

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

JUUL LABS, INC.,
Petitioner,

v.

NJOY, LLC,
Patent Owner.

IPR2024-00160
Patent 11,497,864 B2

Before CHRISTOPHER M. KAISER, KIMBERLY McGRAW, and
AVELYN M. ROSS, *Administrative Patent Judges*.

McGRAW, *Administrative Patent Judge*.

JUDGMENT
Final Written Decision
Determining No Challenged Claims Unpatentable
Dismissing Patent Owner's Motion to Exclude
35 U.S.C. § 318; 37 C.F.R. § 42.64

I. INTRODUCTION

In this inter partes review, instituted pursuant to 35 U.S.C. § 314, Petitioner JUUL Labs, Inc. challenges the patentability of claims 1–48 (“the challenged claims”) of U.S. Patent No. 11,497,864 B2 (Ex. 1001 (“the ’864 Patent”)), assigned to NJOY, LLC (“Patent Owner”).

We have jurisdiction under 35 U.S.C. § 6. This Final Written Decision, issued pursuant to 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73, address issues and arguments raised during trial. For the reasons discussed below, we determine that Petitioner has not shown by a preponderance of the evidence that any of the challenged claims of the ’864 patent are unpatentable.

A. *Procedural History*

Petitioner JUUL Labs, Inc. filed a petition for an *inter partes* review (Paper 3 (“Pet.”)) challenging claims 1–48 of the ’864 Patent. Patent Owner NJOY, LLC filed a Preliminary Response (Paper 7), to which Petitioner filed an authorized reply to the Preliminary Response (Paper 8), and Patent Owner filed a sur-reply (Paper 9). We then instituted an *inter partes* review of all of the challenged claims based on all of the grounds identified in the Petition. Paper 10 (“Inst. Dec.” or “Institution Decision”).

Thereafter, Patent Owner filed a Response to the Petition (Paper 17, “PO Resp.”), Petitioner filed a Reply (Paper 22 (“Reply”)), and Patent Owner filed a Sur-reply (Paper 25, “Sur-reply”). Patent Owner also filed a Motion to Exclude (Paper 31, “Mot. Excl.”), to which Petitioner filed an Opposition (Paper 33, “Opp. Mot. Excl.”), and Patent Owner filed a Reply (Paper 34, “Reply Mot. Excl.”). A consolidated oral hearing was held for

proceeding and IPR2024-00161 on February 25, 2025, and a transcript of the consolidated hearing has been entered into the record. Paper 39 (“Tr.”).

B. Real Parties-in-Interest

Petitioner asserts that JUUL Labs, Inc. is the real party-in-interest. Pet. 1, 4. Patent Owner asserts that the real parties-in-interest are “Patent Owner, NJOY, LLC, and Patent Owner’s parent corporation, Altria Group, Inc.” Paper 6 (“Patent Owner’s Mandatory Notices”), 1.

C. Related Matters

The parties identify a number of district court and ITC proceedings as related to the ’864 patent. Pet. 5; Paper 6 (Patent Owner’s Mandatory Notices), 1. Both parties identify a co-pending district court litigation as a related matter as involving the ’864 patent:

- *NJOY, LLC v. JUUL Labs, Inc.*, No. 1:23-cv-00917 (D. Del.), filed August 22, 2023. Pet. 5; Paper 6, 1.

Both parties also identify two district court proceedings, now dismissed, that were filed by Patent Owner’s predecessor in interest, Fuma International LLC, as involving the ’864 patent:

- *Fuma International LLC v. Logic Technology Development LLC*, No. 2:23-cv-04093 (D.N.J.), filed July 31, 2023 and dismissed August 25, 2023;
- *Fuma International LLC v. Altria Group, Inc.*, No. 2:23-cv-00231 (E.D. Va.), filed May 26, 2023 and dismissed August 14, 2023.

Pet. 5; Paper 6, 1.

Patent Owner further identifies as a related matter a third dismissed district court proceeding (the “M.D.N.C. Litigation”), in which Patent Owner’s predecessor in interest asserted infringement of U.S. Patent No. 10,334,881 (“the ’881 patent”), the parent to the ’864 patent.

- *Fuma International LLC v. RJ Reynolds Vapor Company*, No. 1:19-cv-00660 (M.D.N.C.), filed July 2, 2019 and dismissed December 2, 2021. Paper 6, 1.

Although Petitioner does not specifically identify the M.D.N.C. Litigation as a related matter (*see* Pet. 4–5), the Petition does discuss this proceeding.

See, e.g., Pet. 11–12.

Petitioner identifies (Pet. 5) the following co-pending ITC proceeding as a related matter:

- *In Re Vaporizer Devices, Cartridges Used Therewith, and Components Thereof*, Case No. 337-TA-3961¹, filed August 22, 2023.

Patent Owner identifies (Paper 6, 1) a different ITC proceeding as a related matter:

- *Certain Vaporizer Devices, Cartridges Used Therewith, and Components Thereof*, USTIC Inv. No. 337-TA-1372, filed August 22, 2023.

D. The '864 Patent (Ex. 1001)

The '864 patent, titled “Electronic Vaporizer,” is directed to an “electronic vaporizer includ[ing] a cartridge that facilitates provision of a vaporized solution to an individual.” Ex. 1001, codes (22), (45), (54), (57). The '864 patent claims priority to a number of U.S. patent applications, including the application that gave rise to the '881 patent. *Id.* at code (63).

The '864 patent states that “[c]onventional electronic cigarette designs generally include a battery, a heating element, and a mouthpiece. The

¹ Although not identified as a related matter, the Petition also cites to exhibits from ITC proceedings *In re Vaporizer Devices, Cartridges Used Therewith, and Components Thereof*, 337-TA-1368 (Ex. 1022) (Pet. 28) and *In re Vaporizer Devices, Cartridges Used Therewith, and Components Thereof*, 337-TA-1372 (Ex. 1019) (Pet. 18).

mouthpiece includes a liquid solution that comprises nicotine, and the battery provides power to the heating element, which in turn operates to vaporize the solution.” *Id.* at 1:23–30. The ’864 patent further states that “manufacturers of vaporizers generally manufacture a power source and a heating element in a proprietary manner, such that only a heating element provided by the manufacturer can be electrically or electronically coupled to a power source provided by the manufacturer.” *Id.* at 1:64–2:1. The ’864 patent provides adapters “configured to electrically or electronically couple power sources from a first manufacturer with a heating element from a second manufacturer.” *Id.* at 2:7–9.

Figure 1 of the ’864 patent is reproduced below.

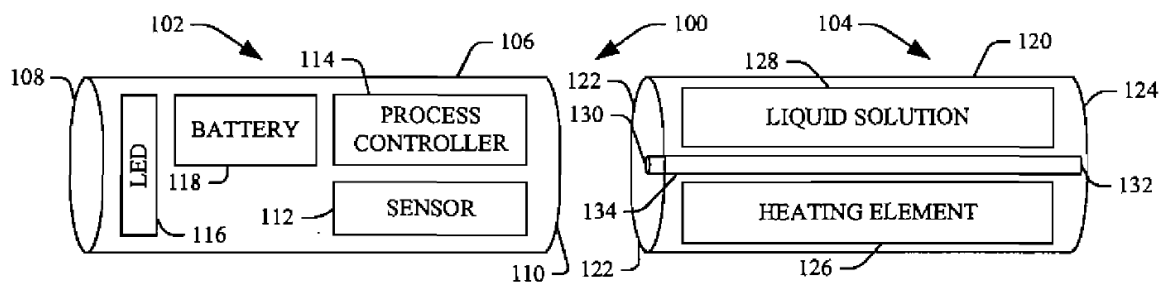


Figure 1 depicts “a functional block diagram of an exemplary electronic vaporizer.” *Id.* at 2:20–21. Electronic vaporizer 100 includes power source 102 and cartridge 104, which are mechanically and electrically coupled, e.g., by a respective electrically-conductive threaded fastener and receiver. *Id.* at 2:62–3:11.

Power source 102 includes cylindrical housing 106 having first end 108, opposing second end 110, and an interior. *Id.* at 3:12–13, 3:26–30. Second end 110 can include an aperture (not shown) configured to receive airflow from a user. *Id.* at 3:30–32. Power source 102 further includes battery 118 and switch/sensor 112, both residing on the interior of housing 106.

Cartridge 104 includes cylindrical housing 120 having first end 122 and opposing second end 124, both of which may be considered as a portion of the housing or apart from the housing. *Id.* at 3:46–59, 54. Cartridge 104 further includes a heating element 126 in the housing 120 and a liquid solution 128 in the housing 120. *Id.* at 3:65–66, 4:7–8. First end 122 comprises first aperture 130 that is located approximately the center of first end 122. *Id.* at 4:30–32. Similarly, second end 124 comprises second aperture 132 that is located at approximately the center of second end 124 of cartridge 104. *Id.* at 4:32–34. Airflow passageway 134 extends between first aperture 130 and second aperture 132 axially proximate to the center of housing 120. *Id.* at 4:35–37.

A user can mechanically couple power source 102 to cartridge 104, thereby electrically coupling battery 118 to heating element 126. *Id.* at 4:40–42. When the user places second end 124 of cartridge 104 in their mouth and draws air through airflow passageway 134, the switch/sensor 112 in power source 106 detects the drawing of air through the airflow passageway 134, an electric circuit is closed between the battery 118 and the heating element 126, and the process controller 114 controls an amount of voltage/current to be received by the heating element 126 from the battery 118. *Id.* at 4:42–51. The heating element 126 vaporizes a portion of the solution 128, which is received by the user. *Id.* at 4:52–54.

Figure 2 of the '864 patent is reproduced below.

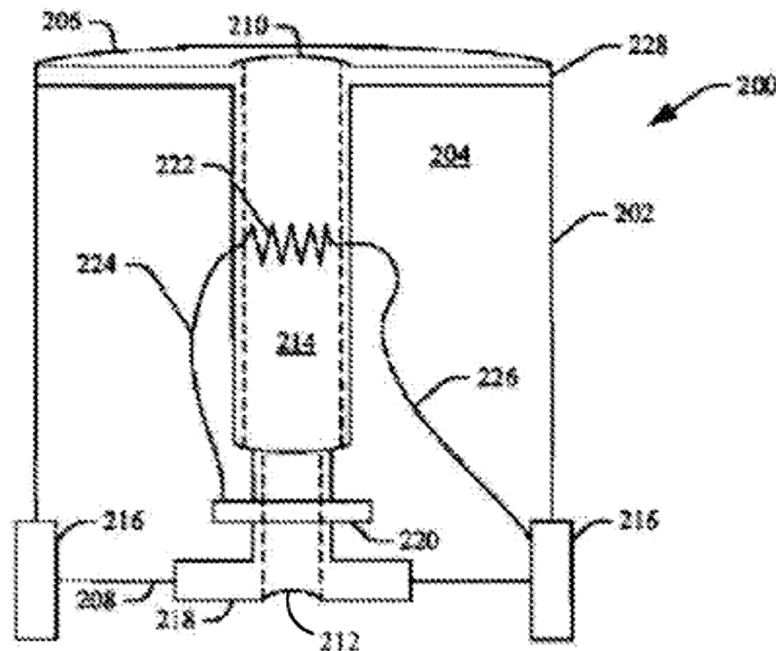


Figure 2 depicts an “exemplary configuration of a cartridge for utilization in an electronic vaporizer.” *Id.* at 2:22–23. The cartridge 200 includes a housing 202 having a first end 206, opposing second end 208, and liquid solution in absorbent material 204 spanning the ends. *Id.* at 5:67–6:6. The first and second ends 206, 208 have respective first and second apertures 210, 212 that form an airflow passageway 214 (also formed by a hollow center post 218) enclosing a heating element 222; these elements operate similarly to their counterparts 122, 124, 126, 130, 132, 134 of the cartridge 104 described for Figure 1. *Id.* at 6:12–24, 32–36, 53–58.

The cartridge further includes a conductive element 216 having metallic threads that facilitate mechanically and electrically coupling the cartridge 200 with a power source (battery). *Id.* at 6:27–31. Conductive lines 224, 226 respectively couple the heating element 222 to an electrical isolator 220 and the conductive element 216. *Id.* at 6:43–46. When the cartridge 200 is coupled to a power source, the conductive element 216 is electrically coupled to a negative terminal of the power source and the center

post 218 (and also, thus, the electrical isolator 220) is electrically coupled to a positive terminal of the power source. *Id.* at 6:49-53.

E. Illustrative Claims

Petitioner challenges all claims of the '864 patent (i.e., claims 1–48). Claims 1, 5, 9, 21, 25, 29, 38, and 45 are independent. Claim 1 is reproduced below.

Claim 1:

1[p] A cartridge configured to couple to a power source of an electronic vaporizer, the cartridge comprising:

[a1] a housing having an interior and a solution holding medium adapted to hold a solution,

[a2] the housing having a first end and a second end that is opposite the first end, *the housing having a first aperture proximate the first end and a second aperture proximate the second end,*

[a3] the first end of the housing being adapted to electrically couple to the power source,

[a4] the first aperture and the second aperture being in communication with one another to permit an airflow through the housing from the first aperture to the second aperture;

[b1] a heating element located in the interior of the housing, the heating element extending transversely to a central longitudinal axis of the housing and being at least partially exposed to the airflow,

[b2]: the heating element being configured to vaporize at least a portion of the solution for oral provision to an individual in the airflow, the heating element being responsive to electrical power received from the power source; and

[c] an airflow passageway in the housing, at least a portion of the airflow passageway extending centrally and axially with respect to the housing,

[d] wherein the airflow passageway extends centrally and axially from the first aperture to the second aperture.

Ex. 1001, 17:19–17:43 (labels and formatting added to correspond with Petitioner’s designation of claim limitations (*see* Pet. i-ii)).

F. Asserted Unpatentability Challenges

Petitioner asserts that claims 1–48 would have been unpatentable based on the following challenges:

	Claim(s) Challenged	35 U.S.C. §²	Reference(s)/Basis
1A ³	1–48	103 ⁴	Xia ⁵
1B	1–48	103	Xia, Wang ⁶
1C	1–48	103	Xia, Fang ⁷

² The Leahy-Smith America Invents Act (“AIA”), Pub. L. No. 112-29, 125 Stat. 284 (2011), amended 35 U.S.C. §§ 102 and 103, effective March 16, 2013. Petitioner asserts, and Patent Owner does not dispute that pre-AIA law applies because the ’864 patent claim priority to an application filed before this date. *See, e.g.*, Pet. 23 (asserting “pre-AIA” prior art).

³ Although the Petition only refers to Grounds 1 and 2, each of these grounds rely on various combinations of the asserted art. We refer to the grounds as Grounds 1A through 1D and Grounds 2A through 2B for clarity.

⁴ Although Petitioner asserts that “[a]ny of the references are anticipatory,” (Pet. 31), Petitioner’s arguments address unpatentability under § 103, not § 102, and we analyze Petitioner’s arguments accordingly.

⁵ Patent No. CN201238610, issued May 20, 2009 (“Xia”). Ex. 1027 (foreign language document); Ex. 1004 (certified English translation); Ex. 1026 (affidavit). When referring to foreign references in this decision, we refer to the English translations filed by Petitioner.

⁶ Patent Publication No. CN101366554, published February 18, 2009 (“Wang”). Ex. 1029 (foreign language document); Ex. 1005 (certified English translation); Ex. 1028 (affidavit).

⁷ Chinese Patent No. CN 201085044Y, issued July 16, 2008 (“Fang”). Ex. 1031 (foreign language document; Ex. 1006 (Certified English translation); Ex. 1030 (affidavit).

	Claim(s) Challenged	35 U.S.C. §²	Reference(s)/Basis
1D	1–48	103	Xia, Wang, Fang
2A	1–48	103	Wang
2B	1–48	103	Wang, Fang

Pet. 17. Petitioner relies on the declaration of Mr. Robert H. Sturges (Ex. 1007). Mr. Sturges was deposed and a copy of his deposition is found at Exhibit 2017. Patent Owner relies on the declarations of William Singhose, Ph.D. (Ex. 2022), Daniel Hillenbrandt (Ex. 2023), and Rebecca Moore (Ex. 2024). Dr. Singhose and Mr. Hillenbrandt were deposed and copies of their depositions were filed as Exhibits 1035 and 1038, respectively.

Petitioner also relies on a declaration of Mr. Wang Shangong (Ex. 1017) prepared for the district court litigation. *See, e.g.*, Pet. 29. Patent Owner states that Petitioner did not make Mr. Wang available for deposition. PO Resp. 46 n.8.

II. ANALYSIS

A. *Principles of Law*

To prevail in challenging Patent Owner’s claims, Petitioner must demonstrate by a preponderance of the evidence that the claims are unpatentable. 35 U.S.C. § 316(e); 37 C.F.R. § 42.1(d). A claim is unpatentable under 35 U.S.C. § 103(a) if “the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.” *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations, including: (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of skill in the art; and (4) when in evidence, objective evidence of obviousness or nonobviousness, i.e., secondary considerations⁸. See *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

Additionally, the obviousness inquiry typically requires an analysis of “whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue.” *KSR*, 550 U.S. at 418 (citing *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2016) (requiring “articulated reasoning with some rational underpinning to support the legal conclusion of obviousness”)). Furthermore, Petitioner does not satisfy its burden of proving obviousness by employing “mere conclusory statements,” but “must

⁸ Because we determine Petitioner has not shown that any of the challenged claims would have been obvious, we need not address Patent Owner’s arguments of secondary considerations. See PO Resp. 88–110.

instead articulate specific reasoning, based on evidence of record, to support the legal conclusion of obviousness.” *In re Magnum Oil Tools Int'l, Ltd.*, 829 F.3d 1364, 1380 (Fed. Cir. 2016).

B. Level of Ordinary Skill in the Art

In determining whether an invention would have been obvious at the time it was made, we consider the level of ordinary skill in the pertinent art at the time of invention. *Graham*, 383 U.S. at 17. Petitioner does not provide its own definition of the level of ordinary skill in the art. Instead, Petitioner asserts:

In previous litigation involving the '881 patent – the parent patent to the '864 patent (*Fuma International LLC v. R.J. Reynolds Vapor Company*, Case No. 1:19-cv-260 (M.D.N.C. 2019)) with an identical specification – Patent Owner's predecessor-in-interest asserted that a person of ordinary skill in the art (“POSITA”) at the time of the purported invention would have had a mechanical or electrical engineering degree, industrial design degree, or a similar technical degree, or equivalent work experience, and 5 to 10 years of experience in electromechanical devices. Ex. 1007, ¶¶14-17.

Pet. 11–12; *see also* Ex. 1007 ¶ 16 (Mr. Sturges testifying that he meets “that qualification” without affirmatively providing a definition for a POSITA).

Before institution, Patent Owner stated it did not challenge this definition (Prelim. Resp. 9), and we adopted Petitioner's proposed definition in our Decision granting institution. During trial, Patent Owner also adopted this definition. PO Resp. 10–11. Upon a complete record, we see no reason to change and we maintain the agreed upon definition of a POSITA.

C. Claim Construction

In an *inter partes* review proceeding, we interpret claim terms using “the same claim construction standard that would be used to construe the claim in a civil action under 35 U.S.C. [§] 282(b), including construing the claim in accordance with the ordinary and customary meaning of such claims as understood by one of ordinary skill in the art and the prosecution history pertaining to the patent.” 37 C.F.R. § 42.100(b). In this context, claim terms “are generally given their ordinary and customary meaning” as understood by a person of ordinary skill in the art at the time of the invention. *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312–13 (Fed. Cir. 2005) (citations omitted) (en banc). The “ordinary and customary meaning of a claim term is the meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention.” *Id.* at 1313. “Importantly, the person of ordinary skill in the art is deemed to read the claim term not only in the context of the particular claim in which the disputed term appears, but in the context of the entire patent, including the specification.” *Id.*

Although both parties discuss the construction of multiple terms by both the district court and the ITC (*see, e.g.*, Pet. 12–17; PO Resp. 2–10), for purposes of this Decision, only the terms (1) “housing having a first end and a second end that is opposite the first end,” “the housing having a first aperture proximate the first end and a second aperture proximate the second end” and (2) “wherein the airflow passageway extends centrally and axially from the first aperture to the second aperture” require construction.

We determine that no other claim terms require express construction 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”); *see also Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (citing *Vivid Techs.* in the context of an *inter partes* review).

1. “housing having a [first or second] aperture proximate the [first or second] end” of the housing

Claim element 1[a2] recites a “housing having a first end and a second end that is opposite the first end,” “the housing having a first aperture proximate the first end and a second aperture proximate the second end.” Ex. 1001, 17:22–25 (claim 1). The same language is recited in the remaining independent claims 5, 9, 21, 25, 29, 38, and 45. *Id.* at 18:2–5 (claim 5), 18:53–56 (claim 9), 19:65–66, 20:1–3 (claim 21), 20:49–50, 20:52–53 (claim 25), 21:36–37, 21:39–42 (claim 29), 22:44–45, 22:46–49 (claim 38), 23:43–44, 23:46–48 (claim 45).

At institution, we preliminarily construed the phrase a “housing having a first aperture” to encompass apertures that are located within the first end of the housing and further stated that the term does not require that the first aperture be located on the housing itself. Inst. Dec. 17–22. We noted that the parties’ claim construction arguments were not fully developed or supported and invited the parties to “address [the] construction of this term during trial.” *See id.*

On the full record developed during trial, we reach a different conclusion.

a) Parties Positions

In its Petition, Petitioner did not propose an express construction of a “housing having a first aperture.” Rather, Petitioner argues that, in the M.D.N.C. Litigation involving the related ’881 patent, Patent Owner “took—and the District Court adopted—positions relevant to this petition, including positions regarding the claimed first aperture and claimed airflow passageway.” Pet. 13. Petitioner argues that Patent Owner “asserted that the claimed ‘first aperture on the first end’ of the cartridge housing is met by a single opening inside the housing, where air entering the cartridge converges at that opening to pass through to the alleged airflow passageway.” *Id.* at 13–14 (citing Ex. 1021 (“Fuma Summary Judgment Brief”), 9–12). Petitioner asserts that the District Court agreed with Patent Owner when it granted summary judgment of infringement, and that the district court “explicitly held that the aperture internal to the device, at the beginning of the internal passageway, *i.e.*, the hole within the internally-contained ‘positive pin’ depicted above, meets the requirement for a first aperture ‘on the first end.’” Pet. 14–15 (citing Ex. 1014 (“RJR Mot. for Summary Judgement”), 44; Ex. 1015 (“Summary Judgment Order”), 14–18). Petitioner also argues that in a parallel ITC case, “Patent Owner is asserting this same product is covered by the ’864 patent claims and that this internal aperture meets the ‘proximate’ limitation.” *Id.* at 15 (citing Ex. 1032 (ITC Contentions), 3–4).

Patent Owner responds that the plain and ordinary meaning of a “housing having a first aperture proximate the first end” is a “hole in the housing structure at a location proximate the first end of the housing.” PO Resp. 21–22 (citing Ex. 2002 ¶¶ 81–94). According to Patent Owner, the

proper construction excludes “holes in objects within the housing.” *Id.* at 22; *see also id.* at 68 (“The correct construction of “the housing having a ‘first aperture proximate the first end’ refers to an aperture formed in the housing wall at or near the housing’s end; it does not encompass apertures in objects within the housing.”).

Patent Owner argues that the challenged claims use the term “having” in two different contexts, one directed to a “housing having an interior and a solution holding medium” where the term *having* refers to items *within the housing*, and the other directed to a “housing having a first aperture proximate the first end and a second aperture proximate the second end,” where the term *having* recites a characteristic of the housing itself. *Id.* at 22.

Patent Owner further argues that the language of the specification and the arguments in the M.D.N.C. Litigation and ITC proceeding support Patent Owner’s proposed construction. *Id.* at 23–30 (stating that Patent Owner’s arguments in related proceedings are not inconsistent with its present claim construction argument).

In its Reply, Petitioner maintains that Patent Owner’s proposed construction in the present proceeding is inconsistent with the arguments and conclusions made during prosecution, in in the M.D.N.C. Litigation, and at the ITC litigation. Reply 9–15. According to Petitioner, Patent Owner “and its predecessor-in-interest, Fuma, have consistently taken the position (during examination, in Federal District Court, and at the ITC) that internal apertures can satisfy the claims, and [they] should be held to that claim scope.” *Id.* at 15.

In the Sur-reply, Patent Owner again states that Petitioner is incorrect and that the representations made during examination and litigation are consistent with Patent Owner's proposed construction. Sur-reply 7–11.

b) Analysis

(1) Intrinsic Evidence

We start with the language of the claims themselves. The claims recite a “housing having a first end” and the “housing having a first aperture proximate the first end.” The plain and ordinary meaning of “proximate” is near or close to, not on. Thus, the plain and ordinary understanding of the claim language of a “first aperture proximate the first end” of a housing is that the first aperture is near, though not necessarily on, the first end of the housing.

This, however, does not address the full scope of the claim language, which also recites a “housing having an aperture.” The parties dispute whether a “housing having a first aperture proximate the first end” encompasses an aperture that is located within the inside of the housing (as asserted by Petitioner) or whether the claim language requires that the aperture be *in* the housing itself, i.e., a part of the housing itself.

Claim 1 recites a “housing having a ” multiple times. For example, the independent claims recite a “housing having a first end and a second end that is opposite the first end”, a “housing having a first aperture proximate the first end and second aperture proximate the second end,” and a “housing having an interior and a solution holding medium.”

In our Institution Decision, we stated that the use of the same phrase “housing having a ” to refer to both a housing having a first aperture as well as to a housing having a solution holding medium, creates the presumption

that the phrase “housing having a ” is used consistently throughout the claim and that the first aperture, like the solution holding medium, may be located within the interior of the housing as opposed to in the housing itself. Inst. Dec. 20 (noting that the parties did not address whether multiple recitations of the same term should be applied differently); *see also Phonometrics, Inc. v. Northern Telecom Inc.*, 133 F.3d 1459, 1465 (Fed. Cir. 1998) (stating that words or phrases used consistently throughout a claim should be interpreted consistently).

During trial, Patent Owner argues that this presumption does not apply in the present case, and we agree. PO Resp. 21–30. Whether a claim term should be interpreted consistently depends the context of how the term is being used. *See Epcon Gas Sys., Inc. v. Bauer Compressors, Inc.*, 279 F.3d 1022, 1030–31 (Fed. Cir. 2002) (stating terms should be construed based on the context of how the terms are used in the claims and construing the term “substantially” recited twice in the claims as having two different meanings, because the term was used in different contexts).

We agree with Patent Owner that the term “having” can have different meanings depending on its context of use. PO Resp. 24. For example, because of context, there is a difference in the meaning of “having” when stating a “bag having two apples” and a “bag having two handles.” *Id.* at 24.

Patent Owner argues, and Petitioner does not dispute, that an aperture is a “hole” or an “opening.” *See, e.g., id.* at 21; *see generally* Reply. Patent Owner asserts that, in the proper context, the plain and ordinary meaning of a housing having an aperture is that the aperture is a hole, or an opening, on the housing structure itself. *Id.* at 21–22. We agree. In order for an object to have an “aperture” or an “opening,” the aperture or opening must be on

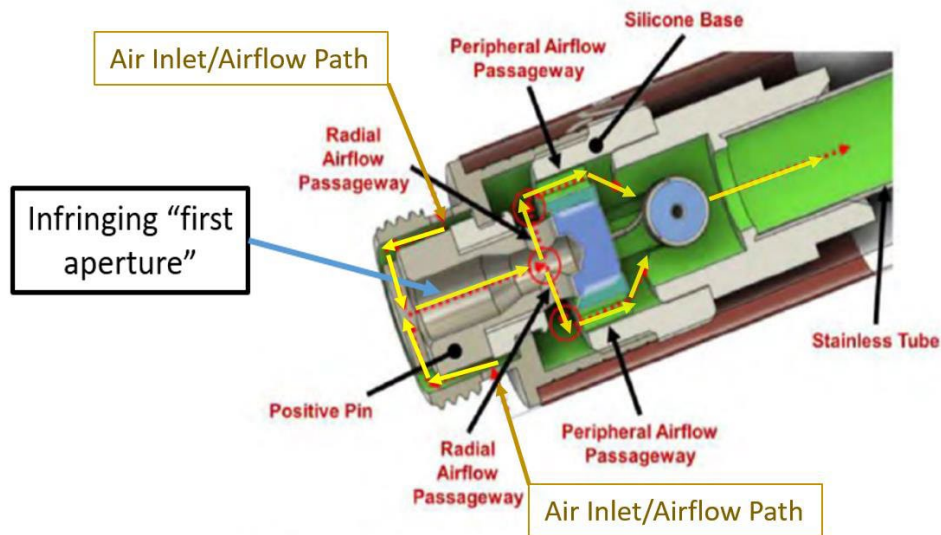
the structure itself and not on a separate object that is located in the structure.

This construction is in accord with the Specification of the '864 patent, which refers to apertures in context of the structure on which they are located. *See, e.g.*, Ex. 1001, 6:12–18 (referring to a first end comprising a first aperture), 7:11–12, 7:65–67 (stating that the wall of an airflow passageway may have apertures).

(2) Extrinsic Evidence

In our Institution Decision, we acknowledged Petitioner's contention that Patent Owner's arguments made in related district court and ITC proceedings could support a construction that encompasses a first aperture that is located within the housing, as opposed to on the housing itself, but noted that the record was not fully developed on this point. *See* Inst. Dec. 21. On a full record, we determine that Patent Owner's statements in the related proceedings do not require that claim term "housing having [an] aperture" encompass apertures that are located on a separate object that is located within the housing.

Petitioner asserts that in the M.D.N.C. Litigation, the patent owner mapped the "first aperture" recited in the claims of the related '881 patent to an internal central aperture located inside the cartridge housing of the accused Vuse Ciro device. Pet. 14 (citing Ex. 1021 (Fuma brief), 9–12); Reply 12–13. The figure below is reproduced from the Petition:



The figure above depicts a portion of the Vuse Ciro device with an airflow path annotated in yellow arrows. Pet. 14 (citing Ex. 1021, 15; Ex. 1007 ¶ 29); Reply 12–13 (describing same figure as depicting “the Vuse Ciro”). As indicated by the “Infringing ‘first aperture’” annotation in the figure, Petitioner argues that the identification by Patent Owner’s predecessor-in-interest of “the hole within the . . . ‘positive pin’” as the “first aperture ‘on the first end’” means that “on the first end” must encompass structures internal to the housing because the positive pin is “internally-contained.” Pet. 14–15. Petitioner also argues that the District Court agreed (*id.* at 14) and that Patent Owner asserts that this made the same assertions in the ITC proceeding when it asserted that this same product is covered by the ’864 patent claims (*id.* at 15 (citing Ex. 1032, 3–4)).

Contrary to Petitioner’s assertions however, Patent Owner did not directly identify VUSE Ciro’s asserted aperture within the positive pin as internally-contained. PO Resp. 26–27; Ex. 1032, 3–5. Nor did the district court in the M.D.N.C. Litigation. Ex. 1015, 17–18. Patent Owner explains that the positive pin in the VUSE Ciro device is an electrical conductor and

is part of the housing. PO Resp. 27. And, as Patent Owner notes, the identified aperture in the VUSE Ciro is on the non-planar outer surface of the end of the housing. PO Resp. 27–28 (stating that even though the aperture is located on a portion of the electrical connector that is slightly recessed, the aperture starts at the outside of the housing to provide access into the interior of the housing). Although there are portions of the housing that extend further from the cartridge than the location of the aperture, those portions of the housing do not enclose or cover the aperture, placing the aperture on the end of the housing. *See* Ex. 2005 (Fuma complaint, M.D.N.C.), 23, Fig. 1.D.

Similarly, we do not understand Patent Owner to have asserted that the purported “first aperture” of the JUUL device at issue in the ITC has an aperture interior to the housing. *See* Sur-reply 7–8 (asserting that the “aperture” is a hole in the housing’s first end of the JUUL device and is visible from the exterior of the housing and citing Ex. 1043.002; Ex. 2043.0002).

Thus, we construe the term “housing having a first aperture” as a housing that has an aperture on the housing structure itself, and not merely an aperture that is located on a separate object that is located within the housing.

2. *“wherein the airflow passageway extends centrally and axially from the first aperture to the second aperture”*

Claim element 1[c]–1[d] recites:

1[c] an airflow passageway in the housing, at least a portion of the airflow passageway extending centrally and axially with respect to the housing,

[d] wherein the airflow passageway extends centrally and axially from the first aperture to the second aperture.

Ex. 1001, 17:39–43. Claims 21 and 38 recite the same limitations. *Id.* at 20:19–32, 23:1–5.

In the Petition, Petitioner did not propose a construction for this phrase, but Petitioner did inform us that the North Carolina District Court construed a similar limitation in the related '881 patent as an “airflow passageway [that] extends in a straight path through the center of the cartridge from a first opening on the first end to a second opening on the opposite end of the cartridge.” Pet. 13 (footnote omitted). Petitioner also noted that the district court applied this construction to an accused product in which the passageway contained obstructions that forced air to depart from a straight-line path along the central axis of the cartridge. *Id.* at 15–17.

Patent Owner argues that we should interpret “airflow passageway that extends centrally and axially” as “encompass[ing] small obstructions . . . but exclud[ing] structures that define the airflow passageway.” PO Resp. 30–36. Petitioner disagrees, arguing that “[t]here is no principled distinction between large and small obstacles.” Reply 15–17. Patent Owner responds that “[t]he prosecution history . . . provide[s] guidance,” demonstrating that “obstructions like Han’s or Xia’s liquid storage are ‘large,’ and obstructions diverting airflow no more than the heating element are ‘small.’” Sur-reply 11–12 (citing PO Resp. 31–35).

On the record developed during trial, we agree with Patent Owner that large obstructions that force the air flow to near the peripheral surface of the housing, render the passageway non-central. During prosecution of the '864 patent, the Examiner rejected certain claims (i.e., dependent claims 49, 63, and 75) over Han.

To overcome this rejection, the applicant argued that Han cannot meet the limitation “wherein the airflow passageway extends centrally and axially from the first aperture to the second aperture.” Ex. 1002, 273. The applicant explained that Han does not meet this limitation because Han’s shell (b) does not include a central airflow passageway and instead places the perforated component for liquid storage (9) in the middle of shell (b), thereby forcing the airflow around the peripheral surface of the perforated component for liquid storage (9). *Id.* at 273–274. The examiner relied on this argument in determining that the applicant had overcome an earlier rejection. *Id.* at 195. Thus, some obstructions of a passageway render the passageway non-central; in particular those obstructions that force air to flow near the peripheral surface of the housing are large enough to render the passageway non-central.

Not all obstructions are of this type, though. In related litigation in district court involving the related ’881 patent, the court determined that the presence of “certain obstacles,” including “a ‘positive pin,’ a ‘silicone base,’ and a ‘heating element,’” that “alter the air’s path as it travels from the base of the airflow passageway to the opposite end” nevertheless did not preclude finding the existence of a central passageway. Ex. 1015, 14–16. In reaching this conclusion, the court relied on the recitation in claims 1 and 8 that “airflow through the passageway pass[es] on both transverse sides of the heating element.” *Id.* at 16; *see* Ex. 1001, 17:44–45, 18:41–44. We find the court’s analysis persuasive and, because that analysis is supported by the language of the challenged claims, we agree with the court that some obstacles placed in the airflow passageway are small enough to maintain a central passageway.

Accordingly, we interpret “airflow passageway that extends centrally and axially” as encompassing passageways that have small obstructions located within them, but as excluding passageways with obstructions large enough to force airflow to the periphery of the housing.

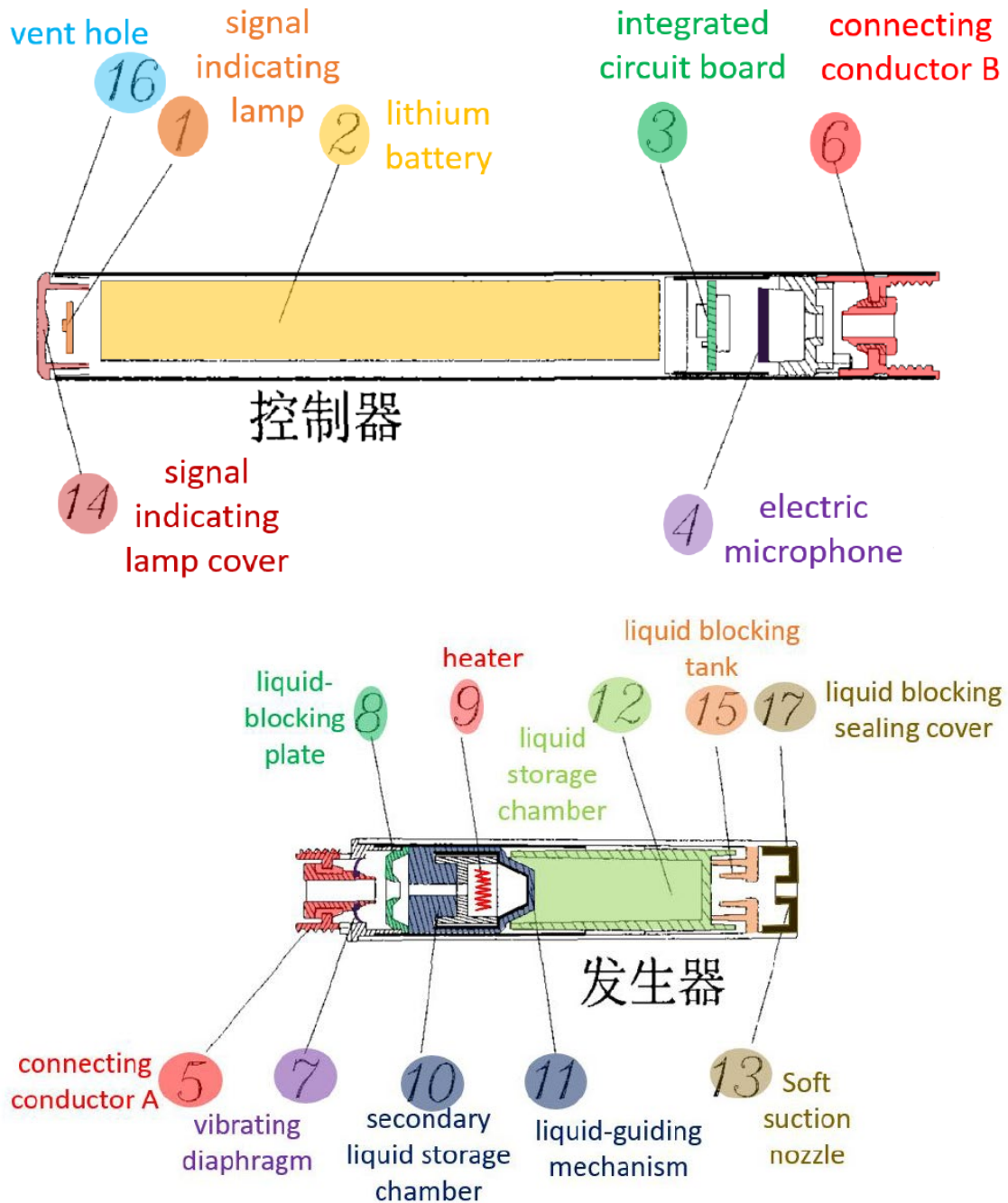
D. Claims 1–48 – Alleged Obviousness over Xia alone or with Wang and/or Fang

Petitioner contends claims 1–48 of the ’864 patent are unpatentable as obvious over Xia alone or over Xia in view of Wang and/or Fang. Pet. 30–90; Reply 1–4. Patent Owner opposes. PO Resp. 50–80; Sur-reply 1–24. For the reasons set forth below, Petitioner has not shown by a preponderance of the evidence that claims 1–48 would have been obvious over Xia, either alone or in combination with Wang and/or Fang.

1. Xia (Ex. 1004)

Xia is a Chinese patent, titled “Environmental-protecting Type Incombustible Atomizing Electronic Cigarette with Function of Cigarette Substitute,” that discloses an electronic cigarette including a “detachable controller and a generator.” Ex. 1005, codes (11), (54), (57); *see also id.* at 7 (“the technical solution . . . [is an] electronic cigarette with a function of a cigarette substitute[and] comprising a detachable controller and a generator”).

Patent Owner’s color annotated versions of Xia’s Figure 2 depicting the controller portion (top) and generator portion (bottom) are reproduced below:



Prelim. Resp. 10–11. Xia’s Figure 2 is a “schematic structural diagram of the . . . atomizing electronic cigarette” comprising a controller (top) and generator (bottom). Ex. 1004, 9. Xia provides the following listing of the illustrated features:

1 signal indicating lamp, 2 rechargeable lithium battery, 3 integrated circuit board, 4 electric microphone, 5 connecting conductor A, 6 connecting conductor B, 7 vibrating diaphragm, 8 liquid-blocking plate, 9 heater, 10 secondary liquid storage chamber, 11 liquid-guiding mechanism, 12 liquid storage chamber, 13 soft suction nozzle, 14 indicating lamp cover, 15 liquid blocking tank, 16 vent hole, 17 liquid blocking sealing cover.

Ex. 1004, 9.

2. *Wang (Ex. 1005)*

Wang is a Chinese patent publication, titled “Electronic Pure Cigarette,” that discloses an electronic cigarette including a “cigarette holder part and a cigarette rod part.” Ex. 1005, codes (11), (54), (57); *see also id.* at 4 (“technical solution” is an electronic cigarette comprising a “cigarette holder part and a cigarette rod part”).

Figures 2 and 3 of Wang are reproduced below.

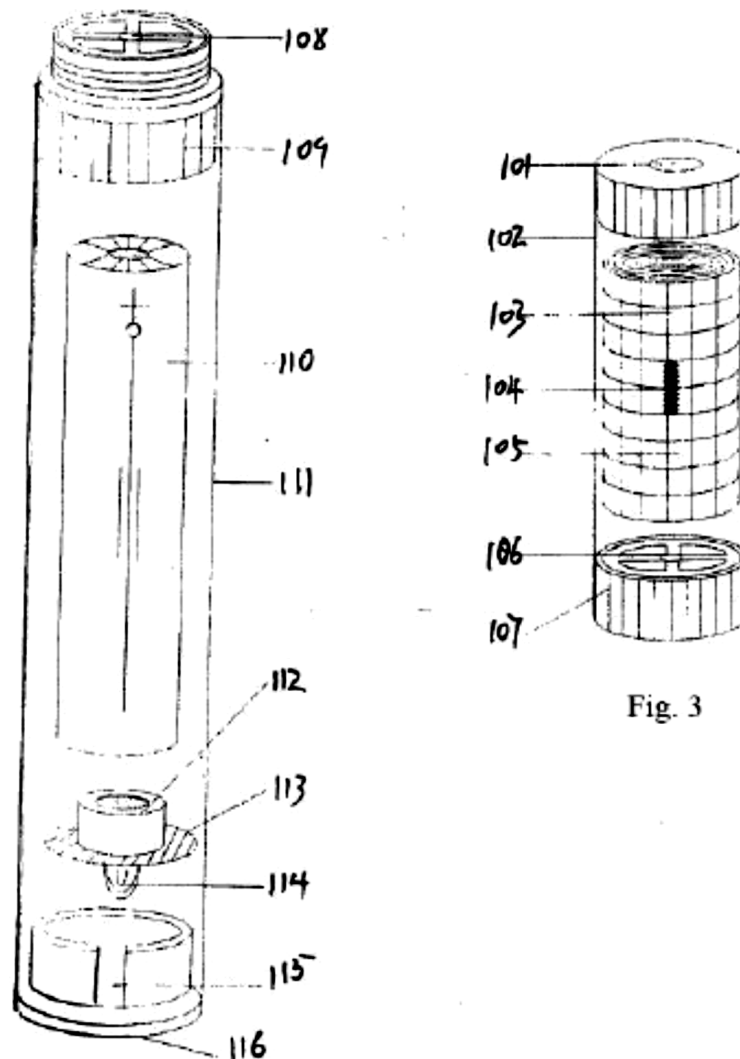


Fig. 3

Figures 2–3, shown above, are “schematic structural diagram[s] of a cigarette rod part in [the first embodiment]” (Figure 2) and “a cigarette holder part in [the first embodiment]” (Figure 3). *Id.* at 5.

Wang provides the following listing of the illustrated features:

an electronic pure cigarette comprises a cigarette rod consisting of a cigarette rod shell 111, a battery 110, a sensor 112, an indicating lamp 114, a circuit control board 113, an indicating lamp cover 116, an air inlet 115, an air outlet 108, an output end 109, and the like; and a cigarette holder consisting of a cigarette holder shell 102, an electric heater 104, a tobacco

extract 103, an organic fiber 105, an air inlet 106, an air outlet 101, an input end 107, and the like.

Id.

Rod shell 111 “is a hollow cylinder, providing a space for the battery 110, the sensor 112, the indicating lamp 114, the circuit control board 113 and wires to solder them.” *Id.* at 5–6. At one end of the shell “is one end of the air outlet 108 . . . connected to the input end of the cigarette holder along with the output end 109.” *Id.* at 6. At the other end of the shell “is one end of the air inlet 115 on the indicating lamp cover 116” and “forms an uninterrupted airflow channel together with a gap inside the shell 111.” *Id.* Sensor 112 “is a switch device that drives the circuit control board 113 and then drives the discharge output of the battery 110.” *Id.* “The sensor is used to collect airflow and pressure changes generated by smoking motions.” *Id.*

“The circuit control board judges a switching signal through the sensor 112, so as to supply power to the output end 109 and the indicating lamp 114, manage a voltage and current of the battery 110, and give corresponding prompts through the indicating lamp 114.” *Id.* “A core of the circuit control board 113 of the cigarette rod is an embedded chip.” *Id.*

“The cigarette holder shell 102 is a hollow cylinder with one end being one end of the air inlet 106, and is connected to the output end 109 of the cigarette rod together with the input end 107.” *Id.* at 7. “The other end is one end of the air outlet 101.” *Id.* “The interior of the shell 102 provides a space for the electric heater 104 and the tobacco extract 103 and organic fiber 105 wound around it, and also provides a space for smoke produced when the tobacco extract 103 in the organic fiber 105 is heated by the electric heater 104.” *Id.*

“The air inlet 115 of the cigarette rod, an internal gap of the cigarette rod, the air outlet 108 of the cigarette rod, the air inlet 106 of the cigarette holder, an internal gap of the cigarette holder and the air outlet 101 of the cigarette holder form the complete airflow channel.” *Id.* at 8. “The air outlet 101 of the cigarette holder is placed at the other end of the air inlet 106 of the cigarette holder . . . is a channel for finally sucking out smoke.” *Id.* at 8.

The inlets and outlets of the airflow channel can be varied. *Id.* at 6–7. “The air inlet 115 of the cigarette rod may be placed in the middle or on a side of the indicating lamp cover 116, and may also be opened in the side of the shell 111.” *Id.* at 6 “The air outlet 108 of the cigarette rod is placed in the middle or on a side of the output end 109.” *Id.* “The air inlet 106 of the cigarette holder is placed in the middle or on a side of the input end 107 of the cigarette holder.” *Id.* at 7. “The air outlet 101 of the cigarette holder may be integrated with the cigarette holder shell 102 or may be separated.” *Id.* at 8.

3. *Fang* (Ex. 1006)

Fang is a Chinese patent publication, titled “Electronic Cigarette,” that discloses an electronic cigarette including a “fuming device control switch and . . . nicotine oil fuming device . . . sequentially nested in the cigarette rod shell.” Ex. 1006, codes (54); *id.* at 4 (“technical solution”), 6 (“to increase a storage amount of nicotine oil, the oil conservator 7 is nested”).

Figure 1 of Fang is reproduced below.

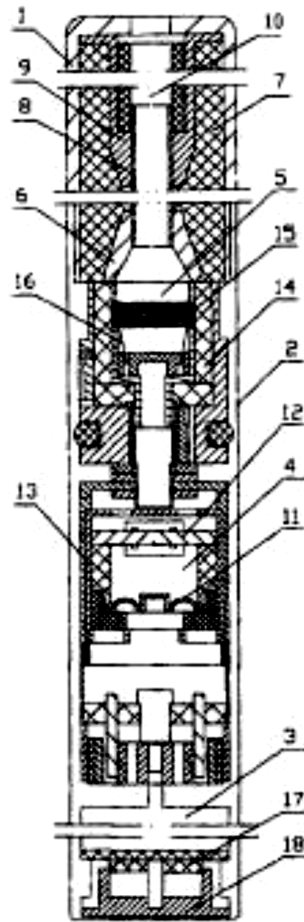


Figure 1 of Fang above depicts a “schematic diagram of the utility model.” *Id.* at 5.

Fang provides the following listing of the illustrated features:

1 sucker, 2 cigarette rod shell, 3 battery, 4 fuming device control switch, 5 nicotine oil fuming device, 6 waterproof sleeve with bell mouth, 7 oil conservator, 8 gas pipe, 9 gas pipe support, 10 smoking channel, 11 silicon film-coated tablet, 12 switch circuit board, 13 support, 14 oil storage device, 15 temporary oil storage device, 16 electric heating film wire, 17 luminous display panel, 18 lamp cover.

Id.

Fang describes the assemblage of the components as follows:

A nicotine oil storage sleeve 7 is nested in the sucker 1, a gas pipe 8 is nested in the center of the evaporation oil storage sleeve 7, the gas pipe 8 is connected with a gas pipe support 9, the gas pipe 8 and the gas pipe support 9 form a smoking channel 10 with the center of the sucker 1 being separated and closed from the oil conservator 7, and the other end of the smoke sucking pipe 8 is communicated with the nicotine oil fuming device 5.

Id.

4. *Analysis*

Petitioner argues that Xia, or the combination of Xia and Wang, or the combination of Xia, Wang, and Fang, teaches or suggests the subject matter of claims 1–48, as well as that a person of ordinary skill in the art would have had a reason to combine the teachings of Xia, Wang, and Fang with a reasonable expectation of success. Pet. 30–90; Reply 17–24.

Among other arguments, Patent Owner argues that none of the asserted art, alone or in combination, teaches or suggests either (1) a housing having a first aperture as required by each of the challenged claims or the (2) the “airflow passageway that extends centrally and axially with respect to the housing intermediate of the first aperture on the first end of the housing and the second aperture on the second end of the housing” that is recited in independent claims 1, 21 and 38. On the record developed at trial, we agree with Patent Owner.

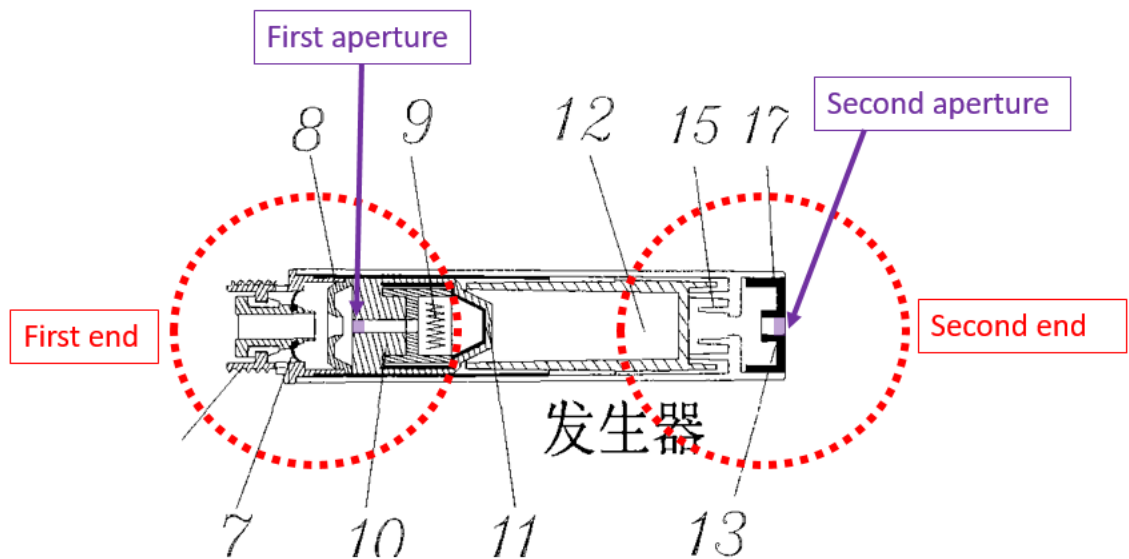
a) Housing Having a First Aperture

As noted above, each of the independent claims recite a “housing having a first end a second end that is opposite the first end,” “the housing having a first aperture proximate the first end and a second aperture proximate the second end.” Ex. 1001, 17:22–25 (claim 1), 18:2–5 (claim 5),

18:53–56 (claim 9), 19:65–66, 20:1–3 (claim 21), 20:49–50, 20:52–53 (claim 25), 21:36–37, 21:39–42 (claim 29), 22:44–45, 22:46–49 (claim 38), 23:43–44, 23:46–48 (claim 45).

(1) *Xia Alone*

Petitioner asserts that the “stainless steel shell” of Xia’s generator/cartridge as shown in the excerpt of Xia’s Figure 2 below is a housing and that the opening (purple) in secondary liquid storage chamber 10 is the housing’s first aperture as required by the independent claims. Pet. 31, 37–38.



Xia’s excerpted Figure 2, with Petitioner’s annotations added, depicts the generator of an electronic cigarette having asserted first and second ends (red) and asserted first and second apertures (purple). Ex. 1004, Fig. 2; Pet. 19, 38.

Petitioner contends that because Xia’s first end extends to at least the location of first aperture, the position of Xia’s first aperture is “not limited” to only the very edge or exterior of the device. Pet. 38 (citing Ex. 1007 ¶ 86). Petitioner also asserts that if the claimed aperture must be “closer” to

the edge and surface of the first cartridge, then it would have been obvious to reposition Xia's first aperture to be closer to edge/surface. *Id.* at 38–39.

As discussed above, we interpret the term “housing having an aperture” to require that the aperture be located on the housing itself. Xia's “first aperture” identified by Petitioner is not located on, or part of, the asserted housing steel shell, but rather is an opening in liquid storage chamber 10, a separate structure that is located within the housing. *Id.* at 31, 37–38. A liquid storage aperture that is merely located within or “close” to the edge of the housing, but not on the housing itself, is not a housing aperture and does not meet the “housing having a first aperture” limitation. Thus, Petitioner's argument that Xia's aperture meets the “housing having an aperture” limitation is not persuasive.

Petitioner also contends that “[a]lternatively, a POSITA would know that moving Xia's external air intake from the cartridge side to the battery side, which would result in air entering centrally on the end of the cartridge “was a simple and obvious modification.” Pet. 38 (citing Ex. 1007 ¶ 90). We are not persuaded by Petitioner's contention.

Petitioner does not sufficiently explain why it would have been “simple” or “obvious” to make such a redesign moving the external air intake from the generator (the asserted cartridge (purple) shown on the right) to the controller having the battery (green) shown on the left in Xia's Figure 2 below.

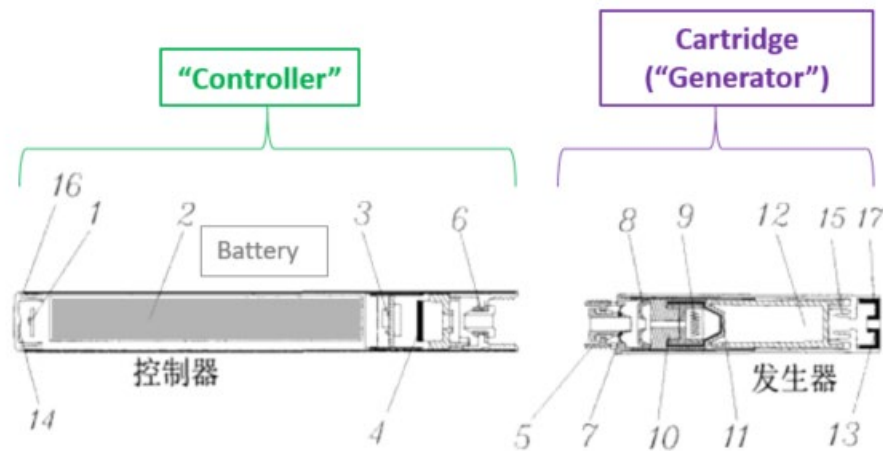


图 2

Indeed, Petitioner admits that this redesign requires multiple modifications, including removing Xia's diaphragm detection based suction system detection of Xia and using a traditional pressure sensor instead. *See, e.g.*, Reply 23 (citing Ex. 1007 ¶¶ 95–99). Petitioner contends, however, that making this change is another benefit because it makes the cartridge cheaper and more reliable. Reply 23 (citing Ex. 1007 ¶¶ 97–99). Petitioner's assertions that it would have been obvious to make such a modification are not sufficiently supported by the record.

Rather, we are persuaded by Patent Owner's argument, supported by Dr. Singhose's testimony, that Petitioner's proposed modification are a substantial redesign that removes critical features from Xia, including safeguards to prevent liquid from back-flowing into the battery compartment and safeguards that remove liquid from the vapor stream before it enters the consumer's mouth. PO Resp. 69 (citing Ex. 2002 ¶¶ 147–175, 199–237).

Accordingly, Petitioner has not shown that Xia teaches or suggests a "housing having a first aperture" as required by the independent claims. For

at least this reason, Petitioner has not shown by a preponderance of the evidence that any of the challenged claims would have been obvious over Xia alone.

(2) *Xia with Wang and/or Fang*

Petitioner also argues that if the apertures are required to be on the edges of the cartridge (i.e., on the housing and not on a structure within the housing), that it would have been obvious to modify Xia in view of Wang and/or Fang by merely extending the edge of the passageway to the very edge of the housing, with a central aperture as taught by Wang and Fang. Pet. 39. Petitioner asserts that doing so would allow the solution holding medium to be extended to the edge of the housing, which would increase liquid storage capacity “as explained in Ground 2, 1[c].” Pet. 39 (citing Ex. 1007 ¶¶ 91–100, 137–160, 307–317).

Petitioner also asserts that a POSITA would have been motivated to combine Xia with Wang and/or Fang because each of the references are directed to similar devices, use similar structures to achieve similar functions, any combination of the references would merely require known and predictable substitutions that would not result in unpredictable results, and any distinctions between any of the references are basic design choices. Pet. 28–30 (citing Ex. 1007 ¶¶ 61–65).

Petitioner does not sufficiently explain why it would have been “simple” or “obvious” to make such a redesign moving the external air intake from the generator (the asserted cartridge (purple) shown on the right) to the controller having the battery (green) shown on the left in Xia’s Figure 2 below. To the extent Petitioner contends a POSITA would have modified Xia in view of Wang and/or Fang to provide an e-cigarette having a housing

with a first aperture, for the same reasons set forth with respect to Xia alone, (e.g., in order to increase liquid storage capacity), these arguments are not persuasive for the reasons set forth above.

We agree with Patent Owner that such a modification would require extensions to Xia and Petitioner has not provided a sufficient reason that a POSITA would make such a modification with a reasonable expectation of success. *See, e.g.*, PO Resp. 53–60. Although Mr. Sturges states that combining Xia with Wang and/or Fang is merely a substitution of known elements and the references could be combined with a high likelihood of success, Mr. Sturges does not provide any support for his position. Ex. 1007 ¶¶ 61–65. Rather, Mr. Sturges simply states that altering the physical arrangements of known components, such as a heater or a battery, would not result in unpredictable results. Ex. 1007 ¶ 64.

Petitioner’s contention that it would have been obvious to extend Xia’s passageway to the very edge of the housing “to increase[e] liquid storage capacity as explained in Ground 2, 1[c]” (Pet. 39) is not persuasive for the reasons set forth in Ground 2 below.

Because Petitioner has not shown that Xia, either alone or in combination with Wang and/or Fang, teaches or suggests a housing having a first aperture as required by each of the challenged independent claims, Petitioner has not shown that any of the challenged claims would have been obvious over the asserted art.

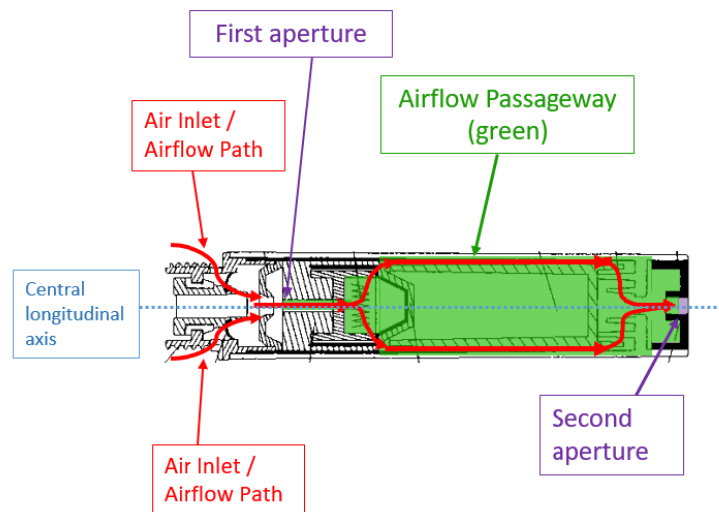
Thus, for at least this reason, Petitioner has not shown by a preponderance that any of the challenged claims would have been obvious over Xia alone or with Wang and/or Fang.

b) airflow passageway extending centrally and axially from first aperture to the second aperture

(1) Xia Alone

Claims 1, 21, and 28 each recite limitations that require “an airflow passageway that extends centrally and axially with respect to the housing intermediate of the first aperture on the first end of the housing and the second aperture on the second end of the housing.” Ex. 1001, 17:26–30, 18:31–38, 19:38–51. As discussed above, we interpret this limitation to encompass passageways that have small obstructions located within them but to exclude passageways with obstructions large enough to force airflow to the periphery of the housing.

Petitioner argues that Xia teaches or suggests this limitation, depicting the airflow through Xia’s passageway in the annotated figure reproduced below:

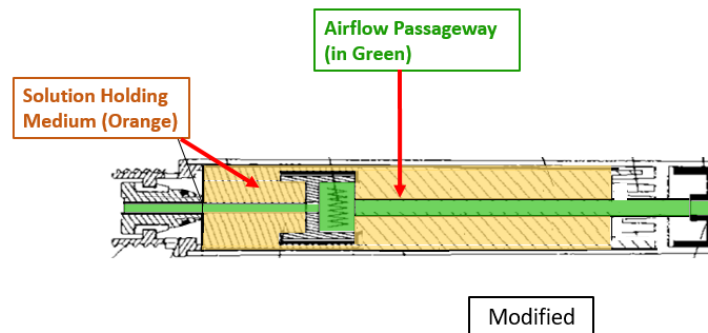


Pet. 39. In the figure reproduced above from the Petition, Petitioner depicts the “Airflow Path” through Xia’s cartridge using red arrows. *Id.* The airflow path is through spray hole 904, along the central axis of the cartridge

and past heating wire 901, then splitting to flow along the inner edge of the housing, between the housing and the outer edge of liquid storage chamber 12. *Id.*; see Ex. 1004, Figs. 2, 4, 5. In this flow path, the airflow is forced to the periphery of the housing. Accordingly, the passageway in Xia does not meet our construction of the limitation that requires a central and axial passageway. Thus, for this additional reason, Petitioner has not shown by a preponderance of the evidence that Xia teaches or suggests the recited passageway and has not shown that independent claims 1, 21, and 38, or the claims that depend therefrom (i.e., claims 2–4, 22–24, 39–44) are unpatentable over Xia.

(2) *Xia and Wang*

Petitioner also argues that the combination of Xia and Wang teaches or suggests this limitation, depicting the passageway of the combined teachings in the annotated figure reproduced below:



Pet. 57. According to Petitioner, a person of ordinary skill in the art would have had reason to combine the teachings of Xia with those of Wang to arrive at a cartridge with an airflow passageway running straight through the center of the cartridge from one end to the other, other than a widened portion in the vicinity of the heating element. *Id.* (depicting the airflow passageway in green). *Id.* at 54–62.

The parties disagree about whether a person of ordinary skill in the art would have had a reason to combine the teachings of Xia with those of Wang. Petitioner argues that

A POSITA would have been motivated to modify Xia's cartridge to include this obvious passageway arrangement of Wang because, for example, making the change to an airflow passageway located centrally and axially, to the extent it is not already, away from the walls of the housing, with the solution holding medium situated between the passageway and the housing, throughout the length of the housing would provide improved, smoother air flow without pinch points, better temperature control, and vapor content, as well as being simpler and cheaper to design and manufacture. Ex.1007 ¶140. Moreover, improved air flow, temperature, and vapor content can improve the device's appeal to users, for example by making the user experience more similar to a traditional cigarette, and by making the vapor more palatable. Ex. 1007 ¶141.

And this obvious substitution and use of Wang's cartridge layout could be easily achieved using Wang's elements that connect the cartridge and battery-holding component, and it would result in predictable results with a reasonable expectation of success. Xia already uses this architecture for part of its system because secondary liquid storage chamber 10, part of the solution holding medium, is situated between the housing and heater 9 and the portion of the airflow passageway passing over the heater. See, e.g., element 1[a1] above. This modification would simply make that architecture consistent and run along the length of the cartridge. All items would function as they currently do in Xia. Ex. 1007, ¶145-148.

This modification would also simplify the structure of the device, making it (1) have fewer parts, and (2) be more easily manufactured by increasing the use of cylindrical shapes. In doing so, a POSITA would move the portion of the liquid blocking plate 8 that stops the backflow of liquid to the end of the secondary liquid storage chamber. Ex.1007 ¶149–150; *see* Ex. 1004, 13 (“The liquid-blocking plate 8 may prevent the

chemical liquid in the secondary liquid storage chamber 10 from flowing out...”).

Pet. 61–62; *see also* Reply 22–23 (repeating and expanding upon these asserted benefits). Petitioner also argues that “the proposed modifications to Xia” would have “result[ed] in a cheaper and simpler device.” Reply 21–22.

Patent Owner argues that Petitioner’s combination of Xia and Wang “lacks motivation and is plagued by improper hindsight.” Sur-reply 15–17. On the record developed during trial, we agree with Patent Owner that Petitioner has not shown by a preponderance of the evidence that a person of ordinary skill in the art would have had a reason to combine the teachings of Xia with those of Wang to arrive at the claimed limitations.

Relying on the testimony of Patent Owner’s declarant Dr. Singhose, Petitioner argues that a person of ordinary skill in the art “would have known a central straight path has less airflow resistance than a circuitous one.” Reply 22 (citing Ex. 1035, 127:15–128:9). But the same witness also testified that higher airflow resistance might be desirable and explained that providing more resistance to airflow might result in improved mixing. Ex. 1035, 21:21–22:12, 127:20–24, 170:10–14. In addition, Dr. Singhose testifies that the complicated design of the airflow passageway in Xia “serves important functions,” including “allow[ing] large droplets to be reabsorbed by the liquid-guiding mechanism,” allowing “excessive liquid in the airflow [to] condense,” and “prevent[ing] the chemical liquid from being sucked into the mouth.” Ex. 2022 ¶ 190 (citing Ex. 1004, 11, 13–14, 16). Although Petitioner’s declarant Dr. Sturges testifies that a straight airflow passageway “would provide improved, smoother air flow,” he does not

provide any evidence supporting the view that the air flow would be improved. Ex. 1007 ¶ 144. We credit the testimony of Dr. Singhose that using a straight passageway in Xia would have been detrimental rather than beneficial. Ex. 2022 ¶ 190.

Petitioner also argues that the inventors' use of a straight path is evidence that the use of a straight passageway was "merely common-sense obviousness." Reply 22–23. This is hindsight. *Otsuka Pharm. Co. v. Sandoz, Inc.*, 678 F.3d 1280, 1296 (Fed. Cir. 2012) ("The inventor's own path itself never leads to a conclusion of obviousness; that is hindsight."). Moreover, it does not address the testimony of Dr. Singhose that the use of a complicated passageway like that in Xia had benefits not present in a straight central passageway.

Petitioner argues that, because straightening Xia's passageway would involve "removal of the over-complicated and error-prone flapping-diaphragm-based suction detection disclosed in Xia," it both would "create[] greater solution-holding capacity" and would "mak[e] the cartridge cheaper and more reliable." Reply 23 (citing Ex. 1007 ¶¶ 95–99; Ex. 1035, 58:21–59:4). But the testimony on which Petitioner relies states only that extending Wang's fiber to "extend all the way from one end to the other" would result in "a device [that] would be able to hold more liquid, all else equal, than the [device of] Wang." Ex. 1035, 58:21–25. This says nothing about the liquid-holding capacity of the combination of Wang and Xia relative to that of Xia alone. Moreover, although Dr. Singhose agreed that "storing more liquid" would be "advantageous," he also testified that extending Wang's fiber to the end of the cartridge "would be disadvantageous in other ways." *Id.* at 59:1–4. As for the argument that

Petitioner's proposed change would "mak[e] the cartridge cheaper and more reliable," Reply 23 (citing Ex. 1007 ¶¶ 95–99), the cited testimony of Dr. Sturges does not discuss the cost or reliability of the modification and thus is not persuasive. Ex. 1007 ¶¶ 95–99.

Because Petitioner has not shown that a person of ordinary skill in the art would have had a reason to combine the teachings of Xia with those of Wang, Petitioner has not shown by a preponderance of the evidence that the challenged claims would have been obvious over the combination of Xia and Wang.

(3) *Xia, Wang, and Fang*

Petitioner argues that to the extent this limitation would not have been obvious over Xia and Wang, that it is also obvious in light of Fang, which also teaches a central and axial airflow passageway. Pet. 62. Petitioner asserts that a POSITA would have been motivated to modify Xia or Wang's cartridge to include Fang's known airflow passageway arrangement for the same reasons discussed with respect to Wang. *Id.* at 64–65. Petitioner's arguments are not persuasive for the same reasons discussed above.

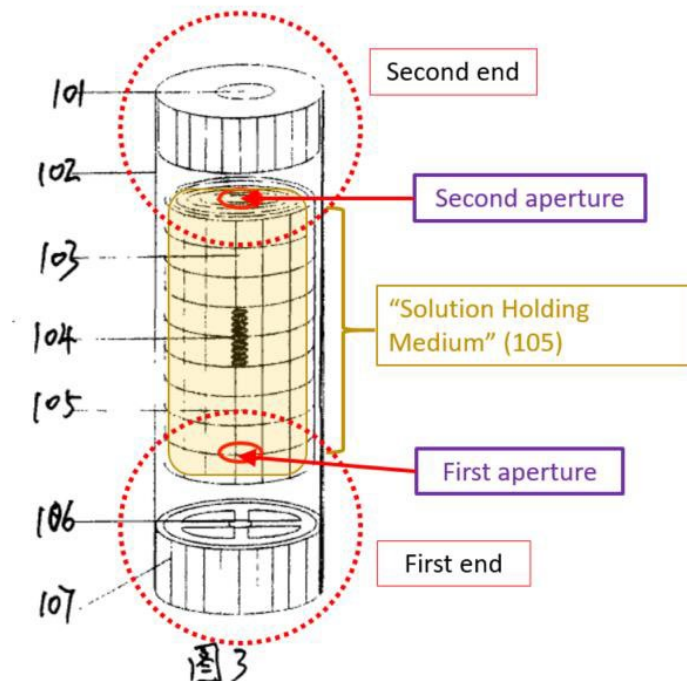
Because Petitioner has not shown that a person of ordinary skill in the art would have had a reason to combine the teachings of Fang with those of Xia and Wang, Petitioner has not shown by a preponderance of the evidence that the challenged claims would have been obvious over the combination of Xia, Wang, and Fang.

*E. Claims 1–48 – Wang alone or in combination
with Fang (Ground 2)*

Petitioner contends claims 1–48 of the '864 patent are unpatentable as obvious over Wang alone or in combination with Fang. Pet. 91–121; Reply 1–4. Patent Owner opposes. PO Resp. 80–88; Sur-reply 24–36.

The challenged claims each recite limitations that require a “housing having a first aperture proximate the first end.” Ex. 1001, 17:22–25 (claim 1), 18:2–5 (claim 5), 18:53–56 (claim 9), 19:65–66, 20:1–3 (claim 21), 20:49–50, 20:52–53 (claim 25), 21:36–37, 21:39–42 (claim 29), 22:44–45, 22:46–49 (claim 38), 23:43–44, 23:46–48 (claim 45).

Petitioner identifies Wang’s “cigarette shell holder 102,” which “is a hollow cylinder,” as the claimed “housing,” organic fiber 105, which holds tobacco oil, as the “solution holding medium,” and a location on organic fiber 105 as the “first aperture.” *Id.* at 91–94 (citing Ex. 1005, Fig. 3 (reproduced below); Ex. 1007 ¶¶ 272–275, 280).



Wang Figure 3 above, with Petitioner’s annotations, depicts a cigarette rod consisting of cigarette shell holder 102, organic fiber 105, and input end 107. Ex. 1005, 5, Fig. 3; Pet. 93. Petitioner does not rely on Fang for teaching the claimed first aperture. *See generally* Pet.

As discussed above in Section II.C.1, we interpret the term “housing having an aperture” to require that the aperture be on the housing itself and not to encompass apertures that are not on the housing, but rather are located on another structure that is within the interior of the housing.

Petitioner’s identified aperture is on the end of the solution-holding medium, not on the identified housing. Pet. 93. Although Petitioner argues that the aperture is “on the first end . . . of the housing,” Petitioner identifies the aperture only on the solution-holding medium rather than on the housing. *Id.* at 93–94. Petitioner’s declarant, Dr. Sturges, similarly testifies that Wang’s cartridge “has a first end . . . as well as a first aperture proximate the first end” but relies on an annotated figure identifying the first aperture on the end of the solution-holding medium rather than on the end of the housing. Ex. 1007 ¶ 280. Accordingly, the aperture in Wang does not meet our construction of the limitation that requires an aperture on the end of the housing.

In its Reply, Petitioner argues that Patent Owner’s expert, Dr. Singhose, agreed that “it would be beneficial to extend the solution-holding medium, bringing the apertures to the very edge of the housing . . . , resulting in beneficial liquid storage capacity.” Reply 36 (citing Ex. 1035, 58:10–59:4). But Dr. Singhose’s statement actually was that extending the solution-holding medium “would be advantageous in terms of storing more liquid, but . . . would be disadvantageous in other ways.” Ex. 1035, 58:21–

59:4. Petitioner directs us to no other evidence of record, Reply 36, and there is therefore no evidence of how a person of ordinary skill in the art would have weighed the advantage of greater liquid storage volume against the disadvantages that Dr. Singhose identified. We do not find such equivocal and incomplete evidence sufficient to support a finding that a person of ordinary skill in the art would have extended Wang’s solution-holding medium to the ends of the housing.

Thus, Petitioner has not sufficiently shown that Wang, or Wang and Fang, teach or suggest a “housing having an aperture” as required by each of the challenged independent claims. According, Petitioner has not shown by a preponderance of the evidence that any of the challenged claims (i.e., claims 1–48) would have been obvious over either Wang or Wang and Fang.

III. PATENT OWNER’S MOTION TO EXCLUDE EXHIBIT 1007 IN PART AND EXHIBITS 1014, 1017, 1018, 1021, 1023-1025, 1036, 1038 (IN PART), 1039-1042, AND 1044

Patent Owner filed a motion to exclude either portions of, or the entirety of, various exhibits. Paper 31. Because we determine that Petitioner has not shown by a preponderance of the evidence that any of the challenged claims are unpatentable, and our decision would be no different were we to exclude any of the exhibits Patent Owner seeks to exclude, we dismiss Patent Owner’s motion as moot.

IV. CONCLUSION

After reviewing the complete record developed during the course of the trial, we conclude that Petitioner has not shown by a preponderance of the evidence, that claims 1–48 of the ’864 patent are unpatentable under any of the asserted grounds.

In summary:

Claims	35 U.S.C. §	Reference(s)/ Basis	Claims Shown Unpatentable	Claims Not Shown Unpatentable
1–48	103	Xia		1–48
1–48	103	Xia, Wang		1–48
1–48	103	Xia, Fang		1–48
1–48	103	Xia, Wang, Fang		1–48
1–48	103	Wang		1–48
1–48	103	Wang, Fang		1–48

V. ORDER

For the reasons given, it is:

ORDERED that, Petitioner has not established by a preponderance of the evidence that claims 1–48 of the '864 patent are unpatentable; and

FURTHER ORDERED that, because this is a Final Written Decision, parties to the proceeding seeking judicial review of the decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.

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