

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

CANON U.S.A., INC. and CANON INC.,

Petitioners,

v.

SLINGSHOT PRINTING LLC,

Patent Owner.

Case No. IPR2023-00309

Patent No. 7,290,864

Before JO-ANNE M. KOKOSKI, GARTH D. BAER, and JOHN D. HAMANN,
Administrative Patent Judges.

**PETITIONERS' REPLY TO
PATENT OWNER'S RESPONSE TO PETITION**

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PETITIONERS' EXHIBIT LIST (New Exhibits in *Italics*)

<u>Exhibit</u>	<u>Description</u>
Ex.1001	U.S. Patent No. 7,290,864 to King <i>et al.</i>
Ex.1002	Declaration of Stephen F. Pond, Ph.D.
Ex.1003	<i>Curriculum Vitae</i> of Stephen F. Pond
Ex.1004	File History of U.S. Patent 7,290,864
Ex.1005	U.S. Patent No. 7,722,144 to Benjamin <i>et al.</i> (“Benjamin-144”)
Ex.1006	U.S. Patent No. 7,278,703 to Benjamin <i>et al.</i> (“Benjamin-703”)
Ex.1007	U.S. Patent No. 6,582,062 to Childers <i>et al.</i> (“Childers”)
Ex.1008	Japanese Patent Application Publication No. 11-245409 to Uenishi <i>et al.</i> , English Translation, and Affidavit (“Uenishi”)
Ex.1009	U.S. Patent Publication No. 2001/0045967 to Hayasaki (“Hayasaki”)
Ex.1010	Order Granting Stay of <i>Slingshot Printing LLC v. Canon U.S.A., Inc. et al.</i> , Case No. 2:22-cv-01852, Dkt. 42 (E.D.N.Y. Dec. 1, 2022)
Ex.1011	Case Management Schedule for <i>Slingshot Printing LLC v. Canon U.S.A., Inc. et al.</i> , Case No. 2:22-cv-01852, Dkt. 36-1 (E.D.N.Y. Nov. 2, 2022)

Ex.1012	Slingshot LLC’s Infringement Contentions for <i>Slingshot Printing LLC v. Canon U.S.A., Inc. et al.</i> , Case No. 2:22-cv-01852, (E.D.N.Y.)
Ex.1013	THE PENGUIN DICTIONARY OF ELECTRONICS (Valerie Illingworth ed.) (3d ed. 1998)
Ex.1014	Claim Construction Order for <i>Slingshot Printing LLC v. HP, Inc.</i> , Case No. 1:20-cv-00186-ADA, Dkt. 82 (W.D.T.X. Jan. 14, 2021)
<i>Ex.1015</i>	<i>Deposition of Steven Dietl, December 19, 2023</i>
<i>Ex.1016</i>	<i>Concise Oxford American Dictionary (2006) (excerpt)</i>
<i>Ex.1017</i>	<i>U.S. Patent No. 7,488,056 to Torgerson et al.</i>

I. INTRODUCTION

Petitioners¹ submit this Reply in support of their Petition. In its Response, Patent Owner (“PO”) does not dispute that the combination of Benjamin ’144 and Benjamin ’703 (Benjamin Combination, Ground 1) or Uenishi (Ground 3) discloses nearly all limitations of the Challenged Claims. Instead, PO uses claim construction to argue the Benjamin Combination and Uenishi each fails to disclose the “bondpad” and “physically separated proximal to the bondpad” limitations.

For the “bondpad” limitation, as Petitioners’ expert, Dr. Stephen Pond, explained, both the Benjamin Combination and Uenishi explicitly disclose a bondpad that connects to heater array portions on both sides of an ink via. PO’s expert, Mr. Steven Dietl, agreed—admitting that (i) the Benjamin combination disclosed at least one bondpad on the heater chip edge and (ii) Uenishi disclosed the same for its electricity-feed terminal.

For the “physically separated proximal to the bondpad” limitation, PO and its expert do not dispute that the power traces separate near the bondpad. Rather, PO attempts to inject an additional negative limitation to avoid the Benjamin Combination and Uenishi—namely that the power trace separation cannot *also* be near a heater array. This limitation is found nowhere in the Challenged Claims,

¹ Capitalized terms not defined have the same meaning as in the Petition.

which PO's expert agreed. PO's only support is Figure 3, which PO's expert acknowledges is merely a *schematic representation* and not drawn to scale. After rejecting PO's tortured construction, it is clear both the Benjamin Combination and Uenishi disclose power traces physically separated proximal to their respective bondpads.

Therefore, Petitioners respectfully submit that the Board should find claims 1-6, and 8-20 of the '864 Patent unpatentable.

II. CLAIM CONSTRUCTION

Petitioners and PO agree that all claim terms should be given their plain and ordinary meaning. Pet., 6; POR, 18. PO nonetheless proposes narrowing constructions improperly limited to embodiment figures from the '864 Patent. *See Phillips v. AWH*, 415 F.3d 1303, 1320 (Fed.Cir. 2005). Specifically, PO imports relative size requirements into the “bondpad” and “power traces” terms, despite the claims requiring none. Regarding the “physically separated proximal to the bondpad” term, PO seeks to add a negative limitation that the separation cannot also be proximal to a heater array. PO's constructions are neither supported by the claims nor specification and should be rejected.

A. “Bondpad”

PO argues that the plain and ordinary meaning of “bondpad” should be limited to “the structures shown in Figs. 1-3 of the '864 patent which

illustrate...relatively large bondpads” solely to try and eliminate prior art. POR,

18. Because PO has no basis for importing this size limitation, the Board should reject PO’s construction. *See Phillips*, 415 F.3d at 1320. In fact, PO’s own expert agrees that the ’864 Patent “does not address the size of the bond pad relative to the power trace.” Ex.1015, 61:1-20.

PO’s only purported support for a “relatively large bondpad” limitation comes from the ’864 Patent figures, which PO’s expert agrees are merely schematic representations and not drawn to scale. Ex.1015, 37:1-5 (“so **are the widths of the traces 326 depicted in Figure 3** of the ’864 patent? A. **No, I don’t believe so.** I don’t believe—I think **it’s more a schematic representation** of the trace path.”) PO’s expert also agrees that bondpads can be smaller than power traces connected to them. Ex.1015, 59:12-19 (“Q. And what about if that power trace is—is **wider than...that bond pad...Is that still a bond pad under your definition?** A. Yeah. I—I **don’t think there’s any reason why that wouldn’t be a bond pad...**”). Mr. Dietl’s admissions stand in stark contrast to his declaration, which merely parrots the conclusory statements presented in PO’s Response. *Compare* POR, 39 *with* Ex.2004, ¶71. (“Fig. 3 of the ’864 patent shows narrower connections (326) referred to as ‘power traces’ extending from a relatively larger bondpad (328)”).

Further, even if Figure 3 were the only embodiment—it is not—it is impermissible to so limit the claims “absent a clear indication in the intrinsic record that the patentee intended the claims to be so limited.” *Liebel-Flarsheim Co. v. Medrad, Inc.*, 358 F.3d 898, 913 (Fed. Cir. 2004); *see Epos Techs. Ltd. v. Pegasus Techs. Ltd.*, 766 F.3d 1338, 1343 (Fed. Cir. 2014). None exists here.

The Board should therefore reject PO’s improper construction of Bondpad.

B. “Power Traces”

While not discussed in the claim construction section of its PO Response, PO argues that “‘power traces’ are relatively narrow structures” and that “Fig. 3 of the ’864 patent shows narrower connections (326) referred to as ‘power traces’ extending from a relatively larger bondpad (328)” POR, 39-40. PO’s “relatively narrow” power traces construction is merely a rehash of its “relatively large” bondpad construction and should be rejected for the same reasons.

PO again improperly attempts to import a limitation purportedly from the specification into the claims, requiring a dimensional constraint from a figure of *a representation of* a power trace to limit the claim scope. However, PO’s expert admits the figures are “more a schematic representation of the trace path.” Ex.1015, 37:1-5. Relying on patent figures for sizing constraints, especially those admitted as *not* accurately depicting the dimensions of power traces, is improper.

See Hockerson-Halberstadt, Inc. v. Avia Group Int'l, 222 F.3d 951, 956, 55

USPQ2d 1487, 1491 (Fed. Cir. 2000).

A POSITA would appreciate that power traces merely carry a signal or power and come in varying sizes and often change in width to reduce the resistance of the power trace itself. *See* Ex.1005, 75:67-76:2 (“**Layout contributions to energy variation include fire line width...**”); *see also* Ex.1015 (“a person having ordinary skill in the art would know that in this device, you’re always trying to reduce parasitic resistance to the extent you can possibly do it...”); Ex.2005, 15-21 (“The word trace does not convey any geometrical information.”) Nothing in the claims or ’864 Patent specification requires limiting power traces to any particular size and PO’s construction should be rejected.

C. “Physically Separated Proximal to the Bondpad”

The phrase “the at least two traces are physically separated proximal to the bondpad” is a simple phrase that requires the power traces be physically separate from each other nearer (*i.e.*, proximal) to the bondpad (point of origin) than the end of the trace (*i.e.*, which is distal to the bondpad). Petitioners and PO agree on this point, but PO injects an additional and unnecessary “nearer to the bond pad **than the heater arrays**” limitation not found in the claims. POR, 19. Fundamentally, the dispute boils down to whether “proximal to the bondpad” simply means the

part of the trace that is *near* to the bondpad, as Petitioners contend, or “nearer to the bond pad *than the heater arrays*,” as PO contends.

The claims are clear, proximity is measured along the trace relative to the bondpad. Nothing in the claims requires a comparison to other structures, like the heater arrays. In fact, claim 9 does not even refer to a heater array. Ex.1001, Cl. 9 (“[t]he heater chip of claim 8, wherein the at least two traces are physically separated proximal to the bondpad.”) PO’s construction relies on importing limitations from a schematic figure in the ’864 patent, which is again improper. *Liebel-Flarsheim*, 358 F.3d at 913. In fact, PO’s expert agreed that the term “proximal” is not defined in the specification and “only exists in the claims.” Ex.1015, 69:6-12.

PO’s construction is also inconsistent with how proximal and distal are defined in PO’s cited dictionary—as a measure of distance from a point of origin. Ex.2001, 3 (defining proximal as “situated nearer to...the point of attachment.”); Ex.1016, 3 (defining distal as “situated away...from the point of attachment.”). Including a “nearest” or “not near other structures” limitation is inconsistent with the plain and ordinary meaning of proximal.

Further, PO’s “nearer to the bond pad than the heater array” limitation injects ambiguity into the claim term. Dr. Pond explained that a heater array is not a single point, but rather an array of heaters that the trace extends along, providing

power to each heater. Ex.2005, 20:21-21:24. Under PO's construction, the claim scope changes dramatically depending on what point along the heater array defines its location—narrower if selecting the closest heater to the bondpad and broader if selecting the furthest. A construction that adds ambiguity and renders the claims indefinite is rarely, if ever, correct. *Ruckus Wireless, Inc. v. Innovative Wireless Sols., LLC*, 824 F.3d 999, 1004 (Fed. Cir. 2016) (*citing Phillips*, 415 F.3d at 1327).

Dr. Pond testified that a POSITA would understand the claim phrase simply requires the trace separation be near the bondpad (point of origin). Ex.2005, 16:20-17:20. This plain and ordinary meaning is consistent with how the term “proximal” would be understood by POSITAs and how it is used in the definitions provided by PO. *Id.*; Ex.2001, 3; Ex.1016, 3.

PO's expert testified that he only considered a “portion” of the power trace to determine whether the separation is “proximal to the bondpad” and “disregarded” the remainder of the power trace past the first heater. Ex.1015, 88:2-9. Mr. Dietl's rational was that “the important parameter to balance the parasitic resistance” occurs “between the first heater of the array and the bond pad.” Ex.1015, 75:10-14. However, Mr. Dietl admits a POSITA “**would strive to minimize parasitic resistance down the length of the array,**” not just between the bondpad and the first heater, which discredits Mr. Dietl's rationale for

considering only the first heater in the array. Ex.1015, 78:4-6; *see id.*, 76:22-

77:10.²

The Board should reject PO's construction of "physically separated proximal to the bondpad."

III. THE BENJAMIN COMBINATION RENDERS CLAIMS 1-3, 5-6, 8-10, AND 13-15 OBVIOUS (GROUND 1).

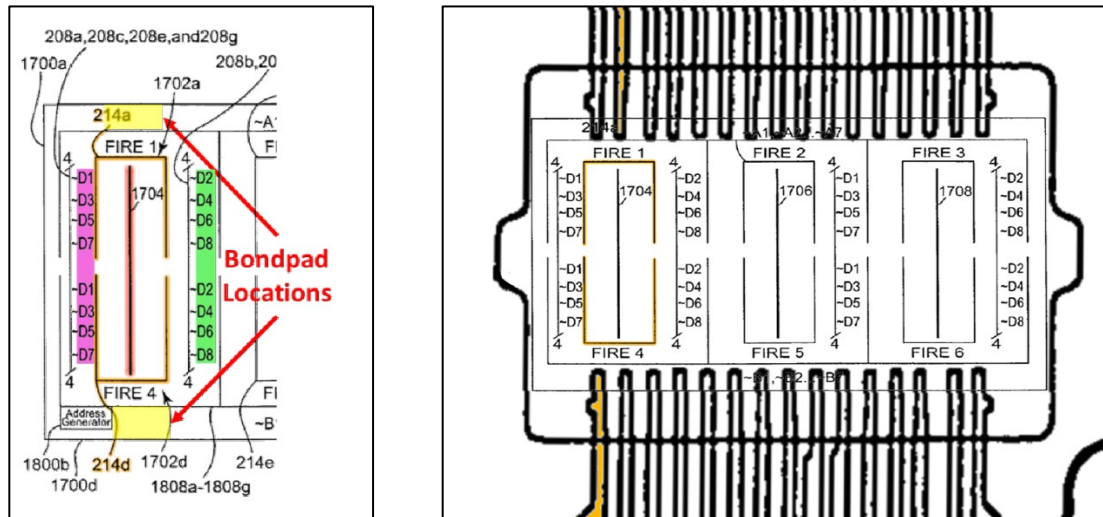
A. The Benjamin Combination Discloses the Bondpad Limitation³

PO's central argument is that the Benjamin Combination fails to teach a bondpad and "a connection between U-shaped fire lines and bondpads located on the heater chip itself." POR, 28. This, however, is directly contradicted by PO's expert's admission that not only does Benjamin '144 teach each of these

² Minimizing parasitic resistance down the length of an array is well known. *See* US 7,488,056, Ex.1017, 24:7-10 ("the width W3 of first and second sections 582 and 584 maintain a suitable energy variation between the firing resistors 52."). US 7,488,056 "is fully incorporated by reference" into Benjamin '144. Ex.1005, 1:6-16.

³ PO does not contest the Benjamin Combination's disclosures for any other elements of independent claims 1 and 8 nor for any dependent claim elements other than the "proximal" limitations of claims 3 and 9 addressed in Section III.B. POR, 36-37.

components but also that they are readily apparent to a POSITA. Ex.1015, 123:1-7 (“And you agree it could be one bondpad that’s being utilized for fire line 214a, right? A. **Could be one bondpad, yep**, or it could be two bond pads...”); *see* Ex.1015, 123:15-22; Ex.1015, 123:8-22; Ex.1015, 124:1-9.



Ex.1005, Fig.22 and Fig.25B (annotated/excerpted in Ex.1002, ¶¶94-96, 119)

This is consistent with Dr. Pond’s analysis and the explicit disclosures of the Benjamin Combination, reproduced above. Ex.1005, 75:63-67 (“**the firing resistor 52 nearest the bond pad** receiving the energy signal FIRE1, FIRE2...FIRE6.”); Pet. 17-22; Ex.1002, ¶¶88-103. As detailed in the Petition and supported by Dr. Pond’s declaration, Benjamin ’144’s bondpads are located along the closest edge of the heater chip. Pet., 25-29; Ex.1002, ¶¶88-103. Specifically, Dr. Pond analyzed how Benjamin ’144’s flex circuit is coupled to the heater chip using contacts 2006 to provide “energy pulses” from external circuitry via fire line contacts F1 and F4 (teal). Ex.1002, ¶94; Ex.2005, 41:18-42:6.

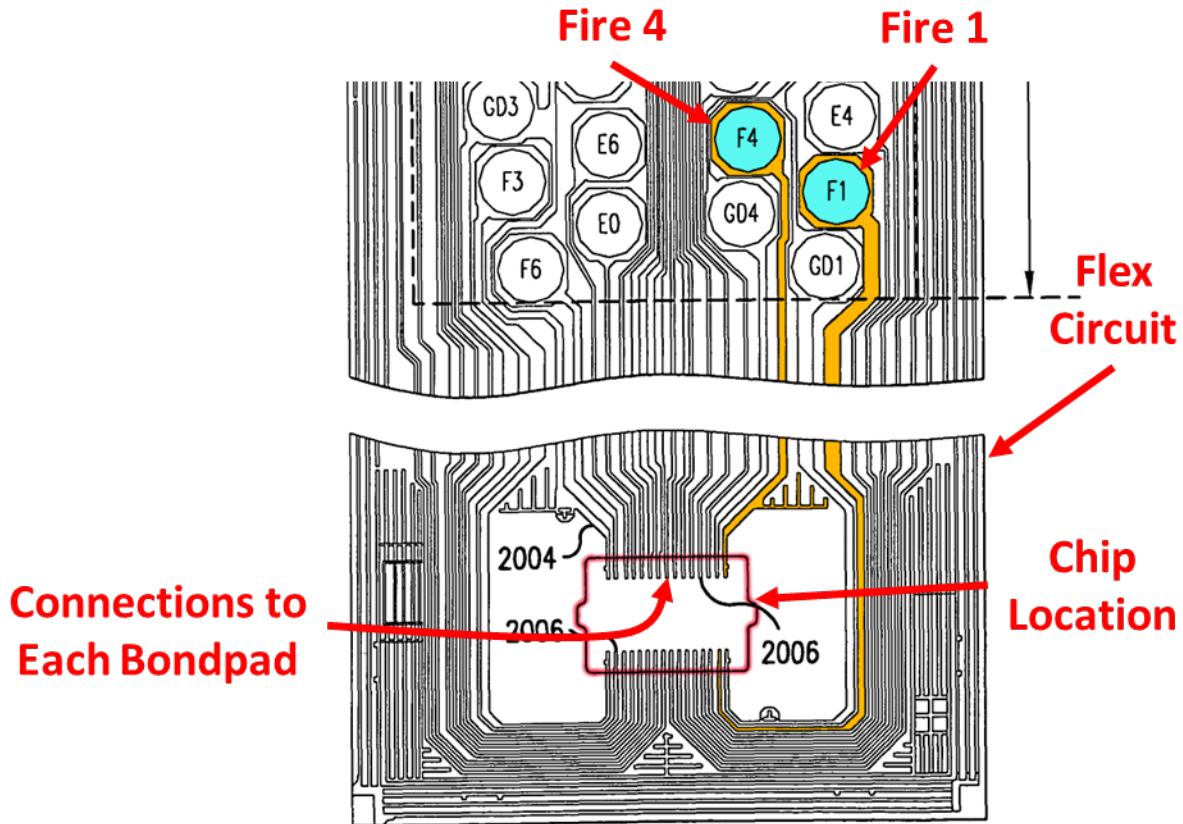


FIG. 25B

Ex.1005, Fig.25B (annotated/excerpted in Ex.1002, ¶¶94-95)

Dr. Pond opined that “Benjamin ’144 explicitly teaches that an interface or bond pad supplies power to a least a portion of the first heater array and to at least a portion of the second heater array because, as seen in Figures 21-22 above, FIRE1 fire line spans heater arrays on both sides of the ink slot within fire group 1702a.” Ex.1002, ¶96. Further, as the Board correctly noted, and PO failed to address, it would be nonsensical for data line bondpads to be on the edge of the heater chip but not fire bondpads. ID, 23 (“we find unavailing Patent Owner’s arguments limiting these teachings that bond pads are on the printhead die to only

bond pads for the data lines...we find no principled basis to make such a distinction.”)

Second, when asked specifically about Benjamin ’144, Mr. Dietl agreed that the reference taught at least one bondpad could be connected to each U-shaped fire line. Ex.1015, 123:1-7 (“And you agree it could be one bondpad that’s being utilized for fire line 214a, right? A. **Could be one bondpad, yep**, or it could be two bond pads...”)

Mr. Dietl also agreed that Benjamin ’144’s fire bondpad for each U-shaped fire line would be located on the edge of the chip⁴ closest to the U-shaped fire line Ex.1015, 123:15-22 (“**The bond pads for that side of the data groups and the...fire groups would be along the edge of the die 1700d.**”); Ex.1015, 123:8-22. He also agreed there would be at least one trace connecting each fire bondpad and each U-shaped fire line. Ex.1015, 122:1-8, 124:1-9 (“Q...there would need to be at least **one trace connecting...the fire line bondpad to fire line 214d**, right? A. **Yes...**”). He further opined that alternatives, such as wire bonding, would be undesirable. Ex.1015, 124:6-125:17.

Third, PO’s contention that there might be “two bondpads, one for each half

⁴ PO’s expert explained why bondpads need to be located on the heater chip along its edge (Ex.1015, 39:20-41:12) and that a POSITA would understand all bond pads are located on the heater chip near its edge. Ex.1015, 47:19-48:2.

of the U-shape of the fire line” is inconsistent with Benjamin ’144’s disclosures.

POR, 30. Benjamin ’144 explicitly teaches a “bondpad” (singular) that receives “energy signal FIRE1” for an entire “fire group” (i.e., the entire U-shaped fire line). Ex.1005, 75:58-64. PO’s hypothetical two-bondpad arrangement is also not supported in any detail in Mr. Dietl’s declaration, where he again parrots verbatim PO’s conclusory statement. Again, Mr. Dietl agrees Benjamin ’144 could have a **single** fire bondpad (Ex.1015, 123:1-7), which is inconsistent with Mr. Dietl’s testimony that Benjamin ’144 only teaches a single bondpad for each data line contact, but not for each fire line. Ex.1015, 103:4-14 (we have [] **one contact** **2006**, for example, for data line group one **that connects to a single bond pad on the edge of the chip**. Is that fair? A. **Yeah**. It’s not real explicit, but yeah. **I think that’s fair.**”).

Nonetheless, even if Benjamin ’144 does not disclose a fire bondpad, Benjamin ’703 explicitly discloses a single fire bondpad for each fire line. Ex.1006, 19:45-47 (“[t]he fire line input pad 706 [yellow] is electrically coupled to fire line 712 [orange] that is electrically coupled to firing cells 120 in printhead die 40.”); Pet. 27-28; Ex.1002, ¶¶122-126. PO’s argument that Petitioners “pick and choose” disclosures from the Benjamin Combination (POR, 23) misunderstands the relevant inquiry, which is whether the claimed subject matter would have been obvious to a POSITA in light of the combined teachings of Benjamin ’144 and

Benjamin '703. *See In re Keller*, 642 F.2d 413, 425 (CCPA 1981). A “[POSITA] is also a person of ordinary creativity, not an automaton,” and would readily use Benjamin '703's single fire bondpad with each of Benjamin '144's U-shaped fire lines for the reasons provided in the Petition. *KSR International Co. v. Teleflex Inc.*, 550 U.S. 398, 421; Pet., 20-22, 27-29; Ex.1002, ¶¶98-103, 122-126.

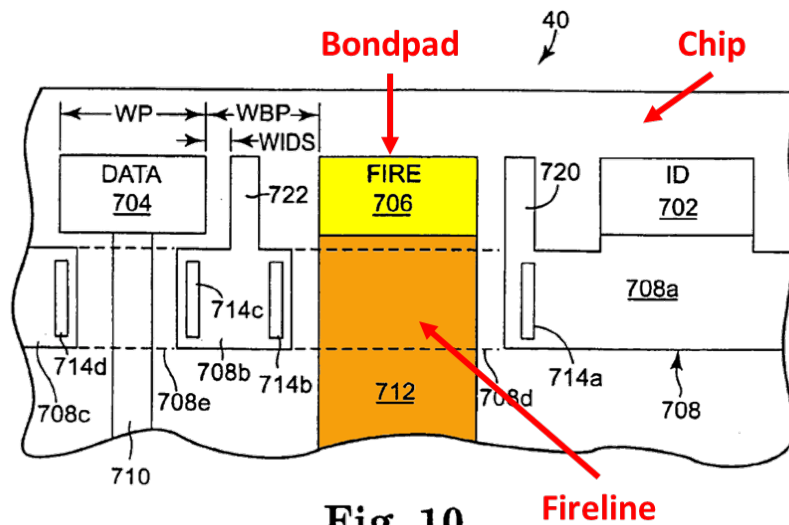


Fig. 10

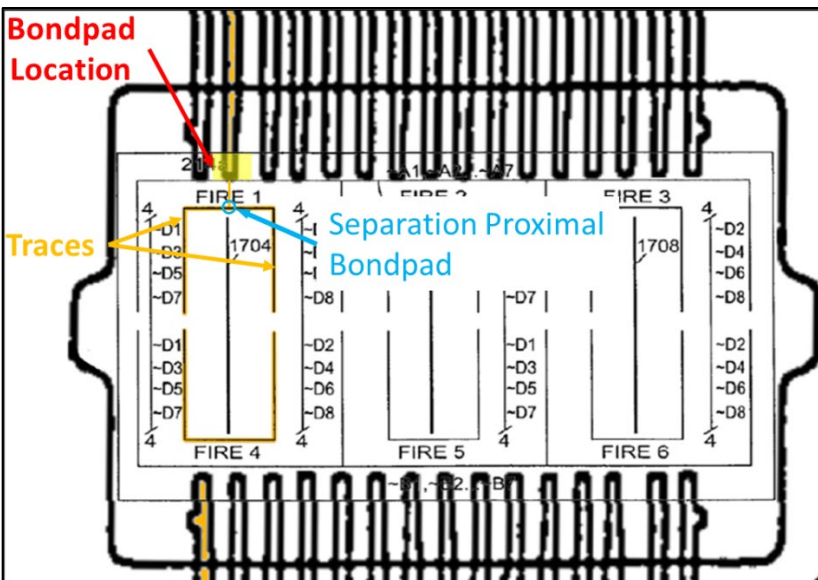
Ex.1006, Figure 10 (annotated)

Given the explicit teachings in Benjamin '144 and Benjamin '703 along with Mr. Dietl's admissions, the Board should once again reject PO's meritless argument. ID, 22 ("In addition, at this stage of the proceeding, we find unavailing Patent Owner's argument that Benjamin 144 does not teach 'a connection between U-shaped fire lines and bond pads located on the heater chip itself.'")

B. Benjamin '144's U-Shaped Fire Lines Are "Physically Separated Proximal To The Bondpad"

PO's remaining challenge to the Benjamin Combination is focused on the "physically separated proximal to the bondpad" limitation found in dependent claims 3, 8, and 15. PO argues that Benjamin '144's power traces are not "physically separated proximal to the bondpad" because they are shown close to the top portion of the heater array. POR, 34-35. Specifically, PO argues "branching of the [trace] structure occurs proximal to the heater arrays..." and not the bondpad. POR, 34. PO's argument is classic misdirection premised on its improper construction of "physically separated proximal to the bondpad" and should be rejected for that reason. *See supra*, Section II.C.

As detailed in the Petition and supported by Dr. Pond's declaration, **Benjamin '144's U-Shaped fire lines (claimed traces) separate proximal to their respective bondpads** along the closest edge of the heater chip. Pet., 25-29; Ex.1002, ¶¶115-126. Dr. Pond analyzed this arrangement in his declaration, reproduced below:



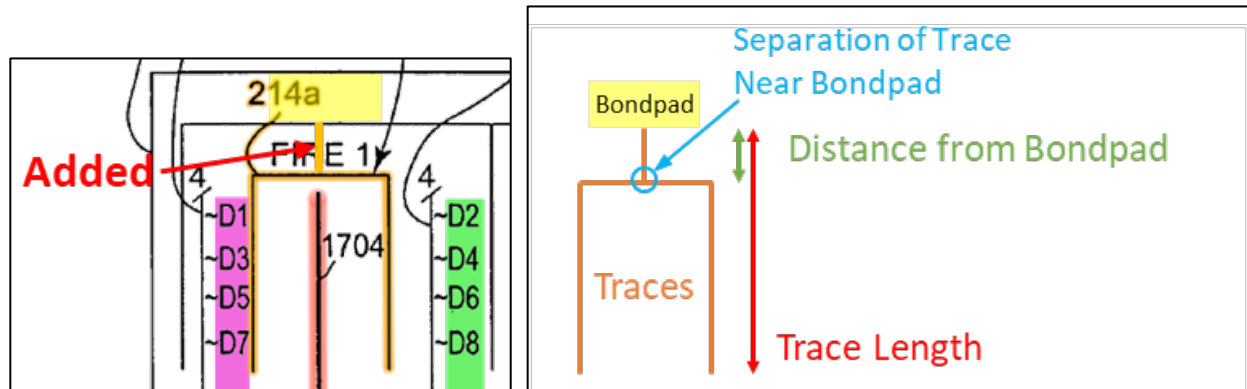
Ex.1005, Fig.22 and Fig.25B (annotated/excerpted)

Ex.1002, ¶¶94-96, 119.

Specifically, Dr. Pond explained that Benjamin '144 Figure 22 depicts “fire lines 214a-214f are physically separated to form ‘a substantially U-shaped fire line’ that is proximal to the bondpad.” Ex.1002, ¶119. Dr. Pond also identified the locations of the bondpad (yellow) for each U-shaped fire line. *Id.* As shown above and below in Dr. Pond’s annotated Figure 22, each fire line (i.e., the claimed trace) is physically separated nearer to the bondpad that it connects to than the distal end of each trace.

As discussed above, Dr. Pond and PO's expert both agree that there is at least one trace connecting each Benjamin '144 fire bondpad to each U-shaped fire line. Ex.1015, 122:1-8, 124:1-9; Ex.1002, ¶¶117-120. Dr. Pond and PO's expert also agree that at least one fire bondpad is located along the nearest edge to each

U-shaped fire line (e.g., edge 1700c for fire line 1702a and edge 1700d for fire line 1702d). Ex.1015, 123:8-22; Ex.1002, ¶¶90-97. These uncontested issues, as well as Dr. Pond's analysis, are further illustrated below with Figure 22 removed for clarity.



Ex.1005, Fig.22 (left—excerpted/annotated, right—figure removed)

As explained by Dr. Pond, the yellow square represents the location of the bondpad and the blue circle depicts where the trace is physically separated. Ex.2005, 18:11-14 (“the 214 U-shape has a crossbar of the U at the top, and so the separation will be somewhere along that crossbar.”) The length of the trace—the distance between the bondpad and the distal end of the trace—is in red. Ex.2005, 16:24-17:2 (“I consider that the power trace starts at the bond pad and ends at the last heater that power is supplied to. That’s a length.”) The distance between the bondpad and the physical separation is in green. Ex.2005, 17:13-15 (“I look at where that separation point is relative to the start and the finish...”). Because the trace is physically separated closer to the bondpad than to its distal end, Benjamin ’144’s U-shaped fire lines are physically separated

proximal to the bondpad. Ex.2005, 17:13-20 (“**I conclude that that separation is closer to the start than it is to the finish. So I conclude that the separation point is proximal to the bond pad, which is the start, rather than to the distal point, which is the finish.**”)

Therefore, the Benjamin Combination clearly teaches each U-shaped power trace is physically separated proximal to its respective fire bondpad.

* * *

PO does not raise any other challenges to the disclosures of Benjamin ’144 and Benjamin ’703. As the “bondpad” and “physically separated proximal to the bondpad” limitations are met by the Benjamin Combination, claims 1-3, 5-6, 8-10, and 13-15 are unpatentable as obvious.

C. Motivation to Combine Benjamin ’144 and Benjamin ’703

Contrary to PO’s arguments, the Petition provided a detailed motivation to combine analysis for Benjamin ’144 and Benjamin ’703. Pet. 44-46.

1. *Ample Motivations Existed*

PO’s central complaint is that neither Benjamin ’144 nor Benjamin ’703 **alone** discloses “a bondpad” that “supplies power to at least a portion of the first heater array and to at least a portion of the second heater array.” POR, 30.

However, as the Board noted, this is the wrong analysis. ID, 27; *see In re Merck & Co.*, 800 F.2d 1091, 1097 (Fed. Cir. 1986) (“Non-obviousness cannot be

established by attacking references individually where the rejection is based upon the teachings of a combination of references”). As described in the Petition, the claimed subject matter was obvious to a POSITA in view of the combined teachings of Benjamin ’144 and Benjamin ’703. Pet. 44-46.

The Petition explained (and PO does not dispute) that Benjamin ’144 and Benjamin ’703 are **analogous art** within the **same field of endeavor**, having overlapping inventors. Pet. 44. The Petition also explained that “utilizing a bondpad to supply FIRE energy signals to the fire lines 214 like in Benjamin-703 would have been an obvious combination of prior art elements to yield **predictable results**.” Pet. 45-46. The Petition further explained that a POSITA would have had a **reasonable expectation of success** given that the Benjamin ’144 and Benjamin ’703 printhead components are the same. Pet. 46. Further, the Petition explained that the references themselves provide **express motivations** to combine. Pet., 45.

Each of these motivations independently support the proposed Benjamin combination.

2. *No Hindsight*

PO alleges hindsight by stating that “Petitioners have done nothing but use the ’864 patent itself as a template to pick and choose elements from prior art references in an attempt to reconstruct the claimed invention.” POR, 1. As explained in the Petition and above, there was ample motivation to combine

provided in the references themselves. Pet., 44-46. These motivations negate any potential hindsight reasoning. *In re Dembiczak*, 175 F.3d 994, 999 (Fed. Cir. 1999) (“Our case law makes clear that the best defense against the subtle but powerful attraction of a hindsight-based obviousness analysis is rigorous application of the requirement for a showing of the teaching or motivation to combine prior art references.”).

3. *Incorporation by Reference*

In addition to the numerous motivations to combine already discussed, Benjamin ’144 incorporated Benjamin ’703 by reference. Therefore, the Benjamin Combination is a single disclosure. *See, e.g., Advanced Display Sys., Inc. v. Kent State Univ.*, 212 F.3d 1272, 1282 (Fed. Cir. 2000). Or, at very least, the incorporation by reference provides an additional explicit motivation to combine the references’ teachings. *See In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006).

While the incorporation by reference includes a minor typographical error—listing the application number of a Benjamin ’703 child application—such a minor error would not prevent a POSITA from easily finding Benjamin ’703 given the detailed information provided in Benjamin ’144’s incorporation by reference. Ex.1002, ¶205; ID, 26 (requesting briefing).

“Whether and to what extent material has been incorporated by reference is a question of law....” *Paice LLC v. Ford Motor Co.*, 881 F.3d 894, 907 (Fed. Cir.

2018). The “standard of one reasonably skilled in the art should be used to determine whether the host document describes the material to be incorporated by reference with sufficient particularity.” *Paice*, 881 F.3d at 907 (*quoting Advanced Display Sys., Inc. v. Kent State Univ.*, 212 F.3d 1272, 1283 (Fed. Cir. 2000)).

Here, the fact that Benjamin ’144 points to the correct title and assignor for Benjamin ’703 and because Benjamin ’144 identifies the application number for Benjamin ’703’s child application having the *same* specification, a POSITA would find this incorporation by reference is sufficiently particular to identify Benjamin ’703 despite the minor typographical error. Ex.1002, ¶205; *see Innovation Scis., LLC v. Amazon.com, Inc.*, No. 4:18-CV-474, 2020 WL 3453728, at *2 (E.D. Tex. June 24, 2020) (typographical error in incorporation by reference citation would not prevent a person skilled in the art to easily find the reference).

PO makes no showing that the minor error—using the Benjamin ’703 child application number—would prevent a person skilled in the art to easily find the referenced Benjamin ’703, particularly given the detail provided in Benjamin ’144 as well as the significant overlap between the references. Therefore, Benjamin ’144 incorporates Benjamin ’703 by reference and the two comprise a single disclosure.

IV. BENJAMIN ’144+BENJAMIN ’703+CHILDERS RENDERS CLAIMS 4, 11-12, AND 16-20 OBVIOUS (GROUND 2).

PO fails to respond to the Petition’s detailed unpatentability showings (Pet., 46-71), supported by Dr. Pond’s opinions with respect to Ground 2. For the

reasons explained above with respect to Ground 1, PO's arguments should be rejected and claims 4, 11-12, and 16-20 found unpatentable.

V. UENISHI ANTICIPATES CLAIMS 1, 3, 5-6, 8-10, 13, AND 15 (GROUND 3).

A. Uenishi Discloses the Bondpad Limitation⁵

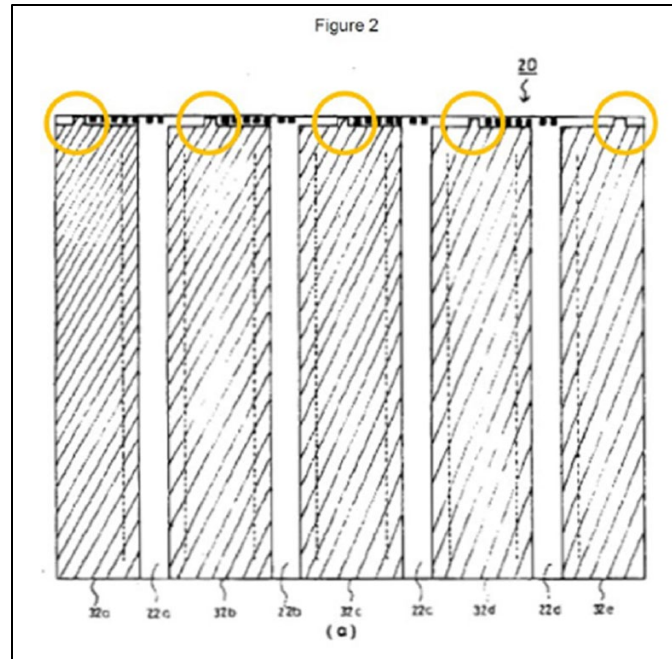
PO contends "Uenishi does not disclose a bondpad structure that supplies power to heater arrays." POR, 39. Specifically, PO raises three arguments (1) Uenishi does not disclose what the electricity feed terminal connects to; (2) Uenishi's electricity feed terminal is "covered" and cannot connect to external structures; and (3) Uenishi's electricity feed terminal "is an integral portion" of the common electrode and "not a distinct component functioning as a bondpad." Each of these arguments lack merit.

PO first argues that Uenishi does not teach a bondpad because "Uenishi does not disclose what terminal 26c connects to, and certainly does not describe the terminal as a pad to which external power traces and onboard power traces can be connected." POR, 40. The claims, however, do not include *any* requirement that the bondpad connect to external circuitry. *See* Ex.1001, cl. 1 ("A heater

⁵ PO does not contest Uenishi's disclosures for any other elements of independent claims 1 and 8 nor for any dependent claim elements other than the "proximal" limitations of claims 3 and 9 addressed in Section V.B. POR, 46-47.

chip...comprising...a bondpad”). Uenishi, however, describes terminal 26c as an “**electricity-feed** terminal”—*i.e.*, a terminal where electricity feeds into the common electrode from an external power source. Ex.1008, ¶33 (“To these five common electrodes 23a-23e, **electricity-feed** terminals 26a-26e are formed linked respectively to them...”)) When asked about Uenishi’s electricity-feed terminal, PO’s expert agreed its shape and size would allow external circuit bond connections. Ex.1015, 144:5-18 (“Q...could you use [] some sort of bonding procedure to attach external circuitry to that electricity-feed terminal? A...if they did not cover them, it’s—**it would be more likely that you could connect at that point, yes.**”). So contrary to PO’s attorney argument, PO’s own expert agrees with Dr. Pond that the identified electricity feed terminal are a bondpad. Ex.1002, ¶¶327-328, 337-338.

Acknowledging Uenishi has bondpads, PO next contends Uenishi’s electricity-feed terminals cannot work because there are “orifice (nozzle) plates” (depicted in Figure 2) that would “interfere[e] with a connection between the underlying feed terminal and connections from outside the printhead die, for instance from a flex circuit.” POR, 41-42.



POR, 41 (Ex.1008, Fig. 2 with PO Annotations)

While showing external connections is *not* required by the claims, Uenishi's written specification is explicit that the electricity feed terminals should not be covered. Specifically, Uenishi teaches that **"thin-plate material 11 covers all the region *except* the drive circuit 6 and the electricity-feed terminals 3 and 7..."** Ex.1008, ¶11. While Uenishi's teaching is made with respect to a prior art manufacturing process, Uenishi teaches its invention is made according to **"the same kind of manufacturing process as the prior art heating head..."**. Ex.1008, ¶28; *see* Ex.1008, ¶36 ("Fig. 2(a) is a plan view that shows the state described above **in a similar manufacturing process to the prior art head shown in Figs. 6 and 7...**"). Therefore, even if Uenishi's Figure 2 shows its electricity feed terminal covered (which appears to be an error), Uenishi

nonetheless explicitly teaches the electricity feed terminal should not be covered.

Therefore, Uenishi expressly teaches that its electricity feed terminal operates as a bondpad.

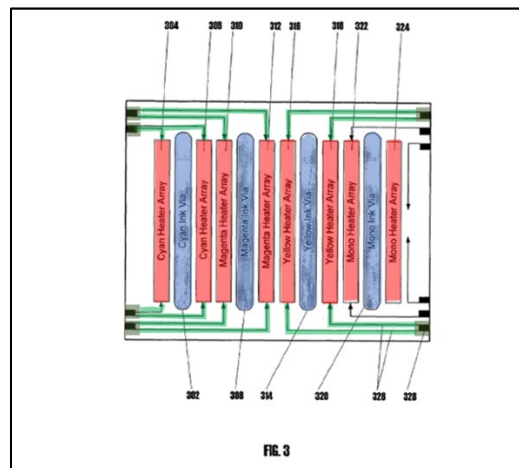
Finally, PO argues “[t]o the extent that the large common electrode 23[] can even be considered a power trace, the electricity-feed terminal 26[] is an integral portion of that large electrode, not a distinct component functioning as a bond pad.” POR, 41. In addition to their ludicrous claim construction positions that the bondpads need to be *relatively large* and the traces *relatively narrow*, PO appears to inject an additional limitation to the claims—namely that the bondpad and power trace must be distinctly formed. The ’864 Patent only requires that “the bondpad supplies power...by power traces physically separated proximal to the bondpad.” Ex.1001, cl. 3. Nothing in the claim requires the bondpad to be a separate structure from the trace, or that the bondpad and traces have different relative sizes. In fact, the specification is clear that “a single power trace may extend from the bondpad 328, and then branch into two or more traces that extend to respective heater arrays.” Ex.1001, 6:7-10. Like the ’864 Patent, Uenishi’s electricity feed terminal acts as a bondpad, which the common electrode extends from and splits into separate branches proximal to it. Ex.1002, ¶¶327, 335-341.

Therefore, Uenishi teaches the bondpad limitation.

B. Uenishi's Common Electrodes Are "Traces" that Are "Physically Separated Proximal To The Bondpad"

In response to Uenishi's clear disclosure of traces physically separated proximal to the bondpad, PO raises two claim construction challenges to inject additional limitations. PO's analysis is wrong for two reasons: (1) it is based on the false premise that power traces *must* be narrower than the bondpad they connect to and (2) it presumes if power traces split near a heater array, they cannot also be split proximal to the bondpad.

PO first contends that Uenishi's common electrode is not a "power trace" because it is too wide compared to Figure 3 of the '864 Patent. Specifically, PO argues "[t]he 'power traces' are relatively narrow structures" and relies exclusively on '864 Patent Figure 3 to support this construction. POR, 39-40.

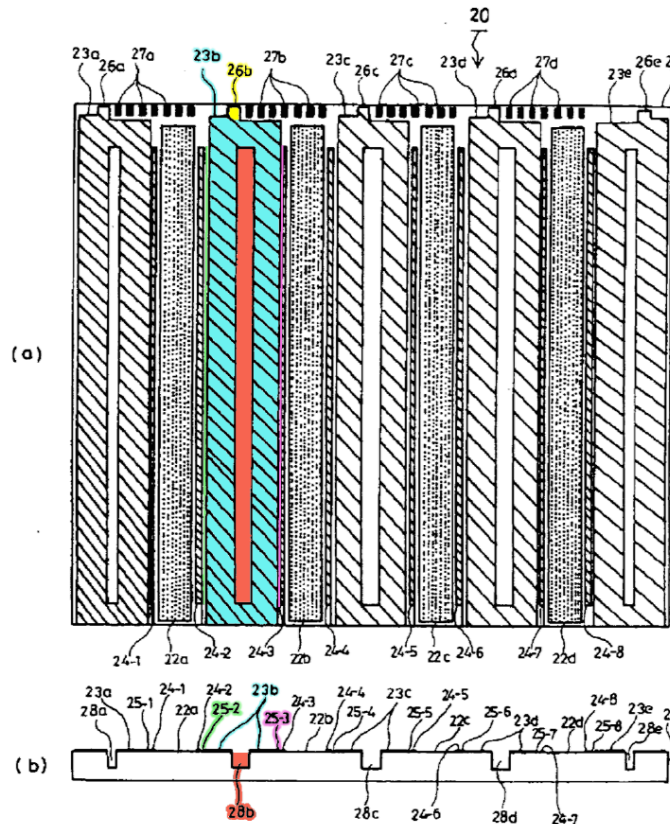


POR, 40 (Ex.1001, Figure 3 with PO Annotations)

PO's proposed construction is wrong for the reasons already articulated in Section II.B. Specifically, PO's construction is based solely on a figure that PO's expert

admits *does not disclose the widths of the traces*. Ex.1015, 37:1-5. Nothing in the claims limit power traces to a particular size such that they would exclude Uenishi's common electrode. Ex.1015, 162:15-20 ("Q. So **do the claims themselves include any sort of width requirement for the power traces?** A. **I don't believe so. No.**"). Uenishi's common electrode therefore discloses a power trace. Ex.1002, ¶¶334-341.

PO's second argument ignores the Petition's detailed analysis of Uenishi's common electrode separating proximal to its electricity feed terminal. Pet., 80-82. The Petition provided the following annotated version of Uenishi's Figure 1 depicting the common electrode (power trace, blue) separating proximal to the electricity feed terminal (bondpad, yellow):



Ex.1008, Figure 1 (annotated)

The Petition explained “Unishi teaches that its common electrode includes traces that are physically separated from one another to accommodate the ink supply channels 28.” Pet. 80. PO agrees Unishi’s common electrode “may show that the electrode is ‘separated,’” but disputes whether the separation occurs “proximal to the bondpad.” POR, 43. As explained in the Petition and discussed below, Unishi’s common electrode (blue above) separates near or proximal to the electricity feed terminal (yellow above). Pet. 80.

As discussed in the claim construction section, whether traces are “physically separated proximal to the bondpad” simply concerns whether the

separation occurs closer to bondpad along the trace. *See supra*, Section II.C. Here, Uenishi's common electrode (blue) runs from the electricity feed terminal, physically separates near the bondpad and runs down both sides of the ink via to the bottom of the chip. Ex.2005, 34:6-24. As shown above, the common electrode splits into two traces near or proximal to the electricity feed terminal (yellow). Because that split occurs closer to the electricity feed terminal (bondpad) along the entire length of the trace, Uenishi discloses its common electrode includes traces that are physically separated proximal to the bondpad. Ex.1002, ¶¶334-341.

Whether Uenishi's common electrode separates into two traces near other structures, such as a heater array or ink via is immaterial to the claims. ID, 37 ("we agree with Patent Owner that Uenishi discloses that its common electrodes separate into two branches in the vicinity of an ink via, rather than proximal to terminal 26 (i.e., the bondpad)."); POR, 43-44. The claims do not require trace separation to occur *nearer* the bondpad than another non-trace structure. If PO wanted to claim this, then it could have chosen to do so, but did not. The claims are clear, the separation of the trace must occur proximal or near to the bondpad, nothing more. This is consistent with how proximal (and distal) are used as a measure of distance from a point of origin. Ex.1016, 3 (defining distal as "situated away...from the point of attachment.")

Because the claim only requires that the trace is at least "physically

separated proximal to the bondpad,” which Petitioners have established, PO’s challenge to Uenishi’s clear disclosure should be rejected.

* * *

PO does not raise any other challenges to the disclosures of Uenishi. If the Board finds that the “bondpad” and “physically separated proximal to the bondpad” limitations are met by Uenishi, then the Board should find claims 1, 3, 5-6, 8-10, 13, and 15 unpatentable as anticipated.

VI. UENISHI-HAYASAKI RENDERS CLAIMS 4, 11, AND 12 OBVIOUS (GROUND 4).

PO fails to respond to the Petition’s detailed unpatentability showings (Pet., 95-101), supported by Dr. Pond’s opinions with respect to Ground 4. For the reasons explained above with respect to Ground 3, PO’s arguments should be rejected and claims 4, 11 and 12 found unpatentable.

VII. CONCLUSION

Petitioners respectfully request that the Board find claims 1-6, and 8-20 of the ’864 Patent unpatentable in view of the cited prior art.

Dated: February 12, 2024

Respectfully Submitted,

/ Dion M. Bregman /

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CERTIFICATE OF WORD COUNT

Pursuant to 37 C.F.R. § 42.24(d), Petitioner hereby certifies, in reliance on the word count feature provided by the word-processing system used to prepare this Reply, that the number of words in this Reply is 5,594. Pursuant to 37 C.F.R. § 42.24(a), words in the table of contents, table of authorities, mandatory notices under § 42.8, certificate of service, certificate of word count, appendix of exhibits, and claim listing were excluded.

Dated: February 12, 2024

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CERTIFICATE OF SERVICE

Pursuant to 37 C.F.R. § 42.6(e)(4), it is hereby certified that on February 12, 2024 an electronic copy of this **PETITIONERS' REPLY TO PATENT OWNER'S RESPONSE TO PETITION** and Exhibits was served via email to Patent Owner's counsel of record in this proceeding:

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