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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte DENIS STRIAKHILEV, AROKIA NATHAN, YURI VYGRANENKO, and SHENG TAO

Appeal 2015-004615
Application 13/112,654
Technology Center 2800

Before ADRIENE LEPIANE HANLON, CATHERINE Q. TIMM, and JAMES C. HOUSEL, *Administrative Patent Judges*.

PER CURIAM.

DECISION ON APPEAL[1]

STATEMENT OF THE CASE

Appellants[2] filed an appeal under 35 U.S.C. § 134 from the Examiner's decision finally rejecting claims 1–5, 7, 8, 10, and 12–21 under 35 U.S.C. § 103(a) as being unpatentable over the combination of

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[1] Our decision refers to Appellants' Specification filed Aug. 13, 2012 (Spec.), the Final Office Action mailed Apr. 14, 2014 (Final Act.), Appellants' Appeal Brief filed Oct. 14, 2014 (Br.), and the Examiner's Answer mailed Dec. 30, 2014 (Ans.).

[2] Appellants identify the real party in interest as Ignis Innovation, Inc. Br. 1.

Yamazaki[3] in view of Seo[4] and claims 6, 9, and 11 under 35 U.S.C. § 103(a) as being unpatentable over Yamazaki and Seo and further in view of Imura.[5] We have jurisdiction under 35 U.S.C. §§ 6(b) and 134(a).

We AFFIRM.

The claims on appeal are directed to pixels having a vertical architecture and methods of fabricating a pixel (*see, e.g.*, claims 1, 15, and 16). Organic light emitting diodes (OLEDs) are electro-luminescent (EL) devices used to emit light by flowing current through an organic compound. Spec. ¶ 3. Appellants disclose that an active type matrix display for an OLED can include thin-film transistors (TFTs) to drive each pixel. Spec. ¶ 3. However, it is difficult to make a TFT backplane that provides high yield and good performance for OLED pixels because an OLED device is typically made of thin layers on the order of 100 nm in thickness. Spec. ¶ 5. Due to these small thicknesses, step-wise features on a substrate and roughness can cause deterioration of light emitting properties of an OLED or its failure. Spec. ¶ 5. In view of this, a smooth substrate is desired to attain OLEDs that perform well and have good yields. Spec. ¶ 5.

Appellants disclose a pixel that addresses the disadvantages of existing pixels. Figure 11 is reproduced below:

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[3] Yamazaki et al., US 2001/0038098 A1, published Nov. 8, 2001 ("Yamazaki").
[4] Seo et al., US 7,199,516 B2, issued Apr. 3, 2007 ("Seo").
[5] Imura, US 2002/0050795 A1, published May 2, 2002 ("Imura").

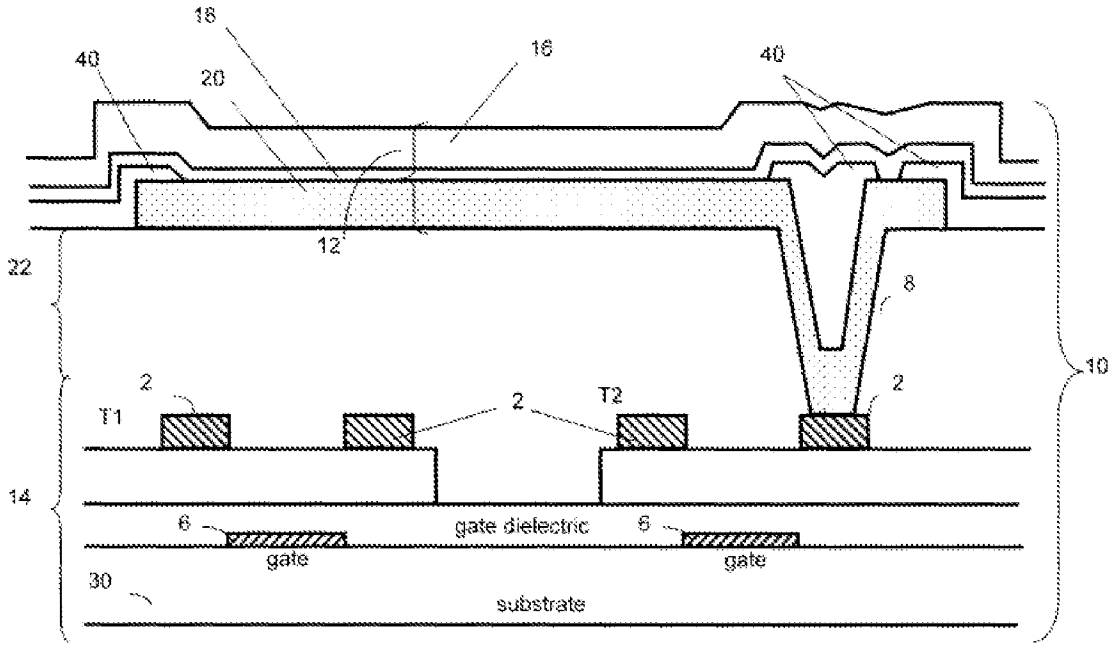

Figure 11 is a cross sectional view of a vertically integrated pixel.

Figure 11 depicts a vertically integrated pixel 10 including an OLED device layer 12 and a TFT based backplane 14. Spec. ¶ 26. The OLED device 12 includes an OLED bottom electrode 20, organic OLED layers 18, and an OLED top electrode 16. Spec. ¶ 27. The top electrode 16 can be transparent when the OLED is top-emitting. Spec. ¶ 28. A via 8 provides an electrical connection between a TFT pixel circuit and the OLED bottom electrode 20. Spec. ¶ 30. A dielectric layer 40 is patterned to cover an area of the via 8 and edges of the OLED bottom electrode 20 so a remainder of the OLED bottom electrode 20 is uncovered. Spec. ¶ 61. A dielectric layer 22 separates the OLED device layer 12 and TFT based backplane 14 and also serves as a planarization layer to smooth or planarize vertical profiles of structures on the substrate 30 of the TFT based backplane 14. Spec. ¶¶ 36 and 37.

Independent claim 1 is illustrative of the subject matter on appeal. Claim 1 is reproduced from the Claims Appendix of the Appeal Brief with limitations at issue in the appeal italicized:

> 1. A pixel having a vertical architecture, comprising:
> *an organic light emitting diode (OLED) device having* a bottom electrode, one or more OLED layers and *a transparent top electrode for emitting light*;
> a thin-film transistor (TFT) based backplane for electrically driving the OLED device, the TFT based backplane being vertically integrated with the OLED layers and located below said bottom electrode *to form a top-emitting OLED*;
> a planarization dielectric layer provided between the TFT based backplane and the OLED bottom electrode so as to planarize the vertical profile on the TFT based backplane, said planarization dielectric layer being in direct contact with both said TFT based backplane and said OLED bottom electrode;
> a via in said planarization dielectric layer to provide a path between said TFT based backplane and said OLED device; and
> a dielectric layer deposited on top of said bottom electrode and covering said via and all the edges of said bottom electrode while leaving the rest of said bottom electrode uncovered.

Br. 8 (emphasis added).

OPINION

Claims 1–5, 7, 8, 10, and 12–21

Claims 1–5, 7, 8, 10, and 12–21 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Yamazaki in view of Seo. Appellants argue claims 1–3, 5, 7, 8, 12–19, and 21 as a group, claims 4 and 20 as a separate group, and claim 10 as another separate group. Br. 4–6. We select claims 1, 4, and 10 as representative of these respective groups. The remaining claims stand or fall with the claim with which it is grouped.

Claim 1

For the rejection of claim 1, the dispositive issue on appeal is whether Appellants have identified a reversible error in the Examiner's conclusion that it would have been obvious to use a transparent top electrode in the device of Yamazaki to provide a top-emitting OLED, as recited in claim 1.

Appellants have not persuaded us of such an error.

Citing Figures 10A and 10B of Yamazaki, the Examiner finds Yamazaki discloses a pixel including an OLED device having a bottom electrode, one or more OLED layers, and a top electrode. Final Act. 2–3. The pixel further includes a TFT based backplane, a planarization dielectric layer, a via providing a path between the TFT based backplane and the OLED bottom electrode, and a dielectric layer. Final Act. 2–3. The Examiner finds Yamazaki does not disclose that the dielectric layer covers all edges of the bottom electrode but finds Seo discloses an OLED device having an insulating bank with this structure and concludes it would have been obvious to modify the pixel of Yamazaki in view of Seo. Final Act. 3.

The Examiner finds that in the embodiment of Figures 10A and 10B, Yamazaki discloses forming the top electrode of Mg-Ag, but that, in the embodiment of Figure 11B, Yamazaki discloses forming a top emitting pixel, citing paragraph 240 of Yamazaki. Final Act. 3. The Examiner concludes it would have been obvious to choose a transparent conductive material for the top electrode (i.e., cathode 772 in Figure 10B of Yamazaki) so as to form a top emitting OLED device. Final Act. 3.

Appellants contend claim 1 requires a "top-emitting OLED" including a "transparent top electrode for emitting light." Br. 4. Appellants assert paragraph 240 of Yamazaki, which the Examiner relies on for a disclosure of

a top-emitting pixel, does not explain how light emitting from an EL element would be directed toward the side of a cover member and is silent with regard to a top-emitting pixel. Br. 4. Instead, Appellants argue, the embodiment of Figures 11A and 11B, which paragraph 240 of Yamazaki refers to, includes a cathode 4305 having a "light shielding property" made of "a conductive film," which could not provide a top-emitting OLED. Br. 4, citing Yamazaki ¶ 236. Further, the bottom electrode 4302 for the embodiment of Figures 11A and 11B is transparent, which provides a bottom-emitting EL element. Br. 5. Appellants further argue it would not have been obvious to use a transparent top electrode in the device of Yamazaki to provide a top-emitting OLED, as recited in claim 1, because it would have changed the principle of operation of Yamazaki's pixel, would have required substantial redesign and reconstruction, and because the Examiner engaged in impermissible hindsight. Br. 5. Appellants argue Seo fails to remedy the deficiencies of Yamazaki. Br. 5.

In response to Appellants' arguments, the Examiner finds paragraph 240 of Yamazaki discloses "a variation of the device, where one can desire to have radiation of light coming from the side of the cover." Ans. 2. The evidence supports this finding. Paragrah 240 discloses the use of a transparent cover member (cover member 4102) overlying cathode 4305. Yamazaki ¶ 240. In that embodiment, "the radiation of light from the EL element is directed toward the side of the cover member." *Id.* In other words, instead of being directed downwards as in the embodiment previously disclosed in paragraph 236, and related paragraphs, the light is directed upward toward the cover.

In addition, the Examiner finds:

> It was well known in the art that
>
> > for (1) top emission through cathode side, cathode is made with transparent material, and anode is formed of light shielding material,
> >
> > (2) While for a bottom emission through anode side, anode is obviously made transparent, while cathode is light shielding.

Ans. 2–3.

The Examiner further finds the "basic principal [sic] of OLED is to have a light emitting organic layer between two electrodes (anode and cathode) which produces light." Ans. 2. In other words, the Examiner finds the "[b]asic operation of the device is to emit light." Ans. 2. Therefore, modifying the device of Yamazaki to make it a top-emitting device, as suggested by paragraph 240 of Yamazaki, would not have changed its basic principle of operation, nor would it have involved a substantial redesign and reconstruction. Ans. 3.

Appellants have not responded to the Examiner's findings. No reply brief was filed. Therefore, Appellants have not identified a reversible error in the Examiner's findings and have not persuaded us that using a transparent top electrode in the device of Yamazaki to provide a top-emitting OLED, as recited in claim 1, would not have been obvious to the ordinary artisan. To the contrary, we determine that a preponderance of the evidence supports the Examiner's conclusion of obviousness with respect to the pixel of claim 1.

Appellants do not argue dependent claims 2, 3, 5, 7, 8, 12–19, and 21 separately from claim 1. Br. 5. We note that claims 15 and 16 are independent claims that are not limited in the same way as claim 1.

Although claim 1 includes the language "top-emitting OLED" and "transparent top electrode for emitting light," independent claim 15 only recites "a transparent top electrode" in its preamble. Moreover, claim 15 is directed to "[a] method of fabricating a pixel" but none of the steps recited in claim 15 recite a step of forming the "transparent top electrode" recited in its preamble. Independent claim 16, which is directed to "[a] method of fabricating a pixel," is silent with regard to both a top-emitting OLED and a transparent top electrode. Appellants' arguments against the rejection of claim 1 do not identify a reversible error in the Examiner's rejection of claims 15 and 16, for the reasons stated above and, at least in the case of claim 16, because claim 16 does not require the limitation Appellants argue as not being taught or suggested by Yamazaki.

For the reasons discussed above and those set forth in the Examiner's Answer, we sustain the Examiner's rejection of claims 1–3, 5, 7, 8, 12–19, and 21 over the combination of Yamazaki and Seo.

Claim 4

Claim 4 depends from claim 1 and further recites "wherein the pixel has a roughness of the order of 1 nm on the planarization dielectric layer and subsequent electrode layer."

In the rejection of claim 4 over the combination of Yamazaki and Seo, the Examiner finds Yamazaki does not specifically disclose the roughness of claim 4 but concludes it would have been obvious to construct the pixel so that it has the recited roughness "for the purpose of enhancing reliability of the device by reducing any unevenness in the layers." Final Act. 4.

Appellants argue the Examiner's rationale is unsupported because there is no suggestion in the cited prior art to provide the roughness of claim

4 and there is no basis in the Examiner's rationale for a low level of roughness to reduce unevenness in the layers of a pixel. Br. 6.

In response to Appellants' arguments, the Examiner states the "examiner respectfully presents that it was well known to reduce unevenness of a surface as low as possible (of the order of nm) so as to laminate subsequent layers having good contact without any gap between layers." Ans. 3.

Appellants have not responded to the Examiner's finding. As stated above, no reply brief was filed. Therefore, Appellants have not identified a reversible error in the Examiner's reasonable finding that it was well known to reduce unevenness of a surface to nanometer level so there was good contact between layers in a pixel. As a result, we take the Examiner's finding as fact, and determine that a preponderance of the evidence supports the Examiner's conclusion of obviousness that it would have been obvious to provide the roughness of claim 4.

Claim 20 depends from independent claim 15 and recites a roughness similar to that recited in claim 4. In the Answer, the Examiner applied the same rationale for claim 20 as in the rejection of claim 4. Ans. 3. Therefore, Appellants have not demonstrated a reversible error in the rejection of claim 20.

For the reasons discussed above, we sustain the Examiner's rejection of claims 4 and 20 over the combination of Yamazaki and Seo.

Claim 10

Claim 10 depends from claim 2, which depends from claim 1, and recites, among other things, that the TFT based backplane includes a

substrate; gate, source, and drain nodes; an interlayer dielectric layer; and a contact plate.

In the rejection of claim 10 over the combination of Yamazaki and Seo, the Examiner finds Yamazaki discloses a contact plate, citing item 766 of Yamazaki. Final Act. 5.

Appellants assert Yamazaki discloses item 766 is a passivation layer, which is a dielectric, such as silicon nitride oxide. Br. 6. Appellants contend the passivation layer of Yamazaki is not a conductive material, as described in paragraphs 53–56 of the Specification and, thus, it could not serve as a contact plate. Br. 6.

The Examiner responds by stating the contact plate recited in claim 10 reads upon the passivation layer 766 when considering the broadest reasonable interpretation of "contact." Ans. 3. The Examiner finds claim 10 does not recite an "electrical contact" or require the contact plate to be made of conductive material. Ans. 3. Further, the Examiner finds the Specification does not set forth a special definition for "contact plate." Ans. 3.

We first consider whether claim 10 requires the "contact plate" to be made of a conductive material. Claim 10 recites "a contact plate which is formed such that the source or drain material overlaps the contact plate" and a via provides a "communication path through the contact plate." This language does not require the contact plate to be made of a conductive material. The claim does not specify what is communicated through the path, *e.g.*, it does not require electrical communication. Moreover, the claim recites that the via is the mode of communication through the contact plate.

As noted above, Appellants assert paragraphs 53–56 of the Specification define the contact plate as including a conductive material. Although paragraphs 53–56 describe how a metal layer or a conductive material can be formed to provide a contact plate, this does not amount to providing a special definition for the "contact plate" of claim 10. An applicant "may demonstrate an intent to deviate from the ordinary and accustomed meaning of a claim term by including in the specification expressions of manifest exclusion or restriction, representing a clear disavowal of claim scope." *In re Am. Acad. of Sci. Tech. Ctr.*, 367 F.3d 1359, 1365 (Fed. Cir. 2004). Appellants' description of using conductive materials for the contact plate does not amount to a manifest restriction of the contact plate to conductive materials.

Moreover, although claims are to be interpreted in light of the specification, limitations from the specification are not to be read into the claims. *See In re Van Geuns*, 988 F.2d 1181, 1184 (Fed. Cir. 1993).

We agree with the Examiner that Appellants have not provided a special definition of a "contact plate" that requires the contact plate to be made of a conductive material. "Without evidence in the patent specification of an express intent to impart a novel meaning to a claim term, the term takes on its ordinary meaning." *Optical Disc Corp. v. Del Mar Avionics*, 208 F.3d 1324, 1334, 54 (Fed. Cir. 2000). The Merriam-Webster dictionary[6] defines "contact" as "the state or condition that exists when two people or things physically touch each other: a state of touching." Therefore, we interpret "contact plate" to require a plate that physically

[6] Merriam-Webster Dictionary entry for "contact," http://www.merriam-webster.com/dictionary/contact (last visited October 28, 2016).

touches the source or drain material of claim 10. In view of the above, Appellants have not demonstrated a reversible error in the Examiner's finding that Yamazaki discloses a contact plate, as recited in claim 10.

We note that an applicant seeking a narrower construction must either show why the broader construction is unreasonable or amend the claim to expressly state the scope intended. *In re Morris*, 127 F.3d 1048, 1057 (Fed. Cir. 1997). In this case, the Examiner has pointed out a breadth problem in Appellants' claim that is easily remedied by an amendment limiting the claim to a conductive contact plate.

Appellants group claims 10 and 11, and argue these claims together. Br. 6. Although claim 11 depends from claim 10, claim 11 is rejected over the combination of Yamazaki, Seo, and Imura, not the combination of Yamazaki and Seo. Therefore, we will address claim 11 when analyzing the rejection over Yamazaki, Seo, and Imura.

For the reasons discussed above and those set forth in the Examiner's Answer, we sustain the Examiner's rejection of claim 10 over the combination of Yamazaki and Seo.

Claims 6, 9, and 11

Claims 6, 9, and 11 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Yamazaki and Seo and further in view of Imura. For claims 6, 9, and 11, Appellants merely reiterate the arguments set forth in support of the patentability of claim 1 and contend Imura does not remedy the deficiencies of the references applied in the rejection of claim 1. Br. 7. For the reasons set forth above, there are no deficiencies in the rejection of claim 1 that require curing by Imura. Therefore, we sustain the Examiner's

rejection of claims 6, 9, and 11 over the combination of Yamazaki, Seo, and Imura.

DECISION

On the record before us, we affirm the decision of the Examiner to reject the claims.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1).

AFFIRMED