UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

JUUL LABS, INC.,
Petitioner,

v.

NJOY, LLC,
Patent Owner

Case No. IPR2024-00161
Patent No. 10,334,881

PATENT OWNER'S RESPONSE

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UPDATED EXHIBIT LIST

Exhibit No.	Description
2001	U.S. Patent Publication US2009/0095311A1 ("Han")
2002	Transcript Excerpt from Case Management Conference in *In the Matter of Certain Vaporizer Devices, Cartridges Used Therewith, and Components Thereof*, ITC-337-TA-1372, dated Feb. 16, 2024
2003	National Academies of Sciences, Engineering, and Medicine; Health and Medicine Division; Board on Population Health and Public Health Practice; Committee on the Review of the Health Effects of Electronic Nicotine Delivery Systems; Eaton DL, Kwan LY, Stratton K, editors. Public Health Consequences of E-Cigarettes. Washington (DC): National Academies Press (US); 2018 Jan 23. Chapter 14, Injuries and Poisonings, pp. 473-479 https://www.ncbi.nlm.nih.gov/books/NBK507183/
2004	Darragh O'Carroll, MD, "Nicotine poisoning: "What are the symptoms, and can you overdose?" (Medical News Today, Feb. 16, 2023), https://www.medicalnewstoday.com/articles/319627
2005	*Fuma International LLC v. R.J. Reynolds Vapor Company*, Case No. 1:19-cv-260, D.I. 1 (M.D.N.C., Mar. 6, 2019) ("Fuma Complaint")
2006	IPR2024-00160 Excerpt for IPR2024-00161 POPR
2007	*Certain Vaporizer Devices, Cartridges Used Therewith, and Components Thereof*, 337-TA-1372, Complainant's Pre-hearing Brief (May 20, 2024)
2008	*Certain Vaporizer Devices, Cartridges Used Therewith, and Components Thereof*, 337-TA-1372, JUUL Labs, Inc. Pre-hearing Brief (May 24, 2024)
2009	*Certain Vaporizer Devices, Cartridges Used Therewith, and Components Thereof*, 337-TA-1372, Order No. 36 (Apr. 4, 2024)
2010	Collins Dictionary (10th ed. 2010)

Exhibit No.	Description
2011	Chambers Concise Dictionary (2nd ed. 2009)
2012	Concise Oxford English Dictionary (12th ed. 2011)
2013	NJOY NPRO CT Scan Images, JLI-ITC1372_00979982
2014	*Certain Vaporizer Devices, Cartridges Used Therewith, and Components Thereof*, 337-TA-1372, Public Transcript
2015	Photograph of NJOY Pro, JLI-ITC1372_00979934
2016	Photograph of NJOY Pro, JLI-ITC1372_00979938
2017	Deposition Transcript of Robert Sturges, dated Aug. 9, 2011 (IPR2024-00160, IPR2024-00161)
2018	*Certain Vaporizer Devices, Cartridges Used Therewith, and Components Thereof*, 337-TA-1372, Order No. 51 (June 25, 2024)
2019	Merriam-Webster's Collegiate Dictionary (11th ed. 2004)
2020	The American Heritage Dictionary of the English Language (4th ed. 2006)
2021	Random House Webster's College Dictionary (1992)
2022	Declaration of William Singhose
2023	Declaration of Daniel Hillenbrandt
2024	Declaration of Rebecca Moore
2025	*Intentionally left blank*
2026	RJR Email dated June 15, 2010
2027	RJR Email dated June 29, 2010
2028	RJR Email dated July 19, 2010

Exhibit No.	Description
2029	U.S. Patent No. 11,497,864 File History
2030	Declaration of Gregory D. Conley, U.S. Patent No. 10,334,881
2031	Excel Spreadsheet, Fuma Sales
2032	RJR Horizon 3 Vapor Presentation: The Open Innovation Solution
2033	Premarket Tobacco Product Applications – Vuse Ciro ENDS Products
2034	R.J. Reynolds Vapor, Vuse Launch
2035	Vuse Patent List
2036	Premarket Tobacco Product Applications – Vuse Solo ENDS Products
2037	Certified Translation of Patent No. KR20100004364U, JLI-ITC1372_00980718
2038	GreenSmoke Presentation, NJOYITC00104148
2039	Carmines Consulting, LLC Report, NJOYITC00105699
2040	*Certain Vaporizer Devices, Cartridges Used Therewith, and Components Thereof*, 337-TA-1372, JUUL Labs, Inc.'s Responsive Post-Hearing Brief (July 15, 2024)
2041	U.S. Patent Application 13/594,813 File History

I. Introduction

U.S. Patent No. 10,334,881 ("881 Patent") claims a novel arrangement for an e-vaping device that places a transverse heating element in an airflow path within a cartomizer.

Petitioner challenges the validity of 881 Patent claims 1-27 ("challenged claims"). The Petition identifies seven invalidity grounds: (1) Grounds 1A-1D are obviousness based on CN201238610 ("Xia") in view of CN101366554 ("Wang") and CN201085044 ("Fang"); (2) Grounds 2A-2B are obviousness based on Wang and Fang.

Grounds 1A-1D fail for numerous reasons. Xia alone does not teach or render obvious several limitations, including at least (1) the claimed cartridge requiring a housing having a heating element and solution holding medium, as Xia discloses a three-piece design comprising a power source, atomizer cartridge, and liquid-storage cartridge; (2) a housing having a first aperture on a first end, because the claims, properly construed, require an aperture in the housing structure; and (3) an airflow passageway that extends centrally and axially, because Xia's passageway is substantially non-central and non-axial. Additional undisclosed and non-obvious limitations are identified below.

The grounds that rely on Xia with secondary references similarly fail. First, Petitioner fails to carry its burden that a POSITA would have made the proposed

modifications to Xia based on teachings from the dissimilar e-cigarettes described by Wang and Fang. These modifications result in a substantially worse design that eliminates components from Xia aimed to counteract undesirable liquid droplets in the airflow stemming from Xia's vaporization approach. Second, Petitioner has not demonstrated that the modified device teaches or renders obvious several limitations.

Grounds 2A-2B also fail to show that the challenged claims are unpatentable. Wang alone does not teach or render obvious (1) a central airflow passageway, because there is no textual support (Petitioner's expert agrees), and the figures fail to depict a central airflow passageway; (2) a housing having a first aperture on a first end, because the claims, properly construed, require an aperture in the housing structure; and (3) a transverse heating element, as Wang's heating element is vertical/axial. Additional undisclosed and non-obvious limitations are identified below.

The combination of Wang and Fang does not render the challenged claims obvious. First, a POSITA would not have modified Wang in view of Fang because they are dissimilar devices; neither Fang's airflow passageway nor its heating element are suitable for Wang, and the proposed modifications yield a worse device. Second, Petitioner fails to show that the proposed combination teaches or renders obvious several limitations.

Objective indicia of non-obviousness demonstrate that the challenged claims are patentable. Evidence of commercial success, industry praise, copying, and licensing are tied to the Fuma e-cigarette, which embodies and is coextensive with the challenged claims. This evidence demonstrates that the patented arrangement of a transverse heating element in the airflow was a new and non-obvious idea that changed the industry's approach to e-cigarette design.

For these reasons, and the additional reasons below, Petitioner's Grounds should be rejected, and the challenged claims should be confirmed patentable.

II. The 881 Patent

The 881 Patent, titled "Electronic Vaporizer," names Gregory Conley and Daniel Hillenbrandt as inventors. The 881 Patent was originally assigned to Fuma International, LLC ("Fuma"). In August 2023, NJOY purchased, and Fuma assigned, the entire right, title, and interest to and in the 881 Patent. Fuma has no corporate affiliation with Patent Owner ("NJOY"), and NJOY has no interest or control over Fuma.

The 881 Patent claims are directed to an e-cigarette cartridge configured to couple to a power source. The claimed cartridge comprises several features, including a housing, within which is at least a heating element, a solution holding medium, and an airflow passageway between two apertures formed at housing ends. EX2022 ¶37.

A. Housing

Examples of the claimed "housing" are depicted in Figure 1 (housing 120) and Figure 2 (housing 202). EX1001, 3:44-47, 5:63-6:9.

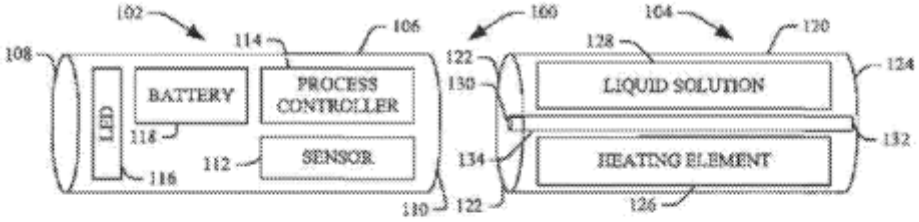


FIG. 1

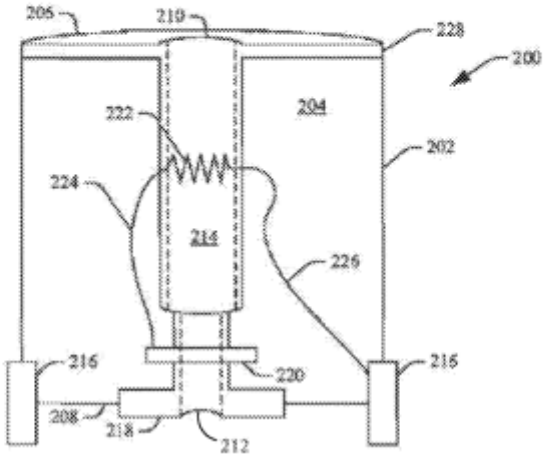


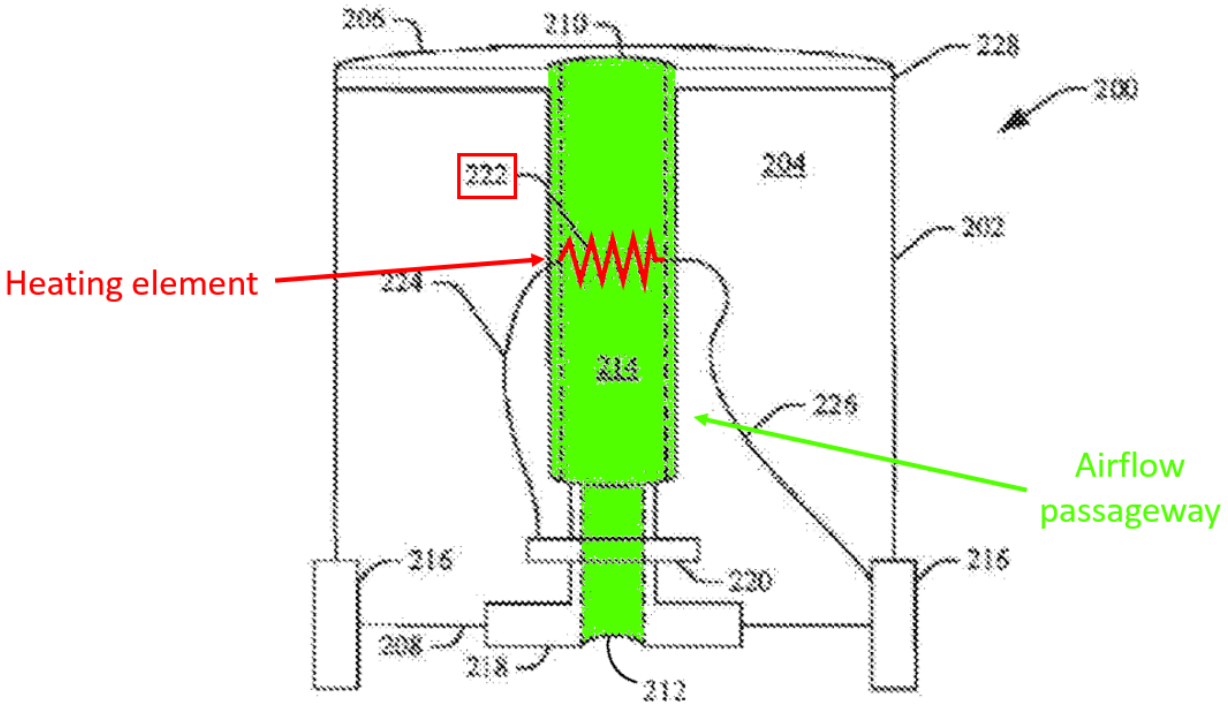
FIG. 2

EX1001, Figs. 1-2

Clear from the specification, the "housing" is the outside structure containing the device internals. Section IV.B.1; EX2022 ¶¶40-41.

B. Heating Element and Liquid Storage

While the 881 Patent describes various heating elements, the claims require a heating element "extending transversely across the airflow passageway." EX1001, Claims 1, 8, 16. This configuration is described with reference to Figure 2:



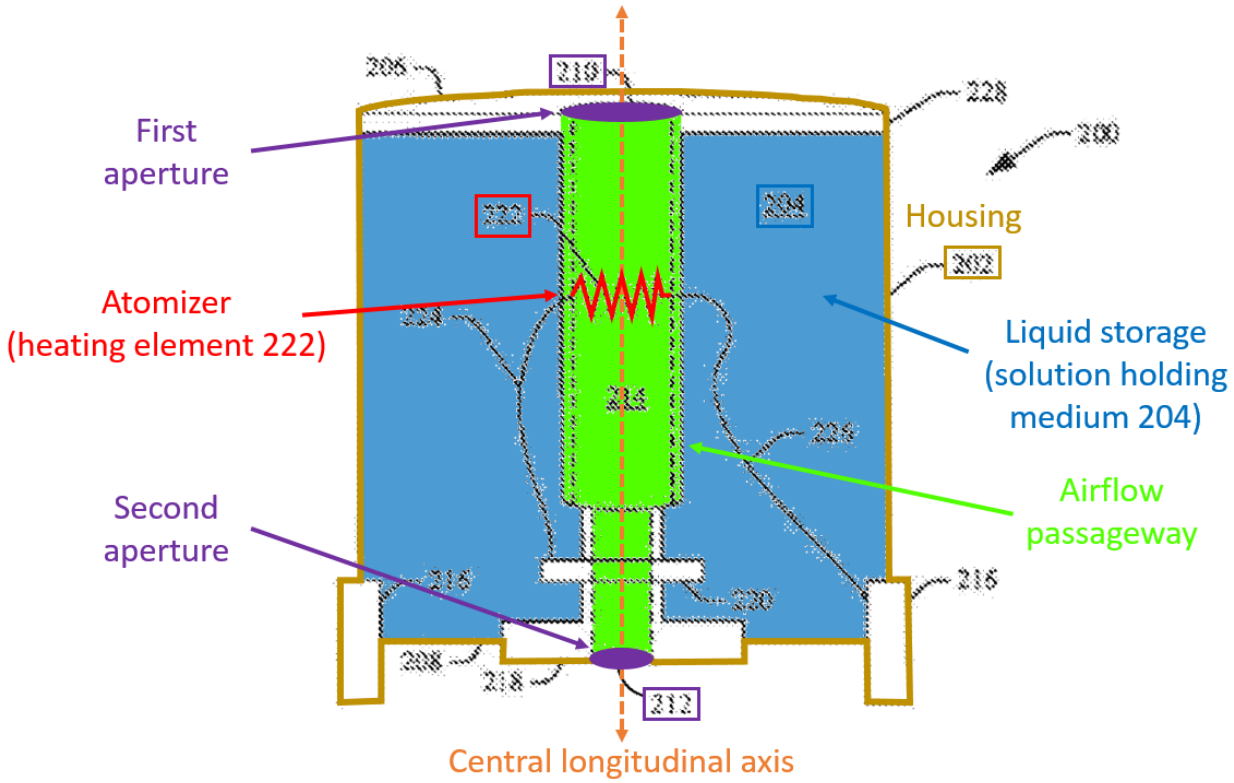
EX1001, Fig. 2 (annotated[1]), 6:41-56, 6:62-7:19

The airflow passageway 214 of the housing runs from aperture 210 to aperture 212. Air travels between these apertures and crosses heating element 222. EX1001, 6:62-63 ("…the heating element 222 is shown as residing solely in the airflow passageway 214…."), 7:16-19 ("…it is readily recognized that airflow may pass directly over the heating element…."). Figure 2's heating element extends transversely across the airflow passageway because it extends crosswise to the passageway. By contrast, the heating element 302 in Figure 3 is a vertical, or axial,

[1] Colors added to figures are annotations.

heating element. EX2022 ¶¶56-57. The specification further explains that the heating element may "comprise a wicking material that draws the liquid solution from the absorbent material 204 towards the heating element 222." EX1001, 6:41-47.

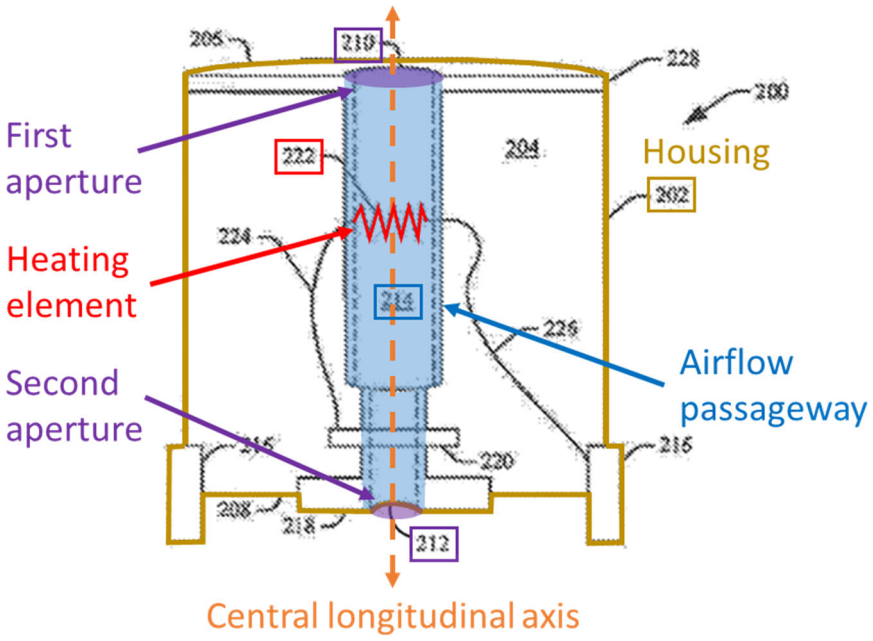
The 881 Patent also describes solution holding media. Specifically, "the solution can be suspended in an absorbent material, capsule, or reservoir, wherein such devices may act as the holding medium for the solution 128." EX1001, 4:5-9. In Figure 2, the solution holding medium is absorbent material 204, which surrounds airflow passageway 214.



EX1001, Fig. 2

C. Airflow Passageway

The 881 Patent claims require an airflow passageway that extends centrally and axially with respect to the housing intermediate of the first aperture and the second aperture. In the ITC Investigation, JLI agreed that this requirement means "[t]he airflow passageway extends in a straight path through the center of the housing from a first opening on the first end to a second opening on the opposite end of the housing." EX2009.0005. Air enters the housing at the first aperture, travels along the airflow passageway, and exits at the second aperture. The claims permit obstructions in the airflow passageway. *See* Section IV.B.3. For example, as shown below, the airflow passageway may include a heating element (222). However, as determined in the M.D.N.C. Litigation, such an obstruction must not divert the airflow any more than the heating element.



EX1001, Fig. 2

D. Two-Piece vs. Three-Piece Designs

As background, and as the parties agreed during the ITC Investigation, it was well known that e-cigarettes could have one-piece, two-piece, or three-piece configurations. EX2007.0089; EX2008.0437. The 881 Patent describes both two-piece and three-piece designs but, as explained below, claims the latter.

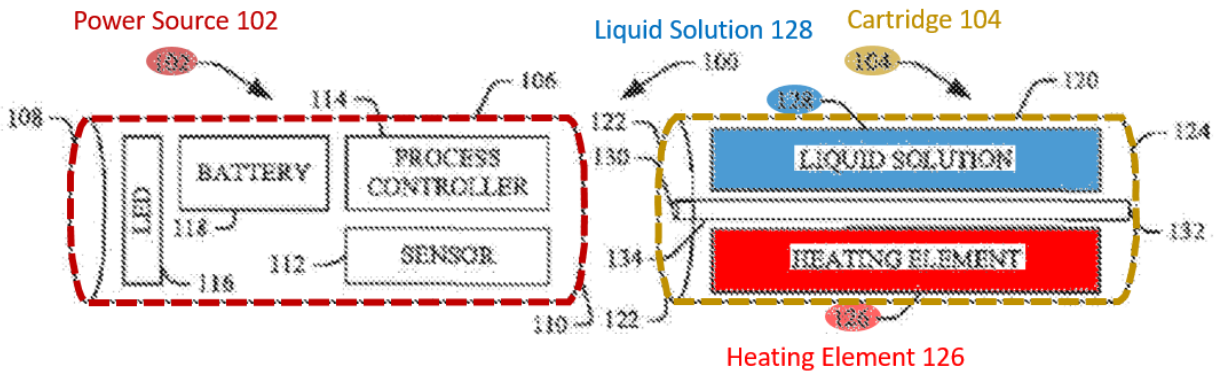
One-piece designs comprised a unitary device having: a power source, a heating element for vaporizing liquid, and a liquid storage. EX2007.0089; EX2008.0437-38.

Two-piece designs separated the e-cigarette into (1) a power source and (2) a disposable cartridge containing the liquid storage. The heating element was integrated into either the reusable power source or the disposable cartridge.

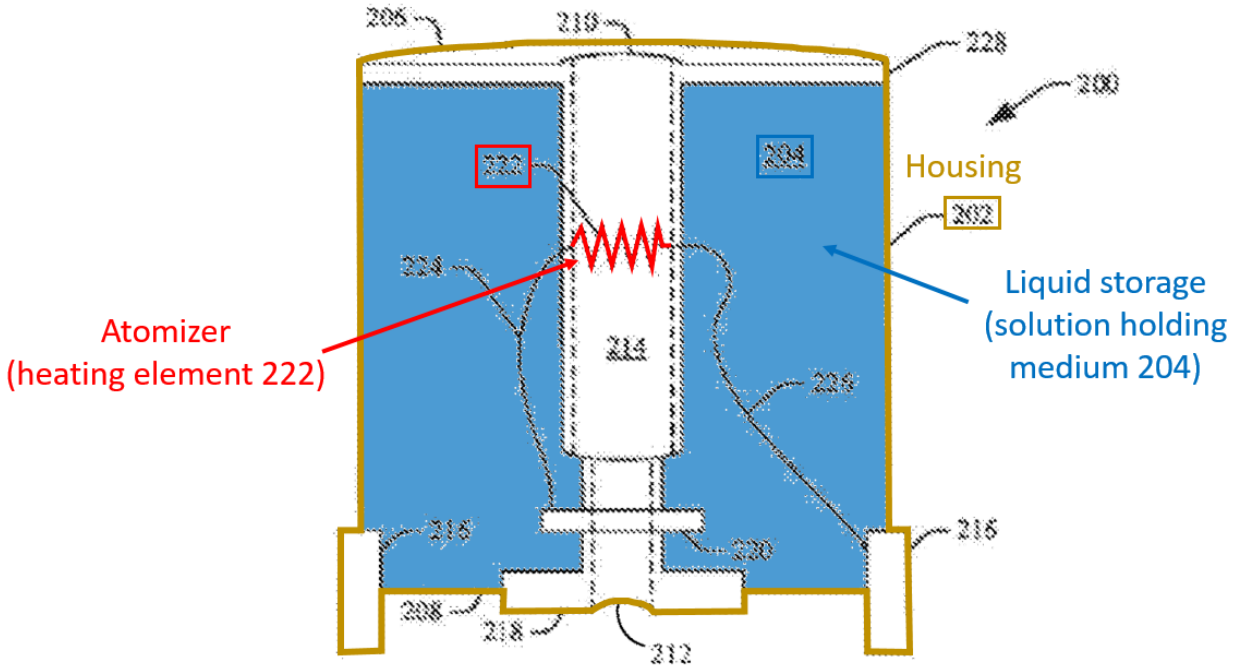
EX2007.0089; EX2008.0438. A cartridge housing the heating element and liquid storage was sometimes called a "cartomizer." EX2007.0090; EX2008.0438. As Petitioner recognized, "cartomizer components could not be separated," so that "in the two-piece design, every new cartridge came with a fresh atomizer, which would be discarded once the solution in the cartridge had been consumed." EX2008.0438; *see* EX2007.0089-90.

Three-piece designs included three separable components: (1) a reusable power source, (2) a atomizer cartridge, and (3) a disposable liquid storing cartridge. EX2007.0090; EX2008.0438. As Petitioner agreed in the ITC Investigation, "[a]s the solution in the [liquid-storage cartridge] was typically consumed faster than the atomizer needed to be replaced, companies in the industry sold replacement 'cartridges' containing the solution holding means and an empty cavity for the end-user to insert an existing atomizer …." EX2008.0438; *see* EX2007.0090. "This helped reduce the waste associated with discarding the heating element with each refill…." EX2008.0087; *see* EX2007.0090 ("The ability to reuse the atomizer prevented waste and kept costs low…").

The 881 Patent distinguishes between two-piece and three-piece designs. Figures 1 and 2 are directed to two-piece cartomizer designs:



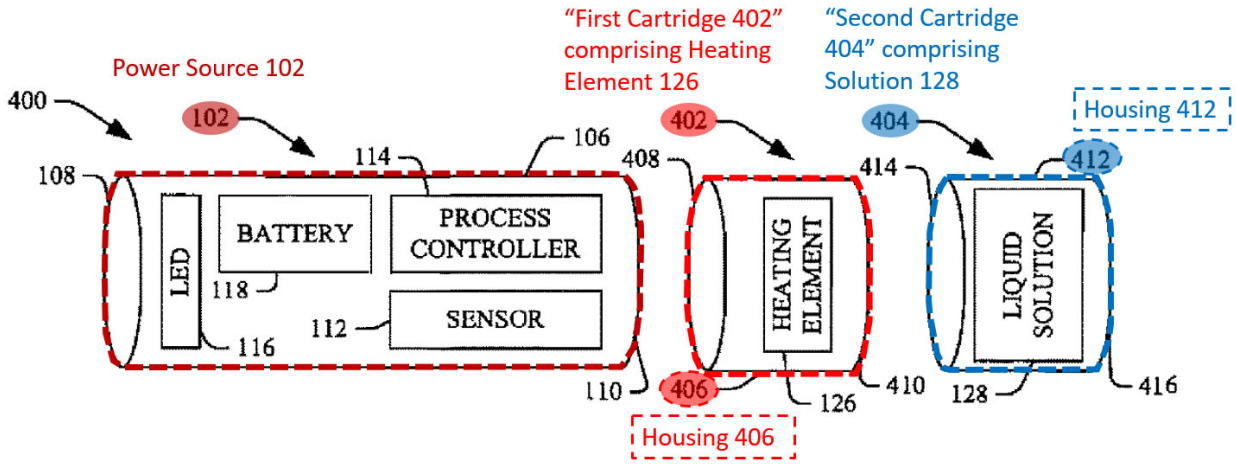
EX1001, Fig. 1



***Id.*, Fig. 2**

Figure 4 is directed to a three-piece design. It includes "three separate portions: 1) the power source 102; 2) a first cartridge 402 that comprises the heating element 126; and 3) a second cartridge 404 (a mouthpiece cartridge) that comprises the solution 128." EX1001, 8:24-29. Cartridges 402 and 404 each have their own housings: "first cartridge 402 can comprise a housing 406" and "second cartridge

404 comprises a housing 412." *Id.*, 8:32-33, 8:47-49; EX2022 ¶¶228-229.



***Id.*, Fig. 4**

The claims cover only the two-piece design. Each claim is directed to a two-piece design as each claim requires "[a] cartridge...having a housing...wherein the housing includes a solution holding medium...wherein the housing includes a heating element." EX1001, claims 1, 8, 16. In contrast, the three-piece design has a separate cartridges for the heating element and the liquid solution. EX2022 ¶¶228-231.

III. Person of Ordinary Skill in the Art

For this Proceeding, NJOY adopts Petitioner's definition of a person of ordinary skill in the art (POSITA). Petition, 10. A POSITA 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.

IV. Claim Construction

A. Terms Construed in the ITC Investigation

In the ITC Investigation, Administrative Law Judge ("ALJ") Doris Johnson Hines addressed six disputed terms and two agreed-to terms. EX2009. Two terms are relevant:

Term	ITC Construction
"airflow passageway" limitations (claims 1, 8, 16) [agreed]	"The airflow passageway extends in a straight path through the center of the housing from a first opening on the first end to a second opening on the opposite end of the housing."
"transversely" (claims 1, 8, 16) [disputed]	Not indefinite; "plain and ordinary meaning, that is, crosswise"

The "airflow passageway" limitations are addressed below in Section IV.B.3.

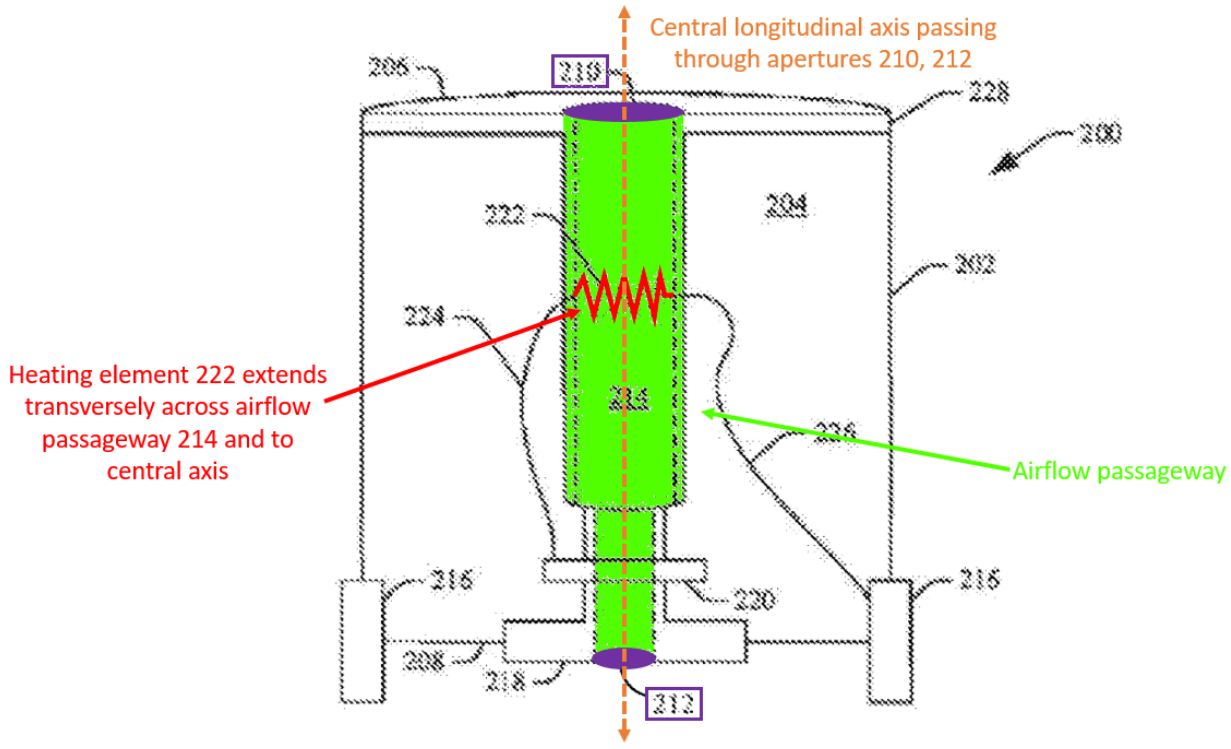
Claims 1, 8, and 16 use the term "transversely" to describe the orientation of a heating element—namely, that the heating element "extends transversely across the airflow passageway." *E.g.*, EX1001, 17:42-44 (claim 1).

In the ITC Investigation, NJOY argued that "transversely" has its plain and ordinary meaning, *i.e.*, "crosswise," while Petitioner argued that "transversely" is indefinite. EX2009.0013. Here, Petitioner argues that the "specification does not use the words 'transversely' or 'transverse,' nor does it describe what it meant by

'transversely across the airflow passageway.'" Petition, 57-58.

But "transverse" is a readily understood word. Dictionaries confirm that "transversely" means "crosswise." *E.g.*, EX2010.0005 (defining "transverse" as "crossing from side to side"); EX2011.0004 (defining "transverse" as "placed, lying, built etc in a crosswise direction"). In the context of the claim language, the heating element must be oriented crosswise to the longitudinal axis of the housing. EX2022 ¶54.

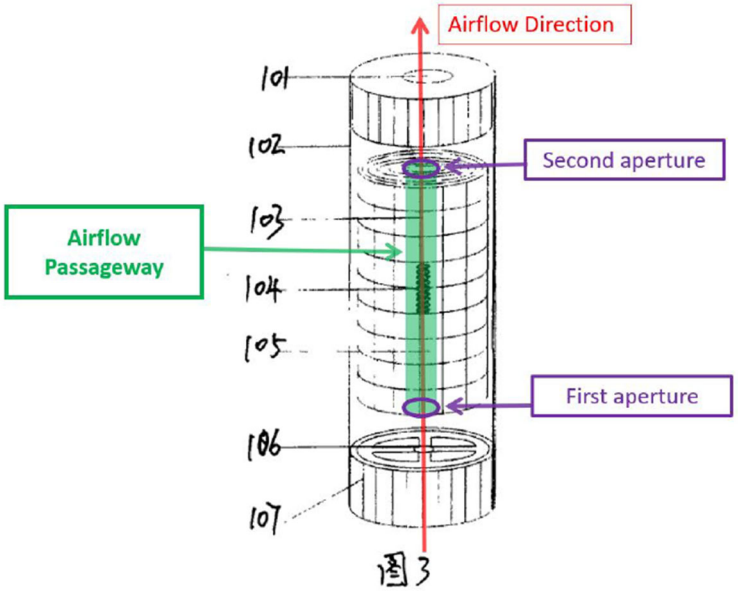
The specification confirms this construction. Figure 2 depicts a heating element oriented crosswise to the longitudinal housing axis.



EX1001, Fig. 2

Petitioner disagrees and argues that, as long as "airflow pass[es] directly over

the heating element," the heating element is extending transversely across the airflow passageway. Petition, 58. Petitioner argues that the heating coil in Wang extends transversely across the airflow passageway because it is "within the airflow passageway and the airflow flows over and around that heater." Petition, 99-100.



Petition, 100

Petitioner further states that the heating element could be "on the exterior of the airflow passageway" and still be "transversely across the airflow passageway." Petition, 58.

Petitioner's construction of "transversely" is based on a statement in the specification that "other configurations of the heating element 222 with respect to the airflow passageway are contemplated and are intended to fall under the scope of the hereto-appended claims." *Id.* (citing EX1001, 6:62-67).

Petitioner's construction is flawed for two reasons. First, the "claims, [] not the specification, measure the protected patent right to exclude others." *Novo Nordisk of North America, Inc. v. Genentech, Inc.*, 77 F.3d 1364, 1369, (Fed. Cir. 1996). The claims recite a heating element "extending transversely across the airflow passageway," a specific configuration. Second, the reference to "hereto appended claims" was filed with a different set of claims in Application No. 13/594,813 on August 25, 2012. EX2041.207 (¶[0033]). The 881 Patent is a continuation application with different claims.

Wang's heating element (depicted above) does not extend crosswise the alleged airflow passageway. Rather, it extends *along* the alleged airflow passageway. Moreover, because the heating element is an axial coil, it wraps around the airflow passageway; Petitioner has not demonstrated that any part of the heating element crosses the alleged airflow passageway. EX2022 ¶58.

At the ITC, the ALJ sided with NJOY, holding that "transversely" means "crosswise." The ALJ concluded,

> JLI [Petitioner] recognizes that the heating element can be situated in various configurations. JLI Br. at 13. The heating element, therefore, could extend across the airflow passageway in, for example, a V-shape or it could extend across the airflow passageway radially. **In neither of those configurations would the heating element be transverse to the airflow passageway because the heating element would not be crosswise to the airflow passageway.**

EX2009.0015.[2] Because the term itself is clear, and based on the specification and the extrinsic evidence, the Board should adopt the ALJ's construction.

The Board made a preliminary determination that:

> [W]e acknowledge Patent Owner's argument that Petitioner's interpretation of the term "transverse" "seemingly argues that every heating element has a transverse dimension" (Prelim Resp. 45), but in the absence of evidence or additional argument from Patent Owner, we find sufficient on this record Petitioner's argument and evidence supporting its interpretation of "transverse" and Wang's alleged disclosure of a transverse heating element.

Paper 10, 47. Under this preliminary construction, terms concerning orientation are rendered meaningless because every object extends in three dimensions. An object would be simultaneously parallel, orthogonal, and skew to the same axis at once. That is not how these terms are understood. EX2022 ¶58. Clear from Figure 2, a heating element extending transversely is one having a major axis transverse to the longitudinal axis.

B. Other Terms Requiring Claim Construction

1. "housing"

Claims 1, 8, and 16 introduce a "housing." *E.g.*, EX1001, 17:21-49 ("a

[2] All emphases added unless otherwise stated.

cartridge having a housing that comprises an interior...wherein the housing includes a solution holding medium") (claim 1). In the context of the 881 Patent, "housing" means an "outside structure containing the device internals." EX2022 ¶¶59-62.

The claims support this construction. The 881 Patent claims recite a housing having "an interior" that contains a (1) "solution holding medium [reservoir] adapted to hold a solution," (2) "heating element located in the interior of the housing," and (3) "airflow passageway" in the housing.

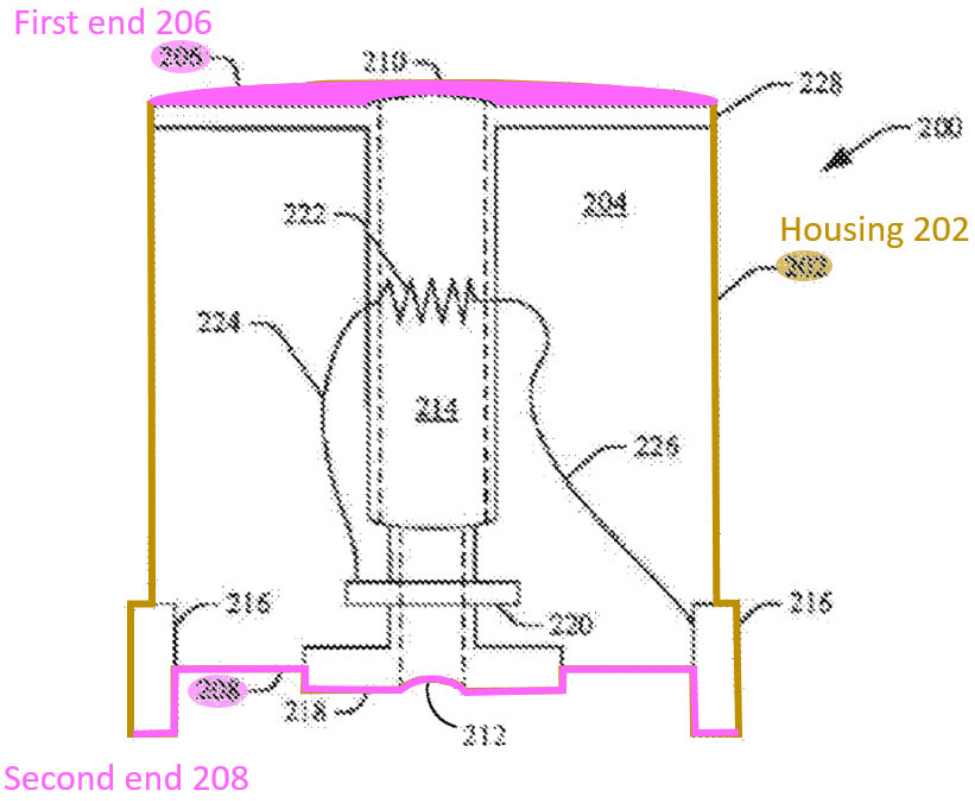
NJOY's construction is consistent with the specification, which explains that a "housing" is a structure having an internal space for containing various components of the cartridge. *E.g.*, EX1001, 3:44-45 ("The cartridge 104 comprises ***a housing 120 that has an interior.***"), 3:63-64 ("A heating element 126 ***resides in the interior of the housing 120***."), 4:5-6 ("A liquid, gelatin, frozen or solid solution (solution) 128 also ***resides in the interior of the housing 120***...."); 6:25-27 ("The cartridge 200 further comprises a conductive element 216, at least a portion of which ***resides in the interior of the housing 202***.").

The specification describes that the housing is, for example, a cylinder having opposing first and second ends:

> Moreover, the housing 120 may comprise only a cartridge wall (that can be cylindrical as well as other shapes). In another example, **the housing 120 may comprise the cylindrical wall and two end-caps**, all constructed of the polymer material or the ceramic material. In still

yet another embodiment, the housing 120 may comprise the cartridge wall and a single end-cap.

EX1001, 3:53-59. The housing is annotated in Figure 2 below:



EX1001, Fig. 2

Note, the cartridge and its housing are not necessarily coextensive. EX2022 ¶63. The housing is a cartridge *component*. *E.g.*, EX1001, 3:44-47, 3:53-61, 5:65-6:9. The specification explains that "cartridge 104 comprises a housing 120" and that "cartridge 104 also comprises a first end 122 and a second end 124, ***which may be considered as a portion of the housing 120***." EX1001, 3:44-47; *id.*, 5:37-39 ("a wood tip may be positioned upon the second end 124, wherein the wood tip is

configured to be received orally by the user"). Indeed, each claim requires a "cartridge comprising...a housing," which does not foreclose additional elements.

The term "housing" should be construed to mean "outside structure containing the device internals."

2. "end"

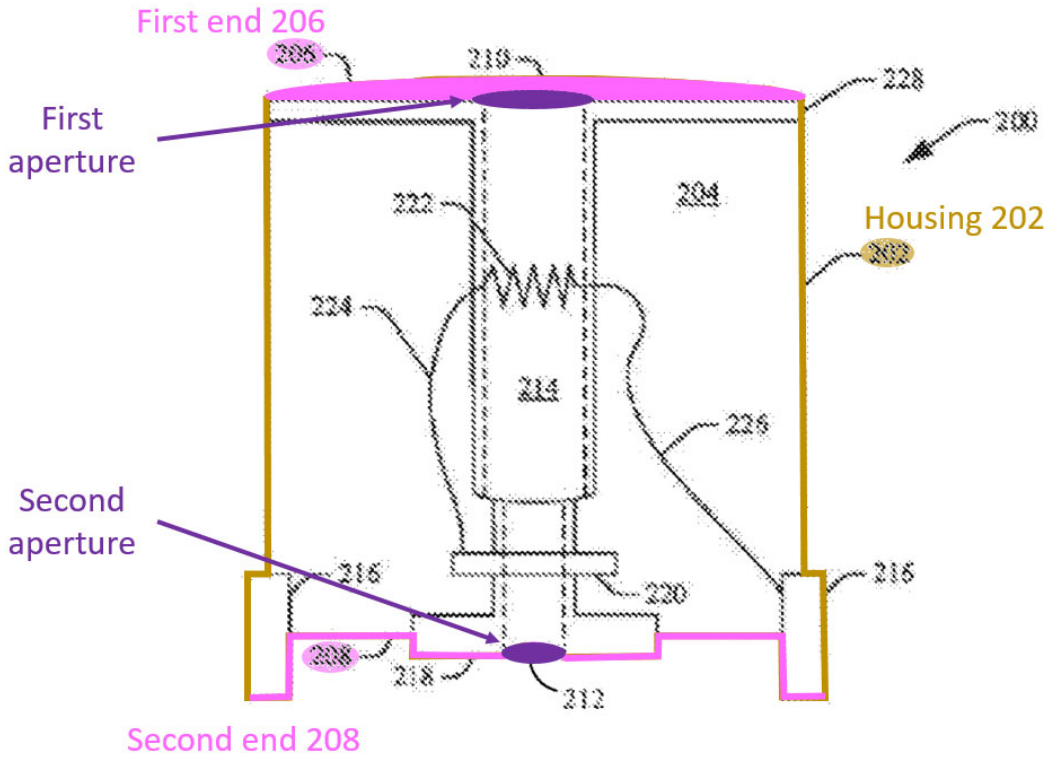
Claims 1, 8, and 16 use "end" to identify the extrema of an object. *E.g.*, EX1001, 17:22-23 ("the housing includes a first end and a second end that is opposite the first end") (claim 1).

The specification confirms this construction. With reference to Figure 2, the 881 Patent describes a housing with a first end opposite a second end.[3] EX1001, 6:3-4; EX2022 ¶65. The first and second ends lie at the opposing extrema of the housing along the housing's longitudinal axis. EX1001, 6:3-4; EX2022 ¶65. The specification recites,

> The first end 206 comprises a first aperture 210, and the second end 208 comprises a second aperture 212. As shown, the first aperture 210 and the second aperture 212 are ***positioned at approximately the centers of the first and second ends 206 and 208***, respectively, such that a central axis of the cartridge 200 passes through both apertures 210 and 212.

[3] The Figure 2 embodiment appears to depict a cartridge exterior co-extensive with the housing.

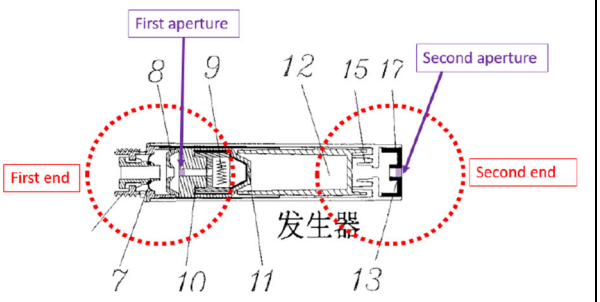
EX1001, 6:10-16. Figure 2 depicts first end 206 and second end 208 centered at the two extreme opposing housing extrema.



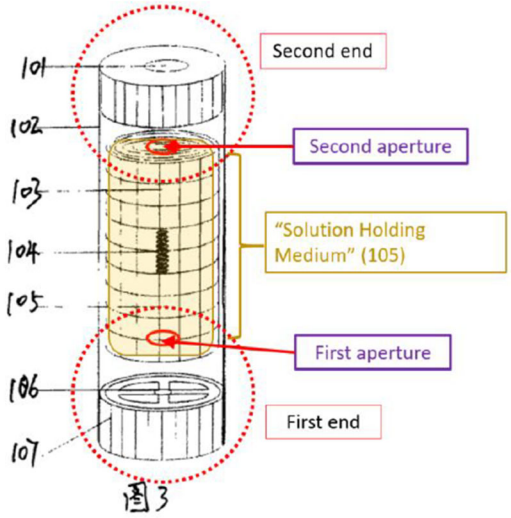
EX1001, Fig. 2

Dictionaries confirm that "end" means the extreme part of an object. *E.g.*, EX2019.0003 (defining "end" as "the extreme or last part lengthwise"); EX2020.0004 (defining "end" as the "outside or extreme edge or physical limit"); EX2021.0003 (defining "end" as "the most remote place or point"); EX2022 ¶68.

Petitioner, in contrast, equates housing "end" to end *regions*. Specifically, Petitioner overlays large circles on Xia's and Wang's figures and labels them first and second "ends."



Petition, 17



Petition, 91

This construction is inconsistent with the agreed-upon construction in the ITC Investigation and with the 881 Patent. EX2022 ¶¶69-70. In the ITC, Petitioner agreed that the "airflow passageway" terms—requiring the passageway extend "intermediate the first aperture on the first end of the housing and the second aperture on the second end of the housing"—mean the passageway extends "from a first opening on the first end to a second opening on the opposite end of the housing." EX2009.0005.

The 881 Patent specification states that, "[a]s shown, the housing 106 comprises a first end 108 and a second end 110 that is opposite the first end 108, and also includes an interior." EX1001, 3:26-28. The housing includes a first end, a second end, ***and*** an interior, which are separate and distinct. If an "end" were a region, the interior would be part of the region, not separate and distinct from that

region. Further, the specification discloses that apertures 210 and 212 are in the approximate center of the "ends." EX1001, 6:10–16. If an end were a region, the "centers" would not be on extrema, as depicted in Fig. 2, but would be somewhere internal the housing, which they are not.

Petitioner points to NJOY's contentions in the ITC Investigation to support its position that "end" refers to a region. Petition, 33-34. NJOY, however, never contended that an "end" was a region, and it clarified its identification of the accused end in subsequent briefs.

The term "end" means the extrema of an object. EX2022 ¶¶64-71.

3. "airflow passageway" extending "centrally and axially"

Claims 1, 8, and 16 require an airflow passageway "that extends/extending/having a length extending] 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." At the ITC, the parties agreed that this term means "[t]he airflow passageway extends in a straight path through the center of the housing from a first opening on the first end to a second opening on the opposite end of the housing." EX2009.0005.

NJOY proposes the following addition relevant to this proceeding: the airflow passageway may encompass small obstructions (*i.e.*, heating element and corresponding structures that do not alter the direction of airflow any more than the

heating element) but excludes structures that define the airflow passageway. NJOY's construction squares with the explicit distinctions drawn during prosecution of a child application and the treatment of this term in the M.D.N.C Litigation.

During prosecution of U.S. Pat. No. 11,497,864 (a continuation of the 881 Patent and the subject of IPR2024-00160), the Examiner rejected the pending claims based on U.S. Patent Publication US 2009/0095311A1 ("Han").

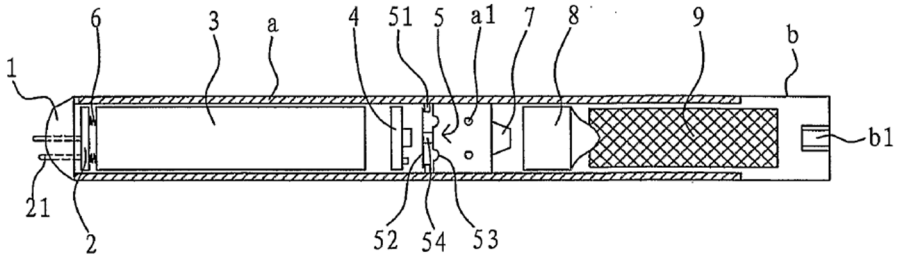


图1

EX2006, Fig. 1[4]

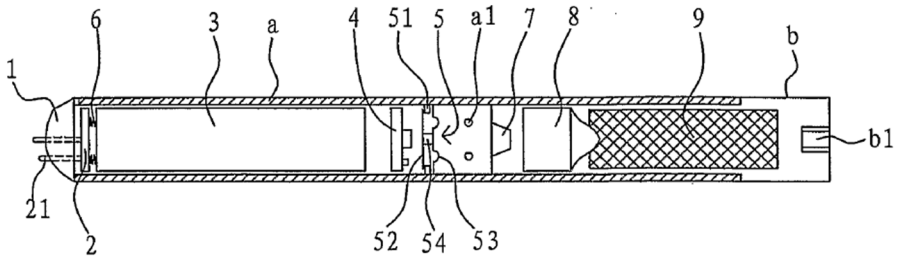
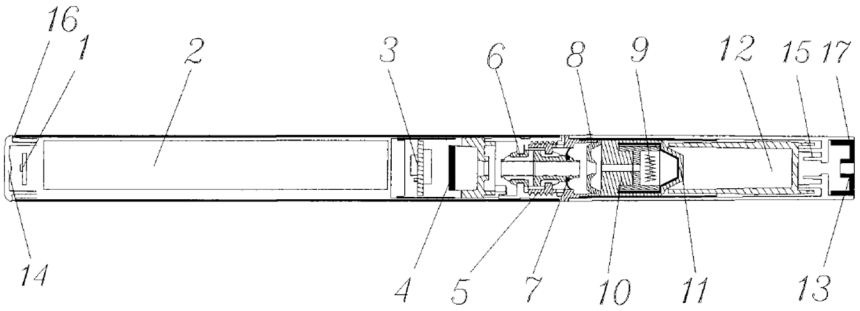
In Han, air enters a peripheral aperture a1, which, during inhalation, draws air into a heater chamber 8. Air drawn into the heating compartment contains "spray" dislodged under the consumer's inhalation power. EX2001.013, ¶0071 ("Since the negative pressure cavity (83) provides the negative pressure compared with the

[4] Han is the U.S. National Phase application of WO 2007/131449 A1 ("Han WIPO"). Han and Han WIPO have identical figures. *Compare* EX2006.0018, Fig. 1 *with* EX2001.0002, Fig. 1. For clarity, higher-quality figures from Han WIPO are shown.

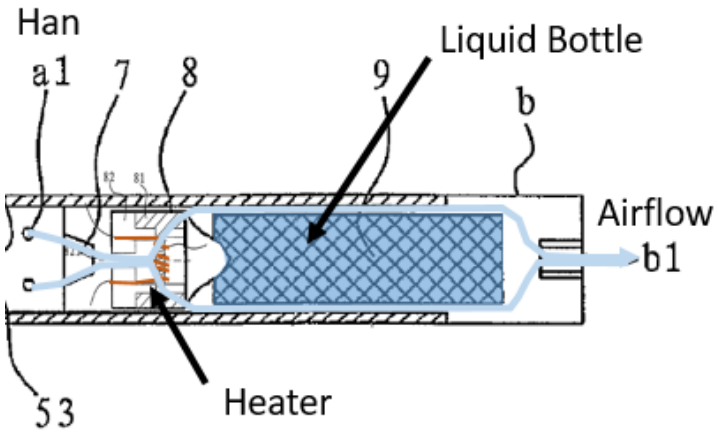
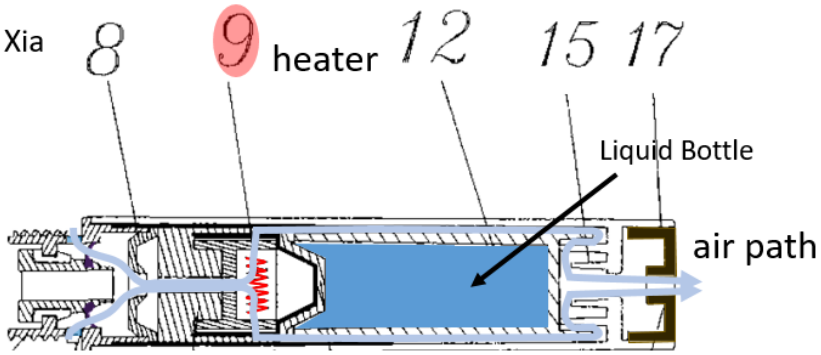
outside, the air flow sprays into it, bringing the cigarette liquid from the porous component (81) to spray into the negative pressure cavity (83) in the form of fine drips."). Once in the heater compartment, the liquid-saturated air undergoes a vortex to capture large drops. *Id.* ("After atomization, the big-diameter fine drips are re-absorbed by the porous component (81) under the action of vortex, while the small-diameter fine drips are suspended in the airflow to form gasoloid"); EX2022 ¶¶75-79.

Once vapor leaves the heater chamber, it flows between the bottle and the shell, which condenses and reabsorbs fine drops that were not vaporized. *Id.* ("When the gasoloid enters the cigarette holder shell (b), multiple small liquid drips are condensed into bigger ones, which fall into the clearance between the cigarette holder shell (b) and air channel (b1) without being absorbed by the air channel (b1)."). Air then exits the device. EX2022 ¶79.

Han is substantially similar to Xia. EX2022 ¶¶133-134.

Han
 图1 **EX2006, Fig. 1**
Xia
 图 1 **EX1027, Fig. 1**

Han and Xia have the same heater arrangement. Han and Xia also include similar language: the "spray" to describe the liquid pulled from the secondary liquid storage chamber and "vortex" to describe the turbulent air near the heating element. In both references, a bottle is pressed against a porous component that draws liquid to the backside of the heating element. The devices are functionally identical. EX2022 ¶¶133-134.

Han
 **EX2006, Fig. 1 (cropped)**
Xia
 **EX1027, Fig. 2 (cropped)**

The Examiner considered Han in detail and concluded that the claims were allowable. Specifically, Applicant argued that "[t]hese dependent claims [rewritten in independent form] recite 'wherein the airflow passageway extends centrally and axially from the first aperture to the second aperture.'" EX2029.273 (864 prosecution history). Applicant argued "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 perforated component for liquid storage*** (9) as described in paragraph [0070] of Han and shown in FIG. 3." EX2029.273-274 (emphasis added).[5] The Examiner responded that "Applicant's arguments with respect to Hon[sic] as previously applied under 35 U.S.C. 102, ***have been fully considered and are persuasive.***" EX1002.195.

Applicant and Examiner understood that large structures like Han's and Xia's liquid bottle do not provide small detours in the airflow passageway, but rather, *define* the passageway. Applicant and Examiner understood that "wherein the airflow passageway extends centrally and axially from the first aperture to the second aperture" encompasses only small obstructions (like the heating element) that may alter the airflow path but do not alter the airflow passageway.

The holding in the M.D.N.C. Litigation supports this interpretation. There, the Judge held that the VUSE Ciro's airflow passageway was central and axial despite small obstructions because those structures "do not alter the direction of the Ciro's airflow passageway any more than the heating element" and they "alter[ed] the airflow's path but not the Ciro's interior airflow passageway, which at all times

[5] The applicant did *not* argue that Han's heating element (a small obstacle) was the reason Han lacked a central airflow passageway.

extends straight through the center of the Ciro's cartridge to the second end as required by the claim." EX1015.0016.

The Board should adopt the approach from the M.D.N.C. Litigation that squares with the prosecution history.

C. The Board's Preliminary Claim Construction

In its institution decision, the Board provided one preliminary construction:

Term	Preliminary Construction
"the housing having a first aperture on the first end"	"encompass[es] apertures that are located within the first end of the housing" and "does not require that the first aperture be located in the housing itself"

Respectfully, this preliminary construction is incorrect.

This term has its plain and ordinary meaning, which is a hole in the housing structure on the first end of the housing. EX2022 ¶¶86-99. The Board, however, preliminarily construed the term to include holes in objects within the housing. That is not the proper context of the term.

The Board reached its preliminary construction based on the limitation "housing [includes/having]...a solution holding medium," which would be satisfied by a solution holding medium internal to the housing. Paper 9, 14-15. The Board reasoned that the same understanding applied to "the housing [includes/having] a first aperture on the first end." The Board did not consider how "includes" and

"having" are used in different contexts by the claims and the specification.

Turning to the claims, the terms "housing [includes/having]" is used in two different contexts in claim 8:[6]

- "a ***housing having*** an interior and a solution holding medium reservoir adapted to hold a solution,"
- "the ***housing having*** a first end and a second end that is opposite the first end, the ***housing having*** a first aperture on the first end and a second aperture on the second end."

In the first context, "having" means within. The housing includes an interior space and in that space is a solution holding medium. This is confirmed by the specification:

> A liquid, gelatin, frozen or solid solution (solution) 128 ***also resides in the interior of the housing 120***....

EX1001, 4:5-9; *see also id.*, Figs. 1-5 (depicting the solution holding medium within the housing).

In the second context, "having" recites a characteristic of the housing itself. The housing itself has a first and second end and first and second apertures. The specification confirms that the ends are part of the housing, not within the housing:

> Both or either the first end 206 or second end 208 can be integrated into ***a single assembly as part of the housing 202***.

[6] The same reasoning would apply to the use of "includes" in claim 1.

EX1001, 6:16-17.

> In another example, ***the housing 120 may comprise the cylindrical wall and two end-caps, all constructed of the polymer material or the ceramic material.*** In still yet another embodiment, the housing 120 may comprise ***the cartridge wall and a single end-cap***.

Id., 3:55-59; *see id.*, Figs. 1-4 (depicting the ends as part of, not within, the housing). If the Board's reasoning is applied to "the housing having a first end and a second end," that limitation would be met by two sides ("ends") of any internal component, such as the heating element or solution holding medium. That is not the context here.

The specification also confirms that "apertures" are apertures in the housing, not within the housing:

> While not shown, the ***second end 110*** can comprise an aperture, wherein the aperture is configured to receiver airflow from a user.

EX1001, 3:28-30.

> ***The first end 122*** of the cartridge 104 comprises a first aperture 130 that is located at approximately the center of the first end 122 of the cartridge 104. ***The second end 124*** comprises a second aperture 132 that is located at approximately the center of the second end 124 of the cartridge 104. An airflow passageway 134 extends between the first aperture 130 and the second aperture 132 axially proximate to the center of the housing 120.

Id., 4:28-35; *see id.*, Figs. 1-3 (universally depicting "apertures" as holes into the

housing). The context is clear from the claim language in view of the specification.

Moreover, there is no specification support that a housing having apertures refers to apertures within that housing. In each case, where the specification refers to an aperture, it is referred to in the context of an object itself having that aperture:

> This gap is optional, as other designs may call **for the walls of the airflow passageway 214 to be permeable or have apertures therein**, to allow for vaporized solution to mix with air in the airflow passageway 214.

EX1001, 7:61-65.

> In such a design, **the wall of the airflow passageway 214 may have apertures**, be permeable, or be conductive to heat such that the vaporized liquid solution may be provided to the user.

Id., 7:9-12.

Context matters; for example, a person saying, "I am carrying a bag having two apples" versus "I am carrying a bag having two handles." A person would not understand the latter phrase to refer to something inside the bag. Similarly, if the claim recited a housing having a blue exterior, it would not be reasonable to conclude this is met by a blue object within the housing. *See Microprocessor Enhancement Corp. v. Texas Instruments, Inc.*, 520 F.3d 1367, 1375 (Fed. Cir. 2008) (holding that, while there is a presumption that a claim term will be construed consistently when used throughout the claims, there is no requirement that a claim term be construed uniformly, particularly if it would lead to a "nonsensical reading"); *Epcon Gas Sys.,*

Inc. v. Bauer Compressors, Inc., 279 F.3d 1022, 1030-31 (Fed. Cir. 2002) (holding that terms should be construed based on the context of the claim limitation); EX2022 ¶¶91-99.

Finally, "having" is used throughout the claims in the context of other phrases. For example, an "airflow passageway having an interior having a uniform cross-sectional area." *E.g.*, EX1001, Claim 16. Under the Board's reasoning, an object within the airflow passageway with a uniform cross-sectional area meets this limitation regardless of whether the passageway's interior itself is uniform. As another example, claim 2 recites an airflow passageway "having a length having a circular cross section." *Id.* Under the Board's reasoning, an object within the airflow passageway having a circular cross-section meets this limitation. Clear from the context, however, these limitations refer to the structure itself.

The Board, also relies on analyses of the VUSE Ciro device from the ITC Investigation and the M.D.N.C. Litigation. NJOY's position here is not inconsistent with Fuma's position there.[7]

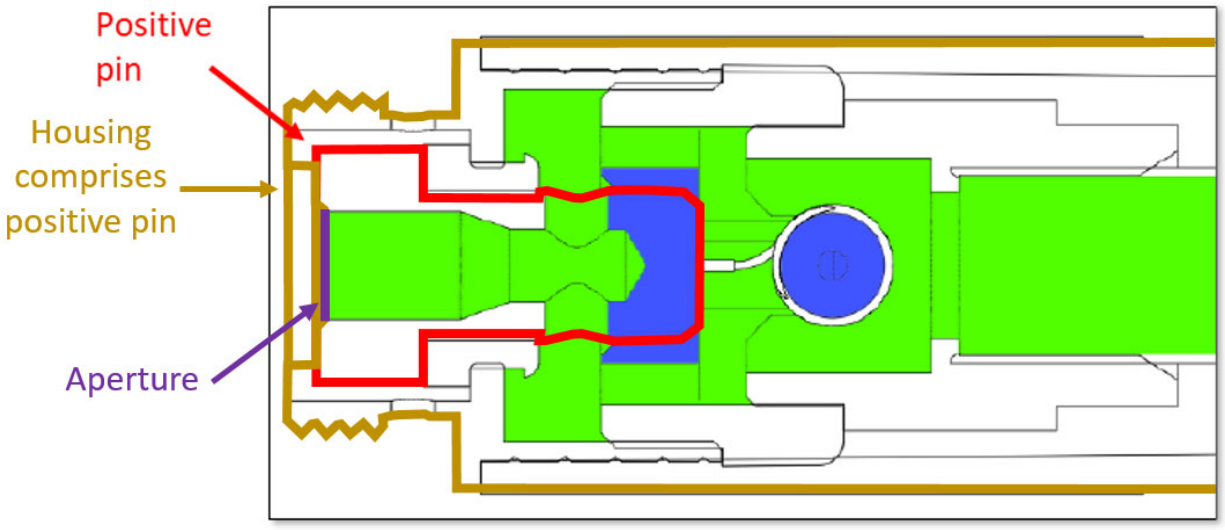
First, the VUSE Ciro's threaded connector is part of the housing. EX2022 ¶104. A "housing" is an outside structure containing the device internals. *See* Section IV.B.1; EX1001, 3:44-49, 3:53-62. The connector provides one end of the

[7] NJOY was not a party in the M.D.N.C. Litigation.

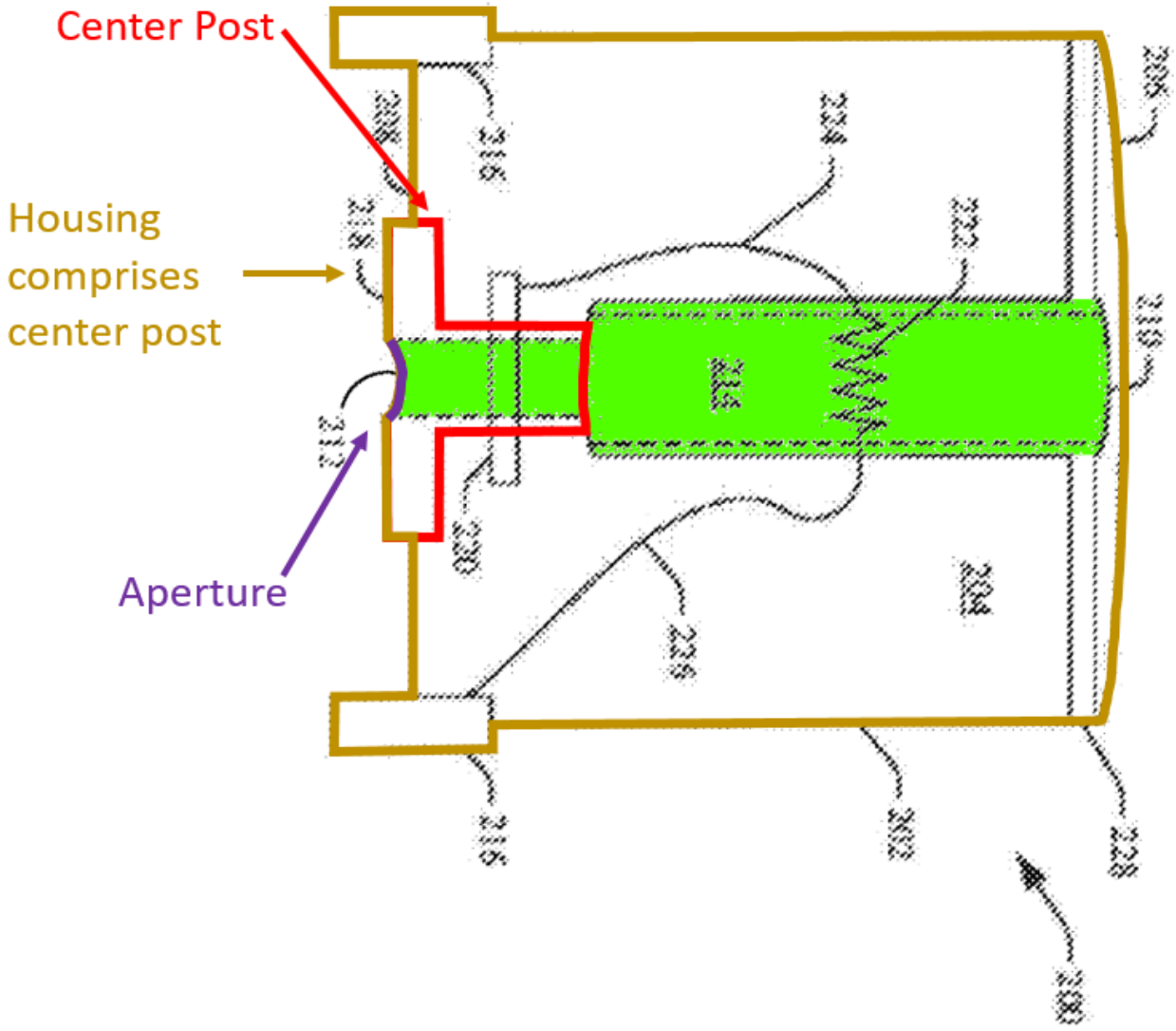
structure containing the device internals. The specification makes clear that the housing is not necessarily a unity construction: "The cartridge 200 comprises a housing 202, which is constructed of a non-metallic material, such as a polymer, wood, ceramic, ***and/or any combination thereof***." EX1001, 5:63-6:1; *see id.*, 3:57-62 ("…[T]he housing 120 may comprise the cartridge wall and a single end-cap. One or more end-caps described herein may be constructed from conductive material, such as metal, a conductive polymer, or the like."). And the claims require that the first end of the housing is "adapted to mechanically and electrically couple to the electrically conductive portion of the power source," which the 881 Patent identifies is provided by the threaded connector. *E.g.*, *id.*, Claim 1, 2:60-3:2.

Second, Fuma's identification of the VUSE Ciro's first aperture in the M.D.N.C. Litigation is not inconsistent with NJOY's position here. EX2022 ¶¶105-107. The Board seemingly accepted Petitioner's characterization of Fuma's arguments, but Fuma ***did not argue*** that the accused aperture was internal to the housing. Fuma argued that the VUSE Ciro had a housing aperture under two alternative theories. First, as depicted below, the positive pin, *i.e.,* the electrical conductor, is part of the housing. The airflow passageway (in green) begins at a first aperture on the first end of the housing. This aperture is an aperture ***into the housing***. The aperture is located on a portion of the electrical connector that is slightly recessed (the housing end is not flat but dips in for a portion), but nonetheless

starts at the outside of the housing to provide access into the interior of the housing.

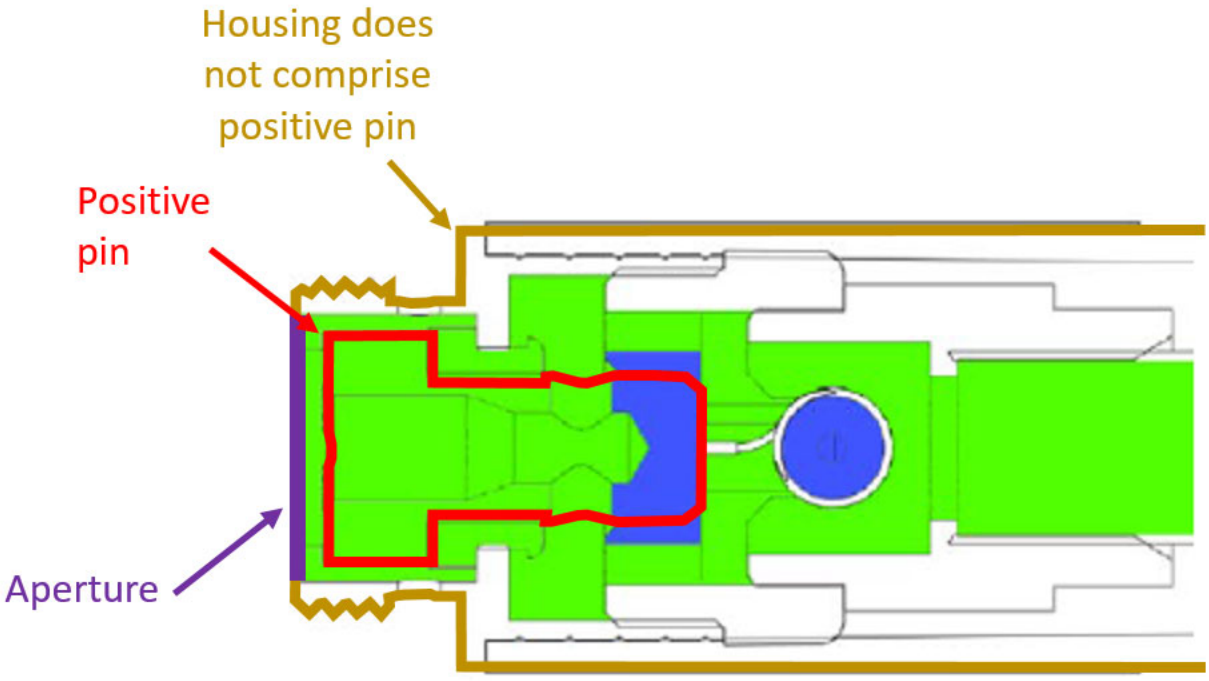


The Ciro's center post is a recessed electrical contact that forms part of the housing like the center post 218 in Figure 2 of the 881 Patent. *See* EX1001, 6:35-38 ("center post 218 can be formed of a conductive material, and may be constructed as being a portion of an end cap"), Claim 1("the first end of the housing is adapted to mechanically and electrically couple to the electrically conductive portion of the power source").



EX1001, Fig. 2

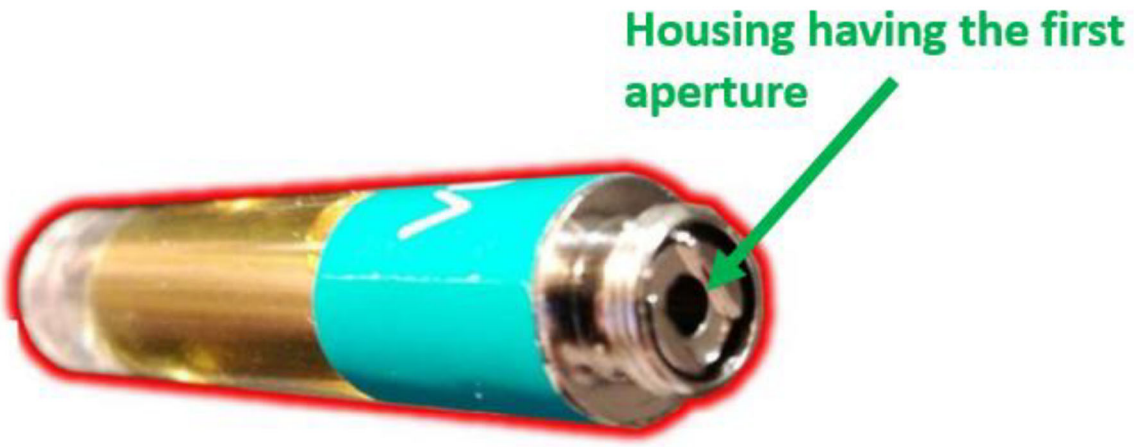
Second, to the extent the positive pin is not part of the housing, there remains an aperture in the housing. EX2022 ¶106. As seen below, the airflow passageway starts at the left (beginning at an aperture on first end of the housing) and traverses to the right. This aperture permits access ***into the housing***.



The Board also seemingly accepted Petitioner's statement that the "District Court held instead that an aperture **internal** to the device satisfies a first aperture on the first end of the housing." Petition, 12 (citing EX1015.0014-.0018). The District Court ***did not*** make this determination. The District Court stated, "[a]ir enters through an opening at the base of the positive pin…." EX1015.0016; *see id.*, .0014-.0015, .0017-.0018. The "positive pin" is the electrical connector, which forms part of the first end of the housing. In other words, the District Court agreed that there was a first aperture at the first end.

Petitioner deceptively relies on a statement by the Judge that, "the air converges and passes through a single opening at the base of the positive pin." Paper 7, 2. Petitioner neglected to explain that air enters the cartridge through the

side wall, ***then exits*** the cartridge altogether, converges ***outside*** the cartridge, and ***reenters*** the cartridge through a hole in the base (*i.e.,* first end) of the housing. As NJOY explained in the POPR, the hole is ***readily visible*** on the housing. It is not clear how the hole depicted below is "inside" the housing when it provides access into the interior of the housing. EX2022 ¶107.



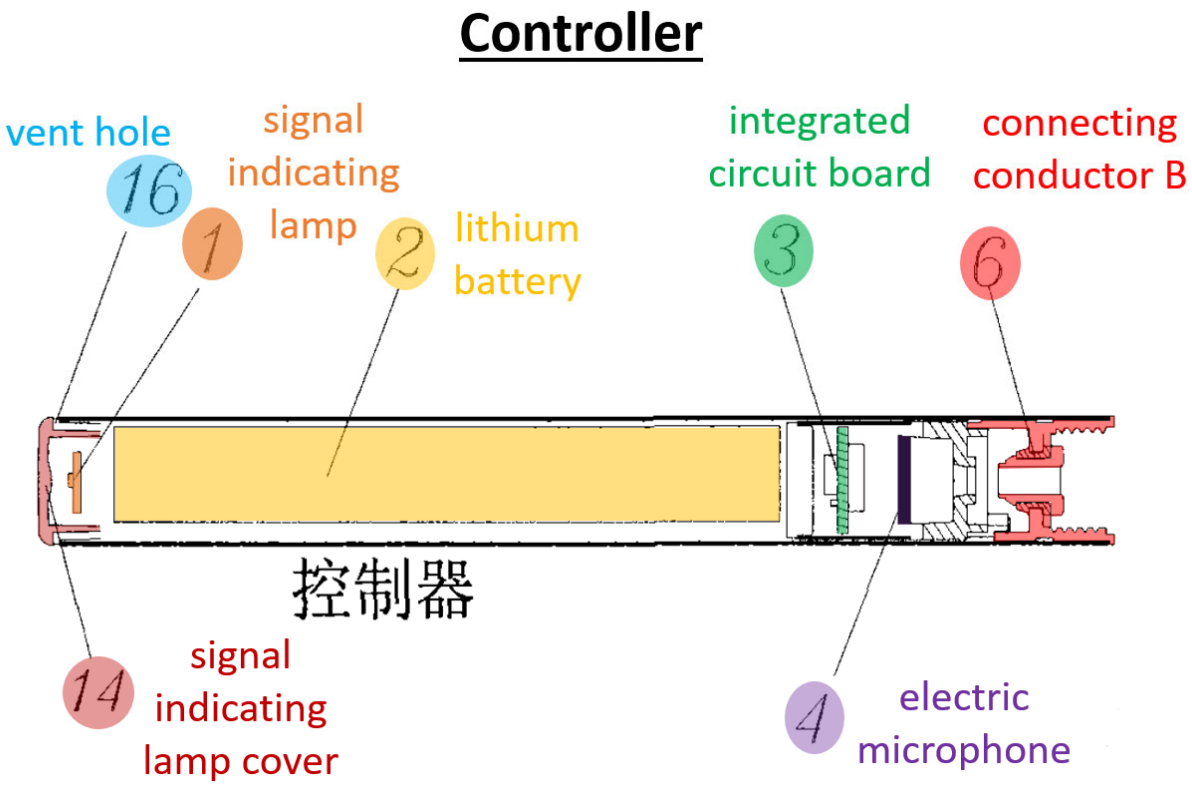
EX2005.0023 (actual device from above drawings)

V. Prior Art

A. Xia

Xia is a Chinese patent titled "Environmental-protecting Type Incombustible Atomizing Electronic Cigarette with Function of Cigarette Substitute" that issued on May 20, 2009 as CN201238610Y. EX1004. Xia describes an e-cigarette having a three-piece design: a controller, an atomizing component, and a liquid storage component. EX1004.0001. The controller includes signal indicating lamp 1, signal indicating lamp cover 14, vent hole 16, lithium battery 2, IC board 3, electret

microphone 4, and connecting conductor 6. *Id.*



EX1027, Fig. 1

The atomizer component (left, below) comprises "liquid-blocking plate 8," "secondary liquid storage chamber 10," "spray hole 904," and "heating wire 901." EX1004.0010. The liquid-blocking plate prevents back-flow of liquid into the battery compartment. Liquid is pulled under the suction force of the smoker through the spray hole where it enters the atomization chamber for vaporization (mostly). The primary liquid storage component (right, below) comprises an cotton fiber filled open-ended liquid storage cylinder housed in a soft suction nozzle. EX1004.0013. A gap exists between the soft suction nozzle and open-ended liquid storage cylinder

for airflow.

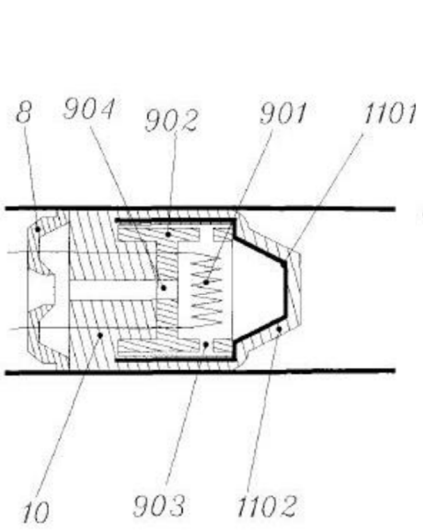


Fig. 4

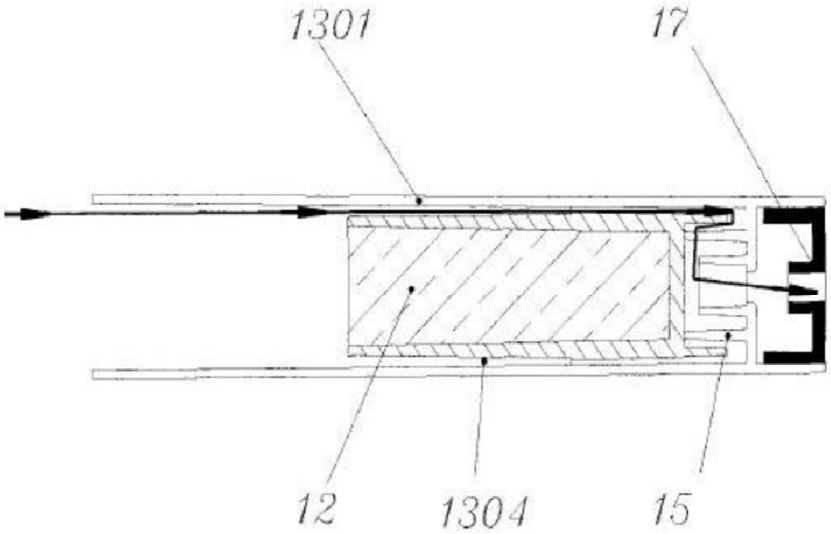
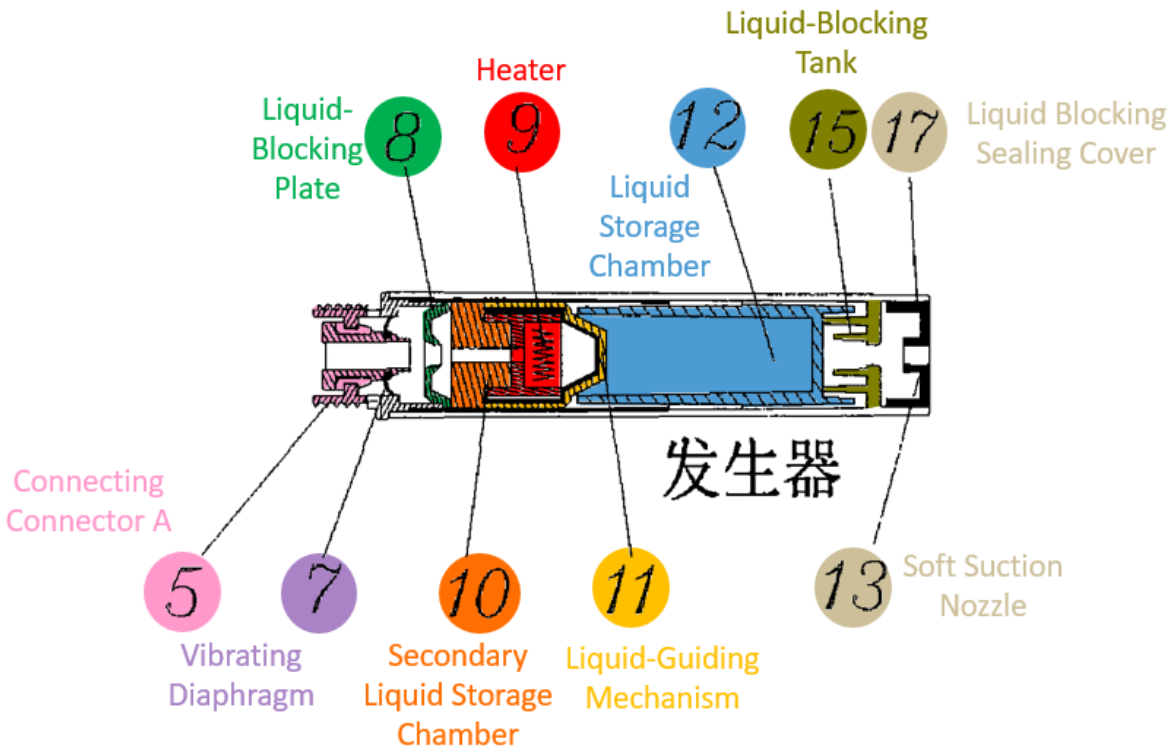


Fig. 5

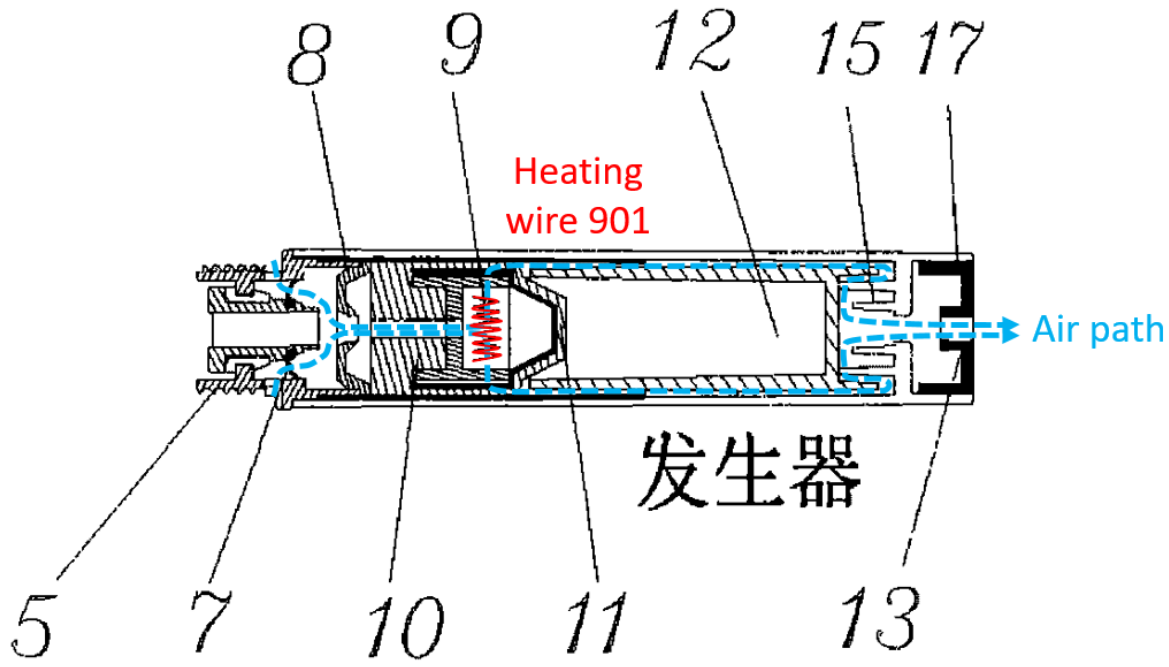
EX1004, Figs. 4-5

The liquid storage component is slotted over the atomizer component, bringing the liquid storage cylinder into contact with the wicking component in the atomizer and creating what Xia terms the "generator." EX2022 ¶113. Comparing Figures 4 and 5 (above) with Figure 2 (below) shows that when assembled, the white housing of the liquid storage component slides over the black housing of the atomizer, and the liquid guiding mechanism 11 presses into the leftmost end of the liquid storage chamber 12.



EX1027, Fig. 2

During inhalation, air enters at inlet holes just above the atomizer component's threaded connector (see below). The air converges and is drawn through secondary liquid storage chamber 10 to heating wire 901. EX2022 ¶¶113; EX1004.0013 ("Its working process is as follows: under the action of airflow, small droplets are sucked into the other side of the heat insulation seat 902 through the spray hole 904 in the heat insulation seat 902.").

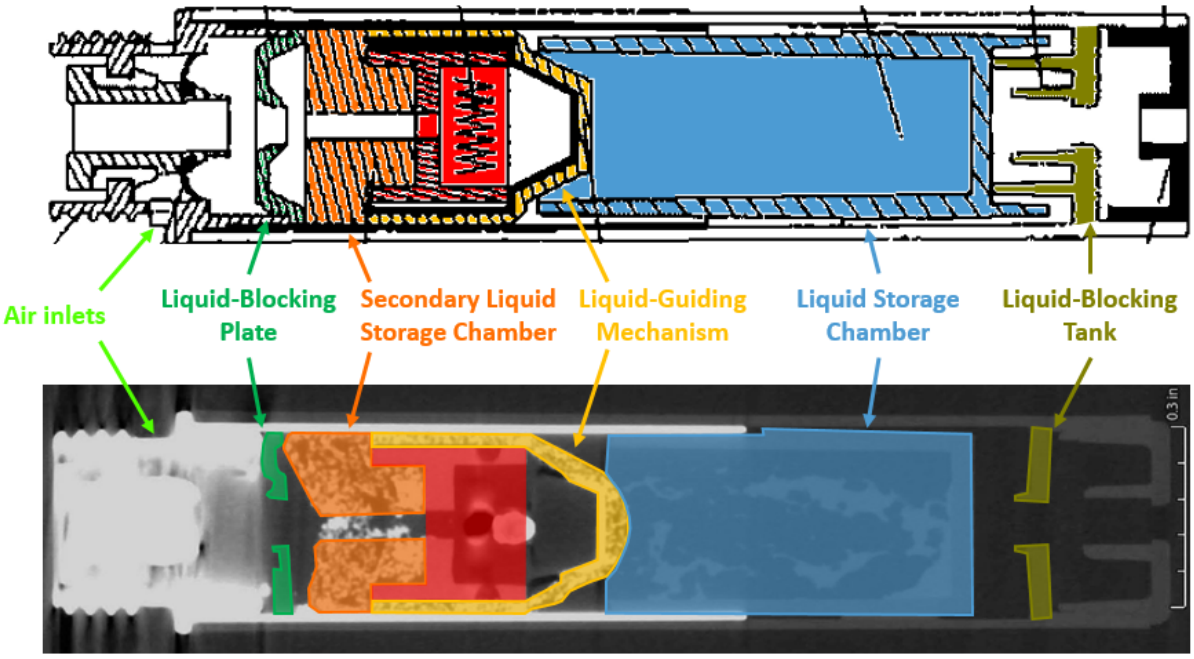


EX1027, Fig. 1

The liquid-saturated air enters the chamber of heating wire 901 where the design of the chamber causes the air to vortex to shed excess, unvaporized liquid. EX1004.0016 ("large-diameter droplets after atomization are attached to a wall under the action of a vortex to be reabsorbed by the liquid-guiding mechanism [11] through the overflow holes."); EX2022 ¶117. The vapor exits the heating chamber and travels along the sides of the device until liquid-blocking tank 15. EX2022 ¶120.

Here, the airflow passageway turns back and forth through liquid-blocking tank 15 to remove unvaporized liquid. Finally, the vapor exits the device at liquid-blocking sealing cover 17, which further traps excess liquid. EX1004.0011 ("liquid blocking tank 15 and the liquid blocking sealing cover 17 are used to prevent the chemical liquid from being sucked into the mouth"); EX2022 ¶120.

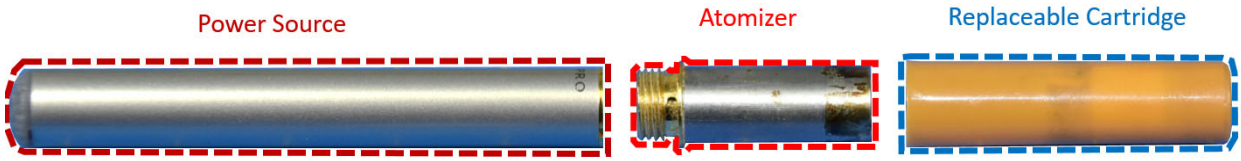
In the ITC Investigation, the Petitioner raised as prior art the NJOY NPRO e-cigarette. As shown below, the NPRO and Xia have a substantially similar design.



EX1027, Fig. 2 (top); EX2013.0011 (bottom)

The parties did not dispute that the NJOY NPRO e-cigarette is substantially similar to Xia. EX2014, 1244:3-1246:21 (Petitioner's ITC expert testifying that Xia and NPRO are similar except for Xia's absence of a heating coil surrounding a wick, and contending that NPRO anticipates the claims for the same reasons that Xia allegedly anticipates); EX2022 ¶¶129-130. The NJOY NPRO (below) makes clear this (and Xia) is a three-piece design.

EX2015

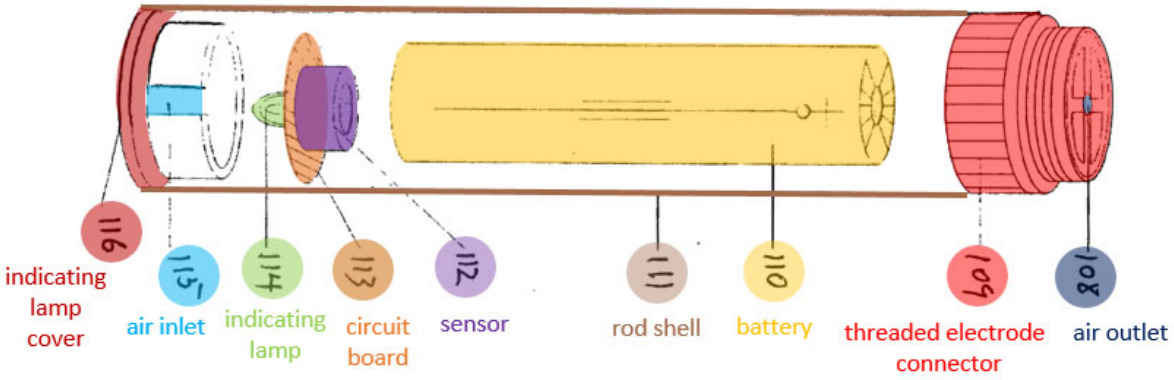


EX2015 (cropped); EX2016

The liquid storage component (replaceable cartridge) is separately purchasable for when the liquid runs dry. EX2022 ¶¶131-132.

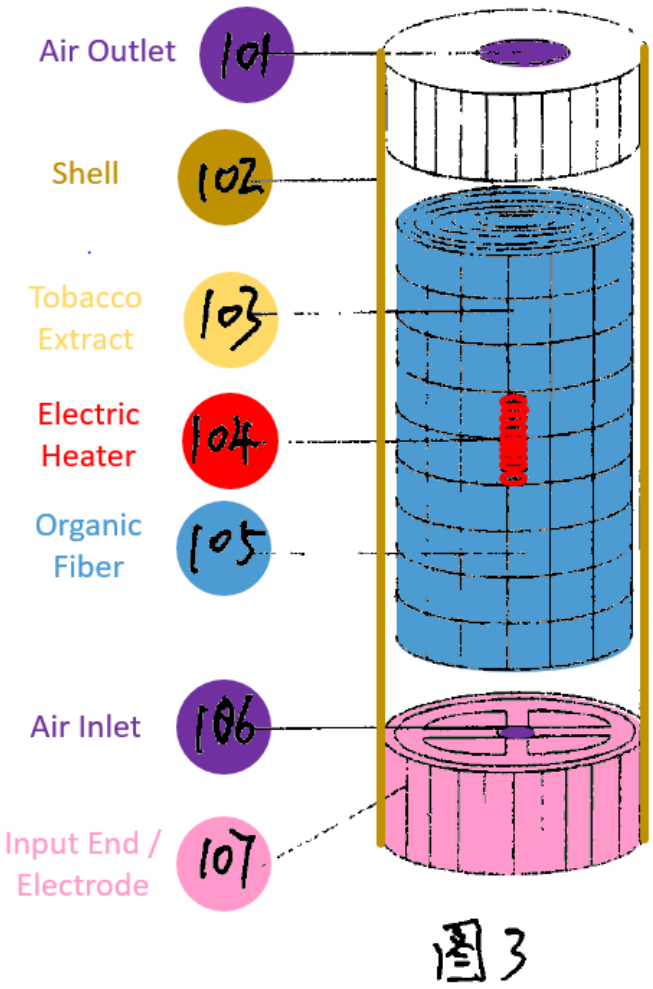
B. Wang

Wang is a Chinese patent publication titled "Electronic Pure Cigarette" published on February 18, 2009 as CN101366554A. Wang describes "an electronic pure cigarette, which comprises a cigarette holder part and a cigarette rod part." EX1005.0001. Wang teaches a cigarette rod consisting of rod shell 111, battery 110, sensor 112, indicating lamp 114 and lamp cover 116, circuit board control 113, air inlet 115 and outlet 108, and threaded connector 109. EX1005.0005.



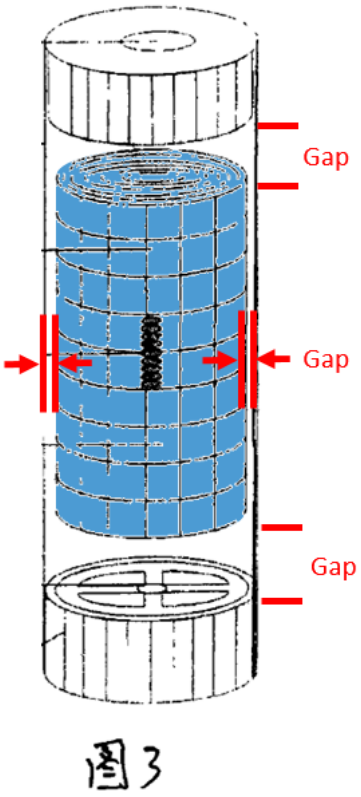
EX1029, Fig. 2

Wang teaches a cigarette holder component comprising holder shell 102, electric heater 104, tobacco extract 103, organic fiber 105, air inlet 106 and outlet 101, and input end 107. EX1005.0005.



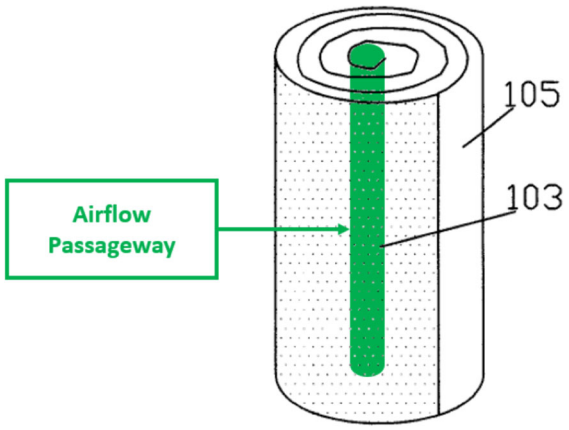
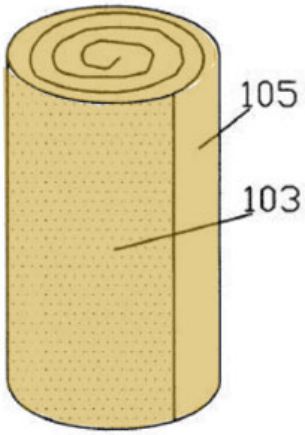
EX1029, Fig. 3

Within the cigarette holder, organic fiber 105 soaked with tobacco extract 103 is wound around electric heater 104. Gaps between the organic fiber and the cigarette holder (illustrated below) allow for the smoke produced from heating the tobacco liquid. EX1005.0007-.0008; EX2022 ¶138. Wang teaches that the organic fiber provides the aroma and taste of a common cigarette. EX1005.0007.



EX1029, Fig. 3

The parties dispute whether Wang discloses an airflow passageway through organic fiber 105. Petitioner envisions an airflow passageway running through the organic fiber. Petition, 21-23. But, Petitioner's expert conceded that Wang provides no textual support for a passageway. EX2017, 51:23-52:3. Wang describes only organic fiber "wound" around the heating element. EX1005.0007. Petitioner's expert alleges an airflow passageway based on Figure 5, below, and the declaration from Mr. Wang. Both parties illustrated their positions using Wang Figure 5:

Petitioner	NJOY
 图 5 **Petition, 23**	 Fig. 5 **POPR, 29**

1. Wang Declaration

Petitioner submitted a declaration from Mr. Wang ("Wang Declaration"), the inventor of Wang (reference). The Wang Declaration, however, is not prior art; nor is Mr. Wang providing expert testimony. He is a fact witness that provided testimony in the M.D.N.C. Litigation regarding whether certain ***products*** have a central and axial airflow passageway. EX1017.0003. The declaration does not address whether Wang (reference) has a central or axial passageway.

At best, the Wang Declaration recites that these products purportedly "cover[] the invention disclosed in my 948 Application." *Id.* But there are structural differences between Wang (reference) and the product exhibits attached to the Wang Declaration. EX2022 ¶¶145-147. Petitioner fails to provide any explanation for

these differences.

Finally, Mr. Wang is not a credible declarant.[8] Based on the facts ALJ Hines had before her, she noted:

> I think it's important to kind of recognize where we are and that at least from the information that's been presented to me so far, it doesn't appear that Mr. Wang is necessarily completely truthful. So I would take with a grain of salt what he has said with respect to the prior art. I don't believe from what I have seen it is necessarily true.

EX2002, 85:7-13. The ALJ excluded both the Wang Declaration and Mr. Wang's deposition from the M.D.N.C. Litigation because they were not reliable. EX2018.0009 ("Mr. Wang's conduct in this investigation, which is not disputed by the parties, has demonstrated that his testimony is not reliable…. He demonstrated the same at his deposition."), *see id.* EX2018.0010.

The Board should disregard the Wang Declaration.

C. Fang

Fang is a Chinese patent titled "Electronic Cigarette" that issued on July 16, 2008 as CN201085044Y. Fang discloses an e-cigarette that solves technical problems associated with complex technical structure and high manufacturing cost.

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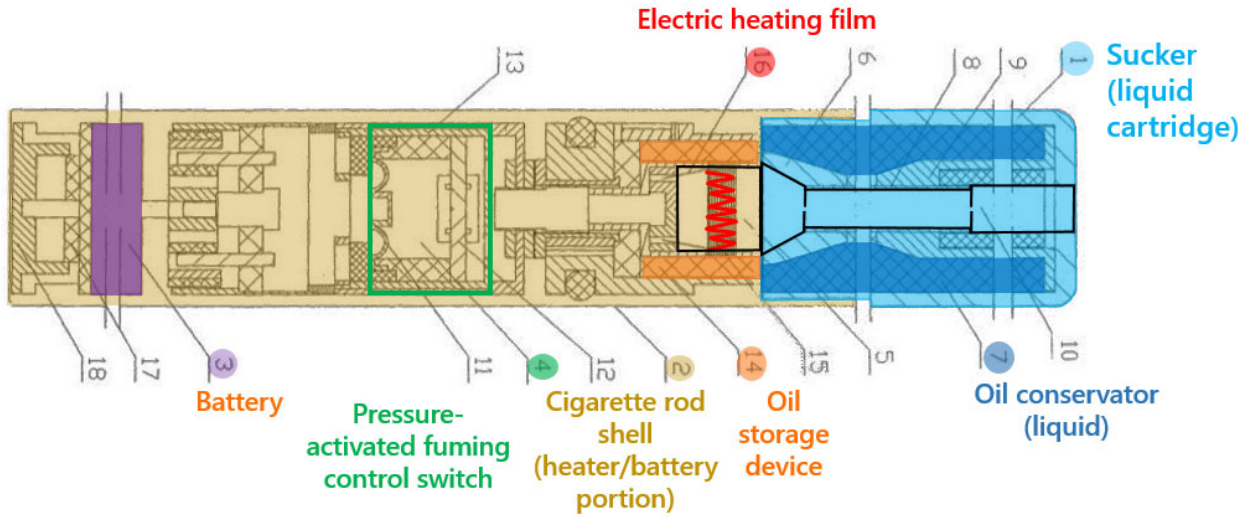
[8] Patent Owner requested to depose Mr. Wang; Petitioner did not make Mr. Wang available.

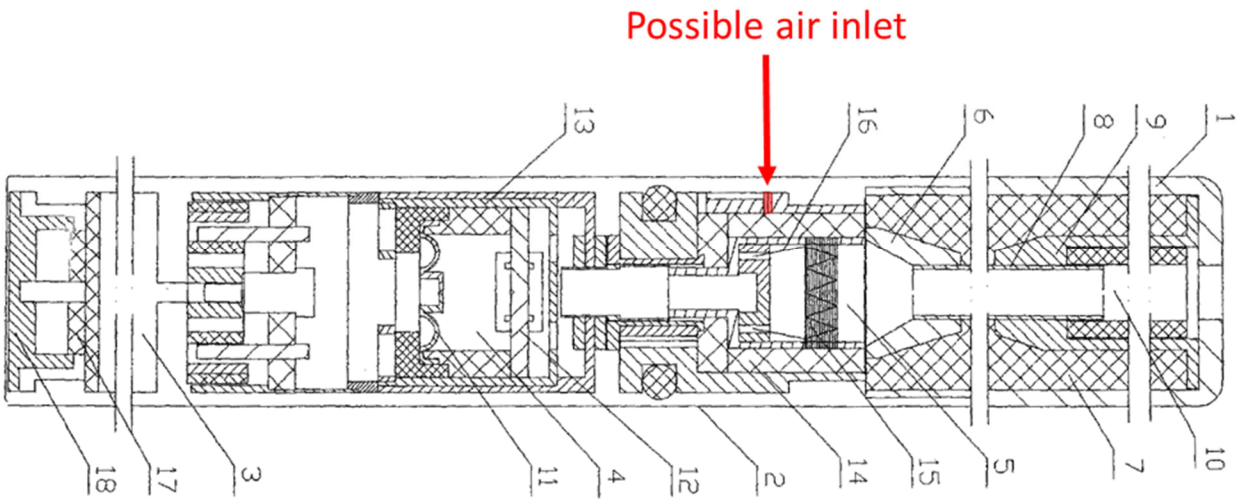
EX1006.0001.

Fang discloses a two-piece design comprising cigarette rod shell 2 and sucker 1. EX1006.0005. The cigarette rod shell comprises battery 3, pressure-activated fuming device control switch 4, electric heating film wire 16, temporary oil storage 15, and oil storage device 14. *Id.* The sucker (liquid cartridge) comprises gas pipe 8 nested in the center of oil conservator 7. *Id.*

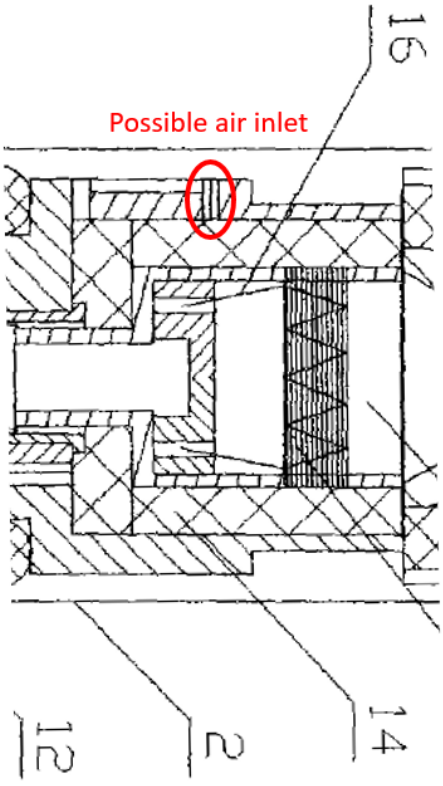


EX1031, Fig. 1

Fang, confirmed by Petitioner's expert, does not describe or depict an air inlet. EX2022 ¶153; EX2017, 65:25-71:1. At best, Figure 1 shows a possible air inlet near the side of the cigarette rod shell, as annotated in the figure below. EX2022 ¶155.

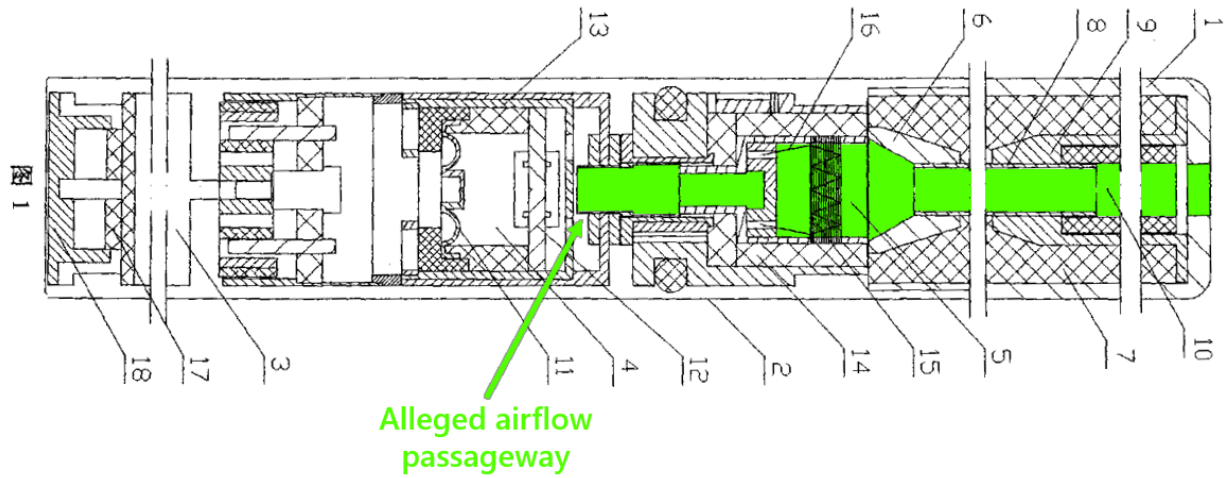


EX1031, Fig. 1



EX1031, Fig. 1 (cropped)

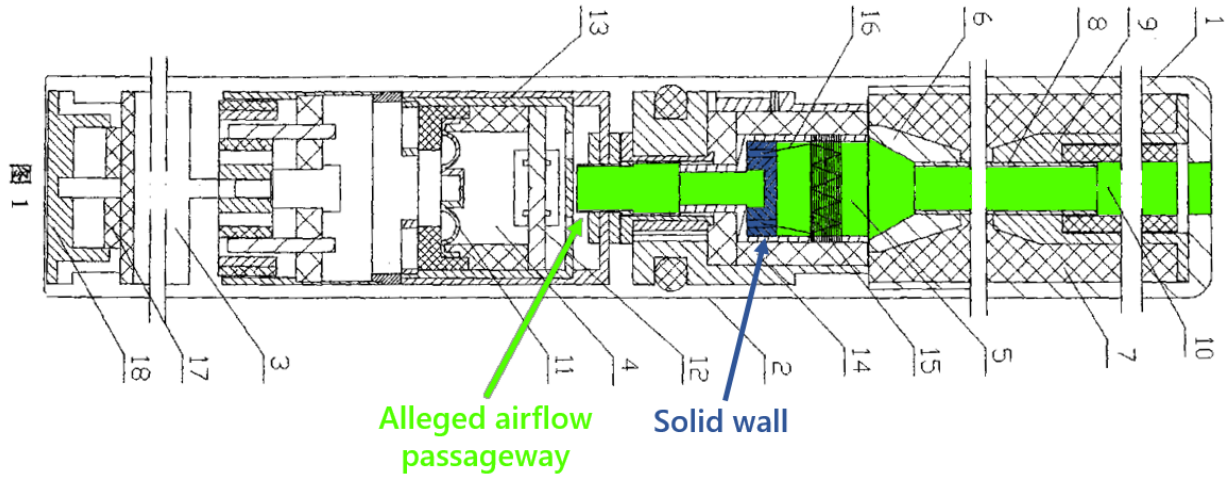
Petitioner nonetheless suggests there is an airflow passageway as depicted:



EX1031, Fig. 1 (showing alleged airflow passageway)

This cannot be an airflow passageway, however, because a ***solid wall*** sits in the middle of this "passageway." Petitioner provides no explanation how air would flow through this solid wall and Fang provides no discussion of this solid wall. Fang only discloses that, "the smoking channel 10 generates a negative pressure in the atomizer control switch 4 by a suction force of a user." EX1006.0005-.0006. Generating negative pressure in the control switch ***does not require*** an airflow passageway through this wall. If the wall is flexible, the flexing of the wall during inhalation would create a negative pressure at the control switch. EX2022 ¶157. Indeed, Fang itself acknowledges that pressure can be transmitted using a flexible membrane. *See, e.g.*, EX1006.0005-.0006 ("When the utility model is in use, the smoking channel 10 generates a negative pressure in the atomizer control switch 4 by a suction force of a user, ***the silicon film-coated tablet 11 bulges*** in the support 13 towards the

direction of the switch circuit board 12").



EX1031, Fig. 1

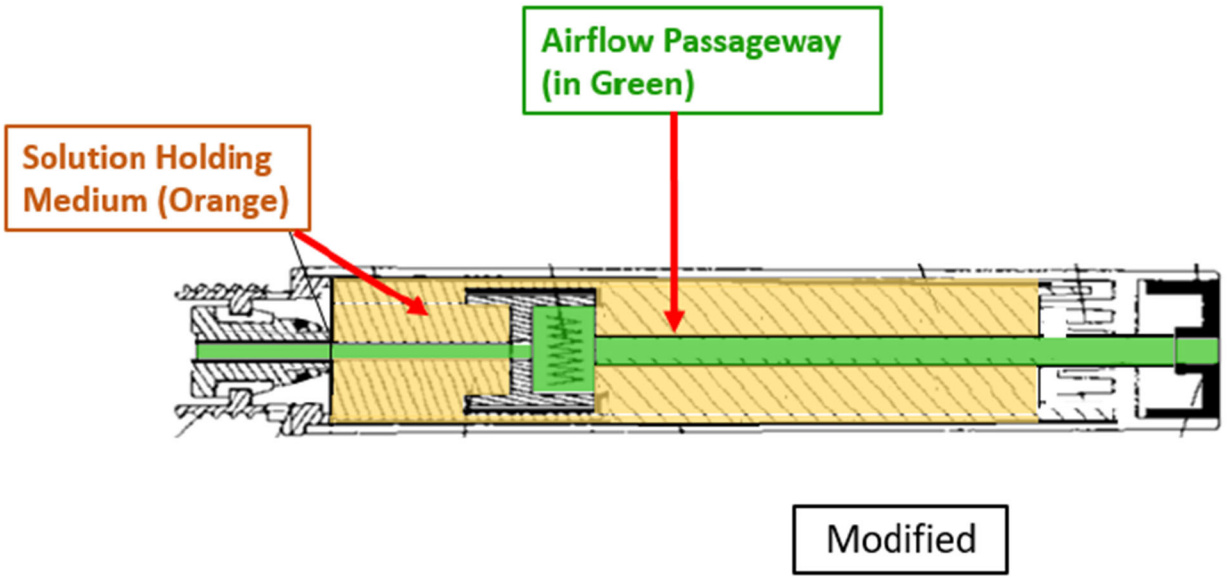
VI. The Cited References Do Not Render the Challenged Claims Unpatentable

A. It Would Not Have Been Obvious to Combine Xia, Wang, and Fang

Petitioner asserts it would have been obvious to combine (1) Xia with Wang, (2) Xia with Fang, (3) Xia with Wang and Fang, and (4) Wang with Fang. But Petitioner has not provided sufficient motivation to combine or a reasonable expectation of success for any of these combinations.

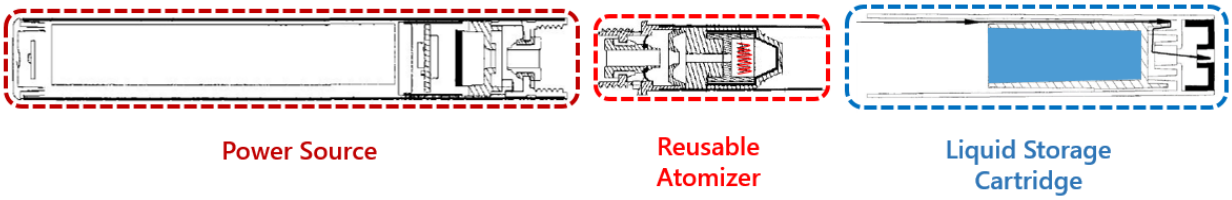
1. Xia with Wang and/or Fang

Petitioner asserts that it would have been obvious in view of Wang and/or Fang to extend the air passageway in Xia's secondary liquid storage chamber "leftward and rightward, such that airflow passageway extends through the solution holding medium." Petition, 43.

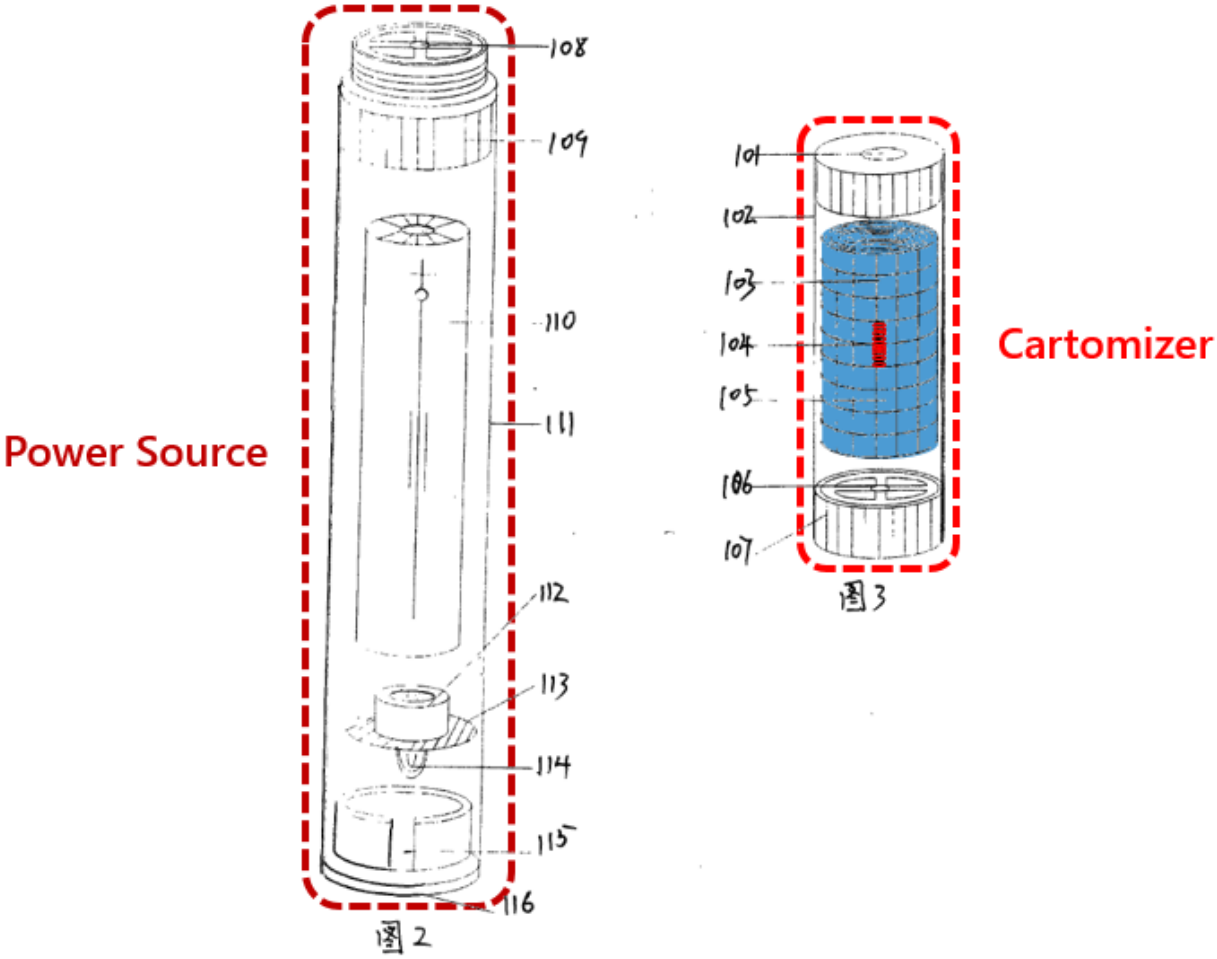


Petition, 44

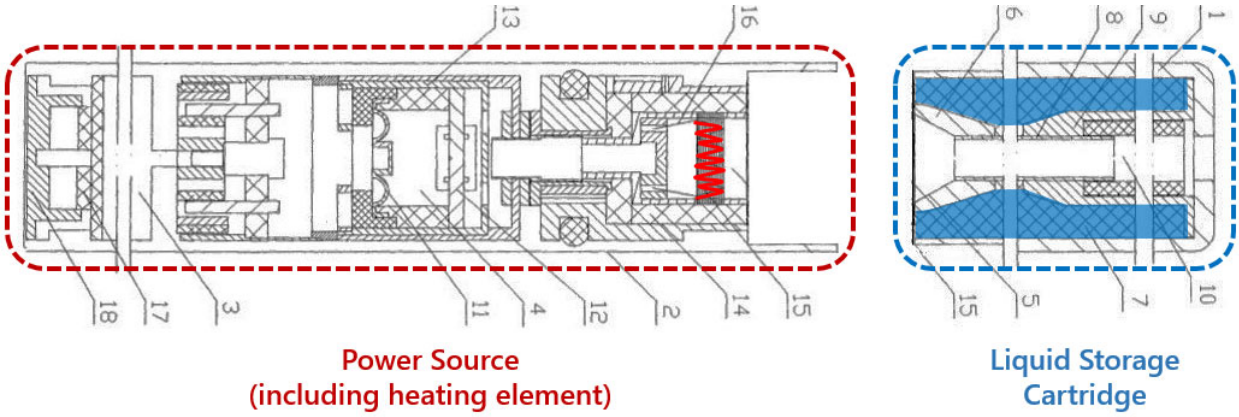
Wang, however, does not disclose a central and axial airflow passageway, so a POSITA would not look to Wang to modify Xia. *See* Section V.B; EX2022 ¶¶139-142. Moreover, a POSITA would not be motivated to combine Xia, Fang, and Wang because they have significantly different designs. EX2022 ¶¶188-225. Xia discloses a three-piece device with a body comprising a power source, a first cartridge comprising a heating element, and a second cartridge comprising a liquid storage (*see* Section V.A); Wang discloses a two-piece device with a body comprising a power source and a cartridge comprising a heating element and liquid storage (*see* Section V.B); and Fang discloses a two-piece device with a body comprising a power source and a heating element and a cartridge comprising the liquid storage. *See* Section V.C.



EX1027, Figs. 2-5 (modified)



EX1029, Figs. 2-3

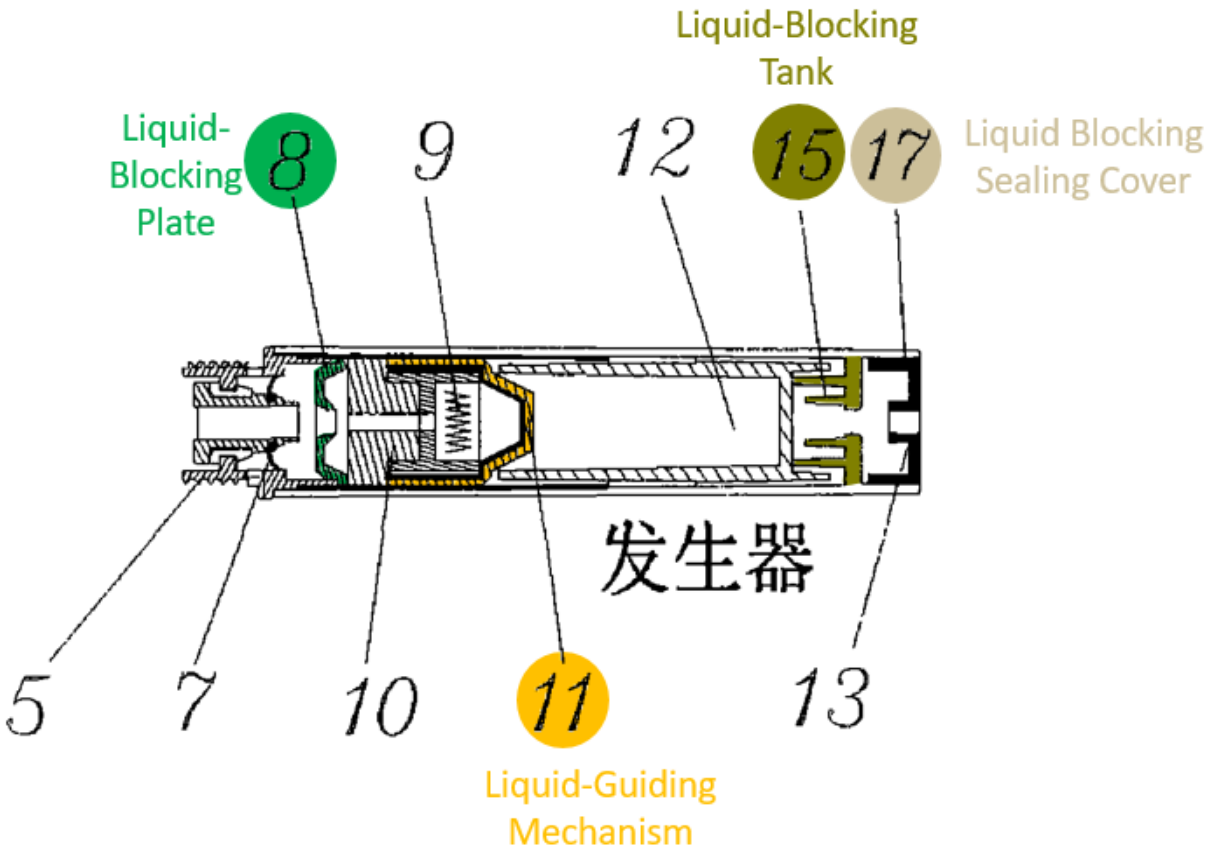


EX1031, Fig. 1 (modified)

Because of these structural differences, Xia, Wang, and Fang could not be combined without extensive modifications. Xia, Fang, and Wang have substantially different mechanisms for transporting and vaporizing liquid. EX2022 ¶¶219-225. Petitioner fails to account for the differences amongst these references including how the different sizes of the heating elements relate to energy consumption, rate of liquid consumption, temperature of vapor, amount of vapor, particle size of the aerosol, material selection, battery life, and airflow. Moreover, the wick placement in these references is completely different, and placement alters the characteristics of the device, such as the airflow path, draw resistance, and components placement.

For example, Xia uses the consumer's inhalation to pull liquid from the secondary liquid storage chamber into its channel for vaporization, which Xia calls "spray." EX1004.0016. This creates large amounts of unvaporized liquid, which Xia addresses by using a circuitous airflow pathway designed to provide opportunities to capture this liquid. For example, Xia includes liquid-blocking plate

8, liquid-guiding mechanism 11, liquid-blocking tank 15, and liquid-blocking sealing cover 17. EX2022 ¶¶117-120.



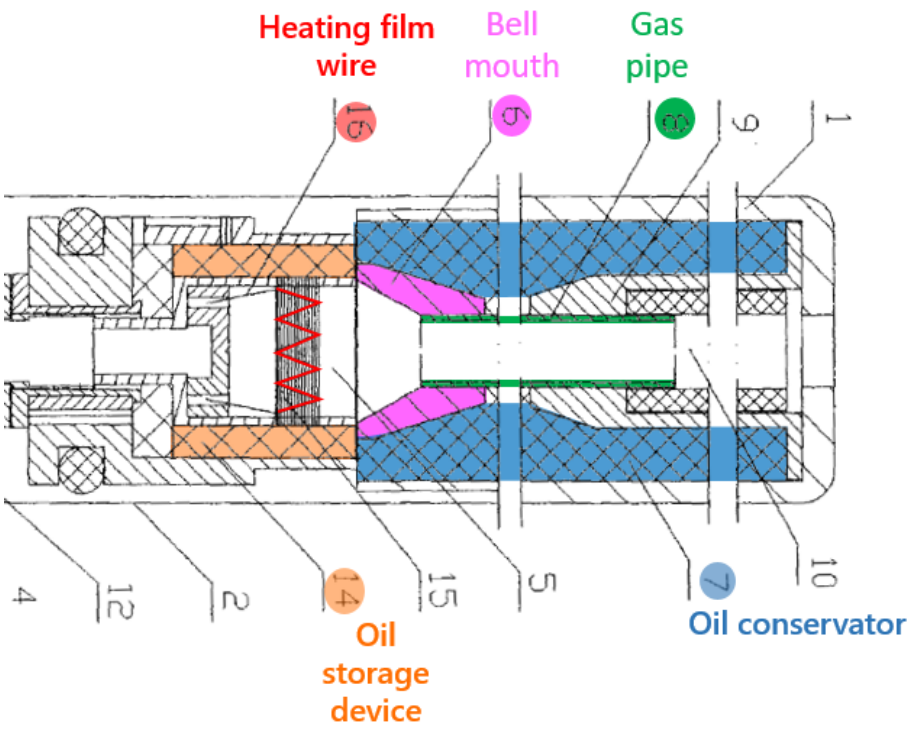
EX1027, Fig. 2

Liquid-blocking plate 8 may "prevent the chemical liquid from flowing into the controller and affecting the circuit." EX1004.0013. Liquid-guiding mechanism 11 forces the airflow into a vortex pattern to shed liquid. EX1004.0016 ("large-diameter droplets after atomization are attached to a wall under the action of a vortex to be reabsorbed by the liquid-guiding mechanism through the overflow holes."). And "liquid blocking tank 15 and the liquid blocking sealing cover 17 are used to

prevent the chemical liquid from being sucked into the mouth." EX1004.0011.

Wang's method of operation and structure are different. Wang does not rely on spray to bring solution into contact with the heater. Rather, Wang wraps a saturated fiber directly against the heater. EX1005.0007; EX2022 ¶138. Accordingly, Wang does not contemplate liquid-minimizing components.

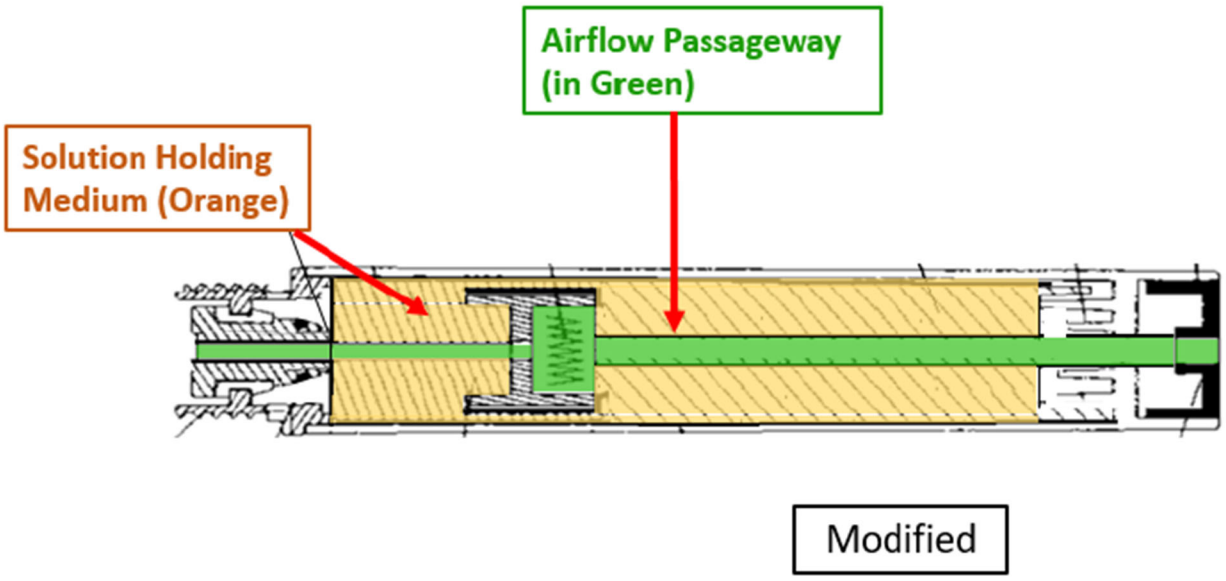
Fang uses neither Xia's "spray" method nor Wang's direct contact method. Fang uses temporary oil storage device 15 (wick) to draw liquid from oil storage device 14 directly to heating film wire 16. This heating arrangement "has high electrothermal conversion efficiency and long service life, experiments prove that it may save 40% of electricity compared with a fuming device in the prior art." EX1006.0006. Fang's heating element alters the heating and vaporizing profile of Fang, for which Petitioner provides no accounting.



EX1031, Fig. 1

Fang also uses a unique airflow passageway with a waterproof bell mouth 6 that reabsorbs excess nicotine oil droplets while channeling vapor into gas pipe 8 and smoking passage 10 for delivery to the consumer. EX1006.0006.

As discussed above, these different mechanisms necessitate substantially different physical arrangements—a POSITA cannot swap one element for another. For example, Petitioner attempts to replace Xia's airflow passageway with Wang's "channel" or a modified Fang channel.



Petition, 44

But Xia struggles with excess liquid in the vapor, which is combatted by a combination of recapture mechanisms. Nonetheless, Petitioner's combination eliminates many of these mechanisms, including liquid-blocking plate 8, liquid-guiding mechanism 11, and liquid-blocking tank 15. EX1004.0013 ("liquid-blocking plate 8 may prevent the chemical liquid...from flowing into the controller and affecting the circuit"), .0011 ("liquid blocking tank 15 and the liquid blocking sealing cover 17 are used to prevent the chemical liquid from being sucked into the mouth"), .0016 ("large-diameter droplets after atomization are attached to a wall under the action of a vortex to be reabsorbed by the liquid-guiding mechanism through the overflow holes."). With Petitioner's modified device, consumers will inhale undesirable liquid droplets (hence why Xia goes to lengths to prevent them),

which studies suggest are dangerous to ingest.[9] Petitioner's expert does not dispute that it would be harmful to ingest liquid. EX1017, 47:11-21.

Petitioner's modified device also relocates the first aperture to the first housing end. Petitioner argues it would have been obvious because "it would merely require extension of the passageway to the very edge of the housing, with a central aperture (already present in Wang and Fang), which would also allow the solution holding medium to be extended to the edge of the housing as well, increasing liquid storage capacity." Petition, 36. Petitioner fails to account for the potential effects that moving components in the device would have on vaporization, vapor size, vapor temperature, and airflow. Nor does Petitioner provide any consideration to Xia's three-piece design or how this modification would interfere with replacing the liquid storage. For example, this modification eliminates the wick against which the liquid storage is supposed to abut. EX2022 ¶219-225.

Petitioner fails to identify in any prior art reference a first aperture at the housing end—neither Wang's nor Fang's "first aperture" is in the housing or at the

---

[9] EX2003.0005 ("Ingestion of nicotine-containing e-cigarette solutions can result in serious health effects, including death, due to nicotine toxicity."); EX2004.0006 ("The higher a product's nicotine content, the higher its risk of producing adverse effects. Direct consumption of nicotine liquids is the most dangerous to ingest.").

end. Further, pushing the solution holding medium to the housing end does not transfer the aperture to the housing, which is required by the claims. Nor is extending the liquid storage to the housing end a "mere extension." Xia discloses that air enters the device at the threaded junction. By extending the aperture to the housing end, Petitioner alters Xia's entire air intake system, requiring air to enter through the battery section. Petitioner does not explain how this would affect the design of the sensor and actuation circuit. Moreover, by including the battery portion in the airflow path, vaporized liquid (in the airflow path) would backflow into the battery compartment, which would negatively affect the electrical components. EX2022 ¶173.

The rationale, "increasing liquid storage capacity," is disingenuous because liquid storage capacity is increased at the expense of vibrating diaphragms 7 and liquid-blocking plate 8. Vibrating diaphragm 7 is necessary for actuating the device. EX1004.0010 ("airflow enters the inside of the generator from the air inlets 702 on a side surface of the generator, under the action of the airflow, the vibrating diaphragm 7 vibrates,... the heater 9 starts working…"). EX2022 ¶¶207-214. And liquid-blocking plate 8 prevents liquid from entering the battery portion. EX1004.0013 ("The liquid-blocking plate 8 may prevent the chemical liquid...from flowing into the controller and affecting the circuit."). Petitioner's modification results in an inoperable device that permits corrosive nicotine liquid into the battery

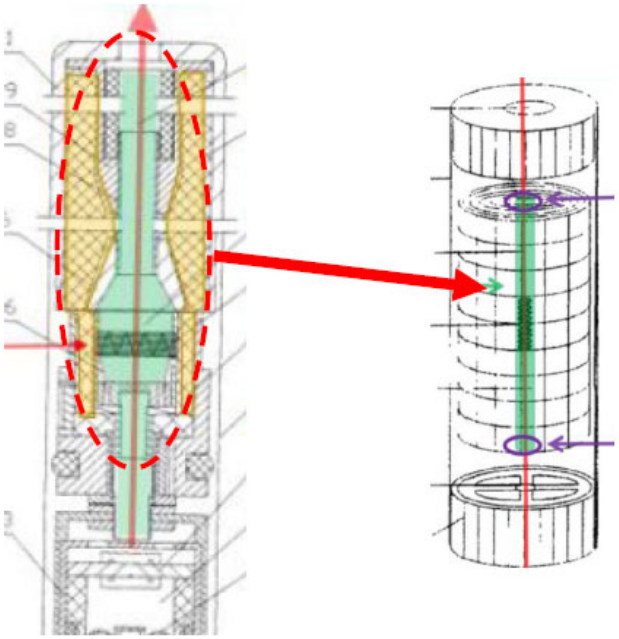
compartment and liquid nicotine into the consumer's mouth.

Petitioner's expert suggests that the above combination would be arrived at through a simple substitution of known elements. EX1007 ¶109. But based on Mr. Sturges' declaration, the combination requires ***several*** modifications (none of which is discussed in the Petition), including a: (1) new liquid storage with a central air passageway therethrough (EX1007 ¶109); (2) modified liquid blocking plate (*id.* ¶122); (3) impermeable liquid storage barrier (*id.* ¶122); (4) elongated secondary liquid storage chamber (*id.* ¶122); and (5) completely redesigned sensing and actuation system (*id.* ¶93). And despite designing an ***entirely new device***, Petitioner never argues that the "first aperture" is anywhere but in the secondary liquid storage chamber.

2. Wang with Fang

Petitioner contends that Wang can be modified in view of Fang. But as discussed above, a POSITA would not have been so motivated.

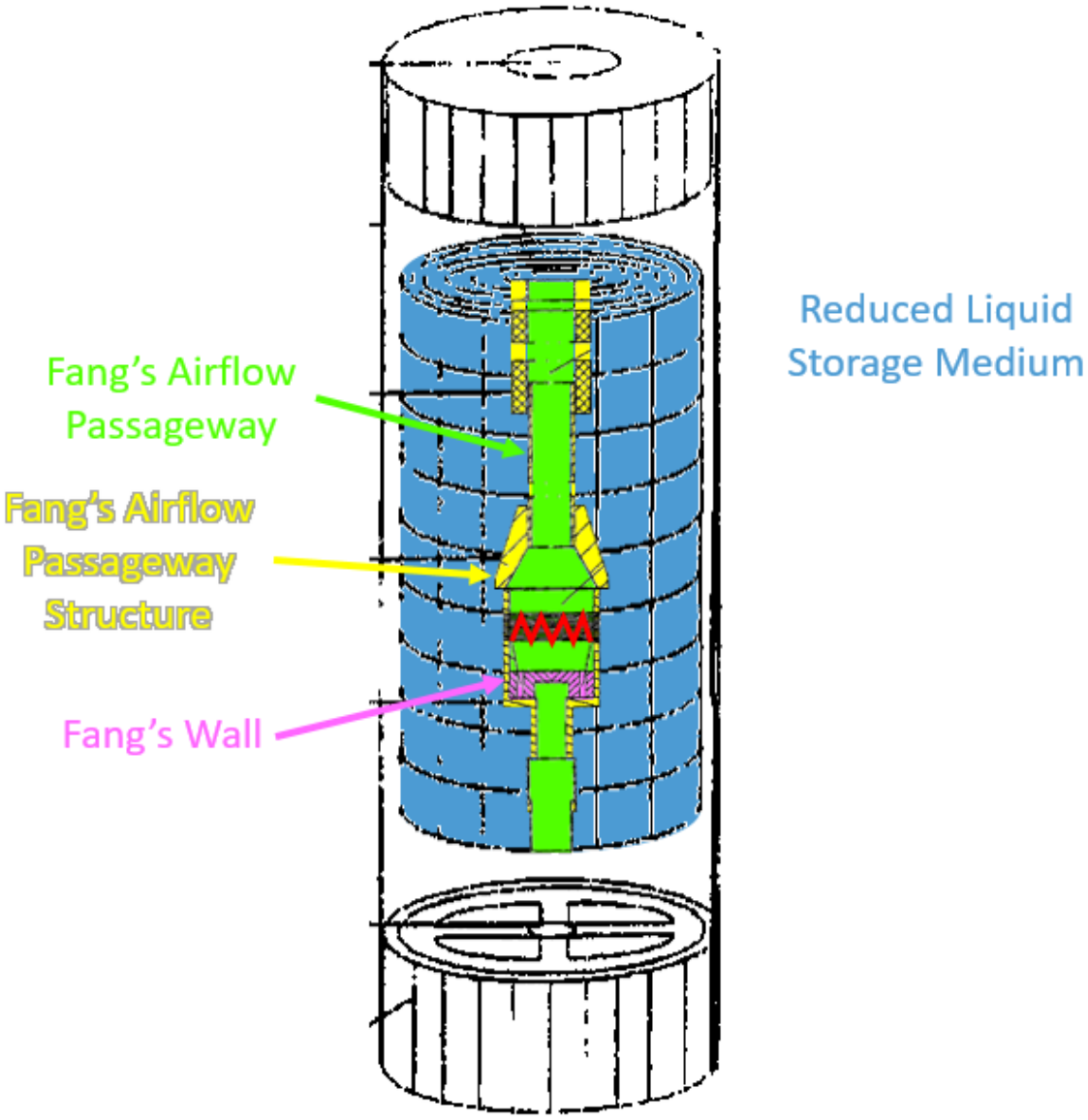
Petitioner failed to identify features in Fang that cure Wang's deficiencies. For example, Petitioner has not identified in Fang a "housing [that] includes a first aperture" as properly construed. Indeed, Petitioner does not suggest that Fang provides this limitation. *See* Petition, 32-36 (discussing this limitation at 1[b2]).



Petition, 61, 51 (combined)

Regarding limitation 1[c], Petitioner imports Fang's central channel into Wang—replacing Wang's internal structure. Petition, 93-94. There is no possibility this would work. EX2022 ¶¶321-331. Wang's system includes a liquid storage directly wound about the heating element. EX1005.0007. In contrast, Fang includes a complex system for bringing liquid from a replaceable storage medium (sucker) to an intermediate wick and then to a transversely oriented heating element having its own wicking element. EX1006.0005-.0006. Petitioner fails to account for these structural differences. Wang is an inexpensive, simple device designed to be disposable. EX2022 ¶325. The modification takes the expensive, non-replaceable portions of Fang (wicking structures, tubular structures, complicated heating element) and sticks them into the replaceable portion of Wang. *Id.*

To the extent Wang has a central channel, it would be defined by the organic fiber. Fang, in contrast, is defined by a varying diameter solid cylinder. Modifying Wang in this manner would drastically reduce the liquid capacity of Wang, require fixing solid walls within the organic fiber, require structure maintaining a transverse heating element, and require a mechanism for bringing liquid to the heating element. EX2022 ¶326. Moreover, as discussed above, Fang does not have a central and axial passageway due to the solid wall blocking air flow.



EX1029, Fig. 3 (modified); EX1031, Fig. 1 (modified)

Petitioner claims that including a central airflow passageway in Wang's liquid storage would provide "obvious benefits," but they only cite "creating a uniform, consistent airflow." Petition, 94 (citing EX1007, ¶268). Yet there is nothing to suggest that Wang does not already provide uniform, consistent airflow. Thus, there

is no substantiated reason to include a central airflow passageway, particularly in view of the disadvantages noted above.

Regarding limitation 1[h], it would not have been obvious to modify Wang in view of Fang to surround the airflow passageway and heating element with the solution holding medium (Petition, 103) for the same reasons discussed above.

Petitioner argues that a POSITA would have been motivated to make this combination so that the solution holding medium could insulate a smoker from the heated vapor and the heated vapor from a cold outer environment. Petition, 103. Petitioner cites to two paragraphs of its expert declaration, which in turn parrots the language in the petition. Petitioner's purported motivation to modify Wang to surround a heating element and airflow passageway with a solution holding medium does not exist. When a smoker inhales, the air moves quickly through the gap adjacent to the housing, which provides little time for vapor to be adversely impacted by the environment or for the vapor to adversely affect the e-cigarette device. EX2022 ¶327. In fact, placing the solution holding medium adjacent to the housing prevents the vapor from properly cool and mix, as Wang contemplates. *Id.* Another concern is placing the liquid storage adjacent to the housing without thermal insulation (as proposed by Petitioner). *Id.* In a cold environment, the liquid in the storage chamber becomes colder quicker. This is problematic because there is no indication that the heater will change output based on the temperature of the liquid.

Id. Thus, in Petitioner's modification, there is a concern that the heater would be inadequate to heat the liquid to vaporization. *Id.*

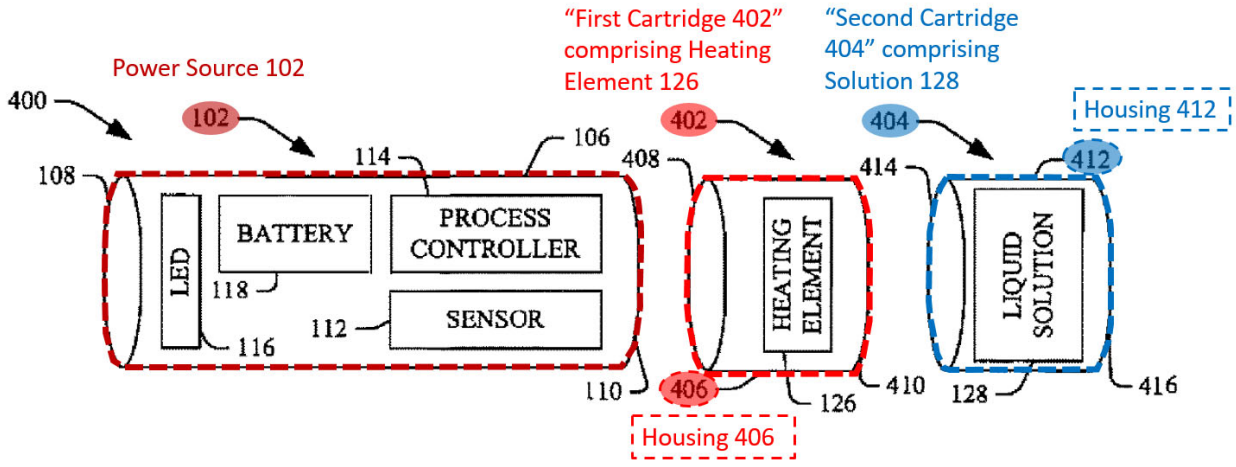
B. Ground 1 Fails

1. Xia Alone Does Not Render Obvious the Challenged Claims

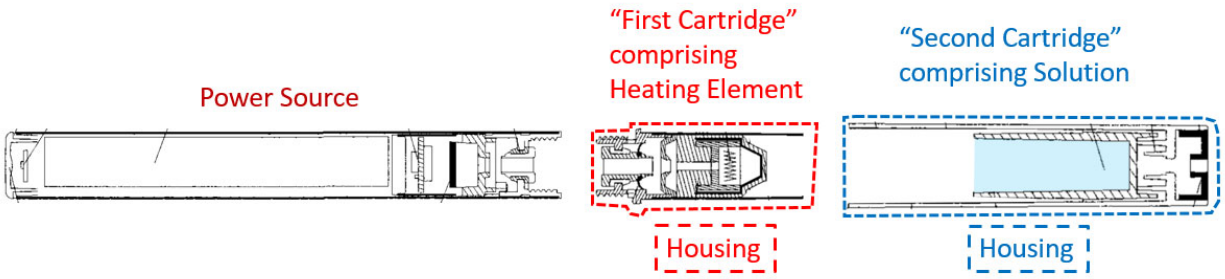
a. Xia Does Not Render Obvious "a cartridge having a housing...[including] a solution holding medium...a heating element" (Claims 1, 8, 16)

Petitioner asserts that Xia teaches or renders obvious a cartridge comprising a housing having a solution holding medium and a heating element therein. Petition, 31-36, 55-61. The claims are directed to a two-piece design having a cartridge comprises a housing having both the solution holding medium and heating element. *See* Section II.D.

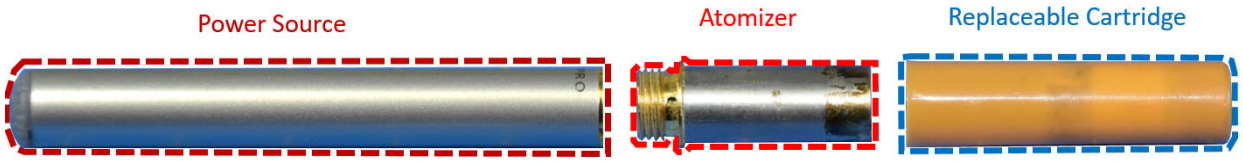
Xia is a three-piece design. *See* Section V.A. Xia's heating element and solution holding medium are in separate cartridges. This is confirmed by NPRO, which Petitioner used to map Xia to the 881 Patent in the ITC Investigation.



EX1001, Fig. 4



EX1027, Figs. 2-5

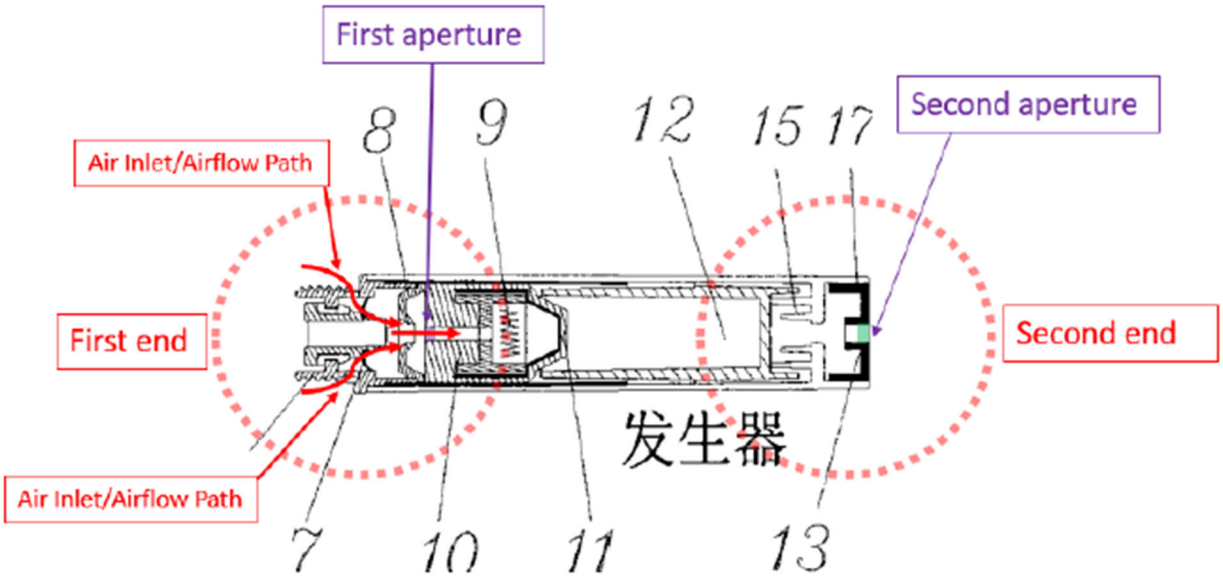


EX2015 (cropped); EX2016

b. Xia Does Not Render Obvious "the housing having a first aperture on the first end" (Claims 1, 8, 16)

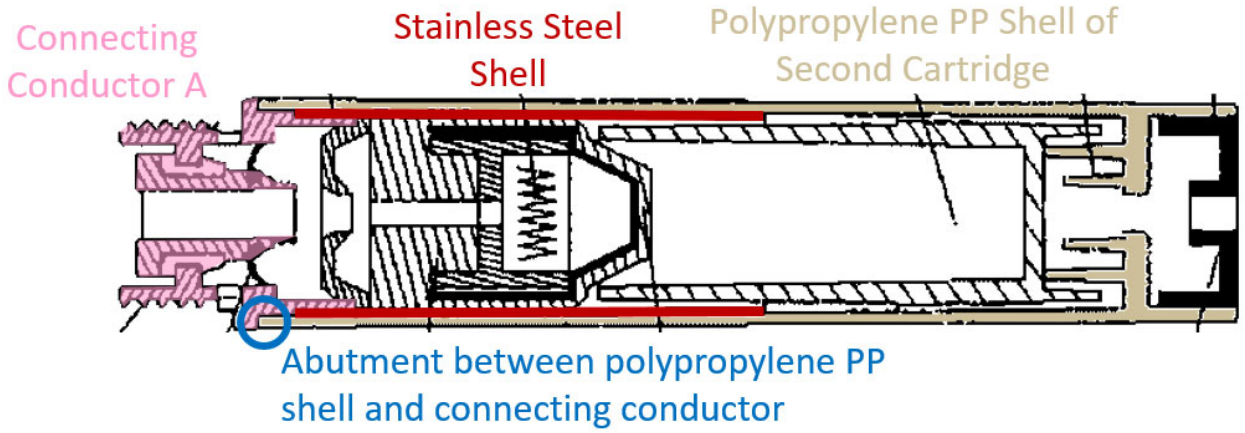
Housing

Petitioner identifies Xia's stainless steel shell as the "housing" and identifies first and second "ends" with large circles on Xia Figure 2. Petition, 31, 34-35. Petitioner labels an opening in secondary liquid storage chamber 10 as a "first aperture." *Id.*



Petition, 35

"Housing" means "an outside structure containing device internals" and "ends" means the "extrema of an object." Section IV.B.1. Xia's "stainless steel shell" is not a housing because it is neither an outside structure nor does it contain the device's internals. As shown in Figure 2, the liquid storage component slides over the stainless steel shell, so the shell is not external. Moreover, the stainless steel shell does not encapsulate the liquid storage component. EX2022 ¶128.



EX1027, Fig. 2

Apertures

The correct construction of "the housing having a first aperture on the first end" refers to an aperture formed in the housing wall on the housing's end; it does not encompass apertures in objects within the housing. *See* Section IV.C. The Petitioner's aperture resides within the housing as part of secondary liquid storage chamber 10. EX2022 ¶163. Thus, Petitioner's "first aperture" is not a *housing* aperture. EX2022 ¶¶161-165.

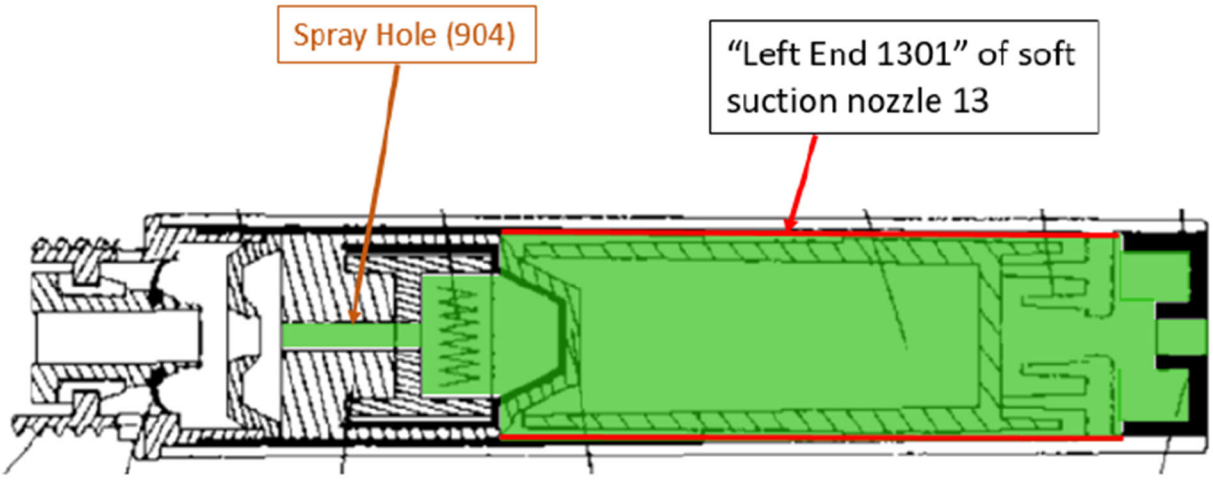
Petitioner's obviousness argument for Xia alone consists of a single sentence: "Alternatively, a POSITA would know that moving Xia's external air intake to the battery side to have air enter centrally on the end of the cartridge was a simple and obvious modification." Petition, 35. Petitioner cites one paragraph in Dr. Sturges' report (EX1007, ¶88). *Id.* This is insufficient to demonstrate obviousness. Petitioner makes no effort to explain why it would have been "simple" or "obvious." Nor does Petitioner argue a reasonable expectation of success. Relying on the expert to fill in these gaps is improper incorporation by reference. *Instrumentation Lab'y Co., v. Hemosonics LLC*, IPR2017-00855, 2019 WL 625561, at * 8 (P.T.A.B. Feb. 13, 2019) (declining to consider "[a]rguments and information that are not presented and developed in the Petition, but instead are incorporated by reference"); *Fid. Nat'l Info. Servs., Inc. v. DataTreasury Corp.*, IPR2014-00490, 2014 WL 4059221, at *5

(P.T.A.B. Aug. 13, 2014) ("the petition must contain a 'full statement of the reasons for the relief requested,' including a detailed explanation of the significance of the evidence...[w]e, therefore, decline to consider information presented in a supporting declaration, but not discussed sufficiently in a petition....") (quoting 37 C.F.R. § 42.22(a)(2)).

Regardless, Dr. Sturges' opinion just reiterates that it would be simple and obvious. Yet Petitioner's modification is a substantial redesign of the device that removes critical features that Xia relies on to provide an acceptable smoking experience. EX2022 ¶¶166-167. Xia, for example, includes several safeguards to prevent liquid from back-flowing into the battery compartment and safeguards to remove liquid from the vapor stream (which is very hot) before it enters the consumer's mouth. *See* Section VI.A.1.

c. Xia Does Not Render Obvious "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" (Claims 1, 8, 16)

Petitioner identifies an "airflow passageway" that passes through some of Xia's structures, partially envelops some structures as "obstructions," and fully envelops other structures:

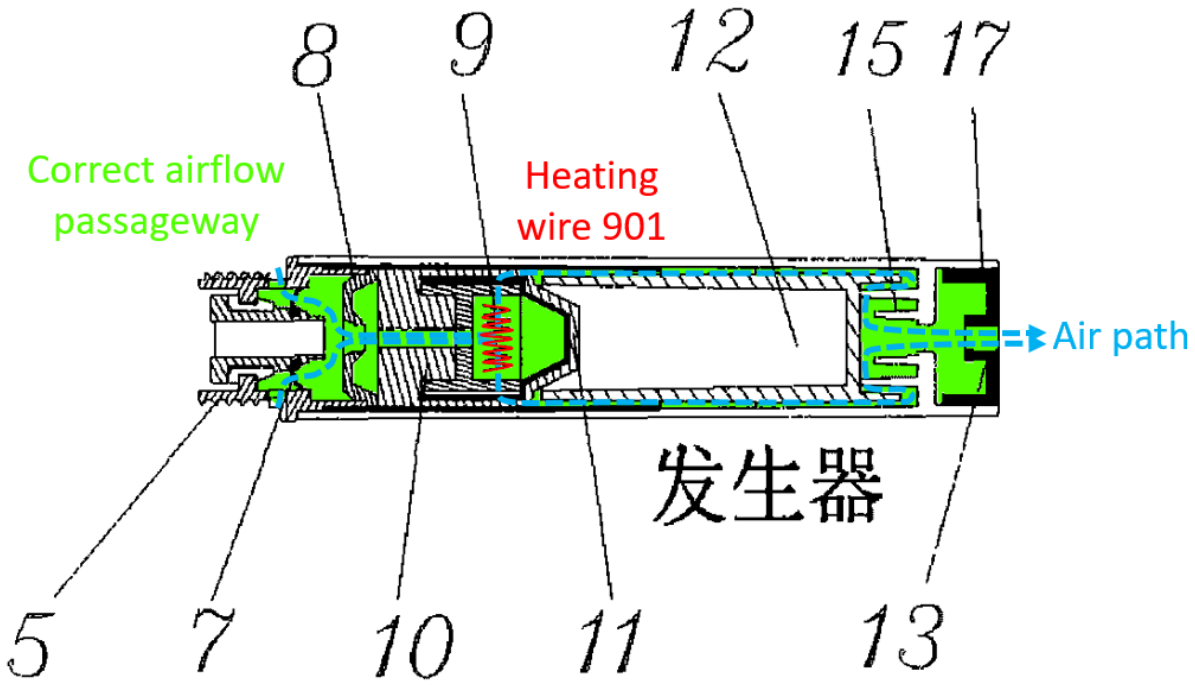


Petition, 37

The proper construction of an "airflow passageway that extends centrally and axially…intermediate of the first aperture…and the second aperture" excludes structures that divert the airflow more than a heating element. This was recognized by the M.D.N.C. Court, which specifically adopted this understanding during the summary judgment process; and was recognized by the Examiner during prosecution of the 864 Patent, a continuation of the 881 Patent with a substantially similar limitation. *See* Section IV.B.3.

Petitioner's "airflow passageway" contravenes the M.D.N.C court's and the Examiner's understanding. The liquid storage chamber ***substantially diverts*** the airflow pathway from a central and axial orientation—far more than the heating element. This is purposeful. Xia requires a circuitous airflow passageway (*e.g.,* vortex chamber, reducing diameter pathway, liquid-blocking tank 15, liquid-blocking seal cover 17) to reduce liquid in the vapor stream. *See* Section V.B and

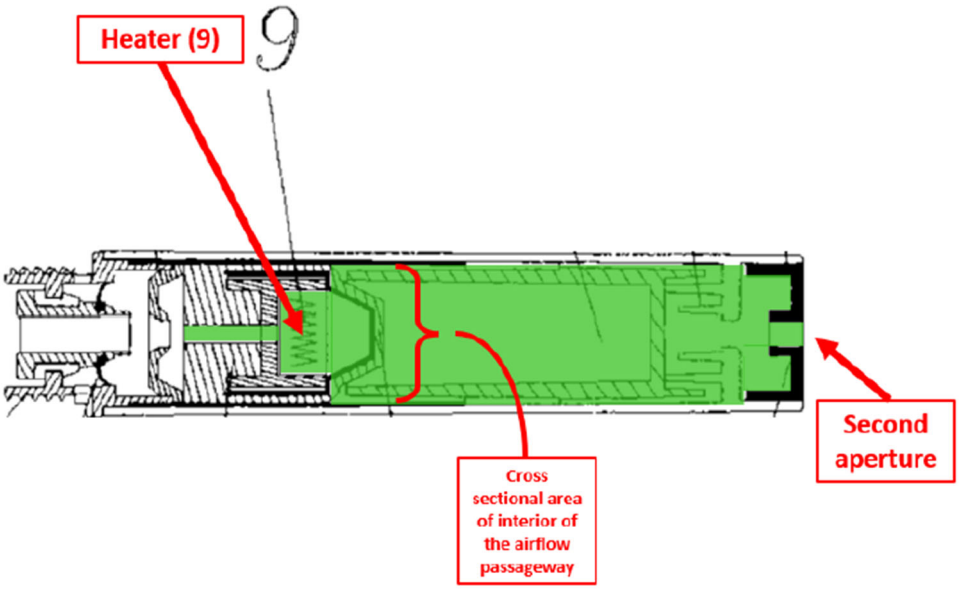
VI.A.1; EX2022 ¶. This is not a central and axial airflow passageway.



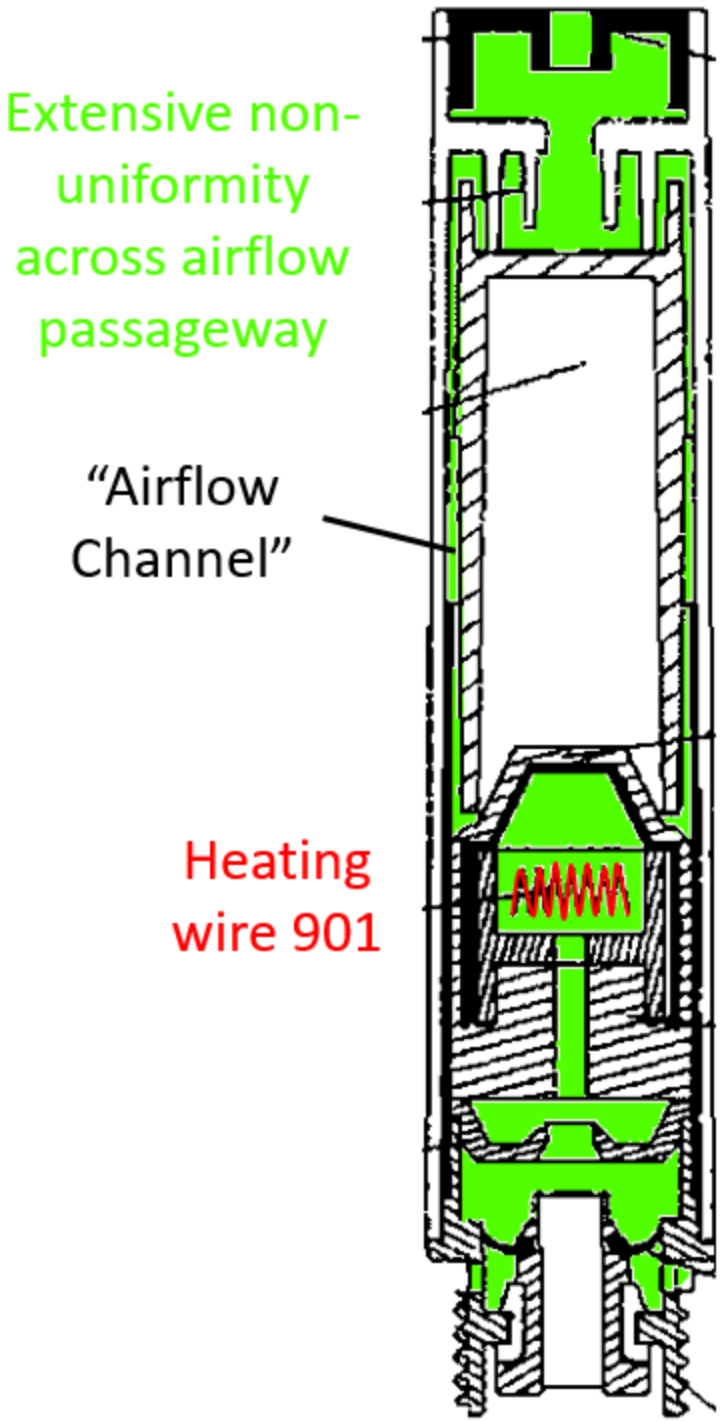
EX1027, Fig. 1

d. Xia Does Not Render Obvious an Airflow Passageway Having "a uniform cross-sectional area" Between the Heating Element and the Second Aperture (Claims 7, 15, 27)

Petitioner alleges that "Xia's airflow (highlighted in green) has a uniform cross-sectional area measured perpendicular to a central longitudinal axis of the housing between the heating element (9) and the second aperture (13)." Petition, 72. In support, Petitioner presents the following:



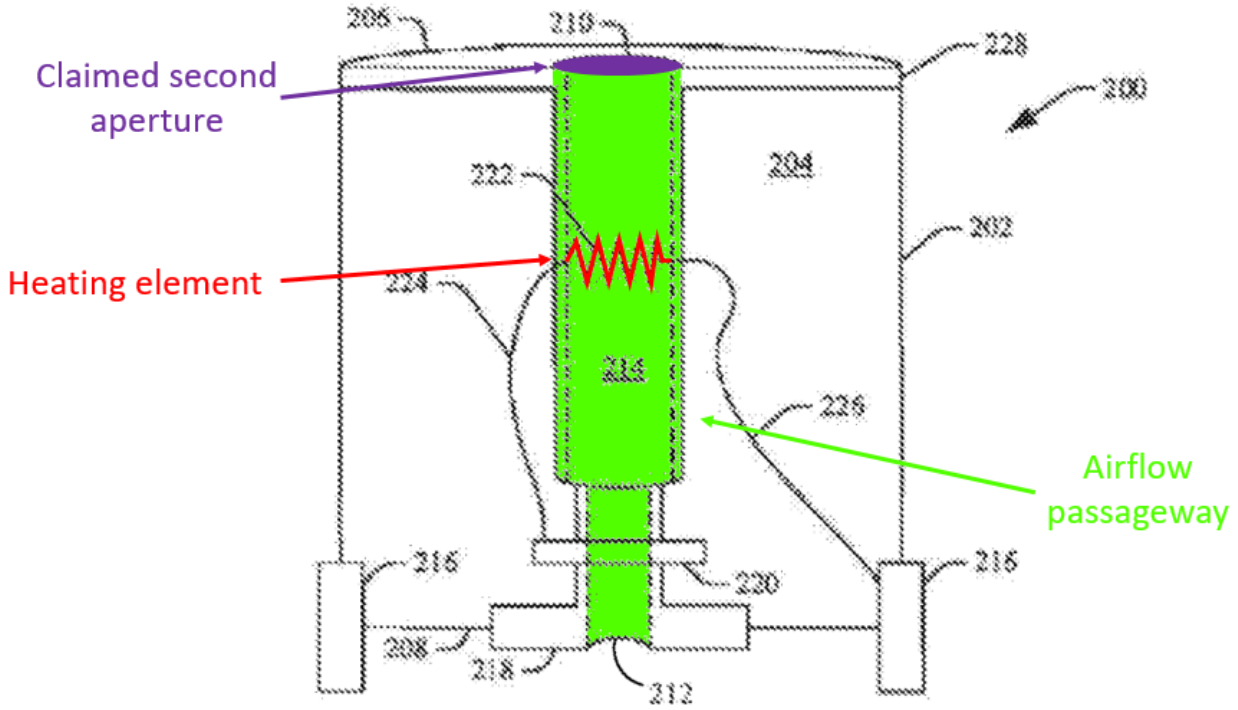
Petitioner's argument and annotations rely on an erroneous interpretation of Xia. The airflow passageway of Xia is not uniform. EX2022 ¶248. A more accurate depiction of Xia is annotated below.



EX1004, Fig. 2

As shown, the airflow passageway in Xia tapers as it passes around the liquid storage

chamber 12, zig-zags, widens, then narrows. EX2022 ¶248. This distinction is notable compared to the airflow passageway in Figure 2 of the 881 Patent, which has a uniform cylindrical shape between the heating element and second aperture.



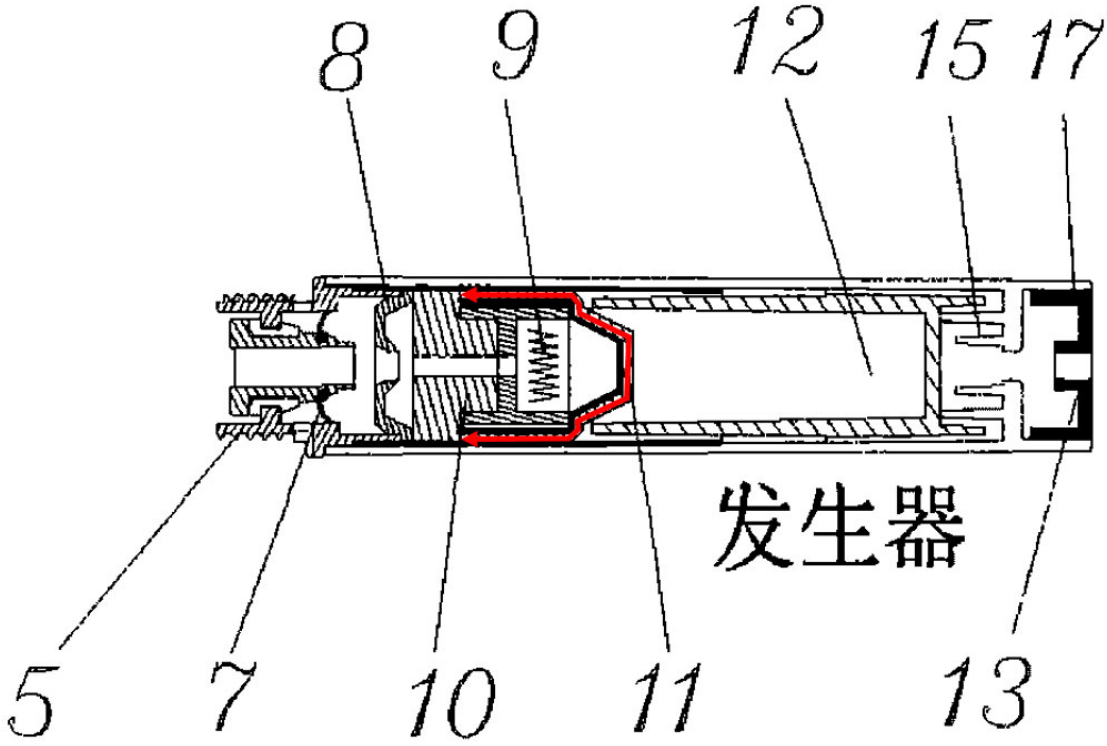
EX1001, Fig. 2

e. Xia Does Not Render Obvious "wherein the heating element is in operative connection with a wicking material...operative to attract a portion of the solution from the solution holding medium…toward the heating element" (Claim 26)

Petitioner alleges that Xia's liquid guiding mechanism 11 acts as wicking material to attract solution from liquid storage container 12 toward the alleged heating element (heater 9). Petition, 59, 85. Claim 26 requires that the "heating element is in operative connection with a wicking material," but Xia's heater 9 does

not connect with a wicking material. *See* EX2014, 1245:14-17 (Petitioner's ITC expert testifying that a wick within a coil "is not present in the Xia device"). Liquid is provided to the heating element by the suction force from the consumer. EX2022 ¶¶113-115.

Regardless, the liquid guiding mechanism 11 does not attract solution toward the heating element. It attracts solution from liquid storage container 12 *around* and *away* from the alleged heating element toward secondary liquid storage container 10. EX2022 ¶285.

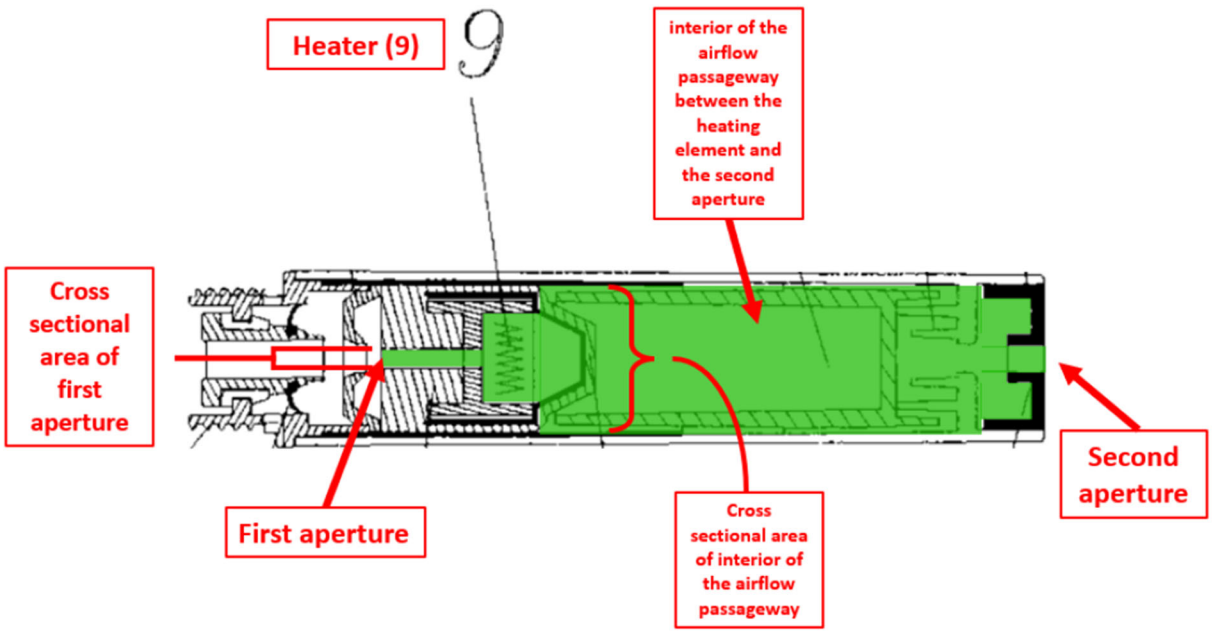


EX1027, Fig. 2

Petitioner also alleges that the second liquid storage chamber 10 acts as the wicking material. Petition, 85. Liquid storage chamber 10 does not attract solution toward the heating element. Solution is brought to the heating element by the consumer's suction force, which pulls small droplets into the airflow. EX1004.0008; EX2022 ¶¶113-115. Moreover, Petitioner identifies liquid storage chamber 10 as *both* the "solution holding medium" (Petition, 56) *and* the "wicking material" that attracts solution "*from the solution holding medium*" (Petition, 85). Petitioner cannot have it both ways.

f. Xia Does Not Render Obvious "the airflow passageway having an interior between the heating element and the second aperture no smaller in cross-sectional area than the cross-sectional area of the first aperture" (Claims 3, 11, 16)

Petitioner alleges that "Xia's airflow passageway has a cross-sectional area larger than the first aperture." Petition, 69-70. Petitioner relies on the following figure:



Petition, 70

Petitioner's argument should be rejected because Petitioner has omitted the complete airflow passageway in Xia, and the omitted portion is "smaller in cross-sectional area than the cross-sectional area of the first aperture." Xia discloses "overflow holes 903" between the heating element and the second aperture. EX1004, 12-13. These overflow holes are depicted in Figure 4 of Xia, which Petitioner agrees are "part of the airflow passageway."

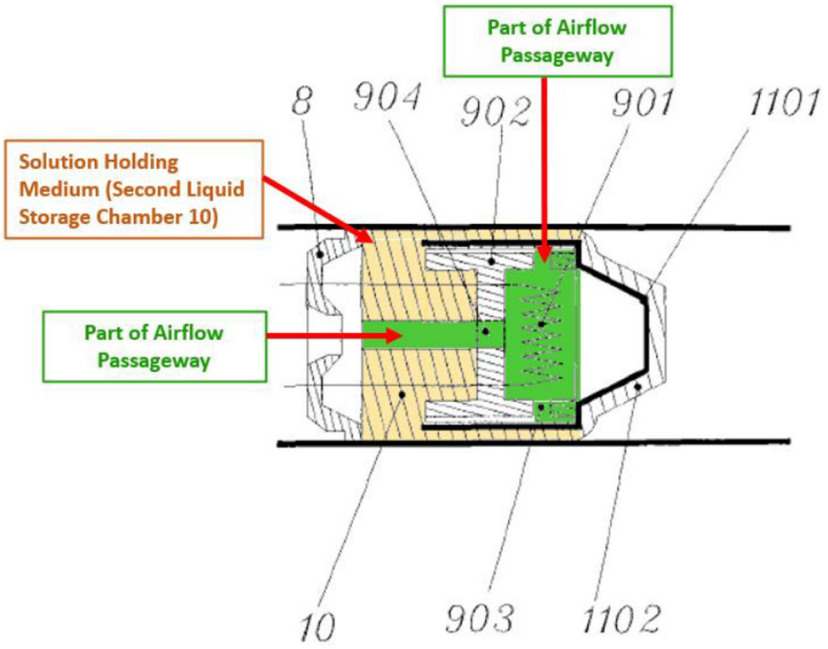
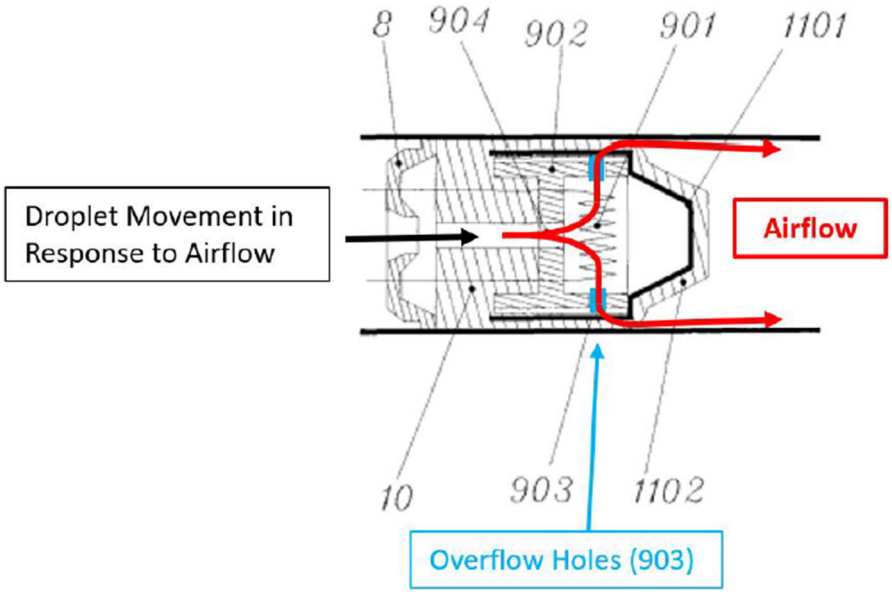


图 4

Petition, 42

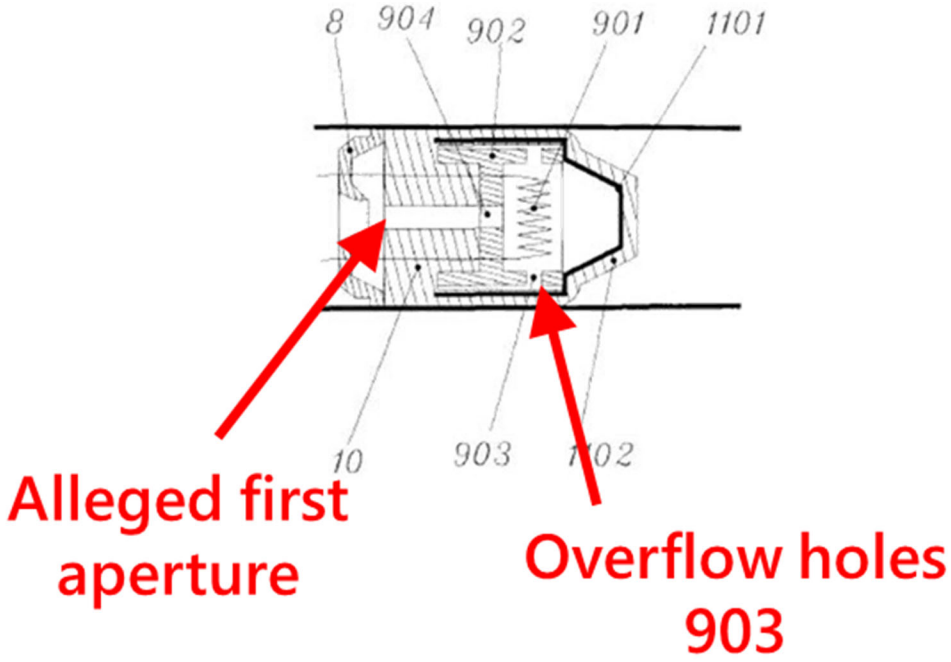


Petition, 60

The Petition is deficient because it does not address the cross-sectional area

of overflow holes 903.

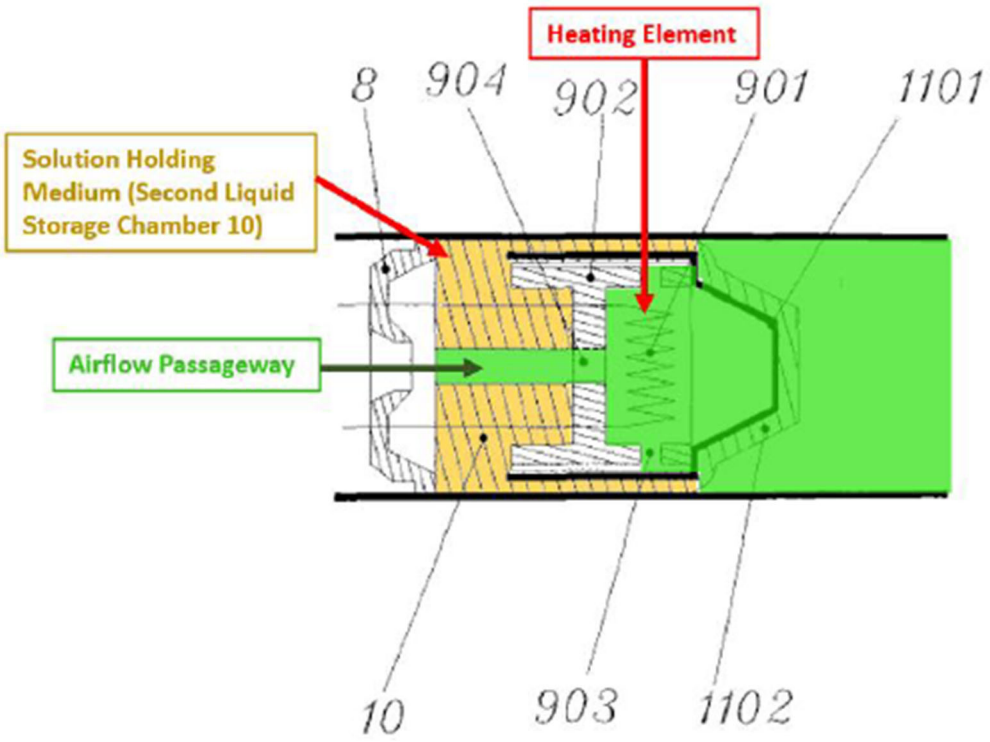
Moreover, a POSITA would have appreciated that the overflow holes are smaller in cross-sectional area than the alleged first aperture. EX2022 ¶244-245.



EX1004, Fig. 4

g. Xia Does Not Render Obvious "the solution holding medium surrounds the airflow passageway...in the interior of the housing and intermediate of the first end and the second end" (Claims 1[h], 8[c2])

For claims 1 and 8, Petitioner alleges that "Xia's solution holding medium 10 surrounds the heating element (heater 9) and at least a portion of the airflow passageway (in green)." Petition, 62. Petitioner presents the following figure:



Petition, 63

Element 10 of Xia, however, is not a solution holding medium. Element 10 comprises "cotton fibers" that draw solution from liquid storage chamber 12. EX1004.0013. For claim 26, Petitioner identifies element 10 of Xia as a "wicking material" that draws liquid *from* the solution holding medium 12. Petition, 85-86. Thus, Xia does not disclose a solution holding medium that "surrounds the airflow passageway" as required by claims 1 and 8.

h. Xia Does Not Render Obvious an "airflow passageway having an exterior adjacent to the solution holding medium along a majority of the length of the airflow passageway" (Claim 16[b3])

Claim element 16[b3] is similar to elements 1[h], 8[c2] but requires that the "airflow passageway [have] an exterior adjacent to the solution holding medium

along a majority of the length of the airflow passageway." Claim element 16[b3] is not met for the same reasons discussed above. Petitioner argues that claim 16 is disclosed by Xia based on the following figure:

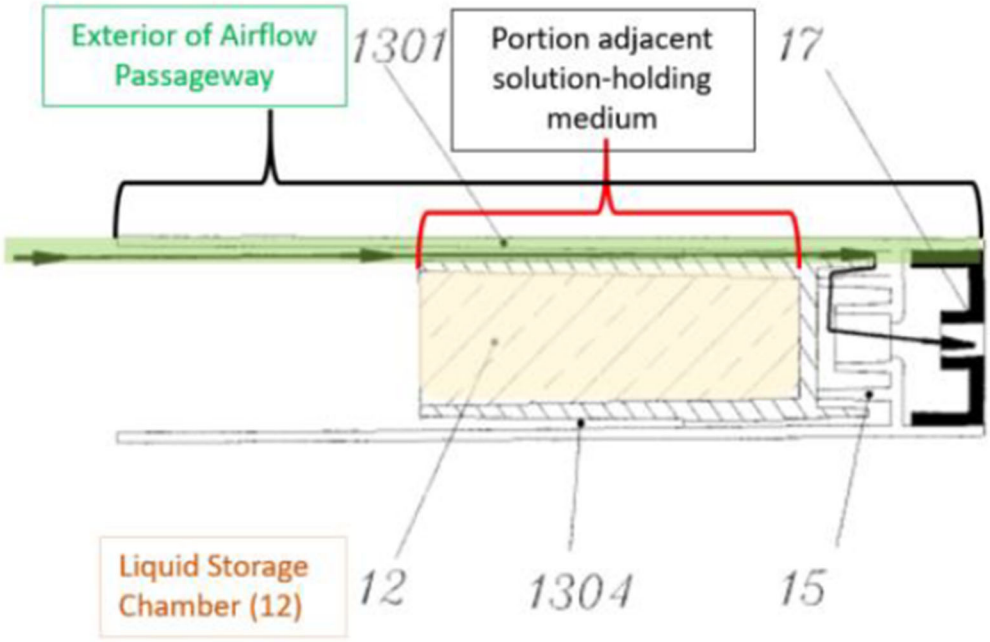


图 5

Petition, 80

But a POSITA would have understood that in the vicinity of the solution holding chamber 12 (the majority of the length), the airflow passageway has its exterior edge defined by the soft suction nozzle and its interior edge defined by the exterior edges of the solution holding medium 12 as illustrated below. EX2022 ¶¶267-271.

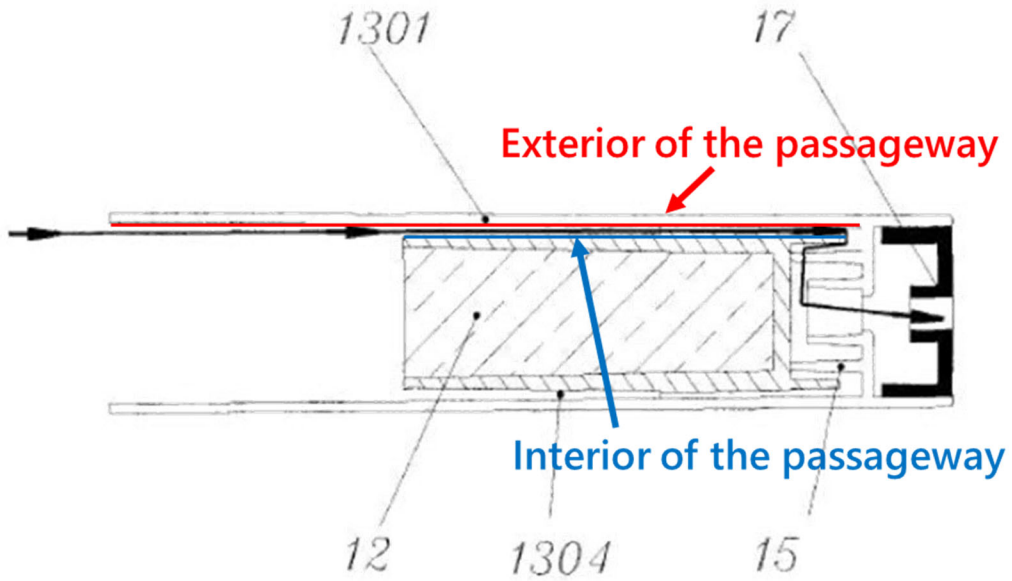


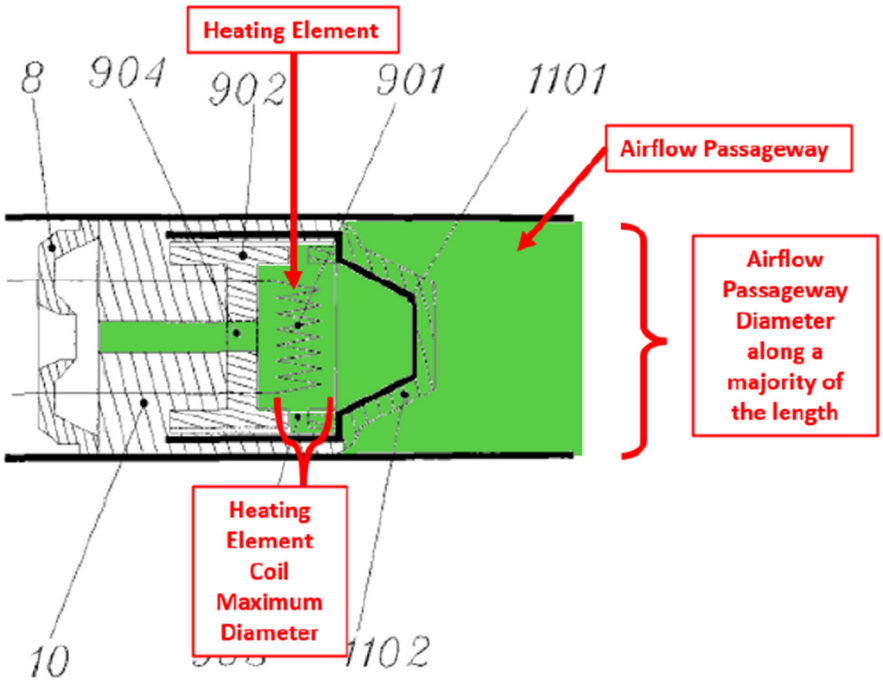
Fig. 5

EX1004, Fig. 5

Element 12 of Figure 5 is adjacent to an *interior* of the airflow passageway, not an exterior. Xia thus fails to disclose claim 16.

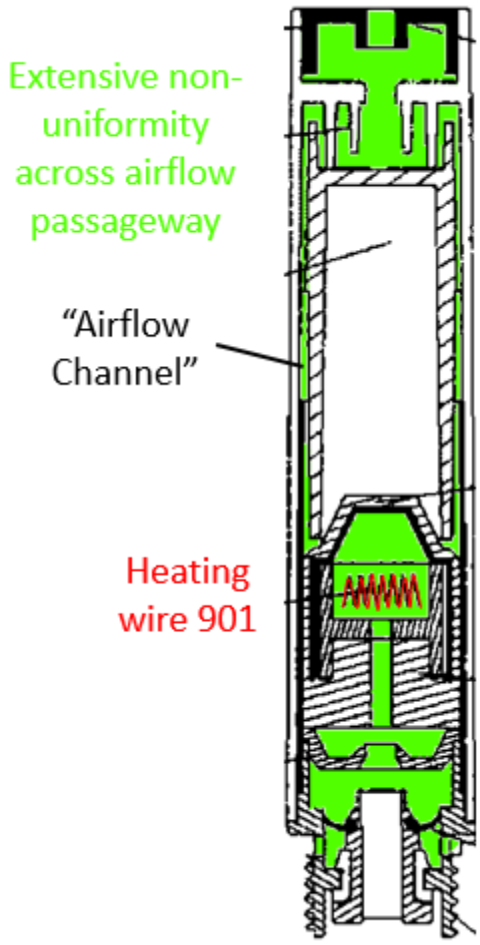
i. Xia Does Not Render Obvious the airflow passageway having a uniform "circular cross section" or a "circular cross section...along the majority of the length" (Claims 2, 10, 18, 21)

Claims 2 and 10 recite that the airflow passageway has "a length having a circular cross-section having a diameter along the majority of the length." Claims 18 and 21 recite that the "uniform cross-sectional area of the airflow passageway is a circle." Petitioner alleges that Xia discloses these claim elements because its "airflow passageway is a cylinder." Petition, 67 n.10.



Petition, 68

Petitioner mischaracterizes Xia. A POSITA would have understood that under the proper interpretation of the airflow passageway, which takes into account how the internal components of Xia 610 define the passageway's shape, the passageway lacks an overall uniformity along with a circular cross-section along a majority of its length. EX2022 ¶242. Petitioner ignores, for example, the complex shape of the airflow passageway around the liquid blocking tank 15 as well as the overflow holes 903. Below is an annotated Figure 2 of Xia showing its airflow path.



EX1004, Fig. 2

Xia thus fails to disclose claims 2, 10, 18, or 21.

2. Xia in View of Wang or Fang Does Not Render Obvious the Challenged Claims

A POSITA would not have been motivated to combine Xia with Wang and/or Fang. *See* Section VI.A.1.

Petitioner has also failed to find in any reference: (i) a housing having a first aperture, (ii) an airflow passageway extending centrally and axially from the first aperture to the second aperture. Regarding (i), none of Petitioner's apertures are

consistent with the proper construction of the "housing having" term. Concerning (ii) Wang lacks a central and axial passageway, and Fang lacks an airflow passageway (it has a wall) extending centrally and axially intermediate of a first and second aperture. *See* Section V.B (Wang); Section V.C (Fang).

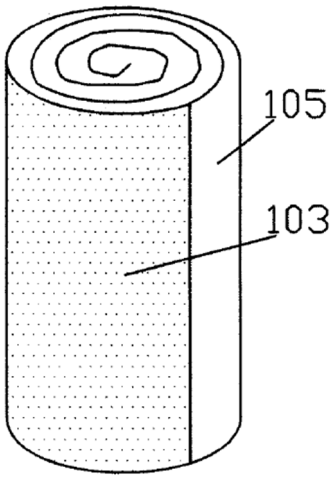
C. Ground 2 Fails

1. Wang Alone Does Not Render Obvious the Challenged Claims

a. Wang Does Not Render Obvious "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" (Claims 1, 8, 16)

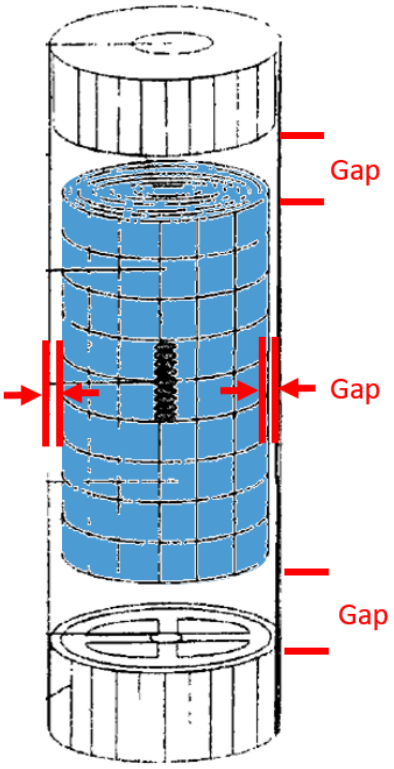
Wang does not disclose an airflow passageway that extends centrally and axially with respect to the housing. *See* Section V.B; EX2022 ¶¶139-142. Petitioner's expert concedes there is no textual support for a passageway, but nonetheless concludes otherwise based on Figure 5 and the Wang Declaration. EX2017, 51:23-52:3.

But Figure 5 does not disclose a central and axial passageway; it depicts only a tightly wound organic fiber. The white space in Fig. 5 is the fiber itself. The figure identifies the white space as "organic fiber 105." EX1005.0007; EX2022 ¶141. That white space traces back to what Petitioner identifies as the passageway.



EX1029, Fig. 5

Figure 3 further confirms because it depicts gaps provided around the organic fiber to enable airflow. EX1005.0007 ("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."); EX2022 ¶138.



EX1029, Fig. 3

Vapor permeates through the fiber and is picked up in these gaps for delivery to the consumer. EX2022 ¶138.

Regarding the Wang Declaration, it is not prior art, it is unreliable, and it concerns *products* (not the patent). *See* Section V.B.1.

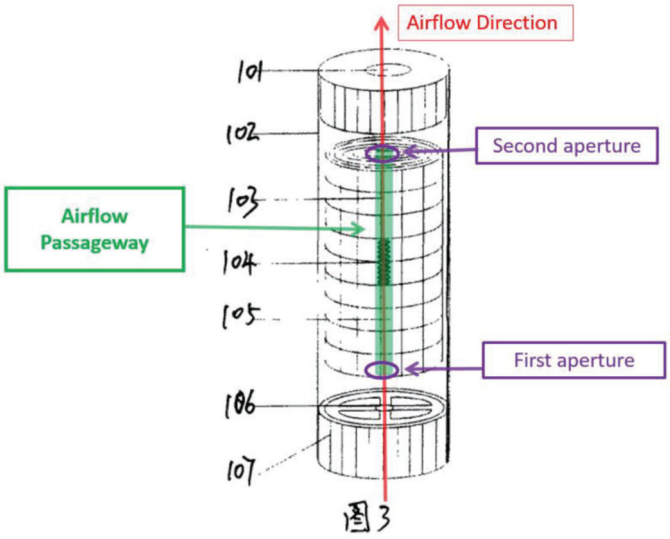
b. Wang Does Not Render Obvious "the housing having a first aperture on the first end" (Claims 1, 8, 16)

Wang does not disclose an airflow passageway extending centrally and axially. *See* Sections V.B, VI.C.1.a; EX2022 ¶¶139-142. Accordingly, there are no corresponding apertures. EX2022 ¶¶293-296. Regardless, Petitioner's "apertures" are in the organic fiber, not the housing. The "apertures" are also not on the housing

ends, when "end" is properly construed. *See* Section IV.B.2.

c. Wang Does Not Render Obvious "wherein the housing includes a heating element [that] extends transversely across the airflow passageway" (Claims 1, 8, 16)

Wang's electric heater 104 extends longitudinally along the central/longitudinal axis of the alleged airflow passageway, not crosswise. Electric heater 104 therefore does not "extend transversely across the airflow passageway" under the proper construction of "transversely." *See* Section IV.A.2; EX2022 ¶304-305.



Petition, 97

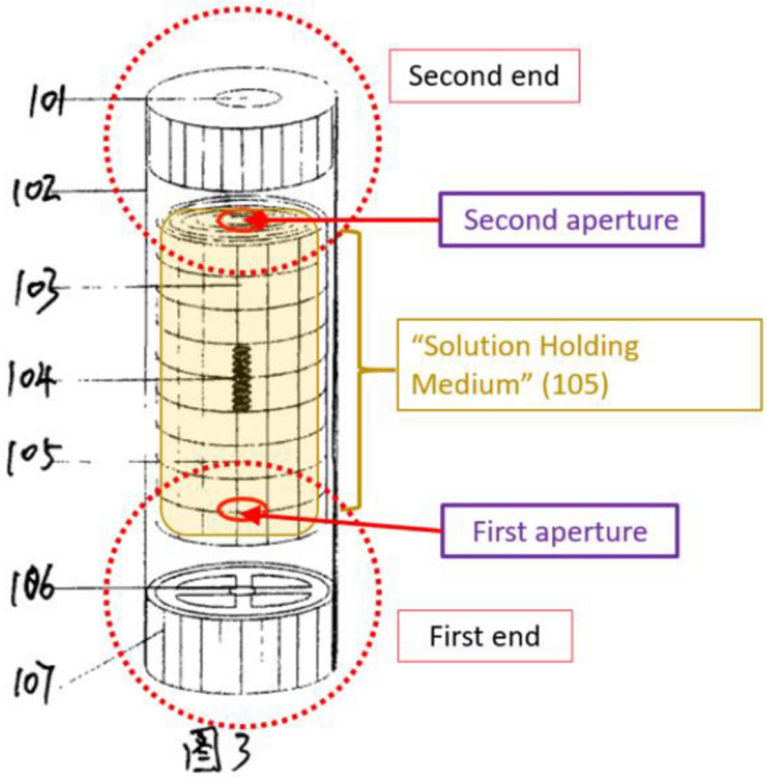
In the ITC Investigation, the ALJ considered a radially shaped heating element—*i.e.*, the type depicted by Wang. The ALJ stated, "[t]his configuration [transversely] is recited in claims 1, 8, and 16 of the '881 patent in which 'transversely' modifies how the heating element extends across the airflow

passageway, that is, crosswise to it, **as opposed to, for example, in a V-shape or radially**." EX2009.0016.

It would not have been obvious to orient Wang's heating element transversely. Wang's heating element maximizes contact with the organic fiber, maximizes space for liquid storage, and minimizes the width of the cartridge. EX2022 ¶307. Rotating the heating element minimizes contact with the fiber, reduces liquid storage, negatively impacts vapor generation, increases manufacturing cost, and damages the heating element. EX2022 ¶307. Petitioner provides no accounting for the effect this would have on vapor generation, power consumption, air flow, cost, and manufacturing difficulty. *See* Section VI.A.2.

d. Wang Does Not Render Obvious "wherein the heating element is in operative connection with a wicking material...operative to attract a portion of the solution from the solution holding medium...toward the heating element" (Claim 26)

Petitioner alleges that Wang's organic fiber 105 acts as a wicking material to draw solution from the organic fiber 105 (*i.e.* from itself) toward the heating element. Petition, 118. However, this limitation requires a wicking material that attracts solution *from the solution holding medium*, not that the wick *is* the solution holding medium.



Petition, 91

Petitioner has identified element 105 as the solution holding medium. That element cannot also be a wick and attract solution "from" itself.

e. Wang Does Not Render Obvious "the first aperture on the first end is smaller than the second aperture on the second end" (Claims 4, 12, 20, 23)

Petitioner does not argue that Wang discloses this limitation. Petitioner instead contends that a POSITA would "ensur[e]" that the first aperture was smaller than the second "to ensure proper airflow exiting the device." Petition, 107-108. Petitioner provides no evidence that Wang lacks "proper airflow" or that adjusting aperture sizes would "ensure proper airflow." Petitioner cites one paragraph in its

expert declaration that parrots the same language. Nor has Petitioner accounted for what effect a change in aperture size would have on the generation of vapor, the size of the vapor droplets, the temperature of the vapor, the airflow through the device, the power consumption, or the activation of the device. Petitioner also fails to articulate a reasonable expectation of success. Moreover, these "apertures" are in the organic fiber, and it is unclear how the aperture sizes would be maintained. EX2022 ¶312.

f. Wang Does Not Render Obvious "the solution holding medium surrounds the airflow passageway and the heating element in the interior of the housing and intermediate of the first end and the second end" (Claims 1[h], 8[c2], 16[b3])

Petitioner alleges that "Wang's solution holding medium 105 surrounds the heating element (heater 9) and at least a portion of the airflow passageway surrounds the entire identified airflow passageway and the heating element." Petition, 102. In support, Petitioner presents the following figure:

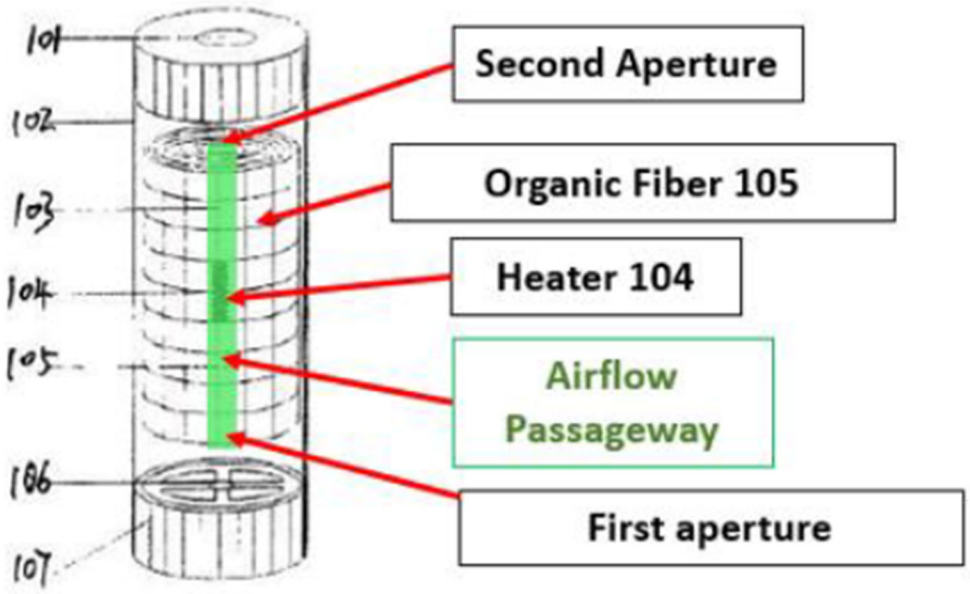
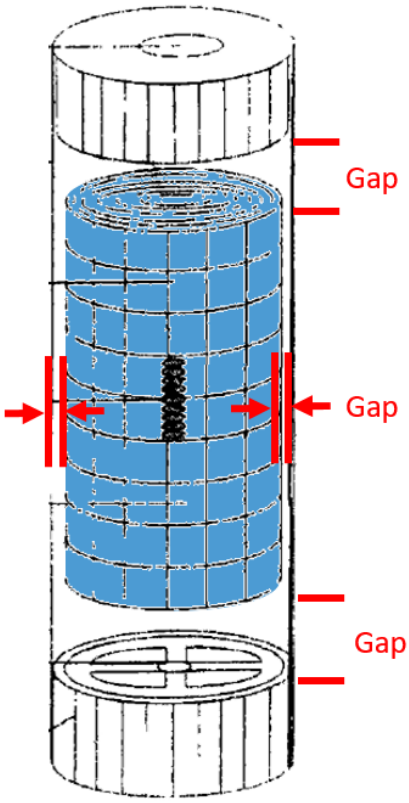


Fig. 3

Petition, 102

Wang does not disclose a central and axial airflow passageway. *See* Section VI.C.1.a. Moreover, as illustrated in the following annotated figure, there are gaps alongside the fiber that would also permit air to flow.



EX1029, Fig. 3

Claim element 16[b3] is not met for the same reasons discussed above with respect to Claims 1[h] and 8[c2].

g. Wang Does Not Render Obvious an Airflow Passageway or Aperture with a Particular Cross-sectional Area (Claims 2-3, 7, 10-11, 15-16, 18, 21, 27)

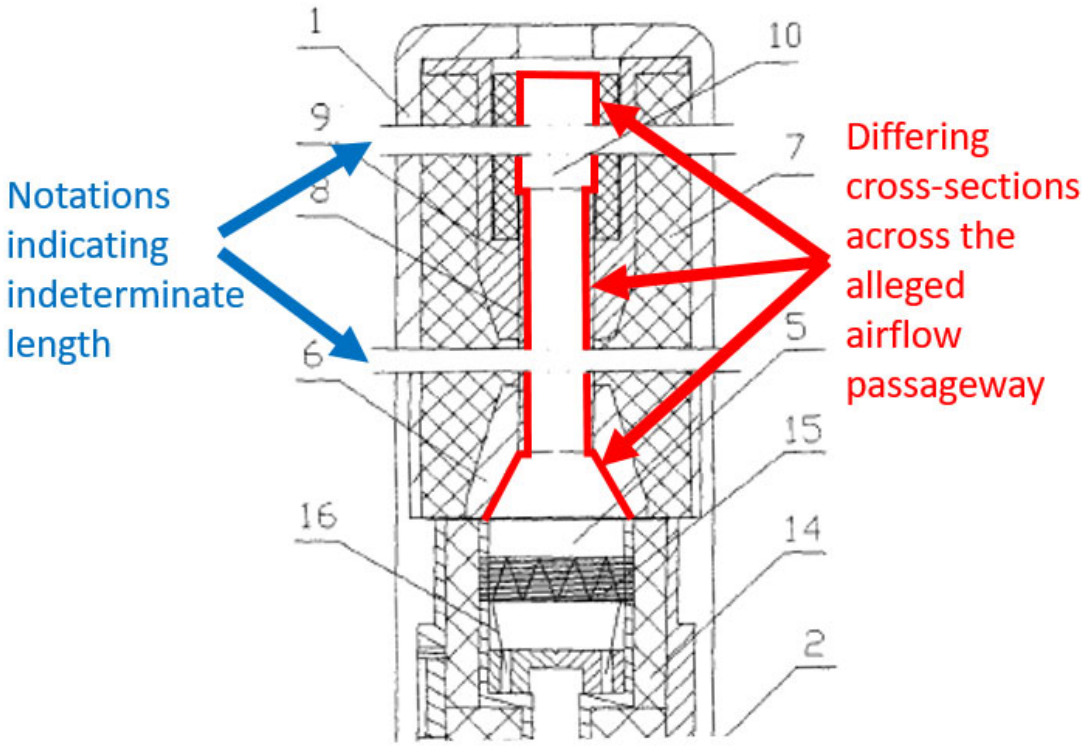
These claims include limitations directed to the cross-sectional area of the airflow passageway or the first or second aperture. Wang does not disclose a central and axial airflow passageway and thus these limitations cannot be met. Section VI.C.1.a. But even so, Wang does not disclose a cross-sectional area—Dr. Sturges admitted that there is no textual disclosure of a passageway; and Fig. 5 provides no

illustration of any cross-sectional area. EX2017, 51:23-52:3; EX1029, Fig. 5; EX2022 ¶¶317-320.

2. Wang in View of Fang Does Not Render Obvious the Challenged Claims

A POSITA would not have been motivated to combine Wang with Fang. *See* Section VI.A.

Regardless, Petitioner has failed to find in any of the references (i) a housing having a first aperture, (ii) an airflow passageway extending centrally and axially from the first aperture to the second aperture; and (iii) an airflow passageway or aperture with a particular cross-sectional area as required by claims 2-3, 7, 10-11, 15- 16, 18, 21, 27. Regarding (i), none of Petitioner's apertures are consistent with the proper construction of the "housing having" term. Concerning (ii) Fang does not have a passageway extending centrally and axially intermediate of a first and second aperture—there is a wall. *See* Section V.C (Fang). Concerning (iii), Fang does not disclose an airflow passageway much less its cross-sectional characteristics. And even if one were to modify Wang to include Fang's *alleged* airflow passageway, the airflow passageway would not have "a uniform cross-sectional area" along the majority of the length or between the heating element and the second aperture because Fang uses the notation of indeterminate length. EX2022 ¶343.



EX1031, Fig. 1

VII. Secondary Considerations Show the 881 Patent is Nonobvious

Secondary considerations of non-obviousness show that the 881 Patent is non-obvious. *See Leo Pharm. Prod., Ltd. v. Rea*, 726 F.3d 1346, 1348 (Fed. Cir. 2013) ("Objective indicia 'can be the most probative evidence of nonobviousness in the record, and enables the court to avert the trap of hindsight.'") (citations omitted).

As discussed above, the claims are directed to a cartomizer-type cartridge. Before the patented invention, cartomizer-type cartridges had various issues, including requiring more suction to draw a vapor, creating excess liquid droplets during inhalation, and burning the absorbent material holding e-liquid, which creates a burnt taste. EX2023 ¶5. The 881 Patent inventors, who co-founded Fuma

International, LLC ("Fuma"), invented, patented, and commercialized a complete, operative device that overcame these problems by mounting a transverse heating element in a central, axial airflow passageway. This arrangement created a clear path for the airflow (reduced required suction), isolated the airflow from the liquid storage (reduced excess liquid droplets), and removed the heating element from the liquid storage (prevented burnt taste), thereby achieving a better consumer experience. EX2023 ¶6; EX2022 ¶347.

This improved and novel e-cigarette cartridge yielded commercial success for Fuma, was praised and copied by competitors, and led to a significant license. These factors demonstrate the challenged claims are non-obvious.

A. Nexus

Nexus is presumed because the Fuma e-cigarette cartridge embodies and is coextensive with all challenged claims. EX2022 ¶¶ 350-401; *Brown & Williamson Tobacco Corp. v. Philip Morris Inc.*, 229 F.3d 1120, 1130 (Fed. Cir. 2000) ("if the marketed product embodies the claim features, and is coextensive with them, then a nexus is presumed . . ."). Moreover, each challenged claim is coextensive with the Fuma e-cigarette cartridge. The 881 Patent claims recite a complete and operative e-cigarette cartridge, namely: a cartridge configured to couple to a power source, a housing with first and second ends, apertures in the housing, an airflow path or passageway between the apertures, a solution holding medium to hold the solution,

and a transverse heating element to vaporize the solution. EX2022 ¶345. The Federal Circuit has "never held that the existence of one or more unclaimed features, standing alone, means nexus may not be presumed. Indeed, there is rarely a perfect correspondence between the claimed invention and the product." *Fox Factory, Inc. v. SRAM, LLC*, 944 F.3d 1366, 1374 (Fed. Cir. 2019). Any unclaimed features of the Fuma cartridge are not: material to functionality, what led to Fuma's commercial success, or responsible for the industry's praise and copying of the claimed features. No other features would have made for a successful product absent the patented design, which improved issues with pre-existing e-cigarettes. EX2022 ¶348.

Beyond this presumed nexus, NJOY may also "prove nexus by showing that the evidence of secondary considerations is the 'direct result of the unique characteristics of the claimed invention.'" *Fox Factory*, 1366, 1369 (quoting *In re Huang*, 100 F.3d 135, 140 (Fed. Cir. 1996)). Here, nexus further exists because the evidence of secondary considerations, discussed below, directly results from the unique characteristics of the claimed invention. EX2022 ¶349.

B. Commercial Success

Fuma commercialized the patented invention of the 881 Patent in 2009. EX2024 ¶7. Sales of Fuma's cartridges and starter kits substantially grew from $47,897 in 2009, to $727,681 in 2010, and to $2,699,102 in 2011. EX2024 ¶4; EX2031. In 2012, Fuma's sales declined to $2,087,355 due to competing products

(*see* Section VII.C) that copied Fuma's patented design. EX2024 ¶4; EX2022 ¶403. Fuma's sales directly resulted from the claimed features, which, as discussed above, eliminated the issues in pre-existing devices. EX2023 ¶8.

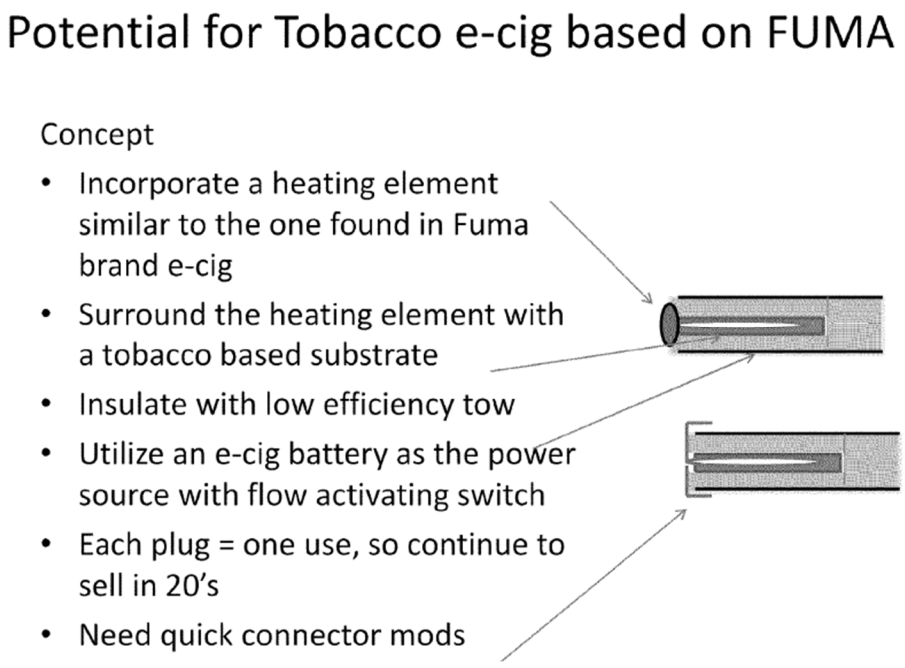
C. Industry Praise, Copying, and Licensing

R.J. Reynolds Vapor Company ("RJRV") and others in the industry copied the patented design. None of the prior art or evidence that Petitioner relies on shows any cartomizer (liquid + atomizer) design (Fang only has a liquid cartridge) with a transverse heating element before the patented invention. EX2022 ¶346.

RJRV praised and intentionally copied Fuma's patented design. EX2022 ¶¶ 405-411. In 2010, Dennis Potter, RJRV's VP of Strategic Innovations, emailed Greg Conley, co-inventor of the 881 Patent and co-founder of Fuma, stating that part of his role "is to search out and investigate promising new technology and product technologies." EX2026.0001. After receiving Fuma's e-cigarette, Mr. Potter reported on June 29, 2010 that "the product is unique in design and operation to the e-cigarette designs based on the Chinese models we have previously seen," "the Fuma product is simple, clean and very close to intuitive to use," "I see more potential in this product design than any of the others we have assessed to date," and "the 'magic' is primarily in the mouth piece/aerosolizer end which obviously contains both the liquid aerosol former and some form of heating element." EX2027.0001. Mr. Potter believed that "Fuma is not the first vapor/aerosol product

that we have looked at, but it generated the highest interest to date." EX2028.0001.

In an internal presentation, RJRV praised the transverse heating element and central airflow in the "Fuma two piece e-cig,"[10] stating that it has a "[u]nique heavier gauge heating element" and a "[n]ew central flow design," and "we currently believe [Fuma's product] may present one of the best ways forward for a Horizon 3 Platform." EX2032.0002, .0018. This RJRV presentation included diagrams representing such unique features and discussing a potential RJRV e-cigarette based on Fuma's patented design:



[10] The Fuma e-cigarette is a "two-piece" because it comprises two pieces: (1) a cartridge/cartomizer and (2) a battery.

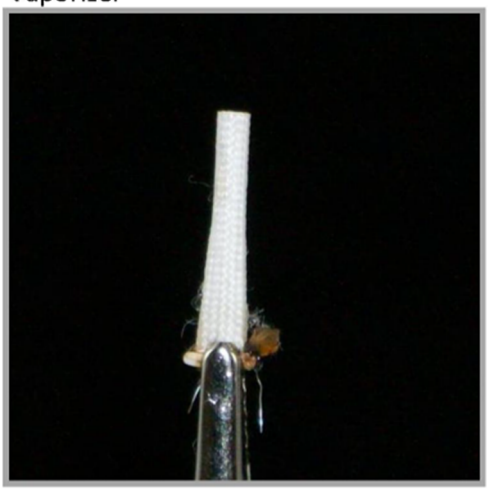
EX2032.0020

RJRV subsequently launched e-cigarette products, the VUSE Solo and the VUSE Ciro, which included transverse heating elements in airflow passageways. EX2034.0002; EX2022 ¶¶408-410. Fuma alleged that the VUSE Solo and VUSE Ciro copied its patented design and sued RJRV for infringement. EX2005. The parties ultimately entered into a Settlement and License Agreement to resolve that litigation. EX2024 ¶5. Today, RJRV lists the 881 Patent on its patent marking website for its e-vapor products. EX2035.0003, .0004, .0006.

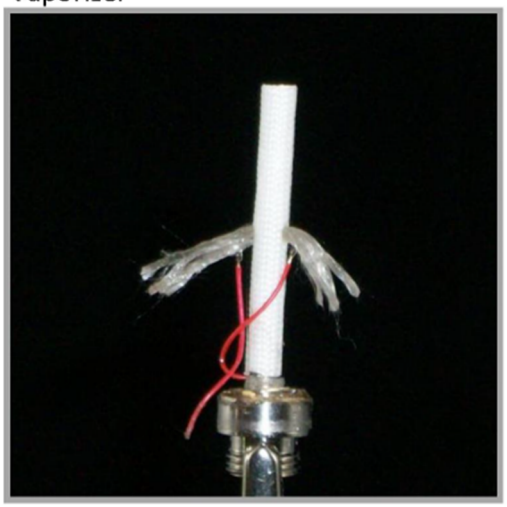
Other companies began implementing transverse heating elements in airflow passageways after Fuma commercialized its patented invention in 2009. A 2013 Carmines Consulting Report indicates that "[i]n the two-component products, the design is generally a horizontal orientation of the coil placed in a woven fiberglass tube" and depicts thirty-three cartomizer-type cartridges implementing a transverse heating element in an airflow passageway, some of which used an inverted "T" configuration and others that implemented a "cross" configuration. EX2039.0011; EX2022 ¶412.

EX2039.0011

Examples showing how competitors copied the transverse heating element and airflow passageway of Fuma's patented design are below:

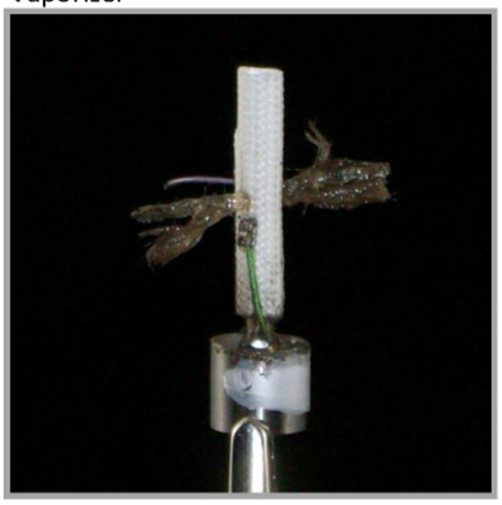
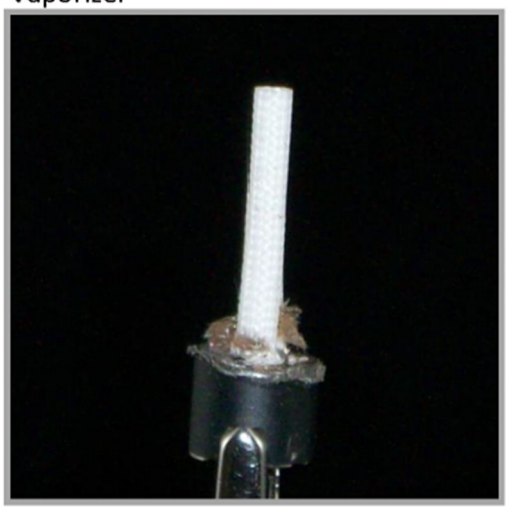
Two-piece Device	Report Photograph
Bloog	Vaporizer  *Double wrapped inverted T* EX2039.0025

Two-piece Device	Report Photograph
Bull Smoke Automatic	Vaporizer *Double wrapped inverted T* EX2039.0034
Cigarti	Vaporizer *Triple wrapped inverted T* EX2039.0040

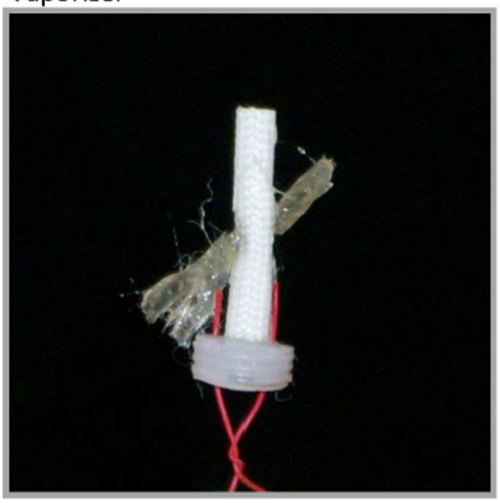
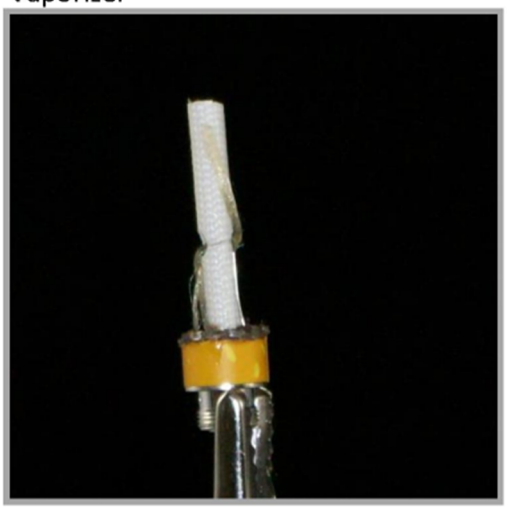
Two-piece Device	Report Photograph
Cigavette Premier	Vaporizer *Triple wrapped inverted T* EX2039.0043
Crown 7 LXE	Vaporizer  *Triple wrapped cross configuration* EX2039.0046

Two-piece Device	Report Photograph
Duo Pro	Vaporizer *Triple wrapped inverted T* EX2039.0049
Eon Smoke	Vaporizer *Triple wrapped inverted T* EX2039.0058

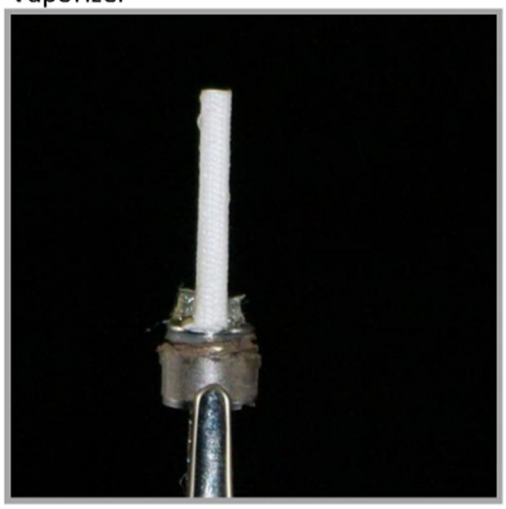
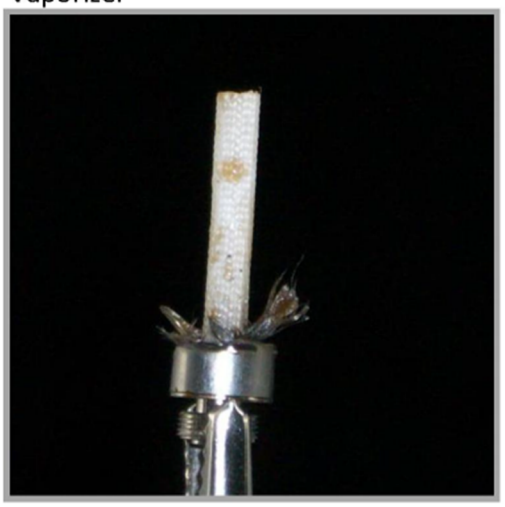
Two-piece Device	Report Photograph
ePuffer Colibri	Vaporizer *Triple wrapped cross* EX2039.0061
Eversmoke	Vaporizer *Double wrapped inverted T* EX2039.0067

Two-piece Device	Report Photograph
Green Smoke	Vaporizer  *Double wrapped cross* EX2039.0082
Halo G6	Vaporizer  *Triple wrapped inverted T* EX2039.0085

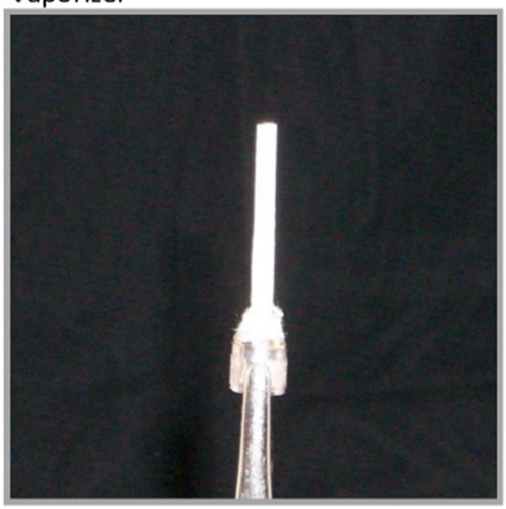
Two-piece Device	Report Photograph
Logic Power Series	Vaporizer *Triple wrapped inverted T* EX2039.0091
Nirvana Eco	Vaporizer *Triple wrapped inverted T* EX2039.0106

Two-piece Device	Report Photograph
Ozone Smoke	Vaporizer  *Triple wrapped cross* EX2039.0109
Pure	Vaporizer  *Triple wrapped cross* EX2039.0118

Two-piece Device	Report Photograph
Smokesation	Vaporizer *Double wrapped inverted T* EX2039.0133
SmokeTip	Vaporizer *Triple wrapped inverted T* EX2039.0136

Two-piece Device	Report Photograph
South Beach Smoke	Vaporizer  *Double wrapped inverted T* EX2039.0139
Ultra	Vaporizer  *Double wrapped inverted T* EX2039.0142

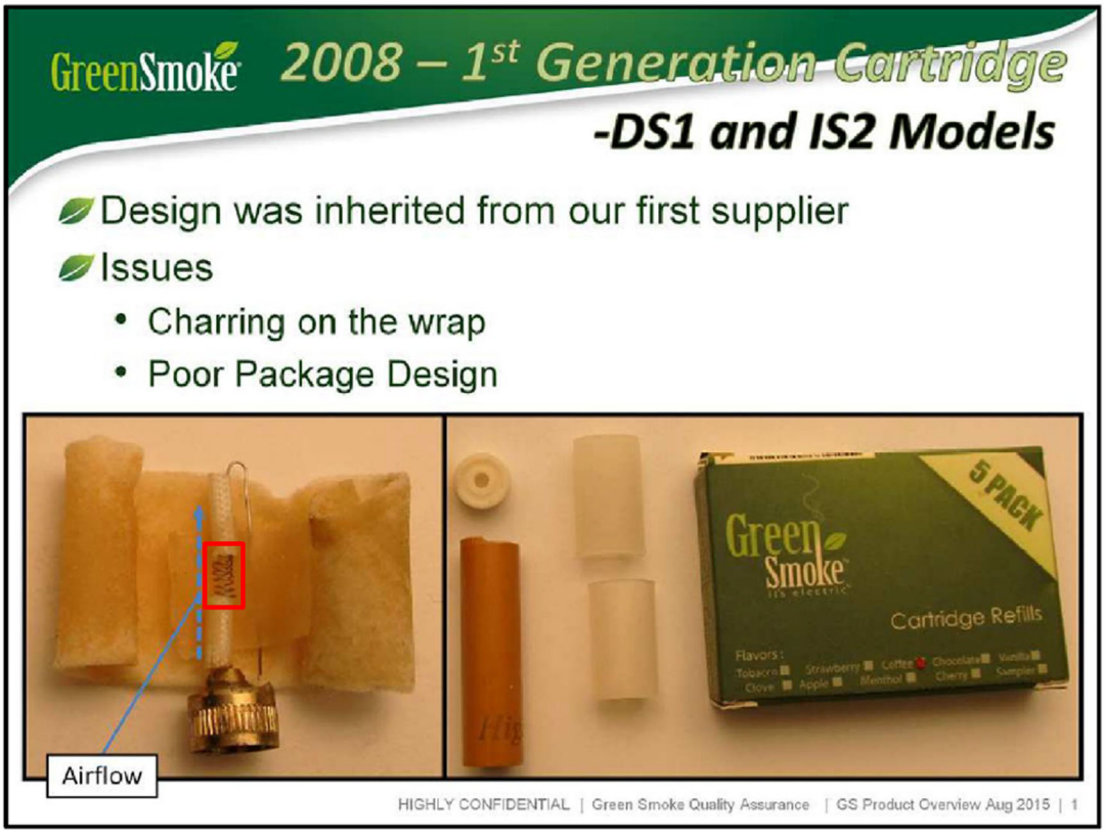
Two-piece Device	Report Photograph
V2 Cigs	Vaporizer *Triple wrapped inverted T* EX2039.0145
Vapage	Vaporizer *Triple wrapped inverted T* EX2039.0148

Two-piece Device	Report Photograph
Vapor Couture	Vaporizer  *Triple wrapped inverted T* EX2039.0151
Victory	Vaporizer *Double wrapped inverted T* EX2039.0157

Two-piece Device	Report Photograph
White Cloud Cirrus 3	Vaporizer *Triple wrapped inverted T* EX2039.0160
Zerocig	Vaporizer *Double wrapped cross* EX2039.0163

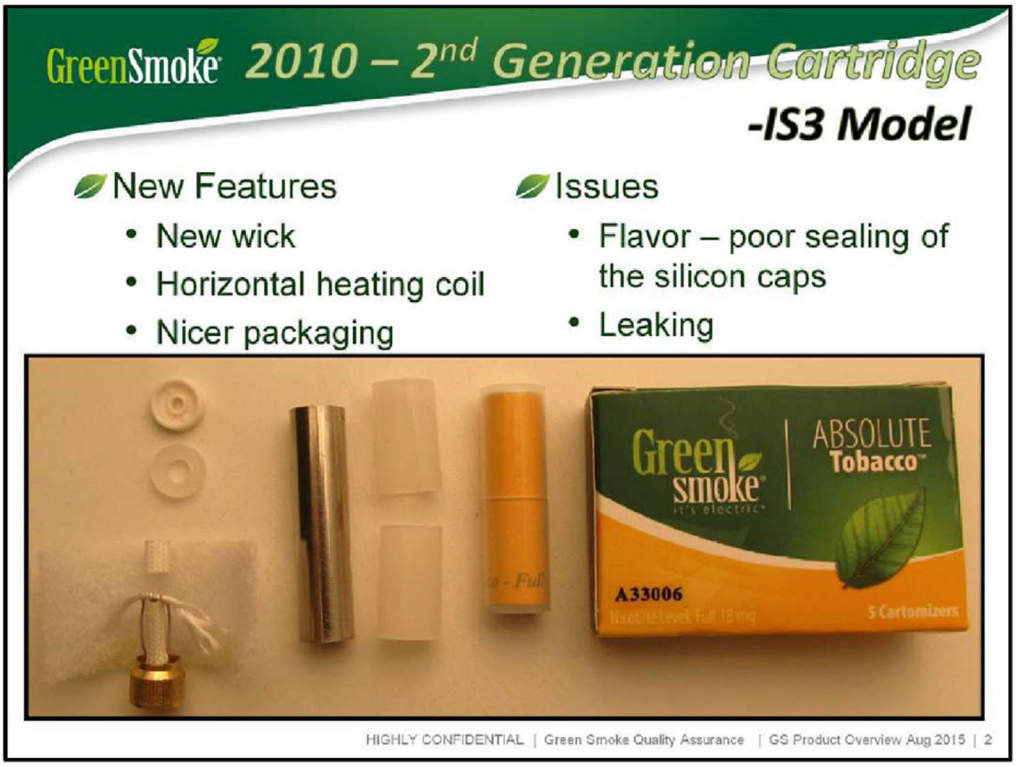
The Green Smoke e-cigarette provides further evidence of copying. EX2022 ¶¶414-415. Before the claimed invention, the first generation Green Smoke device

lacked a transverse heating element across a central airflow passageway. Instead, it had an axially-oriented heating element (*i.e.*, an axial coil), depicted in the red box below:



EX2038.001

After the claimed invention and Fuma's commercialization of its product in 2009, Green Smoke introduced newer cartridges with a transverse heating coil and wick across a central airflow passageway surrounded by a solution holding medium:


GreenSmoke 2010 – 2nd Generation Cartridge
-IS3 Model
New Features
• New wick
• Horizontal heating coil
• Nicer packaging
Issues
• Flavor – poor sealing of the silicon caps
• Leaking
Green smoke
it's electric
ABSOLUTE Tobacco
A33006
5 Cartomizers
HIGHLY CONFIDENTIAL | Green Smoke Quality Assurance | GS Product Overview Aug 2015 | 2

EX2038.002

GreenSmoke
2011 – 3rd Generation Cartridge
-IS3 Model – FlavorMax
New Features
Longer by 3mm
New leaf seal sticker
Blister packaging
Nicer box
Green smoke
25%
ABSOLUTE Tobacco
HIGHLY CONFIDENTIAL | Green Smoke Quality Assurance | GS Product Overview Aug 2015 | 3

EX2038.003

EX2038.004

***

Because Fuma's products embody and are coextensive with the 881 Patent's claimed invention, and because the claimed features in those products yielded commercial success for Fuma, were praised and copied by competitors, and led to a significant license, the challenged claims are non-obvious.

VIII. Conclusion

The challenged claims should be confirmed as patentable.

Dated: August 23, 2024

Respectfully submitted,

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CERTIFICATE OF COMPLIANCE

Pursuant to 37 C.F.R. § 42.24 et seq., the undersigned certifies that this document complies with the type-volume limitations. This document contains 13,882 words as calculated by the "Word Count" feature of Microsoft Word 2016, the word processing program used to create it.

Dated: August 23, 2024

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CERTIFICATE OF SERVICE

The undersigned certifies that on August 23, 2024, the foregoing **PATENT OWNER'S RESPONSE** was served via electronic mail upon the following:

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