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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte MERCK PATENT GMBH and
KONARKA TECHNOLOGIES, INC.¹
Appellants

Appeal 2015-006235².
Application 13/690,662
Technology Center 1700

Before MARK NAGUMO, N. WHITNEY WILSON, and
CHRISTOPHER L. OGDEN, *Administrative Patent Judges*.

OGDEN, *Administrative Patent Judge*.

DECISION ON APPEAL

¹ Appellants are the applicants under 37 CFR ¶ 1.46 (2012). Merck Patent GmbH is identified as the real party in interest. Appeal Br. 1, Dec. 9, 2014. The listed inventors are Mark James, Iain McCulloch, Warren Duffy, Philip Edward May, Dan Walker, David P. Waller, Richard Kendal Childers, and Sheila Rodman.

² Appeal 2016-06979, in related application 12/738,417, is decided concurrently.

Appellants appeal under 35 U.S.C. § 134(a) from the Examiner's final decision³ rejecting claims 1 and 5–14 in the above-identified application.

We have jurisdiction pursuant to 35 U.S.C. § 6(b).

We AFFIRM-IN-PART.

BACKGROUND

Appellants' invention relates to “formulations comprising an organic semiconductor (OSC) and a conductive additive,” which may be used “as conducting inks for the preparation of organic electronic (OE) devices, especially organic photovoltaic (OPV) cells.” Spec. 1. Independent claim 1 is representative:

1. A formulation comprising one or more *organic semiconducting (OSC) compounds*, one or more organic solvents, and one or more *conductive additives* that increase the conductivity of the formulation, wherein said conductive additives are volatile and/or are *not capable of chemically reacting with the OSC compounds* and/or wherein the conductive additives are present in a total concentration of less than 0.5 % by weight in the formulation; and wherein the conductive additives are selected from the group consisting of: *quaternary ammonium salts* wherein the anion is selected from the group consisting of *acetate*, formate, methanesulfonate and bis(trifluoromethylsulfonyl)imide; and phosphonium salts, imidazolium salts and other heterocyclic salts excluding heterocyclic quaternary ammonium salts, wherein the anion is selected from the group consisting of halides, sulfates, acetate, formate, tetrafluoroborate, hexafluorophosphate, methanesulfonate, triflate (trifluoromethanesulfonate) and bis(trifluoromethylsulfonyl)imide.

³ Office Action, April 9, 2014 [hereinafter Final Action].

Appeal Br. 11 (emphasis added).

The Examiner maintains the following grounds of rejection:

I. Claim 1 is provisionally rejected on the ground of nonstatutory obviousness-type double patenting over co-pending U.S. Patent Application No. 12/738,471. Final Action 2–4; Answer 2.

II. Claims 1, 5, 7–11, and 14 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Hsu⁴ in view of Carter.⁵ Final Action 4–5; Answer 2–3.

III. Claim 6 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Hsu in view of Carter and Hosokawa.⁶ Final Action 6; Answer 3–4.

IV. Claim 12 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Hsu in view of Carter and Pei.⁷ Final Action 6–7; Answer 4–5.

V. Claim 13 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Hsu in view of Carter and Yang.⁸ Final Action 7–8; Answer 5.

⁴ Che-Hsiung Hsu et al., U.S. Patent No. US 7,563,392 B1 (issued July 21, 2009) [hereinafter Hsu].

⁵ Susan A. Carter et al., U.S. Patent Application Pub. No. US 2003/0151700 A1 (published Aug. 14, 2003) [hereinafter Carter].

⁶ Chishio Hosokawa, U.S. Patent Application Pub. No. US 2002/0011783 A1 (published Jan 31, 2002) [hereinafter Hosokawa].

⁷ Qibing Pei & Floyd L. Klavetter, U.S. Patent No. 5,682,043 (issued Oct. 28, 1997).

⁸ Yang Yang et al., U.S. Patent Application Pub. No. US 2005/0003574 A1 (published Jan. 6, 2005).

In the Appeal Brief, Appellants argue claims 1, 5, 7–11, and 14 as a group, with respect to rejection II. *See* Appeal Br. 3–7. Therefore, we select claim 1 as the basis of our decision relating to this group, and claims 5, 7–11, and 14 stand or fall with claim 1. *See* 37 C.F.R. § 41.37(c)(1)(iv) (2013). Regarding claims 12 and 13, Appellants present no additional arguments beyond those presented with respect to claim 1. *See* Appeal Br. 8–9. Therefore, we limit our discussion to claims 1 and 6.

DISCUSSION

Claim 1

Appellants present no substantive argument for reversing the provisional rejection of claim 1 on ground of obviousness-type double patenting. *See* Appeal Br. 3; Answer 6. Therefore, we summarily affirm the Examiner’s decision to provisionally reject claim 1 based on pending U.S. Application No. 12/738,471. *See Hyatt v. Dudas*, 551 F.3d 1307, 1314 (Fed. Cir. 2008) (holding that the Board need not consider the merits of an uncontested ground of rejection).

Regarding the rejection of claim 1 under 35 U.S.C. § 103(a), the Examiner finds that Hsu teaches a composition that comprises an OSC (polythiophene), an organic solvent, and a conductive additive that is a quaternary ammonium salt in which the anion is acetate. Answer 2–3, 6–7 (citing Hsu 2:17–45, 6:14–60); *accord* Final Action 5. The Examiner finds that this salt is a conductive additive as defined by claim 1, which includes this salt within the genus of structures from which the conductive additive is to be selected. *See* Answer 6. The Examiner also finds that Carter describes a formulation of an OSC and a conductive additive (an ionic dopant), and

“teaches that the conductive additives increase device efficiency and avoid irreversible electrochemical reactions.” Answer 3 (citing Carter ¶ 29 (“The ionic dopants . . . are chosen . . . so that they do not cause significant irreversible electrochemical reactions under operating conditions, [and] they enable efficient device operation”)). The Examiner also finds that Hsu and Carter are analogous art references “because they both teach OSC devices comprising conductive polymers and organic salts as conductive additives.” Final Action 5; *accord* Answer 3. In light of these findings, the Examiner concludes that it would have been obvious to combine the teachings of Hsu and Carter in order to “increase the device efficiency and avoid irreversible electrochemical reactions.” Answer 7–8; *see also* Final Action 5 (“It would have been obvious [to combine the references] in order to obtain a formulation in which the conductive additive did not react with the conductive polymer.”).

Appellants argue⁹ that Hsu does not disclose that the organic cation is conductive, and that “Hsu never connects its teachings about other possible anions at col. 6, lines 22–25 (such as acetate), with quaternary ammonium salt cations. The only anions mentioned by Hsu to use with quaternary

⁹ Appellants argue that the Examiner has added additional reasons for the objections in the Answer for the first time. *See* Reply Br. 1–2. However, Appellants have not petitioned under 37 C.F.R. § 1.181 to challenge the Examiner’s alleged failure to designate a new ground of appeal, pursuant to 37 C.F.R. § 41.40 (“Failure of appellant to timely file such a petition will constitute a waiver of any arguments that a rejection must be designated as a new ground of rejection.”). Nor have Appellants explained how the Examiner’s modifications to the grounds of rejection in the Answer change the thrust of the original grounds of rejection from what could have been apprehended on the basis of the Final Action, or place Appellants at any unfair and prejudicial disadvantage.

ammonium salt cations are phosphate and hydroxide.” Appeal Br. 4; *see also* Reply Br. 1–2. We do not find these arguments persuasive of reversible error. While Hsu states that the organic cations may be derived from various quaternary ammonium phosphates or hydroxides, *see* Hsu 6:26–33, and that the anions “are, in some embodiments, hydroxides and phosphates,” *see id.* at 6:19–20, Hsu also lists acetate as among the “[s]uitable anions” for the organic cation salt, *see id.* at 6:22–25. Thus, a person of ordinary skill in the art would have understood that Hsu teaches that a quaternary ammonium acetate is a suitable source of organic cations for use in the composition disclosed by Hsu.

The Examiner has also established a *prima facie* case that a quaternary ammonium acetate is a *conductive additive* as that term is used in claim 1. We give claims their broadest reasonable interpretation consistent with the Specification. *In re Hyatt*, 211 F.3d 1367, 1372 (Fed. Cir. 2000). The Specification uses the term *conductive additive* to refer to broad classes of materials, *see* Spec. 6–8, including “ammonium acetates,” which the Specification describes as “[s]uitable and preferred,” Spec. 7. Moreover, quaternary ammonium acetates are structurally within the scope of conductive additives as defined by claim 1. *See In re Best*, 562 F.2d 1252, 1255 (CCPA 1977) (holding that when the claimed and prior art products are identical or substantially identical in structure or composition, the PTO can require an applicant to prove that the prior art products do not necessarily or inherently possess the characteristics of the claimed product). Appellants have not directed us to any evidence or technical reasoning that a quaternary ammonium acetate is not a conductive additive; therefore, we are not

persuaded that the Examiner reversibly erred by finding that the quaternary ammonium acetates are conductive additives within the meaning of claim 1.

Appellants also argue that Carter does not specifically or generically disclose the conductive additive defined by claim 1. *See* Appeal Br. 4–6. This does not persuade us of reversible error because Carter was cited for its teaching that the conductive additive is not chemically reactive with the OSC compounds, not for its specific selection of a conductive additive. *See* Final Action 5. “The test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art.” *In re Keller*, 642 F.2d 413, 425 (CCPA 1981).

Appellants further argue that it would not have been obvious for a person of ordinary skill in the art to combine the teachings of Hsu and Carter. *See* Appeal Br. 6–7; *see also* Reply Br. 2–3. According to Appellants, “merely because two references are directed to the same general field does not make them ‘analogous art,’” and the salts in the two references are not interchangeable, and are used for “very different purposes.” *Id.* at 6–7; *see also* Reply Br. 4–5. Appellants acknowledge that Carter and Hsu both have a “general relation in the field of OSC devices,” and “both reference inventions generally involve the field of OSC devices.” Reply Br. 3. Moreover, Appellants do not contest the Examiner’s finding that Hsu and Carter “both teach organic semiconductor devices which convert electrical energy into light,” Answer 7, although Appellants argue that this field is defined too broadly, *see* Reply Br. 4.

We do not find Appellants' arguments persuasive of reversible error. There are two separate tests for determining whether prior art is analogous: "(1) whether the art is from the same field of endeavor, regardless of the problem addressed and, (2) if the reference is not within the field of the inventor's endeavor, whether the reference still is reasonably pertinent to the particular problem with which the inventor is involved." *In re Bigio*, 381 F.3d 1320, 1325 (Fed. Cir. 2004). For the first test, the scope of the appropriate "field of endeavor" is informed by "explanations of the invention's subject matter in the patent application, including the embodiments, function, and structure of the claimed invention." *Id.* (citing *In re Wood*, 599 F.2d 1032, 1036 (CCPA 1979)). According to the Specification, the field of the invention includes the use of the claimed compositions "as conducting inks for the preparation of organic electronic (OE) devices." Spec. 1. This field is broad enough to include Carter, which according to Appellants, "relates to a screen printable electroluminescent polymer ink." Reply Br. 2. Moreover, as the Examiner correctly points out, the inks described by Carter share a similar composition with Hsu's disclosure and Appellants' invention, which comprise "conductive polymers and organic salts as conductive additives" for use in OSC devices. *See* Final Action 5; *accord* Answer 3. For the same reasons, we find no reversible error in the Examiner's finding that the appropriate field of endeavor also includes Hsu as an analogous reference. *See also* Spec. 2 (referring to art within the relevant field as teaching the preparation of "hole injection layers (HIL) or hole transport layers (HTL) for electroluminescent devices"); Hsu 1:30–33 ("Buffer layers . . . typically facilitate the injection of holes from the anode into the photoactive layer."). Based on the preponderance of the

evidence on this record, we are persuaded that Hsu and Carter are both within the same field of endeavor as Appellants' invention, and therefore they are analogous references under the first test of *Bigio*.

For the above reasons, we are not persuaded of reversible error in the Examiner's rejection of claim 1, and likewise, we are not persuaded of reversible error in the Examiner's rejection of claims 5 and 7–14.

Claim 6

Claim 6 depends from claim 1, and further requires that “the formulation has a conductivity from 10^{-6} to 10^{-9} S/m.” Appeal Br. 11. The Examiner finds that Hosokawa “teaches an organic semiconductor formulation for an electroluminescent device having a conductivity of 10^{-8} S/m,” and “teaches that the device produces better brightness and homogeneity.” Answer 4 (citing Hosokawa ¶ 121, abstract); *see also* Final Action 6. The Examiner concludes that “[i]t would have been obvious to a person of ordinary skill in the art to combine the conductivity of Hosokawa with the formulation of Hsu in order to obtain a formulation having a conductivity useful for an electroluminescent device,” Final Action 6, and “in order to obtain an organic semiconductor device having improved brightness and homogeneity,” Answer 4; *see also id.* at 8.

While Hosokawa teaches a device that includes an organic semiconductor layer with a conductivity within the range specified by claim 6, the Examiner has not articulated a clear technical rationale for combining this teaching with the teachings of Hsu and Carter. *See In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006) (requiring “some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness”). For example, the Examiner has not shown that the layer in Hosokawa has any

structural similarity to the compositions disclosed in Hsu or Carter, such that a person of ordinary skill in the art would have expected the teachings of Hosokawa to be applicable to the other references. In addition, the Examiner has not shown that the improvement in brightness and homogeneity described by Hosokawa is connected with the disclosed conductivity. Appellants argue, and we agree, that “Hosokawa (e.g., in the Abstract) appears to link the improved brightness properties with the manner of arrangement of the electrodes and the nature of the electrodes of the device.” Reply Br. 3. Likewise, Hosokawa refers to an improvement in hole injection, but appears to attribute that improvement to “[t]he arrangement” of the semiconductor layer, rather than its conductivity. *See* Hosokawa ¶ 121. Therefore, we reverse the Examiner’s decision to reject claim 6.

DECISION

The Examiner’s decision to provisionally reject claim 1 on the ground of nonstatutory obviousness-type double patenting over co-pending U.S. Patent Application No. 12/738,471 is affirmed.

The Examiner’s decision to reject claims 1, 5, 7–11, and 14 under 35 U.S.C. § 103(a) is affirmed.

The Examiner’s decision to reject claim 6 under 35 U.S.C. § 103(a) is reversed.

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

AFFIRMED-IN-PART