

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

PATENT OWNER'S SUR-REPLY

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Patent Trial and Appeal Board
United States Patent and Trademark Office
P.O. Box 1450
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I. CLAIM CONSTRUCTION

A. “Bondpad”

Patent Owner does not argue that the term “bondpad” should be “limited” to the structures shown in the '864 patent, as Petitioners argue. (PR pp. 2-3.) That is a red herring that misconstrues the argument. Instead, Patent Owner stated that the term should be “applied consistently with the structures shown in Figs. 1-3 of the '864 patent, which illustrate traces [326] that are connections stemming from relatively large bondpads [328].” (Ex. 2004 ¶54.) Patent Owner further explained why this position is consistent with the understanding of that term to a PHOSITA. (Ex. 2004 ¶54.) As a PHOSITA knows, the relatively large nature of a bondpad assisted in connecting external structures to power traces or other structures on the printhead without requiring a high degree of precision, simplifying manufacturing and reducing defects. (*Id.*) Patent Owner did not argue that whether a structure is a bondpad or not relies on its size relative to power traces. (POR pp. 18-19.) Instead, a PHOSITA would understand that a structure is only a bondpad if it assists in connecting external structures to power traces or other structures on the printhead without a high degree of precision. (*Id.*) Petitioners' claim construction arguments are thus non-responsive to Patent Owner's position.

B. “Physically Separated Proximal to the Bondpad”

Petitioners admit that the term “physically separated proximal to the bondpad” must mean that power traces are physically separate from one another “nearer” to

the bondpad, but argue that Patent owner inserts an additional requirement of “nearer to the bondpad than the heater arrays.” (PR p. 5, emphasis added.) However, it is Petitioners that add a requirement that is not in the claims by arguing that “proximal to the bondpad” compares attachment to the bondpad of the “end of the trace,” even though an “end of the trace” is not mentioned in the claims of the '864 patent. Under the clear language of the claims, the power traces connect two types of structures: (1) bondpads and (2) heater arrays. (*See, e.g.* Ex. 1001 claim 3.) Patent Owner's interpretation is the only one consistent with the claim language, considering where the power traces separate relative to the bondpad on the one hand and the heater arrays on the other.

Illustrations are helpful to understand the parties' disagreement. Below is Fig. 3 of the '864 patent:

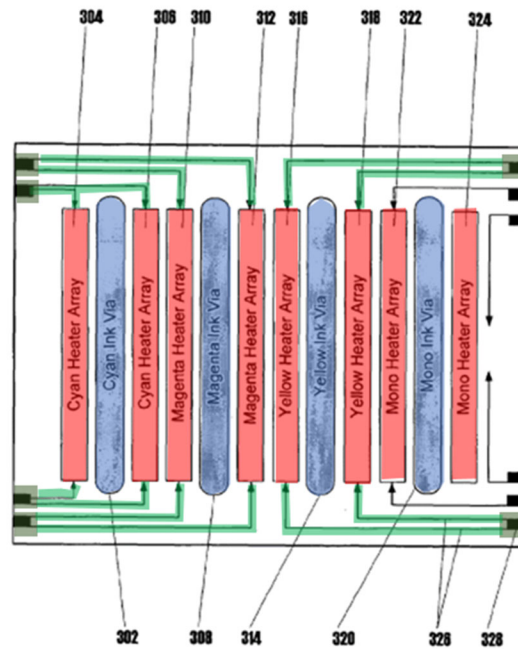
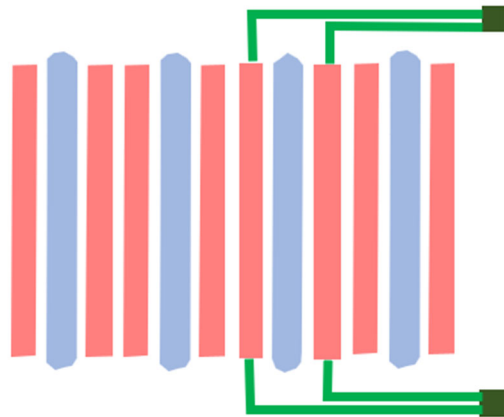


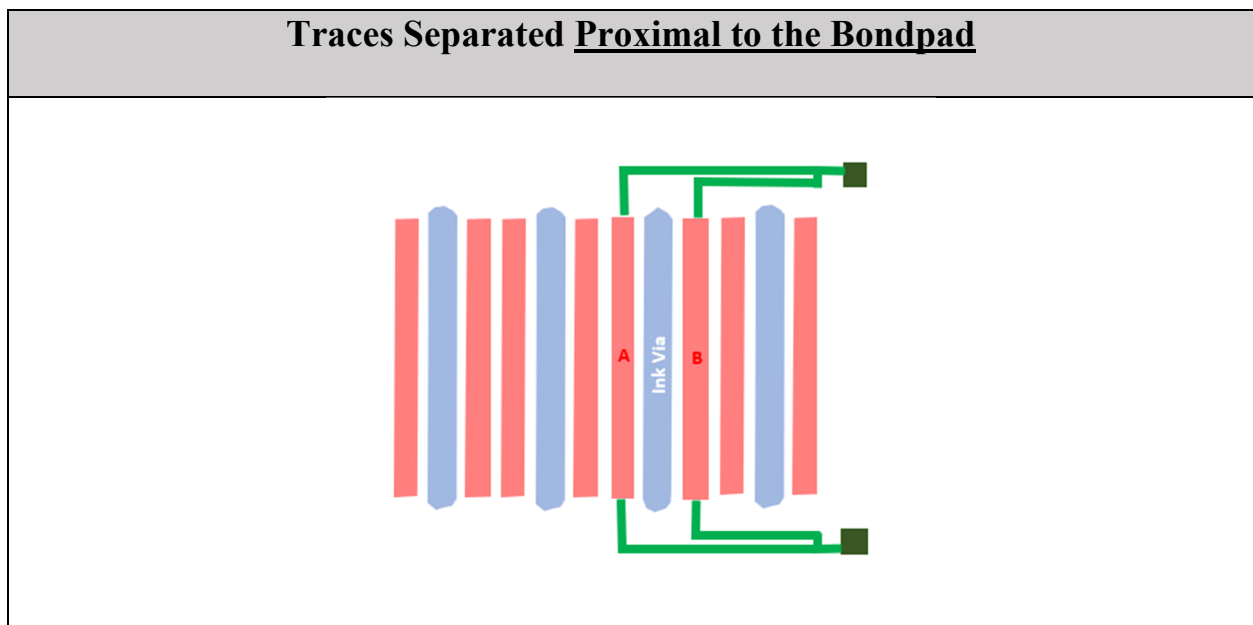
FIG. 3

(Ex. 1001 Fig. 3.) Bondpads are shaded dark green, power traces are shaded light green, and heater arrays (groups of heater elements in a linear arrangement) are shaded red. Ink vias (blue) separate heater arrays connected to the same bondpad. Below is a simplified version of the above illustration to more easily see the separate traces stemming from a common bondpad:

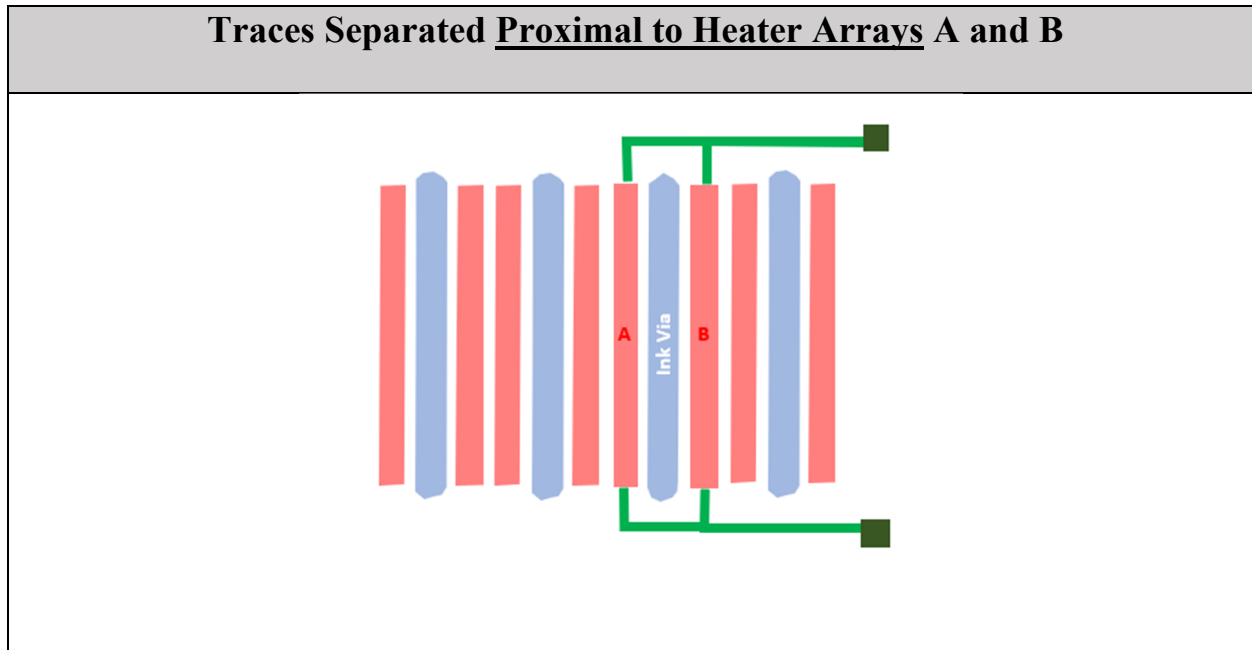


In the above drawing, the traces are always separate, and are never joined near their associated bondpad or near their associated heater arrays.

In contrast, below the light green traces extend from the bondpad as a single trace but then separate at a location that is proximal the bondpad, *i.e.* nearer the bondpad than to heater arrays A and B to which they connect on their other ends:



On the other hand, below the traces are joined throughout almost the entire distance between the bondpad and the heater arrays (red), separating only in the vicinity of the heater arrays “A” and “B” (red) to which they connect and the ink via separating the two arrays:



Petitioners could argue that the above drawing as also shows separation proximal to the bondpad under their construction, speculating that the green traces can extend through the red heater arrays all the way to the opposite end, or at least to a point that is further from the point of separation than the bondpad is. This would not make sense. The claims clearly require a bondpad to supply power to two heater arrays: (1) “a first heater array adjacent at least a portion of one side of an ink via” and (2) “a second heater array adjacent at least a portion of another side of the [same] ink via.” (Ex. 1001 claim 1.) The relevant separation relates to power traces that supply

power from a single bondpad to these first and second heater arrays. (*Id.* claim 3.) it is physically impossible for the power traces to separate between the two heater arrays at a point that is past the nearest end of the array, because there is an intervening ink via. As a result, Petitioners' proposed construction makes no sense.

As mentioned above, the claims make no mention of the "end of the trace" to which Petitioners refer. Petitioners attempt to play word games by suggesting that "nearer to the bondpad than the heater arrays" is unnecessarily complicated when compared to "**near** to the bondpad." (PR p. 6.) The problem, though, is that both "near" and "nearer" are relative terms. And Petitioners already admitted that the phrase must be interpreted as the physical separation of the traces being "nearer (i.e., proximal) to the bondpad" than another structure. (PR p. 5.) The only question is the nature of that other structure. Petitioners contend that Patent Owner's construction relies on importing limitations from the schematic, but that is absolutely incorrect. As discussed above, the only structures identified in the claims as having a relationship to the power traces are the bondpad and heater arrays (not individual heaters). Therefore, it is Petitioners, not Patent Owner, who are importing subject matter into the claims by focusing on irrelevant portions of power traces where a separation between different sides of the ink via is physically impossible.

For similar reasons, Petitioners' argument that Patent Owner's construction is inconsistent with how proximal is defined in dictionaries is fundamentally incorrect.

Power traces are attached at both ends, connecting a bondpad at one end to a pair of heater arrays at the other end. The only question is whether the point of separation is closer to the bondpad point of attachment or closer to the heater array point of attachment. There is no ambiguity in that analysis, just a question of whether the point of separation is on one side of the halfway point between the bondpad on the heater arrays or on the other side of the halfway point. In contrast, Petitioners inject numerous unnecessary questions regarding where the traces end and how far they have traveled. Those questions are not addressed anywhere in the '864 patent. The fact that a heater array is not a single point, but rather an array of heaters, only reinforces Patent Owner's construction. The clear language of the claims indicates that two arrays, not individual heaters, are powered by the separated traces. There is no question of what point along the heater array is relevant to the separation point for determining proximal attachment. The comparison is between the point where the traces touch the bondpad and the point where they first connect to a heater array (i.e. the point of attachment on the heater array closest to the bondpad and the point of attachment on the bondpad closest to the heater array). Only Petitioners' claim construction injects ambiguity. For instance, Dr. Pond's testimony that the claim phrase "simply requires the trace separation to be near the bondpad (point of origin)" (PR p. 7) only raises questions. Near what? And relative to what?

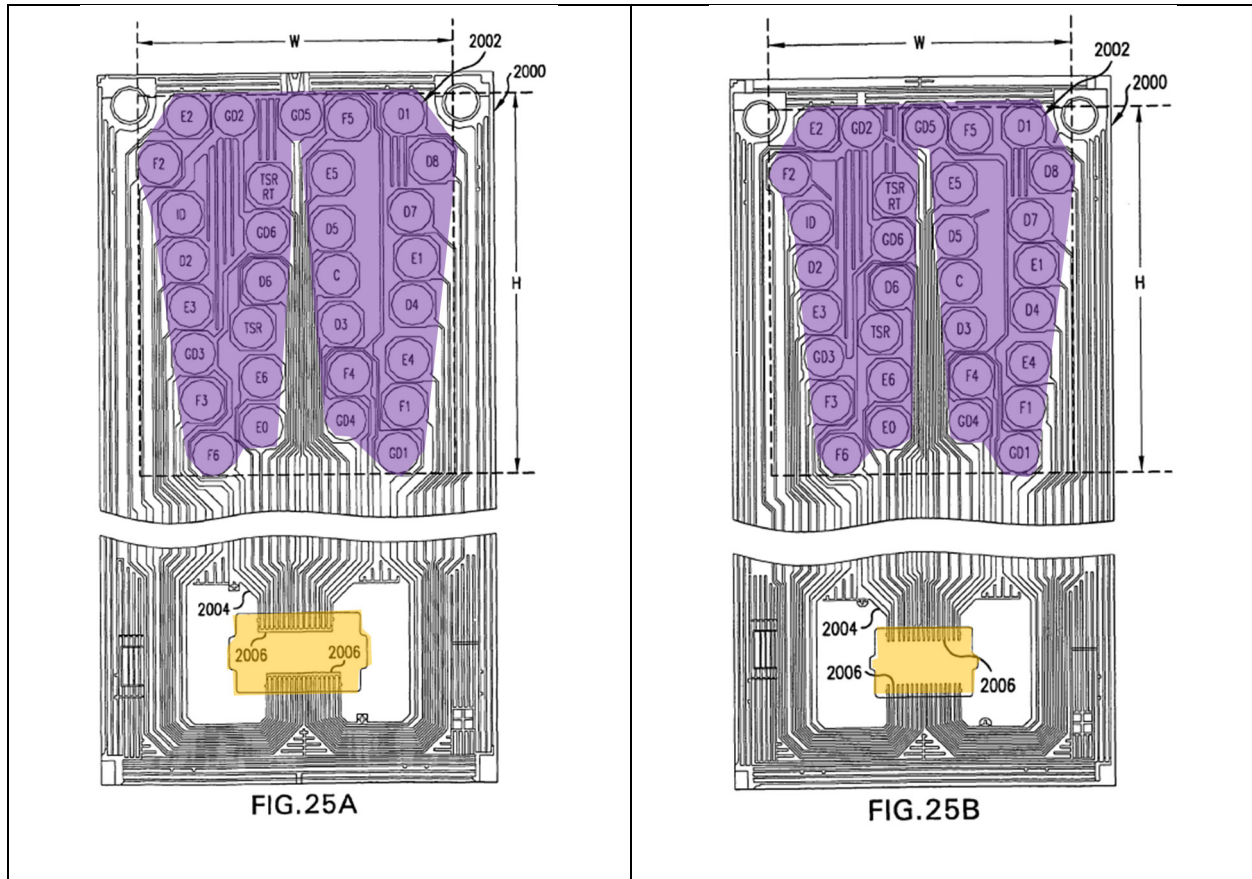
For all of the reasons above, there is only one portion of the power traces that is relevant: the portion between the bondpad and the heater arrays.

II. THE '864 CLAIMS WOULD NOT HAVE BEEN OBVIOUS BASED ON BENJAMIN '144 IN VIEW OF BENJAMIN '703 (GROUND 1)

Petitioners begin their argument regarding Ground 1 with misdirection, stating that Mr. Dietl admitted that Benjamin '144 teaches bondpads located on the heater chip itself. Their support for this argument is speculation about what “could” be the case, not what the reference itself teaches. (PR p. 9.)

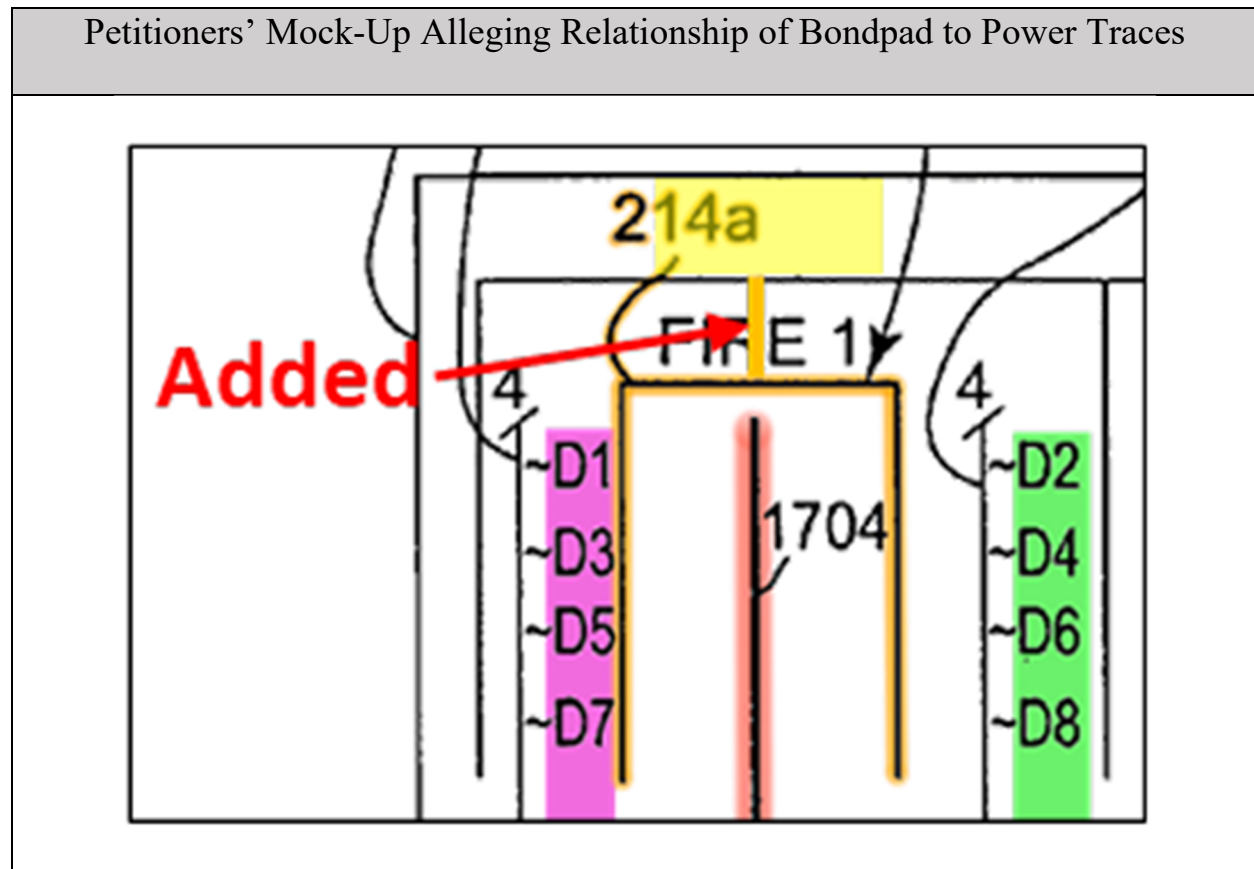
The specific argument in the Petition is that a PHOSITA would appreciate that Benjamin '144 discloses U-shaped fire lines that are electrically coupled to external supply circuitry by appropriate “interface pads,” referencing the flex circuit shown in Figs. 25A and 25B. (Pet. pp. 16-18.) Petitioners then assert that the '144 patent “uses the terms interface pads and bondpads interchangeably.” (Pet. p. 17.) From the images and discussion of Benjamin '144, Petitioners argue that a PHOSITA would understand the approximate locations of bondpads associated with the fire lines, and would understand that the bondpads are located on the printhead die or chip. (Pet. pp. 19-20.) However, Benjamin '144 indicates that the “interface pad” for the U-shaped fire lines is not on the printhead die/heater chip. The portion of Benjamin '144 discussing the “interface pad” coupled to fire lines refers to Figs. 25A and 25B. (Ex. 2004 ¶59; Ex. 1005 col. 11 lns 9-12.) Figs. 25A and 25B are reproduced below, and show contact areas 2000 [purple] located on a flexible circuit

2002 that extends away from the heater chip in order to interface with external supply circuitry of the printer that is not shown. (Ex. 1005 col. 77 lns 41-46.)



(Ex. 1005 Figs. 25A and 25B.) The heater chip is not shown at all in these figures (Pet. p. 18; Ex. 005 col. 11 ln. 7 through col. 12 ln. 4.) There is no actual description in Benjamin '144 of how or where the contacts connect to bondpads or of a connection between U-shaped fire lines and bondpads located on the heater chip itself. (Ex. 2004 ¶59.) All of Petitioners' evidence on where a bondpad for the fire line is actually located are simply speculation as to where it "could be."

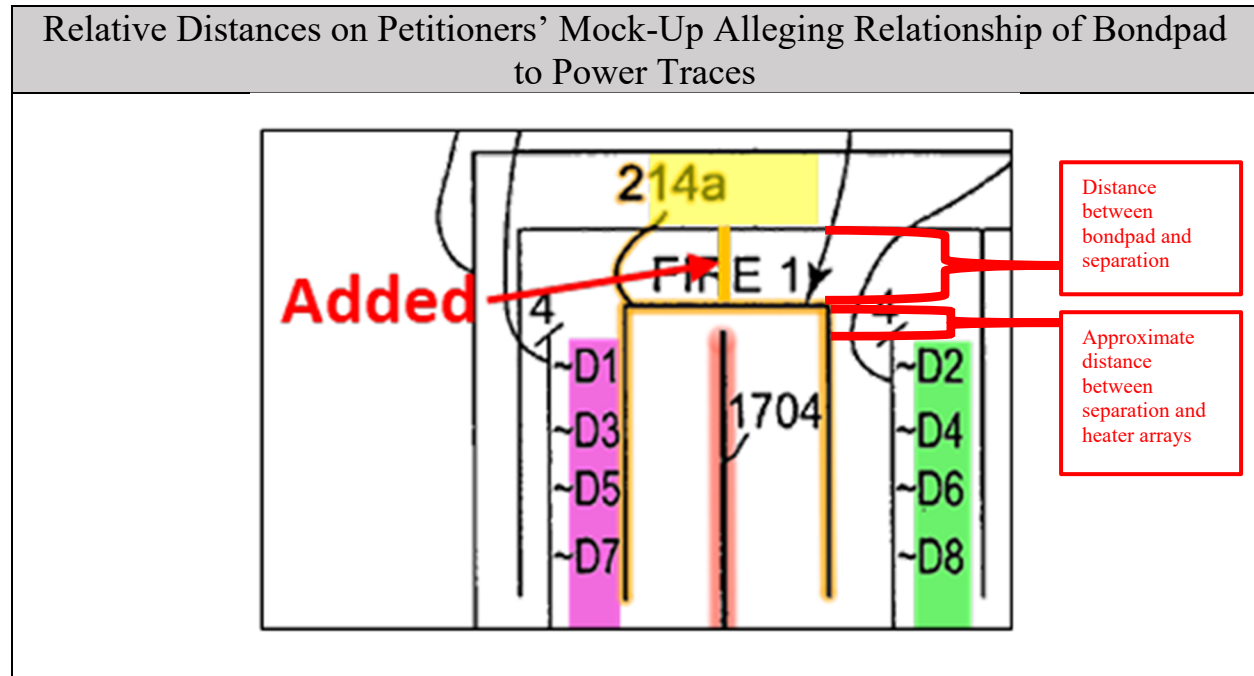
Regarding whether the Benjamin combination discloses power traces that supply power to a first heater array and a second heater array where the power traces are “physically separated proximal to the bondpad,” it is clear that Petitioners’ combination does not have that feature. Below is the figure presented in Petitioners’ Reply:



(PR p. 16.) There are numerous problems associated with interpreting this figure to show a distance relationship between power traces, a bondpad, and heater arrays. For instance, the above figure is a schematic, and there is absolutely no indication that it shows any parts to scale. The lack of accurate scale alone makes it impossible

to argue that this figure shows where the point of separation lies in the distance between the bondpad (if any) and heater arrays. Additionally, the relied-upon figure depicts all parts as simple lines, giving no indication of shape, thickness, etc. Furthermore, **it does not show a bondpad or heater arrays**. Petitioners have added a yellow box to the area in which they argue a bondpad is positioned, and added an orange line to depict how they allege their purported bondpad connects to the U-shaped fire line. To be clear, D1 through D8 are “data line groups,” not heaters, and the actual relationship between the U-shaped fire line and heater arrays is not depicted.

Even giving Petitioners every benefit of doubt that distances can be determined in this figure (which they cannot), despite all of the above issues, and even assuming that Petitioners are correct about all aspects that they have added to these drawings, Petitioners’ speculative mock-up does not show separation of traces proximal the bondpad for the reasons shown below in annotation, taking into account the proper meaning of “physically separated proximal to the bondpad” in Section I above:



The mock up shows the fire line separating along opposite sides of an ink via (1704) only at the last possible location before encountering the ink via and associated pair of heater arrays, not “proximal the bond pad.”

III. THE '864 CLAIMS ARE NOT ANTICIPATED BY UENISHI (GROUND 3)

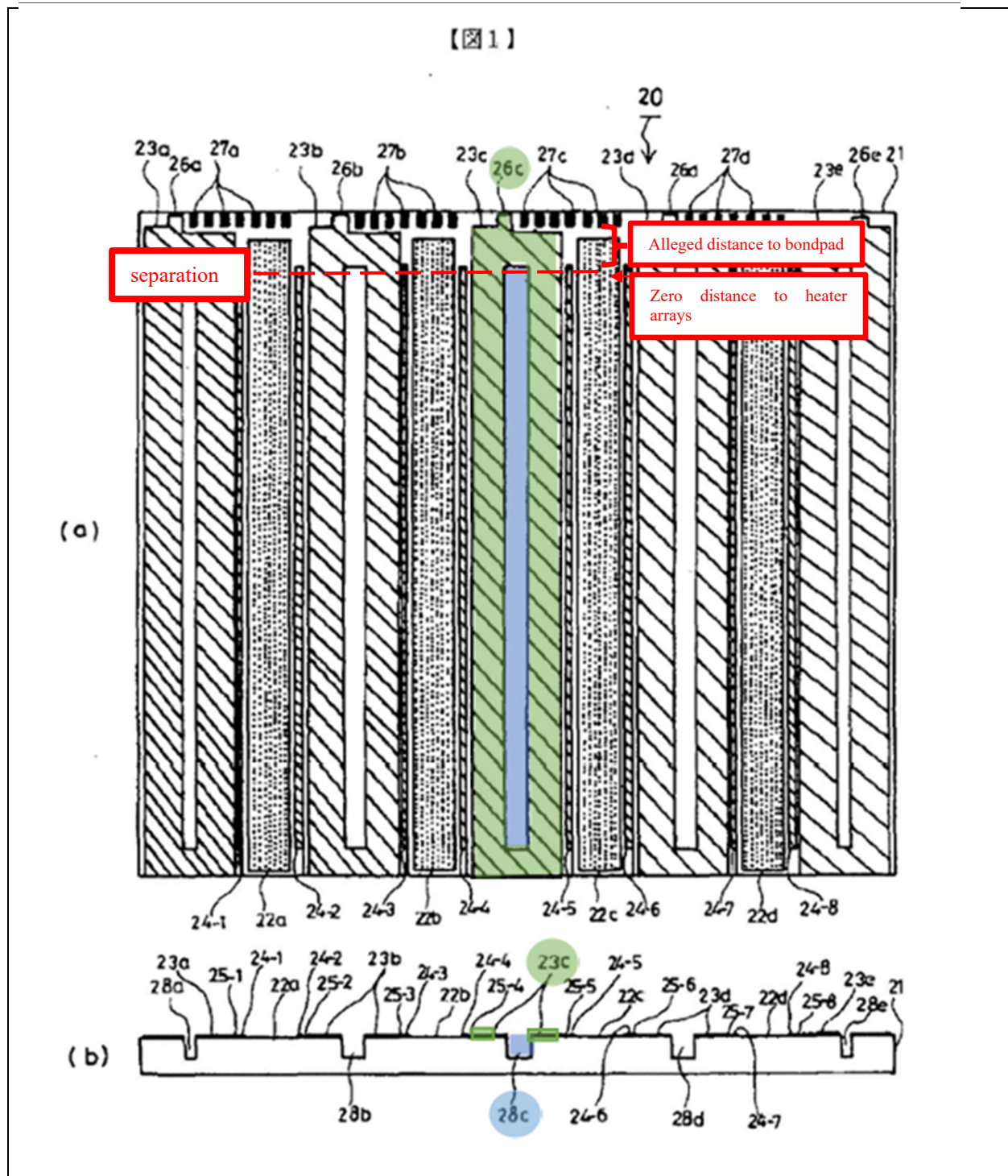
Petitioners argue that Uenishi discloses bondpads because the claims do not include any requirement that bondpads connect to external circuitry. (PR p. 21.) However, there is no dispute that connection to external circuitry is the essential nature of a bondpad. In other words, the definition of “bondpad” depends on a structure’s ability to fulfil this purpose. (See Ex. 2004 ¶54.) Petitioners’ argument that Mr. Dietl admitted that the electricity feed terminals of Uenishi are bondpads conveniently omits the fact that he was answering a hypothetical question asking “if

the partition material 9 and thin-plate material 11 did not cover, uh, the electricity-feed terminal, um, **could you** use, uh, some sort of bonding procedure to attach external circuitry to that electricity-feed terminal?" (Ex. 1015 144:5-10.) With this added context, Mr. Dietl's testimony is not contrary to Patent Owner's arguments.

Likewise, Petitioners' speculation that Uenishi's disclosure contains errors does not counter Patent Owner's arguments regarding what Uenishi does or does not disclose. Their contention that connecting directly to a power trace is the same as connecting to a bondpad that supplies power to heater arrays via power traces is also specious.

Finally, even if the electricity feed terminals are considered bondpads, Petitioners' argument that Uenishi teaches power traces that are physically separated from one another "proximate the bond pad" makes no sense. Uenishi's design is shown below, with one "common electrode" shown in green. Heater arrays (25-5) cannot be seen, because they are covered by the common electrode.¹ The heater arrays, however, would be parallel to the ink via (blue).

¹ In particular, the resistors on one side are connected by individual wiring electrode 24-5 between the drive circuit 22c and the common electrode 23c. (Ex. 1005 at [0031].) Resistors 25-4 are on the other side of the ink supply channel and are connected by individual wiring electrode 24-4 between drive circuit 22b and third common electrode 23c. (*Id.* at [0030].)



At most, Uenishi shows separation of the common electrode only at a point overlying the heater arrays or at the very beginning of the heater arrays. Thus, under a proper

interpretation (as discussed above), this separation is proximate the heater arrays, not proximate the bondpad. “Proximate” is a relative term indicating that something is situated near to the point of attachment. (Ex. 2004 ¶56; Ex. 2001 (Concise Oxford American Dictionary, 2006, p. 714); Ex. 2002 (Webster's II New Riverside University Dictionary, p. 948).) The term indicates distance from a connection or point, i.e. the bond pad or a heater array. (Ex. 2004 ¶56.) A PHOSITA would consider the bondpad to be the point of origin of power traces, because the power traces carry electricity from the bondpad to heater arrays at their opposite ends and “stem” from a bondpad. (Ex. 2004 ¶56; Ex. 1001 col. 2 lns 10-11, col. 5 lns 40-46, col. 5 lns 49-52, col. 5 lns 54-56, col. 6 lns 3-6, and col. 6 lns 13-17.)

Any notion that “proximal to the bondpad” refers to any point along the electrode without considering relative distance of the point of separation to the two structures associated with the power traces in the claims of the '864 patent (i.e. the bondpad and the two heater arrays on opposite sides of an ink via) completely ignores the teachings of the '864 patent regarding the advantages of separating traces proximal to the bondpad, including the ability to efficiently balance resistance of power traces. (Ex. 2004 ¶75; Ex.1001 col. 5 ln 64 through col. 6 ln 3.)

IV. CONCLUSION

For at least the reasons described above, and because Petitioners have not demonstrated that the claims of the '864 patent would have been obvious, the Board should affirm their patentability.

Respectfully submitted,
FITCH EVEN TABIN & FLANNERY LLP

Dated: March 25, 2024

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CERTIFICATE OF WORD COUNT

The undersigned hereby confirms that the foregoing Response complies with the type-volume limitation of 37 C.F.R. § 42.24(c). Excluding the items listed in 37 C.F.R. § 42.24(c) as not included in the word count, this Patent Owner's Sur-Reply contains 2,616 words, calculated by the word-processing system used to prepare it.

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CERTIFICATE OF SERVICE

Pursuant to 37 C.F.R. § 42.6(e), the undersigned hereby certifies that a true copy of the foregoing PATENT OWNER'S SUR-REPLY was served this 25th day of March, 2024, by e-mail upon the following:

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