



Petitioner Canon's Demonstratives

Canon U.S.A. Inc., and Canon Inc. v. Slingshot Printing LLC,

IPR2023-00309

U.S. Patent No. 7,290,864

I.

Overview of the '864 Patent

II.

Ground 1: Benjamin '144 and Benjamin '703

III.

Ground 2: Benjamin '144 and Benjamin '703 in view of Childers

IV.

Ground 3: Uenishi

V.

Ground 4: Uenishi in view of Hayasaki

Overview of the '864 Patent

Canon's Demonstratives, not evidence

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Ex.1001, Fig. 3



The '864 Patent

FIG. 1 is a block diagram of the configuration of heater arrays and routing of the connections to bondpads on a heater chip with only one ink via as it exists in the prior art.

a droplet of ink. Notably, in the prior art configuration of FIG. 1, each bondpad 102 sends current through its respective power trace 104 only to the heater array 106 that is on the same side of the ink via 108 as the bondpad 102 itself.

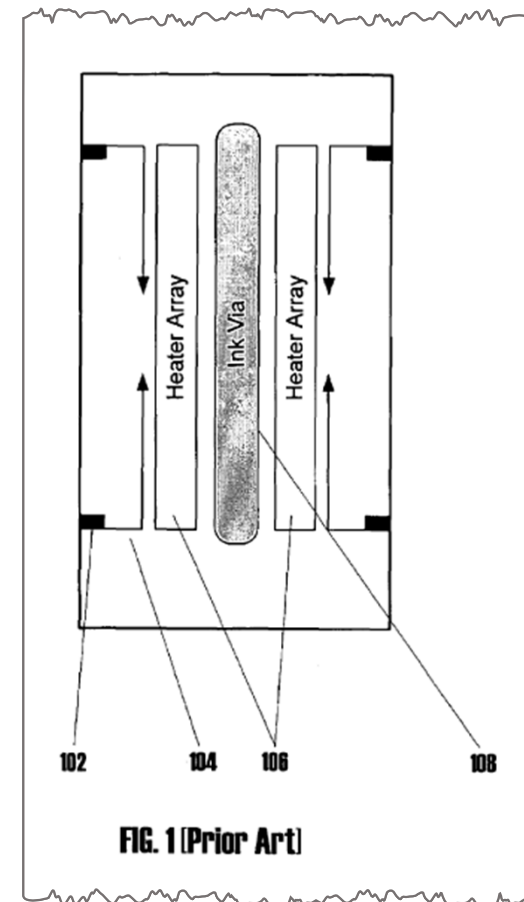


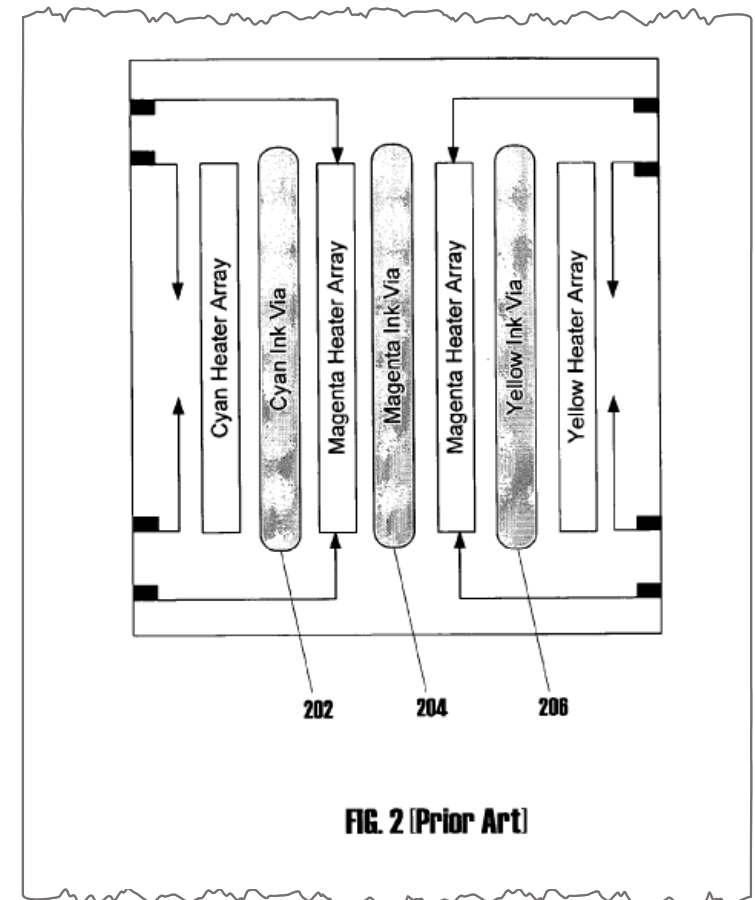
FIG. 1 (Prior Art)

Canon's Demonstratives, not evidence

The '864 Patent

FIG. 2 is a block diagram of the configuration of heater arrays and routing of the connections to bondpads on heater chips with multiple ink vias as they exist in the prior art.

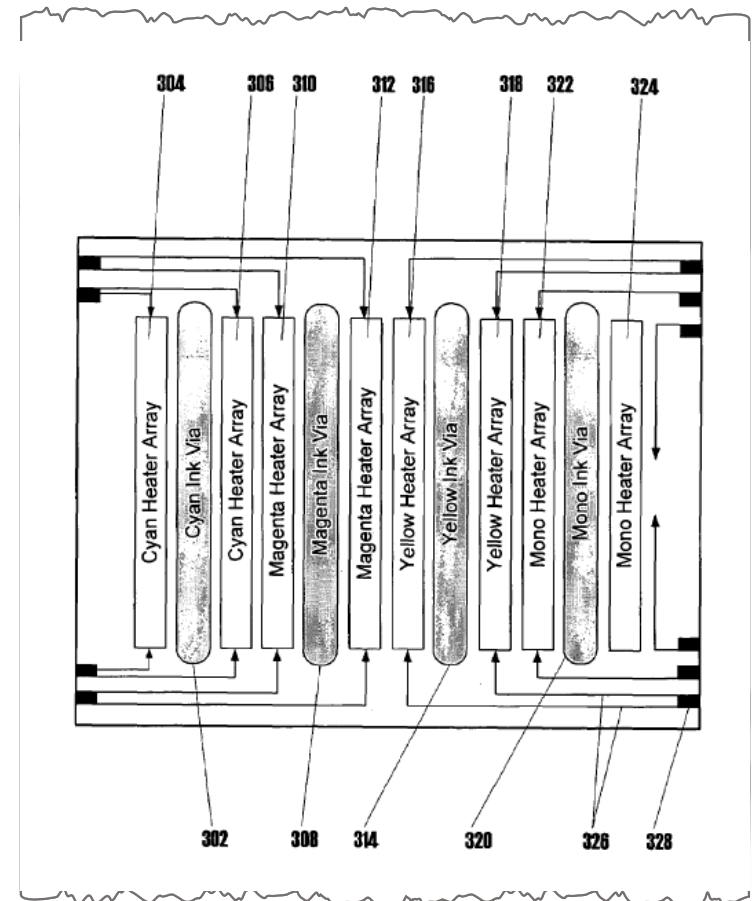
yellow ink via 206. As they exist in the prior art, the CMY (Cyan, Magenta, Yellow) color heater chip's bondpads supply power only to the heater array that is on the same side of the ink via as the bondpad itself. These conventional designs shown in FIGS. 1 and 2 are undesirable because chip bondpads consume chip area, as do the on-chip routing of power from the bondpads to the heater arrays.



The '864 Patent

FIG. 3 shows a block diagram of the configuration of heater arrays and routing of the connections to bondpads on a heater chip with multiple ink vias in accordance with an illustrative embodiment of the present invention.

power balance across the array. To save space on the heater chip, a bondpad 328 may be configured to supply power to the portions of two or more different arrays of heaters. For example, a bondpad may be configured to supply current to the top or bottom halves of two different heater arrays through the use of multiple power traces stemming from that bondpad. This configuration maintains the maximum current



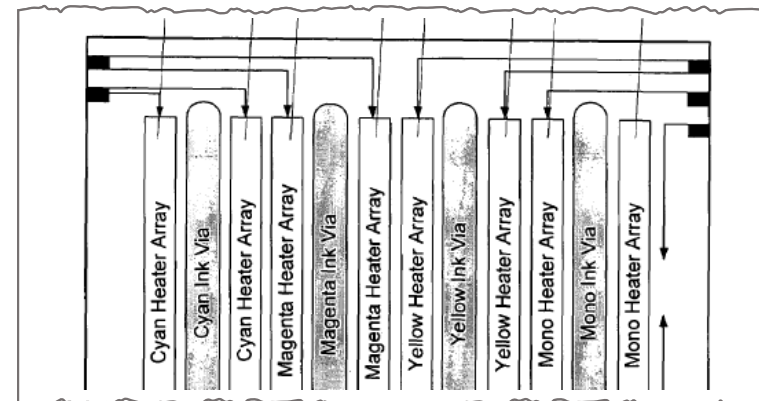
Canon's Demonstratives, not evidence

The '864 Patent

1. A heater chip for use in a printing device, comprising:
an ink via;
a first heater array adjacent at least a portion of one side of the ink via;
a second heater array adjacent at least a portion of another side of the ink via; and
a bondpad, wherein the bondpad supplies power to at least a portion of the first heater array and to at least a portion of the second heater array.

16. A heater chip comprising:
at least eight heater arrays, wherein the at least eight heater arrays comprise four heater array pairs, and wherein the arrays in each of the heater array pairs are disposed substantially adjacent opposing sides of at least a portion of an ink via; and
a plurality of bondpads operatively connected to the at least eight heater arrays, wherein at least one of the plurality of bondpads is operatively connected to both heater arrays within one of the heater array pairs.

8. A heater chip for use in a printing device, comprising
an ink via;
a first heater array and a second heater array adjacent at least a portion of the ink via, wherein the ink via is positioned between the first heater array and the second heater array; and
a bondpad having at least two traces stemming from the bondpad, wherein at least one of the traces is operatively connected to the first heater array and at least another one of the traces is operatively connected to the second heater array.

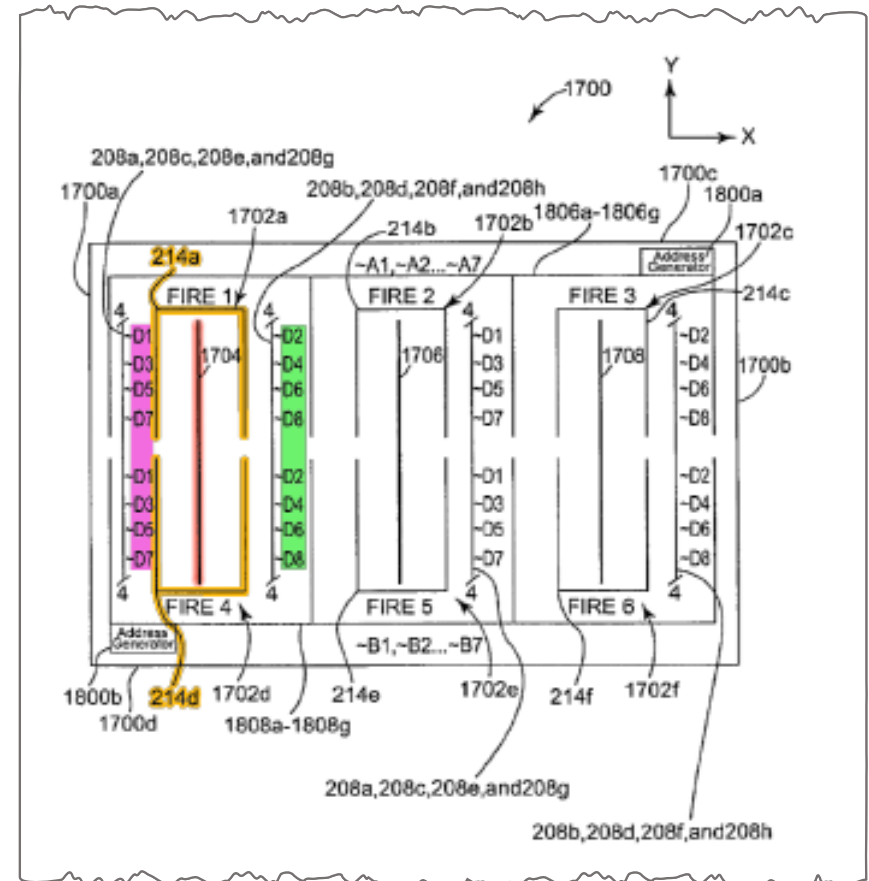


Canon's Demonstratives, not evidence

Benjamin '144

Fire groups 1702a-1702f and fire lines 214a-214f are laid out along ink feed slots 1704, 1706 and 1708 to achieve a suitable energy variation. The pre-charged firing cells 120 in a fire group 1702a-1702f are located along opposing sides of an ink feed slot 1704, 1706 or 1708. Instead of having all pre-charged firing cells 120 in a fire group 1702a-1702f along the entire length of one side of an ink feed slot 1704, 1706 or 1708, the pre-charged firing cells 120 in a fire group 1702a-1702f are located along half of the length of each of the opposing sides of an ink feed slot 1704, 1706 or 1708. The

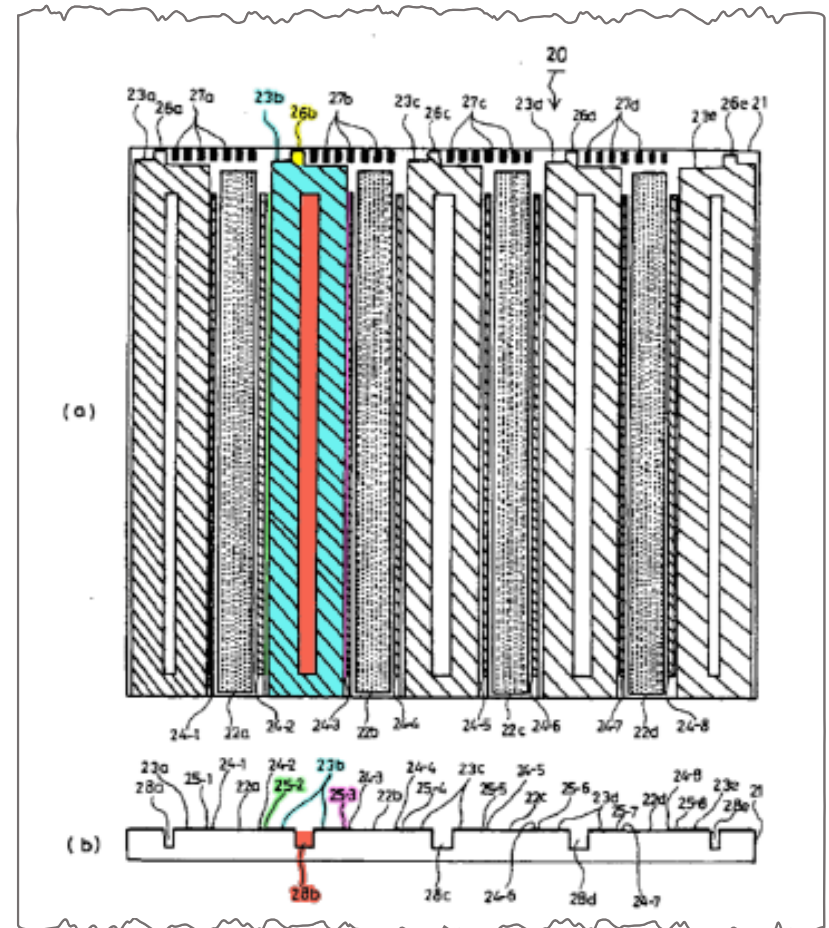
as only a single firing resistor 52 is energized, where the first firing resistor 52 is the firing resistor 52 nearest the bond pad receiving the energy signal FIRE1, FIRE2 . . . FIRE6. The



Uenishi

By thus sharing a drive circuit, electricity-feed circuit, and ink supply channel between two orifice columns, this embodiment can shrink the chip size without increasing the size of the thermal inkjet head and achieve double the conventional nozzle columns virtually without changing the conventional size. Also, a high-precision thermal inkjet head that has double the resolution using conventional miniaturization technology can be practically constituted.

To these five common electrodes 23a–23e, electricity-feed terminals 26a–26e are formed linked respectively to them, while the drive circuit terminals 27a–27d are formed connected to their respective four drive circuits 22a–22d.



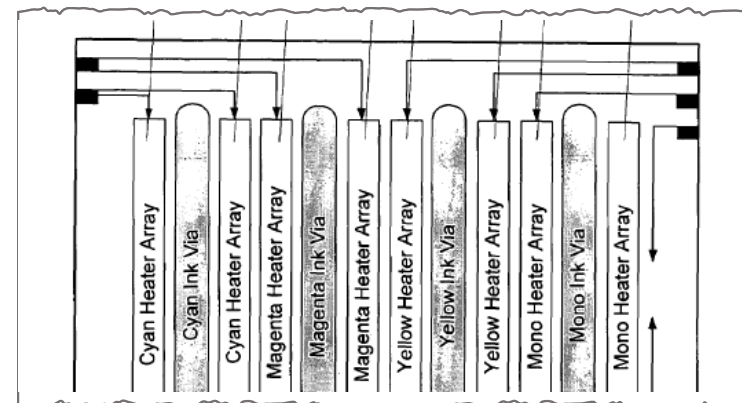
Claim Construction: “Bondpad”

The '864 Patent: The Bondpad Limitation

1. A heater chip for use in a printing device, comprising:
an ink via;
a first heater array adjacent at least a portion of one side of the ink via;
a second heater array adjacent at least a portion of another side of the ink via; and
a bondpad, wherein the bondpad supplies power to at least a portion of the first heater array and to at least a portion of the second heater array.

16. A heater chip comprising:
at least eight heater arrays, wherein the at least eight heater arrays comprise four heater array pairs, and wherein the arrays in each of the heater array pairs are disposed substantially adjacent opposing sides of at least a portion of an ink via; and
a plurality of bondpads operatively connected to the at least eight heater arrays, wherein at least one of the plurality of bondpads is operatively connected to both heater arrays within one of the heater array pairs.

8. A heater chip for use in a printing device, comprising an ink via;
a first heater array and a second heater array adjacent at least a portion of the ink via, wherein the ink via is positioned between the first heater array and the second heater array; and
a bondpad having at least two traces stemming from the bondpad, wherein at least one of the traces is operatively connected to the first heater array and at least another one of the traces is operatively connected to the second heater array.



Canon's Demonstratives, not evidence

Claim Construction: Bondpad

Canon

Petitioner

Plain and ordinary meaning

Petition at 6; Reply at 2-4

**Slingshot
Printing**

Patent Owner

“bondpad” should be limited to “the structures shown in Figs. 1-3 of the '864 patent which illustrate...**relatively large bondpads**”

POR at 18

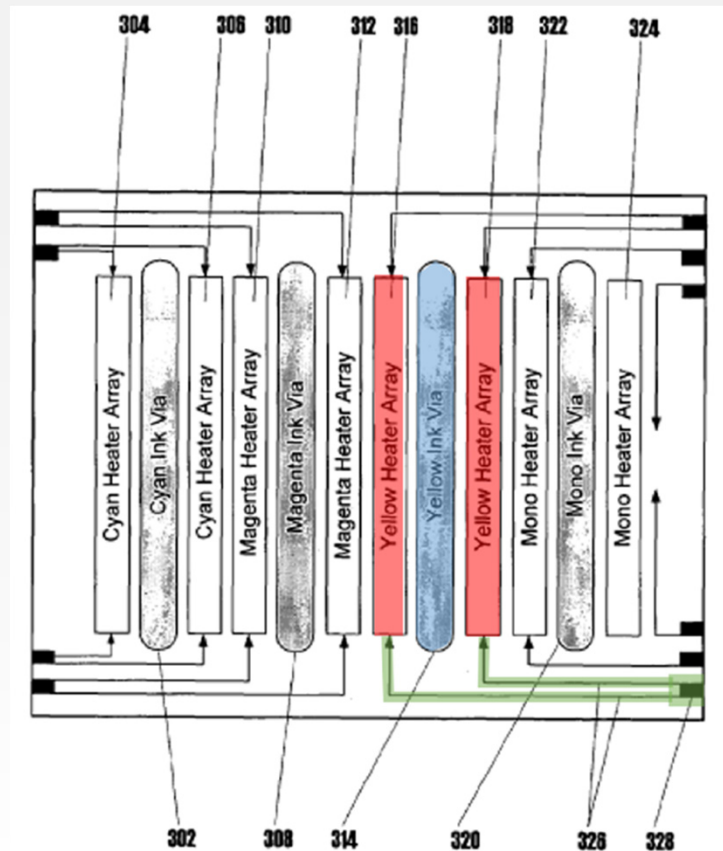
Pet. at 6; Reply at 2-4; POR at 18

Canon's Demonstratives, not evidence

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Claim Construction: Bondpad

Slingshot Printing Patent Owner



Slingshot's Additional Requirements for "Bondpad"

Slingshot Printing

Patent Owner

Bondpad 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]." POR at 19, Sur-Reply at 1

"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.**" PO Sur-Reply at 1.

Slingshot Attempts to Avoid Prior Art Using Claim Construction

The Canon logo is displayed in red, bold, sans-serif font.

Petitioner

1. PO adds “relatively large” and “connecting external structures” limitations found nowhere in the claim
2. PO’s construction imports limitations from figures that are “a schematic representation”
3. PO adds language in an attempt to overcome prior art

Claim Construction: Bondpad



“it is improper to read limitations from a preferred embodiment described in the specification—even if it is the only embodiment—into 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)

Claim Construction: Bondpad



*Patent Owner's Expert
Steven Dietl*

Q. ...the patent doesn't impose a restriction on the size of the bondpad relative to a power trace?

A. I said **the patent does not address the size of the bond pad relative to the power trace**, but as a PHOSITA, you know, it's **typically** larger than the power trace, **in my experience**.

Ex.1015, 61:1-20

Claim Construction: Bondpad



*Patent Owner's Expert
Steven Dietl*

Q. 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."

Ex-1015, 37:1-5

Claim Construction: Bondpad



*Patent Owner's Expert
Steven Dietl*

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...**"

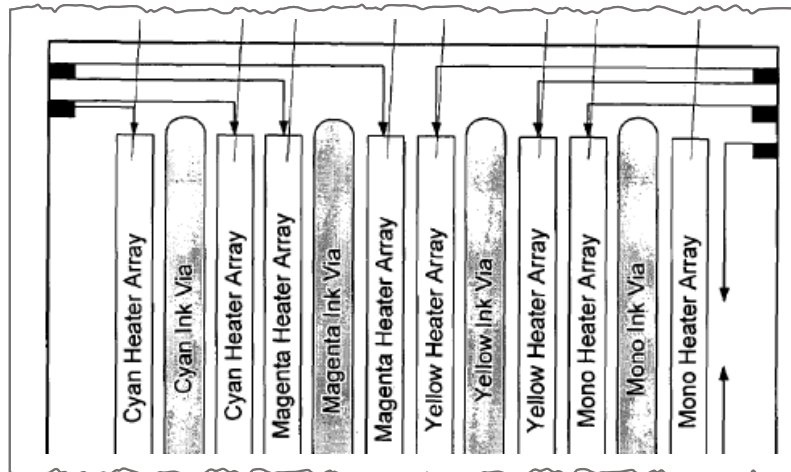
Ex-1015, 59:12-19

Claim Construction: “Traces/Power Traces”

The '864 Patent: Traces/Power Traces

3. The heater chip of claim 1, wherein the bondpad supplies power to the first heater array and the second heater array portions by **power traces** physically separated proximal to the bondpad.

5. The heater chip of claim 1, wherein the bondpad supplies power to the first heater array and the second heater array by at least one **power trace**.



8. A heater chip for use in a printing device, comprising an ink via;

* * *

a bondpad having at least **two traces** stemming from the bondpad, wherein at least one of **the traces** is operatively connected to the first heater array and at least another one of **the traces** is operatively connected to the second heater array.

9. The heater chip of claim 8, wherein the at least **two traces** are physically separated proximal to the bondpad.

15. The heater chip of claim 8, further comprising:
another ink via disposed between a third heater array and a fourth heater array; and
a second bondpad coupled to **a trace** that is operatively connected to the third heater array and to a trace that is operatively connected to the fourth heater array, wherein **the traces** coupled to the second bondpad are physically separated proximal to the second bondpad.

Claim Construction: Traces/Power Traces

Canon

Petitioner

Plain and ordinary meaning

Petition at 6; Reply at 4-5

**Slingshot
Printing**

Patent Owner

“‘power traces’ are **relatively narrow structures**”
and “Fig. 3 of the ’864 patent shows narrower
connections (326) referred to as ‘power traces’
extending from a relatively larger **bondpad** (328)”

POR at 39-40

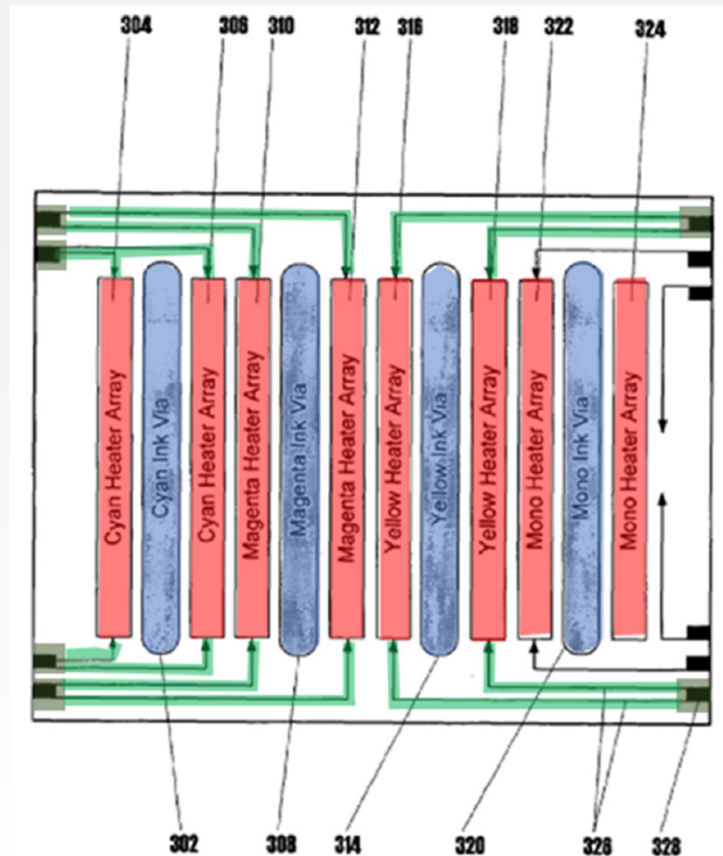
Pet. at 6; Reply at 4-5, POR, 39-40

Canon’s Demonstratives, not evidence

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Claim Construction: Traces/Power Traces

**Slingshot
Printing**
Patent Owner



Slingshot Attempts to Avoid Prior Art Using Claim Construction

The Canon logo is displayed in red text on a white background.

Petitioner

1. PO adds a “relatively small” limitation found nowhere in the claim
2. PO’s construction imports limitations from figures that are “a schematic representation”
3. PO adds language in an attempt to overcome prior art

Claim Construction: Bondpad



“it is improper to read limitations from a preferred embodiment described in the specification—even if it is the only embodiment—into 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)

Claim Construction: Power Traces



*Patent Owner's Expert
Steven Dietl*

Q. 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."

Ex-1015, 37:1-5

Claim Construction: “Physically Separated Proximal to the Bondpad”

Canon’s Demonstratives, not evidence

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The '864 Patent: Physically Separated Proximal to the Bondpad

3. The heater chip of claim 1, wherein the bondpad supplies power to the first heater array and the second heater array portions by power traces physically separated proximal to the bondpad.

9. The heater chip of claim 8, wherein the at least two traces are physically separated proximal to the bondpad.

Claim Construction: Physically Separated Proximal to the Bondpad

Canon

Petitioner

The part of the trace that is near the bondpad

Reply at 5-8

**Slingshot
Printing**

Patent Owner

“nearer to the bondpad than the heater arrays”

POR at 18

Reply at 5-8; Ex.2005 at 16:20-17:20; POR at 18

Canon’s Demonstratives, not evidence

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“Physically Separated Proximal to the Bondpad”

**Slingshot
Printing**
Patent Owner

“the only structures identified in the claims as having a relationship to the power traces are the bondpad and **heater arrays (not individual heaters).**”

PO Sur-Reply at 6

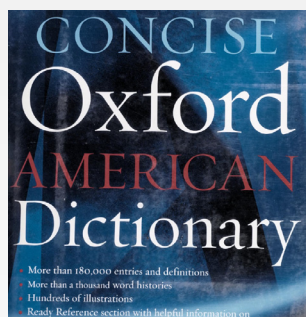
Slingshot Attempts to Avoid Prior Art Using Claim Construction

The Canon logo is displayed in red text on a white background.

Petitioner

1. PO's construction improperly imports a "nearer to the bond pad ***than the heater arrays***" limitation to attempt to overcome prior art
2. PO's construction is inconsistent with the claims and its own dictionary
3. PO's construction injects ambiguity into the claims

“Physically Separated Proximal to the Bondpad”



*Ex.2001/
Ex.1016*

Proximal: “**situated nearer** to the center of the body or **the point of attachment.**”

Distal: “**Situated away from** the center of the body or from **the point of attachment**”

Ex.2001 at 3; Ex. 1016 at 3

“Physically Separated Proximal to the Bondpad”



*Petitioners Expert
Dr. Steven Pond*

“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.” Ex-2005, 16:24-17:2

“I look at **where that separation point is relative to the start and the finish...**” Ex.2005, 17:13-15

“**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.**” Ex.2005, 17:17-20

“Physically Separated Proximal to the Bondpad”

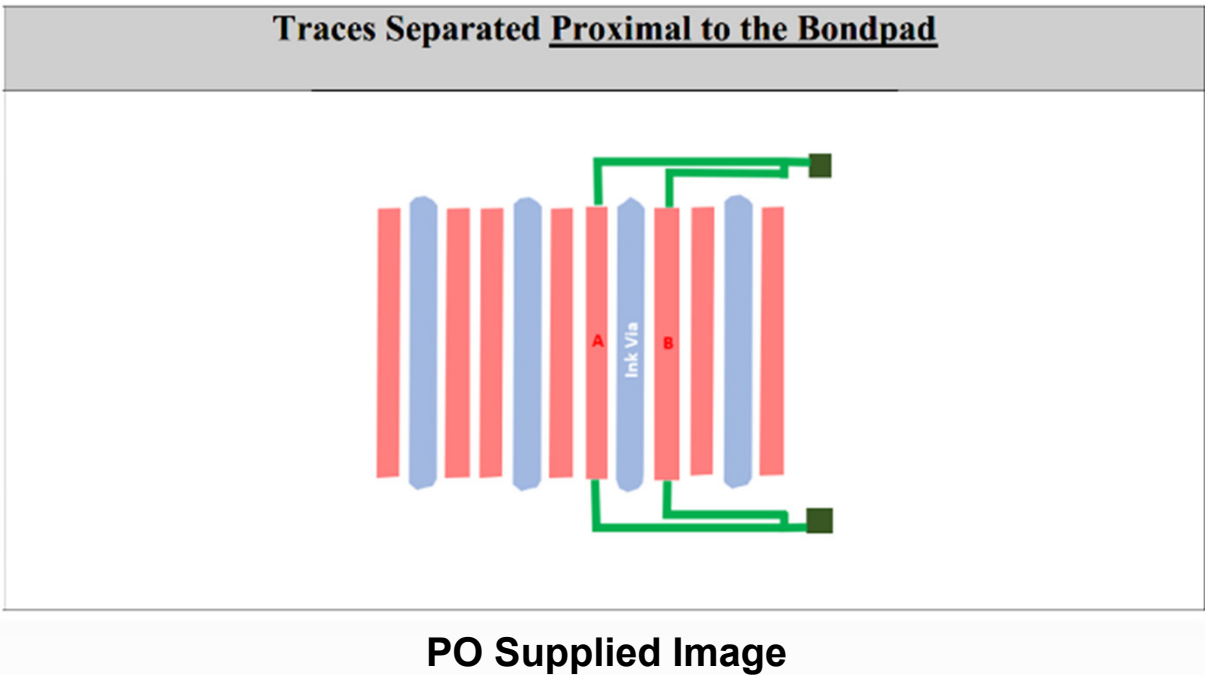
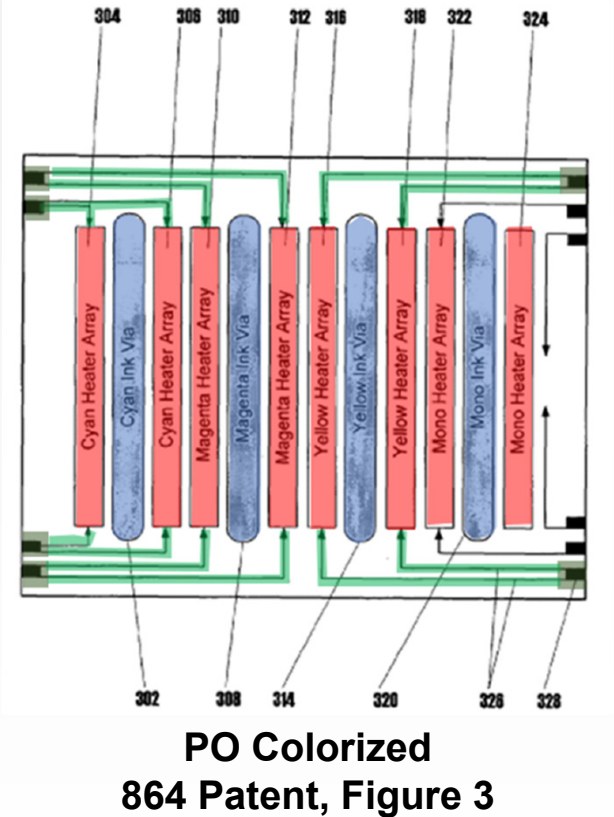


*Patent Owner's Expert
Steven Dietl*

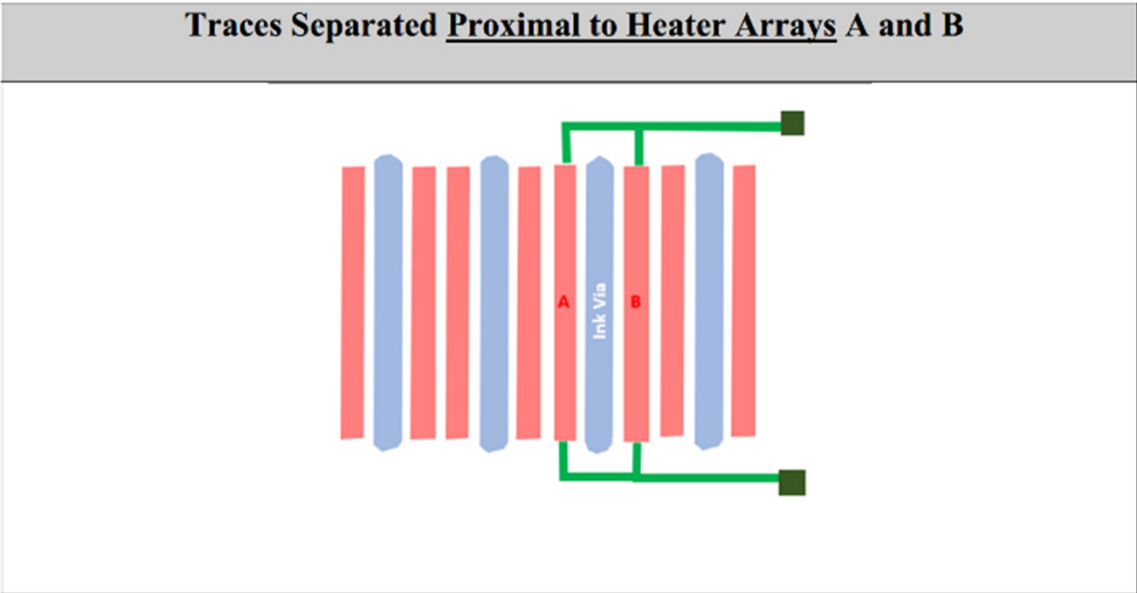
A. ...you would strive to minimize parasitic resistance down the length of the array...

Ex.1015, 78:4-6

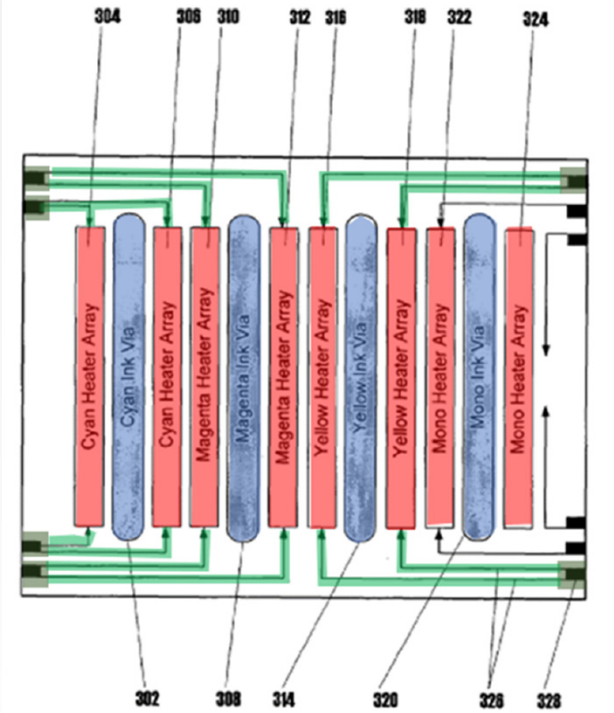
Slingshot Creates New Figures Not Disclosed in the 864 Patent



Slingshot Creates New Figures Not Disclosed in the 864 Patent



PO Supplied Image



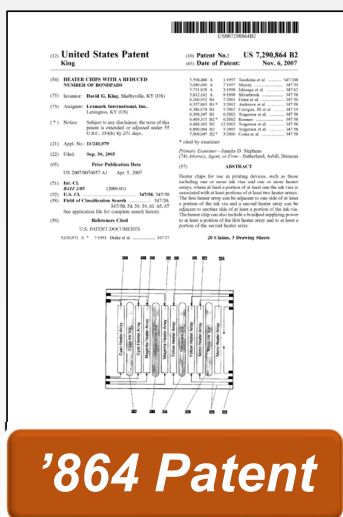
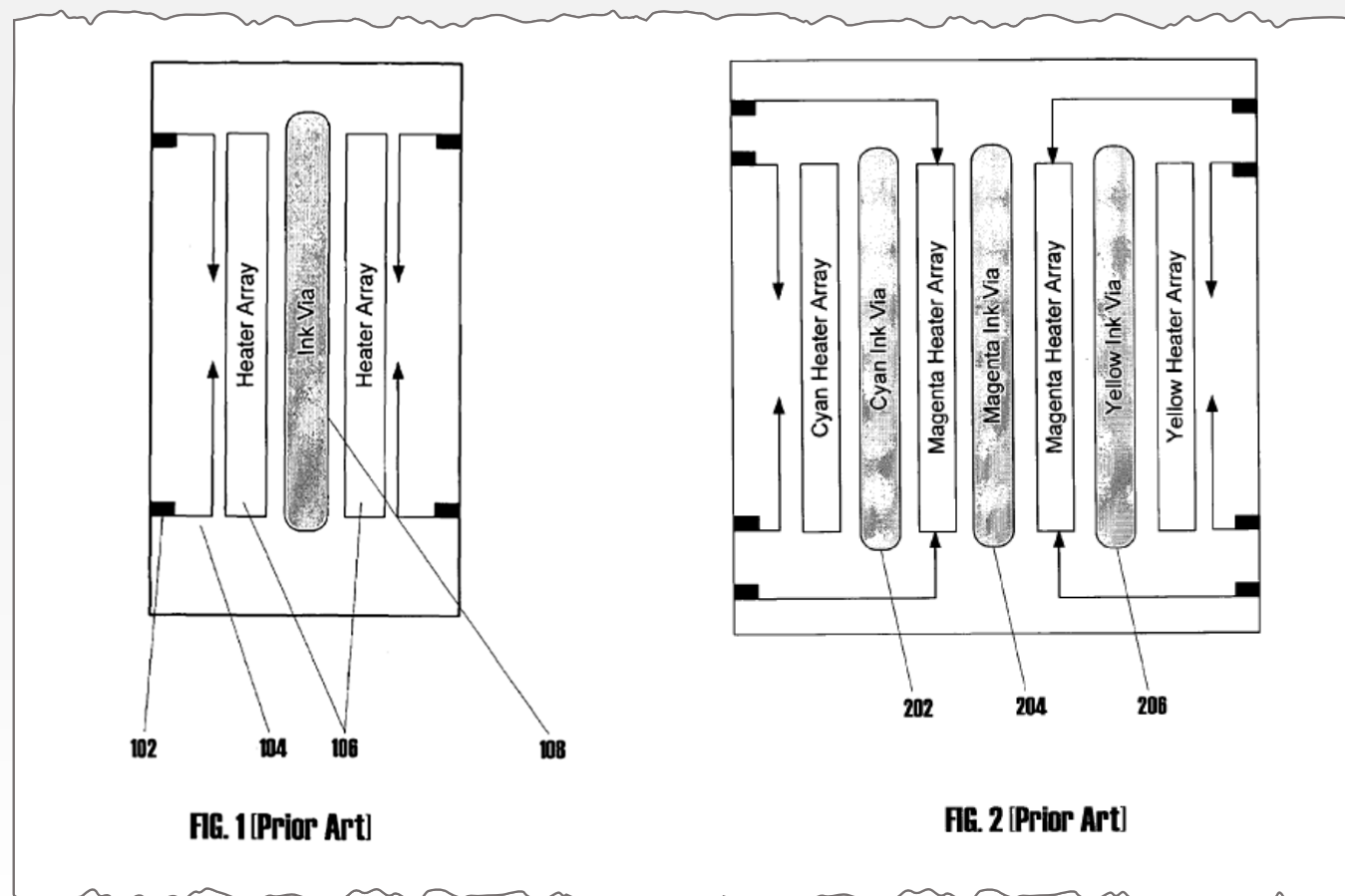
PO Colorized
864 Patent, Figure 3

PO's Construction Injects Ambiguity Into the Claims

**Slingshot
Printing**
Patent Owner

“the only structures identified in the claims as having a relationship to the power traces are the bondpad and heater arrays (**not individual heaters**).”

PO Sur-Reply at 6



Slingshot's Arguments are Based on Improper Claim Constructions

Slingshot Printing

Patent Owner

- PO argues Benjamin Combination and Uenishi each fail to disclose a Bondpad.
- PO argues the Benjamin Combination and Uenishi each do not have power traces that are “physically separated proximal to the bondpad”

Ground 1: The Benjamin '114-Benjamin '703 Combination

Benjamin '144: Bondpad

Slingshot Printing

Patent Owner



*Patent Owner's Expert
Steven Dietl*

“it is not possible to determine whether the contacts of the flex circuit contact **a single bondpad** for each ‘fire line’ **or contact multiple bondpads** that each connect to a portion of the fire line.”

POR at 28

Q. 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...”

Ex.1015 at 123:1-7

Reply at 8-9; POR at 28; Ex.1015 at 123:1-7

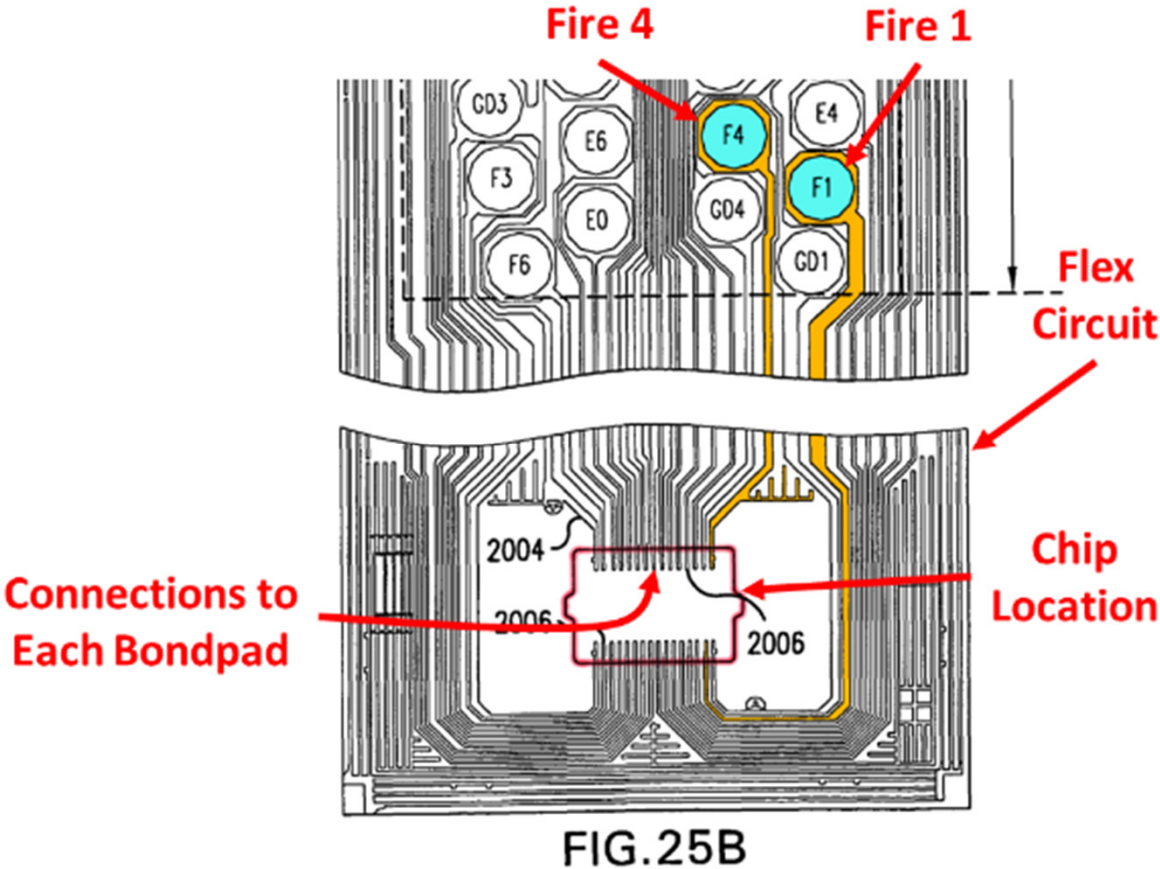
Canon’s Demonstratives, not evidence

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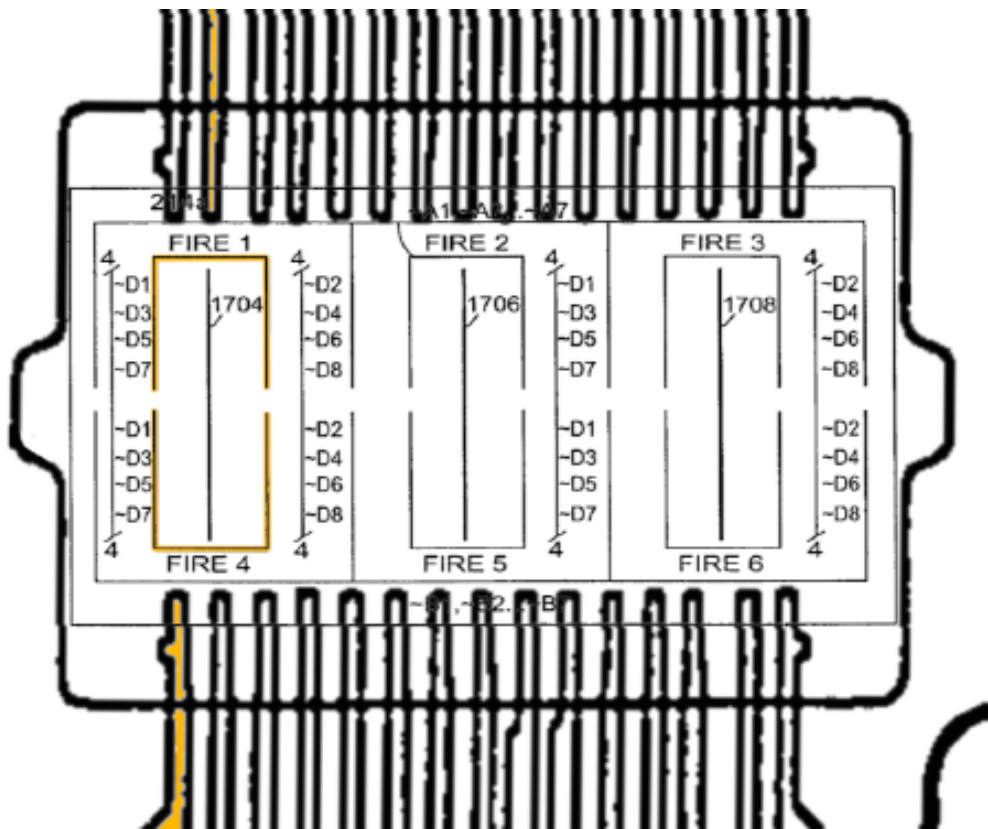
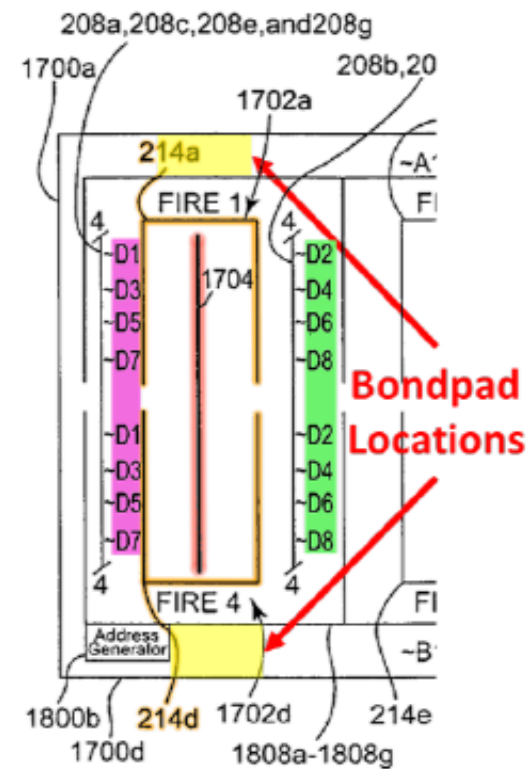
Benjamin '144: Bondpads

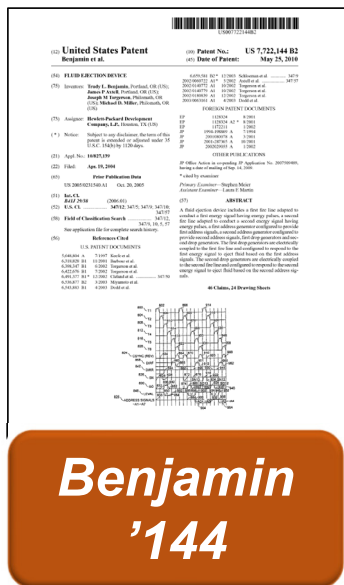
United States Patent
Benjamin et al.
US 7,722,144 B2
May 25, 2010

Benjamin '144



Benjamin '144: Bondpads





Energy variation is the maximum percent difference in power dissipated through any two firing resistors 52 in one of the fire groups 1702a-1702f. The highest amount of power is found in the first firing resistor 52 of a fire group 1702a-1702f as only a single firing resistor 52 is energized, where the first firing resistor 52 is the firing resistor 52 nearest the bond pad receiving the energy signal FIRE1, FIRE2 . . . FIRE6. The lowest amount of power is found in the last firing resistor 52 of a fire group 1702a-1702f as all firing resistors 52 in a row subgroup are energized. Layout contributions to energy varia-

Ex-1005, 75:58-67

Pet. at 19-20; Reply at 8-12; Ex.1005, 75:58-67

Canon's Demonstratives, not evidence

Benjamin '144: Bondpads

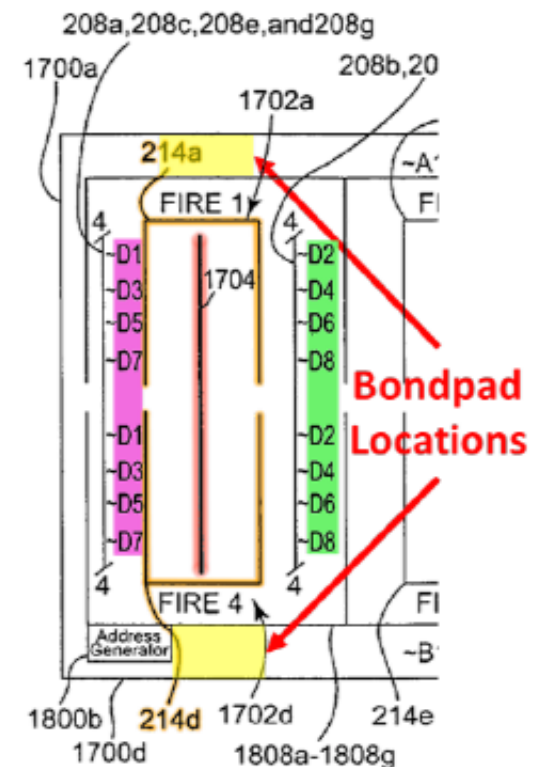


*Patent Owner's Expert
Steven Dietl*

Q. And then, similarly, if we look at the bottom of Figure 22, the bondpad for fire line 215d would be located along the side 1700d of the printhead die. Is that right?

A. Yeah. **The bond pads for that side of the data groups and the –uh, fire groups would be along the edge of the die 1700d.**

Ex-1015, 123:15-22



Canon's Demonstratives, not evidence

Benjamin '144: Bondpad

Slingshot Printing

Patent Owner



*Patent Owner's Expert
Steven Dietl*

The drawing that Petitioners rely on when superimposing contacts of the flex circuit over a printhead die drawing (e.g. Pet. p. 20) shows **a gap between the flex circuit contacts and the inboard fire lines Fire 1 and Fire 4...**

POR at 28

Q...there would need to be at least **one trace connecting...the fire line bondpad to fire line 214d**, right?

A. Yes..."

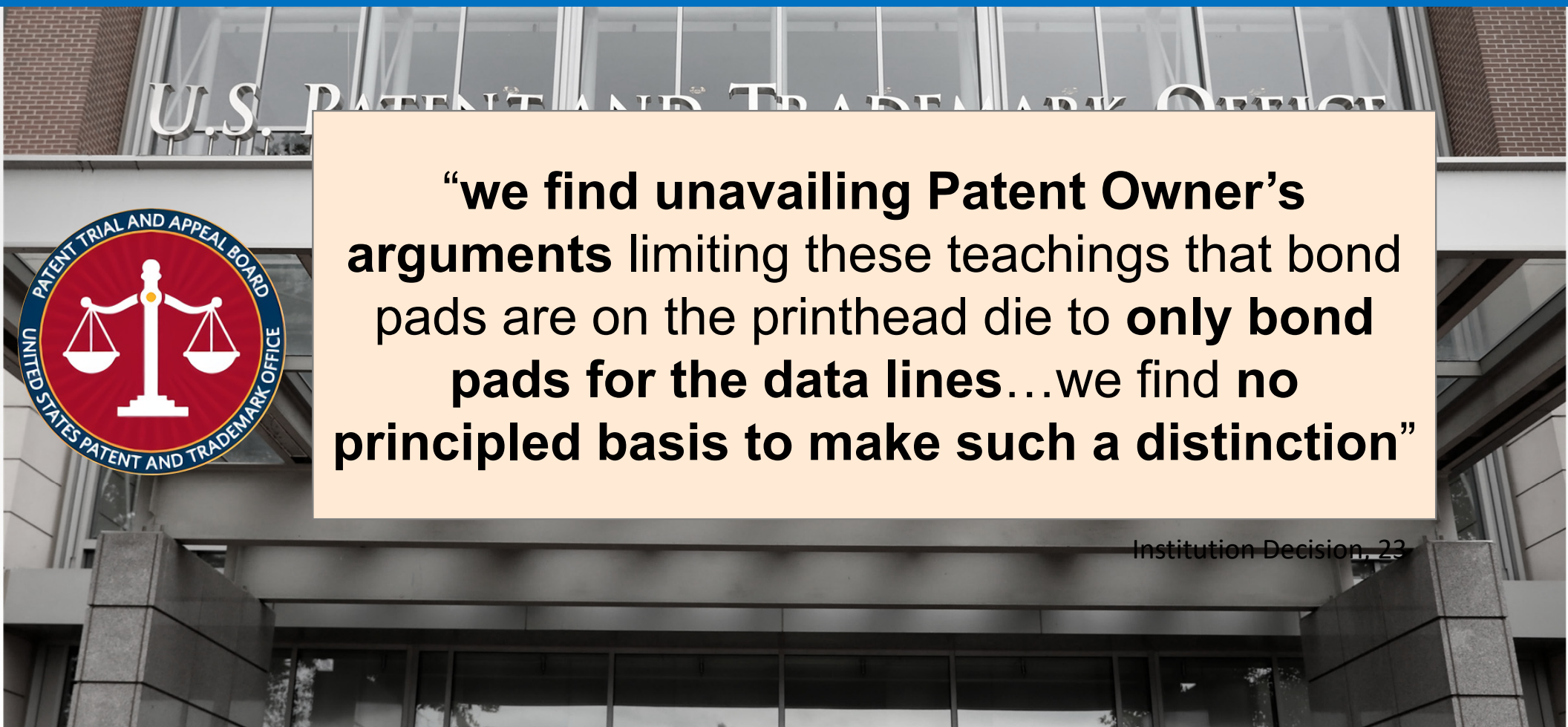
Ex-1015, 122:1-8

Reply at 8-9; POR at 28; Ex.1015 at 122:1-8

Canon's Demonstratives, not evidence

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Benjamin '144: Bondpads



“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”**

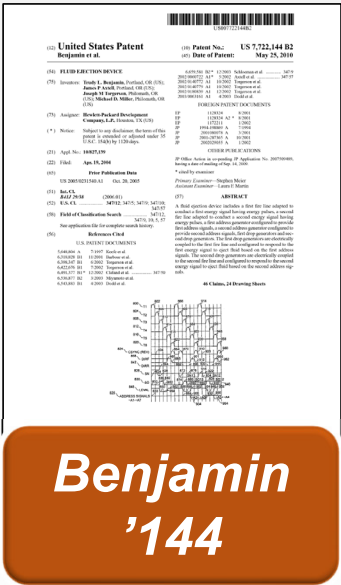
Institution Decision, 23

Institution Decision, 23

Canon’s Demonstratives, not evidence

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Benjamin '144 incorporated Benjamin '703 by reference.



1

FLUID EJECTION DEVICE

CROSS-REFERENCE TO RELATED APPLICATIONS

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This application is related to patent application Ser. No. 10/827,030, entitled “Fluid Ejection Device,” patent application Ser. No. 10/827,163, entitled “Fluid Ejection Device With Address Generator,” patent application Ser. No. 10/827,045, entitled “Device With Gates Configured In Loop Structures,” patent application Ser. No. 10/827,142, entitled “Fluid Ejection Device,” and patent application Ser. No. 11/849,078, entitled “Fluid Ejection Device With Identification Cells,” each of which are assigned to the Assignee of this application and are filed on even date herewith, and each of which is fully 15 incorporated by reference as if fully set forth herein.

Benjamin '703: Bondpads

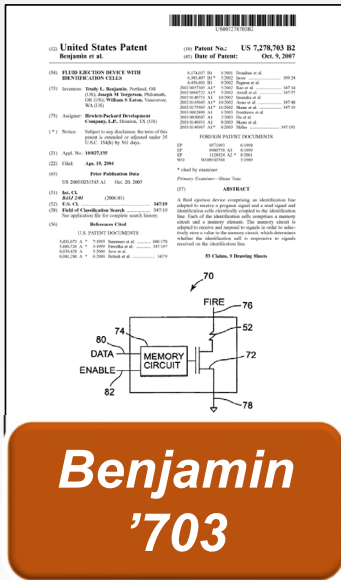
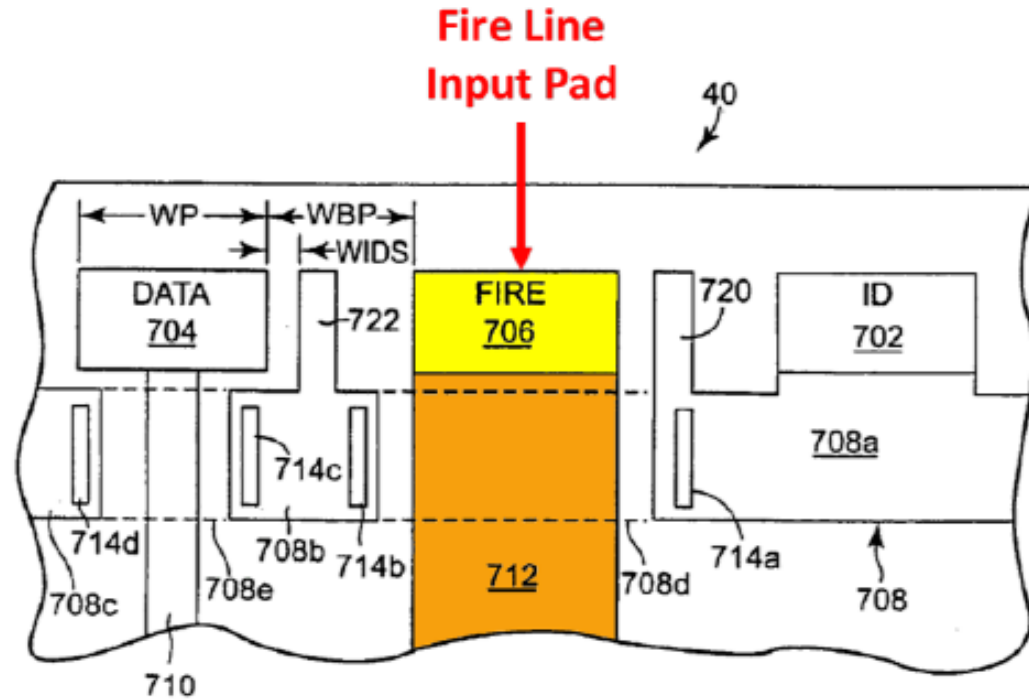


Fig. 10

Slingshot Attacks Benjamin '144 and Benjamin '703 Individually



“Non-obviousness cannot be established by attacking references individually where the rejection is based upon the teachings of a combination of references”

In re Merck & Co., 800 F.2d 1091, 1097 (Fed. Cir. 1986)

Benjamin '144: Physically Separated Proximal to the Bondpad

Slingshot Printing

Patent Owner

“Neither of the Benjamin references contain any teachings like the '864 patent's teachings regarding the advantages of separating traces proximal to the bondpad rather than proximal to associated heater arrays.”

POR at 33

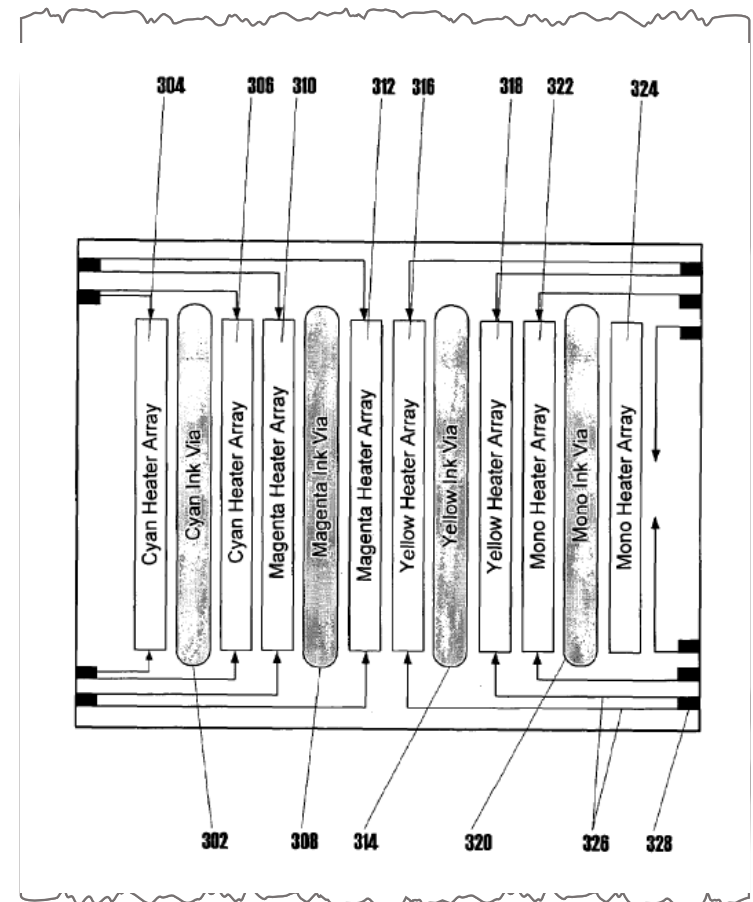
POR at 33

Canon's Demonstratives, not evidence

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The '864 Patent

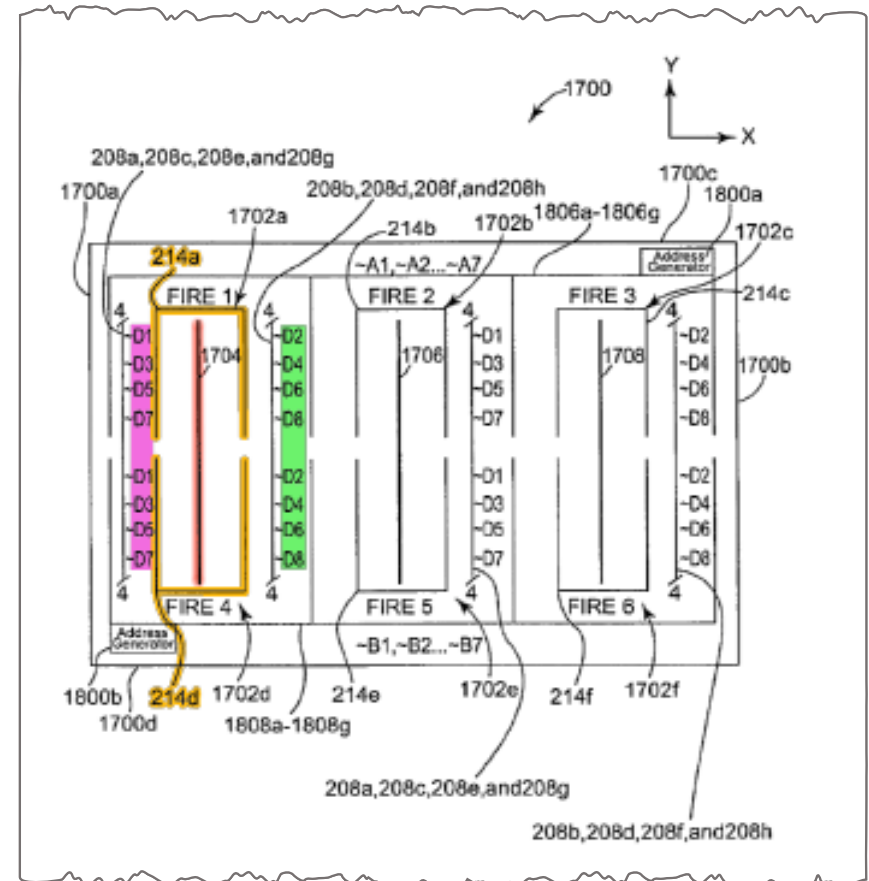
Further, as shown in the exemplary embodiment of FIG. 3, the power traces 326 are physically separated as they meet the bondpad 328. As is shown, it may be advantageous to utilize two separate power traces 326 from a single bondpad 328 to efficiently balance the series resistance of the power traces 326. This ensures adequate power balancing to the heater arrays. Additionally, the on-chip routing of power traces 326 from a single bondpad 328 may also be positioned close together, and more closely than conventional power traces stemming from different bondpads. Although not illustrated, it should also be appreciated 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. The on-chip routing shown and described with



Benjamin '144

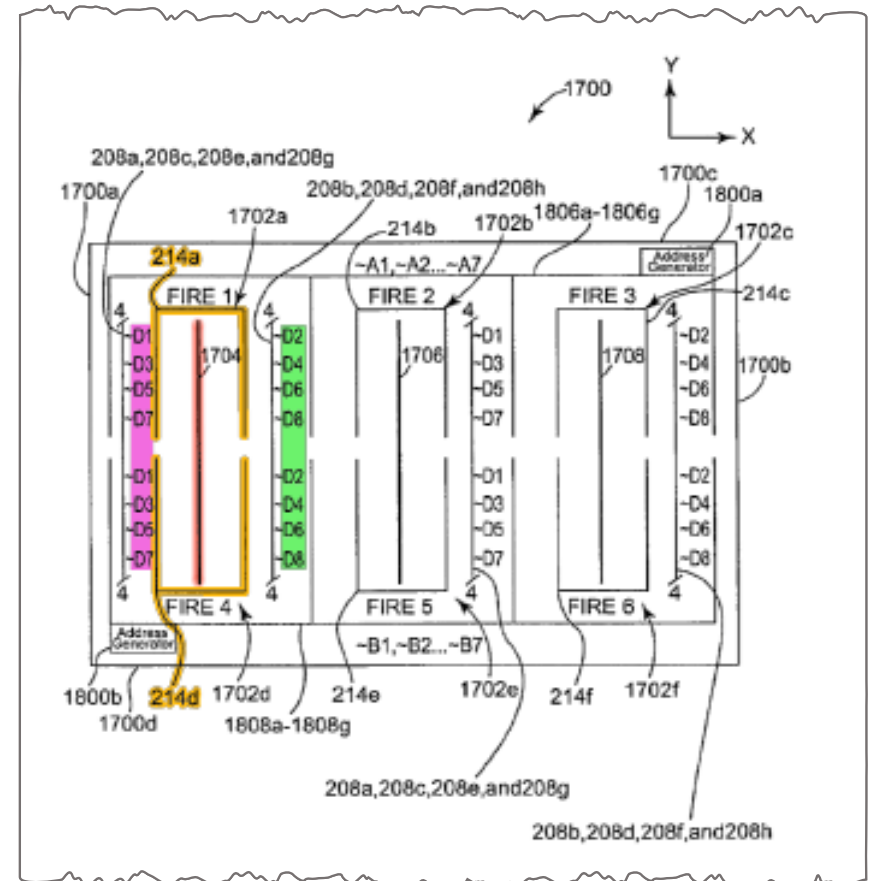
Fire groups 1702a-1702f and fire lines 214a-214f are laid out along ink feed slots 1704, 1706 and 1708 to achieve a suitable energy variation. The pre-charged firing cells 120 in a fire group 1702a-1702f are located along opposing sides of an ink feed slot 1704, 1706 or 1708. Instead of having all pre-charged firing cells 120 in a fire group 1702a-1702f along the entire length of one side of an ink feed slot 1704, 1706 or 1708, the pre-charged firing cells 120 in a fire group 1702a-1702f are located along half of the length of each of the opposing sides of an ink feed slot 1704, 1706 or 1708. The

as only a single firing resistor 52 is energized, where the first firing resistor 52 is the firing resistor 52 nearest the bond pad receiving the energy signal FIRE1, FIRE2 . . . FIRE6. The



Benjamin '144

Row	Fire group shape	Fire width	Gnd width	Die width	Metal thickness	% evar
A	Substantially U-shaped	250 um	115 um	4200 um	360 nm	11%
B	Linear	250 um	115 um	4200 um	360 nm	52%
C	Linear	250 um	115 um	4200 um	1440 nm (4x thick)	36%
D	Linear	750 um	615 um	~7200 um	360 nm	11%
E	Linear	515 um	380 um	~5790 um	1140 nm (4x thick)	11%

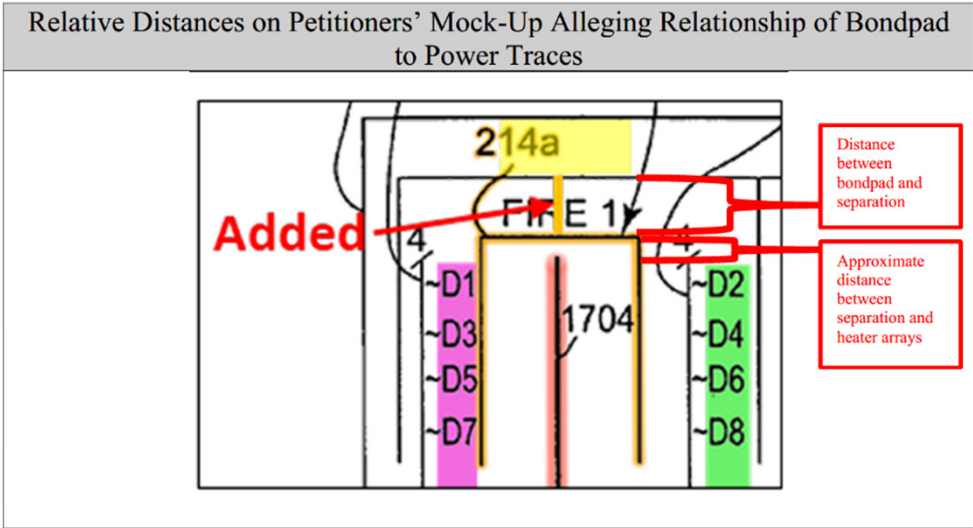


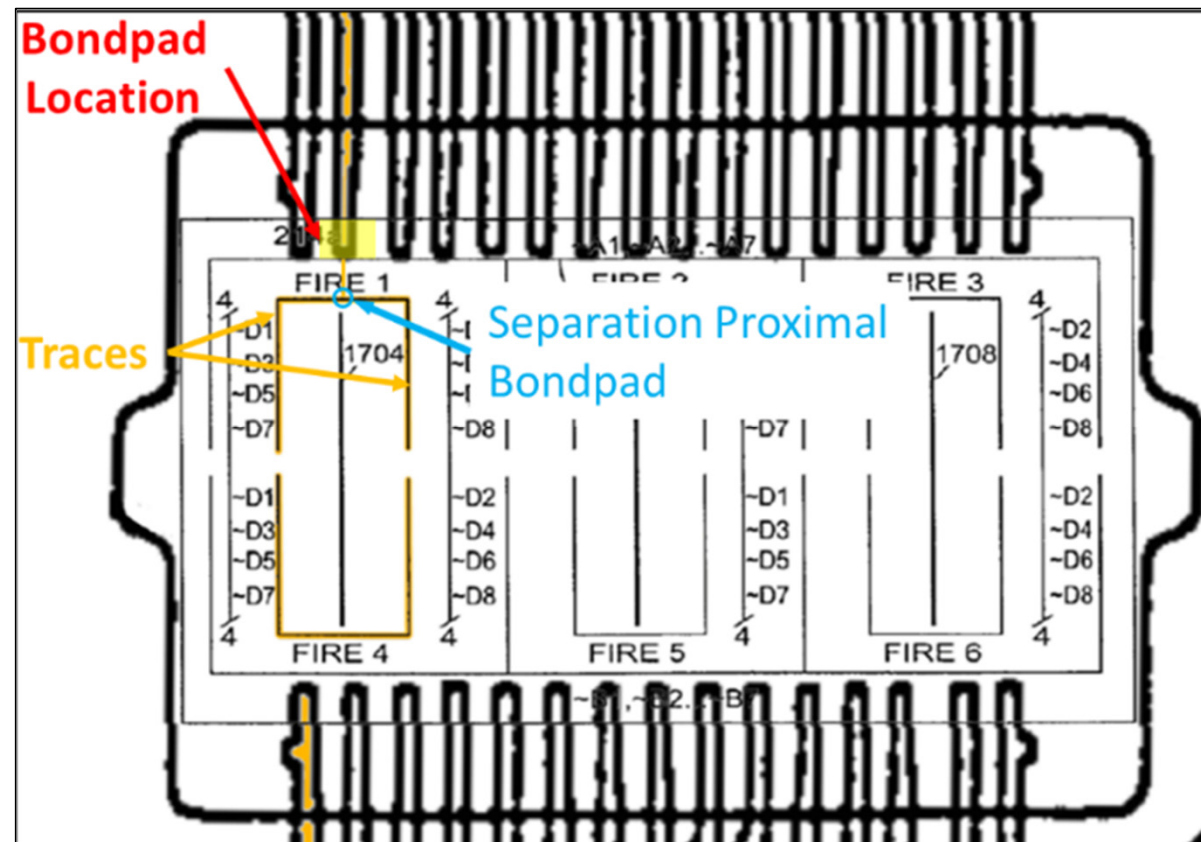
Benjamin '144: Physically Separated Proximal to the Bondpad

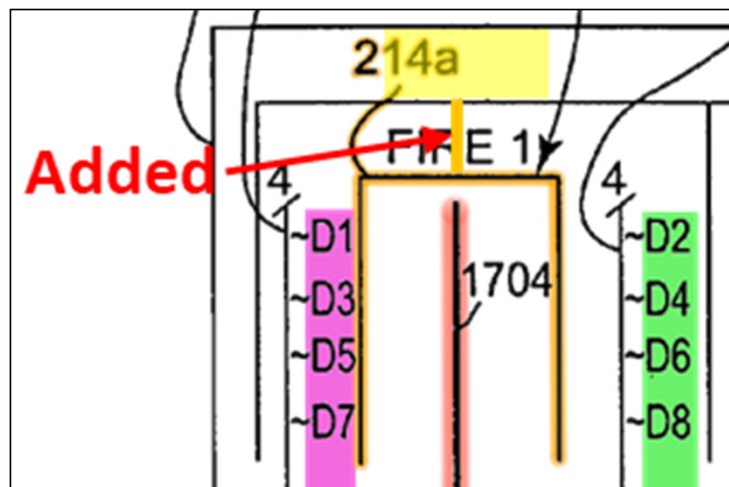
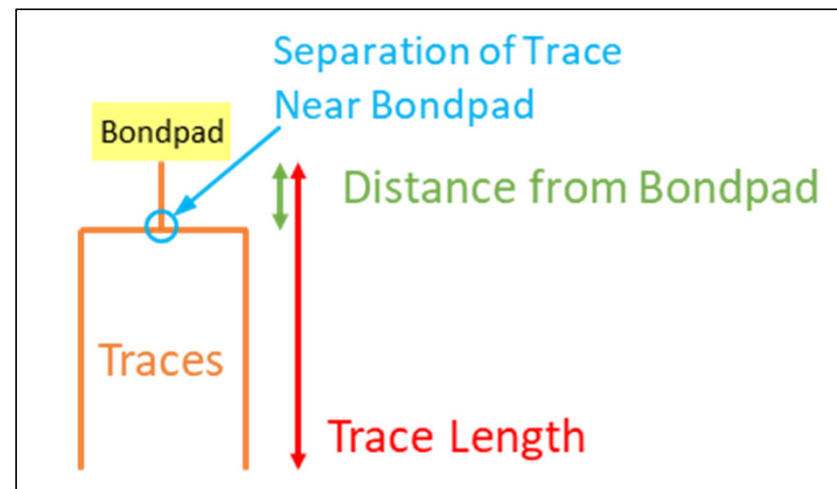
**Slingshot
Printing**
Patent Owner

“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.’”

PO Sur-Reply, 12



[illegible]

[illegible]

Benjamin '144: Physically Separated Proximal to the Bondpad



*Petitioners Expert
Dr. Steven Pond*

“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.” Ex-2005, 16:24-17:2

“I look at where that separation point is relative to the start and the finish...” Ex.2005, 17:13-15

“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.” Ex.2005, 17:17-20

Ample Motivation to Combine Benjamin '144 with Benjamin '703

1. Benjamin '144 and Benjamin '703 are **analogous art** within the **same field of endeavor**; even having overlapping inventors. Pet. 44.
2. “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.
3. 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.
4. The Benjamin references provide **express motivations** to combine. Pet., 45.

Benjamin '144 and Benjamin '703: Analogous Art/Same Field

(10) Patent No.: US 7,722,144 B2

(54) FLUID EJECTION DEVICE

(75) Inventors: **Trudy L. Benjamin**, Portland, OR (US);
James P Axtell, Portland, OR (US);
Joseph M Torgerson, Philomath, OR
(US); **Michael D. Miller**, Philomath, OR
(US)

(73) Assignee: **Hewlett-Packard Development
Company, L.P.**, Houston, TX (US)

(21) Appl. No.: 10/827,139

(22) Filed: **Apr. 19, 2004**

(51) Int. Cl.
B41J 29/38 (2006.01)

(52) U.S. Cl. 347/12; 347/5; 347/9; 347/10;
347/57

(58) Field of Classification Search 347/12,
347/9, 10, 5, 57

(10) Patent No.: US 7,278,703 B2

(54) FLUID EJECTION DEVICE WITH
IDENTIFICATION CELLS

(75) Inventors: **Trudy L. Benjamin**, Portland, OR
(US); **Joseph M Torgerson**, Philomath,
OR (US); **William S Eaton**, Vancouver,
WA (US)

(73) Assignee: **Hewlett-Packard Development
Company, L.P.**, Houston, TX (US)

(21) Appl. No.: 10/827,135

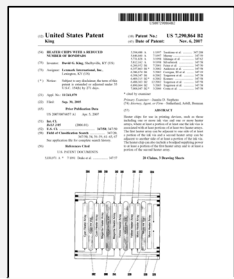
(22) Filed: **Apr. 19, 2004**

(51) Int. Cl.
B41J 2/01 (2006.01)

(52) U.S. Cl. 347/19

(58) Field of Classification Search 347/19
See application file for complete search history.

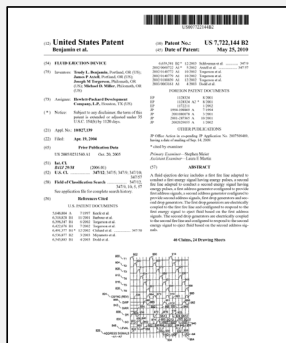
864 Patent and Benjamin Combination Teach the Same Way to Reduce Energy Variation



'864 Patent

As is shown, it may be advantageous to utilize two separate power traces **326** from a single bondpad **328** to efficiently balance the series resistance of the power traces **326**. This ensures adequate power balancing to the heater arrays.

Ex.1001 at 5:64-6:17

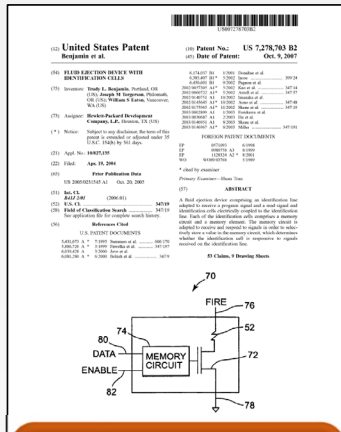


**Benjamin
'144**

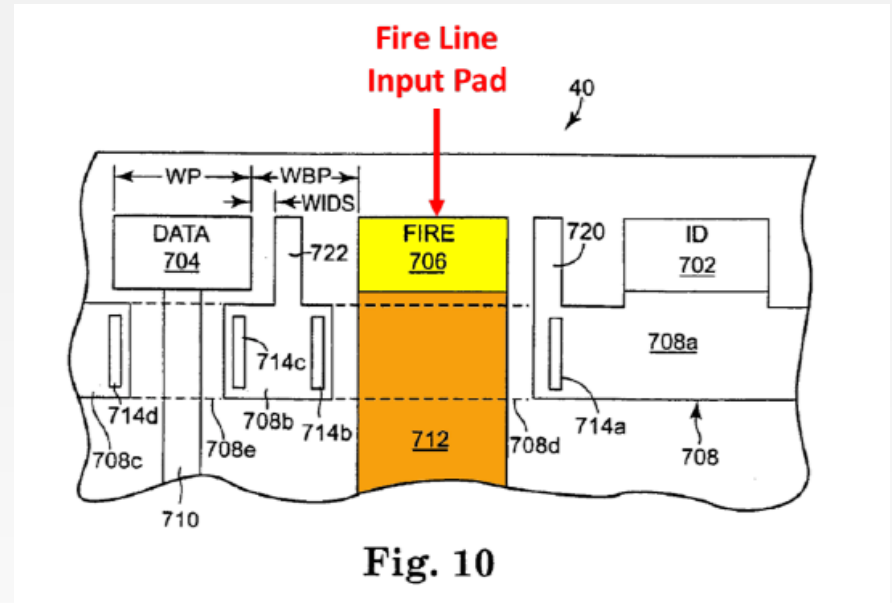
Fire groups **1702a-1702f** and fire lines **214a-214f** are laid out along ink feed slots **1704**, **1706** and **1708** to achieve a suitable energy variation. The pre-charged firing cells **120** in a fire group **1702a-1702f** are located along opposing sides of an ink feed slot **1704**, **1706** or **1708**. Instead of having all pre-charged firing cells **120** in a fire group **1702a-1702f** along the entire length of one side of an ink feed slot **1704**, **1706** or **1708**, the pre-charged firing cells **120** in a fire group **1702a-1702f** are located along half of the length of each of the opposing sides of an ink feed slot **1704**, **1706** or **1708**. The

Ex.1005 at 76:6-16

Benjamin '703's Express Teachings

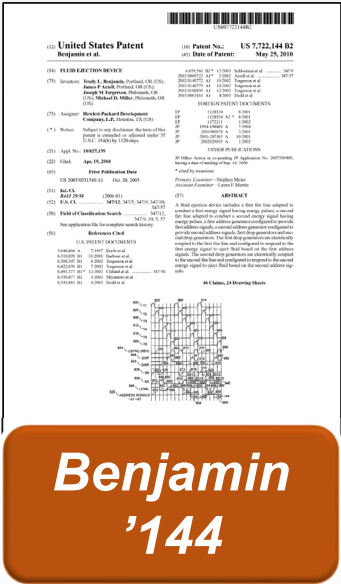


**Benjamin
'703**



The fire line input pad **706** is electrically coupled to fire line **712** that is electrically coupled to firing cells **120** in print-head die **40**.

Benjamin Combination: Reasonable Expectation of Success



As inkjet printheads have evolved, the number of drop generators in a printhead has increased to improve printing speed and/or quality. The increase in the number of drop generators per printhead has resulted in a corresponding increase in the number of input pads required on a printhead die to energize the increased number of firing resistors. In one type of printhead, each firing resistor is coupled to a corresponding input pad to provide power to energize the firing resistor. One input pad per firing resistor becomes impractical as the number of firing resistors increases.

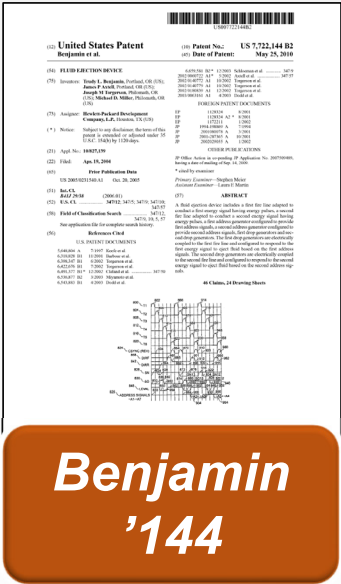
No Hindsight



“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”

In re Dembiczak, 175 F.3d 994, 999 (Fed.Cir. 1999)

Benjamin '144 Incorporated Benjamin '703 by Reference.



1

FLUID EJECTION DEVICE

CROSS-REFERENCE TO RELATED APPLICATIONS

5

This application is related to patent application Ser. No. 10/827,030, entitled “Fluid Ejection Device,” patent application Ser. No. 10/827,163, entitled “Fluid Ejection Device With Address Generator,” patent application Ser. No. 10/827,045, entitled “Device With Gates Configured In Loop Structures,” patent application Ser. No. 10/827,142, entitled “Fluid Ejection Device,” and patent application Ser. No. 11/849,078, entitled “Fluid Ejection Device With Identification Cells,” each of which are assigned to the Assignee of this application and are filed on even date herewith, and each of which is fully 15 incorporated by reference as if fully set forth herein.

Ample Motivation to Combine Benjamin '144 with Benjamin '703



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 LLC v. Ford Motor Co., 881 F.3d 894, 907 (Fed. Cir. 2018)

Ample Motivation to Combine Benjamin '144 with Benjamin '703

- Benjamin '144 identifies the correct **title** and **assignee**.
- Benjamin '144 identifies the correct **date**.

(10) **Patent No.:** **US 7,722,144 B2**

(54) **FLUID EJECTION DEVICE**

(75) Inventors: **Trudy L. Benjamin**, Portland, OR (US);
James P Axtell, Portland, OR (US);
Joseph M Torgerson, Philomath, OR
(US); **Michael D. Miller**, Philomath, OR
(US)

(73) Assignee: **Hewlett-Packard Development
Company, L.P.**, Houston, TX (US)

(21) Appl. No.: **10/827,139**

(22) Filed: **Apr. 19, 2004**

(10) **Patent No.:** **US 7,278,703 B2**

(54) **FLUID EJECTION DEVICE WITH
IDENTIFICATION CELLS**

(75) Inventors: **Trudy L. Benjamin**, Portland, OR
(US); **Joseph M Torgerson**, Philomath,
OR (US); **William S Eaton**, Vancouver,
WA (US)

(73) Assignee: **Hewlett-Packard Development
Company, L.P.**, Houston, TX (US)

(21) Appl. No.: **10/827,135**

(22) Filed: **Apr. 19, 2004**

Ample Motivation to Combine Benjamin '144 with Benjamin '703

(10) **Patent No.:** US **7,278,703 B2**

(54) **FLUID EJECTION DEVICE WITH IDENTIFICATION CELLS**

(75) Inventors: **Trudy L. Benjamin**, Portland, OR (US); **Joseph M Torgerson**, Philomath, OR (US); **William S Eaton**, Vancouver, WA (US)

(73) Assignee: **Hewlett-Packard Development Company, L.P.**, Houston, TX (US)

(21) Appl. No.: **10/827,135**

(22) Filed: **Apr. 19, 2004**

(10) **Patent No.:** US **7,543,906 B2**

(54) **FLUID EJECTION DEVICE WITH IDENTIFICATION CELLS**

(75) Inventors: **Trudy L. Benjamin**, Portland, OR (US); **Joseph M Torgerson**, Philomath, OR (US); **William S Eaton**, Vancouver, WA (US)

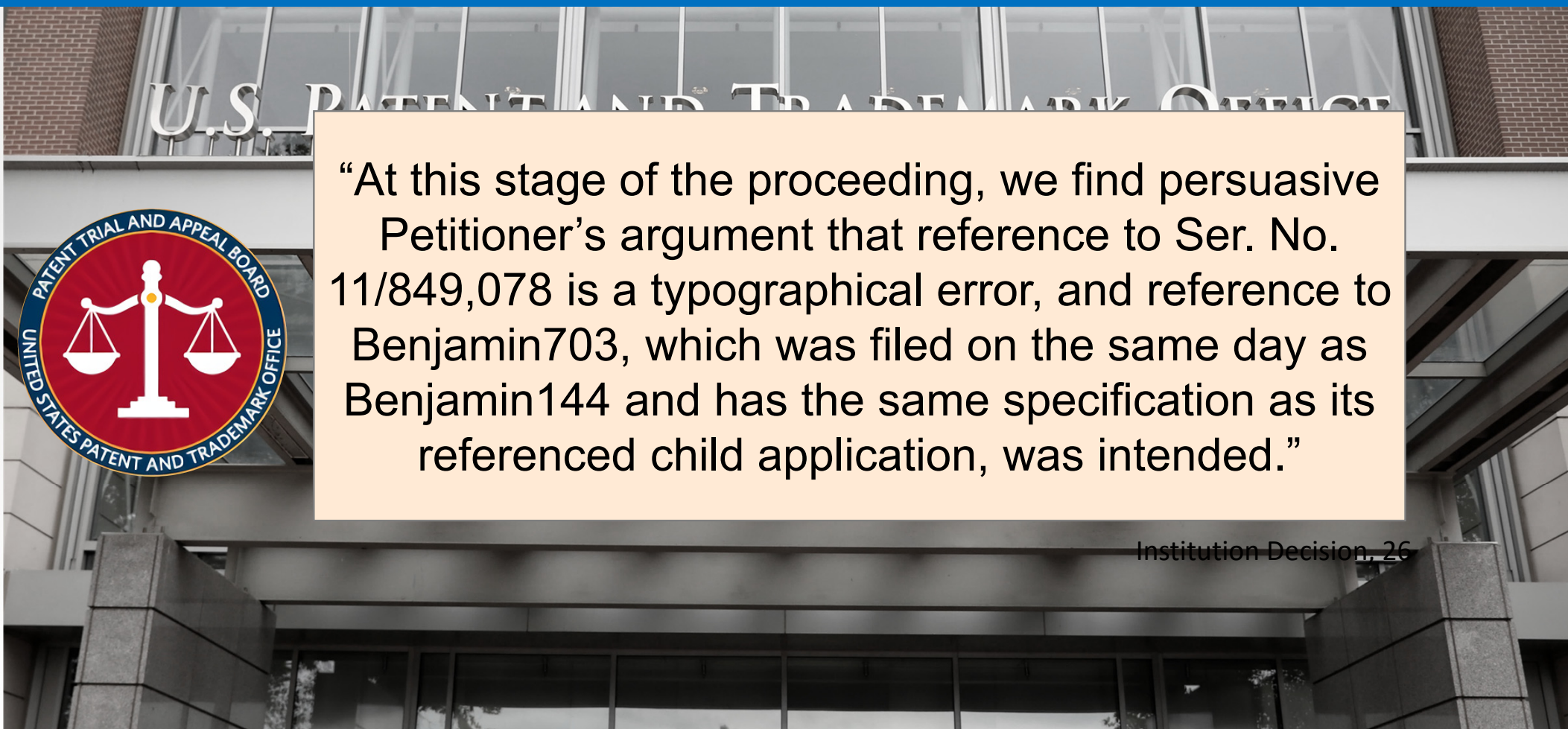
(73) Assignee: **Hewlett-Packard Development Company, L.P.**, Houston, TX (US)

(21) Appl. No.: **11/849,078**

(22) Filed: **Aug. 31, 2007**

This patent application is a divisional of application Ser. No. **10/827,135**, filed on **Apr. 19, 2004**, now U.S. Pat. No. **7,278,703** which is herein incorporated by reference.

Ample Motivation to Combine Benjamin '144 with Benjamin '703



“At this stage of the proceeding, we find persuasive Petitioner’s argument that reference to Ser. No. 11/849,078 is a typographical error, and reference to Benjamin703, which was filed on the same day as Benjamin144 and has the same specification as its referenced child application, was intended.”

Institution Decision, 26

Ground 2: Benjamin Combination in view of Childers

Ground 2: Claims at Issue

16. A heater chip comprising:
at least eight heater arrays, wherein the at least eight heater arrays comprise four heater array pairs, and wherein the arrays in each of the heater array pairs are disposed substantially adjacent opposing sides of at least a portion of an ink via; and
a plurality of bondpads operatively connected to the at least eight heater arrays, wherein at least one of the plurality of bondpads is operatively connected to both heater arrays within one of the heater array pairs.

19. The chip of claim **16**, wherein each of the at least eight heater arrays comprises a top portion and a bottom portion, and wherein some of the plurality of bondpads are operatively connected to the top portion of one of the at least eight heater arrays and the top portion of another one of the at least eight heater arrays.

4. The heater chip of claim **1**, wherein each of the first and second heater arrays comprise at least 320 heaters.

PO Does Not Raise Any Independent Challenge to Ground 2

Slingshot Printing

Patent Owner

“For at least the same reasons discussed above relative to Ground 1, especially as to independent claims 1 and 8, the claimed inventions would not have been obvious in view of the cited art.”

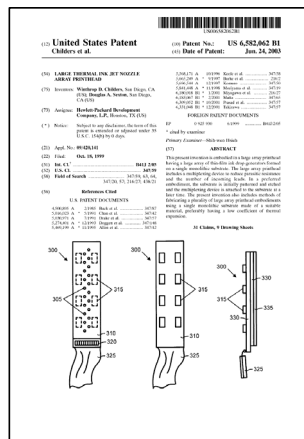
POR at 37

POR at 37

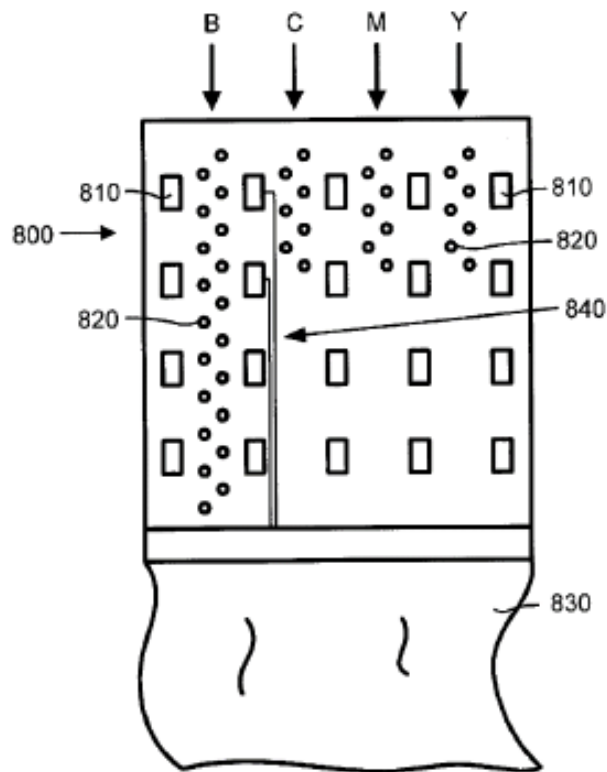
Canon's Demonstratives, not evidence

73

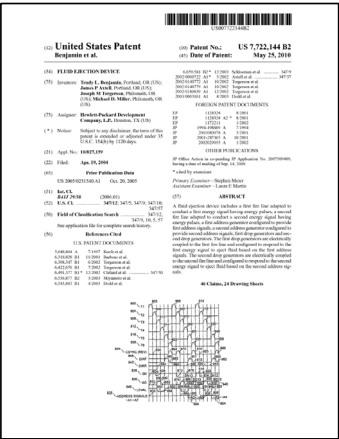
Benjamin Combination in view of Childers



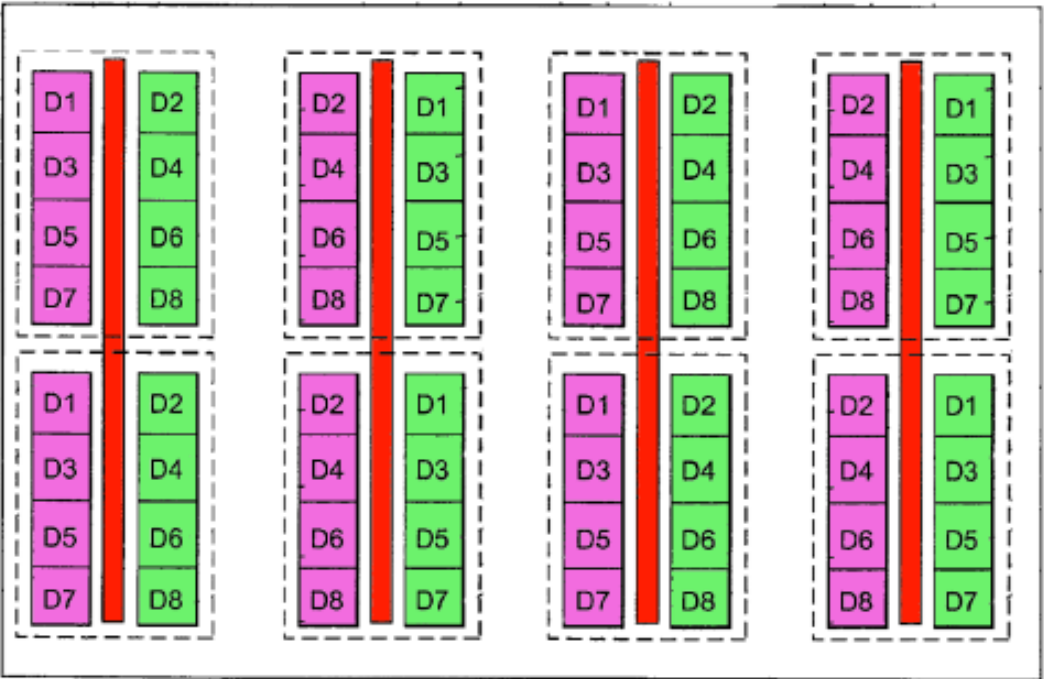
Childers



Benjamin Combination in view of Childers



Benjamin '144



Ground 3: Uenishi

Uenishi: Bondpad

Slingshot Printing

Patent Owner



*Patent Owner's Expert
Steven Dietl*

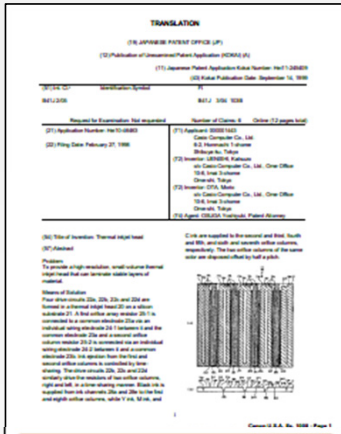
Uenishi does not disclose a bondpad structure that supplies power to heater arrays...“bondpad” is used in its ordinary sense to refer to a metalized area of the substrate to which **external and internal power traces can be connected to provide power to internal components.**

POR at 39

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.** Ex-1015, 144:5-18

Uenishi: Bondpads

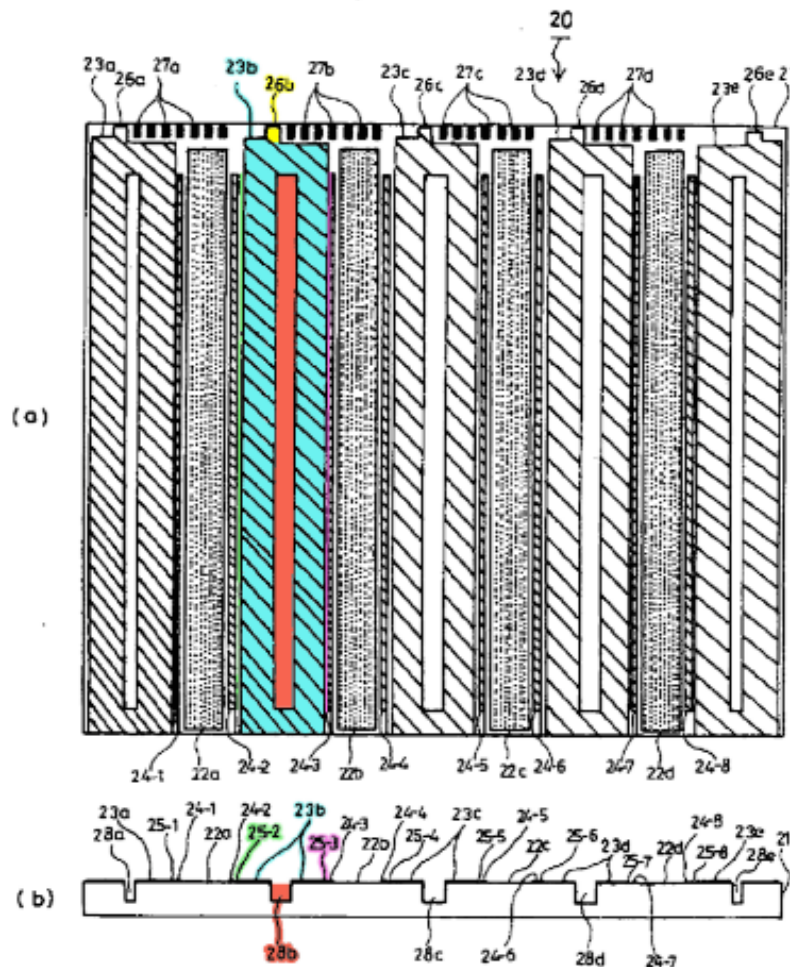


Uenishi

To these five common electrodes 23a–23e, electricity-feed terminals 26a–26e are formed linked respectively to them, while the drive circuit terminals 27a–27d are formed connected to their respective four drive circuits 22a–22d.

Ex-1008, Para 33

Uenishi: Bondpads



PO Misconstrues Uenishi's Teachings

Slingshot Printing

Patent Owner

“These orifice plates show tabs, circled in yellow below, in the same position as feed terminal 26c...A PHOSITA would view these tabs on the orifice plate as interfering with a connection between the underlying feed terminal and connections from outside the printhead die, for instance from a flex circuit.



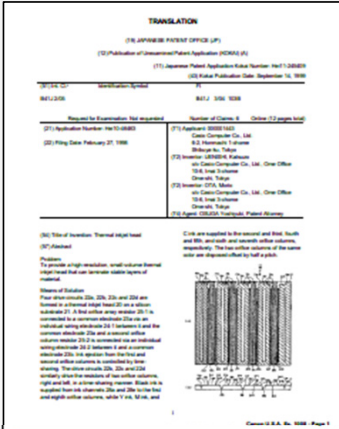
POR, 41-42

POR at 41-42

Canon's Demonstratives, not evidence

80

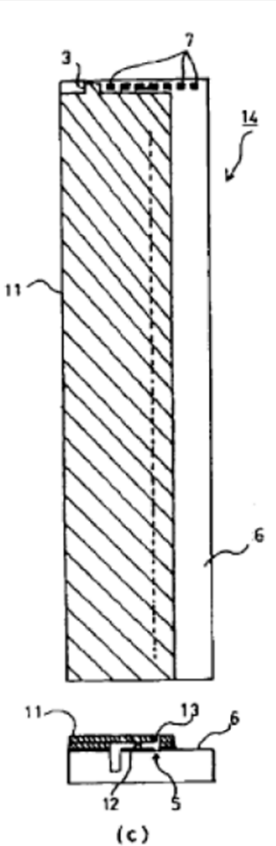
PO Misconstrues Uenishi's Teachings



Uenishi

Figs. 6(c) and 7(c) show the state immediately after steps 5 and 6, described above, are completed. In other words, thin-plate material 11 covers all the region except the drive circuit 6 and the electricity-feed terminals 3 and 7; the tops of the

Ex-1008, Para 11



Slingshot Attempts to Avoid Prior Art Using Claim Construction

The Canon logo is displayed in red, bold, sans-serif font.

Petitioner

PO raises two claim construction challenges to overcome Uenishi:

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.

Uenishi: Power Traces

Slingshot Printing

Patent Owner



*Patent Owner's Expert
Steven Dietl*

“The ‘power traces’ are relatively narrow structures. Fig. 3 of the ’864 patent shows narrower connections (326) referred to as ‘power traces’ extending from a relatively larger bondpad (328)...”

POR at 39

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...”

Ex-1015, 59:12-19

Pet. at 78-80; Reply at 21-24; POR at 39; Ex-1015, 59:12-19

Canon’s Demonstratives, not evidence

83

Uenishi's Common Electrodes are "Traces"

TRANSLATION

(1) JPO/USPTO FOREIGN OFFICE (JPO)

(2) Publication of Unexamined Patent Application (JP2002/21)

(3) Japanese Patent Application Publication Number: JP2002/21

(4) Publication Date: September 16, 1999

(5) Filing Date: February 27, 1998

(6) Priority Date: February 27, 1998

(7) Priority Number: JP2002/21

(8) Priority Number: JP2002/21

(9) Priority Number: JP2002/21

(10) Priority Number: JP2002/21

(11) Priority Number: JP2002/21

(12) Priority Number: JP2002/21

(13) Priority Number: JP2002/21

(14) Priority Number: JP2002/21

(15) Priority Number: JP2002/21

(16) Priority Number: JP2002/21

(17) Priority Number: JP2002/21

(18) Priority Number: JP2002/21

(19) Priority Number: JP2002/21

(20) Priority Number: JP2002/21

(21) Priority Number: JP2002/21

(22) Priority Number: JP2002/21

(23) Priority Number: JP2002/21

(24) Priority Number: JP2002/21

(25) Priority Number: JP2002/21

(26) Priority Number: JP2002/21

(27) Priority Number: JP2002/21

(28) Priority Number: JP2002/21

(29) Priority Number: JP2002/21

(30) Priority Number: JP2002/21

(31) Priority Number: JP2002/21

(32) Priority Number: JP2002/21

(33) Priority Number: JP2002/21

(34) Priority Number: JP2002/21

(35) Priority Number: JP2002/21

(36) Priority Number: JP2002/21

(37) Priority Number: JP2002/21

(38) Priority Number: JP2002/21

(39) Priority Number: JP2002/21

(40) Priority Number: JP2002/21

(41) Priority Number: JP2002/21

(42) Priority Number: JP2002/21

(43) Priority Number: JP2002/21

(44) Priority Number: JP2002/21

(45) Priority Number: JP2002/21

(46) Priority Number: JP2002/21

(47) Priority Number: JP2002/21

(48) Priority Number: JP2002/21

(49) Priority Number: JP2002/21

(50) Priority Number: JP2002/21

(51) Priority Number: JP2002/21

(52) Priority Number: JP2002/21

(53) Priority Number: JP2002/21

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(55) Priority Number: JP2002/21

(56) Priority Number: JP2002/21

(57) Priority Number: JP2002/21

(58) Priority Number: JP2002/21

(59) Priority Number: JP2002/21

(60) Priority Number: JP2002/21

(61) Priority Number: JP2002/21

(62) Priority Number: JP2002/21

(63) Priority Number: JP2002/21

(64) Priority Number: JP2002/21

(65) Priority Number: JP2002/21

(66) Priority Number: JP2002/21

(67) Priority Number: JP2002/21

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(69) Priority Number: JP2002/21

(70) Priority Number: JP2002/21

(71) Priority Number: JP2002/21

(72) Priority Number: JP2002/21

(73) Priority Number: JP2002/21

(74) Priority Number: JP2002/21

(75) Priority Number: JP2002/21

(76) Priority Number: JP2002/21

(77) Priority Number: JP2002/21

(78) Priority Number: JP2002/21

(79) Priority Number: JP2002/21

(80) Priority Number: JP2002/21

(81) Priority Number: JP2002/21

(82) Priority Number: JP2002/21

(83) Priority Number: JP2002/21

(84) Priority Number: JP2002/21

(85) Priority Number: JP2002/21

(86) Priority Number: JP2002/21

(87) Priority Number: JP2002/21

(88) Priority Number: JP2002/21

(89) Priority Number: JP2002/21

(90) Priority Number: JP2002/21

(91) Priority Number: JP2002/21

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(94) Priority Number: JP2002/21

(95) Priority Number: JP2002/21

(96) Priority Number: JP2002/21

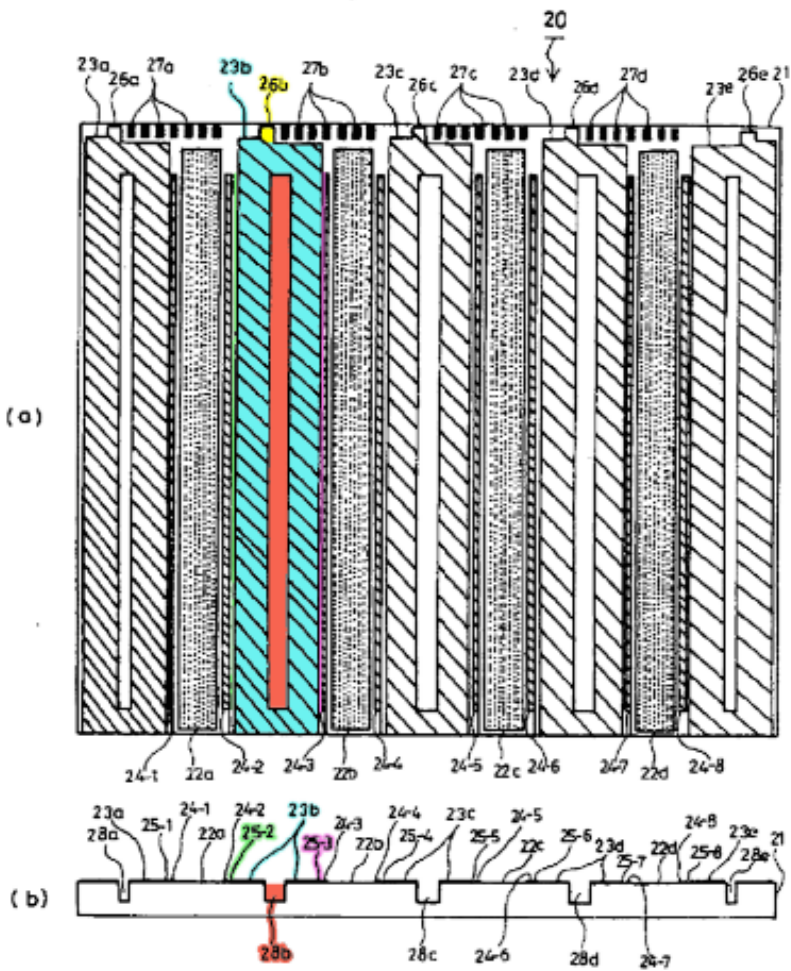
(97) Priority Number: JP2002/21

(98) Priority Number: JP2002/21

(99) Priority Number: JP2002/21

(100) Priority Number: JP2002/21

Uenishi



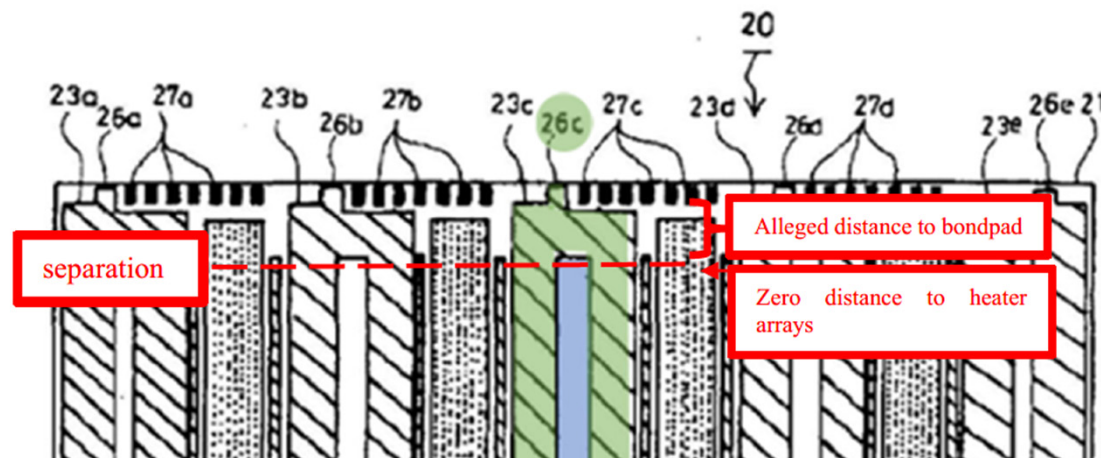
PO Misconstrues Uenishi's Teachings

Slingshot Printing

Patent Owner

“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... this separation is proximate the heater arrays, not proximate the bondpad.”

PO Sur-Reply, 14-15



PO Sur-Reply at 14-15

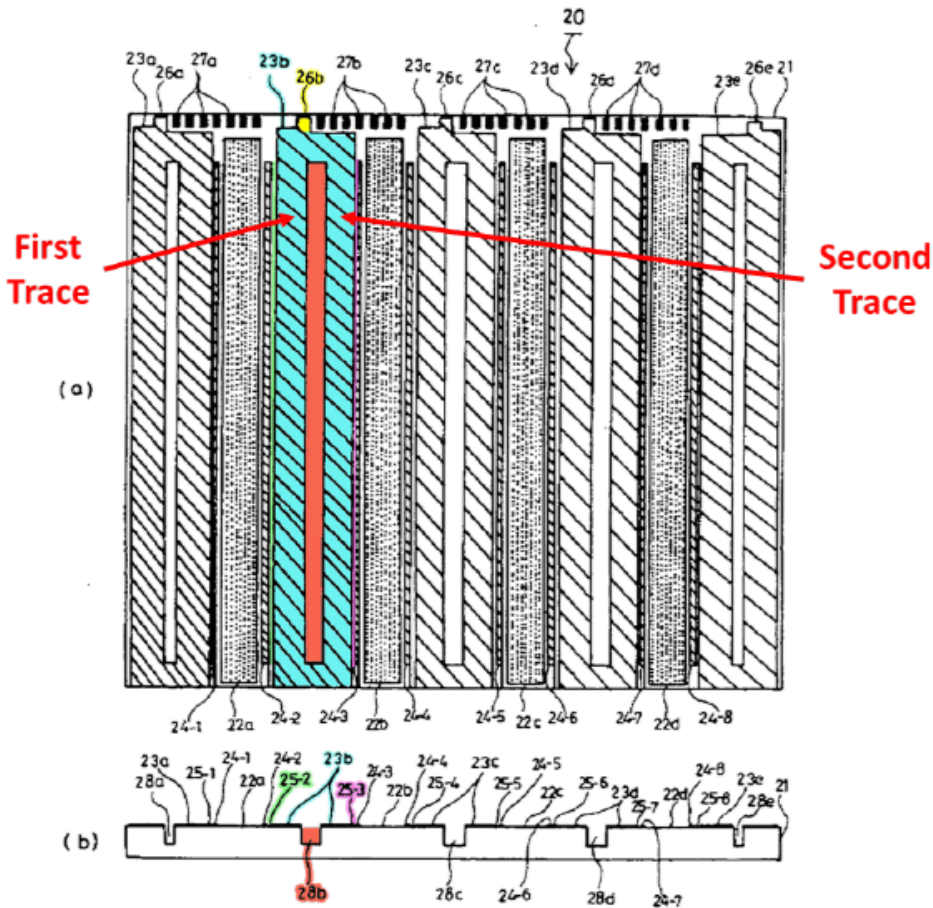
Canon's Demonstratives, not evidence

85

Uenishi: Physically Separated Proximal to the Bondpad

TRANSLATION
(1) JPO/USPTO PRIORITY OFFICE (JPO)
(2) Publication of Unexamined Patent Application (JP2003-21)
(3) Japanese Patent Application Serial Number: 2001-128820
(4) Filing Date: February 27, 1999
(5) Publication Date: September 10, 1999
(6) Title: Semiconductor Device
(7) Inventor: Tetsuo Uenishi
(8) Assignee: Canon Computer Co., Ltd.
(9) Address: Canon Computer Co., Ltd., One Office
1-1-1, Aomori, Aomori, Japan
(10) Attorney: Canon Computer Co., Ltd., One Office
1-1-1, Aomori, Aomori, Japan
(11) Agent: Canon Computer Co., Ltd., One Office
1-1-1, Aomori, Aomori, Japan
(12) Examiner: Tetsuo Uenishi
(13) Date of Examination: September 10, 1999
(14) Date of Publication: September 10, 1999
(15) Date of Filing: February 27, 1999
(16) Date of Priority: February 27, 1999
(17) Date of Priority: February 27, 1999
(18) Date of Priority: February 27, 1999
(19) Date of Priority: February 27, 1999
(20) Date of Priority: February 27, 1999
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(90) Date of Priority: February 27, 1999
(91) Date of Priority: February 27, 1999
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(93) Date of Priority: February 27, 1999
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(95) Date of Priority: February 27, 1999
(96) Date of Priority: February 27, 1999
(97) Date of Priority: February 27, 1999
(98) Date of Priority: February 27, 1999
(99) Date of Priority: February 27, 1999
(100) Date of Priority: February 27, 1999

Uenishi



Ground 4: Uenishi in View of Hayasaki

Ground 4: Claims at Issue

4. The heater chip of claim 1, wherein each of the first and second heater arrays **comprise at least 320 heaters.**

11. The heater chip of claim 8, wherein each of the first and second heater arrays **contain at least 320 heaters.**

12. The heater chip of claim 11, wherein the bondpad and the at least two traces are capable of supplying **eight simultaneous fires per heater array.**

PO Does Not Raise Any Independent Challenge to Ground 4

Slingshot Printing

Patent Owner

“For at least the same reasons discussed above relative to Ground 1, especially as to independent claims 1 and 8, the claimed inventions would not have been obvious in view of the cited art.”

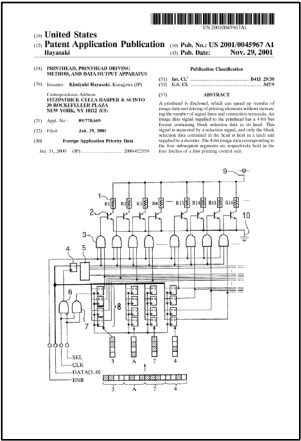
POR at 47

POR at 47

Canon's Demonstratives, not evidence

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Uenishi in View of Hayasaki



Hayasaki

