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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte ERIC TIXHON, ERIC MICHEL, and JOSEPH LECLERCQ

Appeal 2018-006626
Application 13/643,327
Technology Center 1700

Before N. WHITNEY WILSON, CHRISTOPHER C. KENNEDY, and MERRELL C. CASHION, JR., *Administrative Patent Judges*.

CASHION, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE

Pursuant to 35 U.S.C. § 134(a), Appellant[1] appeals from the Examiner's decision to reject claims 1–19 and 22–29. We have jurisdiction under 35 U.S.C. § 6(b). An oral hearing was held on September 12, 2019.[2] We have jurisdiction under 35 U.S.C. § 6(b).

We AFFIRM.

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[1] We use the word "Appellant" to refer to "applicant" as defined in 37 C.F.R. § 1.42. Appellant identifies the real party in interest as AGC GLASS EUROPE. Appeal Br. 1.

[2] A written transcript of the oral hearing will be entered into the record when the transcript is made available.

The invention is directed to a planar electrode. Spec. 1. According to the Specification, electrodes used in plasma treatments are subject to very severe working conditions that can lead to localized breakdown and destruction of the electrode. *Id*. In addition, the use of planar electrodes in this environment leads to problems of delamination resulting from the differences in expansion coefficients between the dielectric and the metallic planar electrode material. *Id*. at 2. The prior art has addressed the delamination issue by using adhesives to bond the dielectric to the metallic material but, apparently, to no avail. *Id*.

The invention addresses the delamination issue by using an interlayer to bond the dielectric layer to the metallic material that comprises polyvinyl butyrate (PVB) or ethylene vinyl acetate (EVA). *Id*. at 4. According to the Specification, this interlayer allows for absorption of a very substantial differential expansion of the active part and the dielectric, due to the difference between the thermal expansion coefficients of the active part and the dielectric. *Id*. at 6. The Specification also describes that removing bubbles or microbubbles from the interlayer prevents localized electric arcing. *Id*. at 6, 10. The Specification further suggests that the use of EVA or PVB as interlayers for this purpose was thought to be impossible because they cannot withstand very high temperatures. *Id*. at 6. However, the invention's use of a metallic envelope to cool the assembly alleviates this concern. *Id*. at 9–10. Claim 1 is illustrative of the subject matter claimed and is reproduced below:

1. A planar electrode, comprising:

a metal envelope comprising an active continuous planar part, suitable for placing parallel to a surface to be treated and adapted to be filled with a liquid coolant flowable in contact with an interior of the metal envelope to form a heat exchanger;

a dielectric sheet on an exterior of the active metal part; and

an interlayer sheet comprising EVA (ethylene vinyl acetate) or PVB (polyvinyl butyral) fixing the dielectric sheet directly to the exterior of the active metal part,

wherein

the interlayer sheet comprises a uniform joint between the dielectric sheet and the active metal part substantially free of bubbles and micro bubbles,

the electrode is suitable for dielectric barrier discharge DBD plasma treatment of a surface, and

the electrode is suitable for raising to a voltage capable of plasma ignition.

Independent claim 23 is also directed to a planar electrode but differs from the subject matter of claim 1 in that claim 23 further requires a PVB interlayer and that the electrode is suitable for dielectric barrier discharge DBD plasma treatment of a surface where the plasma reaches temperatures between 200 °C and 600 °C. Independent claim 10 is directed to a device essentially comprising the planar electrode of claim 1.

Appellant requests review of the following rejections from the Examiner's Non-Final Action dated January 16, 2018:

I. Claims 1, 4, 5, 8–11, 18, 22, 28, and 29 rejected under pre-AIA 35 U.S.C. § 103(a) as unpatentable over Spence (US 5,895,558, issued April 20, 1999), Nishimae (US 4,890,294, issued December 26, 1989), Arakawa (US 2006/0163197 A1, published July 27, 2006), and Ono (US 2005/0007783 A1, published January 13, 2005).[3]

II. Claims 1, 4, 8–11, 19, 22, 28, and 29 rejected under pre-AIA 35 U.S.C. § 103(a) as unpatentable over Spence, Nishimae, Arakawa, and Schafft (US 4,047,060, issued September 6, 1977).

III. Claim 6 rejected under pre-AIA 35 U.S.C. § 103(a) as unpatentable over Spence, Nishimae, Arakawa, Schafft, and Ono.

IV. Claims 2, 3, and 7 rejected under pre-AIA 35 U.S.C. § 103(a) as unpatentable over Spence, Nishimae, Arakawa, Schafft, and Ono and Kumar (US 6,280,584 B1,[4] issued August 28, 2001).

V. Claims 12 and 13 rejected under pre-AIA 35 U.S.C. § 103(a) as unpatentable over Spence, Nishimae, Arakawa, Schafft, and Ono and Jackson (US 4,434,841, issued March 6, 1984).

VI. Claim 14 rejected under pre-AIA 35 U.S.C. § 103(a) as unpatentable over Spence, Nishimae, Arakawa, Schafft, and Ono and Basnett (US 2005/0115835, A1, published June 2, 2005).

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[3] Appellant notes that claim 22 was not included in any of the grounds of rejection presented for review on appeal. Appeal Br. 37. The Examiner has also failed to clarify the status of this claim. *See generally* Ans. For the purposes of this Opinion, we have included claim 22 in Rejections I and II. If prosecution of this Application is further continued, the Examiner should formalize the rejection of claim 22.

[4] As recognized by Appellant, the Examiner erroneously cited US 2008/0152917 A1 to Brunovska, published June 26, 2008, instead of US 6,280,584 B1 as the reference to Kumar. Non-Final Act. 21; Appeal Br. 6. The Examiner does not dispute that US 6,280,584 B1 is the correct reference. *See generally* Non-Final Act. and Ans. Therefore, for the purposes of this Opinion, we rely on US 6,280,584 B1 as the correct Kumar reference.

VII. Claims 15 and 16 rejected under pre-AIA 35 U.S.C. § 103(a) as unpatentable over Spence, Nishimae, Arakawa, Schafft, and Ono, Beckmann (US 3,658,636, issued April 25, 1972), Curlee (US 5,009,690, issued April 23, 1991), and Eubank (US 2,863,782, issued December 9, 1958).

VIII. Claim 17 rejected under pre-AIA 35 U.S.C. § 103(a) as unpatentable over Spence, Nishimae, Arakawa, Schafft, and Ono, Kumar, and Bunn (US 6,192,969 B1, issued February 27, 2001).

IX. Claims 26 and 27 rejected under pre-AIA 35 U.S.C. § 103(a) as unpatentable over Spence, Nishimae, Arakawa, Schafft, Ono, and Okubo (US 2007/0009674 A1, published January 11, 2007).

X. Claims 23 and 24 rejected under pre-AIA 35 U.S.C. § 103(a) as unpatentable over Spence, Nishimae, Schafft, and Okubo.

XI. Claim 25 rejected under pre-AIA 35 U.S.C. § 103(a) as unpatentable over Spence, Nishimae, Schafft, Okubo, and Arakawa.

OPINION[5]

Rejection I–IX

Appellant argues independent claims 1 and 10 together and presents additional arguments only for dependent claim 6 (Rejection III), 19 (Rejection II), 22 (Rejection I), and claims 26 and 27 (Rejection IX). *See generally* Appeal Br. Appellant also states that claims 2, 3, 7, and 12–17 (Rejections IV–VIII) stand or fall with their respective independent claims. *Id*. at 40. We therefore select claim 1 as representative of the subject matter claimed. Claims 2–5, 7–18, 28, and 29 stand or fall with claim 1. We address claim 6, 19, 22, 26, and 27 separately.

[5] We refer to the Examiner's Non-Final Office Action dated August 17, 2016 for the text of all rejections.

After review of the respective positions the Appellant and the Examiner provide, we AFFIRM the Examiner's prior art rejections of claims 1–19, 22, and 26–29 under 35 U.S.C. § 103(a) for the reasons presented by the Examiner. We add the following for emphasis.

Claim 1

Claim 1 is directed to a planar electrode apparatus comprising a metal envelope comprising an active continuous planar part, an interlayer sheet comprising EVA (ethylene vinyl acetate) or PVB (polyvinyl butyral), and a dielectric sheet.

The Examiner finds that the combined teachings of Spence and Nishimae teach the claimed planar electrode structure except for the use of an interlayer comprising EVA or PVB to provide a joint between the dielectric sheet and the active metal part. Non-Final Act. 11–15. The Examiner finds that Ono, directed to the field of light emitting devices, teaches it is known to use an EVA copolymer as an alternative to brazing materials to bond ceramic (dielectric) and metal for the purpose of absorbing the stresses caused by the differences in expansion coefficient of the ceramic and the metal. Non-Final Act. 15–16; Ono ¶¶ 3, 9, 21, 27, 39, 53. Ono discloses using adhesives having melting temperatures higher than 150 °C and bonding temperatures of preferably in the range of about 180°C–300°C. Ono ¶ 53. In an alternate rejection (Rejection II), the Examiner finds that Schafft, directed to the field of piezo-electric acoustic transducers, teaches it is known to use PVB as an alternative to epoxy resins to bond a desired ceramic element 21 and a metal plate 30 to a temperature of approximately 140° C for approximately 10 minutes to address differences in thermal coefficients of expansion between ceramic and metal. Non-Final Act. 8;

Schafft Figure 2, col. 1, ll. 33–41, 57–64, col. 4, ll. 15–18. The Examiner also finds that Arakawa, directed to the field of electromagnetic shielding sheet, teaches laminating a metal film 21 to a transparent polyester resin base sheet 11 (dielectric) by means of an adhesive 13. Non-Final Act. 10–11; Arakawa Abstr., ¶ 50. The Examiner finds that Arakawa teaches that the adhesive can be spread uniformly without containing bubbles to form a good quality laminated sheet. Non-Final Act. 12; Arakawa ¶ 43. Arakawa also discloses as known to remove bubbles from adhesives using vacuum suction to avoid the detrimental impact of the bubbles presence when forming a laminate. Arakawa ¶ 129.

The Examiner determines that it would have been obvious to a person having ordinary skill in the art to substitute the bonding layer of the combined teachings of Spence and Nishimae with either Ono's EVA layer or Schafft's PVB layer without containing bubbles, as taught by Arakawa, for the purpose of improving the bonding strength between the metallic part and the ceramic part and forming a good quality laminated sheet, as taught by the combined teachings of Ono/Schafft and Arakawa. Non Final Act. 16.

Appellant does not contest that the combined teachings of the cited art would lead one skilled in the art to the claimed structure. Instead, Appellant principally argues that the claim 1 language "suitable for dielectric barrier discharge DBD plasma treatment of a surface" and "suitable for raising to a voltage capable of plasma ignition" describes an electrode device comprising an EVA or PVB layer that is suitable for use in DBD treatments at typical plasma temperatures of 200–600 °C. Appeal Br. 8–12; Spec. 9. According to Appellant, one skilled in the art would be drawn away from using PVB or EVA as the interlayer in DBD treatment because both

materials are incompatible with the noted temperature range encountered in a plasma reactor. Appeal Br. 10–13.

Appellant's arguments do not identify reversible error in the Examiner's determination of obviousness.

"[A]pparatus claims cover what a device *is*, not what a device *does*." *Hewlett-Packard Co. v. Bausch & Lomb, Inc.*, 909 F.2d 1464, 1468 (Fed. Cir. 1990). Therefore, the patentability of an apparatus claim depends on the claimed structure, not on the use or purpose of that structure, *Catalina Mktg. Int'l Inc. v. Coolsavings.com Inc.*, 289 F.3d 801, 809 (Fed. Cir. 2002), or the function or result of that structure. *In re Danly*, 263 F.2d 844, 848 (CCPA 1959); *In re Gardiner*, 171 F.2d 313, 315–16 (CCPA 1948). If the prior art structure possesses all the claimed characteristics including the capability of performing the claimed function, then there is a prima facie case of unpatentability. *In re Ludtke*, 441 F.2d 660, 663–64 (CCPA 1971).

A review of the record shows that Appellant is emphatic that the reason for the claimed electrode's suitability in DBD treatments rests on the use of the electrode device in connection with a cooling system. Appeal Br. 9 ("Applicant's claimed planar electrode and device *requires* (1) cooling and heat exchange at DBD plasma treatment temperatures of between 200°C and 600°C" (emphasis added)). In fact, the Specification describes that the argued capability resides in the "specific technology [developed] to limit the temperature increase in the binding layer." Spec. 9, *see also id.* at 11 ("cooling is essential because PVB is being used"). The arguments and the disclosure would suggest a focus on a new use for an old device that is best presented as "method of use" claims because the benefit associated with the claimed structure is not inherent in the structure itself but on its use. A

Declaration under 37 C.F.R. § 1.132 (Declaration or Decl.) by co-inventor Eric Michel (Declarant) dated May 17, 2017[6] states that "the PVB interlayer survived when we took steps to introduce sufficient cooling of the metal surfaces of the electrode." Decl. ¶ 7.

While claim 1 recites a metal envelope adapted to serve as a heat exchanger to cool the interlayer, the metal envelope by itself is insufficient to distinguish the claim from the teachings of the cited art. This is particularly true given that Appellant has not contested the Examiner's specific findings regarding the teachings of Spence and Nishimae, nor that the combined teachings of these references suggest the claimed planar electrode structure (metal/interlayer/dielectric), including a metal envelope serving as a cooling path to cool the metal/interlayer/ceramic electrode. *See generally* Appeal Br.; Non-Final Act. 8; Nishimae col. 20, ll. 30–46; Figure 33. Appellant has also not contested the Examiner's finding that Ono's EVA and Schafft's PVB are known interlayers for a metal/interlayer/dielectric structure that alleviate differences in thermal coefficients of expansion between dielectric and metal layers due to exposure to heat, which is the central problem addressed by Appellant's invention with respect to planar electrodes. *See generally* Appeal Br.; Spec. 2. Upon review of the record, we determine that the Examiner provided a reasonable basis for one skilled in the art to use either Ono's EVA or Schafft's PVB as an interlayer in the electrode assembly of the combined teachings of Spence and Nishimae, and would reasonably have expected that this assembly would be suitable to function as an electrode. *In re O'Farrell*,

[6] The Declaration was entered into the record by the Examiner in the Final Office Action dated June 6, 2017.

853 F.2d 894, 904 (Fed. Cir. 1988) ("For obviousness under § 103, all that is required is a reasonable expectation of success.").

Giving weight to the claim language "suitable for dielectric barrier discharge DBD plasma treatment of a surface" as directed to DBD treatments at typical plasma temperatures of 200–600 °C does not change our determination.

As the Examiner notes, Spence discloses the operation of an electrode in a plasma environment where the operating temperature of the electrode ranges from 25–70 °C. Ans. 16; Spence col. 4, ll. 62–67. Spence also discloses a desire for the highest possible working temperature which does not allow thermal damage to the dielectric substrate. Spence col. 4, l. 67–col. 5, l. 2. Moreover, Nishimae describes the cooling of a metal/dielectric electrode exposed to a plasma environment as: "[t]he surface of the metallized layer **75** faces directly to the cooling water path **77**, and the dielectric **12** is contacted directly by the cooling water through the metallized layer **75** and cooled." Nishimae col. 20, ll. 42–46. Therefore, the prior art recognizes the importance of operating an electrode cooling system to cool an electrode across the layers forming the electrode to minimize the detrimental impact of heat on the electrode's dielectric layer. Spence col. 4, l. 60–col. 5, l. 2, col. 6, ll. 15–26; Nishimae col. 20, ll. 38–46.

Ono and Schafft disclose polymeric interlayers having melting temperatures that can be approximately 140–150°C. Ono ¶ 53; Schafft col. 4, ll. 13–18. At plasma temperatures of 200°C, the lower range of Appellant's disclosed typical plasma temperatures, and at an electrode operating temperature of 25°C, one skilled in the art would have reasonably expected that an electrode cooling system would have cooled an electrode

comprising polymeric interlayers having melting temperatures of approximately 140°C to temperatures below such melting temperatures because the polymeric interlayer would be directly in contact by the cooling water through a metallized layer. Thus, there would have been a reasonable expectation that an electrode comprising an EVA or PVB interlayer would be suitable for DBD plasma treatments at 200°C. *See O'Farrell*, 853 F.2d at 904. Appellant has provided no explanation explaining why such an embodiment would not have been expected to work

Appellant also contends that Arakawa is not concerned with eliminating bubbles and microbubbles from the adhesive interlayer fixing a dielectric sheet to the active metal part of a planar electrode for DBD plasma treatment of a surface. Appeal Br. 24. According to Appellant, Arakawa, directed to electromagnetic shielding sheets, teaches removing bubbles from an adhesive to eliminate light scattering and decrease in clearness of images due to difference in refractive index between air and the adhesive. Appeal Br. 24; Arakawa ¶¶ 23, 94. Thus, Appellant contends that persons having ordinary skill in the art would have had no reason, incentive, or motivation in view of Arakawa's teaching to eliminate or remove bubbles and microbubbles from the adhesive interlayer sheet comprising PVB or EVA because Arakawa's teachings are of no consequence for an adhesive interlayer that fixes a dielectric to an active part of a planar electrode. Appeal Br. 25.

We find these arguments unavailing for the reasons the Examiner presents. Non-Final Act. 10–11; Ans. 23.

We first note that Spence generally recognizes that the presence of holes in an electrode can locally distort the electric field (arcing). Spence

col. 6, ll. 39–43. Spence also suggests minimizing the presence of holes in some instances. *Id.* Arakawa teaches the general concept that the presence of bubbles in adhesives in a structure can be detrimental to the function of the adhesives and the structure. Arakawa ¶ 94. Therefore, the prior art recognizes that the presence of defects in an adhesive layer can impair its function. In view of this, Appellant has not explained adequately why one skilled in the art, using no more than ordinary creativity, would not have been capable of ensuring that a polymeric adhesive interlayer contains no bubbles when applied to join a dielectric and a metal layer. *See KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 421 (2007) ("A person of ordinary skill is also a person of ordinary creativity, not an automaton."); *see also In re Sovish*, 769 F.2d 738, 743 (Fed. Cir. 1985) (presuming skill on the part of one of ordinary skill in the art). One skilled in the art would have expected to minimize the presence of bubbles to ensure adequate adhesion between the electrode layers to form an adequate structure.

Claims 6 and 19

Claims 6 and 19 recite the use of a PVB interlayer.

We have considered Appellant's arguments for these claims (Appeal Br. 35–37) but find them unavailing for the reasons given above with respect to our discussion of Schafft.

Claim 22

The subject matter of claim 22 is directed to an interlayer sheet substantially free of bubbles and micro bubbles. However, claim 22 is drafted in a product-by-process format.

The patentability of this type of claim does not depend on the process steps, except to the extent that the process steps are shown to result in

properties not possessed by prior art products. It has long been held that "'[i]f the product in a product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process."' *Smithkline Beecham Corp. v. Apotex Corp.*, 439 F.3d 1312, 1317 (Fed. Cir. 2006) (quoting *In re Thorpe*, 777 F.2d 695, 697 (Fed. Cir. 1985)). It is also well settled that when a claimed product reasonably appears to be substantially the same as a product disclosed in the prior art, the burden of proof is on the applicants to prove that the prior art product does not inherently or necessarily possess the characteristics attributed to the claimed product. *In re Best*, 562 F.2d 1252, 1255 (CCPA 1977) ("Where, as here, the claimed and prior art products are identical or substantially identical, . . . the PTO can require an applicant to prove that the prior products do not necessarily or inherently possess the characteristics of his claimed product.").

We have considered Appellant's argument for this claim (Appeal Br. 37) but are unpersuaded by it.

To the extent that claim 22 is directed to an interlayer that is substantially free of bubbles and microbubbles, we direct Appellant's attention to our prior discussion of this issue. We additionally note that Appellant does not direct us to any objective evidence that shows the recited process steps result in properties not possessed by prior art interlayer product.

Claims 26 and 27

Claims 26 and 27 recite the electrode as suitable for dielectric barrier discharge DBD plasma treatment of a surface where the plasma reaches temperatures of 200°C or more.

We are unpersuaded by Appellant's arguments for these claims (Appeal Br. 37–40) for the reasons we give above with respect to our discussion concerning a plasma operating temperature of 200°C.

Accordingly, we affirm the Examiner's prior art rejections of claims 1–19, 22, and 26–29 under 35 U.S.C. § 103(a)..

Rejections X and XI

Claim 23

Like independent claim 1, independent claim 23 is directed to a planar electrode but specifically recites the use of a PVB interlayer.

To the extent that Appellant relies on the arguments presented when discussing claim 1 (Appeal Br. 27–30), we direct Appellant's attention to our previous discussion.[7]

Claims 24 and 25

Claim 24 recites that the PVB interlayer comprises a uniform joint between the dielectric sheet and the active metal part while claim 25 recites that the PVB interlayer is substantially free of bubbles and microbubbles. The Specification equates uniform joint with absence of bubbles/microbubbles. Spec. 8.

We have considered Appellant's arguments regarding Arakawa for these claims and again are unpersuaded. We direct Appellant's attention to our discussion of this issue above.

[7] We need not address the Examiner's reliance on Okubo for disposition of this rejection. Okubo was primarily cited to teach typical plasma temperatures, which fall within Appellant's acknowledged typical plasma temperatures. Ans. 24.

Accordingly, we affirm the Examiner's prior art rejections of claims 23–25 under 35 U.S.C. § 103(a) for the reasons the Examiner presents and we provide above.

ORDER

The Examiner's prior art rejections of claims 1–19 and 22–29 under 35 U.S.C. § 103(a) are affirmed.

CONCLUSION

In summary:

Claims Rejected	Basis	Affirmed	Reversed
1, 4, 5, 8–11, 18, 22, 28, 29	§ 103(a) Spence, Nishimae, Arakawa, Ono	1, 4, 5, 8–11, 18, 22, 28, 29	
1, 4, 8–11, 19, 22, 28, 29	§ 103(a) Spence, Nishimae, Arakawa, Schafft	1, 4, 8–11, 19, 22, 28, 29	
6	§ 103(a) Spence, Nishimae, Arakawa, Schafft, Ono	6	
2, 3, 7	§ 103(a) Spence, Nishimae, Arakawa, Schafft, Ono, Kumar	2, 3, 7	
12, 13	§ 103(a) Spence, Nishimae, Arakawa, Schafft, Ono, Jackson	12, 13	

Claims Rejected	Basis	Affirmed	Reversed
14	§ 103(a) Spence, Nishimae, Arakawa, Schafft, Ono, Basnett	14	
15, 16	§ 103(a) Spence, Nishimae, Arakawa, Schafft, Ono, Beckmann, Curlee, Eubank	15, 16	
17	§ 103(a) Spence, Nishimae, Arakawa, Schafft, Ono, Kumar, Bunn	17	
26, 27	§ 103(a) Spence, Nishimae, Arakawa, Schafft, Okubo	26, 27	
23, 24	§ 103(a) Spence, Nishimae, Schafft, Okubo	23, 24	
25	§ 103(a) Spence, Nishimae, Schafft, Okubo, Arakawa	25	
Overall Outcome		1–19 and 22–29	

TIME PERIOD

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