

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

HUTCHINSON TECHNOLOGY INC.,
HUTCHINSON TECHNOLOGY OPERATIONS (Thailand) CO., LTD.,
Petitioners,

v.

NITTO DENKO CORPORATION,
Patent Owner.

Case IPR2017-01499
Patent 7,923,644

Before THOMAS L. GIANNETTI, CHRISTA P. ZADO, and
MELISSA A. HAAPALA, *Administrative Patent Judges*.

HAAPALA, *Administrative Patent Judge*.

DECISION
Denying Institution of *Inter Partes* Review
37 C.F.R. § 42.108

Hutchinson Technology Incorporated and Hutchinson Technology Operations (Thailand) Co., Ltd. (collectively, “Petitioner”) filed a Petition pursuant to 35 U.S.C. §§ 311–319 to institute an *inter partes* review of claims 1–4 and 6 of U.S. Patent No. 7,923,644 B2 (“the ’644 patent”). Paper 2 (“Pet.”). Nitto Denko Corporation (“Patent Owner”) filed a Preliminary Response. Paper 6 (“Prelim. Resp.”). Applying the standard set forth in 35 U.S.C. § 314(a), which requires demonstration of a reasonable likelihood that Petitioner would prevail with respect to at least one challenged claim, we deny Petitioner’s request and do not institute an *inter partes* review of the ’644 patent.

I. BACKGROUND

A. *The ’644 Patent (Ex. 1001)*

The ’644 patent describes a particular type of printed circuit board (suspension board) for aligning the magnetic head of a hard disk drive with a desired track of a magnetic disk. *See* Ex. 1001, 1:7–9, 1:13–15. The printed circuit board has reduced characteristic impedances of wiring patterns. *Id.* at 1:49–56. Figure 1 is depicted below:

FIG. 1

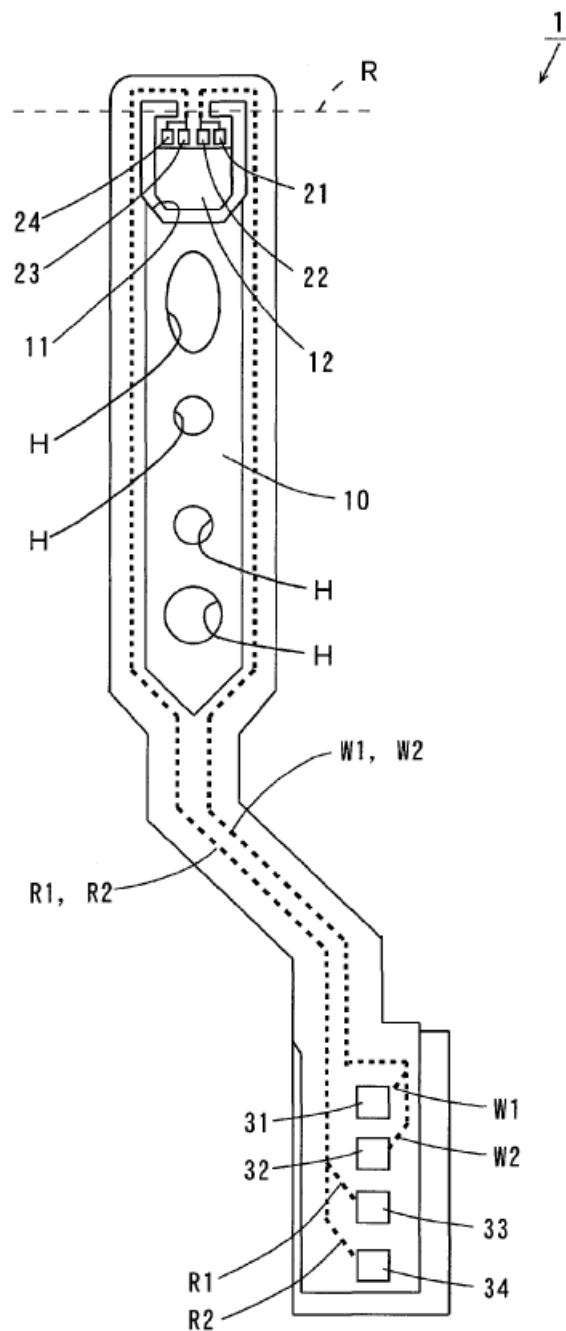


Figure 1 is a plan view of a suspension board. *Id.* at 5:58–59. Suspension board 1 includes suspension body 10 formed of a long-sized metal substrate. *Id.* at 6:34–36. Write wiring patterns W1, W2 and read wiring patterns R1, R2 are formed on suspension body 10. *Id.* at 6:36–38. Electrode pads 21, 22, 23, 24 are formed on one end of the suspension body and electrode pads

31, 32, 33, 34 are formed on the other end. *Id.* at 6:46–49. Electrode pads 21 to 24 and electrode pads 31 to 34 are electrically connected to one another through wiring patterns W1, W2 and read wiring patterns R1, R2, respectively. *Id.* at 6:49–53.

Figure 2 of the '644 patent, as annotated in the Preliminary Response (at p. 4), is depicted below:

FIG. 2

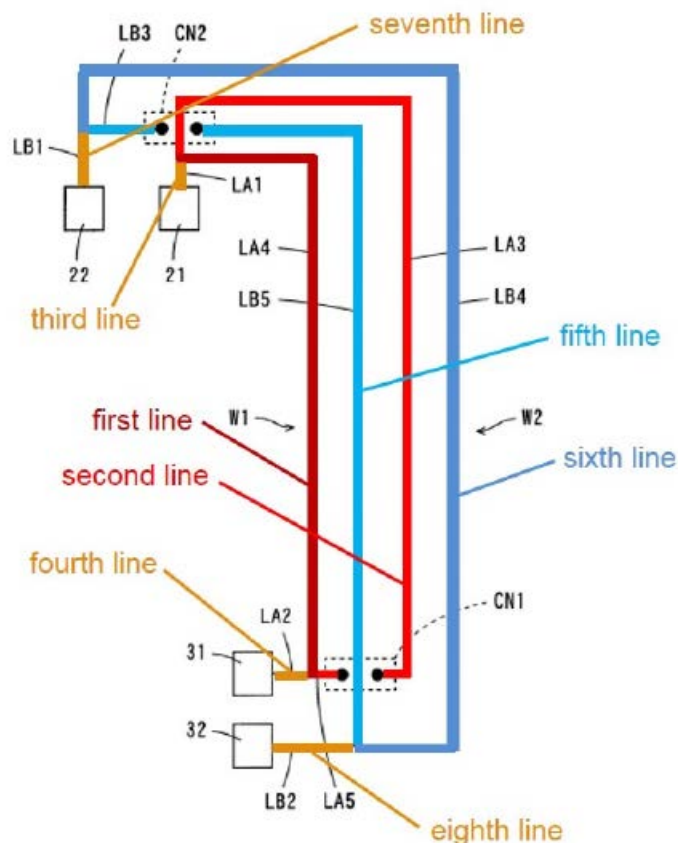


Figure 2 is an annotated schematic diagram showing the configurations of write wiring patterns W1, W2. Ex. 1001, 6:65–67. Write wiring pattern 1 (depicted in red and yellow) is constituted by lines LA4 (first line), LA3/LA5 (divided second line), LA1 (third line), and LA2 (fourth line). *Id.* at 7:1–2. LA1 is connected to electrode pad 21 and LA2 is connected to

electrode pad 31. *Id.* at 7:2–4. One end of lines LA3, LA4 are integrated with line LA1, and the other end of line LA3 and end of line LA5 are electrically connected to each other in intersection region CN1. *Id.* at 7:5–8.

Write wiring pattern 2 (depicted in blue and yellow) is constituted by lines LB3/LB5 (divided fifth line), LB4 (sixth line), LB1 (seventh line), and LB2 (eighth line). *Id.* at 7:11–12. LB1 is connected to electrode pad 22 and LB2 is connected to electrode pad 32. *Id.* at 7:12–13. One ends of lines LB3, LB4 are integrated with line LB1, and the other end of line LB3 and end of line LB5 are electrically connected to each other in intersection region CN2. *Id.* at 7:14–17.

Lines LA3, LA4, LB4, and LB5 are in parallel with one another and arranged so that LA3 is located between lines LB4, LB5 and LB5 is located between lines LA3, LA4. *Id.* at 7:20–25. LA3 of write wiring pattern W1 extends to pass through a portion in between the ends of lines LB3, LB5 in intersection region CN2, and LB5 of write wiring pattern W2 extends to pass through a portion in between the ends of lines LA3, LA5 in intersection region CN1. *Id.* at 7:25–31.

B. Illustrative Claim

Claims 1 and 6 are independent claims. Claim 1 is illustrative of the subject matter of the claims at issue:

1. A printed circuit board comprising:
 - an insulating layer;
 - first and second wiring patterns that are formed on one surface of said insulating layer and constitute a signal line pair;
 - first and second electrode pads that are formed on one surface of said insulating layer and are connected to said first wiring pattern;

third and fourth electrode pads that are formed on one surface of said insulating layer and are connected to said second wiring pattern;

a first connecting layer that is provided on the other surface of said insulating layer, wherein

said first wiring pattern has first, second, third and fourth lines,

said second wiring pattern has fifth, sixth, seventh and eighth lines,

one ends of said first and second lines are electrically connected to each other and the other ends of said first and second lines are electrically connected to each other,

said third line extends to be branched from the one end of said first line or the one end of said second line and is connected to said first electrode pad,

said fourth line extends to be branched from the other end of said first line or the other end of said second line and is connected to said second electrode pad,

one ends of said fifth and sixth lines are electrically connected to each other and the other ends of said fifth and sixth lines are electrically connected to each other,

said seventh line extends to be branched from the one end of said fifth line or the one end of said sixth line and is connected to said third electrode pad,

said eighth line extends to be branched from the other end of said fifth line or the other end of said sixth line and is connected to said fourth electrode pad,

said first and second lines of said first wiring pattern and said fifth and sixth lines of said second wiring pattern are arranged such that any one of said first and second lines is located between said fifth and sixth lines and any one of said fifth and sixth lines is located between said first and second lines,

a first intersection region in which said first or second line of said first wiring pattern and said fifth or sixth line of said second wiring pattern intersect with each other is provided,

a second intersection region in which said first or second line of said first wiring pattern and said fifth or sixth line of said second wiring pattern intersect with each other is provided,

a portion of said first or second line of said first wiring pattern positioned in said first intersection region is divided, a portion of said fifth or sixth line of said second wiring pattern positioned in said first intersection region is arranged on said insulating layer to pass through a portion in between divided portions of said first or second line of the first wiring pattern,

said insulating layer has first and second through holes in said first intersection region, one of said divided portions of said first or second line of the first wiring pattern is electrically connected to said first connecting layer through said first through hole, and the other of said divided portions of said first or second line of the first wiring pattern is electrically connected to said first connecting layer through said second through hole.

C. References

Petitioner relies on the following references:

1. U.S. Patent No. 8,154,827, issued Apr. 10, 2012 (“Contreras”) (Ex. 1005).
2. U.S. Patent No. 8,379,349, issued Feb. 19, 2013 (“Pro”) (Ex. 1006).

D. Grounds Asserted

Petitioner challenges the patentability of the claims of the ’644 patent over the following combinations of references:

Reference(s)	Basis	Claim(s)
Contreras	35 U.S.C. § 102(e)	1–4
Contreras and Pro	35 U.S.C. § 103(a)	6
Pro	35 U.S.C. § 102(e)	1–4, 6

E. Related Proceedings

The parties identify the following civil action involving the '644 patent: *Nitto Denko Corporation v. Hutchinson Technology Incorporated*, C.A. No. 2:16-cv-03595-MF, pending in the United States District Court for the District of New Jersey. Pet. 3; Paper 4, 1. Petitioner also has filed a second petition for *inter partes* review of the '644 patent (IPR2017-01625).

F. Real Parties in Interest

Petitioner identifies the following additional real parties in interest:

1. Magnecomp Precision Technology Public Company Limited
2. Magnecomp Corporation
3. Headway Technologies, Inc.
4. TDK Corporation
5. TDK U.S.A. Corporation
6. SAE Magnetics (Hong Kong) Limited
7. Acrathon Precision Technologies (HK) Limited
8. Acrathon Precision Technologies (Dong Guan) Co., Ltd

Pet. 1–3. Patent Owner identifies no additional real parties in interest.
Paper 4, 1.

II. ANALYSIS

A. Claim Construction

In an *inter partes* review, claims of an unexpired patent are interpreted using the broadest reasonable construction in light of the specification of the patent in which they appear. *See* 37 C.F.R. § 42.100(b); *Cuozzo Speed Techs., LLC v. Lee*, 136 S. Ct. 2131, 2144–46 (2016). Under that standard, claim terms are generally given their ordinary and customary meaning, as would be understood by one of ordinary skill in the art in the context of the

entire disclosure. *In re Translogic Tech., Inc.*, 504 F.3d 1249, 1257 (Fed. Cir. 2007).

Petitioner proposes a construction for “connecting layer,” which appears in all challenged claims. Pet. 9–10. Patent Owner asserts this term can be afforded its plain and ordinary meaning. Prelim. Resp. 7–8.

Patent Owner proposes a construction for “extend[] . . . from the . . . end,” which appears in certain of the claimed “lines” limitations in independent claims 1 and 4. *Id.* at 8–9.

In view of our analysis, we do not find it necessary to construe any terms for purposes of this Decision. See *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999) (holding that “only those terms need be construed that are in controversy, and only to the extent necessary to resolve the controversy”).

B. Anticipation by Contreras and Obviousness over Contreras and Pro

Petitioner contends that claims 1–4 are unpatentable as anticipated under 35 U.S.C. § 102(e) by Contreras. Pet. 10–36. Petitioner further contends that claim 6 is unpatentable as obvious under 35 U.S.C. § 103(a) over Contreras and Pro. *Id.* at 37–46. For the reasons that follow, Petitioner fails to demonstrate a reasonable likelihood of prevailing on these grounds.

1. Overview of Contreras

Contreras describes an integrated lead suspension (also called “flexure”) with interleaved coplanar electrically conductive lines or traces for connection of read/write circuitry to the read/write head in a magnetic recording disk drive. Ex. 1005, 1:9–13, 1:44–46. Figure 2A of Contreras is depicted below:

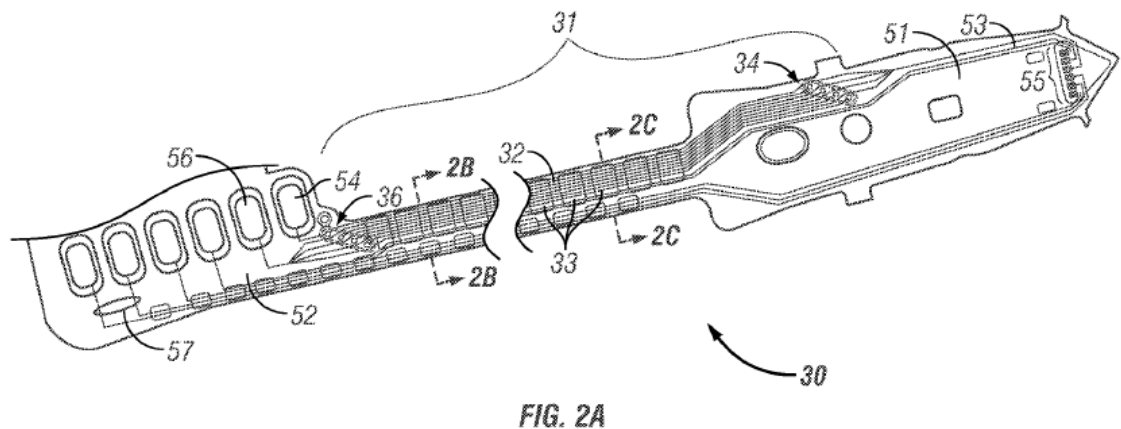


Figure 2A is a plan view of flexure 30 showing an elongate segment 31 between gimbal segment 51 and pad segment 52. *Id.* at 2:65–67. Gimbal segment 51 has conductive traces 53 leading to pads 55 for electrical connection to pads on the slider; traces 53 are also connected to electrical connection end 34. *Id.* at 3:4–9. Electrical connection end 36 is connected to pads 54, 56 on pad segment 52. *Id.* at 3:11–13. A plurality of interleaved electrically conductive traces or lines 32, extend generally parallel to one another along elongate segment 31 between flexure ends 34, 36. *Id.* at 13–16.

Figure 3A illustrates the multiple –crossover coplanar connection (MCC) of the conductive traces and is depicted below:

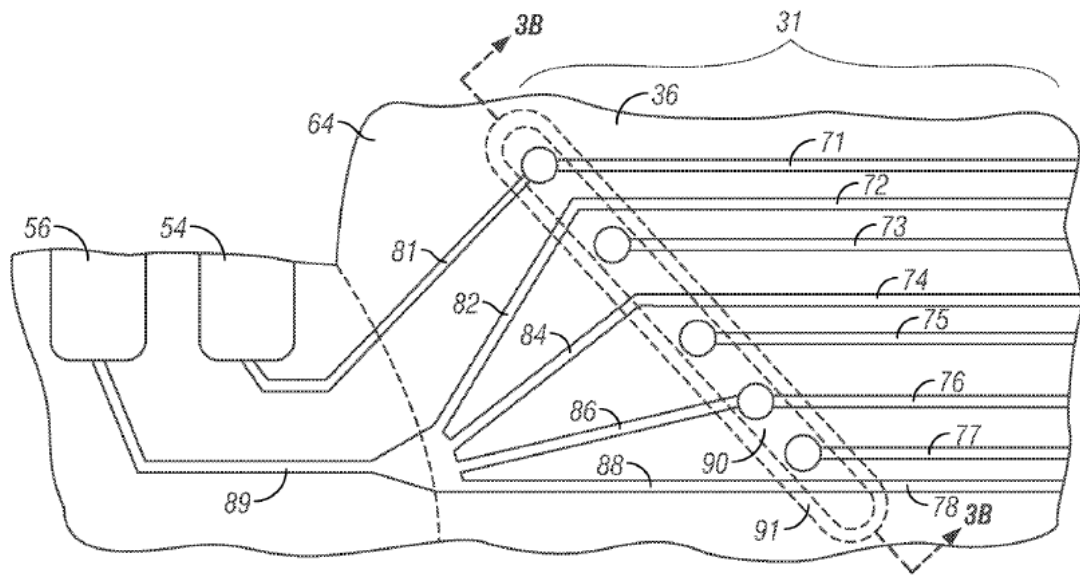
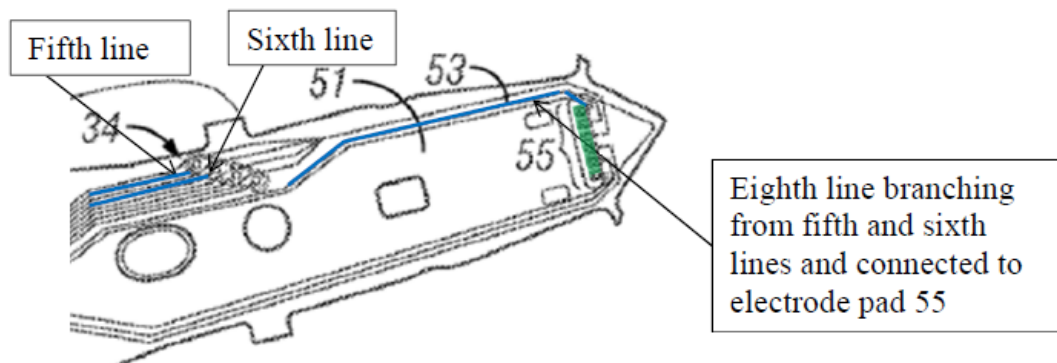


FIG. 3A

Figure 3A is a plan view of a portion of flexure 30 showing end 36 and the connection to pads 54, 56. *Id.* at 3:51–52. Pad 54 is connected via lead 81 to line 71 and then to traces 73, 75, 77 below insulating layer 64. *Id.* at 3:52–55. Pad 56 is connected via lead 89 that fans out to leads 82, 84, 86, 88 that connects to traces 72, 74, 76, 78. *Id.* at 3:55–58. Signal lines 71, 73, 75, 77 in the first set and lines 72, 74, 76, 78 in the second set are interleaved and coplanar on insulating layer 64 and run generally parallel to one another along elongate segment 31. *Id.* at 3:58–61. End 36 also includes island 90 of a metal substrate which allows connection of lines 71, 73, 75, 77 to lead 81 below the insulator layer through a plurality of conductive vias in the insulating layer. *Id.* at 4:7–9, 4:14–18. Flexure elongate segment 31 has a similar MCC at end 34 near gimbal segment 51 (not depicted in Figure 3A), which allows connection of lines 72, 74, 76, 78 in a similar fashion. *Id.* at 4:26–29.

2. Claims 1–4

Independent claim 1, and claims 2–4 by virtue of their dependency, recite “said eighth line extends to be branched from the other end of said fifth line or the other end of said sixth line and is connected to the fourth electrode pad” (“eighth line” limitation). Petitioner identifies one of the conductive traces 53 as the recited eighth line and asserts the identified trace 53 branches from both the fifth line 72 and the sixth line 74 at electrical connection end 34. Pet. 24. Petitioner further provides an annotated version of a selected area of Figure 2A, depicted below:



Petitioner’s annotated version of Figure 2A illustrates a selected magnified portion of that figure. *Id.* In the figure, Petitioner identifies the fifth and sixth lines and the specific trace 53 asserted to be the eighth line connected to electrode pad 55. *Id.* In support of its assertions, Petitioner cites to declaration testimony of its expert, Thomas M. Coughlin, Ph.D. *Id.* (citing Ex. 1007 ¶ 95). In paragraph 95 of his declaration, Dr. Coughlin repeats the assertions made in the Petition, and in paragraph 96 (not cited in the Petition), Dr. Coughlin testifies that “there is a mistake in Fig. 2A of the Contreras patent, the eighth line should be connected with the buried conductive island, which is not clearly shown in the Fig. 2A. Ex. 1007 ¶¶ 95, 96.

Patent Owner contends Contreras does not disclose the “eighth line” limitation. Prelim. Resp. 10–15. Specifically, Patent Owner argues Figure 2A shows trace 53 (identified as the recited “eighth line”) traveling the entire length of the flexure and entirely bypassing—without any connection at all—the ends of all of the lines 72, 74, 76, 78. *Id.* at 12–13. Patent Owner further argues there is no support for Dr. Coughlin’s testimony that there is a mistake in Figure 2A. *Id.* at 14. Additionally, Patent Owner asserts that even if Dr. Coughlin were correct and Figure 2A does have the alleged error, trace 53 would still not be the claimed “eighth line” because it would extend from the buried island structure, not from the lines identified by Petitioner as the fifth or sixth lines. *Id.* at 14–15.

We find that the cited evidence does not support Petitioner’s position that the specific identified trace 53 meets the “eighth line” limitation. Petitioner’s own annotated version of Figure 2A shows the identified trace 53 bypassing the lines identified as the fifth and sixth lines and not “branching from fifth and sixth lines” as asserted by Petitioner.¹ See Pet. 24. The cited portions of Contreras also fail to describe that the identified trace 53 extends to be branched from the end of line 72 (fifth line) or the end of line 74 (sixth line). See Ex. 1005, 3:6–16, 4:26–34. We do not find credible Dr. Coughlin’s testimony that there is a mistake in Figure 2A because it is conclusory and not supported by evidence. See 37. C.F.R. § 42.65(a) (“Expert testimony that does not disclose the underlying facts or data on which the opinion is based is entitled to little or no weight.”); see also *Skky, Inc. v. MindGeek, s.a.r.l.*, 859 F.3d 1014, 1022 (Fed. Cir. 2017)

¹ Figure 2A does show a trace that extends from the ends of lines 71, 72, 73, 74, but Petitioner maps this trace to the claimed “fourth line” and not the “eighth line.” See Pet. 21–22.

(“The Board reviewed the evidence presented by the parties, and chose not to credit Skky’s expert testimony. . . we discern no reversible error in that choice.”). Furthermore, we agree with Patent Owner that even if Dr. Coughlin’s testimony is correct that the identified line should be connected with the buried conductive island (Ex. 1007 ¶ 96), Petitioner fails to explain how a line that connects to *the buried conductive island* meets the claim limitation “extends to be branched *from the other end of said fifth line or the other end of said sixth line*” (emphasis added).

For the foregoing reasons, we conclude Petitioner has not demonstrated a reasonable likelihood of prevailing in establishing claims 1–4 are anticipated by Contreras.

3. Claim 6

Independent claim 6 recites the same “eighth line” limitation discussed above. Petitioner does not assert that Pro discloses this limitation, but rather relies on the analysis for claim 1 to meet the “eighth line” limitation. *See* Pet. 45–46. Accordingly, Petitioner fails to cure the deficiencies in Contreras discussed above and has not demonstrated a reasonable likelihood of prevailing on this challenge.

C. Anticipation by Pro

Petitioner contends that claims 1–4 and 6 are unpatentable as anticipated under 35 U.S.C. § 102(e) by Pro. Pet. 46–75. For the following reasons, Petitioner fails to demonstrate a reasonable likelihood of prevailing on this ground.

Pro describes various jumper constructions that are adapted to electrically connect two or more traces of integrated transmission line arrays of an integrated lead flexure of a disk drive head suspension. *See* Ex. 1006,

1:16–18, 3:46–50. One such jumper construction is shown in Figure 2A, depicted below:

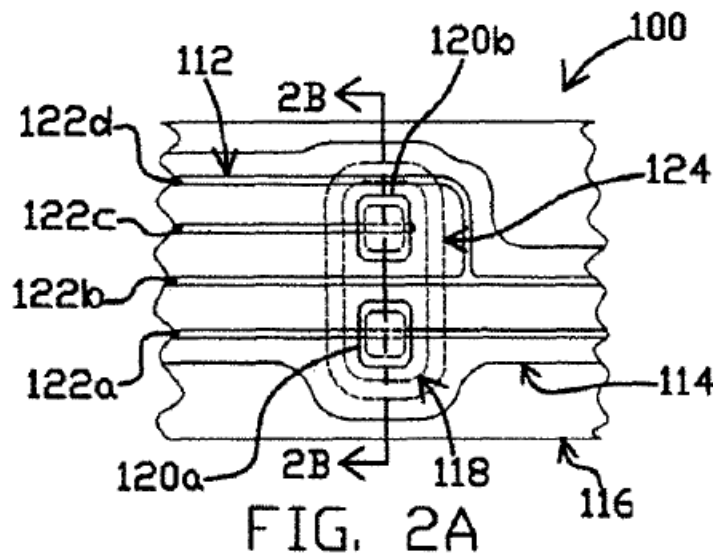
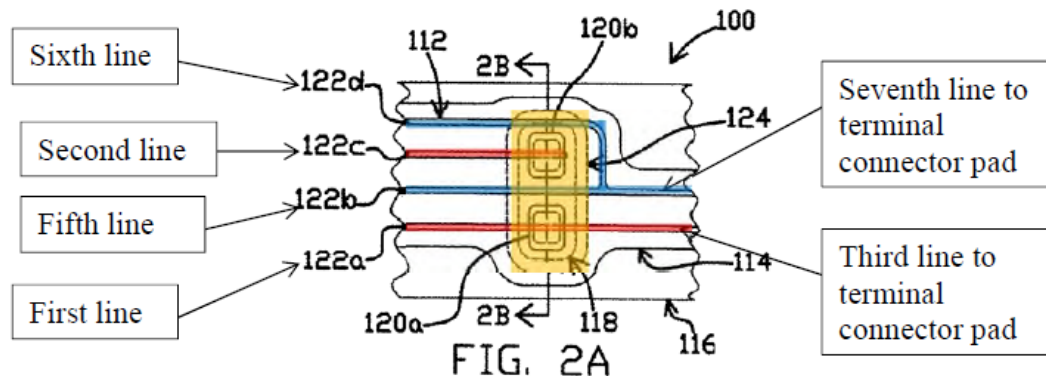


Figure 2A is a schematic view showing a jumper construction for an integrated lead flexure. *Id.* at 1:65–68. Jumper construction 100 includes trace layer 112, insulating layer 114, base layer 116, isolated conductor layer 118 (also described as a conductive island) and a plurality of interconnects 120a, 120b. *Id.* at 4:24–28. Trace layer 112 includes a plurality of traces 122a-122d of one or more integrated transmission line arrays. *Id.* at 4:28–29. Traces 122a-122d are coplanar and are in an interleaved configuration. *Id.* at 4:30–31. First and third traces 122a, 122c are electrically joined through isolated conductor layer 118; second and fourth traces 122b, 122d are electrically joined within trace layer 112. *Id.* at 4:35–39. First and second interconnects 120a, 120b, in combination with isolated conductor layer 118, form a jumper connection between first and third traces 122a, 122c. *Id.* at 5:1–5.

Petitioner asserts Pro discloses the “third line . . . connected to said first electrode pad” and the “seventh line . . . connected to said third

electrode pad,” as recited in independent claims 1 and 6 (and claims 2–4 by virtue of their dependency). *See* Pet. 55, 57; *see also* Pet. 74–75 (pointing to the analysis of claim 1 for the similar recitations set forth in claim 6). In support of its position, Petitioner provides an annotated version of Figure 2A, depicted below:



Petitioner’s annotated version of Figure 2A identifies the claimed first, second, third, fifth, sixth, and seventh lines with elements in the jumper construction 100 shown in the figure. *Id.* at 55, 57. In particular, Petitioner identifies a portion of 122a as the “third line” and a portion of 122b as the “seventh line.” *Id.* Petitioner asserts Pro discloses the illustrated jumper construction may be located near terminal connector pads, and, therefore, discloses the identified portion of trace 122a “is connected to one of the terminal connector pads 40 constituting the first electrode pad.” *Id.* at 55. Petitioner makes a similar assertion that the portion of the trace 122b identified as the seventh line is connected to one of the terminal connector pads constituting the third electrode pad. *Id.* at 57. Petitioner’s expert repeats the same assertions in his testimony. *See* Ex. 1007 ¶¶ 169, 172.

Patent Owner contends Pro fails to disclose the “third” and “seventh” lines that connect to “first” and “third” electrode pads respectively. Prelim. Resp. 17. Patent Owner argues that Petitioner assumes the two identified

lines connect to “terminal connector pads 40,” but Pro “never actually explains how the jumper constructions set forth in Figure 2A is connected to terminals.” *Id.* at 17–18. Patent Owner asserts that Petitioner is not relying on actual disclosure in Pro, but rather has made assumptions regarding how different components could be attached to the jumper shown in Figure 2A. *Id.* at 18.

We have reviewed Petitioner’s analysis and evidence and determine Petitioner fails to establish Pro discloses the claimed “third” and “seventh” lines connected to first and third electrode pads, respectively. Petitioner’s assertion that traces 122a, 122b connect to terminal connector pads 40 is not supported by the cited Figure. *See* Ex. 1005, Fig. 2A. Pro does describe that in some embodiments, the jumper construction illustrated in Figure 2A is located proximate to one of the terminal connector pads 40. *Id.* at 3:52–54. But, Pro does not describe that it is traces 122a, 122b that connect to terminal pad 40, let alone that the specific portions of these traces identified by Petitioner as the third and seventh lines have such a connection.² Moreover, Pro’s description that the jumper connection may be proximate to *one* of the terminal connector pads does not support Petitioner’s position that traces 122a, 122b (third and seventh lines) connect to different terminal pads (first and third electrode pads).

Accordingly, for the foregoing reasons, we conclude Petitioner has not demonstrated a reasonable likelihood of prevailing in establishing claims 1–4 and 6 are anticipated by Pro.

² Petitioner identifies different portions of traces 122a, 122b as the claimed first line and fifth line, respectively. Pet. 51, 53.

III. ORDER

In view of the foregoing, it is:

ORDERED that Petitioner's request for *inter partes* review of claims 1–4 and 6 of U.S. Patent 7,923,644 is denied.

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