

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 No. **IPR2017-01319**
Patent No. **9,326,549**

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

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MPEP 2143.01(VI)40

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Petitioner's Exhibits	
Exhibit	Description
Ex. 1001	U.S. Patent No. 9,326,549 (“’549 patent”)
Ex. 1002	Expert Declaration of Robert Sturges
Ex. 1003	Chinese Patent Application Publication No. CN1233436A (“Hongbin”)
Ex. 1004	Certified translation of Chinese Patent Application No. CN1233436A (“Hongbin”)
Ex. 1005	U.S. Patent No. 2,057,353 (“Whittemore”)
Ex. 1006	U.S. Patent No. 4,947,874 (“Brooks”)
Ex. 1007	IPR2014-01300 Paper 8: Decision for <i>Inter Partes</i> Review Institution
Ex. 1008	Plaintiff Preliminary Claim Constructions and Preliminary Identification of Intrinsic and Extrinsic Information
Ex. 1009	U.S. Patent No. 6,598,607 (“Adiga”)
Ex. 1010	U.S. Patent No. 4,793,365 (“Sensabaugh”)
Ex. 1011	U.S. Patent No. 5,203,355 (“Clearman”)
Ex. 1012	U.S. Patent No. 2,472,282 (“Burchett”)
Ex. 1013	U.S. Patent No. 2,032,695 (“Gimera”)
Ex. 1014	Certified translation of Chinese Patent Application Publication No. CN2293957 (“Zhao”)
Ex. 1015	U.S. Patent No. 5,743,251 (“Howell”)

Ex. 1016	U.S. Patent No. 1,514,682 (“Wilson”)
Ex. 1017	U.S. Patent No. 5,745,985 (“Ghosh”)
Ex. 1018	U.S. Patent No. 4,208,005 (“Nate”)
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Ex. 1020	Excerpts from James W. Dally, <i>Packaging of Electronic Systems: A Mechanical Engineering Approach</i> (1990) (“Dally”)
Ex. 1021	European Patent No. EP0845220B1 (“Susa”)
Ex. 1022	U.S. Patent No. 6,155,268 (“Takeuchi”)
Ex. 1023	U.S. Patent No. 6,501,052 (“Cox”)
Ex. 1024	U.S. Patent No. 4,981,522 (“Nichols”)
Ex. 1025	Excerpts from U.S. Pat. No. 9,326,549 File History
Ex. 1026	Mark’s Standard Handbook for Mechanical Engineers, Eugene A. Avallone et al., published 1978, page 15-6.
Patent Owner’s Exhibits	
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Ex. 2001	Declaration of Richard Meyst
Ex. 2002	<i>R.J. Reynolds Vapor Company v. Fontem Holdings I B.V.</i> , IPR2016-01859, Paper 8, Decision Denying <i>Inter Partes</i> Review (PTAB Mar. 13, 2017)
Ex. 2003	<i>R.J. Reynolds Vapor Company v. Fontem Holdings I B.V.</i> , IPR2016-01527, Paper 1, Petition (PTAB Aug. 3, 2016)
Ex. 2004	Merriam-Webster’s Collegiate Dictionary (11th ed. 2003), selected pages

Ex. 2005	The Oxford American Dictionary and Thesaurus (2003), selected pages
Ex. 2006	<i>R.J. Reynolds Vapor Company v. Fontem Holdings I B.V.</i> , IPR2016-01270, Paper 11, Decision Denying Institution (PTAB Jan. 4, 2017)
Ex. 2007	<i>Nu Mark, LLC v. Fontem Holdings I B.V.</i> , IPR2016-01438, Paper 13, Decision Denying <i>Inter Partes</i> Review (PTAB Dec. 29, 2016)
Ex. 2008	Random House Webster's Unabridged Dictionary (2nd ed. 2001), selected pages
Ex. 2009	<i>Nu Mark, LLC v. Fontem Holdings I B.V.</i> , IPR2016-01283, Paper 12, Decision Denying <i>Inter Partes</i> Review (Nov. 30, 2016)
Ex. 2010	<i>R.J. Reynolds Vapor Company v. Fontem Holdings I B.V.</i> , IPR2016-01859, Paper 2, Petition (PTAB Sept. 23, 2016)
Ex. 2011	<i>R.J. Reynolds Vapor Company v. Fontem Holdings I B.V.</i> , IPR2016-01859, Paper 7, Patent Owner Preliminary Response (PTAB Dec. 19, 2016)
Ex. 2012	<i>Nu Mark, LLC v. Fontem Holdings I B.V.</i> , IPR2016-01664, Paper 1, Petition (PTAB Aug. 22, 2016)
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Ex. 2014	<i>Nu Mark, LLC v. Fontem Holdings I B.V.</i> , IPR2016-01664, Paper 12, Termination Dismissing the Petitions (PTAB Jan. 4, 2017)
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Ex. 2016	<i>Akamai Techs., Inc. v. Limelight Networks, Inc.</i> , IPR2017-00358, Paper 9, Decision Denying Institution (PTAB May 2, 2017)
Ex. 2017	<i>NVIDIA Corp. v. Samsung Elecs. Co., Ltd.</i> , IPR2016-00134, Paper 9, Decision Denying Institution (PTAB May 4, 2016)

Ex. 2018	<i>Nautilus Hyosung Inc. v Diebold, Inc.</i> , IPR2017-00426, Paper 17, Decision Denying Institution (PTAB June 22, 2017)
Ex. 2019	<i>Conopco, Inc. v. Proctor & Gamble Co.</i> , Case IPR2014-00506, Paper 25, Decision Denying Petitioner’s Request for Rehearing (PTAB Dec. 10, 2014)
Ex. 2020	<i>Fontem Ventures B.V., et al. v. R.J. Reynolds Vapor Company</i> , Case No. 1:16-cv-01255-CCE-JEP, Docket No. 28-18 (Ex. 16 to Declaration of Ralph L. Gabric in Support of Defendant R.J. Reynolds Vapor Company’s Motion to Transfer to the Middle District of North Carolina (Patent Owner’s Opposition in IPR2014-01300)) (M.D.N.C. June 29, 2016)
Ex. 2021	<i>Nu Mark, LLC v. Fontem Holdings I B.V.</i> , IPR2016-01297, Paper 1, Petition (PTAB June 28, 2016)
Ex. 2022	<i>Nu Mark, LLC v. Fontem Holdings I B.V.</i> , IPR2016-01285, Paper 2, Petition (PTAB June 28, 2016)
Ex. 2023	<i>Nu Mark, LLC v. Fontem Holdings I B.V.</i> , IPR2016-01299, Paper 1, Petition (PTAB June 28, 2016)
Ex. 2024	<i>NJOY, Inc. v. Fontem Holdings I B.V.</i> , IRP2014-01289, Paper 1, Petition (PTAB Aug. 14, 2014)
Ex. 2025	<i>NJOY, Inc. v. Fontem Holdings I B.V.</i> , IRP2014-01300, Paper 2, Petition (PTAB Aug. 14, 2014)
Ex. 2026	<i>R.J. Reynolds Vapor Company v. Fontem Holdings I B.V.</i> , IPR2016-01270, Paper 2, Petition (PTAB July 2, 2016)
Ex. 2027	<i>Nu Mark, LLC v. Fontem Holdings I B.V.</i> , IPR2016-01309, Paper 11, Decisions Denying Institution (PTAB Dec. 15, 2016)
Ex. 2028	U.S. Patent No. 3,066,681 (“Cohn”)
Ex. 2029	U.S. Patent No. 5,865,186 (“Volsey”)

Ex. 2030	<i>NJOY, Inc. et al. v. Fontem Holdings I B.V.</i> , IPR2015-01301, Paper 16, Decision Denying Institution (PTAB Dec. 8, 2015)
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Ex. 2033	Davis, R.E., et al., <i>Modern Chemistry (Student Edition)</i> , Ch. 12, (Holt, Rinehart and Winston 2002)
Ex. 2034	“1, 2-propanediol,” National Institutes of Health, National Center for Biotechnology Information, PubChem Open Chemistry Database website, https://pubchem.ncbi.nlm.nih.gov/compound/1_2-propanediol#section=Refractive-Index (last visited August 3, 2017)
Ex. 2035	“Ethanol,” National Institutes of Health, National Center for Biotechnology Information, PubChem Open Chemistry Database website, https://pubchem.ncbi.nlm.nih.gov/compound/ethanol#section=Top (last visited August 3, 2017)
Ex. 2036	Declaration of Peter Sher
Ex. 2037	<i>VMR Products LLC v. Fontem Holdings I B.V.</i> , IPR2015-00859, Paper 9, Decision Denying Institution of <i>Inter Partes</i> Review (PTAB Sept. 16, 2015)
Ex. 2038	U.S. Patent No. 8,893,726 (“726 patent”)
Ex. 2039	<i>R.J. Reynolds Vapor Company v. Fontem Holdings I B.V.</i> , IPR2016-01527, Paper 10, Decision Denying <i>Inter Partes</i> Review (PTAB Jan. 30, 2017)
Ex. 2040	<i>R.J. Reynolds Vapor Company v. Fontem Holdings I B.V.</i> , IPR2017-01318, Paper 2, Petition (PTAB May 1, 2017)
Ex. 2041	R.J. Reynolds Vapor Company website, http://rjrvapor.com/Pages/WhatIsRJVC.aspx

Ex. 2042	<i>Nu Mark, LLC v. Fontem Holdings I B.V.</i> , IPR2016-01285, Paper 10, Decision Denying <i>Inter Partes</i> Review (PTAB Nov. 30, 2016)
Ex. 2043	<i>NJOY, Inc.et al. v. Fontem Holdings I B.V.</i> , IPR2015-01299, Paper 15, Decision Denying Institution of <i>Inter Partes</i> Review (PTAB Dec. 8, 2015)

I. INTRODUCTION

This is Petitioner's third IPR challenge to the '549 patent¹, and it comes nearly two months after the Board denied Petitioner's first petition relating to that patent. Here, Petitioner adjusts its approach based on the Board's and Patent Owner's analysis in the prior IPR and takes another run at the '549 patent. The unfairness of Petitioner's repetitive IPR challenges and strategic delay in bringing them piecemeal warrants denial of the Petition. Further, Petitioner's grounds fall short of demonstrating a reasonable likelihood of unpatentability for any claim of the '549 patent.

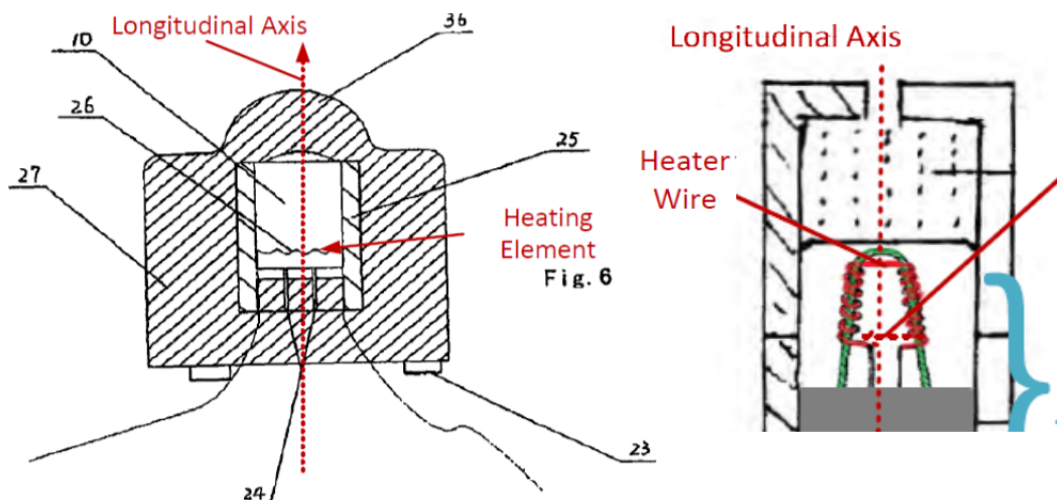
Petitioner filed its first IPR petition relating to the '549 patent in September 2016. After Patent Owner filed its preliminary response, the Board denied that petition in March 2017. The Board concluded Petitioner had failed to show a reasonable likelihood that any of the '549 patent's 27 claims was unpatentable over a reference known as Hon '031. After the Board's rejection, Petitioner filed the current Petition based on the Board's rejection and Patent Owner's preliminary response. The Petition relies on prior art that Petitioner knew about when it filed the first petition. As the Board has held in several prior IPR proceedings, that approach is unfair to a patent owner. *E.g., Xactware Sols., Inc. v. Eagle View*

¹ The second is IPR2017-01318, which was accorded a filing date one day ahead of the Petition in this proceeding.

Techs., Inc., IPR2017-00034, Paper 9 at 10, 11 (PTAB Apr. 13, 2017) (Ex. 2015).

This case presents similar facts, and the result should be the same: denial of the Petition.

Petitioner's flawed approach to obviousness also supports denial. First, even if combined as Petitioner suggests, the asserted references fail to disclose what is claimed. For example, claim 12 recites, in part, "the heating wire extending across the cylindrical chamber of the atomizer perpendicular to the longitudinal axis of the cylindrical housing." Similarly, claim 17 recites, in part, "a heating wire positioned perpendicular to the longitudinal axis of the cylindrical housing." A comparison of Petitioner's own annotated figures of an embodiment in the '549 patent disclosing a perpendicular heating element (below left) and the purported disclosure of a perpendicular heating element in the prior art combination (below right) demonstrates that the prior art combination does not disclose a "perpendicular" heating wire. Petition at 60 (annotations added), 62.



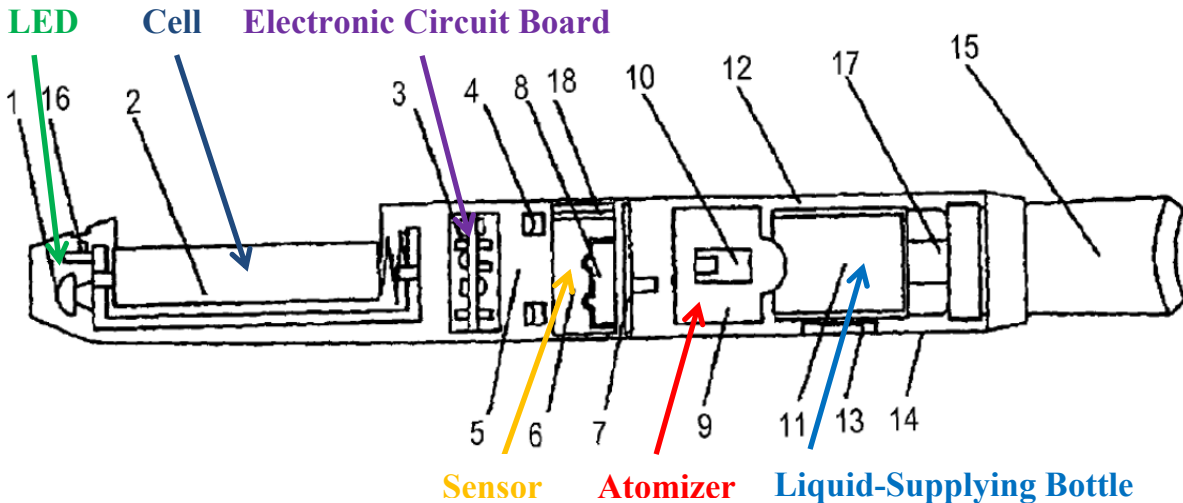
Petitioner also argues that Hongbin teaches a fibrous liquid supply when that reference has no such disclosure. Petitioner also seeks to combine prior art references by using the claims as a roadmap for cobbling together disclosures to fit the claims. The law bars that approach. *Cheese Sys., Inc. v. Tetra Pak Cheese & Powder Sys., Inc.*, 725 F.3d 1341, 1352-53 (Fed. Cir. 2013). Petitioner further seeks to modify Hongbin in a way that would change its fundamental operating principles, relies on non-existent problems to support its proposed reference combinations, and focuses only on design changes that serve its purposes while ignoring all others. For all these reasons, Petitioner's obviousness arguments do not meet the claim limitations or provide the required "articulated reasoning" with "rational underpinning" to support its proposed combinations. *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2007). Accordingly, the Petition fails.

II. THE '549 PATENT

The '549 patent² describes several embodiments of an electronic cigarette. In one embodiment, shell 14 contains LED 1, cell 2, electronic circuit board 3,

² The '549 patent claims priority to U.S. Patent No. 8,893,726 ('726 patent), U.S. Patent No. 8,490,628 ('628 patent), and U.S. Patent No. 8,393,331 ('331 patent). Presently, none of these patents is involved in an on-going PTAB trial, although Petitioner has filed several pending petitions relating to the '726 and '628 patents. For those patents, just as for the '549 patent, because the Board denied Petitioner's

sensor 6, atomizer 9, and liquid-supplying bottle 11. These structures are shown below in annotated Figure 1.



The device includes an atomizer that is separate from and in physical contact with a liquid supply. The atomizer (red) and liquid supply (blue) are shown in annotated Figure 1 below. Solution storage porous body 28 is positioned within liquid-supplying bottle 11 and stores liquid in a porous structure, such as a foam or fiber. Ex. 1001, 3:4-11. Atomizer 9 includes porous body 27 (red circle in annotated Figure 6 below) in physical contact with solution storage porous body 28—a design that allows liquid to move from the liquid supply to the atomizer via capillary action. *Id.*, 2:41-43, 3:58-61. Atomizer 9 then converts the liquid into

prior IPR petitions, Petitioner filed follow-on petitions based on the Board's and Patent Owner's analysis in its earlier unsuccessful attempts.

droplets that form an aerosol for inhalation by a user. *Id.*, 3:43-58; Ex. 2001 ¶¶16,

18. The liquid for atomization can include propylene glycol. Ex. 1001, 4:58-61.

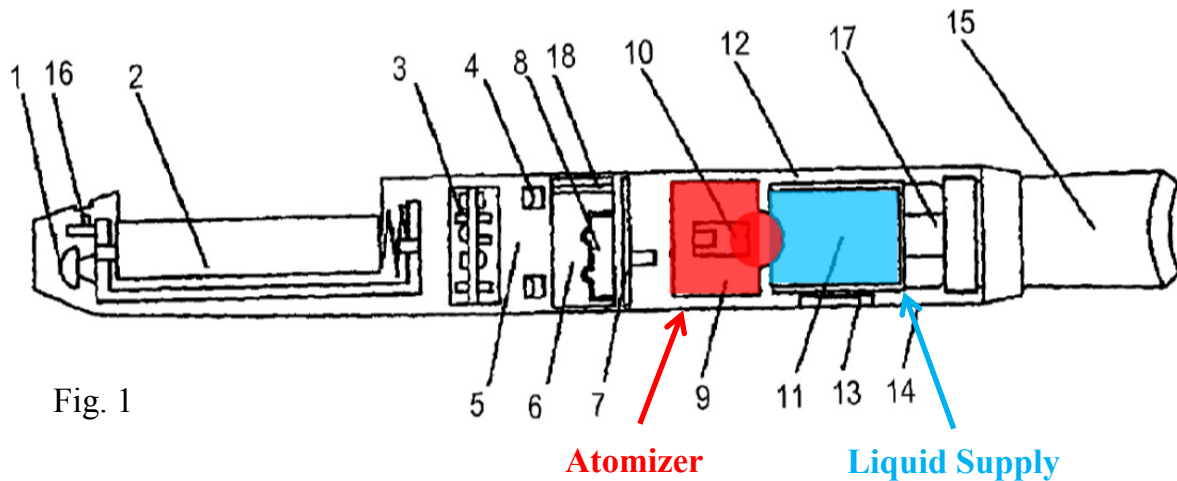


Fig. 1

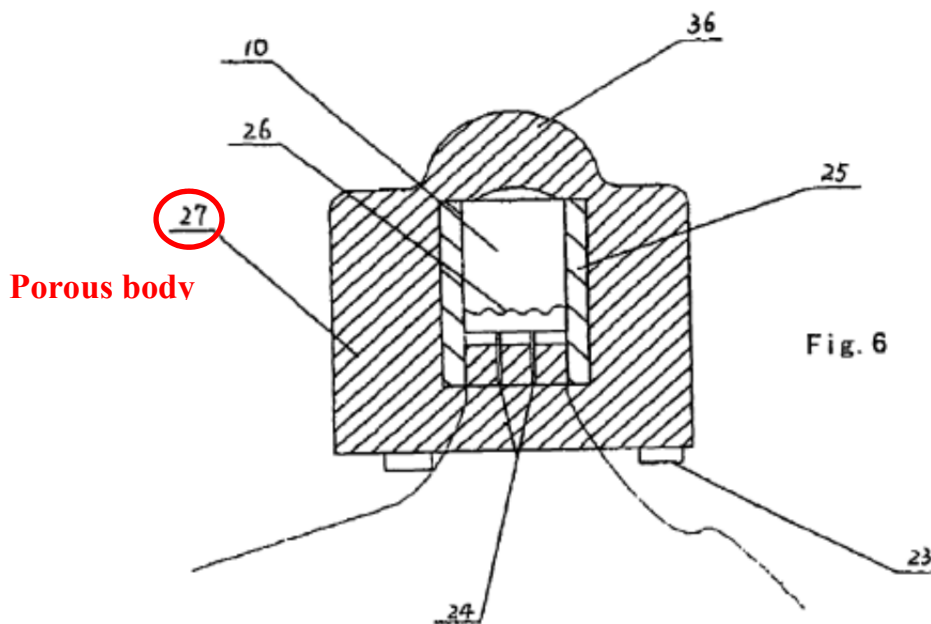
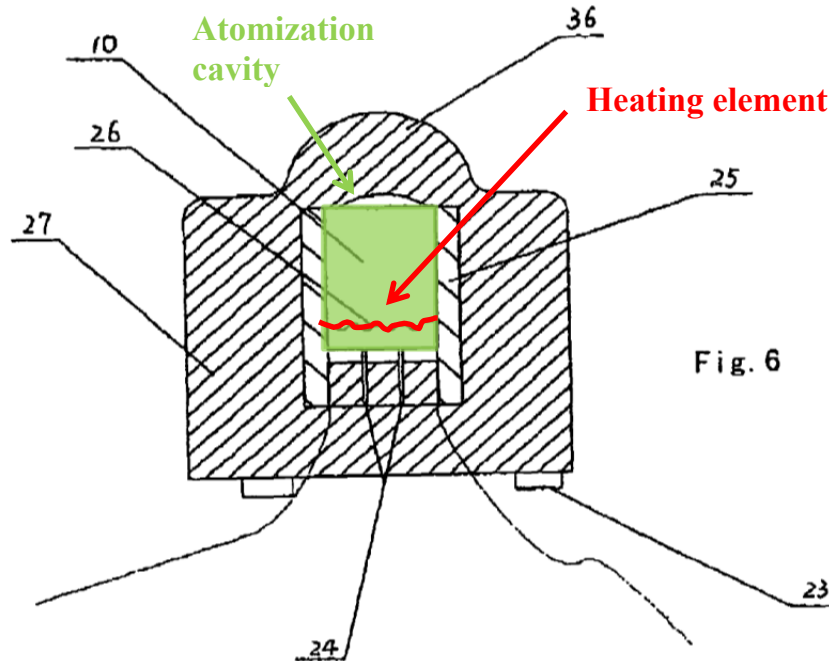
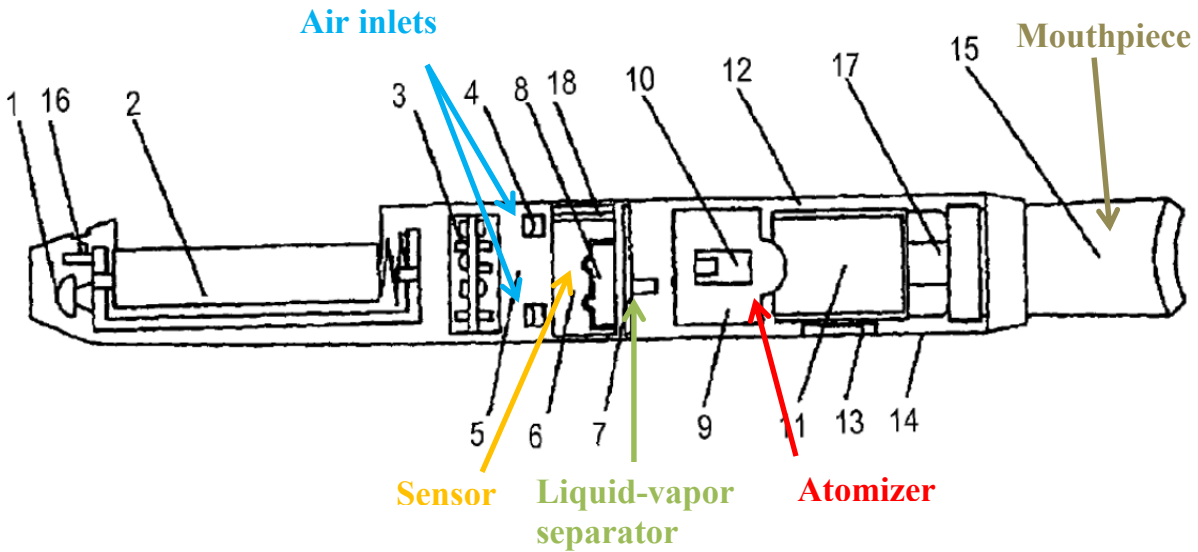


Fig. 6

As shown in annotated Figure 6 below, atomizer 9 includes heating element 26 (red) within atomization cavity 10 (green). *Id.*, 2:41-50, 3:43-52. Atomization cavity 10 provides a space within atomizer 9 where atomization can occur. *Id.*, 3:43-52; Ex. 2001 ¶18.



The '549 patent describes the airflow path through the electronic cigarette. Air flows into the device via inlets 4, through air passage 18, through a hole in vapor-liquid separator 7, and into atomizer 9 where it passes over heating element 26 and mixes with vaporized liquid. Ex. 1001, 2:29-35, 2:64-66, 3:11-13, 3:43-58. Sensor 6 detects a change in air pressure as a user inhales on the device and sends a signal causing the atomizer to operate and vaporize liquid for user inhalation. *Id.*, 3:27-33, 3:43-52, 4:48-52. Liquid droplets then flow out of the atomizer, through aerosol passage 12, and through mouthpiece 15 into a user's mouth. *Id.*, 3:56-58. Annotated Figure 1 below shows many of these structures.



The Petition challenges only claims 12-13, 17-19, and 21 of the '549 patent. Independent claim 12 recites an “electronic vaporizing device” that includes: “a cylindrical housing having a longitudinal axis, a first end and a second end; an LED at a first end of the cylindrical housing; an outlet at the second end of the cylindrical housing; an air inlet for allowing air to flow into the cylindrical housing; a battery, an electronic circuit board, a sensor, an atomizer, and a liquid-supply within the cylindrical housing, wherein the liquid-supply includes a liquid and a fiber material, with the liquid containing propylene glycol, and wherein the liquid supply is cylindrical and parallel to the longitudinal axis of the cylindrical housing; the atomizer comprises a porous component, a hollow cylindrical chamber and a heating wire; the porous component is in physical contact with the liquid in the liquid supply; the hollow cylindrical chamber is co-axial with the cylindrical housing; the heating wire extending across the cylindrical chamber of

the atomizer perpendicular to the longitudinal axis of the cylindrical housing; and an air stream passage from the inlet through the cylindrical chamber of the atomizer to the outlet, and the heating wire positioned in the air stream passage.”

Claim 13 depends from claim 12 and further requires “a separator in the cylindrical housing, with the electronic circuit board and the sensor on a first side of the separator, and with the atomizer and the liquid-supply on a second side of the separator, opposite from the first side, and with the separator having a through hole from the first side to the second side.”

Independent claim 17 is similar to claim 12. Dependent claims 18, 19, and 21 add requirements to those in claim 17:

- Claim 18 depends from claim 17 and requires a “porous component comprising a fiber material.”
- Claim 19 depends from claim 18 and further requires a battery and liquid-supply “co-axial with the longitudinal axis of the cylindrical housing.”
- Claim 21 depends from claim 18 and further requires a “liquid-supply comprising propylene glycol.”

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 ¶22. Petitioner argues a skilled person would have had “at least the equivalent of a Bachelor’s degree in electrical engineering, mechanical engineering, or biomedical engineering or related fields, along with at least 5 years of experience designing electromechanical devices, including those involving circuits, fluid mechanics and heat transfer.” Petition at 9-10. 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 denied an IPR petition relating to the ’549 patent, the Board construed the term “liquid-supply” to mean “a store for liquid.” Ex. 2002 at 5-10. Below, Patent Owner addresses the terms “atomizer” and “liquid-supply.”

A. “atomizer”

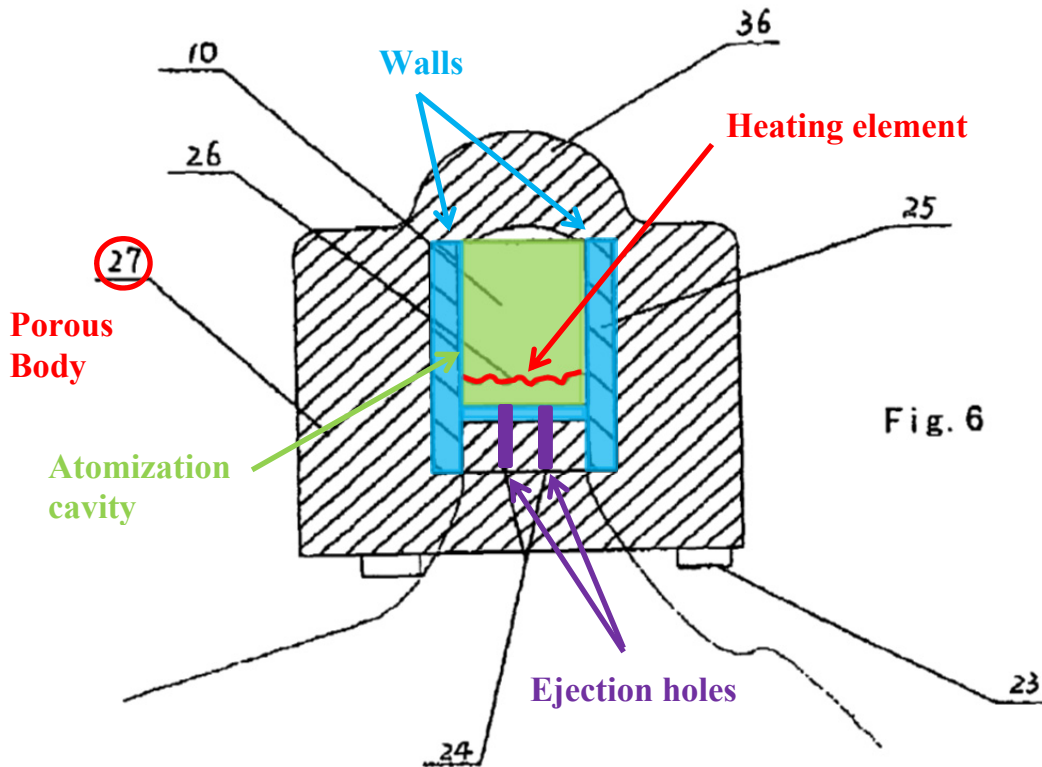
Patent Owner’s Construction	Petitioner’s Construction
“a component or components that convert(s) liquid into aerosol or vapor”	“a part of the electronic cigarette that includes components that facilitate and participate in atomization”

Independent claim 12 recites an “atomizer” with several different components, such as a porous component, a hollow cylindrical body, and a heating wire. Dependent claim 13 described that “the atomizer and the liquid-supply” are

located together “on a second side of the separator.” Petitioner adopts a modified version of a construction issued by the Board in another IPR relating to a different patent. Petition at 10-11; Ex. 1007 at 9. Specifically, Petitioner accepts the portion of the Board’s construction in that IPR of an “atomizer” as “a part of the electronic cigarette that includes components that participate in facilitating atomization,” but rejects the portion of the construction excluding “components included in other recited parts of the electronic cigarette, such as the liquid supply.” Petition at 10-11. Petitioner’s proposed construction is unreasonably broad because it provides no meaningful limit on the term “atomizer”: it extends beyond components that cause atomization (i.e., converting liquid into aerosol or vapor) to components that do not. Ex. 2001 ¶28. Instead, the broadest reasonable interpretation of an “atomizer” is “a component or components that convert(s) liquid into aerosol or vapor.” *Id.* ¶¶26-29.

The ’549 patent discloses an atomizer that includes heating element 26, atomization cavity 10, and porous body 27. Ex. 1001, 2:44-50, 3:43-52, 4:5-7. As shown in annotated Figure 6 below, heating element 26 (red) within cavity 10 (green) atomizes nicotine solution. *Id.* Walls 25 (blue) and porous body 27 (red circle) together form atomization cavity 10. *Id.*, 2:59-64; Ex. 2001 ¶26. When air passes through the porous body’s ejection holes 24 (purple) 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, 2:50-58, 3:43-52.



Petitioner's proposed construction of "atomizer" is unreasonably broad because it defines the atomizer based on an arbitrary decision about which structures "facilitate" or "participate in atomization." Under Petitioner's construction, the term could encompass any structure in an electronic cigarette that "facilitate[s]" or "participate[s]" in atomization, which might be said for the battery, the housing, the air inlets, etc. In another earlier IPR on a related patent, Petitioner adopted a construction for "atomizer" that excluded "components included in other recited parts of the electronic cigarette, such as the liquid

supply.” Ex. 2003 at 9. But now Petitioner takes the opposite tack, arguing that there is no support for excluding “components included in other recited parts of the electronic cigarette, such as the liquid supply.” Petition at 10-11. Petitioner’s new position is mistaken. Claim 12 of the ’549 patent refers to the atomizer and liquid supply as separate components: the atomizer “comprises a porous component” that is “in physical contact with the liquid in the liquid supply.” Claim 1 similarly recites that the liquid supply “is in physical contact with the atomizer.” The specification also describes the atomizer and liquid supply as separate structures “in contact with” one another. Ex. 1001, Abstract, 2:2-3, 2:41-43, 3:58-61. Thus, the claim language and specification make it clear that the atomizer and liquid supply are distinct components. *Becton, Dickinson & Co. v. Tyco Healthcare Grp.*, 616 F.3d 1249, 1254 (Fed. Cir. 2010) (where one claim element is “connected to” another, the two elements are not satisfied by a single structure).

Indeed, in a prior IPR proceeding regarding a related patent, the Board relied on similar language from the claims there (“the liquid storage body in physical contact with the atomizer”) and the same language from the specification (“[t]he atomizer 9 is in contact with the liquid-supplying bottle 11”) to find that the atomizer and liquid storage are separate components. Ex. 2006 at 6-7.

In light of the specification’s description of an atomizer as excluding other components (for example, the liquid supply) and claims that recite those

components as separate, a construction that captures those components is unreasonably broad. Ex. 2001 ¶28. In contrast to Petitioner’s proposal, Patent Owner’s construction limits an “atomizer” to only those components of the electronic cigarette that cause liquid to atomize and excludes components that do not. *Id.* ¶29.

Extrinsic evidence also supports Patent Owner’s proposed construction. Merriam-Webster’s Collegiate Dictionary defines “atomize” as “2: to reduce to minute particles or to a fine spray,” and defines “atomizer” as “an instrument for atomizing usu. a perfume, disinfectant, or medicament.” Ex. 2004 at 78. The Oxford American Dictionary is similar, defining “atomize” as “reduce to atoms or fine particles” and “atomizer” as “an instrument for emitting liquids as a fine spray.” Ex. 2005 at 83.

For these reasons, the broadest reasonable construction of an “atomizer” is “a component or components that convert(s) liquid into aerosol or vapor.”

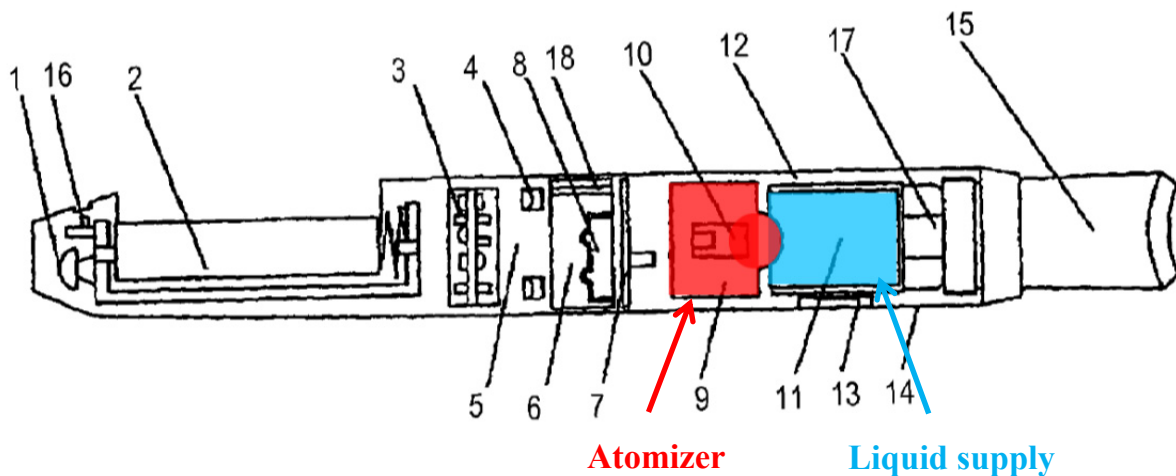
B. “liquid supply”

Patent Owner’s Construction	Petitioner’s Construction
“a store for liquid”	No construction proposed

Independent claims 12 and 17 recite a “liquid supply” located “within [a] cylindrical housing” and “in physical contact” with a “porous component.” Claim 12 requires the “liquid supply” to “include[] a liquid and a fiber material.” Both claims 12 and 17 recite that the “liquid[-]supply” is “cylindrical and [arranged]

parallel to the longitudinal axis of the cylindrical housing.” Claim 13 depends from claim 12, and claims 18-19 and 21 depend from claim 17. The dependent claims include the “liquid[-]supply” requirements from independent claims 12 and 17. Petitioner does not propose a construction for “liquid supply.” Given disagreement between Petitioner and Patent Owner in related previous IPR proceedings regarding the meaning of this term, it should be construed here. The broadest reasonable interpretation of “liquid supply” is “a store for liquid.”

The '549 patent specification supports Patent Owner's proposed construction. The specification discloses a “solution storage porous body” for storing fluid. Ex. 1001, 3:4-13. The solution storage porous body may be made of “polypropylene fiber, terylene fiber or nylon fiber,” or “plastic shaped by foaming, such as polyamine resin foam column or polypropylene foam column” in contact with the atomizer. *Id.* The liquid supply in contact with the atomizer is shown in the annotated figure below. The solution storage porous body holds the liquid for the device and is provided in a “liquid-supplying bottle.” *Id.*, 3:4-8. The claims and the specification both use the term “liquid supply” as a noun to describe a store for liquid. Ex. 2001 ¶32.



The term “liquid supply” has been construed by the Board in IPR proceedings for the ’549 patent and the related ’331 and ’628 patents, all of which share the same relevant disclosures. The Board has provided three different constructions for the term “liquid supply”: (1) a store for liquid (IPR2016-01859), (2) the liquid itself and potentially other things in the liquid (IPR2016-01438 and IPR2016-01283), and (3) a part of the recited electronic cigarette that includes one or more components that supply liquid to the atomizer (IPR2014-01300). Ex. 2002 at 10 (construing “liquid-supply” for the ’549 patent as “a store for liquid”); Ex. 2007 at 11 (construing “liquid-supply” for the ’331 patent as “not limited to the liquid itself, and may include other things in the liquid”); Ex. 2009 at 10 (construing “liquid supply” for the ’628 patent as “not limited to the liquid itself, and may include other things in the liquid”); Ex. 1007 at 10 (construing “liquid-

supply” for the ’628 patent as “a part of the recited electronic cigarette that includes one or more components that supply liquid to the atomizer”)³.

Patent Owner’s proposed construction of “liquid supply” conforms with the Board’s most recent decision construing that term, which was based on the ’549 patent—the same patent at issue here. The Board held that the broadest reasonable interpretation of “liquid supply” is “a store for liquid.” Ex. 2002 at 10.

As support for its decision, the Board relied on claims 1, 12, and 17, which recite that the liquid-supply is “within the cylindrical housing and in physical contact with the atomizer (claim 1) or porous component (claims 12 and 17)” and “is cylindrical and [arranged] parallel to the longitudinal axis of the cylindrical housing.” *Id.* at 7-8. According to the Board, the latter limitation “imposes a physical requirement fixing the shape of the liquid-supply (i.e., cylindrical) and its orientation (i.e., parallel to the longitudinal access of the cylindrical housing).” *Id.* The Board noted that the description of the liquid-supplying bottle and solution storage porous body in the specification tracks the physical structure required in the claims. *Id.* at 8. The Board ultimately concluded that the “liquid-supply” is a

³ The Board acknowledged that its initial construction of “liquid-supply” in IPR2014-01300 was “preliminary” and “without the benefit of proposed constructions from either party in that proceeding.” Ex. 2009 at 6.

“store for liquid” with a “physical structure” that “may comprise, include, or contain liquid.” *Id.* at 9-10. As the Board explained, that construction is consistent with its earlier construction regarding the ’628 patent insofar as the Board found that a “liquid-supply” is not limited to the liquid itself, and may include other things such as fiber. *Id.* at 10 n.4.

Extrinsic evidence also supports the Board’s construction of “liquid supply” as “a store for liquid” having “physical structure.” Merriam Webster’s Collegiate Dictionary defines “supply” as “something that maintains or constitutes a supply.” Ex. 2004 at 1256. Random House Webster’s Dictionary defines “supply” to mean a “store” or “provision.” Ex. 2008 at 1912. And Patent Owner’s expert agrees that the broadest reasonable interpretation of “liquid supply” is “a store for liquid.” Ex. 2001 ¶¶30-37.

V. THE PETITION FAILS TO SHOW A REASONABLE LIKELIHOOD THAT ANY CLAIM OF THE ’549 PATENT IS UNPATENTABLE

Petitioner argues that claims 12-13, 17-19, and 21 are unpatentable as obvious over Chinese Patent Application Publication No. CN1233436A (Hongbin) (Exs. 1003, 1004), U.S. Patent No. 2,057,353 (Whittemore) (Ex. 1005), and U.S. Patent No. 4,947,874 (Brooks) (Ex. 1006). Petition at 8-9.

The Board should deny *inter partes* review for all claims.

A. Petitioner's Follow-on IPR Challenge Prejudices Patent Owner and Should Be Denied

Three previous IPR petitions have already been filed relating to the '549 patent, including one prior petition filed by Petitioner in September 2016 and another filed by Petitioner at about the same time as this Petition. IPR2016-01664; IPR2016-01859 (filed by Petitioner); IPR2017-01318 (filed by Petitioner). Including this Petition, that makes for a total of four petitions to date challenging the '549 patent.

Despite those prior challenges, every claim of the '549 patent remains in force. The Board rejected Petitioner's first petition. In IPR2015-01859 (filed on September 23, 2016), Petitioner challenged claims 1-27, arguing the claims were anticipated by Hon '031, a patent application by the inventor of the '549 patent. Ex. 2010. Patent Owner responded. Ex. 2011. The Board denied the petition, finding Petitioner had failed to show that Hon '031 was prior art to the '549 patent and therefore had not established a reasonable likelihood of unpatentability. Ex. 2002 at 12, 16-17. Petitioner then filed a second petition in IPR2017-01318 challenging claims 1-27, making the same arguments that the Board denied two months ago, namely, that the claims were anticipated by Hon '031. Ex. 2040. The other prior IPR petition relating to the '549 patent (in IPR2016-01664) was filed by petitioner Nu Mark on August 22, 2016 and also relied on Hon '031 to challenge claims 1-27. Ex. 2012. Patent Owner responded to that petition, but the

proceeding terminated before the Board issued a decision on whether to institute.

Ex. 2013; Ex. 2014.

The current Petition should be denied as an attempted IPR do-over on the '549 patent that burdens Patent Owner, reflects gamesmanship by Petitioner, and encourages serial IPR petitions unnecessarily increasing the Board's workload. The Board has broad discretion under 35 U.S.C. §314(a) in deciding whether to institute an IPR. In many cases, the Board has exercised that discretion to deny institution where the same petitioner launches multiple IPR attacks on the same patent using the patent owner's and the Board's analysis from earlier unsuccessful IPR petitions to adjust its positions. *Xactware Sols., Inc. v. Eagle View Techs., Inc.*, IPR2017-00034, Paper 9 at 6-11 (PTAB Apr. 13, 2017) (Ex. 2015); *Akamai Techs., Inc. v. Limelight Networks, Inc.*, IPR2017-00358, Paper 9 at 6-13 (PTAB May 2, 2017) (Ex. 2016); *NVIDIA Corp. v. Samsung Elecs. Co., Ltd.*, IPR2016-00134, Paper 9 at 6-12 (PTAB May 4, 2017) (Ex. 2017); *Nautilus Hyosung Inc. v. Diebold, Inc.*, IPR2017-00426, Paper 17 at 11-17 (PTAB June 22, 2017) (Ex. 2018). That is exactly what Petitioner has done here.

The Board has identified five factors for assessing whether to deny institution in that situation:

- (a) whether the same petitioner previously filed a petition directed to the same claims of the same patent,

- (b) whether the petitioner knew or should have known of the prior art asserted in the later petition when it filed its earlier petition,
- (c) whether at the time of filing of the later petition, the petitioner already received the patent owner's preliminary response to the first petition or received the Board's decision on whether to institute review in the earlier petition,
- (d) the length of time that elapsed between when the petitioner had the patent owner's or Board's analysis on the earlier petition and when petitioner filed the later petition, and
- (e) whether the petitioner provides adequate explanation why the Board should permit another attack on the same claims of the same patent.

Ex. 2015 at 7-8; Ex. 2016 at 9. Here, in light of Petitioner's previous challenge to the '549 patent in IPR2016-01859, all five factors favor Patent Owner.

1. Petitioner's previous petition challenged the same claims of the '549 patent

In IPR2016-01859, Petitioner challenged claims 1-27 of the '549 patent. Ex. 2010. Petitioner now challenges claims 12-13, 17-19, and 21, all of which were challenged in its earlier IPR petition. Petition at 8; Ex. 2010. Because Petitioner's prior petition was directed to the same claims it challenges now, this factor weighs against institution. Ex. 2015 at 8; Ex. 2016 at 9; Ex. 2017 at 8; Ex. 2018 at 12-13.

2. Petitioner knew about the cited prior art when it filed its first petition

The Board considers whether a petitioner knew about later-asserted prior art when it filed an earlier IPR petition. *See Conopco, Inc. v. Proctor & Gamble Co.*, IPR2014-00506, Paper 25 at 4-5 (PTAB Dec. 10, 2014) (Informative) (Ex. 2019). In *Conopco*, the Board found that ignoring prior art known or available to a petitioner during an earlier unsuccessful challenge “would allow petitioners to unveil strategically their best prior art and arguments in serial petitions, using our decisions on institution as a roadmap, until a ground is advanced that results in review.” *Id.* at 4. That practice would “tax Board resources” and “force patent owners to defend against multiple attacks.” *Id.* at 4-5. The Board adopted a more flexible approach taking known and available art into account because doing so “promotes the efficient and economical use of Board and party resources, and reduces the opportunity for abuse of the [IPR] process.” *Id.* at 5.

Here, Petitioner knew about the references raised in the Petition when it filed its earlier IPR petition on the ’549 patent:

- Petitioner knew about Hongbin—its primary reference here. Nearly three months before filing its earlier IPR petition, Petitioner filed an exhibit (an IPR response) that identified Hongbin in related litigation. Ex. 2020 at 8 (identifying Hongbin at Ex. 1022). Also, Petitioner’s earlier IPR petition on the ’549 patent cites several other IPR petitions

that included Hongbin as an exhibit. Ex. 2010 at 20-21 (citing IPR2016-01297, IPR2017-01285, IPR2016-01299, IPR2014-01289, IPR2014-01300); Ex. 2021 at 9 (identifying Hongbin as Ex. 1030); Ex. 2022 at 7 (identifying Hongbin at Ex. 1030); Ex. 2023 at 8 (identifying Hongbin as Ex. 1030); Ex. 2024 at 4 (identifying Hongbin as Ex. 1022); Ex. 2025 at 4 (identifying Hongbin at Ex. 1022). Further, Hongbin is cited on the face of the '549 patent; it is listed on Page 2 of the patent under the heading "Foreign Patent Documents." Ex. 1001, References Cited.

- Petitioner knew about Whittemore. On August 2, 2016, over a month before filing its earlier IPR petition on the '549 patent, Petitioner filed an IPR petition on a different patent that relied on Whittemore. Ex. 2003 at 14, 24-25, 32-34, 59-62. And, like Hongbin, Whittemore is cited on the face of the '549 patent. Ex. 1001, References Cited.
- Petitioner knew about Brooks. On July 2, 2016, over two months before filing its earlier IPR petition on the '549 patent, Petitioner filed an IPR petition on a different patent that relied on Brooks. Ex. 2026 at 12-15, 24-28, 32-62. And as with Hongbin and Whittemore, Brooks is cited on the face of the '549 patent. Ex. 1001, References Cited. Moreover, Brooks is assigned to R.J. Reynolds Tobacco

Company, Petitioner's sister company that manufactures its products.

Ex. 1006 at [73]; Ex. 2041; Ex. 2016 at 10. Petitioner named R.J.

Reynolds Tobacco Company as a real party-in-interest both in this proceeding and in its initial IPR petition relating to the '549 patent.

Petition at 2; Ex. 2010 at 15.

Because the references relied on in the Petition were known to Petitioner when it filed its earlier petition, this factor weighs against institution. Ex. 2015 at 8-9; Ex. 2016 at 9-10; Ex. 2017 at 9-11.

3. Petitioner had Patent Owner's preliminary response and the Board's decision before it filed the Petition

Petitioner filed the current Petition on May 3, 2017. Well before then, Petitioner had received Patent Owner's preliminary response to its earlier petition (filed December 19, 2016) and the Board's decision denying institution of that petition (issued March 13, 2017). By that time, Petitioner also had access to Patent Owner's preliminary response in IPR2016-01664 (filed November 22, 2016), which relates to the '549 patent. Accordingly, this factor weighs against institution. Ex. 2015 at 9; Ex. 2016 at 10-11; Ex. 2017 at 8-9, 11-12; Ex. 2018 at 14.

4. Petitioner had Patent Owner's and the Board's analysis for months before filing the Petition

Before filing the Petition, Petitioner had Patent Owner's preliminary response from Petitioner's prior '549 IPR challenge for over four months (December 19, 2016 to May 3, 2017) and the Board's decision denying institution for nearly two months (March 13, 2017 to May 3, 2017). That timespan is equal to or longer than the time periods in other cases where the Board has denied institution under similar circumstances. Ex. 2015 at 9-10 (follow-on petition filed over four months after patent owner response and nearly two months after Board decision on first petition); Ex. 2016 at 11 (follow-on petition filed nearly four months after patent owner response and one month after Board decision on first petition); Ex. 2017 at 8-9, 11-12 (follow-on petition filed nearly two months after patent owner response to first petition). Thus, this factor weighs against institution.

5. Petitioner provides no explanation for why the Board should permit another challenge

Petitioner does not explain why the Board should permit a follow-on IPR challenge to the '549 patent. Nor does it identify any non-strategic reasons for its delay in filing the Petition. Petitioner merely asserts that the Petition "relies on a prior art combination which has not previously been considered or presented to the PTAB in an IPR petition or considered during prosecution." Petition at 9. But

substantively different art “does not justify permitting Petitioner to gain an unfair advantage by waiting to file its Second Petition so that it can take advantage of [the Board’s] Decision on the First Petition.” Ex. 2015 at 10; *see also* Ex. 2016 at 12.

Petitioner’s strategy of waiting to file another IPR petition so it could adjust its approach based on Patent Owner’s and the Board’s analysis from an earlier IPR challenge is unfair. It forces the Board and Patent Owner to address yet another challenge to the ’549 patent while allowing Petitioner to game the IPR process by waiting for and responding to Patent Owner’s and the Board’s positions in the initial IPR petition. Petitioner did just that. After the Board explained that Hon ’031 (the alleged anticipatory reference Petitioner relied on in its earlier petition) did not qualify as prior art to the ’549 patent, Petitioner jettisoned that reference and adopted a new approach, arguing obviousness based on three other references: Hongbin, Whittemore, and Brooks. Ex. 2002 at 12, 16-17; Petition at 8; Ex. 2015 at 10-11; Ex. 2016 at 12; Ex. 2017 at 11-12.

Petitioner has not provided any meaningful reason for why it should be given a second bite at the apple. This factor therefore weighs against institution.

In sum, the five factors strongly support denying the Petition. Petitioner’s strategy of altering its approach over multiple IPR challenges based on feedback from Patent Owner and the Board is unfair and wastes the Board’s and the parties’ time and resources. *See* Ex. 2027 (denying petition based in part on “the burden

and expense to Patent Owner” and the inefficient “use of Board or party resources”). The harassment to Patent Owner of having to respond to a challenge based on strategic delay outweighs any prejudice to Petitioner in denying institution on grounds that could have been raised in its initial petition. Ex. 2015 at 11; Ex. 2018 at 11-12 (citing H.R. Rep. No. 112-98, pt. 1, at 48 (2011) (noting that post-grant proceedings conducted under the AIA “are not to be used as tools for harassment or a means to prevent market entry through repeated litigation and administrative attacks on the validity of a patent” as “[d]oing so would frustrate the purpose of the section as providing quick and cost effective alternatives to litigation”). For this reason, Petitioner’s follow-on IPR petition should be denied.

B. Claims 12-13, 17-19, and 21 are Not Obvious over the Combination of Hongbin, Whittemore, and Brooks

For the reasons below, Petitioner has not met its burden of showing a reasonable likelihood that claims 12-13, 17-19, and 21 are obvious over the proposed combination of Hongbin, Whittemore, and Brooks. First, even if combined as Petitioner suggests, the prior art references do not disclose what is claimed. Second, a skilled person would not have modified Hongbin or combined it with Whittemore or Brooks in the way Petitioner proposes.

1. Hongbin

Hongbin discloses a “liquid odor cigarette.” Ex. 1004, Title. A “smoking liquid” is loaded directly into evaporation chamber 2. *Id.*, 1:3-14. Evaporation

chamber 2 is created by outer casing 9 and can optionally include electronic heater 15, which “promote[s] evaporation” of the liquid inside the chamber during device operation. *Id.*, 1:9-14, 1:20-21, 2:10-12, Fig. 1. The “smoking liquid” is made from several ingredients, including “alcohol.” *Id.*, Abstract, 1:7-8. Gas suction control valve plate 5 and spring 3 are positioned between evaporation chamber 2 and air intake vent 6. *Id.*, 1:9-14. Battery 7 is connected to valve plate 5 and indicator 8. *Id.*, 1:15-18. The components of the device are shown in Figure 1 below.

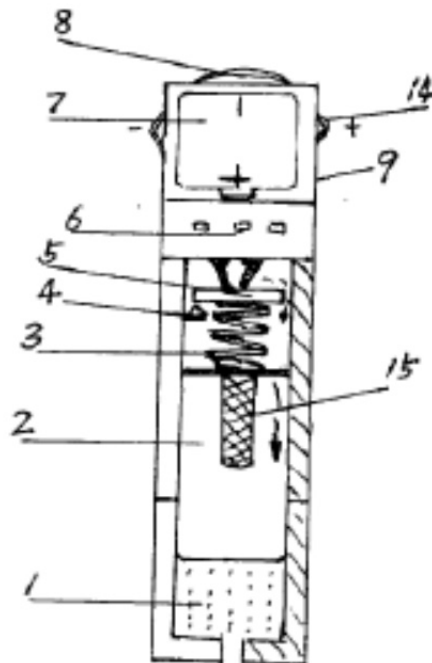


Figure 1

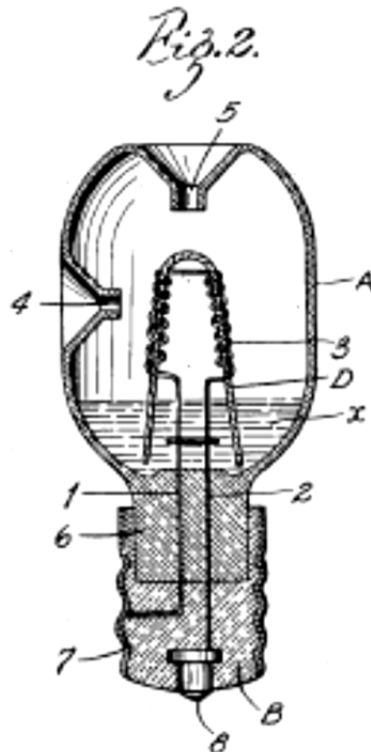
When a user draws on the device, valve plate 5 is sucked away from gas inlets 6 and contacts power source contactor 4, causing heater 15 to activate and

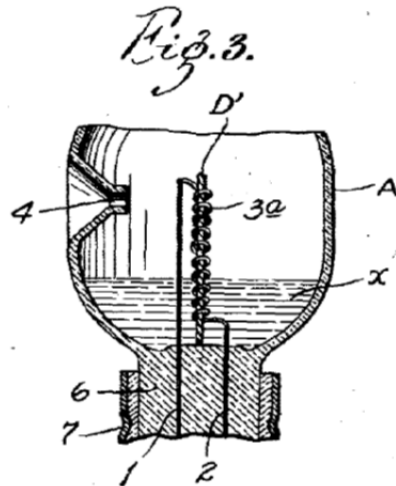
allowing indicator 8 to illuminate. *Id.*, 1:15-22; Ex. 2001 ¶46. The device includes external power source 14 “to provide a backup for the battery.” Ex. 1004, 1:22-23.

2. Whittemore

Whittemore was filed in 1935 and discloses a “vaporizing unit.” Ex. 1005.

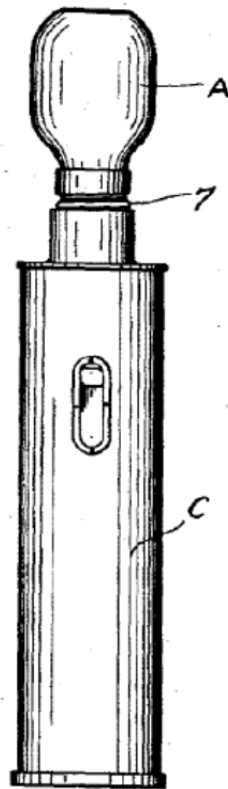
As shown in Figures 2 and 3 below, the device looks like a light bulb. In the embodiment of Figure 2, Whittemore discloses an “inverted V-shaped” wick D and heating element 3 inside glass vessel A, which holds liquid medicament x. *Id.* at 1 col. 1:19-28, 1 col. 2:8-18. In the embodiment of Figure 3, heating element 3^a is “a single vertically-disposed coil.” *Id.* at 1 col. 2:25-34.





The bulb requires an external power source to provide electrical current and heat element 3. *Id.* at 1 col. 1:19-28. The device includes plug B that is “adapted to be plugged into or positioned in a terminal socket forming part of an electric circuit,” including the “socket of an ordinary flashlight C,” to form an electrical circuit. *Id.* at 1 col. 1:39-45, 1 col. 2:47-50, 2 col. 1:3-7, 2 col. 1:20-52. Figure 1 below shows the bulb plugged into a flashlight socket. When the device is activated, vaporization occurs within vessel A. *Id.* at 1 col. 1:19-28. Medicament *x* is carried by wick D to element 3 is where it is “vaporized by the heat from the filament 3.” *Id.* at 1 col. 1:50-col. 2:8. The vapor flows out of the bulb via outlet 5 at the top of the bulb.

Fig. 1.



3. Brooks

Brooks teaches an electrical smoking article that includes heating element 18, as shown in purple in annotated Figure 1 below. Heating element 18 holds an “aerosol forming substance.” Ex. 1006, 4:7-12, 7:26-30, 8:4-8. When a user inhales, heating element 18 increases in temperature “which in turn heats and volatilizes the aerosol forming substance.” *Id.*, 10:45-48.

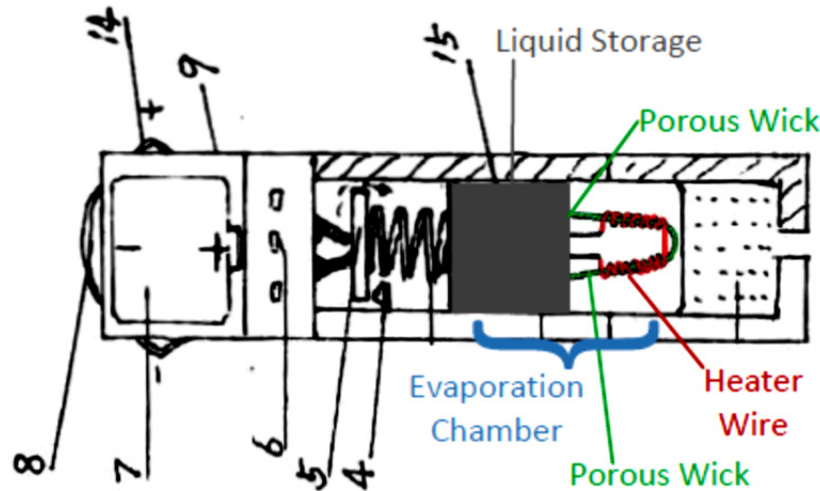


12:39-46, 13:12-19, 15:63-16:4.

4. The Proposed Combination of Hongbin, Whittemore, and Brooks Does Not Disclose What Is Claimed

Petitioner asserts that it would have been obvious to modify Hongbin to include a fibrous “liquid storage” in evaporation chamber 2, incorporate Whittemore’s heater coil and wick, and add Brooks’s control circuit and LED. *E.g.*, Petition at 15-16,

25, 32-33, 35-39, 43-46, 52-53, 55, 59-63, 72-73, 75. The suggested combination is reflected in Petitioner's annotated figure below. Petition at 37.

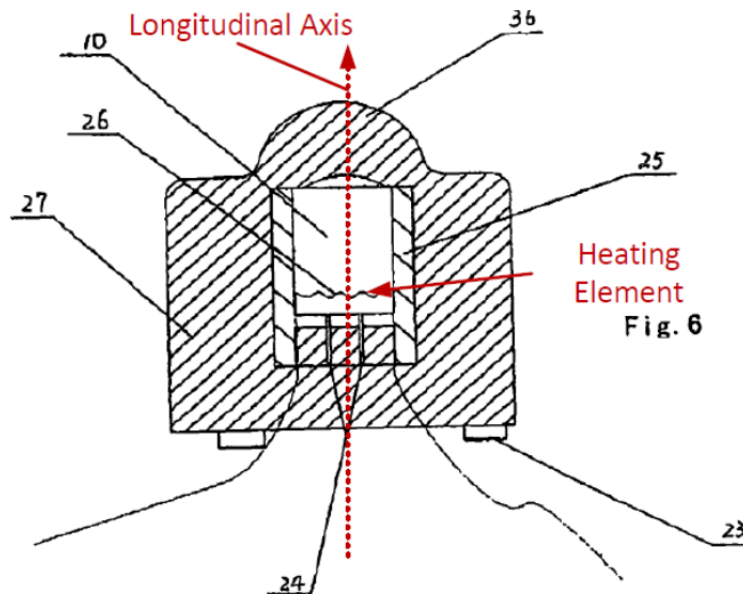


Even if Hongbin, Whittemore, and Brooks were combined in this way, the combination is missing several claim limitations, including a heating wire “extending across the cylindrical chamber of the atomizer perpendicular ” or “positioned perpendicular” to the longitudinal axis of the cylindrical housing as required by all the challenged claims and “propylene glycol” as required by claims 12, 13, and 21. Due to those deficiencies, the proposed combination fails to render the challenged claims obvious.

- a. **Petitioner's proposed combination does not disclose a heating wire extending across the cylindrical chamber of the atomizer perpendicular or positioned perpendicular to the longitudinal axis of the cylindrical housing**

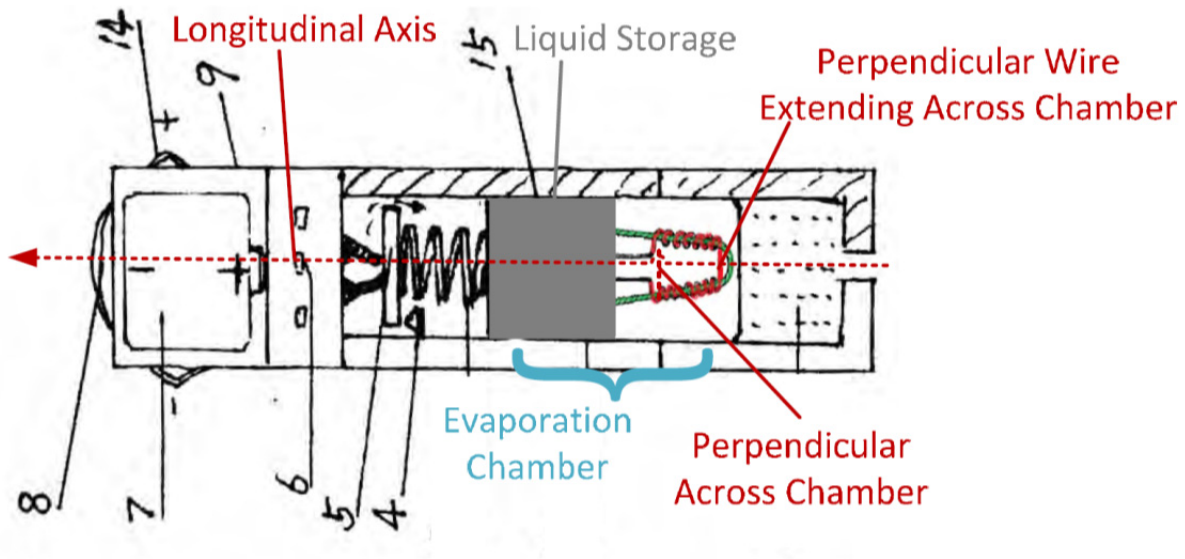
Claim 12 recites a “heating wire” that “extend[s] across the cylindrical chamber of the atomizer perpendicular to the longitudinal axis of the cylindrical

housing.” Claim 13 depends from claim 12 and therefore incorporates the same requirement. Claim 17 recites “a heating wire positioned perpendicular to the longitudinal axis of the cylindrical housing.” Claims 18, 19, and 21 depend from claim 17 and thus require the same limitation. Figure 6 of the ’549 patent, below, discloses an embodiment having a “perpendicular” heating wire. Petition at 62.



Petitioner’s proposed combination shown in the annotated figure below does not disclose the claimed “perpendicular” heating wire. Petition at 59-63, 72-73; Ex. 1002 ¶¶73-74, 91-93. Instead, in the proposed combination, Whittemore’s heating wire extends along the longitudinal axis of Hongbin. In other words, in the proposed combination, the heating wire is at an oblique angle nearly parallel to the longitudinal axis. That a small portion of Whittemore’s wire provided only for completing an electrical circuit connects the portions of Whittemore’s heating wire that actually heat liquid does not mean that the proposed combination discloses the

claimed “perpendicular” heating wire. The only portion of the wire in Whittemore that heats anything is nearly parallel, not perpendicular, to the longitudinal axis.



Based on the plain claim language, it is not enough for some insignificant non-heating portion of the wire to be placed perpendicular to the longitudinal axis of the housing. As shown in its own annotated figure above, Petitioner positions Whittemore’s heating element so that the two coiled sections that function to heat liquid run nearly parallel to the longitudinal axis of the Hongbin device, not perpendicular as the claims require. Ex. 2001 ¶¶56-57. Petitioner and its expert do not suggest orienting the wire in any other way, let alone explain why a skilled person would have done so. Indeed, Petitioner’s expert touts the advantages of using the near-parallel orientation of Whittemore’s heating element to allow the wick to move liquid from the proposed liquid supply to the heater. Ex. 1002 ¶74.

Petitioner tries to dismiss the claim limitations requiring a “perpendicular” heating wire, arguing that “dimensional limitations that do not affect the device’s operation should not preclude a finding of obviousness” and citing *Gardner v. TEC Sys., Inc.*, 725 F.2d 1338, 1349 (Fed. Cir. 1984). Petition at 61-62. In addressing a parent of the ’549 patent in a prior IPR, however, the Board rejected that argument. Ex. 2039 at 9 (“As Patent Owner notes, however, the claim does not simply recite a ‘longitudinal axis’ unrelated to other aspects of the electronic cigarette. Prelim. Resp. 35. Patent Owner also notes that the longitudinal axis is used as a reference to define the orientation of other components of the electronic cigarette, such as the heating element being oriented perpendicular to that longitudinal axis as recited in claims 1 and 8. *Id.*”). As the Board observed, unlike *Gardner*, the longitudinal axis of the ’549 patent provides an axis along which to arrange components so air can flow past, through the atomizer, and out the outlet. Ex. 1001, 1:63-2:3; Ex. 2001 ¶54. The longitudinal axis provides a reference point for the orientation of the atomizer’s heating wire, and that orientation makes a difference in device function. Ex. 2001 ¶54.

Because the heating wire in Petitioner’s proposed combination is not “perpendicular” to the longitudinal axis, Petitioner’s proposed combination does not render claims 12-13, 17-19, and 21 unpatentable.

b. Petitioner's proposed combination does not disclose propylene glycol

Several claims of the '549 patent recite that the liquid to be atomized must include propylene glycol. Claim 12 requires that the liquid in the liquid supply “contain[] propylene glycol.” Claim 13 depends from claim 12 and thus includes the same requirement. Claim 21 depends from claim 18 and recites that the “liquid-supply compris[es] propylene glycol.”

Petitioner argues that Hongbin discloses propylene glycol because the liquid to be vaporized includes “alcohol.” Petition at 48-49, 78; Ex. 1004, 1:7-8. Specifically, Petitioner asserts that propylene glycol is one example of an “alcohol” compound, relying on a statement in Brooks that “propylene glycol” is a “polyhydric alcohol.” Petition at 48; Ex. 1006, 8:49-55.

Petitioner has not shown that Hongbin discloses propylene glycol. Petitioner relies on its expert's assertions that a skilled person would have recognized (i) that the “alcohol” in Hongbin “could” include propylene glycol and (ii) that propylene glycol was a “common aerosol forming substance” at the time of the invention. Petition at 48-49 (emphasis added); Ex. 1002 ¶¶68, 99. Those conclusory assertions are insufficient. Petitioner and its expert reach their conclusions based on hindsight because the claims require propylene glycol, but they ignore the disclosure and requirements of Hongbin.

In the context of Hongbin, a skilled person would have understood the term “alcohol” to refer to a liquid that readily evaporates. Ex. 2001 ¶¶59-60. Hongbin teaches *evaporating* a “smoking liquid” containing “alcohol” to create vapor for inhalation by a user. Ex. 1004, 1:7-8; Ex. 2001. ¶¶59-60. A skilled person would have understood the reference to “alcohol” in Hongbin, which relies on evaporation to generate vapor, to refer to a liquid that readily evaporates even at near room temperatures. Ex. 2001 ¶¶64-65. With that background, a skilled person would have concluded that “alcohol” refers to an alcohol such as ethanol (which evaporates readily) rather than propylene glycol (which does not). Ex. 1004 at 1; Ex. 2001 ¶¶66; Ex. 2034; Ex. 2035.

Petitioner and its expert rely solely on Hongbin as teaching propylene glycol. Petition at 48-49; Ex. 1002 ¶¶68, 99. Because Petitioner fails to show that Hongbin discloses propylene glycol, claims 12, 13, and 21 are patentable despite Petitioner’s proposed combination of Hongbin, Whittemore, and Brooks.

5. Petitioner’s proposed modifications to Hongbin are not obvious because they would have altered its basic operating principles

The objective of the device disclosed in Hongbin is to cause a “smoking liquid” to evaporate and form an “odor” or vapor for inhalation by a user. Ex. 1004, Title, 1:4-5. The liquid is “loaded” into a “smoking material *evaporation* chamber.” *Id.*, 1:9-14 (emphasis added). Hongbin’s use of the term “evaporation”

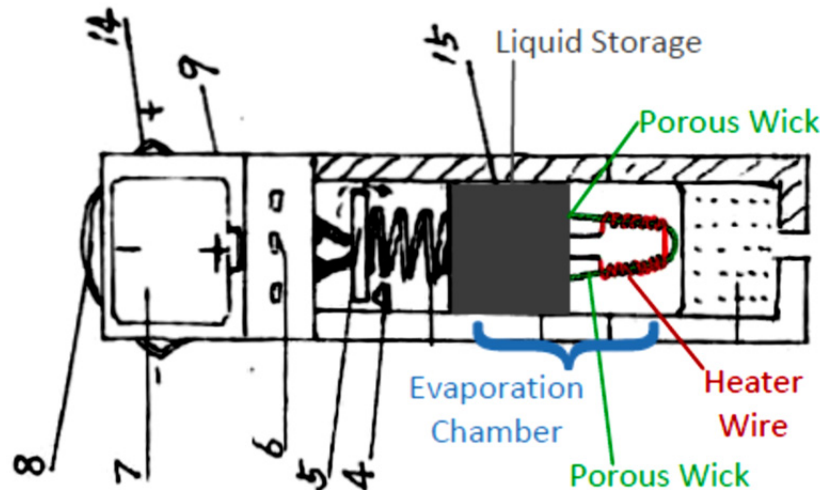
is significant. Evaporation is a specific type of vaporization that takes place at temperatures below a liquid's boiling point and occurs only at the surface of a liquid exposed to air. Ex. 2033 at 365-66; Ex. 2001 ¶¶61, 67. Evaporation is distinct from boiling, another form of vaporization. Ex. 2033 at 366, 378; Ex. 2001 ¶67. Boiling happens at temperatures at or above a liquid's boiling point and occurs at and below the surface level of the liquid. Ex. 2033 at 378; Ex. 2001 ¶67.

Hongbin creates vapor at low temperatures using evaporation, even without a heater. Hongbin's "smoking liquid" is made from "alcohol." Ex. 1004 at Abstract, 1:7-8. One "alcohol" that would work for Hongbin's purposes is ethanol. Ethanol readily evaporates at ambient temperature and thus facilitates liquid evaporation to generate "odor" or vapor for inhalation by a user. Ex. 2001 ¶¶63-66; Ex. 2035. Moreover, when a user inhales on the device disclosed in Hongbin, a suction control valve plate is sucked away from air intake vents, allowing air to flow into the device and over the surface of the liquid loaded in the evaporation chamber, which facilitates evaporation. Ex. 1004, 1:9-14, 1:18-19; Ex. 2001 ¶¶62, 68. Although the device in Hongbin does not require a heater, one can be placed in the evaporation chamber to "promote evaporation." Ex. 1004, 1:20-21; Ex. 2001 ¶¶65, 68. The heater does so by heating the surface of the liquid to increase the evaporation rate. Ex. 2033 at 366; Ex. 2001 ¶¶61-62. Because of its design and

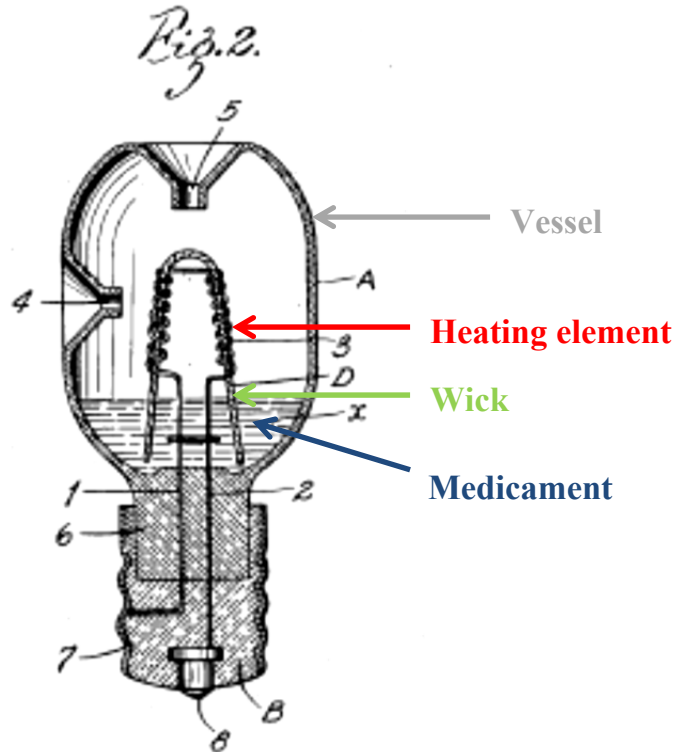
mechanism of action, the Hongbin device does not require a store of liquid to function, nor does it require additional energy to function. Ex. 2001 ¶65.

Hongbin's evaporation approach has several benefits. It does not require a heater at all because evaporation occurs at temperatures below a liquid's boiling point. Ex. 2033 at 365-66; Ex. 2001 ¶¶65, 68-69. That simplifies Hongbin's design and makes the device easier and cheaper to manufacture. Ex. 2001 ¶69. And even if a heater is included in the device, because evaporation occurs at temperatures below a boiling point, increasing the evaporation rate requires less heat than a boiling technique and therefore less electrical power to create that heat. Ex. 2033 at 365-66, 378; Ex. 2001 ¶69. That extends battery life. Ex. 2001 ¶69.

Petitioner ignores Hongbin's basic operating principles and seeks to redesign the device to fit the claims of the '549 patent. Petitioner and its expert argue that it would have been obvious to add a fibrous "Liquid Storage" within evaporation chamber 2 and insert the "Porous Wick" and "Heating Wire" disclosed in Whittemore, as shown in Petitioner's annotated figure below. Petition at 15-16, 35-39; Ex. 1002 ¶¶37-38, 58-65.



Petitioner's proposed redesign would have fundamentally changed Hongbin and does not establish obviousness. *In re Ratti*, 270 F.2d 810, 813 (C.C.P.A. 1959) (reversing obviousness rejection where proposed combination would have caused a "change in the basic principles" under which the reference "was designed to operate"); MPEP 2143.01(VI). Whittemore's wick and heating wire rely on a boiling approach to vaporization rather than the evaporation technique disclosed in Hongbin. In Whittemore, liquid medicament *x* moves from where a volume of liquid is stored within vessel A via capillary action through wick D "to a point where it will be vaporized by the heat from the filament 3 [heating wire]." Ex. 1005 at 1 col. 1:50-col. 2:8. These structures are shown in the annotated version of Whittemore's Figure 2 below.



Whittemore is designed so that wick D carries liquid to heating element 3, which heats up to boil the liquid creating a “stream of vapor” that “project[s]” upward in vessel A toward outlet 5. *Id.* at 2 col. 1:20-37; Ex. 2001 ¶¶70-71. The process occurs as soon as the wire heats up and results in vapor that delivers medication to a user. Ex. 1005 at 1 col. 1:1-4, 2 col. 1:20-52 (“[W]hen an electric circuit is completed through the conductors to heat the [wick] and the medicament entrapped within the wick, a stream of vapor will be formed and projected upwardly within the vessel.... [T]he liquid becomes vaporized upon the filament becoming heated.”). Petitioner and its expert describe Whittemore in similar terms. Petition at 36-37; Ex. 1002 ¶60. To achieve boiling, the Whittemore device

must have a heating element and apply enough power to heat that element beyond the liquid's boiling point. Ex. 2033 at 378; Ex. 2001 ¶71. Indeed, Whittemore's light bulb-style vaporizer is "adapted to be plugged into or positioned in a terminal socket forming part of an electric circuit," which in 1935 would have been understood to include a standard light bulb socket, or the "socket of an ordinary flashlight C." Ex 1005, at 1 col. 1:39-45. Using this approach in Hongbin's device would have required a heater and increased its overall power consumption, altering the device's basic operating principles and undermining the benefits of Hongbin's disclosed evaporation technique. Ex. 2001 ¶72. Accordingly, claims 12-13, 17-19, and 21 are patentable.

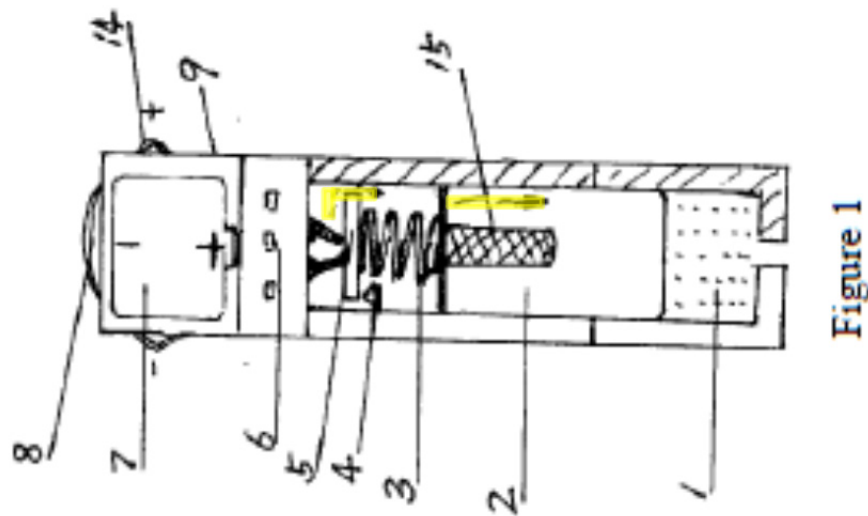
6. It would not have been obvious to modify Hongbin to insert a liquid supply that includes fiber

Independent claim 12 recites a liquid supply that "includes a liquid and a fiber material." Claim 13 depends from claim 12 and therefore includes the same requirement. Petitioner and its expert argue that a skilled person would have understood Hongbin to disclose a fibrous liquid supply. Petition at 15-16, 43-46; Ex. 1002 ¶¶37-38, 67. But on its face, Hongbin discloses that the "smoking liquid" is "loaded" directly into evaporation chamber 2 inside casing 9. Ex. 1004, 1:9-14. Except for heater 15 (which is optional) and the "smoking liquid," evaporation chamber 2 is empty; it does not contain any fiber. Ex. 2001 ¶73. In fact, Hongbin never uses the term "fiber."

Petitioner does not dispute the plain disclosure of Hongbin. Instead, Petitioner relies on a chain of speculative assumptions made by its expert. Petitioner's expert argues that a skilled person would have understood that (i) there are only two ways to store liquid in Hongbin ("freely" in the evaporation chamber or in a container within the chamber), (ii) storing the liquid freely in the chamber "could cause" the device to "leak and malfunction," (iii) placing liquid in a container in the chamber would have avoided those alleged problems, (iv) the liquid storage container "could be" a known fiber material, and (v) a fibrous container would have been preferred because it allows air to flow through it. Ex. 1002 ¶¶37-38, 67.

This is a textbook example of impermissible hindsight. *Cheese Sys.*, 725 F.3d at 1352-53. Because Hongbin does not disclose a fibrous liquid supply, Petitioner and its expert simply assert that a skilled person would have understood Hongbin to have one. As Petitioner concedes, however, this is an argument based on obviousness, not literal disclosure. Petition at 45-46 (listing obviousness rationales); 52 ("For the reasons explained above, *it would have been obvious to modify* Hongbin to include a liquid storage container for storing liquid....") (emphasis added). Petitioner and its expert's argument simply parrots the language of the claims of the '549 patent, instead of relying on the disclosures of Hongbin or the understanding of a skilled person. That is improper.

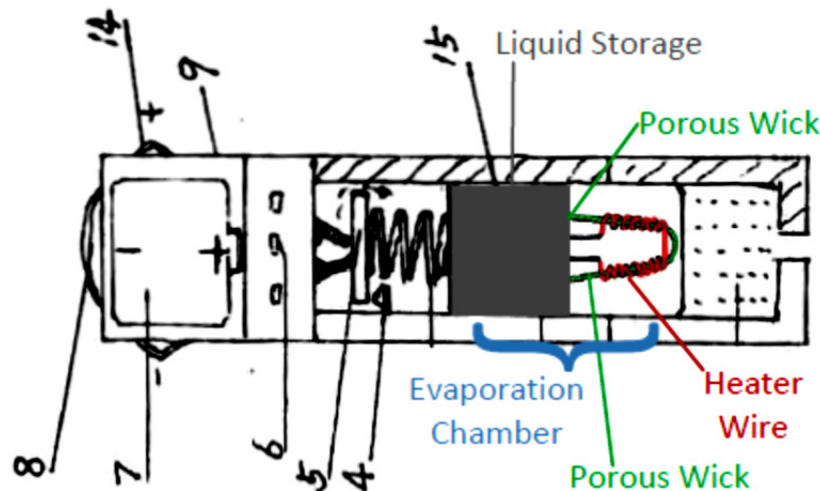
Petitioner's thinly-veiled obviousness argument fails. First, a skilled person would not have added a fibrous liquid supply to Hongbin because of its effects on airflow resistance. As shown by the yellow arrows in annotated Figure 1 below, Hongbin discloses that air moves from air intake vents 6 alongside valve plate 5 and spring 3, past a divider at one end of evaporation chamber 2, alongside electronic heater 15, and to filter tip 1. The air encounters little resistance as it passes from one end of evaporation chamber 2 to the other, and the amount of user suction required to operate the device is consistent and predictable. Ex. 2001 ¶76.



Petitioner proposes adding a fibrous liquid supply within evaporation chamber 2, as shown in gray in the annotated figure below. Petition at 15-16, 37, 39. The proposed supply is substantial and occupies half of the evaporation chamber. Making this design change would have created resistance within the

chamber as air was forced to navigate through the fiber to the filter of the device.

Ex. 2001 ¶77. As a result, more forceful inhalation would have been required to pull valve plate 5 away from air intake vents 6, putting strain on a user and decreasing ease of use. *Id.* Moreover, as liquid depleted from Petitioner’s proposed fibrous liquid supply, airflow resistance would have decreased over time, varying the suction required to make the device operate and leaving a user to guess as to how much suction should be applied. *Id.* ¶78. Because Petitioner’s proposed change would have increased airflow resistance and made it variable over time, a skilled person would not have pursued the change. *Id.* ¶79.



Second, to support its proposed modification, Petitioner and its expert rely on a problem that does not exist. They assert that storing a liquid directly in evaporation chamber 2 (as Hongbin describes) “could” cause liquid to leak through filter tip 1 or the divider between evaporation chamber 2 and spring 3. Petition at

15, 46; Ex. 1002 ¶37. Nothing in Hongbin suggests leaking is a problem. Ex. 2001 ¶80. Petitioner and its expert create that issue to justify their proposed modification. That approach does not prove obviousness. *Leo Pharm. Prods., Ltd. v. Rea*, 726 F.3d 1346, 1354-57 (Fed. Cir. 2013) (rejecting obviousness argument where prior art did not recognize an alleged problem so there was “no reason for one of ordinary skill in the art to attempt to improve” upon the art). Indeed, the Board has already rejected leakage as a potential reason for a combination where a petitioner challenged a related patent but failed to show that leakage was a problem in the primary prior art reference at issue. Ex. 2042 at 8-9.

And even if leaking were an issue in Hongbin’s device, it could have been resolved in many different ways. For example, a skilled person could have modified the divider and filter tip surfaces facing evaporation chamber 2 to allow air or liquid to flow in only one direction. Ex. 2001 ¶81. Those surfaces are shown in red in the annotated version of Figure 1 below. A skilled person could have placed permeable membranes on both surfaces to allow air (but not liquid) to move through them; such membranes were already used in cigarettes to protect filters from liquid exposure. Ex. 2001 ¶81; Ex. 2028, 1:60-66, 1:71-2:23. Or a skilled person could have used a one-way check valve on the divider surface to allow air to flow only in one direction—into the chamber; that approach was also used in simulated cigarettes, including in the ’549 patent and related patents. Ex.

2001 ¶82; Ex. 1001, 4:19-24; Ex. 2038, 4:25-32; Ex. 2031, 2:46-47, Ex. 2029,

Abstract, 2:54-57. Another option would have been to use a foam material to hold

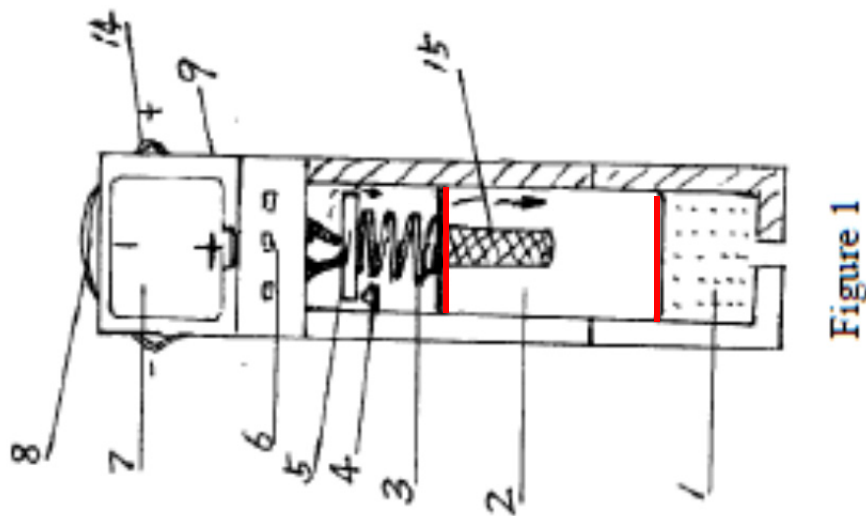
the liquid, or a container or collapsible bladder. Ex. 2001 ¶82; Ex. 1001, 3:4-11

(disclosing foam); Ex. 2031, 2:43-46, 3:55-57 (disclosing “liquid storage

container,” including an embodiment made from rubber). Petitioner and its expert

ignore these options. Instead, they consider only the structure recited in the

claims—a fibrous liquid supply. That approach is based on hindsight.



Third, as another reason for adding a fibrous liquid supply, Petitioner and its expert argue that using an “absorbent material” would have allowed for air to flow through the material. Petition at 16, 45; Ex. 1002 ¶38. But this statement applies to any absorbent material (like foam), not just to fiber. Ex. 2001 ¶83. Petitioner does not explain why a skilled person would have used fiber as opposed to any

other absorbent material. Furthermore, a design that included a container or collapsible bladder with an airflow passage along one side would have accomplished the same aim. Ex. 2031, 2:43-46. 3:55-57 (disclosing “liquid storage container,” including an embodiment made from rubber); Ex. 2038, 3:6-10 (“aerosol passage” alongside “liquid-supplying bottle”); Ex. 1001, 2:66-3:3 (same). Petitioner and its expert do not address those options. Instead, they use the claims as a roadmap and consider only a fibrous liquid supply.

Fourth, Petitioner and its expert argue it would have been obvious to use a fibrous liquid supply in Hongbin because there were “a limited number of predictable solutions for storing the liquid” and using fiber would have been a “simple substitution” of a known technique to yield alleged “predictable result[s]” of storing and transporting liquid, allowing airflow, and preventing leakage. Petition at 45-46; Ex. 1002 ¶¶37-38, 67. The law requires more than this hollow recitation of general obviousness rationales. *KSR*, 550 U.S. at 418 (requiring “articulated reasoning” with “rational underpinning” to support obviousness combinations); Ex. 2030 at 11 (“These conclusory statements are nothing more than a restatement of basic tests identified by the Supreme Court for determining whether an invention would have been obvious. ... General principles on what may constitute a supporting rationale cannot substitute for specific application of those principles to the facts.”). For the reasons explained above, Petitioner and its

expert's analysis is oversimplified and incomplete, and fails to support their obviousness arguments.

Fifth, Petitioner suggests in passing that incorporating Whittemore's wire heater and wick into Hongbin would have resulted in a fibrous liquid supply "by virtue of the fact that the porous wick is in the liquid supply." Petition at 46. As explained below, however, a skilled person would not have combined Hongbin with Whittemore. In any case, Petitioner argues that Whittemore's wick corresponds to the "*porous component*" in the claims, not the "liquid supply." Petition at 55, 75. A "liquid supply" does not include fiber material just because a "porous component" extends into it.

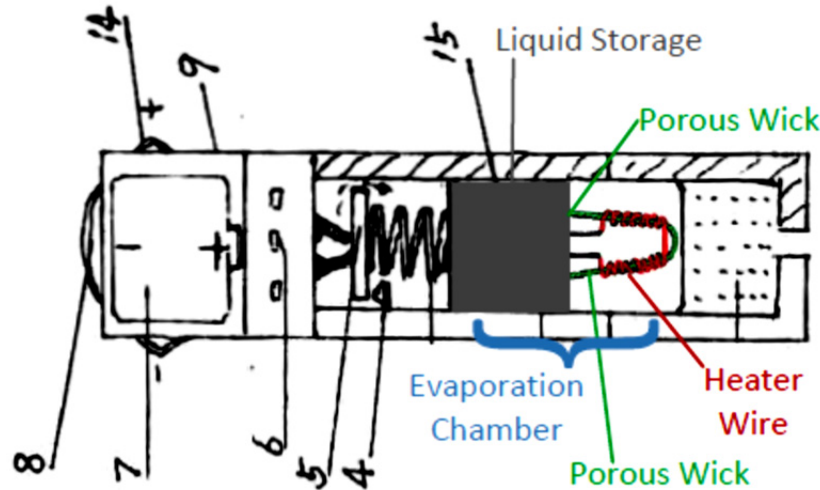
For these reasons, Petitioner has not met its burden to show that claims 12 and 13 are unpatentable.

7. Petitioner has not shown it would have been obvious to combine Hongbin with Whittemore

Claim 12 recites an atomizer that "comprises a porous component, a hollow cylindrical chamber and a heating wire." The atomizer's porous component is "in physical contact with the liquid in the liquid supply." Claim 12 further requires a "heating wire" that "extend[s] across the cylindrical chamber of the atomizer perpendicular to the longitudinal axis of the cylindrical housing." Claim 13 depends from claim 12 and includes these requirements. Claim 17 is similar to claim 12. It recites a "porous component" with a "liquid-supply in physical

contact with the porous component, to move liquid from the liquid-supply to the porous component” and a “heating wire positioned perpendicular to the longitudinal axis of the cylindrical housing.” Claims 18, 19, and 21 depend (directly or indirectly) from claim 17 and include the same requirements.

In light of Hongbin’s minimal disclosure, Petitioner proposes a combination with Whittemore to arrive at the claim limitations listed above. Petition at 35-39, 46, 52-53, 55-56, 59-63, 72-73, 75-76. That combination is reflected in Petitioner’s annotated figure below. Petition at 37. Petitioner proposes adding a liquid supply (“Liquid Storage”) and Whittemore’s “Heater Wire” and “Porous Wick” to Hongbin because that reference is missing the claimed “heating wire” and “porous component” in contact with a “liquid supply.” But the proposed combination is based on hindsight: Petitioner and its expert begin with the claim language and work backward to construct a combination that fits the claims. Doing so is improper. *Cheese Sys.*, 725 F.3d at 1352-53.



Petitioner has not explained why a skilled person would have incorporated Whittemore’s heat wire and wick into Hongbin. Petitioner and its expert fail to provide a plausible basis for why a skilled person would have looked for a more efficient heater. They rely on a supposed “power inefficiency” problem relating to the electric heater disclosed in Hongbin. Petition at 35-39; Ex. 1002 ¶¶58-63. Petitioner and its expert pounce on Hongbin’s disclosure that its optional heater “consumes much electricity.” Ex. 1004, 1:22-23; Petition at 35; Ex. 1002 ¶58. Based on that statement, they conclude that the heater design uses “too much” electricity and “could be improved.” Petition at 33, 35; Ex. 1002 ¶58. Even if heating efficiency were an issue, however, Hongbin provided an “external power supply” as a backup for the device’s internal battery. Ex. 1004, 1:22-23. So power consumption was not a problem in the device. Petitioner and its expert concoct “heating inefficiency” as an after-the-fact justification for their proposed

combination. Petition at 38. That is improper. *Leo*, 726 F.3d at 1354-57. In fact, the Board has rejected heating efficiency and power consumption arguments made by other petitioners challenging related patents because those petitioners failed to support their assertions with adequate explanation. Ex. 2043 at 11-14; Ex. 2037 at 19, 22, 24-31. Petitioner makes the same mistake here.

Petitioner and its expert also fail to explain why Whittemore's heater would have been more efficient than Hongbin's given the devices' different approaches to vaporization. The purpose of the optional electronic heater in Hongbin is "to promote evaporation" of "smoking liquid." Ex. 1004, 1:2-3, 1:20-21. That process occurs at temperatures below a liquid's boiling point, and even a small amount of extra heat accelerates the evaporation process. Ex. 2033 at 365-66; Ex. 1002 ¶¶61-62, 65, 87. Whittemore's device works differently. The heater increases to above the boiling point of the liquid, causing liquid to boil once it contacts the wire and requiring a significant amount of power to drive the heater. Ex. 1005 at 2 col. 1:20-52; Ex. 2001 ¶¶70-71; Petition at 36-37; Ex. 1002 ¶60. Petitioner and its expert do not account for these functional differences; they merely assert that Whittemore's heater is more efficient. They also skip over the fact that Whittemore's heater requires a large external power supply (such as a conventional socket terminal of an electrical circuit from 1935, or one found in a flashlight of that vintage with a large power source), putting its efficiency in question. Ex.

1005, 1 col. 1:39-45, 1 col. 2:47-50, 2 col. 1:3-7, 2 col. 1:20-52; Ex. 2001 ¶¶71, 87.

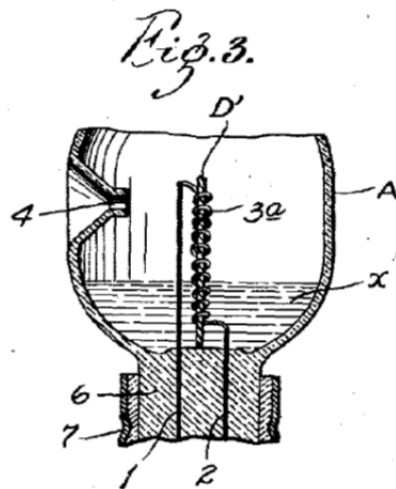
These omissions reflect that hindsight controls Petitioner's analysis.

Furthermore, Petitioner and its expert make other mistakes in grasping for support for their hindsight-driven modifications. They assert that Hongbin's electronic heater "must heat all or most of the ... liquid located in the smoking material evaporation chamber 2 in order to vaporize the liquid needed for a puff," suggesting a large amount of heat and power are required. Petition at 35; *see also* Ex. 1002 ¶60. That is incorrect. To begin with, no additional heat is needed: Hongbin's heater is optional. Ex. 1004, 1:20-21. Further, evaporation occurs at the surface of the liquid so only the surface liquid needs to be heated. Ex. 2033 at 365-66; Ex. 2001 ¶¶61, 67. Moreover, since evaporation happens at temperatures below a liquid's boiling point and accelerates as temperature increases, even adding a small amount of heat to the system will raise the evaporation rate. Ex. 2033 at 366; Ex. 2001 ¶¶61-62. Petitioner and its expert's analysis is flawed because they ignore these facts.

Making matters worse, Petitioner and its expert fail to consider other design options that would have remedied any power consumption problem, favoring the one that suits their argument instead. For example, Hongbin provides an alternative embodiment in which the liquid is heated using chemical energy without the need for any power supply. Ex. 1004, 1:24, 2:27-29. In that

embodiment, “a chemical substance which can be triggered by a metallic plate to give out heat” is loaded between an inner and outer casing. Ex. 1004, 2:27-29.

When triggered, the chemical substance “gives out heat so that the liquid cigarette in the smoking material evaporation chamber vaporizes,” obviating the need for an electrical heater and power supply. Ex. 1004, 1:30-33; Ex. 2001 ¶88. Petitioner and its expert never address this approach. In another example, Whittemore discloses an alternative embodiment with a “single vertically-disposed coil” heater. Ex. 1005, 1 col. 2:26-34. That heater is shown in Figure 3 below. Given its smaller size, the heater consumes less power than the dual-coil V-shaped heater in Petitioner’s proposed combination. Ex. 2001 ¶89. Petitioner and its expert never address this design. Independent claim 12 shows why. That claim requires a wire that “extend[s] across [a] cylindrical chamber.” Whittemore’s alternative heater does not do so, so Petitioner and its expert disregard it. This is another sign of hindsight.



Petitioner and its expert offer several conclusory rationales for their proposed combination of Hongbin and Whittemore. They argue that the change in heating elements is a “simple substitution” to “improve[]” Hongbin’s device and yield the alleged predictable results of “heating liquid,” “more efficient heating and reduced electrical use,” and “heating the liquid in the evaporation chamber when a user inhales.” Petition at 38-39; *see also* Ex. 1002 ¶¶62-63. These assertions are founded on Petitioner’s made-up heating efficiency problem and oversimplified analysis. They do not provide the required “articulated reasoning” with “rationale underpinning” for why a skilled person would have pursued the proposed combination and thus carry no weight. *KSR*, 550 U.S. at 418.

Because Petitioner has not shown that a skilled person would have combined Hongbin and Whittemore, claims 12-13, 17-19, and 21 are patentable.

8. Petitioner has not proven it would have been obvious to combine Hongbin with Brooks

Because of additional deficiencies with Hongbin’s disclosure, Petitioner also seeks to combine Hongbin with Brooks. But like the proposed combination of Hongbin and Whittemore, this proposal is motivated by improper hindsight.

Claims 12 and 17 require “an electronic circuit board” within a “cylindrical housing.” Dependent claims 13, 18-19, and 21 include the same requirement. Because Hongbin does not teach an electronic circuit board, Petitioner relies on a combination with Brooks. Petition at 32-33. Brooks discloses a circuit that

controls heating element temperature “within the desired temperature range.” Ex. 1006, 12:7-15, 13:12-16. Brooks does not disclose a circuit board, but Petitioner and its expert assume that the circuit “necessarily, and inherently” has one anyway. Petition at 33; Ex. 1002 ¶55. They argue that adding Brooks’s circuit to Hongbin would have resulted in a “more energy efficient system and helped to solve the electricity use problem identified in Hongbin.” Petition at 33; *see also* Ex. 1002 ¶54. But energy efficiency and power consumption were not issues in Hongbin, which has a backup external power supply. Ex. 1004, 1:22-23; Ex. 2001 ¶91. And, just like Hongbin, Brooks discloses an external power supply option, which according to Petitioner’s expert, reflects that the device uses too much electricity. Ex. 1006, 4:42-46 (“Alternatively, the electrical power supply can be provided ... as normal household current stepped down by an appropriate transformer.”).

Further, Hongbin is designed to be simple and straightforward: when a user draws on the device, valve plate 5 contacts power contactor 4 to complete a circuit, causing an indicator to illuminate and a heater to energize (if there is one). Ex. 1004, 1:9-19; Ex. 2001 ¶92. A skilled person would not have complicated that design by inserting a printed circuit board with electronic circuitry and therefore increasing the cost of design and manufacture. *Id.* Petitioner’s argument is motivated by a need to add an electronic circuit board to Hongbin so that it matches what is claimed. That is hindsight.

Because Petitioner has not met its burden of showing that a skilled person would have combined Hongbin and Brooks, claims 12-13, 17-19, and 21 are patentable.

C. Petitioner's Expert's Opinions Are Plagued by Hindsight and Other Errors

As support for its arguments, Petitioner relies on the declaration of Dr. Robert Sturges (Ex. 1002). But hindsight pervades Petitioner's expert's opinions, and they suffer from several other infirmities.

Petitioner's expert's opinions on obviousness fall flat. The Supreme Court has held that “[a] patent composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art.” *KSR*, 550 U.S. at 418. Rather, there must be “an apparent reason to combine the known elements in the fashion claimed by the patent at issue.” *Id.* As the Board wrote in denying a previous IPR petition on a related patent, “obviousness requires the additional showing that a person of ordinary skill at the time of the invention would have selected and combined those prior art elements in the normal course of research and development to yield the claimed invention.” Ex. 2032 at 19. “[R]ejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.” *KSR*, 550 U.S. at 418 (citation omitted).

Petitioner's expert fails to meet these requirements, relying instead on conclusory statements infected by hindsight. For instance, with the claims as a starting point, Petitioner's expert assumes that a skilled person would have understood Hongbin to disclose a fibrous liquid supply inside evaporation chamber 2, despite the absence of any such structure in that reference. Ex. 1002 ¶¶37-38, 65. That approach is not credible. It contradicts Hongbin's disclosure of "loading" liquid directly into evaporation chamber 2. Ex. 1004, 1:22-23.

Petitioner's expert redesigns the Hongbin device contrary to its fundamental operating principles so that it matches the claims. Hongbin's device relies on evaporation, which occurs at the surface of a liquid and happens at temperatures below a liquid's boiling point. Ex. 1004, 1:9-14, 1:20-21; Ex. 2033 at 365-66. Indeed, a heater is optional in Hongbin's device because evaporation occurs even without extra heat. Petitioner's expert nonetheless seeks to add a heating wire from Whittemore to Hongbin. Ex. 1002 ¶¶58-64. But that heating wire vaporized liquid by boiling it, which requires heating the wire to a temperature above a liquid's boiling point. Ex. 1005 at 1 col. 1:50-col. 2:8; 2 col. 1:20-52; Ex. 1002 ¶60; Ex. 2033 at 366, 378. Although Hongbin and Whittemore rely on different approaches to vaporization, Petitioner's expert ignores that difference and seeks to convert Hongbin into a device that boils liquid instead of evaporating it. That redesign is evidence of hindsight.

Petitioner's expert also creates nonexistent problems as justification for his hindsight-driven reference combinations. For example, he identifies alleged "high electricity usage" in Hongbin's device as the reason why a skilled person would have modified the device to add an LED from Brooks, a control circuit from Brooks, and a wire heater and porous wick from Whittemore. Ex. 1002 ¶¶50, 54-55, 58-63. But Hongbin already resolves any power consumption issue by providing an external power supply as a backup for the device's battery. Ex. 1004, 1:22-23. And Petitioner's expert assumes that Hongbin has "high electricity usage" because Hongbin discloses external power supply 14, yet he finds no such "high electricity usage" in Whittemore or Brooks even though both disclose using external power supplies.

Petitioner's expert also asserts that leaking provides the motivation for modifying Hongbin's device to insert a fibrous liquid supply into Hongbin's device. Ex. 1002 ¶¶37-38. But he does not provide any justification for that position. Hongbin never suggests that leaking is an issue. Petitioner's expert manufactures that problem as an alleged basis for his combination. That runs contrary to law. *Leo*, 726 F.3d at 1354-57.

Petitioner's tendency to focus on one solution (the one that fits the claims) to the exclusion of all others also demonstrates that hindsight is behind his opinions. For example, Petitioner's expert argues that a skilled person would have used a

fibrous liquid supply because it allows airflow through the device. Ex. 1002 ¶38.

But other materials (such as foam) would have performed the same function. A walled container or collapsible bladder with an airflow path alongside it also would have accomplished that objective. Petitioner's expert also argues that adding a fibrous liquid supply would have prevented leaking. Ex. 1002 ¶¶37-38. But he ignores other solutions such as permeable membranes and one-way check valves, even though those techniques were already used in cigarette devices. Ex. 1001, 4:19-24; Ex. 2028, 1:60-66, 1:71-2:23; Ex. 2029, Abstract, 2:54-57; Ex. 2031, 2:43-46. 3:55-57; Ex. 2038, 3:6-10. In another example, Petitioner's expert urges use of a heating element embodiment from Whittemore because of "more efficient heating." Ex. 1002 ¶62. But he never addresses a smaller and even more efficient heater also disclosed in Whittemore. Ex. 1005 at 1 col. 2:26-34, Fig. 3.

Petitioner's expert's tunnel vision is evidence of hindsight.

Petitioner's expert's conclusory and hindsight-driven opinions should carry no weight in determining whether Petitioner has proven a reasonable likelihood that the claims of the '549 patent would have been obvious.

VI. CONCLUSION

For the reasons discussed above, Patent Owner requests that the Board deny the Petition for *Inter Partes* Review of the '549 patent.

Respectfully submitted,

Date: August 16, 2017

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CERTIFICATE OF COMPLIANCE

The undersigned certifies that this brief complies with the type-volume limitations of 37 CFR § 42.24. Excluding the cover page, signature block, and parts exempted by 37 C.F.R. § 42.24(a), this brief contains 11,626 words as calculated by the “Word Count” feature of Microsoft Word 2010, the word processing program used to create it.

Date: August 16, 2017

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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: August 16, 2017

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

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