan to draw heat from the heat-generating components, disrupting that smooth film of air by introducing a bracket would frustrate the purpose of the fan.

128. The Petition cites to Mr. Smith-Gillespie's declaration, which makes the same bare assertion that "would produce predictable results because Kochiyama's bracket

would advantageously and predictably improve stability of Kimura's driving circuit without interfering with its cooling method." Ex. 1002. 173, ¶ 314. However, when discussing the impact on cooling, Mr. Smith-Gillespie only generally refers to a discussion "above," without citation. Ex. 1002.172, ¶ 313. However, to the extent Mr. Smith-Gillespie discusses Kochiyama's particular method of cooling, he explains that Kochiyama uses conventional blower fans to "force air into the display" and that the "air can be blown directly onto the chassis 2 and the circuit board 3." Ex. 1002.170, ¶ 310. From this he concludes that the bracket does not disrupt airflow through the gap between the circuit boards and the chassis, despite there being no discussion of the nature of such airflow in Kochiyama.

129. More importantly, however, is that Kimura does not simply "force air into the display" and blow air "directly onto" either its driving circuit 19 or backlight unit 18. Instead, Kimura uses a specially designed fan to create a thin film of air that is blown across the backside of the backlight unit 18. Mr. Smith-Gillespie provides no explanation about how obstructing a part of this film of air impacts the remainder of the "film" nor the cooling effect to the backlight unit 18. Thus, it is my opinion that Mr. Smith-Gillespie's analysis is unsupported by the evidence.

130. Therefore, it is my opinion that the Petition has not established a motivation to combine Kimura and Kochiyama.

3. Ground 10 – Claims 4 and 7

131. The Petition asserts that Kimura discloses the “constricted convection plate” of claim 4 and relies on its analysis for claim 9. However, as I discussed above with respect to claim 9, Kimura does not disclose or make obvious a constricted convection plate. See Section VIII.C.1.a above.

132. In addition, the Petition’s motivation to combine Kimura and Hong relies on its motivations discussed with respect to Kim and Hong in Ground 1. However, as I discussed above with respect to that analysis, a POSITA would not be motivated to combine Kim and Hong to use Hong’s metal core PCB as discussed above. Section VIII.A.1.c above. As I discussed above with respect to Kim and Hong, Hong employs a MCPCB because of the high-powered LEDs that it employs. However, Kimura, like Kim, discloses that its inventive fan is designed to operate in a “large domestic appliance,” which I interpret to be a typical consumer display that will not employ the high-power LEDs used by Hong. Kimura, ¶ 75. Thus, a POSITA would not be motivated to modify the Kimura display to use Hong’s MCPCB for the same reasons that I discussed above with respect to Kim. Section VIII.A.1.c above.

133. Further, the Petition asserts that “Kimura’s LEDs need to be mounted on a first side of a PCB within backlight unit 18 in order to operate as intended.” Petition, p. 99. However, Kimura does not describe the nature of the substrate any LEDs are mounted to, nor does Kimura discuss the configuration of its LEDs. Thus, the proposed “needed” (or necessary) requirements are not, in fact, required by the

Kimura design.

134. Therefore, it is my opinion that claims 4 and 7 are allowable over Kim in view of Hong.

4. Ground 11 – Claim 5

135. It is my opinion that claim 5 is patentable over Kimura, Hong, and Kochiyama for the same reasons I discussed above with respect to claim 4. Section VIII.C.3. In addition a POSITA would not be motivated to modify Kimura to use Kochiyama, as I discussed with respect to claim 11. Section VIII.C.2.c.

D. Cho Ground

1. Ground 12 – Claims 4, 5, and 9-11

136. The Petition asserts that “upper plate 513” is the claimed “constricted convection plate” for independent claims 4 and 9. Petition, pp. 106 (claim 4[c]), 112 (claim 9[b]). However, Cho’s upper plate 513 cannot be the claimed “constricted convection plate” because the upper plate 513 encloses a large heat sink 530, that includes a large number of fins 532 extending away from a heat transmission plate 531. Cho, ¶ 51, Figs. 3, 4 (annotated, reproduced below).

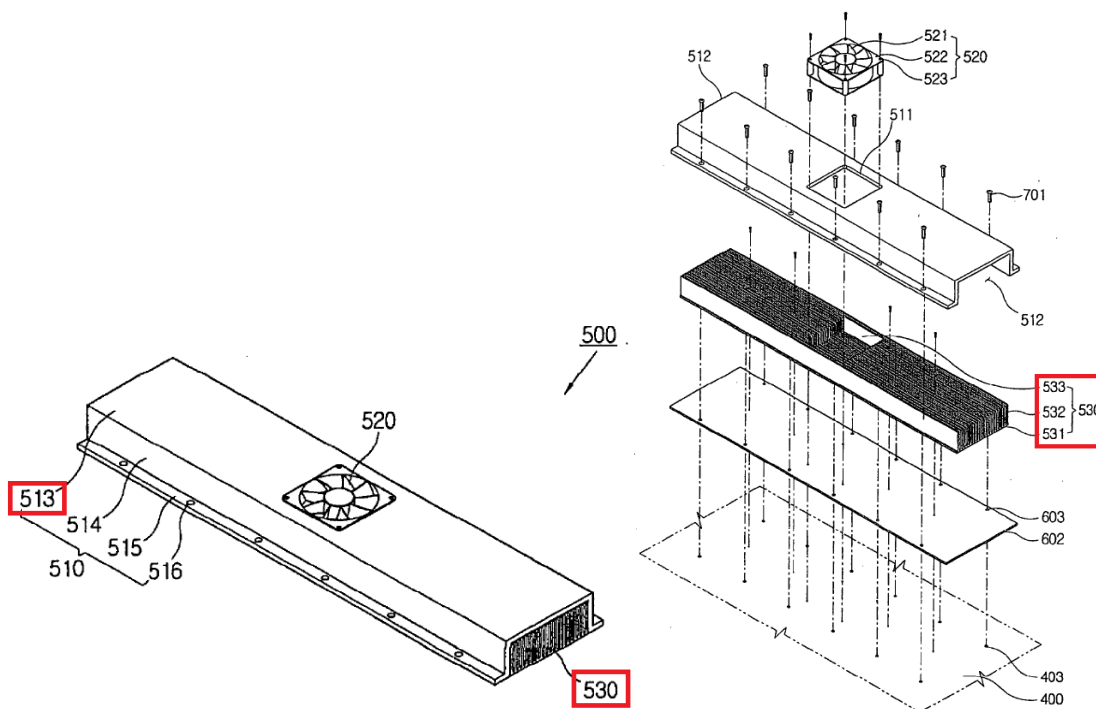


Figure 3

Figure 4

137. In addition, Cho discloses that the “heat sink 530 is interposed between the upper plate 513 and the external surface of the lower chassis 402.” Cho, ¶ 48. To achieve a cooling effect, the fan 520 pulls air through the top opening 511 of the upper plate 513, across the fins of the heat sink 530, before venting the heated air through the side opening 512 defined by the upper plate 513. Cho, ¶ 50. Therefore, because the upper plate 513 provides a cover to the heat sink and a convenient mounting point for a fan 520, it is not a “a plate configured to form part of a constricted convection channel” that is positioned behind a posterior surface of a PCB (claim 4) or the display (claim 9). Further, the fins of the heatsink fill, and therefore obstruct, the pathway through the cavity defined by the upper plate 513,

thereby reducing the speed and creating turbulence within air traversing the pathway, as opposed to providing a “uniform flow of air” as described by the ’322 Patent. ’322 Patent, 3:2-4.

138. Moreover, because Cho discloses that its fan pushes air over the fins of the heatsink and out of the cavity defined by the top plate 513, Cho does not disclose or make obvious “a fan positioned to draw air between the constricted convection plate and the posterior surface” (claim 4) or “a means for forcing air between the constricted convection plate and the posterior surface of the electronic display” (claim 9). Instead, the air is forced between the upper plate 213 and the heatsink’s fins 532 or the heat transmission plate 531. Neither of these components is a posterior surface of a PCB (claim 4) or a posterior surface of an electronic display (claim 9). In addition, Cho’s use of a heatsink is exactly the sort of cooling technique that the ’322 Patent describes as inadequate. ’322 Patent, 2:8-14, 2:25-29.

139. Cho also does not disclose that its top plate 513 “cover[s] a majority of the posterior display surface” as recited in claim 9. Instead, Cho shows that multiple heatsink / top plate assemblies may be arrayed on the exterior rear of its devices, but none of these assemblies covers a “majority of the posterior display surface.” Cho, Figs. 7A-7C. And contrary to the assertions made in the Petition, Cho teaches using multiple assemblies, not creating one large assembly. Cho, Figs. 7A-7C. And using multiple assemblies, as also proposed by the Petition, does not create a single

“constricted convection plate” that “cover[s] a majority of the posterior display surface.”

140. Finally, with respect to claims 5 and 11, the Petition has not established that Cho discloses the claimed “at least one bracket.” The Petition identifies the “combination part 515, combination holes 516” of the casing 510, as well as screws 701, as being the claimed bracket. Petition, pp. 108-109. Further, the Petition’s annotated Figure 4, also includes side surface parts 514, without identifying them. Petition, p. 109 (annotated Figure 4, with orange shading on the side surface part); see also Cho, Fig. 3 (514, 515, 516). However, a POSITA considering Cho’s casing 510 would understand it to be a single piece of material shaped to include all of the features shown, including the side surface parts 514 and combination part 515 with mounting holes 516, not a “bracket” that connects top plate 513 to any surface. Thus, no separate bracket is used to “connects the posterior surface with the constricted convection plate” as recited in claims 5 and 11.

141. Therefore, it is my opinion that claims 4, 5, and 9-11 are patentable over Cho.

IX. Conclusion

142. For the foregoing reasons, it is my opinion that claims 1-5, 7-9, 12, 13, and 16 are patentable.

I hereby declare that statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true. Should further information become available to me as this matter proceeds, I may revise my opinions accordingly as necessary. I declare under penalty of perjury that the foregoing Declaration is true and correct.

Dated: September 26, 2023



Michael N. Gershowitz