

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

R.J. REYNOLDS VAPOR COMPANY,
Petitioner,

v.

FONTEM HOLDINGS 1 B.V.,
Patent Owner.

Case **IPR2016-01527**
Patent No. **8,490,628**

**PATENT OWNER PRELIMINARY RESPONSE TO PETITION FOR
INTER PARTES REVIEW**

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Ex. 1002	The ‘628 Patent File History
Ex. 1003	U.S. Pat. No. 6,155,268 (“Takeuchi”)
Ex. 1004	U.S. Pat. No. 2,057,353 (“Whittemore”)
Ex. 1005	U.S. Pat. No. 5,894,841 (“Voges”)
Ex. 1006	U.S. Pat. No. 5,703,633 (“Gehrer”)
Ex. 1007	“Thermal Ink-Jet Print Cartridge Designers Guide” (2nd Edition Hewlett Packard)
Ex. 1008	IPR2014-01300 Paper 8: Decision for <i>Inter Partes</i> Review Institution
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Ex. 1010	Expert Declaration of Robert Sturges, Ph.D. (“Sturges Decl.”)
Ex. 1011	U.S. Patent No. 5,743,251 (“Howell”)
Ex. 1012	U.S. Patent No. 1,514,682 (“Wilson”)
Ex. 1013	U.S. Patent No. 4,947,874 (“Brooks”)
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Ex. 1018	U.S. Patent No. 6,722,763 (“Hsu”)
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Ex. 1020	U.S. Patent No. 7,284,424 (“Kanke”)
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Ex. 1022	U.S. Patent No. 6,620,659 (“Emmma”)
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Ex. 2001	Declaration of Richard Meyst
Ex. 2002	Hewlett Packard Journal, May 1985, Vol. 36, No. 5 (“HP Journal”)
Ex. 2003	Merriam-Webster’s Collegiate Dictionary (11th ed. 2003), selected pages
Ex. 2004	<i>Fontem Ventures B.V., et al. v. Nu Mark</i> , Case No. 16-2286 (C.D. Cal.), Dkt. No. 28-1, Defendant R.J. Reynolds Vapor Company’s Memorandum of Points and Authorities in Support of Motion to Transfer to the Middle District of North Carolina Pursuant to 28 U.S.C. § 1404(a)
Ex. 2005	File history for U.S. Patent No. 8,393,331, selected pages
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Ex. 2008	<i>US Endodontics, LLC v. Gold Standard Instruments, LLC</i> , IPR2015-01476, Paper 13, Decision Denying Institution of Inter Partes Review (PTAB Oct. 26, 2015)

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Ex. 2011	<i>NJOY, Inc. v. Fontem Holdings 1 B.V.</i> , IPR2014-01300, Exhibit 2011, Expert Declaration of Richard Meyst in Support of Patent Owner's Opposition to Petition
Ex. 2012	<i>Nu Mark LLC v. Fontem Holdings 1 B.V.</i> , IPR2016-01285, Paper 2, Petition for Inter Partes Review of U.S. Patent No. 8,490,628, (PTAB June 28, 2016) (excerpts)
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Ex. 2016	<i>NJOY, Inc. v. Fontem Holdings 1 B.V.</i> , IPR2014-01300, Exhibit 2016, Fontem Ventures B.V. et al. v. NJOY, Inc., Case No. 14-1645, Dkt. No. 93, March 19, 2015
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Ex. 2018	<i>NJOY, Inc. v. Fontem Holdings 1 B.V.</i> , IPR2014-01300, Paper 18, Patent Owner's Opposition to Petition for Inter Partes Review of U.S. Patent No. 8,490,628 (PTAB Jun. 22, 2015)

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Ex. 2022	<i>NJOY, Inc. v. Fontem Holdings 1 B.V.</i> , IPR2014-01300, Exhibit 2022, Deposition Transcript of Mark Weiss, June 4, 2015 (Excerpts), <i>Fontem v. NJOY</i> , Case No. 14-1645 and Related Consolidated Cases
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Ex. 2089	<i>Fontem Ventures B.V. and Fontem Holding 1 B.V. v. DB Distributors, Inc., et al.</i> , First Amended Complaint for Patent Infringement, filed April 8, 2014, United States District Court, Central District of California, Case No. CV14-1649-GW-MRW (Docket No. 15)
Ex. 2090	<i>Fontem Ventures B.V. and Fontem Holding 1 B.V. v. Fin Branding Group, LLC, et al.</i> , First Amended Complaint for Patent Infringement, filed April 8, 2014, United States District Court, Central District of California, Case No. CV14-1651-GW-MRW (Docket No. 22)
Ex. 2091	<i>Fontem Ventures B.V. and Fontem Holding 1 B.V. v. Logic Technology Development LLC, et al.</i> , First Amended Complaint for Patent Infringement, filed April 8, 2014, United States District Court, Central District of California, Case No. CV14-1654-GW-MRW (Docket No. 22)
Ex. 2092	<i>Fontem Ventures B.V. and Fontem Holding 1 B.V. v. NJOY, Inc., et al.</i> , First Amended Complaint for Patent Infringement, filed April 8, 2014, United States District Court, Central District of California, Case No. CV14-1645-GW-MRW (Docket No. 14)
Ex. 2093	<i>Fontem Ventures B.V. and Fontem Holding 1 B.V. v. Spark Industries, LLC, et al.</i> , First Amended Complaint for Patent Infringement, filed April 8, 2014, United States District Court, Central District of California, Case No. CV14-1653-GW-MRW (Docket No. 14)
Ex. 2094	<i>Fontem Ventures B.V. and Fontem Holding 1 B.V. v. Vapor Corp.</i> , First Amended Complaint for Patent Infringement, filed April 8, 2014, United States District Court, Central District of California, Case No. CV14-1650-GW-MRW (Docket No. 13)

Ex. 2095	<i>Fontem Ventures B.V. and Fontem Holding 1 B.V. v. VMR Products, LLC, dba V2Cigs, et al.</i> , First Amended Complaint for Patent Infringement, filed April 8, 2014, United States District Court, Central District of California, Case No. CV14-1655-GW-MRW (Docket No. 14)
Ex. 2096	<i>Praxair Distribution, Inc. and NOxBOX Ltd. v. Mallinckrodt Hospital Products</i> , IPR2016-00777, -00778, -00779, -00780, Paper 10 (Sept. 22, 2016)
Ex. 2097	Supplemental Declaration of Richard Meyst, July 15, 2015, previously submitted in <i>NJOY, Inc. v. Fontem Holdings 1 B.V.</i> , IPR2014-01300
Ex. 2098	Encyclopedia Britannica website, http://www.britannica.com/EBchecked/topic/1777841/e-cigarette (last visited June 18, 2015) (“Encyclopedia Britannica”), complete substitute version of Exhibit 2042 previously submitted in <i>NJOY, Inc. v. Fontem Holdings 1 B.V.</i> , IPR2014-01300
Ex. 2099	Reuters website, http://uk.reuters.com/article/2015/06/09/us-ecigarettes-inventor-idUKKBN0OP1YV20150609 (last visited June 18, 2015), complete substitute version of Exhibit 2075 previously submitted in <i>NJOY, Inc. v. Fontem Holdings 1 B.V.</i> , IPR2014-01300
Ex. 2100	<i>R.J. Reynolds Vapor Company v. Fontem Holdings 1 B.V.</i> , IPR2016-01270, Paper 2, Petition for <i>Inter Partes</i> Review of U.S. Patent No. 8,893,726 (PTAB July 2, 2016) (excerpts)
Ex. 2101	<i>Crocs, Inc. v. Polliwalks, Inc.</i> , IPR2014-00424, Paper 8, Decision Institution of <i>Inter Partes</i> Review (PTAB Aug. 20, 2014)

I. INTRODUCTION

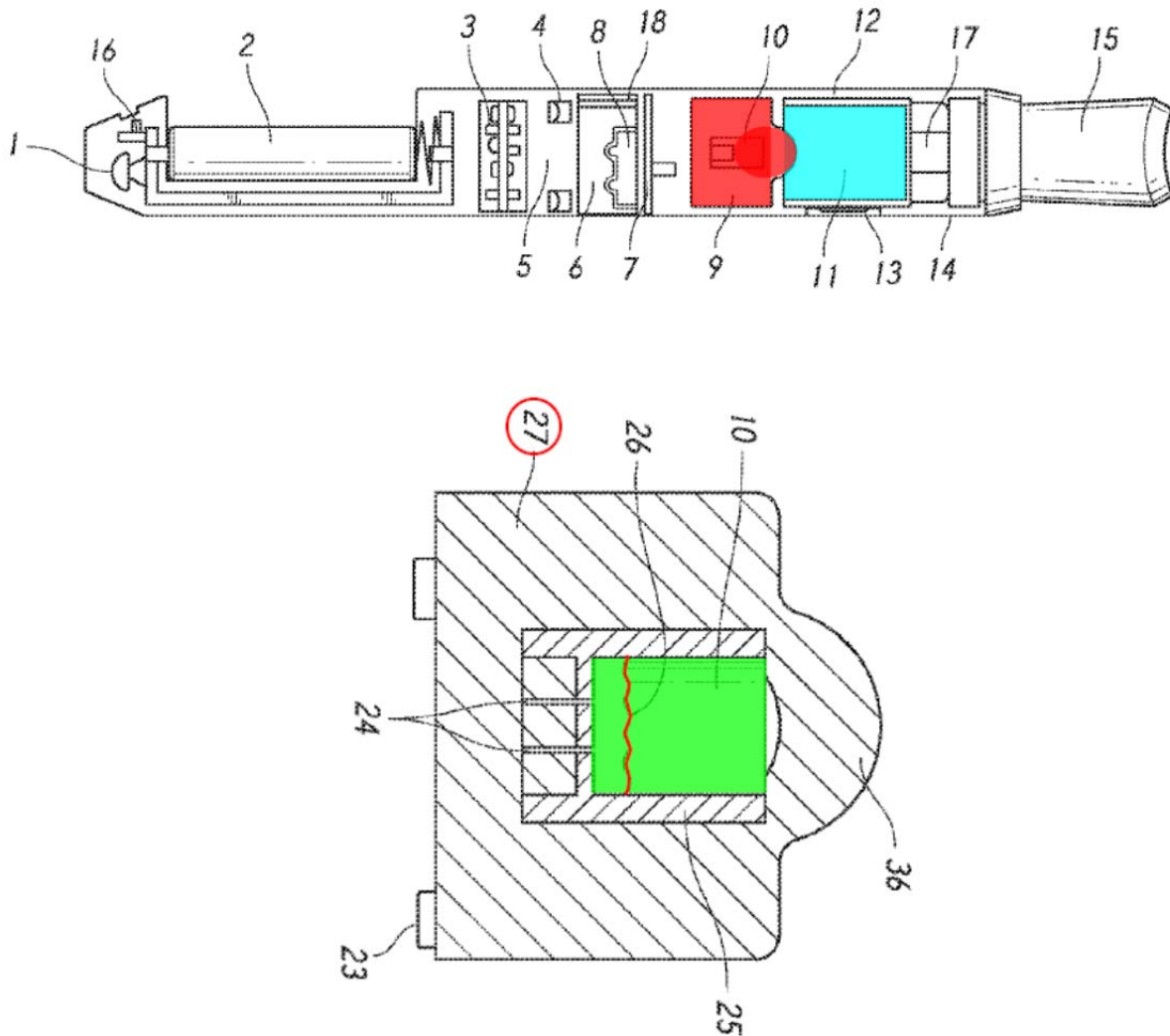
For decades, there was a long felt need to develop a smoking alternative that would simulate the experience of smoking. Tobacco companies reportedly spent over a billion dollars searching for a solution and released products that were commercial failures. Petitioner RJ Reynolds tried twice. First with a product called Premier which reportedly cost \$1 billion to develop that was pulled from the market less than a year after launch. Second with a product called Eclipse which was a similar failure. Hon Lik, the sole inventor of the '628 patent, is famous throughout the world for solving this long felt need with his electronic cigarette invention which was immediately copied and is now a tremendous commercial success.

Petitioner relies upon the same arguments and three of the same four references presented in IPR2014-1300 by the first party to copy Hon Lik's invention—NJOY. That petition was granted. The difference this time around is two-fold. First, during the prior IPR the PTAB's rules did not allow a Patent Owner to submit evidence in its initial response to a petition. Patent Owner does so here, and that evidence reflects that the combination of references relied on by Petitioner does not disclose or suggest all the limitations of claims of the '628 patent and that a person of skill in the art would not have been motivated to combine the references. Second, during the prior IPR the above objective indicia

of non-obviousness were submitted to the Board. Shortly thereafter, NJOY settled and took a royalty bearing license. Surprisingly, Petitioner, fully aware of these indicia of non-obviousness, ignores and does not even mention them in its Petition. When a petitioner is aware of and fails to address objective indicia of non-obviousness, a denial of the petition is appropriate. Here, Patent Owner's evidence setting forth the deficiencies of the references and the objective indicia of non-obviousness warrants denial of the Petition.

II. THE '628 PATENT

The '628 patent discloses several embodiments of an electronic cigarette. Ex. 1001, 1:56-62. The specification describes the device's atomizer and liquid supply. Liquid-supplying bottle 11 includes solution storage porous body 28, which holds the liquid in a porous structure such as foam or fiber. *Id.*, 3:6-13. Atomizer 9 includes a porous body 27 that projects into solution storage porous body 28 inside liquid-supplying bottle 11, allowing liquid to move from the storage body to the atomizer. *Id.*, 2:43-45, 2:61-64, 3:60-63. Atomizer 9 also includes cavity 10 surrounded by porous body 27. *Id.*, 2:61-64. Cavity 10 contains heating wire 26, which atomizes liquid droplets that enter the cavity. *Id.*, 2:47-52, 3:48-54. Atomizer 9 (red), liquid-supplying bottle 11 (blue), cavity 10 (green), heating wire 26 (red line), and porous body (red circle) are shown in annotated Figures 1 and 6 below.



When a user inhales, air enters inlet 4 and flows into cavity 10 through ejection hole 24 in the atomizer 9. *Id.*, 3:45-48. Nicotine solution in porous body 27 also ejects into cavity 10 through ejection hole 24, where it is atomized by heating wire 26. *Id.*, 3:48-54. Large atomized droplets are reabsorbed by porous body 27 so that a user does not inhale liquid droplets that are too large. *Id.*, 3:55-63.

Claim 1 recites an “electronic cigarette” with several components: “a housing having a longitudinal axis, an inlet and an outlet; a liquid supply in the housing; an air flow channel in the housing connecting the inlet to the outlet; and an atomizer assembly in the housing between the inlet and the outlet, including: a porous body projecting into the liquid supply; and a heating wire in the atomizer having a central axis oriented substantially perpendicular to the longitudinal axis of the housing.” Claim 8 is similar.

The dependent claims at issue depend from claim 1 and include additional limitations:

- Claim 2 requires “a battery, a sensor and an electronic circuit board within the housing, with the circuit board electrically connected to the battery, the sensor and the heating wire.”
- Claim 5 requires “the liquid supply compris[e] a fiber material.”

III. A PERSON OF ORDINARY SKILL IN THE ART

A person of ordinary skill in the art at the time of the invention (a “skilled person”) would have had a mechanical or electrical engineering degree, industrial design degree, or similar technical degree, or equivalent work experience, and 5-10 years of working in the area of electromechanical devices, including medical devices. Ex. 2001 ¶¶16-19. Petitioner asserts a skilled person would have “5 years of experience designing electromechanical devices, including those involving

circuits, fluid mechanics and heat transfer.” Petition at 11. Under either definition, Petitioner has failed to meet its burden.

IV. CLAIM CONSTRUCTION

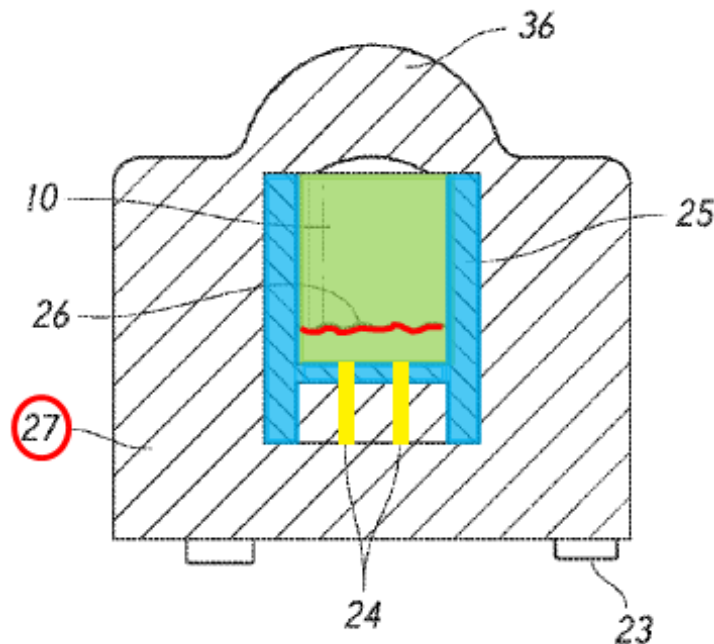
In IPR proceedings, claim terms are given their broadest reasonable construction in light of the specification. 37 C.F.R. § 42.100(b). When the Board previously instituted an IPR relating to the ’628 patent, it construed several terms. Ex. 1008 at 6-11. Below, Patent Owner addresses the terms “atomizer” and “liquid supply,” as well as additional term “wire.”

A. “atomizer”

Patent Owner’s Construction	Petitioner’s Construction
“a component or components that convert(s) liquid into aerosol or vapor”	“a part of the electronic cigarette that includes components that participate in facilitating atomization, but not components included in other recited parts of the electronic cigarette, such as the liquid supply”

Independent claims 1 and 8 recite an “atomizer” including a porous body and a heating wire. The Board’s prior construction of “atomizer” is too broad because it extends beyond components that cause atomization (*i.e.*, converting liquid into aerosol or vapor) to components that do not (*e.g.*, components that transport liquid to the atomizer or receive particles after atomization has occurred). Ex. 2001 ¶24. Properly construed, an “atomizer” is “a component or components that convert(s) liquid into aerosol or vapor.” *Id.* ¶¶21-24.

Claims 1, 7, and 8 refer to a “heating wire” in the atomizer. Claim 3 refers to the atomizer’s “atomization cavity.” Claims 1 and 6-8 refer to the atomizer’s porous body as separate from the liquid supply. The specification explains how those components convert liquid into aerosol or vapor. As shown in annotated Figure 6 below, heating element 26 (red) within cavity 10 (green) atomizes nicotine solution. Ex. 1001, 2:46-52, 3:45-54. Walls 25 (blue) and porous body 27 (red circle) together form cavity 10. *Id.*, 2:61-64; Ex. 2001 ¶23. When air passes through the porous body’s ejection holes 24 (yellow) into cavity 10, liquid from the porous body ejects into the cavity as an aerosol where it is further atomized by heating element 26. Ex. 1001, 2:52-60, 3:48-54.

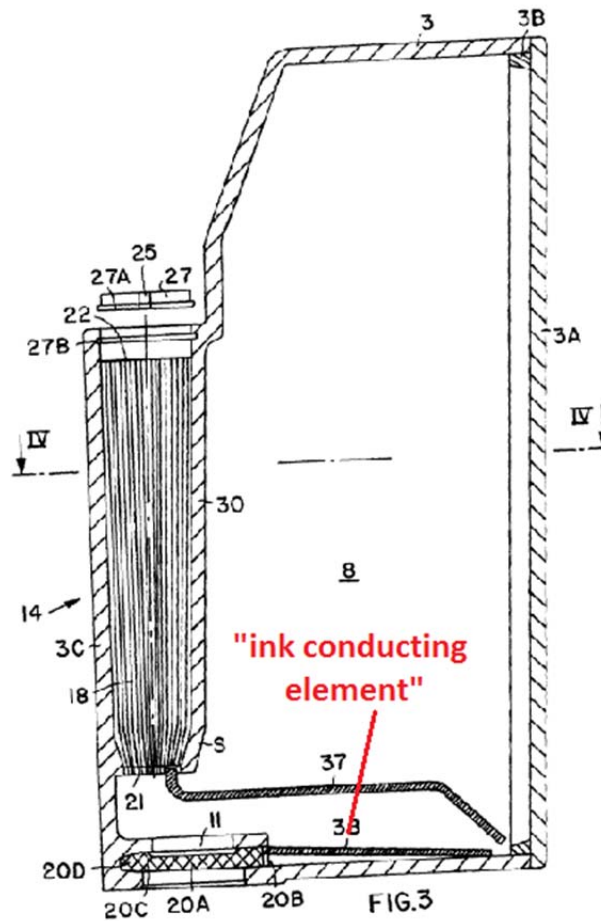


Because the cavity where atomization occurs is within the walls and “porous body,” those structures are part of atomizer 9, as illustrated above. Ex. 2001 ¶23.

The '628 patent refers to all of these components (heating wire, cavity, structures forming the cavity, ejection holes) as the “atomizer.” Ex. 1001, 2:15, 2:43-45, 2:61-62, 3:45-54; Ex. 2001 ¶23.

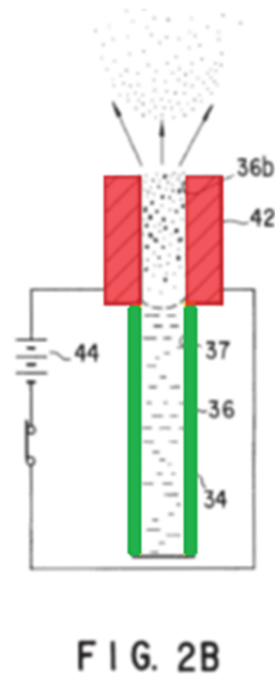
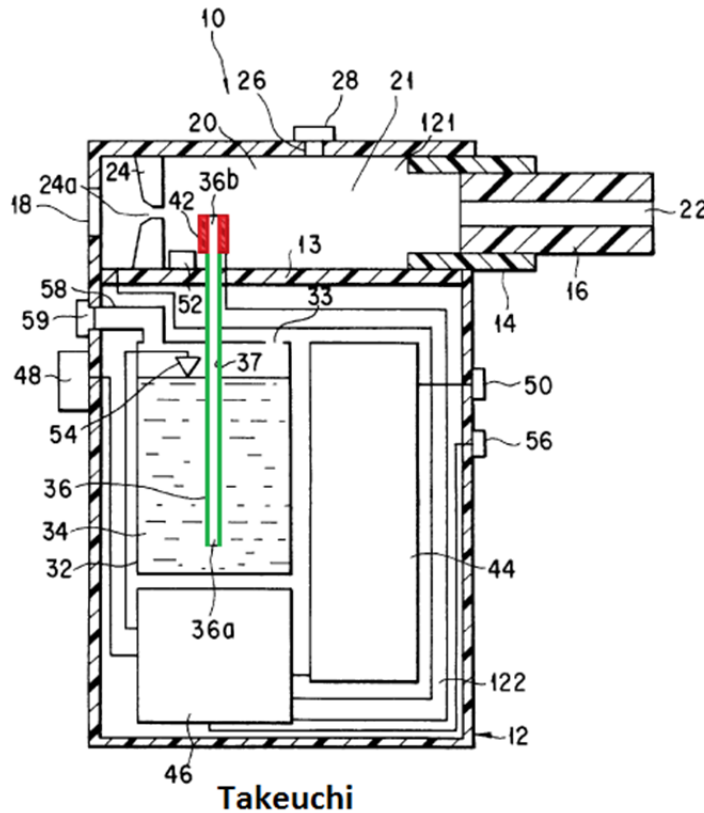
Under Petitioner’s construction, the term “atomizer” would extend to any component in an electronic cigarette that “facilitat[es] atomization,” which could include the battery, the housing, the air inlets, etc. Further, the phrase “but not components included in other recited parts of the electronic cigarette, such as the liquid supply” is ambiguous. One of the “other recited parts of the electronic cigarette” is the housing. Because all other components are “included in” the housing, the construction implies that no components are part of the atomizer.

Petitioner relies on that construction to make up for deficiencies in its prior art. Specifically, Petitioner asserts that an “ink conducting element” in U.S. Patent No. 5,703,633 (Gehrer) (Ex. 1006) is part of an atomizer because it “delivers liquid for atomization and thus facilitates atomization,” even though the element plays no role in atomization. Petition at 74.



Gehrer

Likewise, Petitioner asserts that U.S. Patent No. 6,155,268 (Takeuchi) (Ex. 1003) discloses an atomizer that includes capillary tube 36. Petition at 13, 43-45. But the tube does not convert liquid into aerosol or vapor. The capillary tube's purpose is to move liquid from the liquid storage body to the heater. Ex. 1003, 5:49-50, 6:4-12. The tube does not atomize liquid. Ex. 2001 ¶¶60-61. Tube 36 (green) and heater 42 (red) are shown in the annotated figures below.



The '628 patent claims priority to U.S. Patent No. 8,393,331 (the '331 patent). During prosecution of the '331 patent, Patent Owner distinguished a reference called Voges II, which shares many of the same disclosures as the Voges reference Petitioner relies on in Ground 2. Ex. 2006. Voges II and Takeuchi have a similar configuration—an atomizer separated from a liquid storage body by a tube. Patent Owner distinguished Voges II because it failed to disclose an atomizer in physical contact with a liquid supply because the tube separates the two components. Ex. 2005 at 6-8. The Patent Office issued the '331 patent over Voges II, which further supports that an “atomizer” does not include a liquid transport tube.

Dictionary definitions also support Patent Owner’s proposed construction.

To “atomize” is “to reduce to minute particles or to a fine spray” or to “reduce to atoms or fine particles,” and an “atomizer” is “an instrument for atomizing usu. a perfume, disinfectant, or medicament” or “an instrument for emitting liquids as a fine spray.” Ex. 2003 at 78; Ex. 2007 at 83.

B. “liquid supply”

Patent Owner’s Construction	Petitioner’s Construction
No construction necessary, or in the alternative, “a store for liquid”	“a part of the recited electronic cigarette that includes one or more components that supply liquid to the atomizer”

Independent claims 1 and 8 recite a “liquid supply.” Dependent claim 5 requires that the liquid supply comprises a fiber material. “Liquid supply” needs no construction because its plain meaning is clear to one skilled in the art. In the alternative, “liquid supply” means “a store for liquid.”

Claims 1 and 6-8 require the liquid supply be separate from the atomizer. Claim 5 requires the liquid supply “compris[e] a fiber material.” Claims 1, 7, and 8 require the liquid supply be located “in the housing.” The specification discloses a liquid supplying bottle including “a solution storage porous body” for storing fluid. The solution storage porous body may be made of “fiber” or “foam” in contact with the atomizer. Ex. 1001, 2:43-45, 3:6-10. Thus, the claims and specification use the term “liquid-supply” as a noun to describe a store for liquid. *Id.*, Abstract, 1:56-67; Ex. 2001 ¶¶25-32. While a “liquid supply” can include one

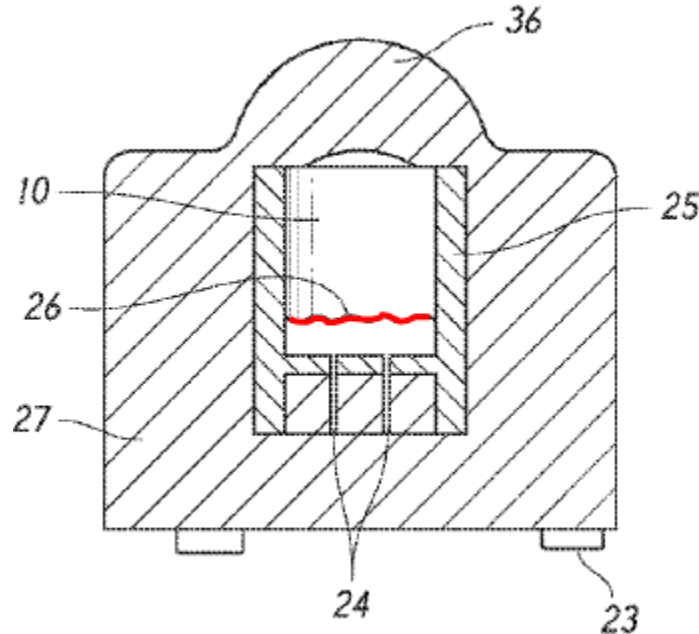
or more components, those components must store liquid. Extrinsic evidence also supports Patent Owner's construction. A "supply" is a "stock" or "store." Ex. 2007 at 1535; Ex. 2020 at 1912. A "liquid supply" would not include the components that transport liquid to the atomizer or the liquid while in transport. It is the store for liquid.

C. "wire"

Patent Owner's Construction	Petitioner's Construction
"a flexible metal thread or rod"	(none proposed)

Independent claims 1 and 8 require "a heating wire in the atomizer." In a prior IPR relating to the '628 patent, Patent Owner argued that the term "wire" should be construed to mean a "flexible metal thread or rod." Ex. 2018 at 21. Despite Patent Owner's previous proposed construction, Petitioner offers no construction, let alone an explanation for why the term "wire" should be construed differently. Instead, Petitioner asserts with no explanation that a "thin film resistor" is a heating wire. Petition at 20, 77-80.

The '628 specification discloses heating element 26, which can be shaped like a "wire" or a "sheet." Ex. 1001, 2:47-52. The patent uses the term "wire" in its ordinary sense. Ex. 2001 ¶¶33-36. A "wire" is "metal drawn out into the form of a thread or thin flexible rod" or "a slender, stringlike piece or filament." Ex. 2007 at 1763; Ex. 2020 at 2180. Heating wire 26 (red) illustrated in Figure 6 (below) is consistent with the term's ordinary definition. Ex. 2001 ¶35.



**V. THE PETITION FAILS TO SHOW A REASONABLE
LIKELIHOOD THAT ANY CLAIM OF THE '628 PATENT IS
UNPATENTABLE**

Petitioner proposes two grounds of unpatentability:

Ground 1. Claims 1, 2, 5, and 8 are obvious over Takeuchi in view of
Whittemore and Gehrler;

Ground 2. Claims 1, 2, 5, and 8 are obvious over Voges in view of Gehrler.

Petition at 7.

**A. The Petition Should Be Denied Because Grounds 1 and 2 Are Redundant
With IPR2016-01285**

The Board has discretion to deny grounds as redundant when “the same or substantially the same prior art or arguments” have been presented to the Board previously. 35 U.S.C. § 325(d); 37 C.F.R. § 42.108; *US Endodontics, LLC v. Gold*

Standard Instruments, LLC, IPR2015-01476, Paper 13 (Ex. 2008 at 8); *Toyota Motor Corp. v. Cellport Systems, Inc.*, IPR2015-01423, Paper 7 (Ex. 2010 at 5-9).

The '628 Patent is currently pending the Board's decision in IPR2016-01285. The petitioner in that proceeding alleges the following grounds of unpatentability:

References	Basis	Claim(s) Challenged
Voges and Gehrler	§103	1, 2, 3, 5, 8
Takeuchi and Adiga	§103	1, 2, 3, 5, 8

Here, Petitioner alleges the following grounds of unpatentability:

References	Basis	Claim(s) Challenged
Voges and Gehrler	§103	1, 2, 5, 8
Takeuchi, Gehrler, and Whittemore	§103	1, 2, 5, 8

Petitioner's arguments here regarding Voges and Gehrler are virtually identical to those presented in IPR2016-01285. Specifically, both petitions rely on Voges as the primary reference and Gehrler for the "porous body" in claims 1 and 8 and the "fiber material" in claim 5. Petition at 7-8; Ex. 2012 at 30.

With respect to Takeuchi, Petitioner's arguments here are not meaningfully different than those presented in IPR2016-01285. That petition relies on Takeuchi as the primary reference and Adiga for the "heating wire" in claims 1 and 8 and the "fiber material" in claim 5. Ex. 2012 at 53-54. Here, Petitioner relies on Takeuchi as the primary reference, Whittemore for the "heating wire," and Gehrler (again) for the "fiber material." Petition at 7. These arguments are essentially the same.

Addressing them twice needlessly increases the expense of these proceedings, delays a just resolution of the merits, and unnecessarily burdens the Board. The Petition should be denied as redundant.

B. Petitioner's Expert's Opinions Have Little Probative Value

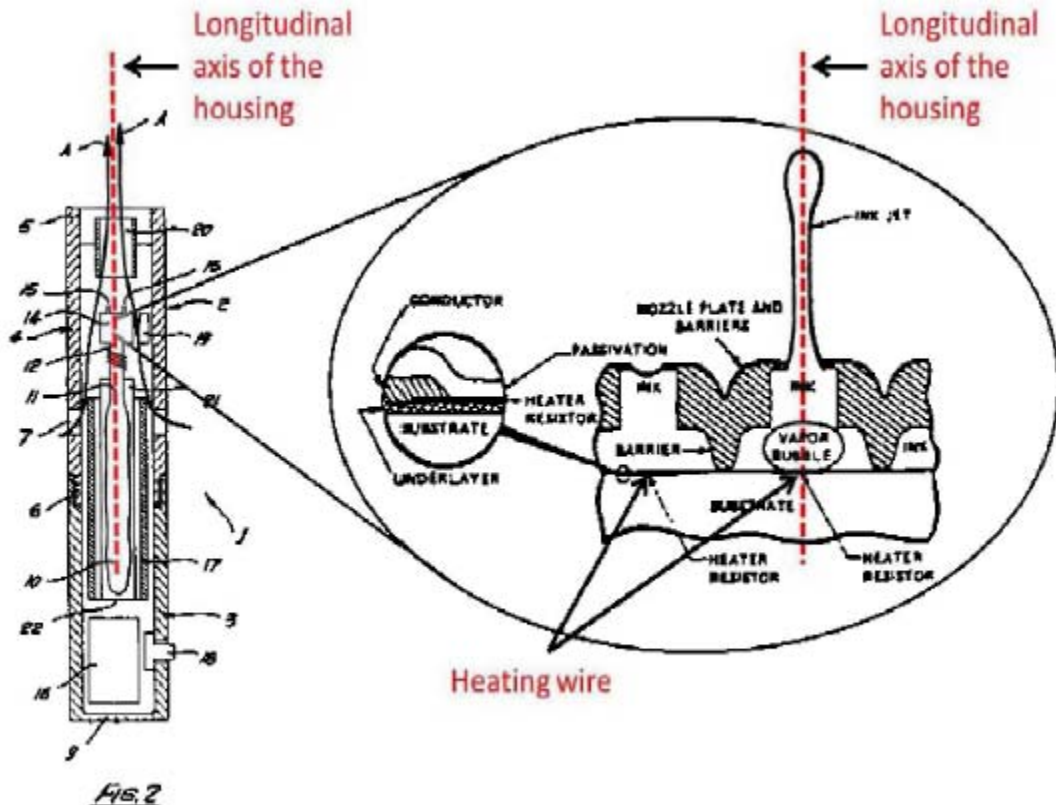
Petitioner's expert's contradictory opinions are not credible. For example, Ground 1 alleges Takeuchi discloses an "atomizer" that includes "a porous body projecting into a liquid supply." For support, Petitioner's expert argues Takeuchi's capillary tube 36 and pore structure 302 are part of Takeuchi's "atomizer" and not part of the "liquid supply." Ex. 1010 ¶¶76 ("The capillary tube 36 (which may include porous material 302) extends into the liquid supply in container 32, but is not part of the liquid supply."); *id.* ¶¶77 ("[T]he capillary tube 36, which is part of the atomizer and may contain porous material 302, extends into the liquid container 32."). Yet, in IPR2016-01270, where a patent related to the '628 patent is at issue, the same Petitioner hired the same expert to argue that Takeuchi discloses a "liquid storage body in physical contact with the atomizer." There, Petitioner's expert argues Takeuchi's pore structure 302 is *not* part of the atomizer, but rather is part of "a liquid storage body" that supplies liquid "to an atomizer." Ex. 2033 ¶¶58, 85 (emphasis added).

In other words, in this Petition, Petitioner and its expert assert that Takeuchi's pore structure 302 "is not part of the liquid supply" and instead "is part

of the atomizer.” Ex. 1010 ¶¶76-77. But in related IPR2016-01270, Petitioner and its expert assert exactly the opposite, that Takeuchi’s pore structure 302 is “a liquid storage body” and supplies liquid “to an atomizer.” Ex. 2033 ¶¶58, 85.

Petitioner’s and its experts’ self-serving and contradictory arguments and testimony should be afforded no weight.

Petitioner’s expert also contradicts his own published work. Here, Petitioner relies on the Ink-Jet Guide’s square-shaped heater resistors as disclosing a “heating wire.” Petitioner’s expert asserts that a square’s “central axis” runs along its plane, thus finding disclosure of a “central axis oriented substantially perpendicular to the longitudinal axis of the housing.” Ex. 1010 ¶100; pp. 77-80.



In direct contrast to that testimony, Petitioner's expert is the named inventor on a patent that correctly discloses the "central axis" of a square as running through its *center*—not along its plane. Ex. 2084, 7:13-18, 7:39-42, Fig. 3 (annotated below).

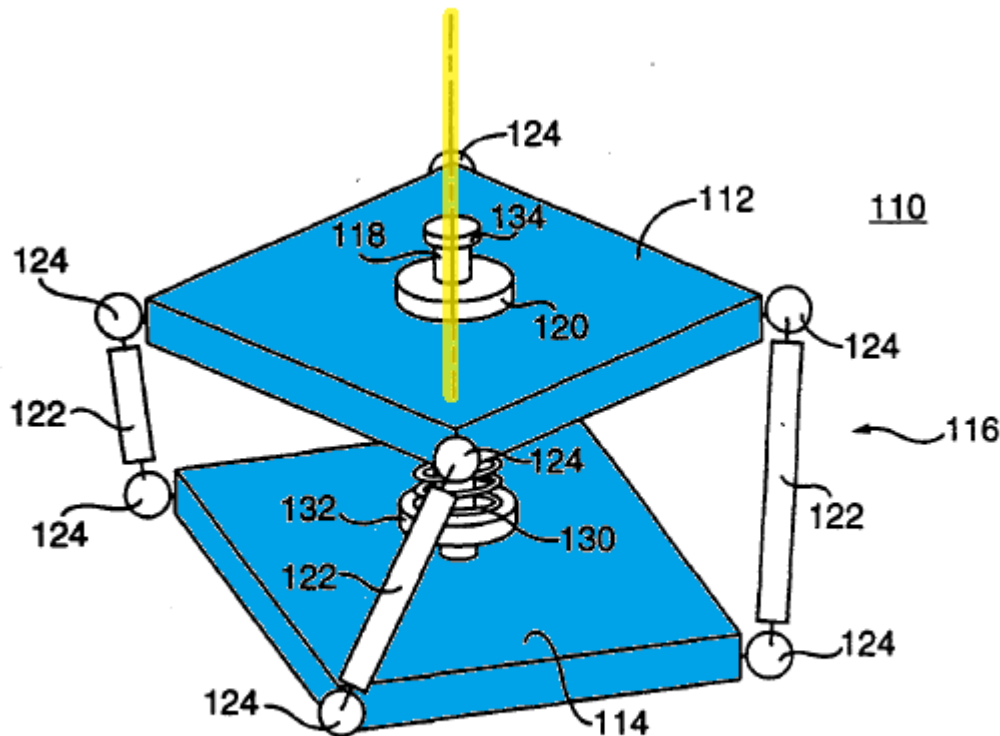
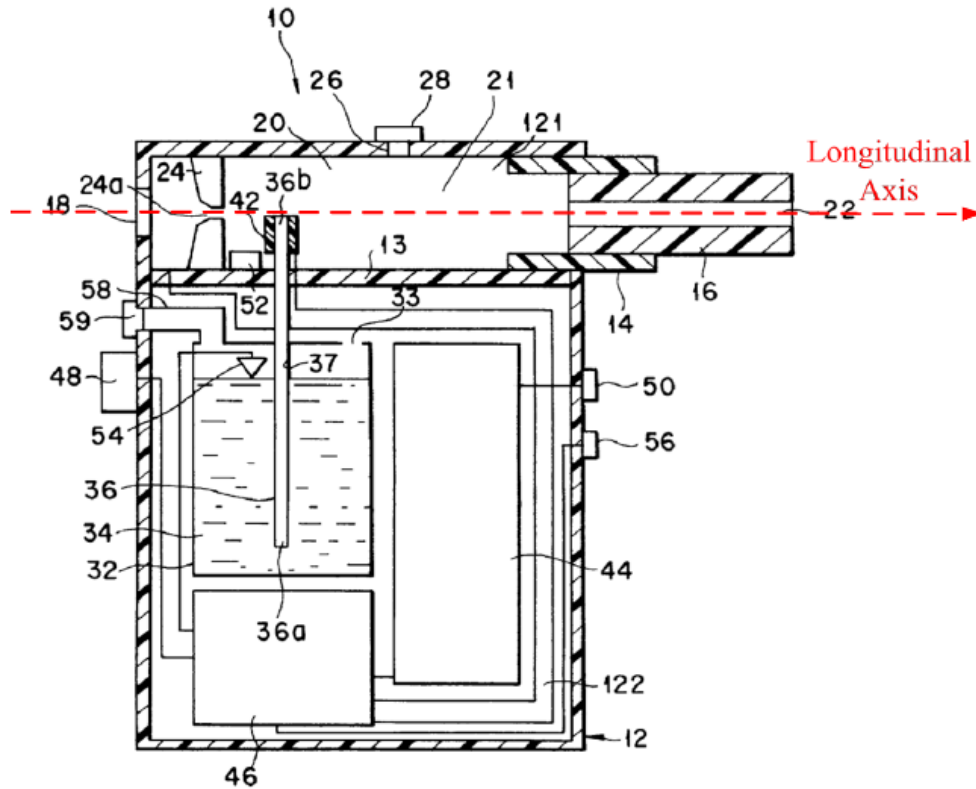
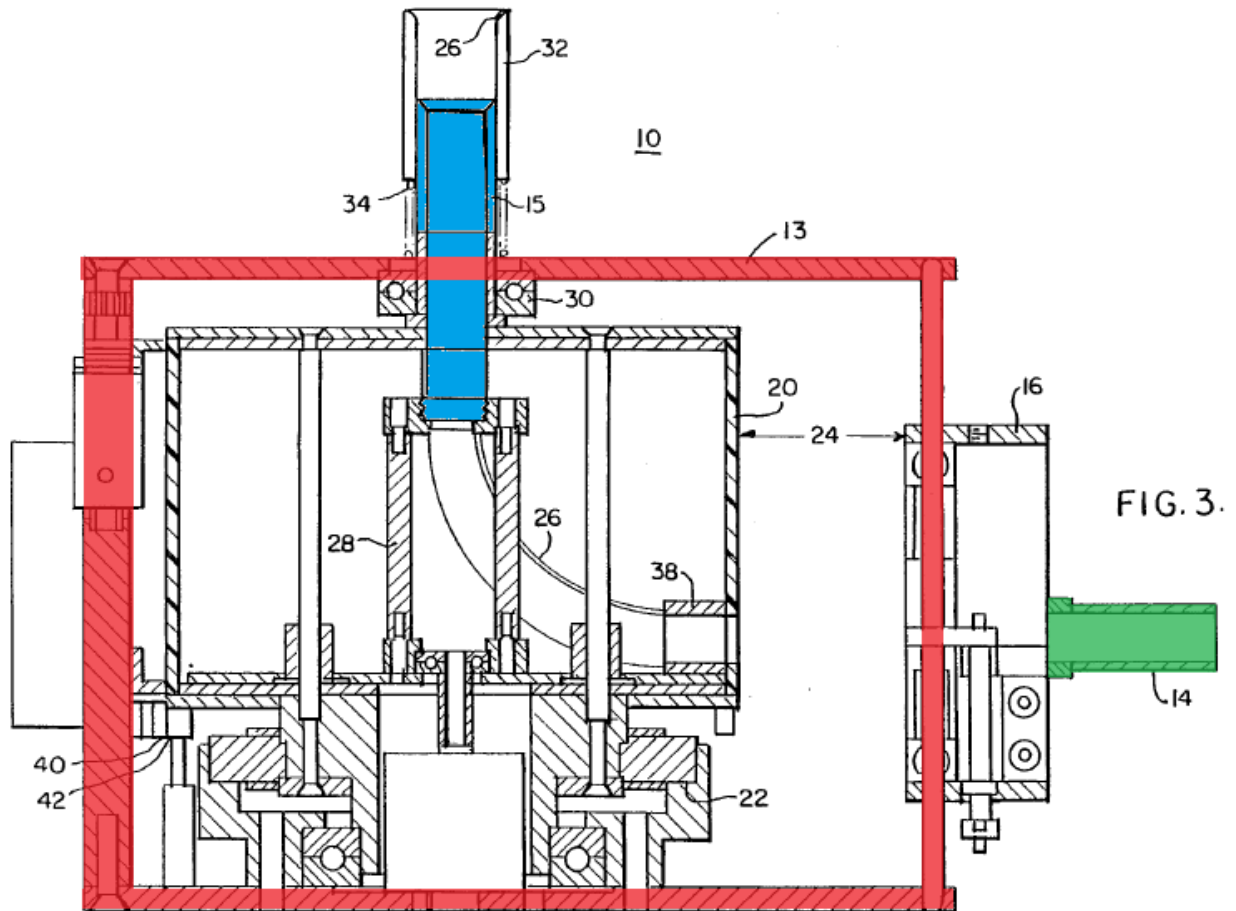


FIG. 3A

Similarly, here Petitioner's expert asserts the "longitudinal axis of the housing" in Takeuchi runs along its width, rather than "along the length, i.e., the longest dimension." Ex. 1010 ¶¶29, 66; Petition at 33-34.

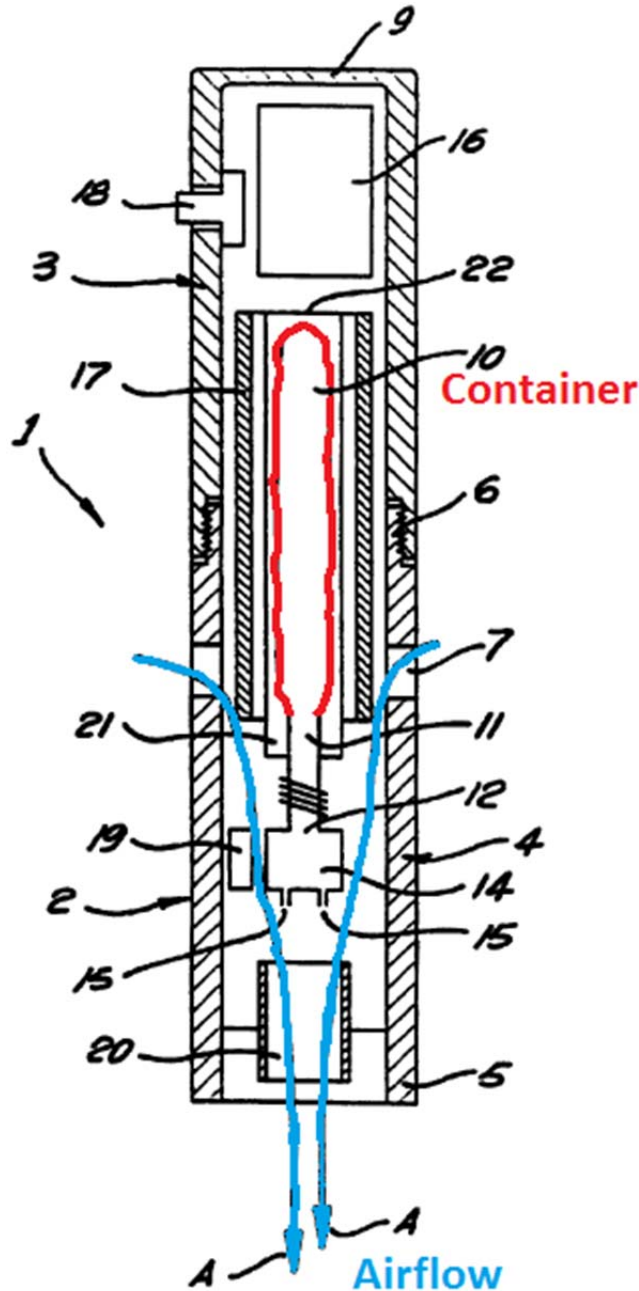


Again in direct contrast to that testimony, Petitioner's expert is the named inventor on a patent for a robotic component that discloses a housing 13 (shown below in red), a front end nozzle 14 (green) oriented "parallel to the longitudinal axis of the housing 13," and a tail end nozzle 15 (blue) oriented "perpendicular to the longitudinal axis of the housing 13." Ex. 2085, 6:3-28, Fig. 3. Unlike his opinion here, in his own patent, the "longitudinal axis" correctly runs "along the length, i.e., the longest dimension." Such contradictory testimony should be afforded no weight.



Petitioner's expert's opinions are so motivated by hindsight that they create non-existent problems to support motivations to combine references. For example, to find motivation to combine Voges with another reference, he argues Voges's liquid-filled collapsible bladder would leak. Ex. 1010 ¶90. He asserts that air flowing past the container would cause liquid to be forced out of the bladder "due to excess internal pressure" and "negative pressure...surrounding the container." *Id.* But a user inhaling would not cause negative pressure around the container because air does not flow past the container in Voges. Ex. 2001 ¶111. Instead, as shown in annotated Figure 2 below, air flows in through slots 7 and out

mouthpiece 5. Ex. 1005, 5:51-54, 6:2-5. Even so, an enormous pressure change would be required to force any liquid out of the bladder. Ex. 2001 ¶111.



Petitioner's expert also parrots the Petition, offering factually unsupported and conclusory opinions. Petitioner's expert often repeats Petitioner's arguments

nearly verbatim, without adding any explanation. *Compare, e.g.*, Ex. 1010 ¶¶48-49, 53, 58-59, 61, 68-70 *with* Petition at 22-24, 26, 28-29, 35-37. These conclusory opinions have no probative value. *ActiveVideo Networks, Inc. v. Verizon Commc'ns, Inc.*, 694 F.3d 1312, 1327 (Fed. Cir. 2012) (rejecting “conclusory and factually unsupported” expert testimony regarding obviousness); *see also* Ex. 2056 at 15 (“Merely repeating an argument from the Petition in the declaration of a proposed expert does not give that argument enhanced probative value.”).

Petitioner’s expert’s contradictory, conclusory, and hindsight-biased opinions should be given no weight.

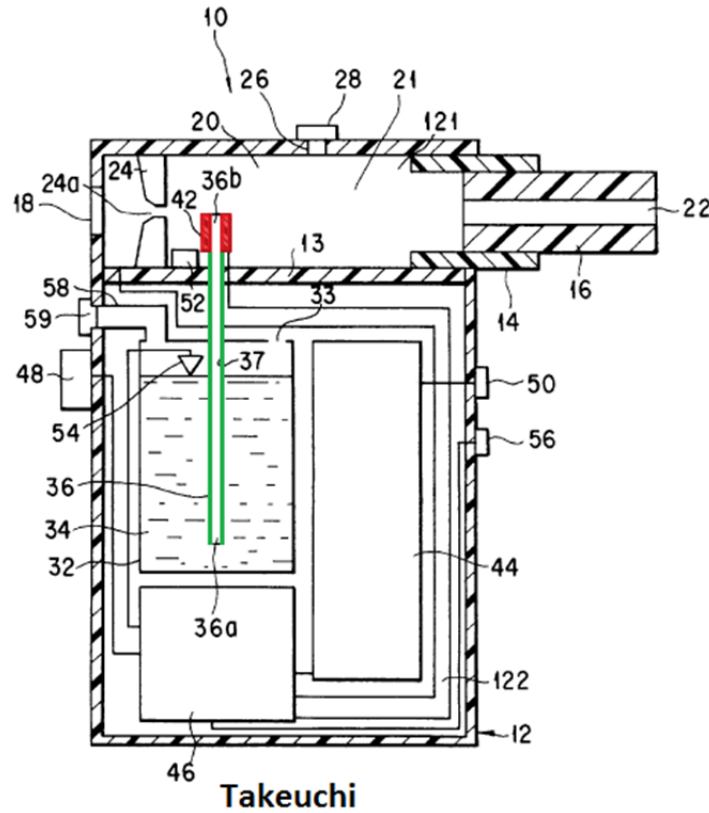
C. Ground 1: Claims 1, 2, 5, and 8 Are Not Obvious Over Takeuchi, Whittemore, and Gehrler

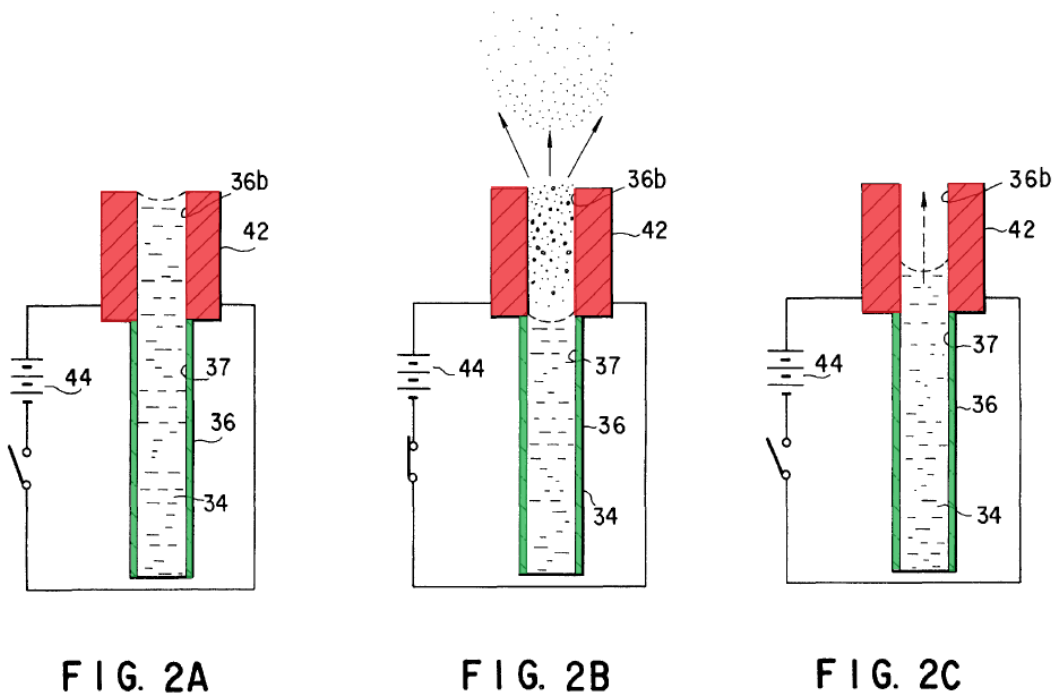
Petitioner has not met its burden of proving a reasonable likelihood of success on Ground 1.

1. Takeuchi

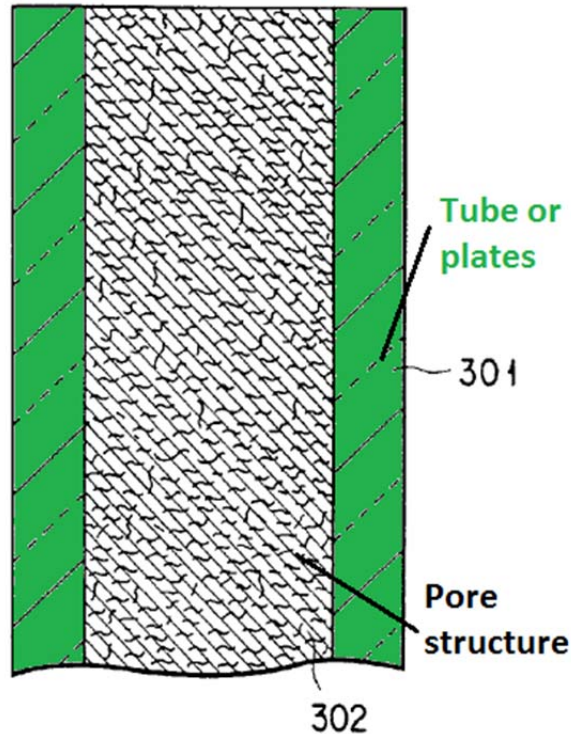
Takeuchi discloses a “flavor generating device.” Liquid containing a flavor source 34 is transported via capillary force through a capillary tube 36 that defines a liquid passageway 37 to a small electric heater, where the liquid is gasified (atomized) for inhalation by a user. Ex. 1003, 5:47-52. Upper chamber 121 then receives the atomized liquid. *Id.*, 6:4-12. One embodiment is shown in Figure 1

below, with heater 42 (red) and capillary tube 36 (green). Atomization in the heater's outlet port 36b is shown below in Figures 2A-2C.





Takeuchi discloses that the capillary force in the liquid passageway is limited by the tube's height and diameter. *Id.*, 3:51-4:3. To mitigate this limitation, Takeuchi discloses optionally filling the liquid passageway with an “intercommunicating pore structure,” as shown below in annotated Figure 14. *Id.*, 4:4-8; 10:50-64.



Takeuchi's compact heater at the end of a liquid passageway has several objectives:

It follows that the flavor-generating device of the present invention *can be driven as a whole at a low energy*. As a result, it is possible to *suppress waste of the flavor source*. In addition, the flavor can be generated *when the user takes a puff* of the flavor.

Ex. 1003, 2:25-29 (emphasis added). Takeuchi's device aimed to provide a puff of flavor "without a time lag." *Id.*, 1:59-64. Takeuchi disclosed specific heaters that accomplished the objectives listed above. Those heaters were small in size and shaped like a ring, a rod, and a plate, as shown below in Figures 3-5.

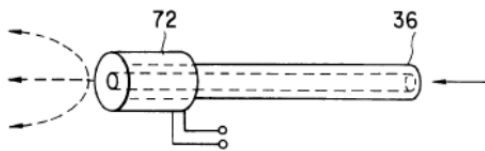


FIG. 3

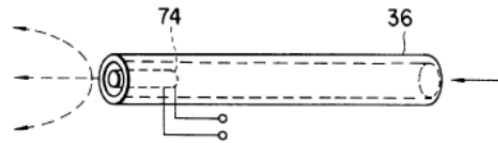


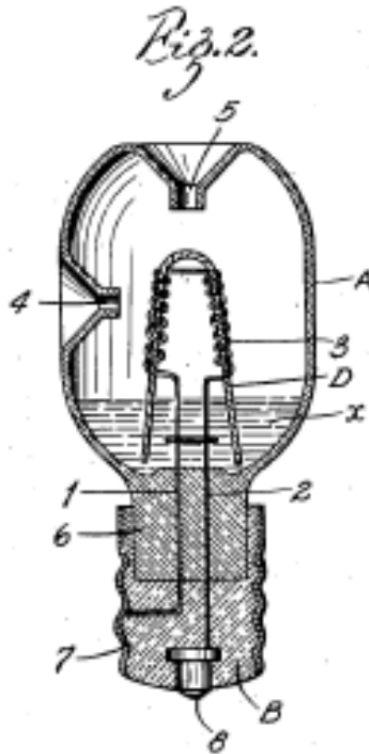
FIG. 4



FIG. 5

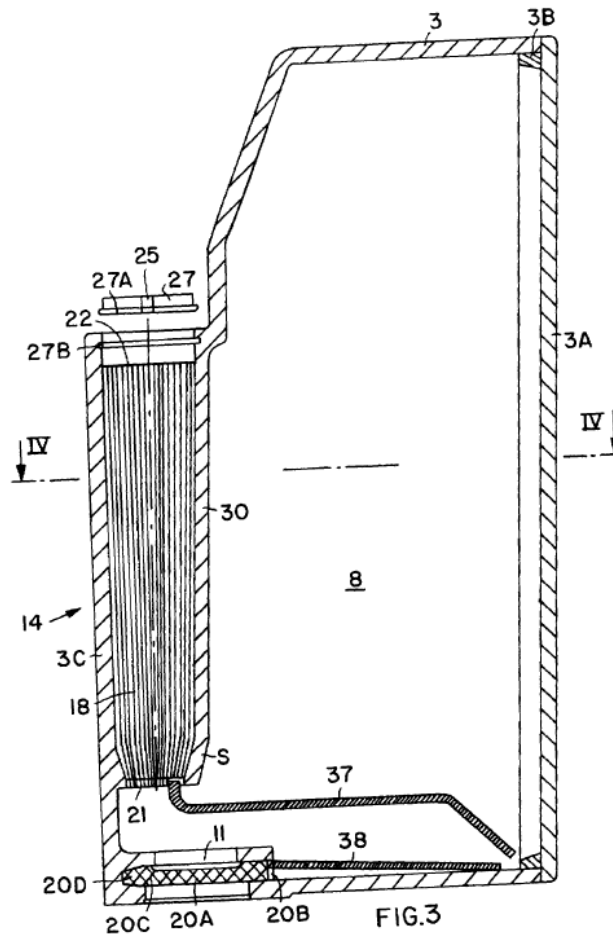
2. Whittemore

Whittemore was cited during prosecution of the '628 Patent. Ex. 1001, References Cited. Whittemore discloses a "vaporizing unit." Ex. 1004. The patent issued in 1936. As depicted in Figure 2 below, the device looks like a light bulb. Whittemore discloses wick D inside glass vessel A that holds liquid medicament x. *Id.*, 1:19-28. Vaporization occurs within vessel A. *Id.*



3. Gehrer

Gehrer discloses an “ink container with a capillary action member.” Ex. 1006, Title. The container includes coupling member 38 that delivers ink from reservoir 8 to a withdrawal port 11. *Id.*, 6:11-24. Capillary body 18 is separated from the rest of the device by separation wall 30 and equalizes pressure using air vent 25. *Id.*, 7:62-8:13, 8:53-61. To ensure ink is transferred properly, the coupling member has a greater capillarity than the pressure-equalizing body. *Id.*, 2:29-47, 8:63-67. One aim of Gehrer’s container was “to improve an ink pot that has a reservoir to hold free ink.” *Id.*, 1:61-67. An embodiment is shown in Figure 3 below.



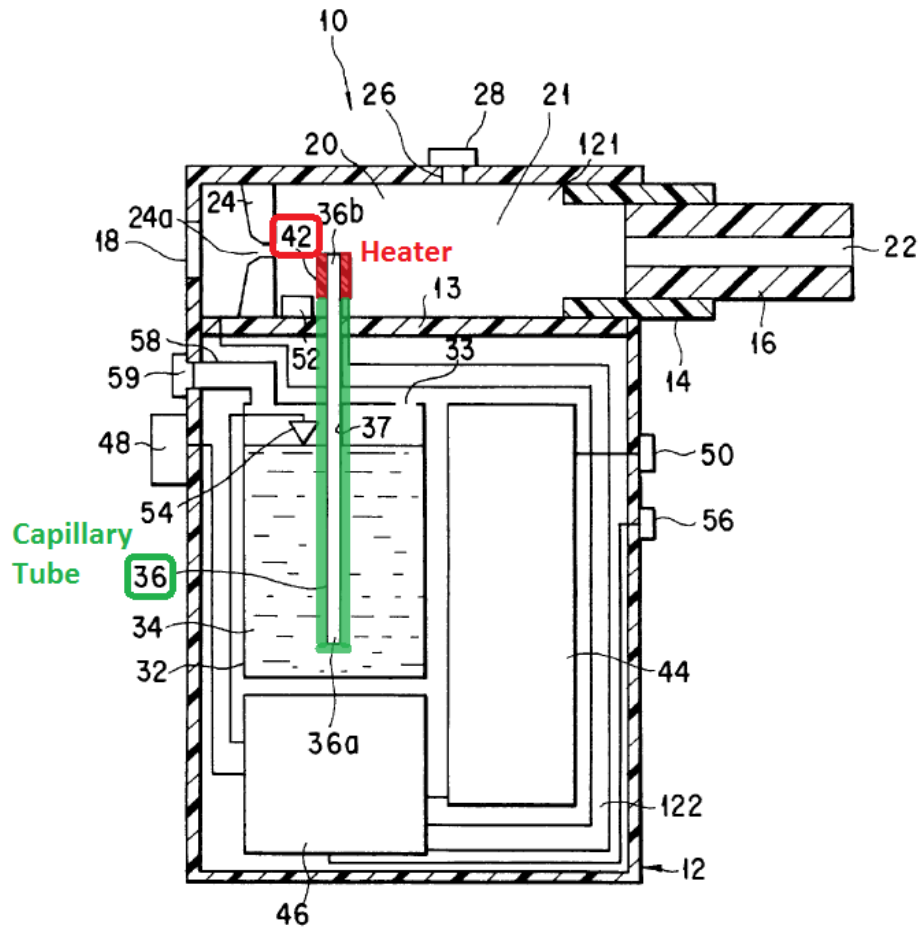
4. Independent Claims 1 and 8

Independent claims 1 and 8 recite an “electronic cigarette” comprising a “housing” with “an inlet and an outlet,” and “a liquid supply,” an “air flow channel,” and an “atomizer” or “atomizer assembly” in the housing. The atomizer includes a “porous body [projecting/extending] into the liquid supply” and a “heating wire” having a central axis oriented “substantially” or “generally” perpendicular to the longitudinal axis of the housing. Petitioner asserts that all these limitations are rendered obvious by the combination of Takeuchi,

Whittemore, and Gehrler. Petition at 24-25, 32-58. But the proposed combination fails to disclose an atomizer with a porous body projecting into the liquid supply or a “heating wire” having a central axis oriented “substantially” or “generally” perpendicular to the longitudinal axis of the housing.

a. Takeuchi, Whittemore, and Gehrler do not teach an atomizer including “a porous body [projecting/extending] into the liquid supply”

Claims 1 and 8 require an atomizer or atomizer assembly including “a porous body [projecting/extending] into the liquid supply.” Petitioner alleges Takeuchi’s capillary tube 36 and its optional intercommunicating pore structure are part of Takeuchi’s atomizer and discloses what is claimed. Petition at 43-52. But neither capillary tube 36 nor the optional pore structure is part of the atomizer or atomizer assembly. Capillary tube 36 is shown in green in annotated Figure 1 below.



Petitioner argues the tube is part of the atomizer because “vaporization of the liquid takes place at the outlet port 36b of the capillary tube, where the heater 42 is located.” Petition at 43-44. But, contrary to Petitioner’s assertion, in the embodiments where heater 42 is used, “the outlet port 36[b] of the liquid passageway 36 is formed by the heater 42 itself,” not by the tube. Ex. 1003, 6:10-12. Thus, vaporization takes place within outlet port 36b of heater 42 (red), not in capillary tube 36 (green), as shown in annotated Fig. 2B below. Ex. 2001 ¶¶60-61. The tube is simply not part of the atomizer.

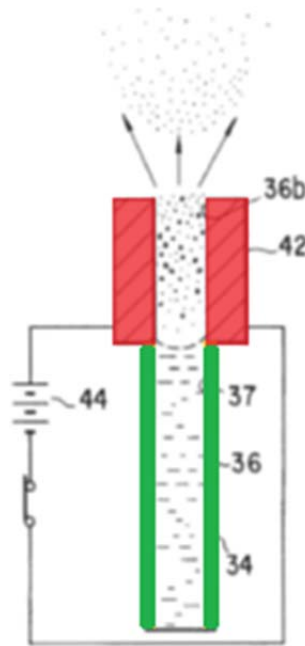
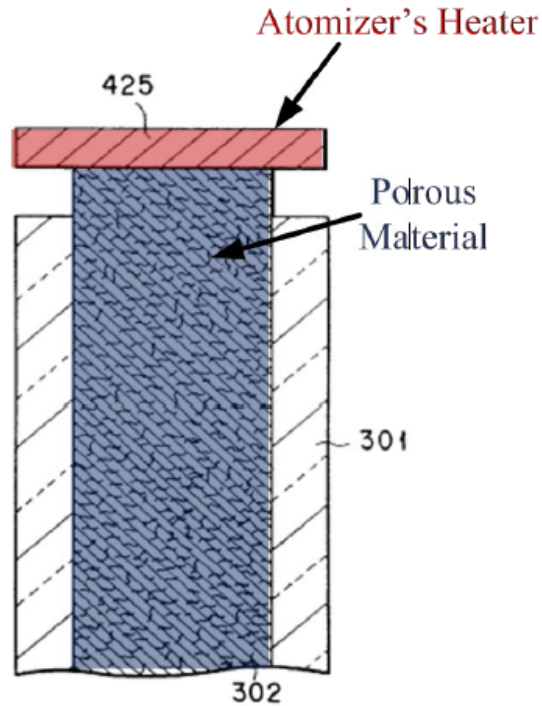


FIG. 2B

Capillary tube 36 and the optional pore structure play no role in atomizing; their purpose is to move liquid from the liquid container to the heater. Ex. 1003, 2:1-16; 3:35-50; Ex. 2001 ¶61. Petitioner admits the tube and pore structure “function to deliver liquid to the heater.” Petition at 43-44. Petitioner’s expert agrees the tube and pore structure “transport[] replenishing liquid from the liquid supply to the heater for atomization” and liquid is “atomized by the heater,” not by the tube or the pore structure. Ex. 1010 ¶76. Although he asserts the tube’s function of transporting liquid “facilitates” atomization as required under Petitioner’s construction of “atomizer,” his assertion contradicts Petitioner’s construction of “liquid supply,” which includes “components that supply liquid to the atomizer.” *Id.*; Petition at 12.

Petitioner's hindsight bias is evidenced by its contradictory arguments in a co-pending IPR petition on a related patent. In IPR2016-01270, the same Petitioner argued Takeuchi's pore structure is *not* part of the atomizer. Rather, Petitioner argued there that Takeuchi's pore structure is a "liquid storage body" and that the claim limitation at issue in that IPR, "liquid storage body in physical contact with the atomizer," is unpatentable because the pore structure "is in physical contact with the heater of Takeuchi." Ex. 2100 at 25-26. Petitioner's expert's contradiction is even more explicit. Instead of arguing Takeuchi's pore structure was part of the atomizer, he said it transports liquid "to an atomizer," and is part of the "liquid storage body" because it both stores and transports liquid. Ex. 2033 ¶¶58, 85. Describing Takeuchi's Figure 15, he said "the intercommunicating pore structure 302...is in an intimate, heat exchange relationship with the heater (i.e., atomizer) 425 at outlet port 36b." *Id.* ¶86. Now, Petitioner and its expert annotate Figure 15 to say just the opposite: that the pore structure and heater are both part of the atomizer. Petition at 16, 43-45; Ex. 1010 ¶83. Petitioner's and its expert's contradictory assertions should be afforded no weight.

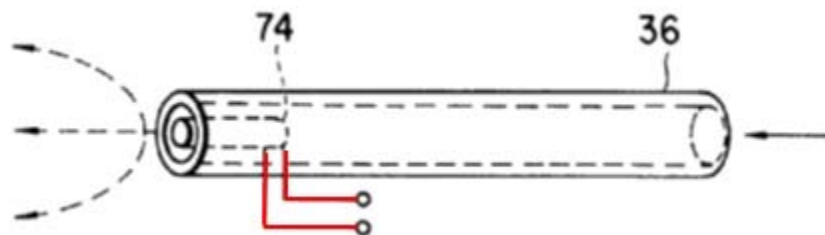


Regardless, as discussed above, during prosecution of the '331 patent, Patent Owner distinguished a reference called Voges II with the same configuration as Takeuchi—an atomizer connected via a tube to a liquid storage body. Ex. 2005 at 6-8. The Patent Office issued the '331 patent over Voges II because its tube separated the atomizer from the liquid storage body. Just like Voges II, the tube in Takeuchi separates the atomizer from the liquid storage body and thus cannot disclose an atomizer or atomizer assembly including “a porous body [projecting/extending] into the liquid supply” as claimed.

b. Takeuchi, Whittemore, and Gehrer do not teach a “heating wire” in the atomizer

Claims 1 and 8 require a “heating wire” in the atomizer or atomizer assembly. Petitioner asserts Takeuchi’s rod-like heater 74 is “arguably” a “wire,” but relies on Whittemore for this limitation. Petition at 24 n. 1. Takeuchi does not disclose a heating “wire,” and Whittemore’s heating wire combined with Takeuchi would be impractical and would not function without significant modification.

Takeuchi does not disclose a heating wire. As discussed above, a wire is “a flexible metal thread or rod.” When Takeuchi refers to a wire, it uses the term “wire.” An “electric wire connecting the power source 44 to the casing 12” would have been understood to be a flexible metal thread or rod. Ex. 1003, 6:19-22; Ex. 2001 ¶¶33-36. Takeuchi’s rod-like heater 74 is not a wire. That heater is shown in Figure 4, annotated below, including the two lead wires (red) that attach to the heater. Ex. 2001 ¶57. There is a marked contrast between the thin wires and the much larger cylindrical heater.



Petitioner asserts that “substituting Whittemore’s heating wire for the heaters of Takeuchi is [a] simple substitution” such that Whittemore’s wire would be “in

intimate contact with [Takeuchi's] intercommunicating pore structure 302."

Petition at 26, 52-53. But Petitioner does not explain how the proposed combination would function. Indeed, without significant modification, it would not. Ex. 2001 ¶64. Whittemore discloses a therapeutic apparatus that is plugged into "the receptacle or socket of an ordinary flashlight C." Ex. 1004, 1:39-45. Its heating wire is wrapped around a wick that extends up out of and then back down into a pool of liquid, a scale that could be measured in inches. *Id.*, Fig. 2.

Takeuchi's heaters are inserted into or placed at the end of a "capillary tube" that is most preferably between 0.1mm (0.004") and 0.8mm (0.03") in diameter, which is comparable to a human hair. Ex. 1003, 5:53-57; Ex. 2001 ¶64. Whittemore's wire would be much too large to function with Takeuchi's intercommunicating pore structure. Ex. 2001 ¶64.

Petitioner also argues that "strips of heating wire" could be substituted for Takeuchi's heater 425 "on the top surface, side exposed surface, and/or at other locations," or could be "coiled around the porous material 302." Petition at 27-28. Petitioner's expert explains further that "strips of inverted u-shaped heating wire" could be used to "cover substantially the entire surface area of the material to be heated." Ex. 1010 ¶55. But Takeuchi and Whittemore disclose nothing about "strips of heating wire." Nor does Petitioner's expert explain how the "strips of heating wire" would function. Among the questions he leaves unanswered are

whether each “strip” is separately connected to the power supply, why the “inverted u” shape is significant, how many strips should fit on a pore structure with a thickness comparable to a human hair, and how such a device would be manufactured. Ex. 2001 ¶¶64-66. Most importantly, he does not explain why a skilled person would make such a complicated modification without any suggestion that Takeuchi’s simple, efficient, and durable heaters were inadequate. *Id.* ¶65.

c. Takeuchi, Whittemore, and Gehrer do not teach a heating wire with a central axis substantially perpendicular to the longitudinal axis of the housing

Claims 1 and 8 require a heating wire with “a central axis oriented [substantially/generally] perpendicular to [the/a] longitudinal axis of the housing.” The Board previously construed “longitudinal axis” to mean “the axis along the length, *i.e.*, the longest dimension, of an object.” Ex. 1008 at 8-9. Patent Owner and Petitioner agree that construction should apply here. Petition at 12.

Petitioner asserts the “longitudinal axis” limitation is a dimensional aspect unrelated to the device’s operation, and therefore not entitled to patentable weight. Petition at 34-35. Petitioner cites *Gardner v. TEC Systems, Inc.*, which affirmed a trial court’s invalidating a patent where the only distinguishing limitations were “artificial dimensional limitations that add nothing to the claims, that are of no constructive significance, and are essentially meaningless.” 725 F.2d 1338, 1344

(Fed. Cir. 1984). Petitioner also cites IPR2014-00424 where the Board held that the limitation of a “three dimensional animal or character figure” printed on a shoe could not be relied upon for a utility patent’s patentability because the limitation had “no mechanical function whatsoever.” Ex. 2101 at 8. Unlike those cases, the longitudinal axis of the ’628 patent provides an axis along which to arrange components so air can flow past, through the atomizer, and out the outlet. Ex. 1001, 1:56-67; Ex. 2001 ¶48. The longitudinal axis provides a reference point for the atomizer’s heating wire’s perpendicular orientation. A long housing also simulates the shape of a real cigarette, which Petitioner confirms by asserting Takeuchi could be lengthened to “replicat[e] the look and feel” of a different device. Petition at 36; Ex. 1001, 1:49-50; Ex. 2001 ¶48. Indeed, Petitioner repudiates itself by arguing Takeuchi’s housing could be modified “for functional or aesthetic reasons.” Petition at 36.

Even though Petitioner relies on Whittemore for disclosing a “heating wire,” Petitioner asserts its orientation is disclosed by Takeuchi alone. Petition at 52-55. Takeuchi has an upside down “L” configuration, with its longest dimension running from its top to its bottom. Its longitudinal axis runs along its length, as shown below in red. The red line is parallel to what Takeuchi discloses as “the longitudinal direction of the capillary tube.” Ex. 1003, 8:43-46; Ex. 2001 ¶51. That axis is not perpendicular to the central axis of any alleged heating wire,

including rod-like heater 74 which Petitioner asserts “arguably” discloses a heating wire. Petition at 24 n.1. As shown in annotated Figures 1 and 4 below, the axis (red line) is parallel to the rod-like heater (red).

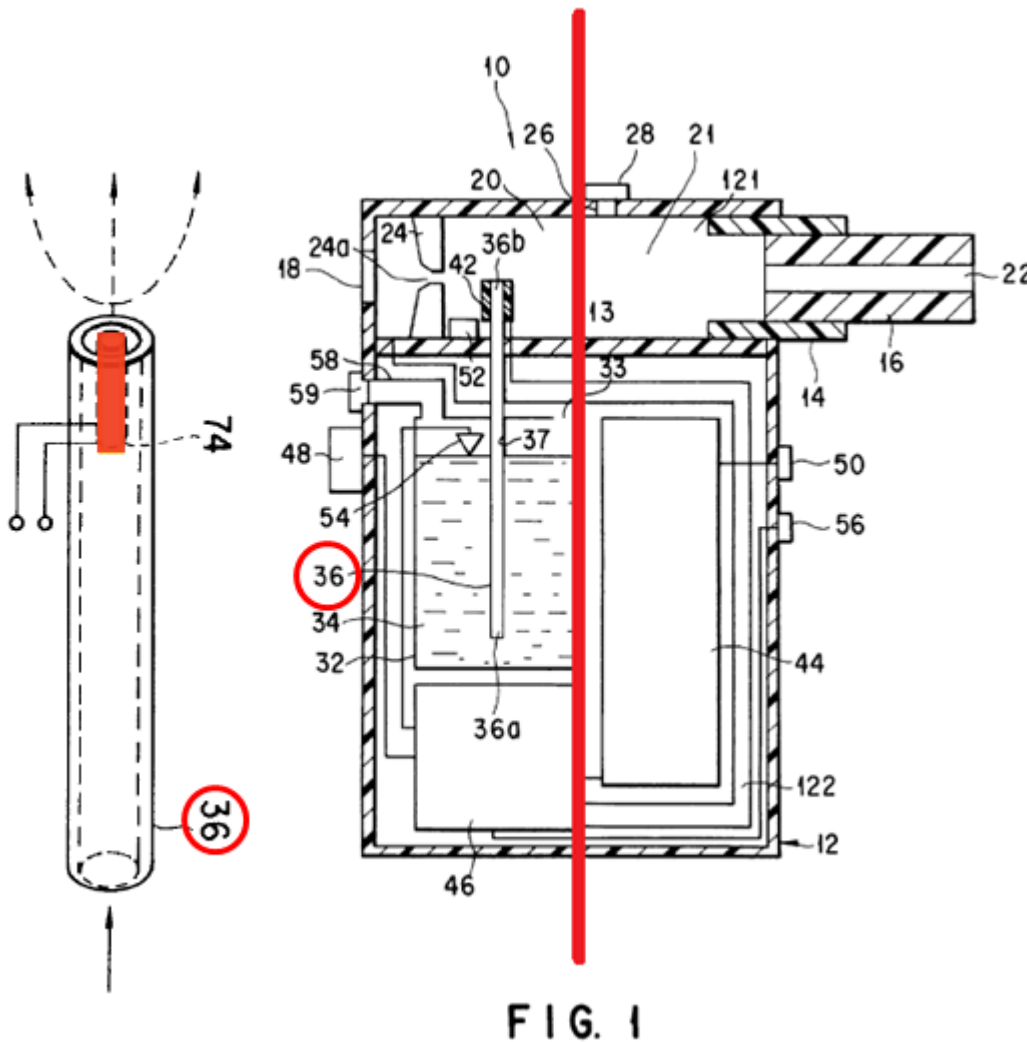


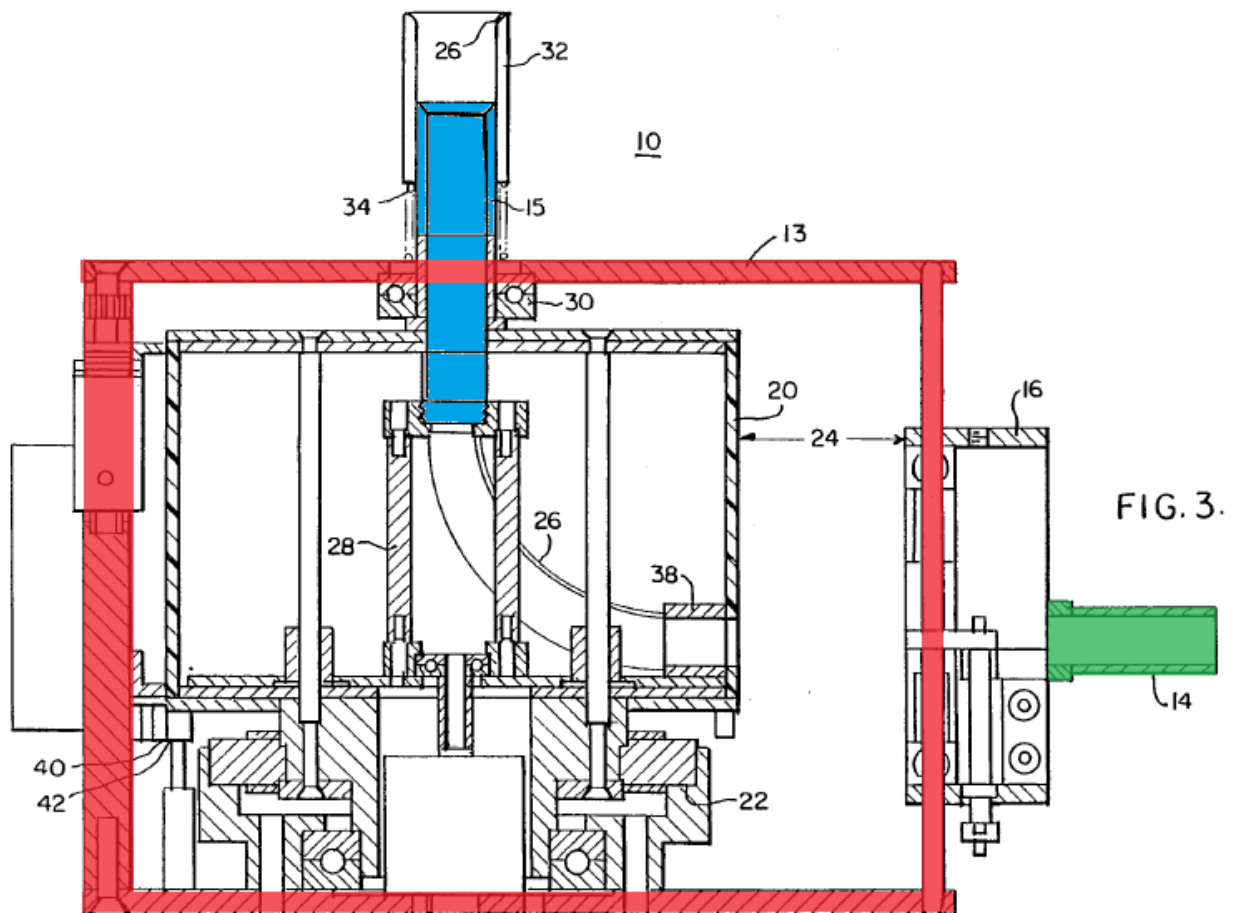
FIG. 1

Petitioner agrees to the definition of “longitudinal axis” described above and even confirms that Takeuchi’s Figure 1 depicts a “generally parallel” heater orientation. Petition at 12, 53. Nevertheless, Petitioner argues that “the longitudinal axis of Takeuchi’s housing is from the inlet 18 to the outlet 22.”

Petition at 33. Petitioner's expert reasons that Takeuchi's longitudinal axis is *not* its longest dimension, but rather the "functional length" of the airflow through its upper chamber. Ex. 1010 ¶¶64-67. The Board already rejected this very same argument in IPR2014-01300. Ex. 1008 at 8-9.

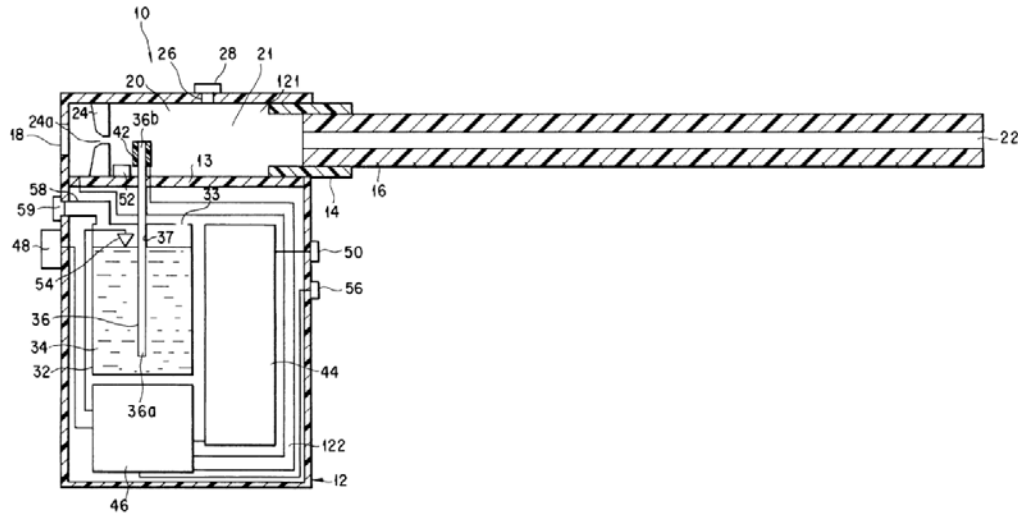
To argue that Takeuchi's longitudinal axis is its "functional length," Petitioner's expert makes a number of assertions that directly contradict Takeuchi and his own published work. Although Takeuchi describes the entire housing in Figure 1 as "one casing," Ex. 1003, 8:59-62, Petitioner's expert says the housing "comprises two distinct sections." Ex. 1010 ¶67. Referring to that Figure, Petitioner's expert says the parts in Takeuchi's "upper chamber 121 are axisymmetric" even though Takeuchi clearly depicts non-axisymmetric parts in the upper chamber, including partition wall 13, sensor 52, heater 42, and outer air introduction hole 26. Ex. 1010 ¶67; Ex. 1003, 4:31-33, 5:1-20, 6:46-54, 8:59-62, Fig. 1, Petitioner's expert asserts that "the arrangement of elements in [Takeuchi's] lower chamber is arbitrary," Ex. 1010 ¶67, despite obviously critical limitations on many of the lower chamber's elements. For example, liquid amount sensor 54 must be "arranged within the liquid container 32," pouring port 58 and removable cap 59 must be "exposed to the outside of the casing" near liquid container 32, and switches 48 and 50 and electrical display means 56 must be on "the outer surface of the lower chamber." Ex. 1003, 6:30-31, 6:63-65, 7:2-7, 7:18-

24. Petitioner's expert is also a named inventor on an "automated wiring system" patent. Ex. 2085, Inventors. He describes his invention as having a housing 13 (shown below in red), a front end nozzle 14 (green) oriented "parallel to the longitudinal axis of the housing 13," and a tail end nozzle 15 (blue) oriented "perpendicular to the longitudinal axis of the housing 13," all without any reference to "functional length." Ex. 2085, 6:3-28, Fig. 3.

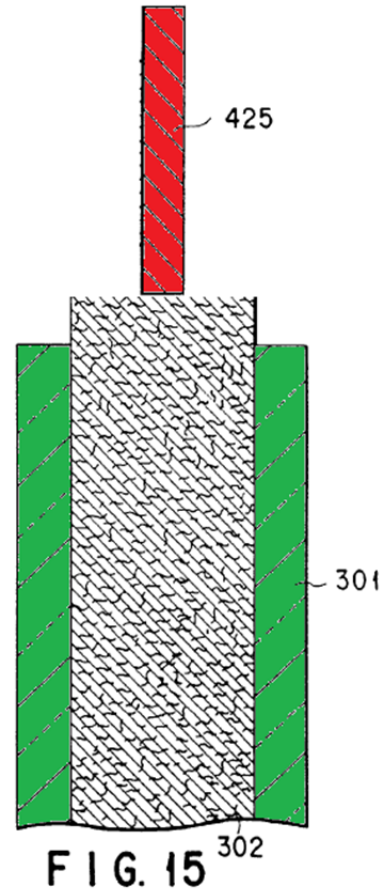
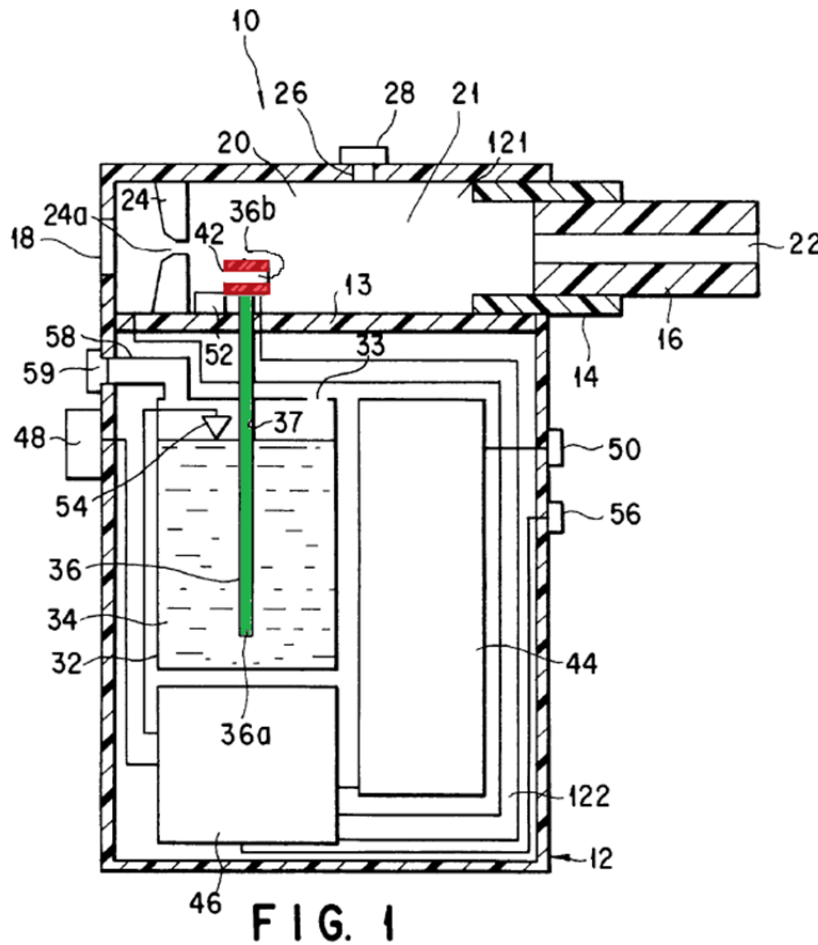


Using the claims as a roadmap and parroting almost identical language, Petitioner and its expert imagine a skilled person "would have readily understood that the horizontal length of the upper chamber *could* be lengthened." Petition at

36 (emphasis added); Ex. 1010 ¶¶69. That is not the test for obviousness. *InTouch Techs., Inc. v. VGO Commc'ns, Inc.*, 751 F.3d 1327, 1352 (Fed. Cir. 2014). As shown in the modified figure below, such a modification makes little sense, and is the result of hindsight.



Even though Takeuchi does not disclose a heating wire, Petitioner points to heaters 42 and 425 and asserts that Takeuchi teaches “the orientation of the heater relative to the longitudinal axis is simply a matter of design choice.” Petition at 34. But this is not true. Takeuchi’s heater 42 has “an inner diameter equal to that of the capillary tube 36,” and thus would only function if it is oriented “in the longitudinal direction of the capillary tube.” Ex. 1003, 6:7-10, 8:43-46; Ex. 2001 ¶¶54. Likewise, heater 425’s contact with “the protruded end of the intercommunicating pore structure 302” would be diminished if its orientation were changed, which would hinder its functionality. Ex. 1003, 10:61-63; Ex. 2001 ¶¶54. The impracticality of these modifications is illustrated below.



Takeuchi's heaters require a specific orientation to function properly. Takeuchi does not teach that heater orientation is "simply a matter of design choice," and does not disclose a heating wire with "a central axis oriented [substantially/generally] perpendicular to [the/a] longitudinal axis of the housing."

d. A skilled person would not have combined Takeuchi with Whittemore

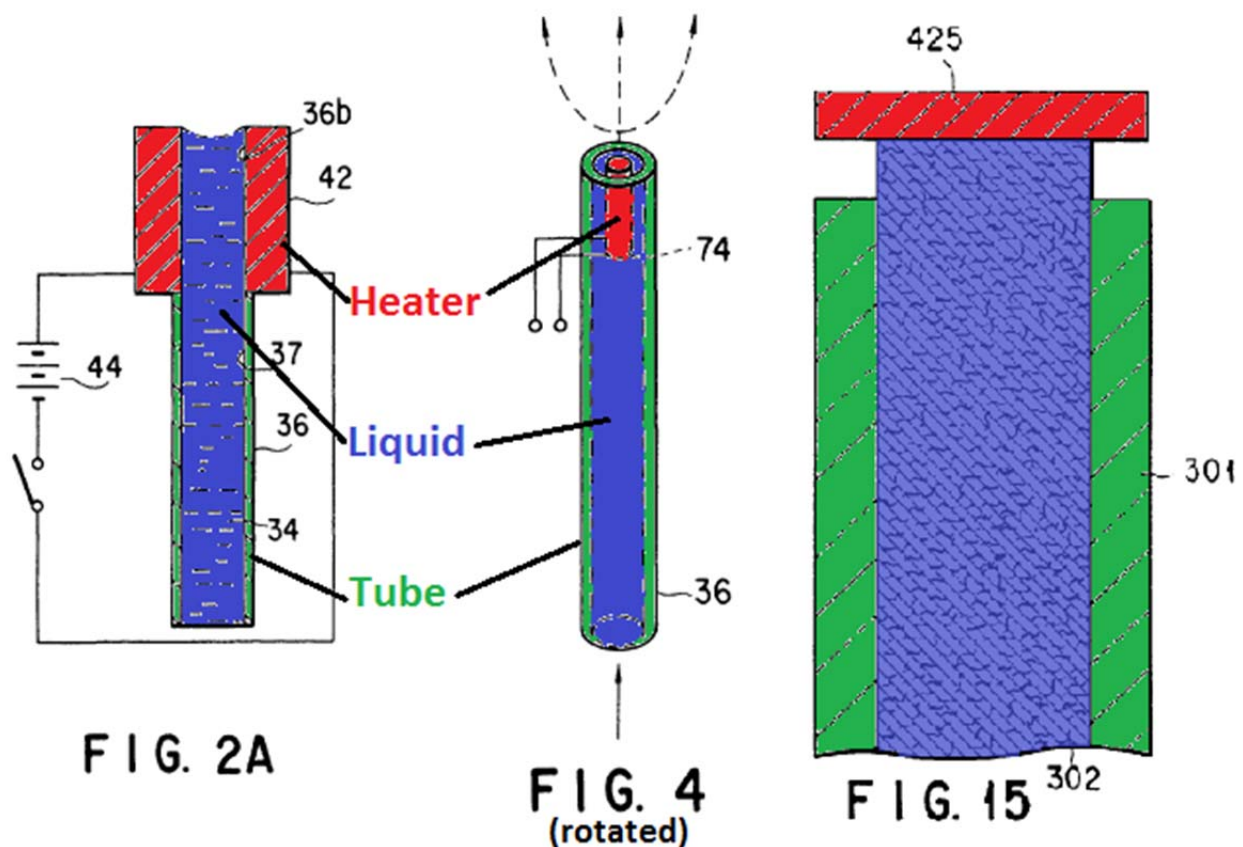
Petitioner does not identify any reason with rational underpinning for combining Whittemore with Takeuchi. *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2007).

Petitioner argues a skilled person would have used Whittemore’s wire in Takeuchi because Whittemore’s wire “achieves good heat transfer.” Petition at 27; Ex. 1010 ¶54. That proposed motivation falls apart under scrutiny.

First, Petitioner and its expert do not explain why a skilled person would have sought better heat transfer in Takeuchi’s device. They do not identify any statements in Takeuchi regarding its adequacy or inadequacy of heat transfer. In considering the same type of conclusory heating efficiency rationale to support proposed prior art combinations, the Board denied review of claims from similar patents. Ex. 2014 at 19, 22 (“Petitioner does not provide sufficient explanation as to why a person having ordinary skill in the art would have wanted to provide ‘more efficient, uniform heating’ in the Hon cigarette.”); Ex. 2019 at 11-12 (“Petitioner does not direct us to, nor do we discern, statements in Higgins with respect to the efficiency—or inefficiency—of heating within the described article.”). The circumstances are no different here.

Furthermore, Takeuchi discloses three different heater shapes: a ring, a rod, and a plate. Ex. 1003, 8:16-25, Figs. 3-7, 10-13, 15. Takeuchi never suggests those heaters are deficient. Indeed, the disclosed heaters would have been durable and easy to manufacture. Ex. 2001 ¶65. Takeuchi's heaters are located in direct or close contact with the liquid, which leads to efficient heat transfer by conduction.

Id. Annotated Figures 2A, 4, and 15 are exemplary:



Petitioner proposes removing Takeuchi's heater 425 and replacing it with "strips of heating wire" in contact with pore structure 302 to permit "more precise control of the amount and location of the porous body to be heated." Petition at

27. Petitioner's proposed combination is inferior to Takeuchi's design. Under Petitioner's proposal, at best only the edges of the wire would be in direct contact with the liquid, leading to less efficient heat transfer. Ex. 2001 ¶¶66. Whittemore teaches that wrapping a wire around a wick leaves the wick "in contact or approximate contact with the heating element." Ex. 1004, 1:50-2:8. Where the wire is only in "approximate contact," heat transfer will be less efficient than in Takeuchi. Ex. 2001 ¶¶66. That contradicts one of Takeuchi's objectives: vaporization on demand when a user puffs on the device. Ex. 1003, 1:59-64, 2:28-29.

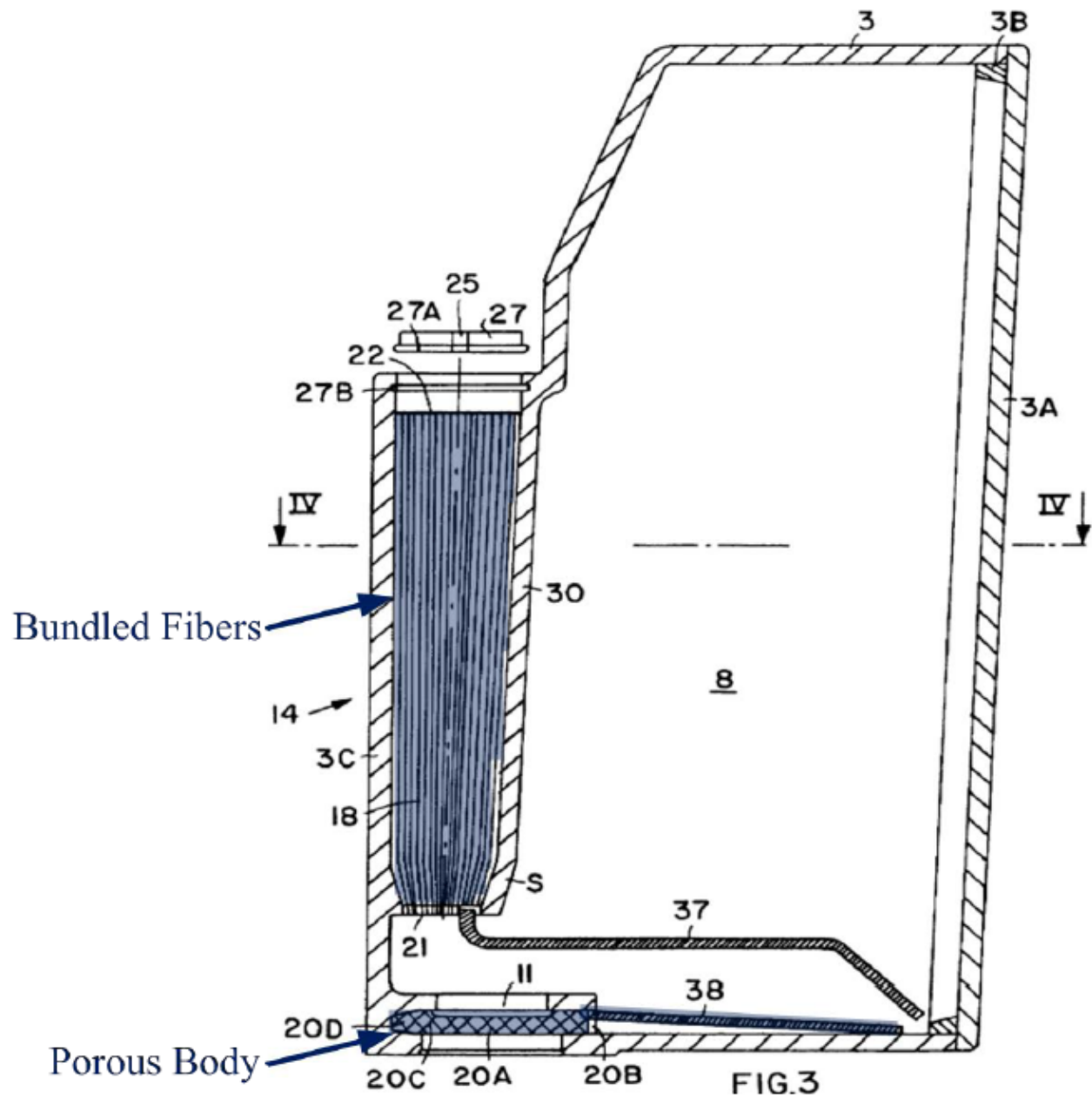
5. Claim 2

Claim 2 depends from claim 1 and is patentable for the reasons discussed with respect to claim 1.

6. Claim 5

Claim 5 depends from claim 1 and requires "the liquid supply compris[e] a fiber material." Petitioner asserts that Gehrler discloses a liquid supply (ink reservoir 8) comprising a fiber material (capillary body 18). Petition at 22-24, 28-32. But as shown in Petitioner's annotated figure below, capillary body 18 is not part of the alleged liquid supply. Ink is stored in reservoir 8, not capillary body 18. Ex. 1006, 6:12-24. Petitioner's expert agrees "Gehrler stores liquid (*i.e.*, ink) in a reservoir 8." Ex. 1010 ¶¶58. Gehrler explains that capillary body 18 is in a separate

chamber 14, divided from reservoir 8 by separation wall 30. Ex. 1006, 1:6-8, 7:62-8:13.

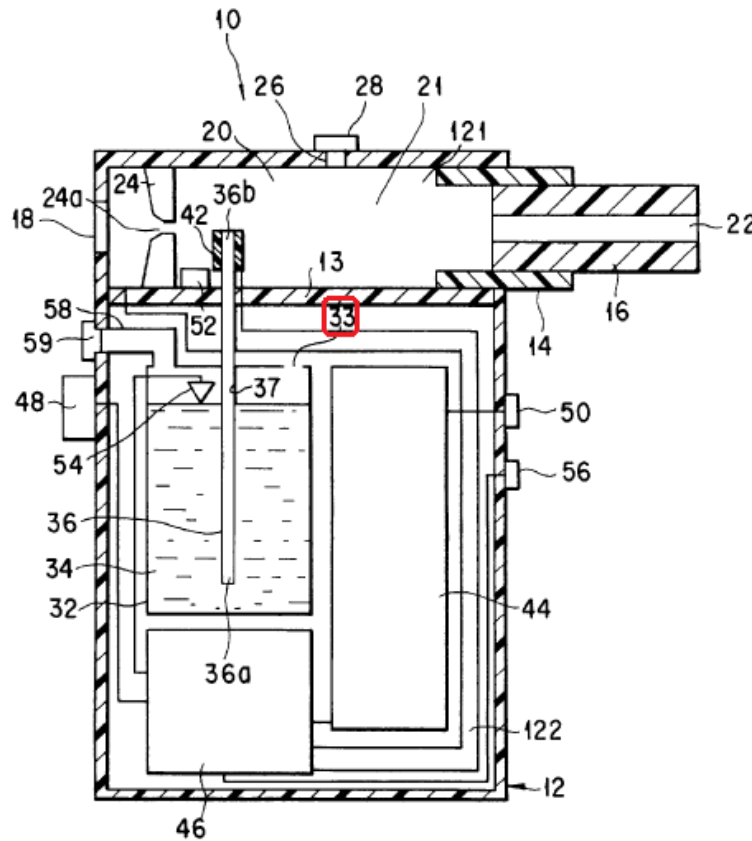


As explained above, a “liquid supply” is a store for liquid, which, in Gehrer, would correspond only to reservoir 8. The object of Gehrer’s container is to improve upon “an ink pot that has a reservoir to hold free ink,” not one filled with

fiber. *Id.*, 1:61-67. But even under Petitioner’s proposed construction, capillary body 18 cannot be part of the “liquid supply.” Capillary body 18 serves only as a pressure equalizer—it does not “supply liquid to the atomizer.” *Id.*, 2:33-36, 8:55-58; Ex. 2001 ¶71. Consequently, a skilled person would not have found a fibrous liquid supply in Gehrler. Ex. 2001 ¶¶101-106.

In any event, a skilled person would not have combined Takeuchi with Gehrler. Petitioner does not identify any reason with rational underpinning for such a combination. *KSR*, 550 U.S. at 418.

Again parroting almost identical language, Petitioner and its expert assert that Takeuchi had a “leak problem” that was “mitigated” but not “completely solved,” thus motivating a skilled person to combine Takeuchi with Gehrler. Petition at 29; Ex. 1010 ¶59. But Takeuchi does not suggest a “leak problem.” Takeuchi’s liquid container 32 was designed with an opening 33 of “sufficiently small diameter so that the liquid flavor source 34 may not leak to the outside therethrough even if the device is inadvertently turned upside down.” Ex. 1003, 5:62-6:3. Opening 33 also “maintain[ed] the inner pressure of the liquid container 32 at an atmospheric pressure.” *Id.*, 5:58-62. Opening 33 is illustrated in Figure 1 below. Given these disclosures, Petitioner’s manufactured reasons for combining Takeuchi and Gehrler disappear. Ex. 2001 ¶78.



Petitioner's expert asserts that the reason Takeuchi's "opening 33 is still a source of leakage [is] because it will capture liquid by capillary action." Ex. 1010 ¶60. Counterintuitively, he proposes "[c]apillary forces within [Gehrer's] capillary body 18" will eliminate the capillary action he finds problematic in Takeuchi's opening. *Id.* ¶62. Opening 33 would not have caused leakage. Ex. 2001 ¶79.

Takeuchi and Gehrer also disclose fundamentally different devices that a skilled person would not have combined. Gehrer discloses an ink container "used for example in an ink jet printer, a writing tip or the like." Ex. 1006, 1:10-11. Takeuchi discloses a "flavor-generating device for enjoying inhalation of flavor."

Ex. 1003, 1:3-8. Takeuchi does not discuss ink jet printers or writing tips, and Gehrler does not discuss enjoying inhalation of flavor.

Gehrler and Takeuchi differ in the liquids they store, which would dissuade a skilled person from combining them. Ex. 2001 ¶76. Gehrler stores ink. Ex. 1006, Abstract. Takeuchi, however, atomizes a liquid flavor source that is inhaled by a user. Ex. 1003, 7:57-63. A skilled person would not have used Gehrler's ink cartridge design in Takeuchi because there is no indication that Takeuchi's liquid flavor source would have been capable of storage in Gehrler's cartridge, much less that the cartridge was proper for holding a liquid to be atomized for inhalation. Ex. 2001 ¶76. What is more, Takeuchi never suggests its liquid container 32 is insufficient in any way.

D. Ground 2: Claims 1, 2, 5, and 8 Are Not Obvious Over Voges and Gehrler

Petitioner has not met its burden of proving a reasonable likelihood of success on Ground 2.

1. Voges

Voges discloses a “dispenser.” A nicotine-containing liquid is stored in a container with a spigot-shaped outlet and coupling that allows fluid to flow to a droplet ejection device (DED) similar to those used in ink-jet or bubble-jet printers. Ex. 1005, 5:58-64. When the user inhales, the DED emits a predetermined number

of liquid droplets to administer a precisely determined dose of nicotine. *Id.* 6:32-

7:3. The device is shown in Figure 2 below.

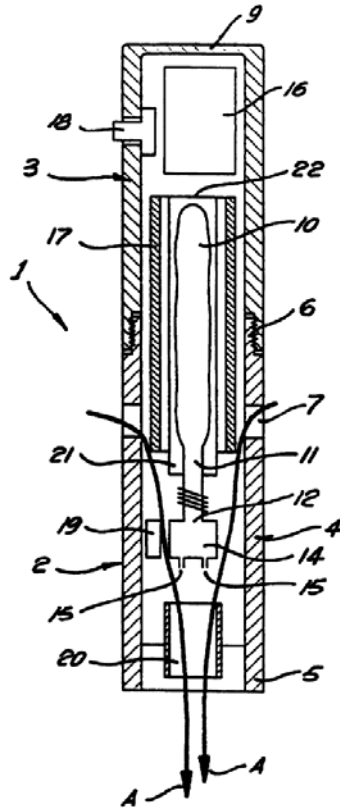


FIG. 2

2. Gehrer

As discussed above in section C.3, Gehrer discloses an “ink container with a capillary action member.”

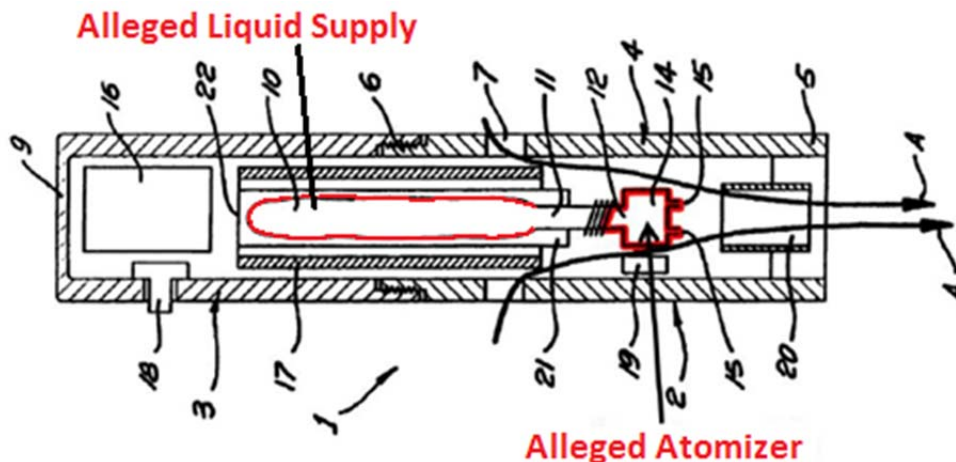
3. Independent Claims 1 and 8

The limitations of independent claims 1 and 8 are discussed above with respect to Takeuchi, Whittemore, and Gehrer. Petitioner asserts these same limitations are rendered obvious by the combination of Voges and Gehrer. Petition

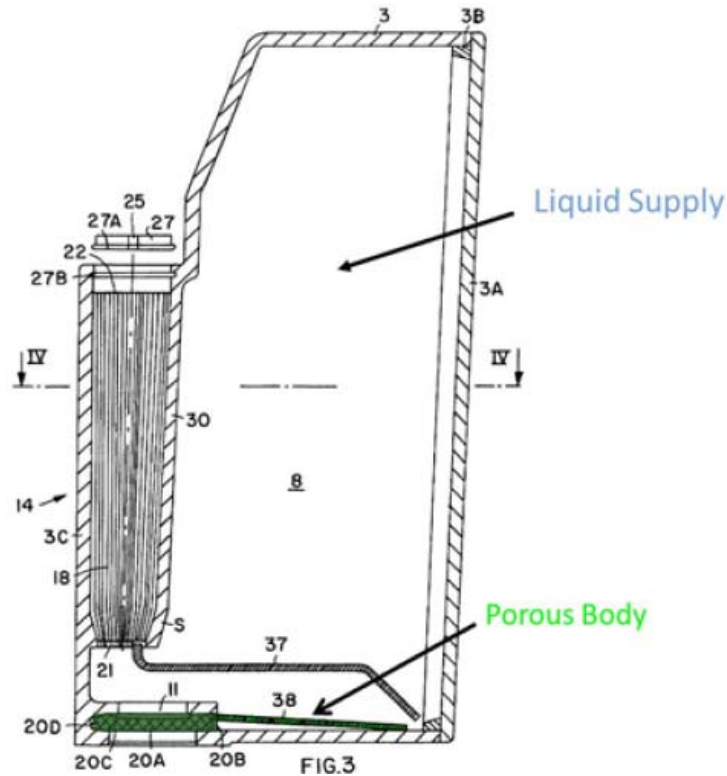
at 62-85. As before, this proposed combination also fails to disclose a porous body projecting into the liquid supply and a heating wire in the claimed orientation.

a. Voges and Gehrer do not teach an atomizer including “a porous body [projecting/extending] into the liquid supply”

Claims 1 and 8 require an atomizer including “a porous body [projecting/extending] into the liquid supply.” In Voges, Petitioner and its expert allege DED 14 is the atomizer and container 10 is the liquid supply. Petition at 69-70, 73; Ex. 1010 ¶86. Those structures are shown below.



Petitioner concedes Voges does not disclose “a porous body [projecting/extending] into the liquid supply” and relies on a combination with Gehrer’s “Ink Container with a Capillary Action Member” patent. Petition at 62, 74-76. Petitioner argues that Gehrer’s wick 38 (shown in the annotated figure below) is porous and “would be part of the atomizer” because it “delivers liquid for atomization” which “facilitates atomization.” *Id.* at 74.



Gehrer's wick 38 cannot be part of the atomizer. Under Petitioner's construction, the wick is part of the liquid supply because it "supplies liquid to the atomizer"—not part of the atomizer, which excludes "components included in other recited parts of the electronic cigarette, such as the liquid supply."

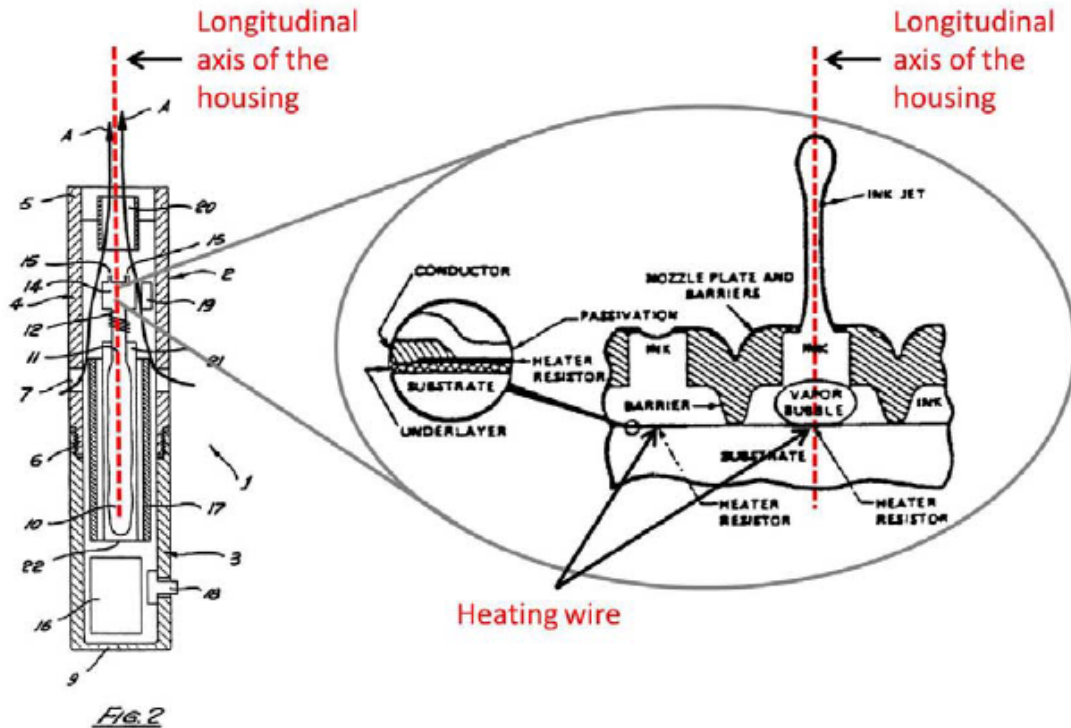
Petitioner's expert confirms that combining Voges with Gehrer would not produce an atomizer with a porous body projecting into the liquid supply. Instead, he argues the combination would produce an atomizer connected to a liquid supply, where the liquid supply contains a porous body. Petitioner's expert states it would have been obvious to replace "Voges's liquid supply (container 10)" with Gehrer and "connect Voges's atomizer (*e.g.*, 12, 14, 15) to the socket 11 provided

in Gehrer's liquid supply." Ex. 1010 ¶88 (emphasis added). Petitioner's expert never says the wick would be part of the atomizer in the proposed combination. Without exception, his arguments focus on modifying or replacing Voges's alleged liquid supply (container 10) while leaving Voges's alleged atomizer (DED 14) unmodified. Ex. 1010 ¶¶86-90, 98. Petitioner admits Voges's alleged atomizer does not include a porous body. Petition at 62. Therefore, the proposed combination cannot disclose an atomizer including a porous body projecting into the liquid supply.

b. Voges and Gehrer do not teach a "heating wire" in the atomizer

All claims require an atomizer with a "heating wire." A "wire" is a "flexible metal thread or rod."

As shown in the annotated figure below, Petitioner asserts that Voges incorporates the Ink-Jet Guide (Ex. 1007) and that the Guide discloses a heating wire inside Voges's droplet ejection device (DED) 14. Petition at 18-22, 77-80.



Voges' DED 14 uses thin film resistors, not heating wires. Ex. 1005, 4:6-8; *see also* Ex. 1007 at 14. In a companion publication relating to the Ink-Jet Guide's printhead, Hewlett-Packard discloses the thin film resistor as a resistor *layer*, not a wire. Ex. 2002 at 28; Ex. 2001 ¶88. HP discloses the thin film resistors within the printhead as "50 to 100 μm square." Ex. 2002 at 23. That is about the same size as a dust particle. Ex. 2001 ¶99.

A thin film resistor is not a "flexible metal thread or rod." It is shaped and structured more like a thin sheet of metal, which the '628 patent expressly distinguishes from a "wire." Ex. 1001, 2:47-52 ("A heating element 26, which can be made of platinum wire...can also be made into a sheet form..."). Petitioner attempts to gloss over the lack of a heating wire by simply adding "*i.e.* thin film

resistor” each time it identifies the purported heating wire. Petition at 20, 77-78.

But Petitioner’s semantic sleight of hand cannot change the prior art’s disclosures.

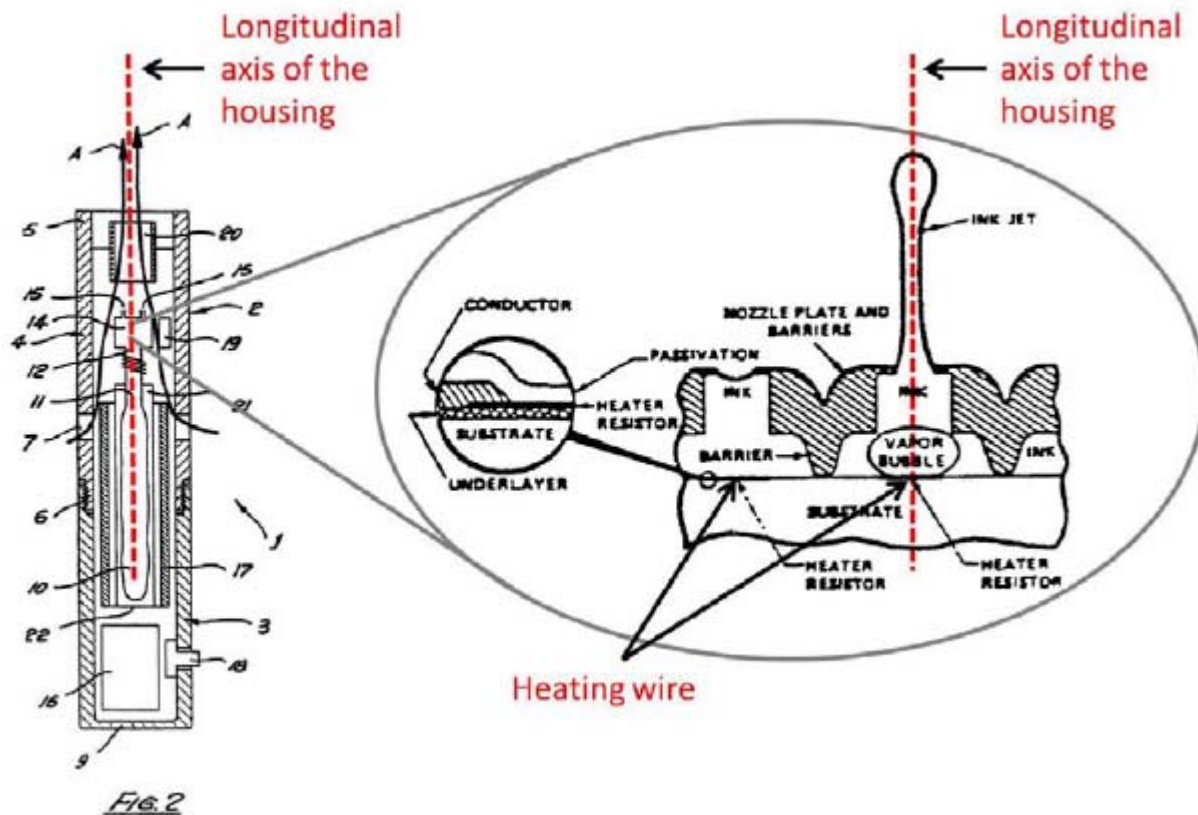
Petitioner’s expert points to Kanke, Dux, and Emmma to support his assertion that “thin film resistors us[e] thin film wires.” Ex. 1010 ¶¶99. But, like the ’628 patent, Kanke distinguishes between wire and thin film “heating resistor[s].” Ex. 1020, 1:23-26. Wire resistors are “constructed by winding a platinum wire around a bobbin and then coating the wire with glass,” and thin film resistors “by forming a thin film resistor on a ceramic substrate or a silicon substrate.” *Id.* Dux does not disclose any “thin film wire.” Rather, Dux relates to “the fabrication of multi-layer thin film structures” to form a “three-dimensional wiring matrix” for integrated circuits, a process the patent refers to as “thin film wiring”—using the term “wiring” in the sense of “making electrical connections.” Ex. 1021, 1:16-27; Ex. 2001 ¶¶89. Emmma discloses a “thin film wire” connected to a thin film transistor (TFT), but like Dux, the “thin film” is for making electrical connections in integrated circuits—not for generating heat. Ex. 1022, 1:11-18, 6:4-8, 7:33-38; Ex. 1021, 1:24-27; Ex. 2001 ¶¶89.

Petitioner’s expert further asserts that “coils, straight wires or rods, thin film wires, plates, etc.” are all interchangeable, and “[s]electing any shape over another would have been an obvious design choice.” Ex. 1010 ¶¶99. But he fails to explain how Voges’ purported atomizer, which “is of the kind used in a bubble jet printer”

(Ex. 1005, 5:61-64), could function with a wire, rod, coil, or any type of heating element other than a “thin film resistor.” The law requires some reason to modify *Voges* to use a wire instead of a “thin film resistor.” *KSR*, 550 U.S. at 418; *ActiveVideo*, 694 F.3d at 1327. And as Petitioner and its expert point out, *Voges* teaches away from using a “wire.” Petition at 78 (“[A] thin film resistor, would have been well adapted for use in this application, as *Voges* teaches, because it would reduce the space requirements of the droplet ejection device 14.”).

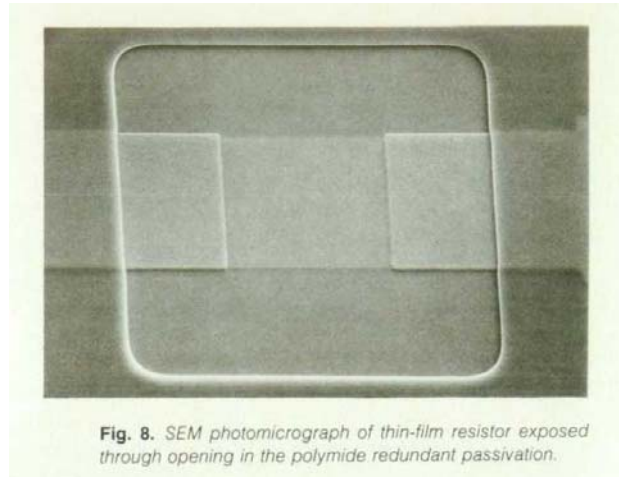
c. Voges and Gehrler do not teach orienting a heating wire perpendicular to the longitudinal axis of the housing

Claims 1 and 8 require the heating wire to have “a central axis oriented [substantially/generally] perpendicular to [the/a] longitudinal axis of the housing.” *Voges* does not disclose the orientation of its “thin film resistors.” It only discloses that they are typically “located directly behind each nozzle.” Ex. 1005, 4:9. Consequently, based on the illustration below, Petitioner asserts that the Ink-Jet Guide (not *Voges*) teaches that the thin film resistor’s “central axis” is “perpendicular to the direction in which the liquid is expelled.” Petition at 78.

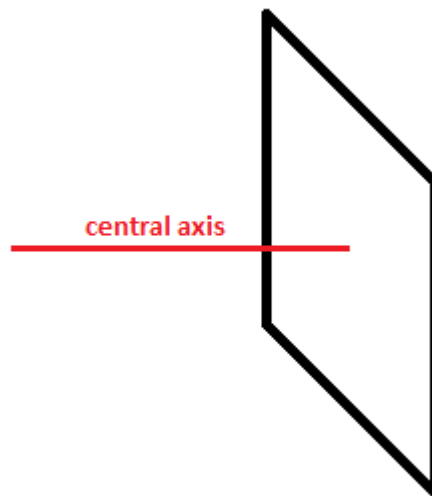


But the thin film resistor disclosed in the Ink-Jet Guide is about “50 to 100 μm square,” roughly the size of a dust particle. Ex. 2002 at 23; Ex. 2001 ¶¶93-94, 100. The housing of the Voges device is large enough to be handheld. Given this radical difference in scale, the dimensions and orientation of one cannot reasonably be compared to the other.

Even if the dimensions were comparable, the thin film resistor is a “square.” Ex. 2002 at 23. Hewlett-Packard published a scanning electron microscope photomicrograph of one of the thin film resistors disclosed in the Ink-Jet Guide, confirming its shape. *Id.* at 30.

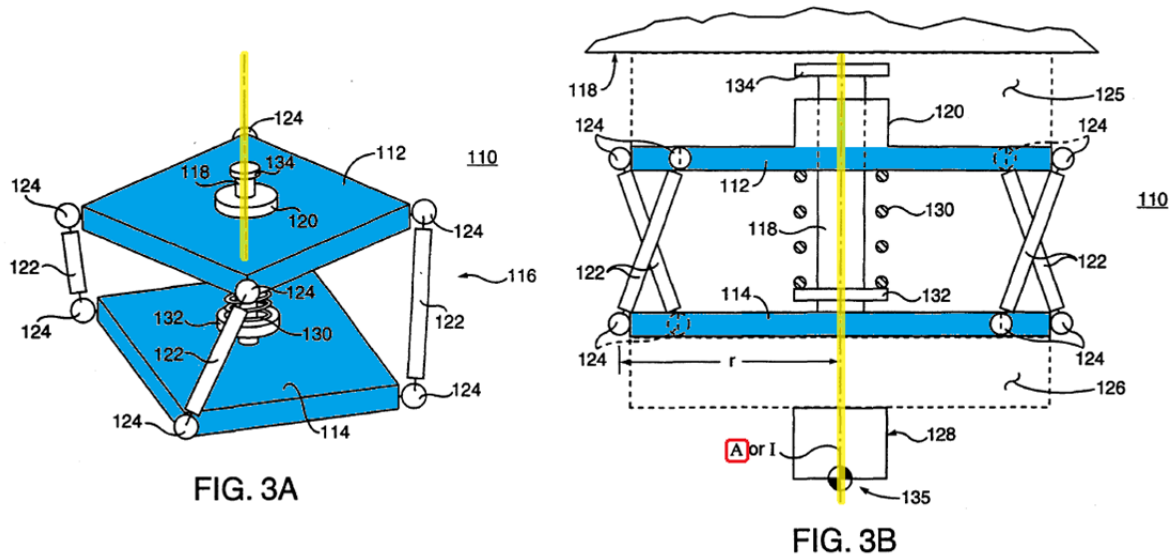


The “central” axis of a square runs through its *center*, not along its plane, as shown in the figure below. Ex. 2001 ¶94.



Petitioner’s expert agrees. Petitioner’s expert is a named inventor on a patent for an assembly apparatus. Ex. 2084 Inventors. One embodiment of his patented apparatus includes two “polygonal (e.g., square) plates 112 and 114,” depicted below (in blue) in Figures 3A and 3B. *Id.* 7:13-18. He describes the location of the connecting joints by reference to “the central axis A of the central

shaft 118 and plates 112, 114 (FIG. 3B).” *Id.* 7:39-42. Thus, while Petitioner asserts that the thin film’s plane is perpendicular, its central axis is not.



d. A skilled person would not have combined Voges and Gehrer

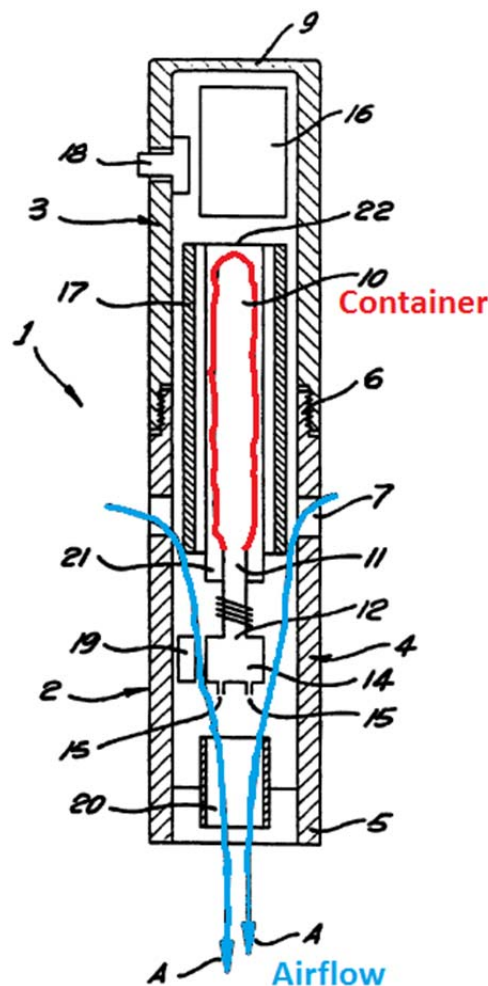
First, Gehrer is non-analogous art to Voges. A reference is analogous to another if it is from the same field of endeavor or if it “is reasonably pertinent to the problem faced.” *See* M.P.E.P. 2141.01(a); *Circuit Check Inc. v. QXQ Inc.*, 795 F.3d 1331, 1335 (Fed. Cir. 2015). Gehrer does not fit in the first category. Voges discloses a dispenser that vaporizes liquid for inhalation and references the Ink-Jet Guide, which discloses a DED that Voges hopes to repurpose. Ex. 1005, 3:62-4:17; Ex. 1007 at 14. Gehrer does not share the common ground of liquid vaporization, but instead discloses an ink cartridge unrelated to atomization.

There is no overlap in the Patent Office fields of search that appear on the face of Voges and Gehrer. Ex. 1005; Ex. 1006. Furthermore, Gehrer is not relevant to the problems addressed by the '628 patent: slow absorption of nicotine in preexisting cigarette substitutes and the failure of those substitutes to satisfy the habitual actions of a smoker. Ex. 1001, 1:45-52; Ex. 2001 ¶108. In any case, Voges purports to solve some of the problems identified in the '628 patent without reliance on Gehrer. Ex. 1005, 3:1-30.

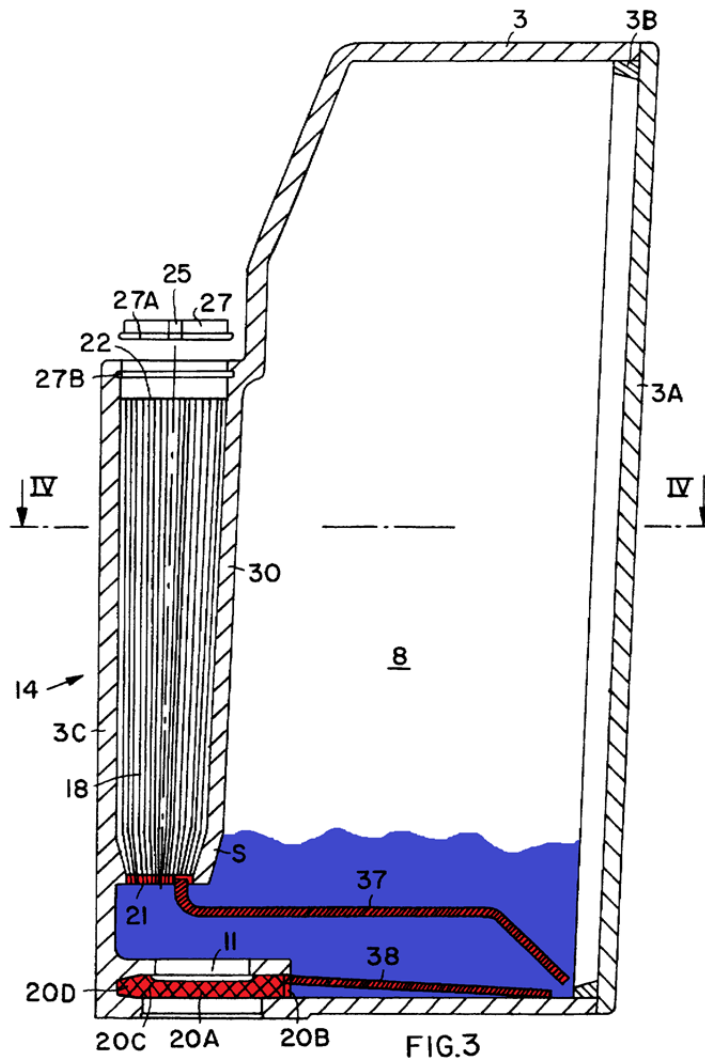
Petitioner asserts that Voges suffers from leakage, pressure problems in the liquid supply, and drying out, and that a skilled person would have looked to Gehrer for a solution. Petition at 63-65. Petitioner rightly states that “Voges does not even address these issues”—because none of them were problems. *Id.* at 65. Voges discloses that container 10, coupling 11, inlet 12, and DED 14 are sealed except for orifices 15, which eject liquid. Ex. 1005, 5:58-61, 6:37-40. And Voges’s collapsible bladder already accounts for pressure changes. *Id.*, 4:17-20; Ex. 2001 ¶109. In light of these disclosures, and Petitioner’s expert’s opinion that the “Voges device also automatically replenishes liquid consumed by the atomizer,” Ex. 1010 at 74, a skilled person would have had no reason to look to Gehrer.

Petitioner’s expert argues that a user inhaling on Voges would result in “excess internal pressure within the container 10 relative to the negative pressure

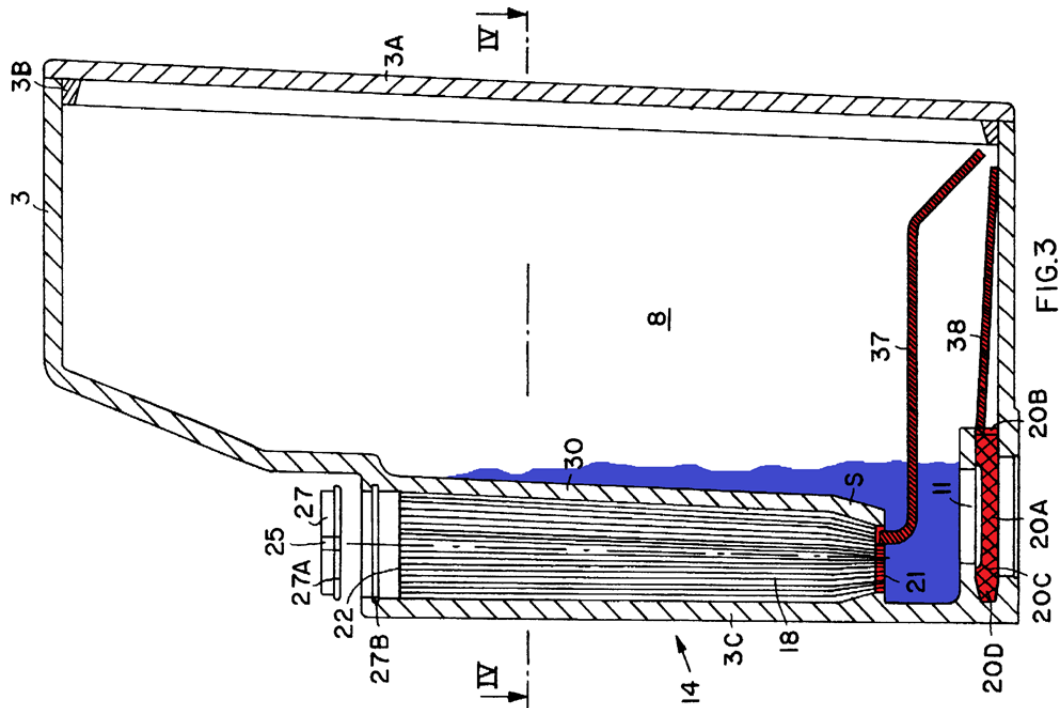
environment surrounding the container 10,” which would force liquid to leak out of the collapsible bladder. Ex. 1010 ¶90. This argument is hindsight. Voges discloses that air does not flow past container 10. Ex. 1005, 5:51-54, 6:2-5, Fig. 2 (annotated below). Without air flowing past the container, a “negative pressure environment surrounding the container 10” would not be able to form. Ex. 2001 ¶111. And because liquids are generally incompressible, a “user inhaling” would not create enough of a pressure change to influence the liquid in the bladder even if it were in the airflow path. *Id.*



Petitioner’s proposed combination would not have solved these alleged problems in any event. Voges is intended to be a “cigarette substitute.” Ex. 1005, 3:29-30. Cigarettes function regardless of orientation. Ex. 2001 ¶112. Gehrer’s “Ink Container” is designed to be used upright to keep coupling member 20, facing end 21, and wicks 37 and 38 wetted with ink. Ex. 1006, 8:14-37. Gehrer prefers ending these wicking elements “in a lowest spot that may be formed as a sink in the container,” as shown in the annotated figure below. *Id.*



Gehrer teaches “[t]his continuous wetting is important because if these areas dry out, the operability may be impaired.” *Id.*, 5:24-25. If the container were turned sideways like a cigarette, as shown below, those components would dry out, and liquid may leak out of vent 25. Ex. 2001 ¶112.



Gehrer was designed to be used in only one orientation: upright. *Id.*; Ex. 1006, 5:24-25. Turned sideways, Gehrer is susceptible to drying out and leaking. Turned upside-down, liquid may not reach wick 38, which is necessary in Petitioner’s proposed combination for the atomizer to function.

A skilled person also would not have combined Voges and Gehrer because the combination would have required a major redesign. *In re Ratti*, 270 F.2d 810, 813 (C.C.P.A. 1959). Petitioner argues that Gehrer’s fiber material accommodates

pressure changes, helps control liquid transport, and prevents leakage, thus a skilled person “would have been motivated to simply substitute Gehrer’s liquid supply for the liquid container 10 of Voges.” Petition at 64. But the bulky shape of Gehrer’s ink container is not compatible with Voges’ slender container 10 and coupling 11. Ex. 1005, 6:31-35; Ex. 2001 ¶113. Thus, a skilled person would need to either redesign Gehrer’s chamber to fit within Voges or redesign Voges to accommodate Gehrer’s cumbersome container. Ex. 2001 ¶113. Either way, the structures disclosed in Voges and Gehrer could not have been reasonably combined. *Id.* Altering the references to combine them would have involved cost and complexity that a skilled person would have wanted to avoid. *Id.* ¶114. Indeed, HP describes the years of effort required to develop the printhead and ink container disclosed in the Ink-Jet Guide. Ex. 2002 at 10, 25, 27.

e. Voges does not incorporate the Ink Jet Guide, and a skilled person would not have combined the two references

Petitioner treats Voges and the Ink-Jet Guide as a single reference. Petition at 19-20, 77-78. But Voges did not properly incorporate the Ink-Jet Guide’s teachings. Voges says that “thermal devices are broadly described” in the Ink-Jet Guide and purports to incorporate the entire document. Ex. 1005, 3:66-4:5. That approach is insufficient. The “host document must identify with detailed particularity what specific material it incorporates and clearly indicate where that

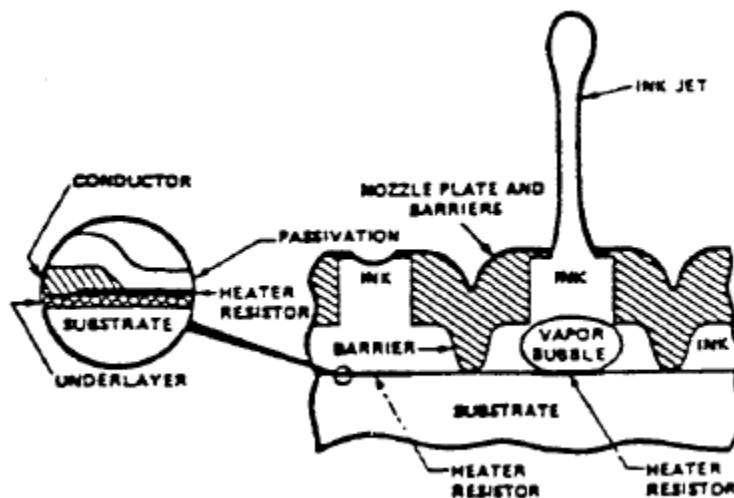
material is found.” *Advanced Display Sys., Inc. v. Kent State Univ.*, 212 F.3d 1272, 1282 (Fed. Cir. 2000). Voges fails to identify any “specific material” from the Ink-Jet Guide.

A skilled person also would not have combined Voges with the Ink-Jet Guide. In the Ink-Jet Guide, the droplet size is too large for human therapeutic delivery. Ex. 2001 ¶95. The Ink-Jet Guide discloses drops with an approximate diameter of 70 microns. Ex. 1007 at 19; Ex. 2001 ¶95. To reach the lungs, droplets for human therapeutic use should have diameters of about 1-5 microns. Ex. 1005, 5:1-5; Ex. 2001 ¶95. To avoid this problem, Voges suggests scaling down the Ink-Jet Guide’s printhead. Ex. 1005, 4:51-53. While theoretically possible, practically, that scaling would have required extensive research and development. Ex. 2001 ¶96.

Regardless, a skilled person would not have used the printhead because it suffers from several design and operational limitations. *Id.* ¶97. The printhead’s nozzles, plates, and barriers are subject to fouling, plugging, and dripping and must be maintained in order to assure reliable droplet formation. *Id.* ¶98. Continuous droplet formation causes liquid to accumulate around the nozzles, the nozzles become saturated with residual liquid, and debris can clog the nozzles. *Id.* Further, if the device is not in use even for short periods, liquid evaporates, becomes more viscous, and plugs the nozzles. *Id.* ¶100. Voges’ suggestion of a

scaled down device would be even more susceptible to issues with fouling, plugging, and dripping.

Plugging would have been a real concern because of the microscopic size of the nozzles. *Id.* ¶¶99. As shown in Figure 2 of the Ink-Jet Guide (below), the printhead nozzle's diameter is roughly the same as the thin film resistor's length. As discussed above, these thin film resistors are about the size of a dust particle. Ex. 2002 at 23; Ex. 2001 ¶¶99. Given the extremely small size of the nozzles, dust particles in the environment would have created a frequent risk of plugged nozzles and poor droplet generation. Ex. 2001 ¶¶99. Indeed, the Ink-Jet Guide recognizes that dust particles “could result in a partial or complete obstruction of a nozzle,” depending on their size and location. Ex. 1007 at 24.



The tendency of the printhead to clog would have frustrated Voges' objective of providing a therapeutic substance “on demand” when a user requested a dose or inhaled on the device. Ex. 1005, Abstract, 3:33-67, 5:8-10. *Broadcom*

Corp. v. Emulex Corp., 732 F.3d 1325, 1335 (Fed. Cir. 2013) (upholding jury verdict of nonobviousness where proposed prior art combination “would not have worked for its intended purpose”); *In re Ratti*, 270 F. 2d at 813; M.P.E.P. 2143.01(VI).

4. Claim 2

Claim 2 depends from claim 1 and is patentable for the reasons discussed with respect to claim 1.

5. Claim 5

As explained above with respect to Takeuchi, Claim 5 depends from claim 1 and requires “the liquid supply compris[e] a fiber material.” As with Takeuchi, Petitioner asserts that Gehrler discloses a liquid supply (ink reservoir 8) comprising a fiber material (capillary body 18). Petition at 83-85; *see also id.* at 22 (“Gehrler’s container includes a liquid supply (*i.e.*, ink reservoir 8)”). As explained above, capillary body 18 is not part of the alleged liquid supply. A skilled person would not have found a fibrous liquid supply in Gehrler. Ex. 2001 ¶¶102-106.

E. The Unrebutted Objective Evidence of Nonobviousness Further Confirms That the Claims of the ’628 Patent Are Not Obvious

1. The Objective Evidence Must Be Considered in Every Case

Objective evidence of nonobviousness must be considered in every case.

WBIP, LLC v. Kohler Co., 829 F.3d 1317, 1328 (Fed. Cir. 2016) (noting that the

Federal Circuit “ha[s] repeatedly stressed that objective considerations of non-obviousness must be considered in *every* case”) (emphasis in original). “It is the secondary considerations that are often most probative and determinative of the ultimate conclusion of obviousness or nonobviousness.” *Pro-Mold & Tool Co. v. Great Lakes Plastics, Inc.*, 75 F.3d 1568, 1573 (Fed. Cir. 1996). The Supreme Court explained the reason for this is to “guard against slipping into use of hindsight.” *Graham v. John Deere Co.*, 383 U.S. 1, 36 (1966). Thus, evidence regarding objective considerations can render claims nonobvious and patentable, even if the petitioner’s prior art references teach all limitations of the claims. *See, e.g., WBIP*, 829 F.3d at 1328-37 (affirming denial of JMOL on obviousness, although prior art undisputedly taught all elements of the claims, in view of objective considerations); Ex. 2017 at 35-41, 45-47 (finding evidence of commercial success and copying outweighed petitioner’s evidence relating to obviousness).

2. Petitioner Knew Of, But Ignored, Fontem’s Objective Evidence

Despite knowing that Fontem previously explained the objective evidence for the ’628 patent in detail in publicly-available IPR proceedings submitted over a year before the Petition was filed, Petitioner and its expert ignored the objective evidence in the Petition. *See* Ex. 2018; Ex. 2011. Indeed, in a brief filed in co-

pending litigation a full month before filing the Petition, Petitioner cited the prior IPRs and stated it “expects that Fontem will likely contend that the alleged commercial failures of Premier, Eclipse, Accord, and possibly other alternative smoking devices developed by U.S. tobacco companies, are evidence of ‘failure of others’ that is relevant to alleged non-obviousness of the Fontem patents.” Ex. 2004 at 11.

Despite this knowledge and expectation, the Petition does not even mention the objective evidence, and Petitioner’s expert’s declaration only included a single boilerplate statement (“I am not aware of any secondary considerations *that would change my opinions*”). Ex. 1010 ¶105 (emphasis added). In fact, the Board has previously denied a petition where a petitioner was aware of and “had the opportunity to address [the patentee’s objective] evidence, but failed to do so in its Petition.” Ex. 2009 at 3 (denying a petitioner’s request for rehearing where the petitioner knew a patent owner’s objective indicia, but simply included a single boilerplate sentence in the petition); Ex. 2096 at 9-10 (declining to institute petition for *inter partes* review where petitioner failed to “address the compelling evidence of secondary considerations set forth during prosecution and in the Preliminary Responses in the earlier proceedings”). In the present case, Petitioner’s strategic decision to ignore the well-known objective evidence of nonobviousness regarding the ’628 patent leaves Fontem’s evidence unrebutted.

3. The Objective Evidence of Nonobviousness is Substantial

The objective evidence of nonobviousness is substantial for the '628 patent. As described in more detail below, R.J. Reynolds, which is related to Petitioner,¹ and other major tobacco companies unsuccessfully tried for decades to create an acceptable substitute to the combustible cigarette. Indeed, these companies' own patents and publications repeatedly emphasized the long felt but unresolved need for an acceptable cigarette substitute. This need was met by Hon Lik's invention in the '628 patent. As confirmed by industry praise from many independent, non-interested sources, Hon Lik is widely considered the inventor of the modern electronic cigarette that sparked an entire industry. In view of the unrebutted evidence of substantial objective indicia, Petitioner's obviousness arguments should be rejected.

a. The long felt but unresolved need for an acceptable smoking substitute

Evidence of a long felt but unresolved need for the solution offered by the patented invention supports nonobviousness. *Graham*, 383 U.S. at 17-18. R.J.

¹ For purposes of this response, "R.J. Reynolds" refers to R.J. Reynolds Tobacco Company ("RJR"). Petitioner and RJR are currently wholly-owned subsidiaries of Reynolds American, Inc. ("Reynolds"). Ex. 2030; Ex. 2031; Ex. 2032 at 2, 8.

Reynolds and other major tobacco companies have long recognized the continued need for a cigarette substitute acceptable to consumers.

For example, in 1988, R.J. Reynolds filed a patent application that described the problem yet to be solved: “it would be desirable to provide a smoking article which can provide the sensations of a cigarette or pipe smoking, which does not burn tobacco or other material, and which does not produce combustion products.” Ex. 2011 ¶117 (quoting Ex. 2028, 3:56-60). As explained by R.J. Reynolds, however, “[d]espite many years of interest and effort, none of the [prior art electronic devices] has ever realized any significant commercial success” or “is capable of providing the user with the sensations of cigarette or pipe smoking.” *Id.* ¶119 (quoting Ex. 2028, 3:49-55).

Similarly, in 1991, Philip Morris applied for a patent stating that non-burning smoking substitutes have advantages over combustible cigarettes, such as “giv[ing] the user the sensation and flavor of smoking without actually creating some of the smoke components associated with combustion.” *Id.* ¶118 (quoting Ex. 2058, 2:55-58). And in 1999, Philip Morris applied for another patent “relat[ing] to a smoking article in which the sensations associated with the smoking of tobacco are achieved without the burning of tobacco.” *Id.* ¶118 (quoting Ex. 2057, 1:7–10).

In 2006, tobacco industry analyst Bonnie Herzog noted the continued existence of the same problems: “[t]here is no question current smokers want a reduced-risk product, ... [b]ut it has to taste, drag, smell, burn, and look like a regular cigarette.” *Id.* ¶120 (quoting Ex. 2029 at 2). To meet the persistent need for an acceptable cigarette substitute, Hon Lik designed a device that simulated smoking. *Id.* ¶121. As described in the ’628 patent, Hon developed his invention to meet the need for a “cigarette substitute” that “simulat[es] a cigarette that looks like a normal cigarette” and that “satisf[ies] habitual smoking actions of a smoker.” *Id.* (quoting Ex. 1001, 1:49-62, 4:48-52).

Another well-known electronic cigarette company, NJOY, likewise recognized the long-felt need for an alternative to traditional cigarettes and that electronic cigarettes satisfied that need. *Id.* ¶126. In 2007, NJOY described its electronic cigarette as “a new alternative offering a solution that many smokers have long sought.” *Id.* (quoting Ex. 2086). NJOY also touted that its product “simulates the smoking experience by emitting a vapor mist that dissipates in seconds” and noted that the top reason people purchased the product was because it was “[j]ust like smoking.” *Id.* In a presentation to the Office of Management and Budget in November 2013, NJOY argued that smoking is the “nation’s leading public health problem” and that “[e]-cigarettes are a desperately needed new approach to stopping tobacco smoking,” including because they can match the

“[v]isual, motor, and psychological features of cigarettes” and “[s]tyle of nicotine delivery.” *Id.* (quoting Ex. 2087 at 1, 5).

As explained in more detail below, novel features of the ’628 patent met this long-felt need, thus establishing a nexus. *Id.* ¶129.

b. Failure of others to create an acceptable smoking substitute

Evidence that others in the art tried and failed to develop inventions similar to what was patented demonstrates nonobviousness. *Graham*, 383 U.S. at 17-18. Over the years, R.J. Reynolds and other tobacco companies repeatedly tried and failed to create a smoking substitute acceptable to customers. Ex. 2011 ¶131.

For example, in 1988, R.J. Reynolds released Premier, a product that heated tobacco pellets in lieu of burning and that reportedly cost over \$1 billion to develop. *Id.* (citing Ex. 2034 at 3-4). But R.J. Reynolds “scrapped the brand in early 1989, less than a year after it was introduced.” *Id.* (quoting Ex. 2034 at 4). Premier’s failure in the marketplace was widely recognized. *Id.* (citing additional documents).

Then, in 1994, R.J. Reynolds released a product called Eclipse that “include[d] a charcoal tip that, when lighted, heats glycerin added to the cigarette but does not burn the tobacco.” *Id.* (quoting Ex. 2034 at 4). But, like prior attempts, Eclipse was a failure. *Id.*

In the late 1990s, Philip Morris tested a product called Accord “that include[d] a battery charger, a puff-activated lighter that holds the cigarette, and a carton of special cigarettes.” *Id.* “To smoke the cigarettes, a smoker sucks on the kazoolike box” and a “microchips senses the puff and sends a burst of heat to the cigarette.” *Id.* The process does not create any smoke or ash. *Id.* But “the product was rather large and awkward to use, and never caught on.” *Id.* (quoting Ex. 2025 at 16).

Then, in 2006, Philip Morris developed a Heat Bar system that included “a rechargeable heating box where you would insert a cartridge that contained tobacco.” *Id.* (quoting Ex. 2025 at 17). “When you puffed on it, the tobacco would heat and produce smoke, but only for the smoker.” *Id.* But the device was not “very satisfying” because a user “couldn’t get a consistent smoke” and it “had a strange ‘papery’ taste to it.” *Id.*

Thus, despite their efforts to design an acceptable cigarette substitute, as of 2006, the attempts by R.J. Reynolds and Philip Morris had “not been commercially successful.” *Id.* ¶136 (quoting Ex. 2029 at 1-2). As noted by tobacco industry analyst David Adelman in 2006, even after 20 years of working to develop an acceptable substitute, “[i]f there is real innovation and an acceptable product that is substantially lower in risk, it has the potential to be a game-changer for the entire industry[.]” *Id.* (quoting Ex. 2029 at 1). According to Mr. Adelman, even in 2006,

“[c]oming up with an acceptable reduced-risk product that doesn’t compromise taste” was still the “Holy Grail” for the industry. *Id.* At the same time, analyst Bonnie Herzog noted that any reduced-risk product would need to “to taste, drag, smell, burn and look like a regular cigarette.” *Id.* (quoting Ex. 2029 at 2). For the products on the market at the time, “no product ha[d] come close.” *Id.* All of the previous efforts to design and market an acceptable cigarette substitute were failures. *Id.* ¶¶136-137.

Many of the failed prior efforts to develop a cigarette substitute are identified and summarized in the following graphic from an industry publication. *Id.* ¶137 (reproducing graphic from Ex. 2025 at 16-17).



In contrast to previous failed efforts, Hon Lik designed a device that satisfied the long felt but unfulfilled need for a smoking substitute that simulated the feel and experience of a cigarette without burning tobacco. *Id.* ¶138. As disclosed in the '628 Patent, Hon's invention was designed to create a "cigarette substitute[]" that "simulat[es] a cigarette" and that "satisf[ies] habitual smoking actions of a smoker." *Id.* ¶121 (quoting Ex. 1001, 1:49-62, 4:48-52).

The features claimed in the '628 patent distinguish Hon's invention from the industry's failed earlier efforts to design an acceptable cigarette substitute, including in particular the atomizer design. *Id.* ¶¶121-122, 135. For example,

Patent Owner's expert previously explained that independent claims 1 and 2 recite an "atomizer" in contact with a "liquid supply," which creates liquid flow that maintains equilibrium. *Id.* ¶122. When a user puffs on the claimed device, liquid moves into the atomizer and is vaporized. *Id.* (citing Ex. 1001, 3:29-54). Then, capillary action created by pores in the atomizer automatically draws the liquid out of the liquid supply into the atomizer to replace the atomized liquid. *Id.* (citing Ex. 1001, 3:55-63).

The claimed design creates a vapor that simulates real smoke without being too wet or dry by efficiently regulating the amount of liquid provided. *Id.* If not enough liquid were provided, a user could inhale hot dry air that might burn the mouth, tongue, throat, and lungs. *Id.* On the other hand, if too much liquid were provided, large liquid droplets could form that stick to the tongue or the back of the throat, causing discomfort and preventing efficient absorption. *Id.* The design of the conjoined porous body and liquid supply claimed in the '628 patent created an improved cigarette alternative that provided a feel and experience for a user like that of using a normal cigarette. *Id.*

In addition to creating a better vapor, the atomizer's self-regulating liquid flow design for transporting liquid through the device is also less expensive than complicated mechanisms used in the prior art such as pumps, tubes (e.g., Takeuchi), and valves. *Id.* ¶123. The claimed atomizer design simplifies liquid

flow by allowing liquid to move directly from the liquid supply into the atomizer without the need for an intermediate component connecting them. *Id.* ¶124. The claimed design also allows for a more compact electronic cigarette device that more closely resembles a regular cigarette by including a liquid supply and atomizer in direct contact, with all the other claim elements connected in series in an elongated housing. *Id.*

Independent claims 1 and 8 also include a heating element within a cavity in the atomizer oriented substantially or generally perpendicular to the device axis. The cavity and heating element create a controlled environment for atomization in which large droplets are absorbed by the walls of the cavity, which prevents inhalation of large droplets by users, thus improving the user experience and more closely simulating a normal cigarette. *Id.* ¶122 (citing Ex. 1001, 3:55-63). Additionally, independent claims 1 and 8 include inlets on the housing that create back pressure or resistance when a user puffs on the device. *Id.* ¶124 (citing Ex. 1001, 3:29-30, 3:45-63). The back pressure created by the inlets gives the user a sensation of puffing and inhaling on a real cigarette. *Id.*

As previously explained by Patent Owner's expert, novel features of the '628 patent, including in particular the atomizer design (in contact with a liquid supply) and other features discussed above (a heating wire oriented substantially or generally perpendicular to the device axis, and air inlets), simulate the same feel

and experience as a normal cigarette without burning tobacco and contribute to a more authentic simulated cigarette and user experience. *Id.* ¶¶121-122, 138. In addition, several publications and media sources state that electronic cigarettes have become popular with consumers because they offer the same feel and experience as a normal cigarette without burning tobacco. *Id.* ¶¶127-128. Accordingly, there is a nexus between the claimed invention, the evidence of others' failures, and the solution to the long-felt need. *Id.* ¶¶127-129.

c. Industry recognition and praise for Hon Lik's invention

Evidence of industry praise supports nonobviousness. *Transocean Offshore Deepwater Drilling, Inc. v. Maersk Drilling USA, Inc.*, 699 F.3d 1340, 1351-52 (Fed. Cir. 2012). Hon Lik has been widely praised as the inventor of the modern electronic cigarette, the device claimed in the '628 patent. Ex. 2011 ¶¶139-142. As one example, according to Time Magazine,

After losing his father to lung cancer, Hon Lik, a Chinese pharmacist—who, like more than 50% of the men in his country, smokes—wanted to invent a safer way to get his nicotine. It took a couple of years, but in 2003 he won the first patent for the electronic cigarette—a device that heated and vaporized a liquid made of pure nicotine, water, flavoring and propylene glycol, the chemical used to make stage fog.

Id. ¶139 (quoting Ex. 2039 at 40). As another example, according to the Encyclopedia Britannica website, “[t]he e-cigarette was invented in 2003 by Chinese pharmacist Hon Lik, who initially developed the device to serve as an alternative to conventional smoking.” *Id.* (quoting Ex. 2042 and citing additional documents; *see also* Ex. 2098).

Praise from others included recognition of Hon’s invention by those within the relevant industries. *Id.* ¶140. For example, in 2008, Ruyan (the company making and selling Hon’s designs at the time) won the Most Innovative Product and Most Marketable New Product of the Year awards at the Tobacco Plus Expo in Las Vegas. *Id.* (citing Ex. 2047 at 2). Ruyan’s press release regarding the award explained that “Ruyan America's Chairman, Mr. Hon Lik, is the inventor and patent holder of the E-cigarette ***and the atomizing technology that is critical to it***, the E-cigar and the E-pipe.” Ex. 2047 at 2 (emphasis added); Ex. 2011 ¶140 (citing Ex. 2047). As discussed in detail above, novel features of the ’628 patent, including in particular the atomizer design, produces a vapor that simulates the same feel and experience as a normal cigarette without burning tobacco. Ex. 2011 ¶¶121-122, 138. Moreover, according to one industry trade website, “every method and technology behind today’s modern electronic cigarette can be attributed to [Hon Lik]. All contemporary electronic cigarette models owe to Hon Lik’s inventions.” Ex. 2048 at 1; Ex. 2011 ¶140 (citing Ex. 2048). Other

electronic cigarette manufacturers have likewise publicly recognized Hon as the inventor of the electronic cigarette. Ex. 2011 ¶140 (citing additional documents).

As discussed in detail above, novel features of the '628 patent, including in particular the atomizer design (in contact with a liquid supply) and other features discussed above (a heating wire oriented substantially or generally perpendicular to the device axis, and air inlets), simulate the same feel and experience as a normal cigarette without burning tobacco and contribute to a more authentic simulated cigarette and user experience. *Id.* ¶144. Accordingly, there is a nexus between the claimed invention and the recognition and praise directed toward Hon Lik. *Id.*

d. Copying of Hon Lik's invention

Copying of the claimed invention is indicative of nonobviousness.

Windsurfing Int'l, Inc. v. AMF, Inc., 782 F.2d 995, 1000 (Fed. Cir. 1986).

Ruyan (Patent Owner's predecessor-in-interest in the '628 patent) released electronic cigarette products as early as 2004. Ex. 2011 ¶100 (citing Ex. 2021 and Ex. 2022 at 62:8-16). As Patent Owner's expert previously explained in detail, Ruyan's atomizing cigarette embodied claims 1-8 of the '628 patent, and Ruyan's V8 devices embodied claims 1-3, and 5-8. *Id.* ¶114 & Exs. D-E (Ruyan claim charts). A comparison of Ruyan's initial atomizing cigarette (pictured below top) and Ruyan's follow-on "V8" product (pictured below middle) with Figure 1 of the '628 patent is shown below. *Id.* ¶101.

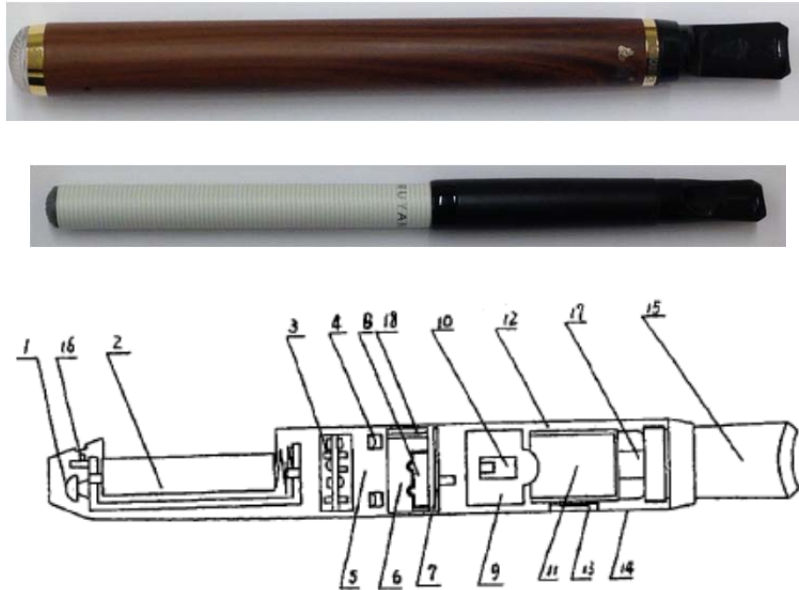


Fig. 1

A company called Sottera (now known as NJOY), an early entrant in the electronic cigarette market, copied Ruyan's early designs that embodied what is claimed in the '628 patent. *Id.* ¶¶100, 105. Several publicly-available articles confirm that NJOY's founder, Mark Weiss, saw a Ruyan electronic cigarette in 2005 and recognized a business opportunity. *Id.* ¶102 (citing Ex. 2024 at 5; Ex. 2023 at 1). For example, in a published interview, NJOY's founder said that in the spring of 2005 he "discover[ed] the Ruyan e-Cig and immediately underst[ood] the potential and start[ed] pursuing e-Cig opportunities." *Id.* ¶103 (quoting Ex. 2025 at 54). Recognizing the potential for Hon's invention, NJOY's founder approached Ruyan to become its U.S. distributor, but those negotiations broke down in the summer of 2006, so he found "an alternate Chinese supplier that [was] manufacturing a product (actually an electronic cigar) similar to the Ruyan

electronic cigar.” *Id.* ¶104 (quoting Ex. 2025 at 54). Before selling its own product in February 2007, NJOY received samples of Ruyan products in April, July, and October 2006. *Id.* (citing Ex. 2026 at 4, 5).

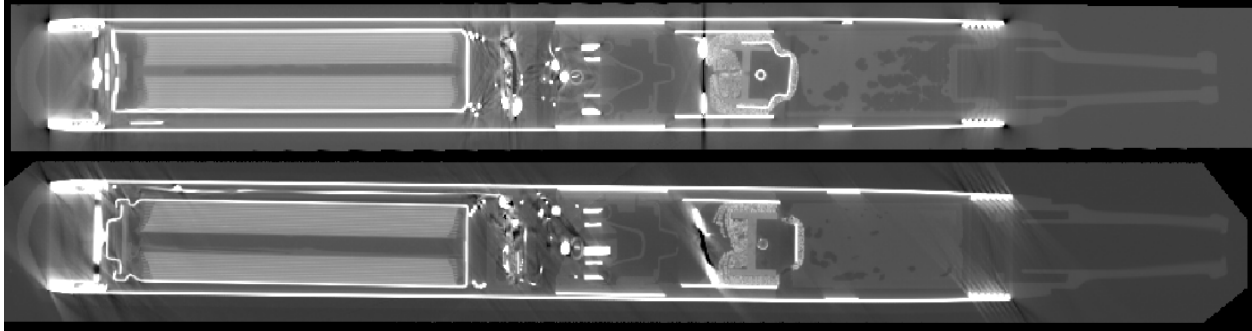
As previously explained in detail by Patent Owner’s expert, NJOY’s products copied Ruyan’s devices and the technology claimed in the ’628 patent, including features of the atomizing device discussed above and claimed in claims 1-8 of the ’628 patent. *Id.* ¶¶105-112. Photographs of Ruyan’s atomizing cigarette (pictured below top) and NJOY’s initial NGAR product (pictured below bottom) show they appear nearly identical. *Id.* ¶105.



Patent Owner’s expert previously inspected these devices and explained that they are nearly identical and their components are interchangeable. *Id.* ¶¶105-107. NJOY’s NGAR was such an exact copy that the indicator cap and liquid supply from the Ruyan product can be attached to the NGAR using the same screw threads and vice versa. *Id.* ¶106. NJOY also copied the microswitch coil 16 cleaning function shown in Figure 1 of the ’628 patent and included in the Ruyan product. *Id.*

The internal design of the Ruyan's atomizing cigarette (pictured below top) and NJOY's NGAR (pictured below bottom) also appear nearly identical. *Id.*

¶107.



NJOY's NGAR copied what is claimed in claims 1-8 of the '628 patent. *Id.*

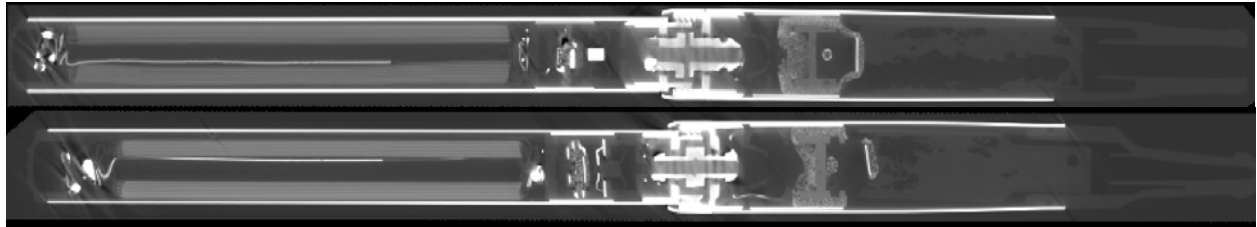
¶108 & Ex. B (NGAR claim chart).

As shown by the photographs below of Ruyan's V8 (top) and NJOY's product called "NCIG" (bottom), the products look very similar. *Id.* ¶109.



Patent Owner's expert inspected the devices and explained that the battery assemblies, cartomizer units (the portion of the device containing the atomizer), mouthpiece, and liquid supply units for Ruyan's V8 and NJOY's NCIG are essentially interchangeable. *Id.* ¶110.

The internal design of the Ruyan's V8 (pictured below top) and NJOY's NCIG (pictured below bottom) look the same. *Id.* ¶111.



As Patent Owner's expert previously described in detail, NJOY's NCIG copied what is claimed in claims 1-3 and 5-8 of the '628 patent, including features of the atomizing device discussed above. *Id.* ¶112 & Ex. C (NCIG claim chart).

Furthermore, inventor Hon Lik testified that several Chinese manufacturers copied Ruyan's designs starting in late 2005, that Ruyan sued those manufacturers in China and won, and that copying was even more serious overseas where Ruyan had negotiated with potential distributors who had received Ruyan product samples and tested markets but chose to sell copies of Ruyan products. *Id.* ¶113 (citing Ex. 2027 at 143:4-144:5, 144:22-146:10, 149:20-150:1). Mr. Hon also testified that copies of Ruyan's products were being sold in the U.S. *Id.* ¶113. Consistent with Mr. Hon's testimony, NJOY's founder admitted he had received a sample Ruyan V8 device and sent it to a company called Raytech, which "took it apart" and provided a quote for manufacturing a "product like the Ruyan product." *Id.* (citing Ex. 2022 at 108:6-109:13).

Because claimed features of Ruyan's products embodying the '628 patent were copied, a nexus exists between the features copied and what is claimed. *Id.* ¶114.

e. Licensing and commercial success

Extensive licensing of the patent may also provide evidence that an invention is not obvious. For example, in *Metabolite Laboratories, Inc. v. Laboratory Corp. of America Holdings*, the Federal Circuit considered the fact that the patentee had licensed the invention to eight companies as an objective consideration that supported nonobviousness. 370 F.3d 1354, 1368 (Fed. Cir. 2004) (citing *In re Sernaker*, 702 F.2d 989, 996 (Fed. Cir. 1983)). The '628 patent has been extensively licensed by numerous companies in the electronic cigarette industry. For example, based on publicly available information, eight electronic cigarette manufacturers agreed to royalty-bearing licenses of the '628 patent in the past year alone. *See* Exs. 2066-2073. When the licenses were entered, the '628 patent was one of the patents that was specifically asserted in then-pending litigations against each of those companies. *See id.*; Exs. 2088-2095.

Commercial success may provide evidence that an invention is not obvious. *Graham*, 383 U.S. at 17-18. The electronic cigarette claimed in the '628 patent has been commercially successful due to its novel claimed features. As described above, although there were many failed attempts, an acceptable smoking substitute

did not exist before Hon Lik's successful electronic cigarette as described in the '628 and related patents. As discussed above, Ruyan's atomizing cigarette embodied claims 1-8 of the '628 patent, and Ruyan's V8 devices embodied claims 1-3, 5-8. Ex. 2011 ¶114 & Exs. D-E (claim charts).

Hon Lik's electronic cigarette had sales income of over 47 million Hong Kong dollars during the first half of 2006. *Id.* ¶146 (citing Ex. 2054 at 6). Under applicable exchange rates, that corresponded to over \$6 million U.S. dollars. *Id.* (citing Ex. 2055). NJOY's founder testified that Ruyan's atomizing cigarette "was selling well" in China and articles supported that Ruyan was making "millions of dollars in sales." *Id.* (quoting Ex. 2022 at 209:11-210:3 and 235:5-236:6).

Further, there is a nexus between the claims of the '628 patent and the commercial success. *Id.* ¶149. As described above, electronic cigarettes are popular with consumers because they simulate the feel and experience of a normal cigarette. *Id.* ¶¶127-128, 149. As also described above, novel features of the '628 patent, including in particular an atomizer in contact with a liquid supply, a heating wire oriented substantially or generally perpendicular to the device axis, and air inlets, simulate the same feel and experience as a normal cigarette without burning tobacco and contribute to a more authentic simulated cigarette and user experience. *Id.* ¶¶121-124, 138. Accordingly, there is a nexus between the claimed invention and the commercial success. *Id.* ¶138.

VI. CONCLUSION

For these reasons, Patent Owner requests that the Board deny the Petition for *Inter Partes* Review of the '628 Patent.

Respectfully submitted,

Date: November 16, 2016

/ Michael J. WISE /
Michael J. Wise, Reg. No. 34,047
Perkins Coie LLP
1888 Century Park East, Suite 1700
Los Angeles, CA 90067
Phone: 310-788-3210
Facsimile: 310-788-3399
Email: MWISE@PerkinsCoie.com

Counsel for Patent Owner

CERTIFICATE OF COMPLIANCE

The undersigned certifies that this brief complies with the type-volume limitations of 37 CFR § 42.24. This brief contains 13,876 words as calculated by the “Word Count” feature of Microsoft Word 2010, the word processing program used to create it.

Date: November 16, 2016

/ Michael J. WISE /
Michael J. Wise, Reg. No. 34,047
Perkins Coie LLP
1888 Century Park East, Suite 1700
Los Angeles, CA 90067
Phone: 310-788-3210
Facsimile: 310-788-3399
Email: MWISE@PerkinsCoie.com

Counsel for Patent Owner

CERTIFICATE OF SERVICE

The undersigned hereby certifies that service on Petitioner was made as follows, in accordance with 37 CFR 42.6(e):

Date of service: November 16, 2016

Manner of service: 1. Electronic submission through the USPTO Patent Trial and Appeal Board End-to-End System
2. Electronic mail

Document(s) served: **PATENT OWNER PRELIMINARY RESPONSE TO PETITION FOR *INTER PARTES* REVIEW**

Persons served: Ralph J. Gabric, Lead Counsel
Robert Mallin, Back-up Counsel
Scott Timmerman, Back-up Counsel
Brinks Gilson & Lione
Suite 3600 NBC Tower
455 Cityfront Plaza Drive
Chicago IL 60611-5599
rgabric@brinksgilson.com
rmallin@brinksgilson.com
stimmerman@brinksgilson.com

/ Pete Sher /
Pete Sher, Paralegal
Perkins Coie LLP