

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SAMSUNG ELECTRONICS CO., LTD., SAMSUNG DISPLAY CO.,
LTD, and SONY CORPORATION,
Petitioner,

v.

SURPASS TECH INNOVATION LLC,
Patent Owner.

Case IPR2015-00887
Patent 7,420,550 B2

Before SALLY C. MEDLEY, BRYAN F. MOORE, and BETH Z. SHAW,
Administrative Patent Judges.

SHAW, *Administrative Patent Judge.*

FINAL WRITTEN DECISION
35 U.S.C. § 318(a) and 37 C.F.R. § 42.73

I. INTRODUCTION

Samsung Electronics Company, LTD., Samsung Display Company, LTD., and Sony Corporation (collectively “Petitioner”) filed a Petition to institute an *inter partes* review of claims 1–5 of Patent 7,420,550 B2 (“the ’550 patent”) pursuant to 35 U.S.C. §§ 311–19. Paper 1 (“Pet.”). Surpass Tech Innovation LLC (“Patent Owner”) filed a Preliminary Response to the Petition. Paper 7 (“Prelim. Resp.”). We determined that the information presented in the Petition demonstrated a reasonable likelihood that Petitioner would prevail with respect to claims 1–5 of the ’550 patent. Pursuant to 35 U.S.C. § 314, we instituted trial as to those claims. Paper 9 (“Dec. Inst.”).

After institution of trial, Patent Owner filed a Patent Owner Response to the Petition (Paper 16, “PO Resp.”). Petitioner filed a Reply to Patent Owner’s Response (Paper 22, “Reply”). An oral hearing was held on May 12, 2016.¹

We have jurisdiction under 35 U.S.C. § 6(c). This Final Written Decision is issued pursuant to 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73. For the reasons that follow, we determine that Petitioner has shown by a preponderance of the evidence that claims 1–5 of the ’550 patent are unpatentable.

A. Related Matters

Petitioner indicates that the ’550 patent is asserted in *Surpass Tech Innovation LLC v. Samsung Display Co., Ltd.* (Civil Action No. 1:14-cv-

¹ The oral hearings for this trial and the following cases were consolidated: IPR2015-00885 and IPR2015-00863. Paper 30. A transcript of the hearing has been entered into the record as Paper 40 (“Tr.”).

00337-LPS) and *Surpass Tech Innovation LLC v. Sharp Corporation* (Civil Action No. 1:14-cv-00338-LPS). Pet. 1. We denied *inter partes* review of the '550 patent on March 10, 2015 in IPR2015-00022, Paper 9.

B. The '550 Patent (Ex. 1001)

The '550 patent is titled “Liquid Crystal Display Driving Device of Matrix Structure Type and Its Driving Method.” Ex. 1001, Title. The '550 patent specifically discloses a matrix structure arrangement for a liquid crystal display (“LCD”) panel in which pixels are arranged in rows and columns.

An example of this structure is shown in Figures 4A and 4B of the '550 patent. Figure 4A is reproduced below:

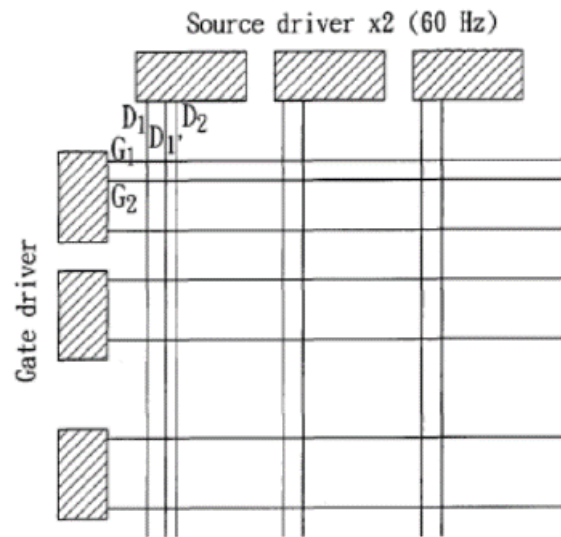


Fig. 4A

Figure 4A, reproduced above, depicts a schematic view showing the arrangement of the gate lines and the data lines of the display panel. Ex. 1001, 4:49–51. Figure 4B is reproduced below:

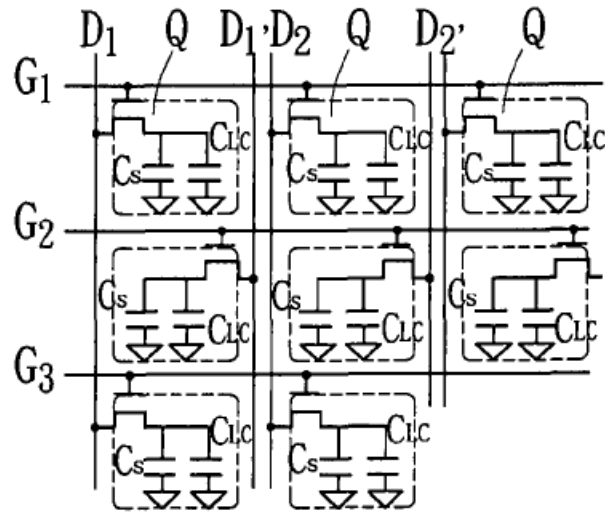


Fig. 4B

Figure 4B, reproduced above, depicts an enlarged schematic sectional view taken from Figure 4A, which shows the arrangement of the gate lines and the data lines and the state of the gate and the source, which are connected to the gate lines and the data lines, of each thin film transistor. *Id.* at 4:52–56.

As shown in Figure 4A and Figure 4B, data lines D₁, D_{1'}, D₂, D_{2'} are connected to source drivers, and the data lines are grouped in pairs, such as D₁ and D_{1'}. The first and the second data lines D₁, D_{1'} of the first group of data lines respectively are connected with the sources of all the thin film transistors Q of the odd and the even rows of the first column. *Id.* at 8:23–26.

The driving device includes a group of thin film transistors Q in a matrix array, which consists of N rows and M columns of thin film transistors, wherein each thin film transistor Q can drive one pixel, so NxM pixels (shown by rectangle with dotted line) can be driven. *Id.* at 8:12–17. The first gate line G₁ is connected with the gates of all the thin film transistors Q

of the first row, the second gate line G_2 is connected with the gates of all the thin film transistors Q of the second row, and so are the others. *Id.* at 8:17–20.

C. Illustrative Claim

Independent claim 1 of the '550 patent is illustrative and recites:

1. A liquid crystal display driving device of matrix structure type including:

a group of thin film transistors with matrix array consisting of N rows and M columns of thin film transistors, wherein each thin film transistor can drive one pixel so that $N \times M$ of pixels can be driven;

a group of N gate lines connected to the gate drivers and insulated with each other, wherein the first gate line is connected with the gates of all the thin film transistors of the first row, the second gate line is connected with the gates of all the thin film transistors of the second row . . . and the N^{th} gate line is connected with the gates of all the thin film transistors of the N^{th} row; and

M groups of data lines connected to the source drivers and insulated with each other, wherein the first and the second data lines of the first group of data lines are respectively connected with the sources of all the thin film transistors of the odd and the even rows of the first column, the first and the second data lines of the second group of data lines are respectively connected with the sources of all the thin film transistors of the odd and the even rows of the second column . . . and the first and the second data lines of the M^{th} group of data lines are respectively connected with the sources of the all thin film transistors of the odd and the even rows of the M^{th} column, and the first data lines and the second data lines of each group of data lines are connected with the same source driver.

D. Grounds of Unpatentability Instituted for Trial

We instituted a trial on the following grounds of unpatentability:

Claims 1–3 under 35 U.S.C. § 103 as obvious over Janssen '708² and APA³;

Claims 1–3 under 35 U.S.C. § 103 as obvious over Janssen '708 and Horii⁴;

Claims 4 and 5 under 35 U.S.C. § 103 as obvious over Janssen '708, APA, and Kubota⁵; and

Claims 4 and 5 under 35 U.S.C. § 103 as obvious over Janssen '708, Horii, and Kubota.

II. ANALYSIS

A. Claim Interpretation

Consistent with the statute and legislative history of the America Invents Act (AIA), the Board interprets claims using the “broadest reasonable construction in light of the specification of the patent in which [they] appear[.]” 37 C.F.R. § 42.100(b); *Cuozzo Speed Techs. LLC v. Lee*, 136 S. Ct. 2131, 2144–46 (2016).

Petitioner proposes claim constructions for “the gate drivers” and “the source drivers,” “[t]he first and the second data lines of the first group of data lines,” “[g]ate lines...insulated with each other,” “data lines . . .

² PCT Publication WO 02/075708 A2, published Sept. 26, 2002 (Ex. 1004) (“Janssen '708”).

³ Background of U.S. Patent No. 7,420,550 B2, issued Sept. 2, 2008 (Ex. 1001, Background) (“APA”).

⁴ JP Publication 2-214818, published Aug. 27, 1990 and translation (Exs. 1006, 1007) (“Horii”).

⁵ U.S. Patent No. 6,300,927 B1, issued Oct. 9, 2001 (Ex. 1005) (“Kubota”).

insulated with each other,” and “a space between the neighboring data lines.” *See* Pet. 11–17. Patent Owner does not specifically contest the claim constructions. Prelim. Resp. 1–35; PO Resp. 1–36.

We adopt Petitioner’s proposed constructions for the terms “date lines” and “insulated with each other,” as we determine them to be consistent with the broadest reasonable construction. *See* Pet. 14–15. We interpret “date lines” as “data lines.” *Id.* We interpret “insulated with each other” to mean “spaced apart from and parallel to each other.” *Id.* We preliminarily interpreted these phrases the same way when we instituted trial. Dec. 7. These interpretations are consistent with the Specification’s figures and description of gate lines and data lines being orthogonally crossed. Ex. 1001, 1:45–45, Figs. 1A, 1B, 4–7; Ex. 1013 ¶¶ 33–34. We agree that when reading the description of gate lines and data lines being “orthogonally crossed,” and when viewing the figures of the ’550 patent, a person of ordinary skill in the art would understand that because of the insulation, these lines are not in physical contact with each other. Pet. 15 (citing Ex. 1013 ¶¶ 33–34).

We determine that we need not construe any other limitations of the challenged claims.

B. Obviousness of Claims 1–3 over Janssen ’708 and Horii

To prevail on its patentability challenge, Petitioner must establish facts supporting its challenge by a preponderance of the evidence. 35 U.S.C. § 316(e); 37 C.F.R. § 42.1(d). In the Petition, Petitioner alleges claims 1–3 would have been obvious over the combination of Janssen ’708 and Horii. Pet. 41–50. We have reviewed Petitioner’s explanation identifying where each limitation allegedly appears in Janssen ’708 and Horii and why a

person of ordinary skill in the art would have had reason to combine their teachings, along with the testimony of Petitioner's Declarant, Dr. Tsu-Jae King Liu. *Id.*; Ex. 1013. We have also reviewed Patent Owner's assertions and evidence as to why Petitioner's explanations and evidence are deficient. PO Resp. 1–36.

Upon consideration of the explanations and supporting evidence, we are persuaded that Petitioner has demonstrated, by a preponderance of the evidence, that Janssen '708 and Horii teach all of the limitations of the claims and that a person of ordinary skill in the art would have had reason to combine their teachings to yield the claimed inventions.

We agree that Janssen '708 and Horii teach all of the elements required by claim 1, including the Odd/Even Alternating Connections structured using thin film transistors. Pet. 23, 41; Ex. 1007, Figs. 3, 5; Ex. 1013 ¶ 41. Figure 3 of Janssen '708 is reproduced below.

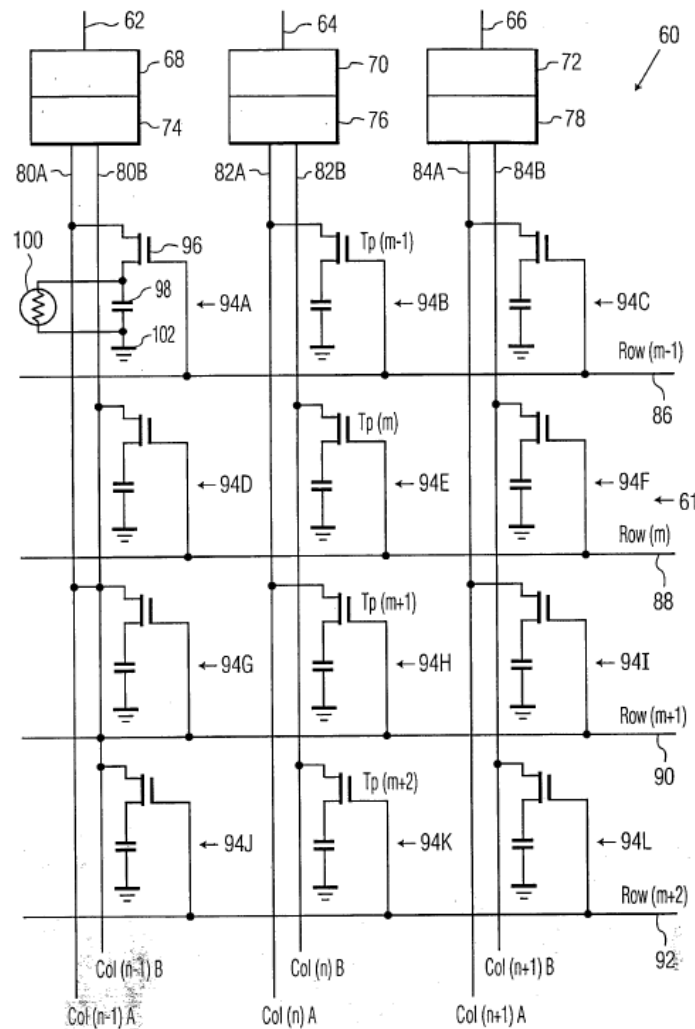


FIG. 3

Figure 3 of Janssen '708 depicts a video display driving circuit and method for driving pixels in a column row matrix that aims to “reduc[e] the capacitive load in the columns of the matrix” by splitting the columns into multiple column lines. Ex. 1004, 1:6–24. Figure 3 of Janssen '708 depicts that data line 80A is connected to the source of each transistor on the odd rows and data line 80B is connected to the source of each transistor on the even rows. Ex. 1004, 5:11–15, Fig. 3; Ex. 1013 ¶ 42.

Claim 1 requires “a group of N gate lines connected to the gate drivers and insulated with each other, wherein the first gate line is connected with the gates of all the thin film transistors of the first row, the second gate line is connected with the gates of all the thin film transistors of the second row . . . and the N^{th} gate line is connected with the gates of all the thin film transistors of the N^{th} row.” Ex. 1001, 19:44–50. Petitioner acknowledges that Janssen ’708 does not explicitly disclose gate drivers, but alleges that it would have been obvious to one skilled in the art to have added Horii’s gate drivers to Janssen ’708 to make a functional device, because although gate drivers are not expressly disclosed in Jansen ’708, a person of ordinary skill in the art would have understood that gate drivers were needed to have a functioning driving circuit of Jansen ’708. Pet. 41–42; Ex. 1013 ¶¶ 60–61.

We find that Horii teaches the claimed “gate drivers” because it shows gate drivers 63 and 64 on either side of the LCD panel. Ex. 1007, Fig. 6(a). Horii discloses an active matrix LCD device (AMLCD) comprising a matrix of thin film transistors 13, data lines 14 (e.g., D_1 to D_{2n}) connected to the data electrodes (i.e., sources) of the TFTs, gate lines 15 (e.g., G_1 to G_m) connected to the gate electrodes of the thin film transistors, a gate driver 16 and a data driver 17 (i.e., source driver). Ex. 1007, 6–7, Fig. 1; Ex. 1013 ¶ 59. A pair of data lines per column are connected to the thin film transistors, with the odd numbered gate lines $G_1, G_3, \dots, G_{m-1}$ connected to the gate electrodes of the thin film transistors whose data electrodes are connected to the odd numbered data lines $D_1, D_3, \dots, D_{2n-1}$, and the even numbered gate lines connected to the gate electrodes of the thin film transistors whose data electrodes are connected to the even numbered data lines. *Id.* at 6. This creates an Odd/Even Alternating Connection between

data lines and gate lines. Ex. 1013 ¶ 59.

Horii also discloses an embodiment where the odd gate lines are driven by the gate driver 63 located on the left side and the even gate lines are driven by the gate driver 64 located on the right side of the panel. Ex. 1007, 9, Fig. 6(a); Ex. 1013 ¶ 60. Horii describes the advantage of this embodiment, as “the odd-numbered pixels and the even-numbered pixels can be controlled completely independently of each other . . . [and that it] is effective even when applied to other kind of control, for example, interlace control.” Ex. 1007, 9.

As stated in *KSR*, “the combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results.” *KSR Int’l. Co. v. Teleflex Inc.*, 550 U.S. 398, 401 (2007). Here, a person of ordinary skill in the art would have recognized that the gate drivers of Horii would have made the device of Janssen ’708 functional. Thus, we agree with and adopt Petitioner’s reasoning for the combination of Horii and Janssen ’708. *See* Pet. 41–42; Ex. 1013 ¶ 60.

Other than Patent Owner’s arguments that Janssen ’708 relates to a lamp and not a liquid crystal device, and that Janssen ’708’s transistors are not thin film transistors, as discussed in more detail below, in its Patent Owner Response, Patent Owner does not explicitly address any other specific claim elements or the rationale to combine Janssen ’708 and Horii..

Next, we address Patent Owner’s arguments regarding whether Janssen ’708 teaches a liquid crystal display and whether Janssen ’708 uses thin film transistors.

Janssen '708's Pixels

Patent Owner argues that Janssen '708 is directed to a lamp and not a liquid crystal device. In particular, Patent Owner argues that Janssen '708's pixels (e.g., pixel 46 in Figure 1, pixel 100 in Figure 3) include a lamp for emitting light, instead of a liquid crystal device. PO Resp. 15–28. Figure 3 of Janssen '708, as annotated by Patent Owner in its Patent Owner Response, is reproduced below.

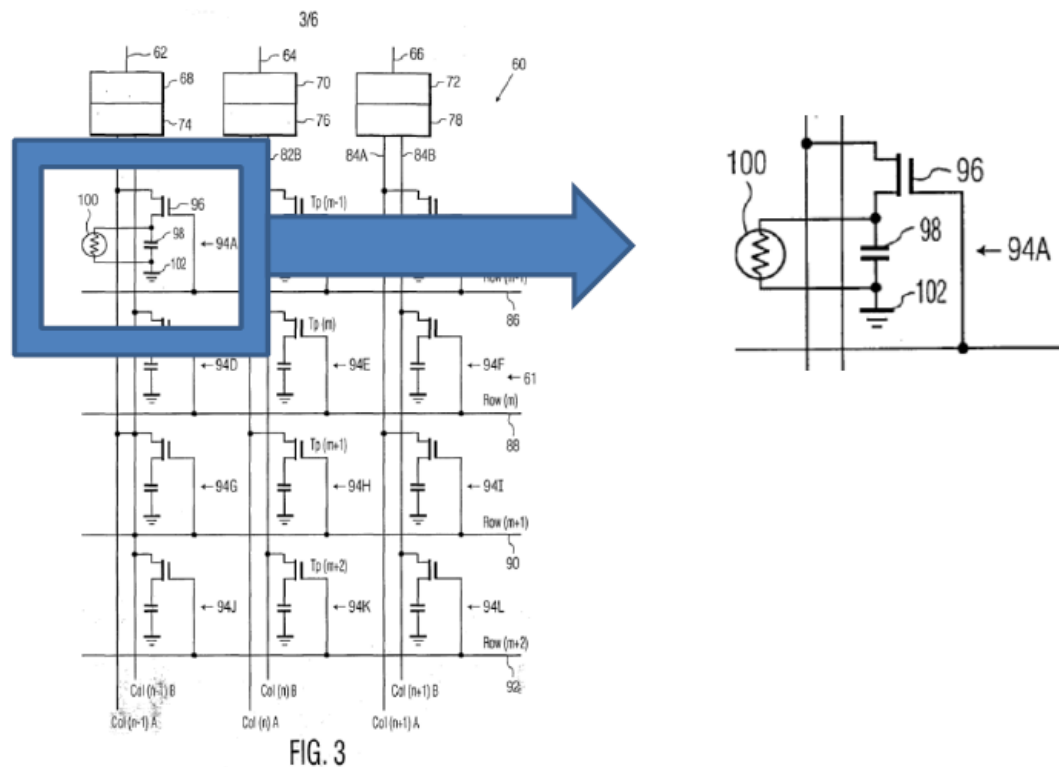


Figure 3 of Janssen '708 as annotated in the Patent Owner Response.

Patent Owner argues that the symbol 100 is a pixel modeled as a resistor inside a circle and is therefore directed to a lamp and not an LCD. See PO Resp. 17. We are not persuaded by Patent Owner's arguments. Patent Owner attempts to distinguish an earlier patent application by the

same inventors as a contrast to Janssen '708, and asks us to infer that the technology of Janssen '708 is vastly different. In particular, Patent Owner acknowledges that U.S. Application No. 2002/0186190 A1 ("Janssen '190," Ex. 1003), "is *clearly directed to an LCD device* (per the title), and shares inventors with Janssen '708." PO Resp. 17 (emphasis added). These two references were first filed within three months of each other. *Id.* Patent Owner argues that because Janssen '708 allegedly "failed to include details of LCD technology," the "only reasonable inference" the Board can make is that Janssen '708 is directed to lamps rather than LCDs. *Id.* We disagree.

First, undermining Patent Owner's position is the fact that Janssen '708 explicitly refers to "video displays" and never to "lamps." *See, e.g.,* Ex. 1004, 1:6–8; Ex. 1013 ¶ 41. Thus, we disagree with Patent Owner's assertion that Janssen '708 failed to include information relevant to LCD technology. Second, a "reasonable inference" based on the facts is the opposite of what Patent Owner argues. Instead, a reasonable inference is that Janssen '708 and Janssen '190, by the same inventors and filed within three months of each other, are both directed to LCD technology, rather than directed to different technology. Although they have different titles, without other persuasive reasoning or evidence to the contrary, we are not persuaded the two references are directed to entirely different technology. Our analysis of Janssen '190 lends weight to the conclusion that Janssen '708 is also directed to LCD technology.

The other evidence Patent Owner presents is ambiguous and does not persuade us that Janssen '708 is directed to a lamp display rather than to LCD technology. *See* PO Resp. 20–21 (citing Exs. 2008, 2009, 2015, 2016, 2023). In particular, Patent Owner argues that Janssen '708's pixel symbol

must be a photoresistor because a photoresistor is indicated as a resistor inside a circle. *Id.* (citing Exs. 2008, 2009). While the patents cited by Patent Owner do identify certain symbols as photoresistors (Ex. 1020 ¶¶ 22–23), Dr. Liu testifies that a person of ordinary skill in the art would understand that a matrix of photoresistors cannot operate as a “video display” because they do not output light or control light passing through a photoresistor matrix. Ex. 1020 ¶ 27. Dr. Liu also testifies that LCD pixel elements can be modeled with a resistor element and a capacitor element (Ex. 2005, 44:16–24; 51:5–25; 77:20–25). That testimony is consistent with prior art submitted into the record. *See, e.g.*, Ex. 1022, Fig. 7; Ex. 1024, Fig. 9.

Patent Owner does not direct us to any persuasive contradictory expert evidence to support Patent Owner’s argument that the pixel 46 of Janssen ’708 includes a lamp and not an LCD. *See* PO Resp. 1–36.

Patent Owner also does not proffer expert evidence that one skilled in the art would consider the device of Janssen ’708 to be similar to the patents (Exs. 2010–2012) that Patent Owner argues show evidence of a light bulb matrix similar to Janssen ’708. As Petitioner points out, Dr. Liu testified that the lamps in these patents required more than one transistor. Ex. 2005, 123:15–19. Moreover, we agree with Petitioner that Exhibit 2010 and Exhibit 2011 use filament light bulb symbols that are not consistent with Janssen ’708’s pixel symbol. *See* Pet. 18–19. Thus, we are not persuaded by Patent Owner’s arguments that this evidence shows Janssen ’708 is directed to a lamp or light bulb.

Patent Owner also argues that Dr. Liu did not analyze “ramp retrace” as discussed in Janssen ’708. PO Resp. 20. Ramp retrace, however, is not

claimed, and we are unpersuaded that we should discount Dr. Liu's testimony for that reason.

Thus, based on the totality of the evidence before us, we are not persuaded that Janssen '708 is directed to a lamp display as Patent Owner argues. See PO Resp. 15–28. We find that Janssen '708 is relevant prior art to the field of LCD technology.

Janssen '708's Transistors

We now address Patent Owner's arguments that Janssen '708's transistors are not thin film transistors. Claims 1 and 2 both require "a group of thin film transistors with matrix array consisting of N rows and M columns of thin film transistors, wherein each thin film transistor can drive one pixel so that N×M of pixels can be driven" and "the first and the second date lines of the first group of date lines are respectively connected with the sources of all the thin film transistors of the odd and the even rows of the first column" Ex. 1001, 19:52–56, 20:13–17. As discussed above, we determine that Petitioner has demonstrated, by a preponderance of the evidence, that Janssen '708 and Horii teach all of the limitations of the claims and that a person of ordinary skill in the art would have had reason to combine their teachings to yield the claimed invention.

Patent Owner argues that there is no evidentiary basis to assume that Janssen '708 discloses thin film transistors. PO Resp. 28–33. The Petition, however, points to dictionary definitions and supporting testimony to establish that Janssen '708's disclosure of a transistor is a thin film transistor. See Pet. 23 (citing Ex. 1011; Ex. 1008; Ex. 1013 ¶ 41). Additionally, Dr. Liu testified regarding the use of thin film transistors in the LCD industry, and why a person of ordinary skill in the art would have

understood that the switching transistors in Janssen '708 would necessarily be thin film transistors. Ex. 2005, 71:7–72:18; Ex. 1020 ¶ 11.

We give Dr. Liu's testimony substantial weight because this testimony is consistent with both Janssen '708's disclosure of video displays and with other evidence of record. As Dr. Liu explains, and as disclosed by Exhibits 1005, 1007, 1022–1024, 1026, 1027, and 1029–1031, thin film transistors are predominantly used to electronically access individual pixels (to charge or discharge the voltages on the pixel electrodes and thereby adjust their brightness) in a LCD device. Ex. 1020 ¶ 11. The amount of current that a thin film transistor conducts in the ON state (or conductive state) is very low (less than one thousandth of an ampere). *Id.* This very low amount of current is only adequate to charge or discharge a small capacitive load, such as a liquid crystal cell capacitance, and is insufficient to adequately drive a resistive load, such as an incandescent lamp. *Id.* Incandescent lamps are resistive devices that inherently require a relatively large amount of current (from a few tenths of amperes to tens of amperes) to produce a suitable light output. *Id.* A single thin film transistor, or even multiple thin film transistors, cannot source such a high level of current. *Id.*

We find that Dr. Liu's testimony outweighs the other equivocal evidence presented by Patent Owner. In particular, Dr. Liu explains that a person of ordinary skill in the art would understand that Janssen '708 shows an active matrix liquid crystal display (“AMLCD”) driving circuit for an LCD pixel because a person of ordinary skill in the art would have understood that, by the time the application underlying Janssen '708 was filed in 2001, the “video display” disclosed in Janssen '708 with a row-column matrix of pixels is an AMLCD display that uses thin-film transistors

to drive the liquid crystal display pixels. Ex. 1013 ¶ 41.

Furthermore, the prosecution history of Janssen '708 supports the finding that Janssen '708's transistor is a thin film transistor in an AMLCD. For example, Examiners of both the U.S. and European Patent Offices found that the underlying applications, from which the Janssen '708 publication derives its benefit of priority claim, are directed to AMLCD technology. *See* Reply at 12–18 (citing Ex. 1020 ¶¶ 16–18). The PCT application that was published as Janssen '708 claimed priority to U.S. Application Serial No. 09/812,489 (“’489 application”). Ex. 1004 at 1. During the examination of the ’489 application, the Examiner identified three U.S. patents as prior art against the pending claims. Two of these references show AMLCD architecture. Ex. 1020 ¶¶ 16–18. As one example, prior patent U.S. Patent No. 4,781,438, cited by the Examiner in the prosecution of ’489 application, discloses an “active matrix LCD panel having a triangular pixel arrangement.” Ex. 1026, 1:8–10; Ex. 1020 ¶ 16. Similarly, when the ’489 application was filed as PCT Application No. PCT/IB02/00903, the European Patent Office identified three additional pertinent prior art references that disclose AMLCD technology. Ex. 1028, 1.

Other than attorney argument (PO Resp. 28–33), which we do not find persuasive, Patent Owner does not present persuasive technical reasoning or evidence that contradicts Dr. Liu’s testimony. For all of these reasons, we find that Janssen ’708’s transistors are “thin film transistors,” as recited in claims 1–3.

Therefore, we determine that Petitioner has shown by a preponderance of the evidence that the combination of Janssen ’708 and Horri teaches the elements required by claim 1, including Odd/Even Alternating Connections

structured using thin film transistors.

Other than the limitations discussed above, Patent Owner does not explicitly address any limitations of claims 1–3. We find that all limitations recited by claims 1–3 are taught by the combination of Janssen '708 and Horii. *See* Pet. 41–50.

Claims 2 and 3

Claim 2 requires “each source driver is installed on the same side of the display panel.” Ex. 1001, 20:26–27. A preponderance of the evidence supports a finding that the combination of Janssen '708 and Horii disclose having the source drivers on the same side of the display panel, as recited in claim 2 because both Janssen '708 and Horri disclose having the source drivers on the top side of the display panel. *See* Pet. 42; Ex. 1004, Fig. 3; Ex. 1007, Fig. 1. Additionally, a preponderance of the evidence supports a finding that Janssen '708 discloses a multiplexing circuit 74 that switches data between each respective source driver (i.e., DAC) and its associated pair of data lines (e.g., lines 80A and 80B shown in Figures 3 and 5), which teaches “the data transfer is switched by an electronic switch,” as recited in claim 2. Pet. 35; Ex. 1004, Fig. 3; Ex. 1013 ¶ 44.

Claim 3 depends from claim 2 and requires “a space between the neighboring data lines to prevent them from short circuit.” Ex. 1001, 20:29–32. A preponderance of the evidence supports a finding that one skilled in the art would have understood that a space exists between the neighboring data lines in Figure 3 of Janssen '708, given that there are pixels formed between the second data line and the first data line of another group. Pet. 42; Ex. 1004, Fig. 3; Ex. 1013 ¶ 45.

Thus, we are persuaded that all limitations recited by claims 1–3 are taught by the combination of Janssen '708 and Horii. *See* Pet. 41–50. For the foregoing reasons, we determine that Petitioner has demonstrated by a preponderance of the evidence that Janssen '708 and Horii render obvious claims 1–3.

C. Obviousness of Claims 1–3 over Janssen '708 and APA

In the Petition, Petitioner alleges claims 1–3 would have been obvious over the combination of Janssen '708 and APA. Pet. 50–57.

We have reviewed Petitioner's explanation identifying where each limitation allegedly appears in Janssen '708 and APA, along with the testimony of Petitioner's Declarant, Dr. Liu. *Id.*; Ex. 1013. We have also reviewed Patent Owner's assertions and evidence as to why Petitioner's explanations and evidence are deficient. PO Resp. 1–36.

Petitioner points to APA, which explains that multiple gate drivers and source drivers in LCDs, in the form of separate gate driver ICs and separate source driver ICs, were known in the prior art. Pet. 50–52, 5, 6 (citing Ex. 1001, Figs. 1–3, 1:24–3:15).

A preponderance of the evidence supports the finding that APA teaches the source drivers and gate drivers as recited in claim 1. APA describes that display panel 10 includes data lines 111 and gate lines 121 connected to the sources and the gates, respectively, of thin film transistors ("TFT") shown as Q₁. Pet. 5 (citing Ex. 1001, Fig. 1A). Pixel 13 is defined as the area enclosed between two adjacent data lines 111 and two adjacent gate lines 121 and includes TFT Q₁. *Id.* at 5–6. Multiple source drivers 11 are connected on the top side of the periphery of the active matrix as viewed in the Figure and provide the voltage signals to the data lines 111. Ex. 1001,

1:36–41. The voltages on the data lines are transferred to the pixels via the TFTs, which are switched on and off by the control signal from the gate driver 12 to the gate line 121 (G₁ in Fig. 1B). *Id.* at 1:43–52.

Petitioner contends that Janssen '708 describes and illustrates that data line 80A is connected to the source of each transistor on the odd rows and data line 80B is connected to the source of each transistor on the even rows, which forms an Odd/Even Alternating Connection structure. Pet. 22 (citing Ex. 1004, 5:11–15, Fig. 3; Ex. 1013 ¶ 42). We agree that Figure 3 of Janssen '708 depicts that data line 80A is connected to the source of each transistor on the odd rows and data line 80B is connected to the source of each transistor on the even rows. Ex. 1004, 5:11–15, Fig. 3; Ex. 1013 ¶¶ 28–30.

We determine that Petitioner has provided articulated reasoning with rational underpinning for combining Janssen '708 and APA. *Id.* In particular, Petitioner explains that a person skilled in the art would have looked to the gate drivers available in the prior art (i.e., APA) and added them to Janssen '708 because it would make the device function. Pet. 50. This argument is supported by the testimony of Dr. Liu, who declares, for example, that a person of skill in the art “would expect to achieve a functioning device by incorporating gate drivers such as those disclosed in the Admitted Prior Art into the driving circuit of Janssen '708.” Ex. 1013 ¶ 47. In *KSR*, the Court explained that if a feature has been used to improve one device, and a person of ordinary skill in the art would have recognized that it would improve a similar device in that field or another, implementing that feature on the similar device is likely obvious. *KSR*, 550 U.S. at 417. Here, a person of ordinary skill in the art would have recognized that the

gate drivers of APA would have improved the driving circuit of Janssen '708 to make a functional device.

We are persuaded that all the limitations recited by claims 1–3 are taught by the combination of Janssen '708 and APA. *See* Pet. 50–57. Other than the limitations discussed above, Patent Owner does not explicitly address any limitations of claims 1–3.

For the foregoing reasons, we determine that Petitioner has demonstrated by a preponderance of the evidence that the combination of Janssen '708 and APA renders obvious claims 1–3.

D. Obviousness of Claims 4 and 5 over Janssen '708, APA, and Kubota

In the Petition, Petitioner alleges dependent claims 4 and 5 would have been obvious over the combination of Janssen '708, APA, and Kubota. Pet. 57–60. Claim 4 depends from claim 2 and adds the limitation “wherein the gate driver is a chip installed on glass.” Ex. 1001, 20:33–35. Claim 5 also depends from claim 2 and adds the limitation “wherein the gate driver is an integrated gate driver circuit installed on glass.” *Id.* at 20:36–38.

Petitioner contends that the combination of Janssen '708, APA, and Kubota teaches or suggests these elements. In particular, Petitioner contends Kubota teaches attaching multiple driver circuits using chip on glass techniques. *See* Pet. 57–60 (citing Ex. 1005, 1:35–43, Fig. 3B, 1:60–67, Fig. 4; Ex. 1013 ¶¶ 62–66). We agree that Kubota teaches mounting a driver circuit IC chip by chip on glass techniques, and an insulating substrate made of glass that has a driver circuit on the substrate. Ex. 1005, 1:35–43, Fig. 3B, 1:60–67, Fig. 4.

Thus, we are persuaded that the limitations recited by claims 4 and 5 are taught by the combination of Janssen '708, APA, and Kubota. *See* Pet.

57–60. Petitioner also has provided articulated reasoning with rational underpinning for combining Janssen '708, APA, and Kubota, which we adopt as our own reasoning for combining. *Id.* Patent Owner does not explicitly address any limitations of claims 4 and 5.

Thus, we determine that Petitioner has demonstrated by a preponderance of the evidence that claims 4 and 5 of the '550 patent are unpatentable as obvious over the combination of Janssen '708, APA, and Kubota.

E. Obviousness of Claims 4 and 5 over Janssen '708, Horii, and Kubota

Petitioner alleges dependent claims 4 and 5 would have been obvious over the combination of Janssen '708, Horii, and Kubota. Pet. 57–60. As discussed above, we agree with Petitioner's contentions that Kubota teaches attaching multiple driver circuits using chip on glass techniques. *See* Pet. 57–60 (citing Ex. 1005, 1:35–43, Fig. 3B, 1:60–67, Fig. 4; Ex. 1013 ¶¶ 62–66). Thus, we are persuaded that the limitations recited by claims 4 and 5 are taught by the combination of Janssen '708, Horii, and Kubota. *See* Pet. 57–60. Petitioner also has provided articulated reasoning with rational underpinning for combining Janssen '708, Horii, and Kubota, which we adopt as our own reasoning for combining. *Id.* Other than the limitations discussed above, Patent Owner does not explicitly address any limitations of claims 4 and 5.

Therefore, Petitioner has demonstrated by a preponderance of the evidence that claims 4 and 5 of the '550 patent are unpatentable as obvious over the combination of Janssen '708, Horii, and Kubota.

F. Patent Owner's Remaining Arguments

Patent Owner argues that an unpatentability ruling in the case would constitute a taking without Article III oversight. PO Resp. 33–35. After Patent Owner presented this argument, however, our reviewing court held that *inter partes* review provisions do not violate Article III. *MCM Portfolio LLC v. Hewlett-Packard Co.*, 812 F.3d 1284, 1289–94 (Fed. Cir. 2015). We have considered the Patent Owner's remaining arguments and find none persuasive. PO Resp. 1–36.

III. PETITIONER'S MOTION TO EXCLUDE EVIDENCE

Petitioner moves to exclude Patent Owner's Exhibits 2004, 2006, 2007, 2024, and Exhibit A of Exhibit 2005. Paper 27 (“Pet. Mot. to Exclude”), 1. Exhibit 2004 is deposition testimony of Thomas Credelle in another *inter partes* review, IPR2015-00863. Exhibit 2006 is deposition testimony of Michael J. Marentic in another *inter partes* review, IPR2013-00913. Exhibit 2007 is deposition testimony of Dr. Richard Zech in another *inter partes* review, IPR2015-00885. Exhibit A of Exhibit 2005 is a drawing made by Dr. Liu during Dr. Liu's deposition at the direction of Patent Owner's counsel. *See* Ex. 2005, 8:3–18. Exhibit 2024 is a website download entitled “Chapter 3. Introduction to Electronics.”

In *inter partes* reviews, documents are admitted into evidence subject to an opposing party asserting objections to the evidence and moving to exclude the evidence. 37 C.F.R. § 42.64. As movant, Petitioner has the burden of showing that an Exhibit is not admissible. 37 C.F.R. § 42.20(c).

We determine, for reasons set forth above, that Petitioner has demonstrated by a preponderance of the evidence that the challenged claims

are unpatentable. We find it unnecessary to consider Petitioner's specific objections to the admissibility of Exhibits 2004, 2006, 2007, 2024, and Exhibit A of Exhibit 2005 because Patent Owner's arguments that Petitioner has not shown that Janssen '708 is relevant prior art are not persuasive for the reasons provided above, even assuming Exhibits 2004, 2006, 2007, 2024, and Exhibit A of Exhibit 2005 to be admissible. Accordingly, Petitioner's motion to exclude Exhibits 2004, 2006, 2007, 2024, and Exhibit A of Exhibit 2005 is *dismissed* as moot.

IV.CONCLUSION

For the foregoing reasons, we determine that Petitioner has shown by a preponderance of the evidence that claims 1–5 of the '550 patent are unpatentable under 35 U.S.C. § 103(a).

V. ORDER

For the foregoing reasons, it is

ORDERED that claims 1–5 of the '550 patent have been shown to be *unpatentable*;

FURTHER ORDERED that Petitioner's motion to exclude evidence is *dismissed*; and

FURTHER ORDERED that, because this is a Final Written Decision, parties to the proceeding seeking judicial review of the decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.

IPR2015-00887
Patent 7,420,550 B2

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