

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. IPR2023-00312

Patent No. 7,484,823

PATENT OWNER SUR-REPLY

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I. PETITIONERS FAIL TO ESTABLISH THAT ANY CLAIMS WOULD HAVE BEEN OBVIOUS IN VIEW OF BENJAMIN AND GIERE '673 (GROUNDS 1 AND 2)

A. Neither Benjamin Nor Giere '673 Suggest Monitoring of Temperatures in Regions Between Ink Vias

It is uncontested that Benjamin does not disclose the placement of its TSR. While Giere '673 discloses a TSR between heater arrays, Petitioners' argument that Patent Owner has attempted to "recast" the claims is absurd given that Petitioners concede that the claims require temperature sensors to be disposed both between adjacent heater arrays and also between adjacent ink vias. (PR pp. 2-3.) Petitioners are the ones attempting to recast claim language, ignoring that Giere '673 does not have any vias at all, let alone multiple parallel vias with heater arrays on both sides of each via as claimed. (*See* Ex. 2003 ¶¶63 and 84.) Instead, they improperly focus on the positioning of a TSR between heaters alone, using hindsight to selectively pluck this aspect from Giere '673 while ignoring the remainder of Giere '673's teachings. This is improper. *In re Dow Chem. Co.*, 837 F.2d 469, 473 (Fed. Cir. 1988); *Monarch Knitting Mach. Corp. v. Sulzer Morat GmbH*, 139 F.3d 877, 885 (Fed. Cir. 1998).

Further, Petitioners do not even address the fact that Giere '673's U-shaped TSR that they rely on has two arms that extend along the outer periphery of the region close to heaters rather than being "substantially centrally disposed with respect to the [second region]" as recited in claims 1 and 11. (POR pp. 44-45.)

Petitioners' modification of Giere '673's Fig. 5 is made out of context, ignoring that the TSR placement shown is presented within the context of Giere '673's own disclosure of 680 μm spacing from heater arrays. (*Id.*) Assuming that the 680 μm spacing is not already present in Fig. 5 is wholly unwarranted.

Unlike Benjamin and the '823 patent, the printhead die of Giere '673 does not include any ink vias, with ink instead flowing from ink reservoir 424 [blue] around the edges of the heater chip substrate 410 [yellow] and into vaporization chambers 418 [red] as shown in the figures below.

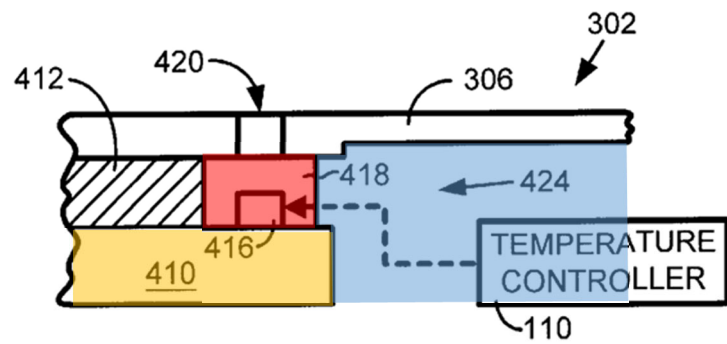


FIG. 4

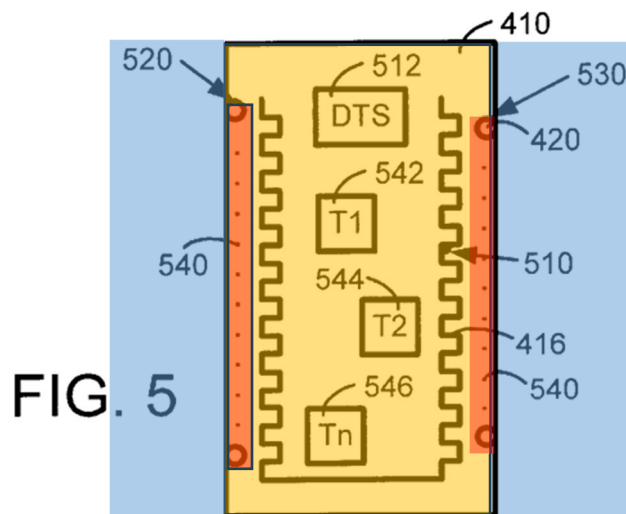


FIG. 5

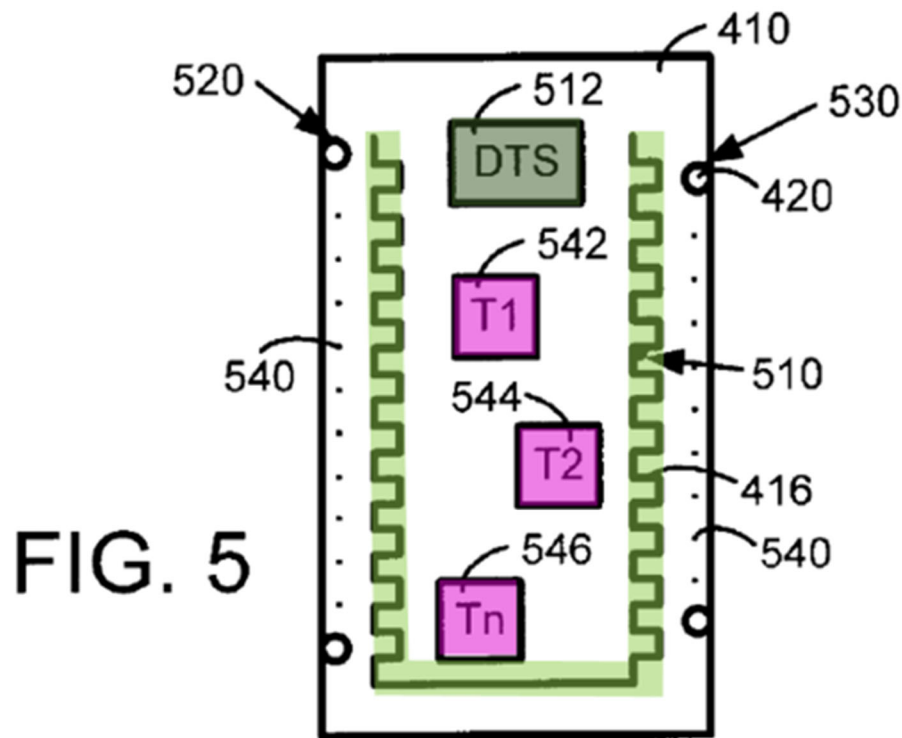
(Ex. 2003 ¶¶63; Ex. 1005 col. 5 lns 42-45.) Giere '673 teaches nothing about where to place temperature sensors in a printhead having a plurality of ink vias with heater arrays on both sides of each via as in the '823 patent. (Ex. 2003 ¶¶63 and 84.) The U-shaped TSR 510 of Giere '673 is positioned between two arrays of heaters only because those heaters are located adjacent the edge of the chip. (*Id.*) Petitioners fail to consider the combined teachings of references in context, instead using hindsight

and the '823 patent to pick and choose isolated aspects of the prior art. Further, Petitioners inconsistently argue later that a “PHOSITA would have known to add Giere673’s TSR into each region to provide more accurate temperature measurement **per color**” (PR p. 14), yet here argue that a PHOSITA would have placed a single, centrally located TSR **between two different color vias** to detect a value of the region (PR pp. 5-6). Petitioners cannot have it both ways. Either sensitive sensors would be positioned very close to individual heater arrays to detect each color or centrally to detect an average of the region as a whole. Petitioners are improperly using the '823 patent’s disclosure in hindsight to reconstruct the invention.

Petitioners’ argument that Patent Owner relies on an “errant” citation to *Par Pharm* is also inaccurate and a red herring. (PR p. 6.) Patent Owner does not argue that Giere '673 does not disclose a TSR positioned between two columns of heaters. Instead, a major problem with Petitioners’ combination is that neither Giere '673 nor Benjamin provide any teachings that would have led a PHOSITA to implement the '823 patent’s approach of monitoring regions between ink vias in a chip similar to that of Benjamin. (POR pp. 43-44.) The cited prior art not only fails to disclose all of the claimed aspects alone or in combination, Petitioners’ logic for combining the references is inconsistent with the fundamental operating principles of the cited references and relies on mischaracterizations of the prior art. (POR pp. 50-57.)

B. Giere '673 Does Not Teach Supplying Heat to Adjacent Heater Arrays Based on the Sensed Temperature Between Two Heater Arrays

Petitioners apparently concede that Benjamin teaches nothing about temperature control, which cannot be reasonably disputed given Benjamin's temperature monitoring system. (POR pp. 46-48.) Petitioners therefore rely solely on Giere '673 to argue that a PHOSITA would have implemented supplying heat to adjacent heater arrays based on the sensed temperature between heater arrays. As Patent Owner has explained, Giere '673 does not describe a temperature control system that regulates heat to adjacent heater arrays in response to the temperature sensed by the U-shaped TSR 510 emphasized by Petitioners. (POR p. 48; Ex. 2003 ¶91.) The temperature controller of Giere '673 uses not only data from TSR 510, but also inputs from several other temperature sensors and recorders, as well as past firing history, printing data from a logic mapping system, and other information to predict thermal conditions of a subset of the ink ejection elements, and to establish operating conditions so that the corresponding heating elements operate at an optimal temperature. (Ex. 2003 ¶91; Ex. 1005 col. 6 lns 5-8, col. 5 lns 28-31, col. 6 lns 35-40.) Some of the elements required for this complex system are shown below in Fig. 5 of Giere '673, including digital temperature sensor 512 [dark green], and multiple temperature recorders 542, 544, and 546 [pink]



Giere '673 uses this data and other information to generate and output printing parameters such as pulse widths, pulse rates, ink ejection chambers to be fired and when they will be fired, activation of non-ejecting changes for warming, and firing voltages optimized to improve ink drop quality. (*Id.* col. 6 lns 39-60.) All of the disclosed embodiments involve these specialized techniques for precisely controlling the firing parameters of subsets of ejection elements based on a variety of inputs. (Ex. 2003 ¶91.) Simply put, Giere '673 does not describe a temperature control system that regulates heat to two columns of adjacent heater arrays in response to the temperature sensed between them by the U-shaped TSR 510. (Ex. 2003 ¶91.) Petitioners ignore the actual operation of Giere '673 in favor of quoting

snippets about “optimum temperature” without understanding the context of those quotes. Reliance on isolated aspects of Giere ’673 is disingenuous, particularly when Petitioners also rely on alleged optimization of print quality as a motivation to combine (PR p. 9) without establishing that optimization of print quality results from the isolated aspect they have relied upon. Rather than Petitioners’ cherry-picking of particular elements with no context, a proper analysis evaluates each reference in its entirety. *In re Evanega*, 829 F.2d 1110, 1112 (Fed. Cir. 1987).

C. Giere ’673 Would Not Have Provided Motivation for the Asserted Combination of References

Petitioners argue that their theory has rested all along on the vague notion of “improved optimization of the print quality” obtained by use of a TSR between heater arrays as in Giere ’673. (PR p. 9.) Yet the words “improved optimization” are nowhere in the Petition, and neither Petitioners nor their expert even attempt to properly analyze how Giere ’673 allegedly improves “optimization of print quality” or how this improvement could be carried over to the structure of Benjamin. Instead, Petitioners simply resort to selecting discrete elements to conjure up a device that does not comport with the design or operating principles of either of the prior art references, as explained in the previous section.

Petitioners also argue that they need not present the “best” temperature sensor technique, just one that would improve Benjamin, even if the modification would unnecessarily add cost and take up space. (PR pp. 6-7.) Yet Petitioners do not even

explain how Benjamin would be “improved” by the proposed modification, instead they simply make vague statements about the “improved” print quality of Giere ’673 without acknowledging that these benefits come from a complex arrangement of multiple sensors and recording devices, and without explaining how these complex improvements could be applied to Benjamin by adding the TSR element of Giere ’673’s complex arrangement. Even if a PHOSITA were to have imported Giere ’673’s entire temperature control system, that would not have met the requirements of the ’823 claims for the reasons discussed above in Section I.B. As noted above, Petitioners’ proposed combination ignores the complex inputs and outputs of Giere ’673’s system, which controls discrete groups of ink ejectors to optimize print quality.

Petitioners’ argument that Patent Owner never argues that the combination would no longer be operable is inapposite. (PR p. 10.) For the reasons discussed above, the combination would not operate as required by the claims of the ’823 patent, and that is all that is relevant here.

Petitioners’ criticism of Mr. Dietl’s testimony about what a PHOSITA would actually have been motivated to do does not advance their position. While Petitioners argue that “neither reference uses a serpentine TSR between different regions” (PR p. 11), it is equally true that neither reference shows a single temperature sensor disposed in each region of a multi-via heater chip and that neither reference suggests

averaging temperatures detected from two or more regions located between different pairs of vias as Petitioners argue would result from the combination.

Petitioners do not address the most important point regarding motivation to combine: that they have presented backwards reasoning that a PHOSITA desiring to monitor the mean temperature of Benjamin's printhead would have also realized that placing a temperature sense resistor in only one region between heater arrays would not accurately report the mean temperature of the entire printhead due to the insulating effect of the ink vias, and consequently would have placed additional temperature sense resistors to measure other individual regions and then used those measurements to compute a mean temperature of the entire substrate in a manner that is inconsistent with Benjamin. (POR pp. 48-49.) The Petition acknowledges that it is the "temperature of the entire printhead die" that Benjamin monitors. (POR p. 48; Pet. p. 28.) Benjamin itself already discloses a single temperature sensor to achieve this, and it simply does not comport with Benjamin's design and teachings to implement a more complex and costly approach. (POR 49.) It is not a matter of the combination not being the best option; the key failing of their argument that Petitioners ignore is that their proposed combination only makes Benjamin worse and offers no corresponding benefit.

D. Giere '673 Does Not Provide Motivation to Substantially Centrally Dispose a TSR Within Each of Benjamin's Regions

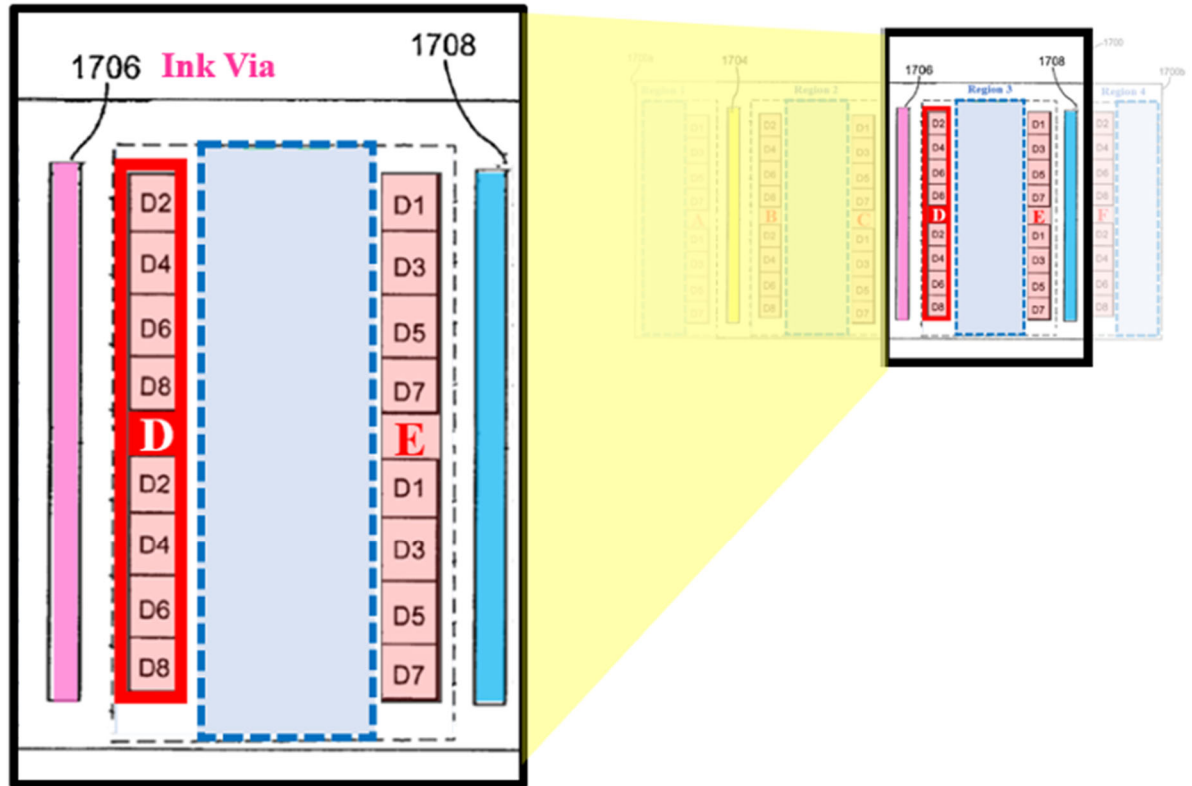
Petitioners' argument that Giere '673 suggests detecting temperature on a region-by-region basis where regions are separated by ink vias improperly relies on hindsight and conclusory testimony from their expert. Petitioners conclusorily state that to obtain vague "optimized performance," a PHOSITA would know to place a TSRs between each pair of heater arrays. (PR p. 12.) Yet Petitioners do not, and cannot, explain how Giere '673 would suggest positioning of TSRs in each region, much less substantially central positioning of TSRs in each region, to achieve "improved" print quality because they cannot connect the vague benefits of Giere '673 to central placement of a TSR in each region, as discussed above. Even if a PHOSITA were to have imported Giere '673's entire temperature control system, that would not have resulted in two heater arrays receiving heating responsive to the temperature of a shared region because, as noted above, Petitioners' proposed combination ignores the complex inputs and outputs of Giere '673's system, which controls discrete groups of ink ejectors to optimize print quality.

Petitioners do not address that their reasoning that a PHOSITA would have followed the temperature sensor arrangement taught by Giere '673 to improve the control system supposedly disclosed in Benjamin completely fails because Benjamin does not disclose any temperature control system and is not directed to optimizing ink ejector temperature. (POR pp. 52-53.)

Petitioners' argument that Patent Owner improperly analyzed each reference individually is simply incorrect. Patent Owner has addressed the combination of references, and a serious defect in Petitioners' argument is that Benjamin has only a single temperature sensor for the entire printhead die, while Giere '673 teaches nothing about detecting overall die temperature in a multi-via heater chip. Petitioners' argument that the combination of references would have led a PHOSITA to "optimize performance in each respective region" (PR pp. 13-14) is nothing more than a rehash of their earlier arguments that ignore the actual function of Giere '673 and the context of both prior art references. Petitioners' attempt to divorce the alleged optimization of performance in Giere '673 from its complex control scheme cannot simply be ignored. Moreover, Petitioners offer no evidence that Giere '673 would suggest *central* positioning of a TSR in each region. In fact, in the very next section Petitioners argue that a "PHOSITA would have known to add Giere673's TSR into each region to provide more accurate temperature measurement **per color**" (PR p. 14), which would require accurate detection of the separate arrays associated with different ink colors in each region rather than a centrally-disposed sensor detecting a temperature representative of the region as a whole.

E. Admitted Prior Art and Yabe Do Not Provide Motivation to Dispose a Single TSR Within Each Region of Benjamin's Chip

Finally, Petitioners argue that if Giere '673 failed to provide a motivation to place a TSR between each set of Benjamin's heating elements, the admitted prior art or Yabe would have provided such a motivation. Petitioners' assertion that a PHOSITA would have realized that ink vias are insulating is a red herring, because none of the prior art cited by Petitioners showing multiple vias on a single chip suggests an approach of placing a temperature sensor in each region separated by vias to detect individual regional temperatures. (POR p. 51.) Petitioners' argument is also non-responsive to Patent Owner's arguments because it conflates measurement of temperature on a per-color basis with the invention of the '823 patent. (PR p. 14.) Thus if Petitioners are correct that a PHOSITA would have wanted to "provide more accurate temperature measurement per color" (PR p. 14), the AAPA and/or Yabe never provide "motivation" to centrally dispose a TSR in each region and cause heating of both heater arrays in the region responsive to a sensed temperature of the region. As Petitioners concede, the heater arrays in each region of Benjamin are associated with different colors, as illustrated below:



(Pet. p. 38.) As the image above from the Petition shows, heater array “D” is associated with the magenta via (1706) and heater array “E” is associated with the cyan via (1708), so monitoring temperature on a per-color basis would require two distinct temperature sensors arranged to be responsive to one but not both of the heater arrays in the region.

Petitioners also mischaracterize Patent Owner’s arguments by stating that the principal contention is that ink vias were not known to act as thermal barriers and that the admitted prior art is “off limits.” (PR pp. 15-16.) While the ’823 patent does not admit that this was known in the prior art, the more significant point is that prior art that does recognize that parallel ink vias insulate regions between those vias from

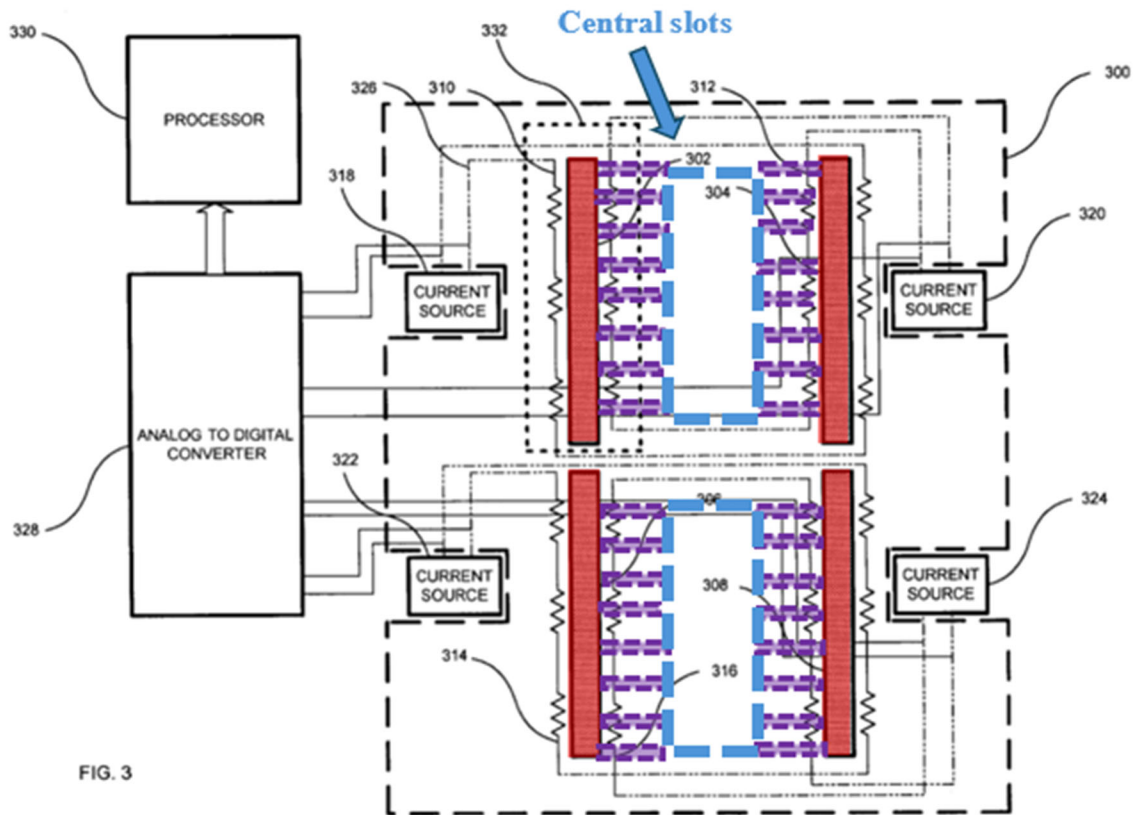
one another does not suggest monitoring the temperature of each region, and instead **avoids** placement of temperature sensors between ink vias altogether. This is clearly demonstrated by Yabe (Ex. 1008). Petitioners' extensive arguments that Yabe recognized that ink vias act as thermal insulators therefore completely miss the point. (PR p. 16.) Yabe recognizes that ink vias can be insulating, and in response does the exact opposite of what Petitioners suggest. (POR p. 51.) Petitioners' arguments are based on pure hindsight, not representative of what a PHOSITA would have recognized and done at the time of the '832 patent.

II. BENJAMIN AND GIERE '178 WOULD NOT RENDER THE CLAIMS OBVIOUS (GROUND 3)

A. Giere '178 Does Not Include a Plurality of Ink Vias on a Single Heater Chip

Nothing in Petitioners' Reply supports their contention that Giere '178 discloses four ink feed slots in elongated regions 302, 304, 306, and/or 308. Petitioners' main argument to the contrary relies on a single, vague reference to "feed slots." (PR p. 20.) Petitioners then assume that the four elongated regions include a feed slot for no reason other than their rectangular shape. Yet Giere '178 unequivocally states that "regions 302, 304, 306, and 308 each include an array of nozzles and associated firing resistors for ejecting ink." (POR p. 59; Ex. 1007 col. 8, lns 47-49.) Giere '178 never states or implies that these regions further include their own separate ink via, or more than one column of firing resistors [heaters]. (*Id.*)

Petitioners simply cannot show that the plural “s” that they emphasize supports their interpretation of the reference as disclosing four feed slots on the same heater chip in a very specific arrangement relative to illustrated temperature sensors. Petitioners read far too much into a statement that “[a]lthough not shown in FIG. 3 for ease of illustration, substrate 300 includes the structures of a typical printhead such as, ink feed slots, ink ejection chambers, firing resistors, etc.” (Ex. 1007 col. 8 lns 44-47.) It is unclear if the plural “ink feed slots” language was intentional, but even if it was, the term “slots” likely refers only to the fact that there are multiple slots across multiple separate printheads or that a central ink slot may be divided into multiple slots with the same overall configuration. **In fact, as Patent Owner previously indicated, there are two central areas in the chip electrical schematic depicted in Fig. 3 of Giere ’178 where an elongated hole can be located between the regions 302, 304, 306, 308 without interfering with the TSR traces identified by Dr. Pond.** (Ex. 2003 ¶75.) The below image of Fig. 3 has been annotated to show a separate ink slot in each of these two central regions:



(Ex. 1007 Fig. 3, annotated.) Dr. Pond is unable to point to a single passage from Giere '178 that describes the rectangular regions 302, 304, 306, and 308 as having multiple heater arrays separated by an ink via. (Ex. 2004 ¶¶95-96.)

Structure aside, Petitioners fail to rebut that a PHOSITA would appreciate the operational benefits of the disclosed temperature monitoring system of Giere '178. (POR pp. 59-60) In particular, a PHOSITA would understand that each array of firing resistors generates heat that contributes to substrate temperature in the adjacent regions, and temperature sensor 310 extends through two outer regions between a single heater array (302 or 304) and a substrate edge, and the temperature

of each outer region is impacted mainly by the corresponding adjacent heater array. (Ex. 2003 ¶100.) Temperature sensor 312 extends through a central region between both heater arrays 302 and 304 where the temperature is affected by heat generated by both adjacent arrays. (*Id.*) Because the temperatures of the outer and central regions can differ, monitoring those regions separately provides useful data and Giere '178 provides a way to achieve this. (*Id.*) Temperature sensors 314 and 316 similarly provide temperature data for the regions separated by heater arrays 306 and 308, which may differ from the data detected from the other regions. As Mr. Dietl explains, this temperature monitoring scheme provides additional utility by generating temperature data on the side of the array near the ink feed (310 and 314 in the case of edge feed or 312 and 316 in the case of a center feed) and separate temperature readings on the side further away from the ink feed (312 and 316 in the case of edge feed or 310 and 314 in the case of a center feed). (Ex. 2003 ¶100.) This makes the chip readily adaptable to both of the disclosed ink supply approaches. (*Id.*) Thus, the layout of the temperature monitoring system disclosed in Giere '178 makes perfect sense in the context of what the reference actually discloses and would not have suggested a different chip design in which each region has two independent heater arrays supplied by an intervening ink via. (*Id.*)

Petitioners do not rebut Mr. Dietl's above testimony regarding the temperature monitoring scheme of Giere '178 and its flexibility with respect to the two described ink delivery approaches. Instead, they simply attempt to bolster their obviously incorrect interpretation of Giere '178 with evidence that does not support their position. For instance, Petitioners incorrectly argue that Giere '178 discloses dual compartment cartridges as an "alternative" to the center feed and edge feed designs. (PR p. 20.) The number of compartments in an ink cartridge does not dictate the number or placements of ink vias in a heater chip, as admitted by Petitioners' expert:

Q. Is it impossible for a cartridge to include multiple chips?

A. Not impossible.

(Ex. 2004 83:4-6.) Petitioners quote a passage stating that two cartridges may collectively supply four inks (i.e. two inks per cartridge) (PR p. 20), indisputably showing that Giere '178 is not intended to show a single chip with ink slots for four different colors.

Petitioners' criticism of Mr. Dietl's "re-drawing of Fig. 3" as wasteful is irrelevant. Giere '178 says what it says regardless of whether Dr. Pond disparages its design. His criticism only demonstrates why a PHOSITA would not have combined Giere '178 with other references due to its shortcomings.

Dr. Pond also admitted at deposition that Giere '178 never actually describes a 4 ink slot design. (Ex. 2004 85:6-15.) While Petitioners also attempt to rely on incorporation by reference of Axtel, **Axtel fails to show the 4-quadrant design alleged by Petitioners, and instead shows side-by-side ink slots.** (PR p. 21.)

In a desperate attempt to prop up their misinterpretation of Giere '178, Petitioners impermissibly turn to new prior art references not included in the original Petition. (PR pp. 18-21.) While Petitioners attempt to portray this as new evidence supporting their interpretation of Giere '178, Petitioners are in fact presenting a new prior art combination. As such, Petitioners' arguments regarding these new references must be disregarded. *See Wasica Fin. GmbH v. Cont'l Auto. Sys.*, 853 F.3d 1272, 1286 (Fed. Cir. 2017) ("Shifting arguments [from the petition to new theories of obviousness in the reply] is foreclosed by statute, our precedent, and Board guidelines."); *Bank of America, N.A. v. Nant Holdings IP, LLC*, IPR2021-01332, Paper 40 at 30 (PTAB Jan. 9, 2023) (new argument in Reply that a figure discloses a particular embodiment is belated is not entitled to consideration). Even if the new prior art is not considered part of a new combination *per se* (even though it is, and clearly relies on structure of the new references that is not in Giere '178), the Board should refuse to consider Petitioners' new rationale for interpreting Giere '178. *Intelligent Bio-Systems, Inc. v. Illumina Cambridge, Ltd.*, 821 F.3d 1359, 1370 (Fed. Cir. 2016)("[W]e find that the Board did not err in refusing the reply brief as

improper under 37 C.F.R. § 42.23(b) because [Petitioners] relied on an entirely new rationale to explain why one of skill in the art would have been motivated to combine [the prior art references].”) In fact, these new arguments justify ignoring Petitioners’ Reply in its entirety. *Id.* at 1369 (“Once the Board identifies new issues presented for the first time in reply, neither this court nor the Board must parse the reply brief to determine which, if any, parts of that brief are responsive and which are improper.”).

Additionally, these new references are not related in any way to Giere ’178, and cannot change what Giere ’178 actually teaches. Reliance on these new prior art references is simply a *post hoc* attempt to justify Petitioners’ misinterpretation of Giere ’178. A PHOSITA would not backfill in undisclosed structural details based on operational aspects of the temperature monitoring system that are also not described in Giere ’178. (Ex. 2003 ¶100.)

Petitioners’ impermissible new prior art also fails to support their interpretation of Giere ’178 in any way. Despite Petitioners’ allegation that Dr. Pond described how this new prior art supports his opinions “in great detail” at his deposition, Dr. Pond actually said very little about these references other than making a vague comparison of their drawings to Fig. 3 of Giere ’178, devoid of any context. (Ex. 2004 126:12 – 133:3.) One of ordinary skill in the art would not have

consulted other unrelated documents when Giere '178 clearly describes the two options for ink feed positions (center feed and edge feed).

Finally, Petitioners' argument that Dr. Pond's criticism of TSRs crossing the center of the chip in Fig. 3 are not inconsistent with other electrical lines crossing rectangular regions 302/304/306/308 is misplaced. Petitioners do not explain the relevance of their argument that connections from the analog to digital converter are "off-chip connections." The electrical connections are still traversing the chip of Fig. 3 in the same manner that the TSRs do. Further, as discussed above, Patent Owner's interpretation (supported by the testimony of Mr. Dietl) is consistent with a central feed slot that is divided in two in order to allow passage of the TSRs across the center of the chip.

B. Ground 3 Fails Because the Alleged Motivations to Combine Are Illogical and Are Based on Inaccurate Characterizations of the References

Petitioners' Reply does not show that the alleged combination of Benjamin and Giere '178 would have resulted in the claimed invention that provides heating responsive to the sensed temperature of a region. As Patent Owner previously discussed, Petitioners' discussion of the alleged purpose of Giere '178's system to detect localized temperature deviations and to react by controlling firing pulses for particular firing resistors does not comport with their stated motivation to modify Benjamin in the first place, which is to measure "the mean temperature of

Benjamin's entire printhead die." (POR pp. 62-63.) Petitioners respond by stating that "Giere 178 purposefully applies heating pulses to only one of the heater arrays at a time to hereby sense a temperature representative of each." (PR p. 25.) In other words, Petitioners argue that Giere '178 pulses the heaters and then determines the temperature resulting from that pulse. They do not explain why Giere '178 would motivate a PHOSITA to provide heating in response to the sensed temperature of a region. Further, even if only one array is pulsed at a time, a temperature sensor extending through the region that is pulsed would not detect a temperature representative of that region, it would detect a temperature that is an average between that region and the unheated region. Thus, their alleged distinction based on selective pulsing only reinforces Patent Owner's position.

In addition, Petitioners fail to explain how their misreading of Giere '178 would have led a PHOSITA to place a TSR in the center of every region of Benjamin. Petitioners simply suggest, without explanation, that a PHOSITA would have selected Giere '178's temperature sensors, which are not centrally disposed but rather run along both sides of the heater arrays. As discussed above in Section II.A., Mr. Dietl explained that Giere '178's temperature monitoring scheme provides utility by generating temperature data on the side of the heater array near the ink feed and separate temperature readings on the side further away from the ink feed in a chip with a single ink feed slot or no ink feed slots. (Ex. 2003 ¶100.) Petitioners

do not at all explain how a PHOSITA would have moved from such a monitoring scheme to one with a sensor substantially centrally disposed in each region.

III. THE PETITION FAILS TO ESTABLISH THAT ANY CLAIMS WOULD HAVE BEEN OBVIOUS IN VIEW OF GIERE '673 AND YABE (GROUNDS 4-5)

A. Petitioners' Argument that "Both Yabe and Giere'673 Teach Disposing a Temperature Sensor in Each Thermal Region" is Clearly False.

Petitioners' brief argument that Yabe and Giere '673 both disclose a temperature sensor in each thermal region between heater arrays makes no sense. According to their own Petition, Yabe does not explicitly disclose placing temperature sensors centrally within regions between the parallel ink vias and heater arrays of its printhead but Petitioners argue that Giere '673 (which does not have ink vias) discloses a temperature sensor between heater arrays a PHOSITA allegedly would have modified Yabe's printhead. (Pet. p. 88-92.) However, for the same reasons discussed above with respect to Ground 1, Giere '673 would have taught a PHOSITA nothing about the positioning of temperature sensors in a multi-via heater chip.

B. Giere '673 Does not Teach Where to Dispose a Temperature Sensor in a Heater Chip with Multiple Ink Vias.

For the reasons discussed above in Sections I.A., I.C., and I.D., Petitioners fail to explain why there would have been any motivation to modify Yabe in view of Giere '673. Yabe already monitors the average temperature of the printhead die,

avoiding detection of temperature between ink vias altogether. Giere '673 provides no indication that duplicating its sensor in each thermal region of Yabe would provide any benefit. Instead, Petitioners' proposed combination would offer nothing but disadvantages and inefficiencies. As in Ground 1, Petitioners rely on supposed advantages of Giere '673's complex temperature monitoring scheme without showing that those advantages could be carried over to Yabe by simply plucking out a single element of Giere '673's complex system and duplicating it in each region of Yabe. Simply parroting general advantages of Giere '673's system without showing that they result from the one specific element that Petitioners propose taking from that reference is simply not enough.

C. Giere '673 Does Not Teach Supplying Heat to Adjacent Heater Arrays Based on the Sensed Temperature of the Region Between Two Heater Arrays.

As discussed in detail in Section I above, Giere '673 does not describe a temperature control system that supplies heat to two columns of adjacent heater arrays in response to the temperature sensed between them by the U-shaped TSR 510. (Ex. 2003 ¶91.) As a result, placing Giere's U-shaped sensor in each region of Yabe would not perform this function, either. Petitioners have done nothing but ignore the actual operation of Giere '673 in favor of quoting snippets about "optimum temperature" without understanding the context of those quotes. Rather

than Petitioners' cherry-picking of particular elements with no context, a proper analysis evaluates each reference in its entirety. *In re Evanega*, 829 F.2d at 1112.

D. Giere '673 and Yabe's Collective Failure to Disclose Sensing Temperatures within Each Region of a Multi-Via Chip is Significant.

Yabe avoids placement of temperature sensors between ink vias altogether. (Ex. 1008.) Giere '673 teaches nothing about where to place temperature sensors in a printhead having a plurality of ink vias with heater arrays on both sides of each via as in the '823 patent. (Ex. 2003 ¶¶63 and 84.) The notion that a PHOSITA would have modified the multi-via chip of Yabe in view of the layout of Giere is absurd. Petitioners' failure to consider Giere '673 for all that it teaches only hurts their analysis. As discussed in Ground 1, they have shown no link between the cherry-picked aspects of Giere '673 that they rely on and the purported benefits of that reference.

E. Giere '673 and Yabe Do Not Provide Motivation to Make the Combination.

Petitioners do nothing to rebut Patent Owner's arguments regarding motivation to combine but refer to their arguments in Ground 1. For the variety of reasons discussed above in Section I, neither Yabe nor Giere '673 would have led a PHOSITA to combine those two references in the manner alleged by Petitioners.

IV. CONCLUSION

For the reasons described above, and because Petitioners have not shown that any of the challenged claims are unpatentable, the Board should affirm their patentability.

Respectfully submitted,
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CERTIFICATE OF WORD COUNT

The undersigned hereby confirms that the foregoing PATENT OWNER SUR-REPLY 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 Sur-Reply contains 5,304 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 SUR-REPLY was served this 25th day of March, 2024, by e-mail upon the following:

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