Paper No. ___
Filed: July 25, 2017

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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R.J. REYNOLDS VAPOR COMPANY,
Petitioner,

v.

FONTEM HOLDINGS 1 B.V.,
Patent Owner.

_____

Case **IPR2017-01118**
Patent No. **8,490,628**

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

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Ex. 1003	U.S. Patent No. 6,155,268 ("Takeuchi")
Ex. 1004	U.S. Patent No. 2,057,353 ("Whittemore")
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Patent Owner's Exhibits	
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Ex. 2003	Merriam-Webster's Collegiate Dictionary (11th ed. 2003), selected pages
Ex. 2004	*Fontem Ventures B.V., et al. v. Nu Mark*, 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)
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Ex. 2112	Declaration of Peter Sher

I. INTRODUCTION

This is the fourth IPR petition against the '628 Patent trying to show that Takeuchi discloses a heating wire "oriented substantially perpendicular to the longitudinal axis of the housing," and the second such petition filed by this Petitioner. The Board denied Petitioner's first petition just this past January on the basis that Takeuchi does not disclose a heating wire perpendicular to the longitudinal axis of the housing. Ex. 1006 at 6-10.

Despite its failure, Petitioner filed this Petition in April, months after the Board denied its earlier petition. But Petitioner cites no new prior art, instead relying on a different figure in Takeuchi and adjusting its arguments in response to the Board's denial. Before, Petitioner argued Takeuchi's longitudinal axis ran from left-to-right, and that a heating element in Takeuchi's upper chamber was perpendicular to that axis. Now, Petitioner adopts the Board's conclusion that Takeuchi's longitudinal axis runs from top-to-bottom, and points to another figure in Takeuchi where the components are arranged differently. Petitioner could have made these arguments previously, but it chose not to do so. Instead, Petitioner waited to make these new arguments so it could take advantage of Patent Owner's previous preliminary response and the Board's analysis in denying Petitioner's earlier petition. The Board has denied petitions on the basis that such a strategy is "unfair" and prejudices a patent owner. *Xactware Sols., Inc. v. Eagle View Techs.,*

Inc., IPR2017-00034, Paper 9 at 10, 11 (Apr. 13, 2017) (Ex. 2013). Such is the case here.

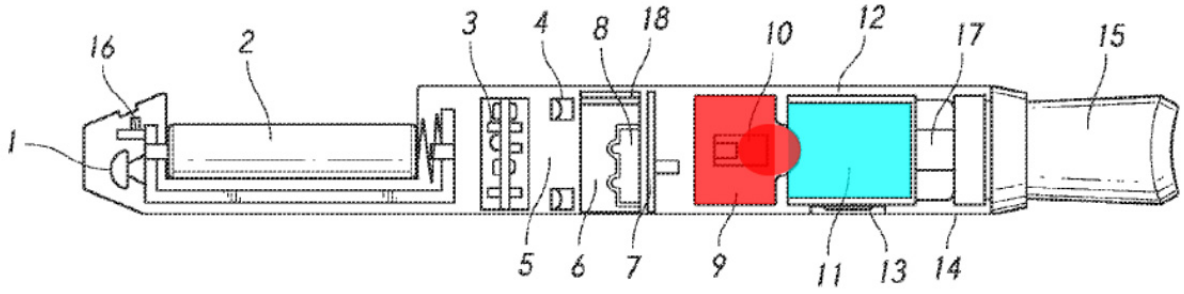
Despite taking a second bite at the IPR apple, Petitioner's modified arguments do not change the ultimate result. Just as Petitioner previously failed to demonstrate a reasonable likelihood that the '628 Patent's claims were obvious over Takeuchi, Petitioner now fails to show Takeuchi anticipates those claims. And Petitioner's proposed obviousness combination of Takeuchi and Whittemore is the same as before. That proposed combination is based on hindsight—a skilled person would not have pursued it. Also, as with its earlier petition, Petitioner fails to address Patent Owner's substantial evidence regarding objective indicia of non-obviousness.

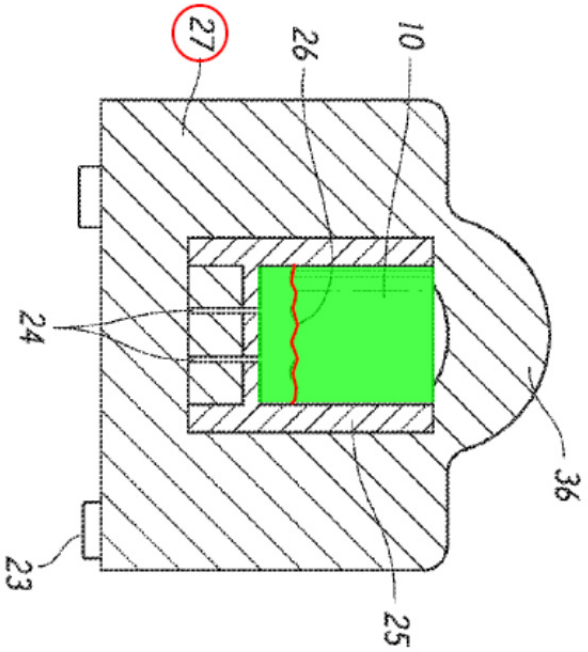
For all of these reasons, the Petition should be denied.

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." Claims 7 and 8 are 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 3 requires "an atomization cavity within the atomizer."
- 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 12. 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). Below, Patent Owner addresses the terms "atomizer," "liquid supply," "heating wire," and "[substantially/generally] perpendicular."

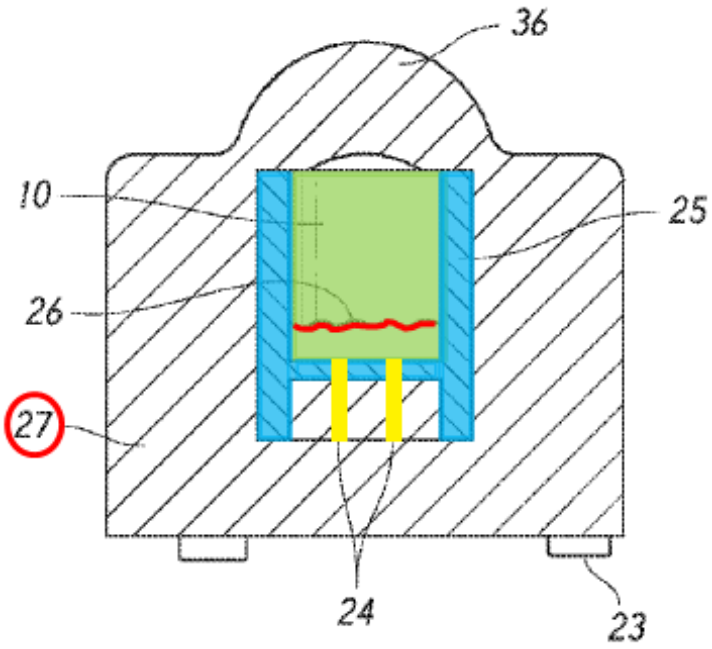
A. "atomizer" and "atomizer assembly"

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 claims 1, 7 and 8 recite an "atomizer assembly" or "atomizer," both of which include 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 receive particles after atomization has occurred). Ex. 2001 ¶24. Properly construed, the broadest reasonable interpretation of an "atomizer" is "a component or components that convert(s) liquid into aerosol or vapor." *Id*. ¶¶21-25.

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, porous body, cavity, structures forming the cavity, ejection holes) as the "atomizer." Ex. 1001, 2:15, 2:43-45, 2:61-64, 3:45-54; Ex. 2001 ¶23.

Under Petitioner's construction, the term "atomizer" would extend to any component in an electronic cigarette that "facilitate[s]" or "participate[s] in atomization," which could include the battery, the housing, the air inlets, etc. In IPR2016-01527 (hereinafter, "First Petition"), Petitioner adopted a construction for this term that excluded "components included in other recited parts of the electronic cigarette, such as the liquid supply." Ex. 2002 at 12. Now Petitioner adopts an even broader construction, arguing that there is no intrinsic support for

excluding "components included in other recited parts of the electronic cigarette, such as the liquid supply." Petition at 13-14. Petitioner is mistaken. As noted above, claims 1 and 6-8 refer to the atomizer and liquid supply as separate components: the atomizer includes a porous body that is "projecting into" or "extending into" the liquid supply. The specification discloses that one is "in contact with" the other. Ex. 1001, 3:60-63. 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). Petitioner's proposed construction is unreasonably broad.

Petitioner relies on its unreasonably broad construction to make up for deficiencies in its prior art. Specifically, Petitioner asserts that U.S. Patent No. 6,155,268 (Takeuchi) (Ex. 1003) discloses an atomizer that includes pore structure 302 inside liquid passageway 371. Petition at 16, 33-40. But the pore structure does not convert liquid into aerosol or vapor. The pore structure's purpose is to move liquid from the liquid storage body to the heater. Ex. 1003, 9:35-44. Petitioner made the same argument in its First Petition. Ex. 2002 at 16, 33-40. The pore structure does not atomize liquid. Ex. 2001 ¶¶60-64.

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. 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. Ex. 2001 ¶25.

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"

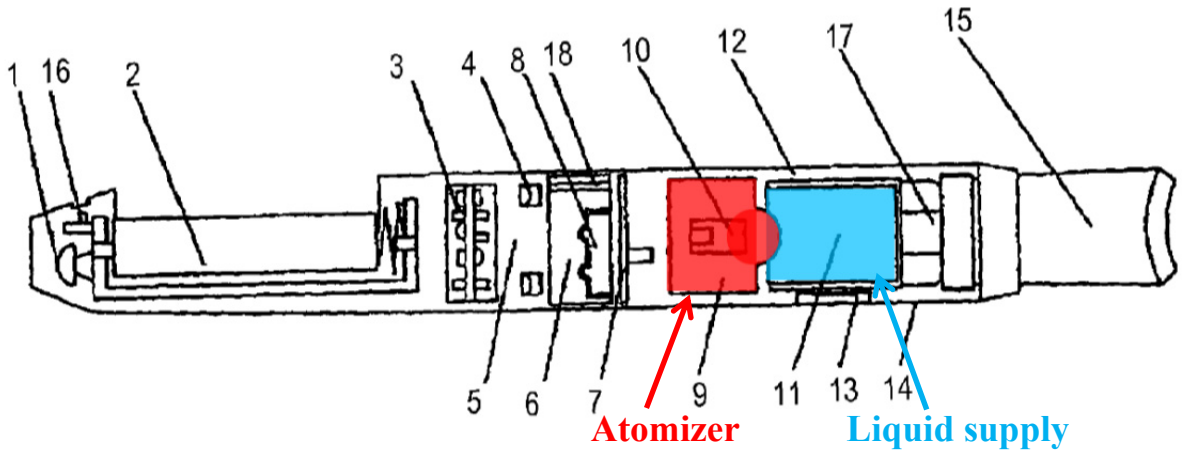
Patent Owner's Construction	Petitioner's Construction
"a store for liquid"	"the liquid itself"

Independent claims 1, 7 and 8 recite a "liquid supply." Dependent claim 5 requires that the liquid supply comprises a fiber material. The broadest reasonable interpretation of "liquid supply" is "a store for liquid."

Claims 1 and 6-8 require the liquid supply to be a structure separate from the atomizer that stores liquid. Claim 5 requires the liquid supply "compris[e] a fiber

material." Additionally, claim 7 requires "the air flow channel extending alongside of the liquid supply." Claims 1, 7, and 8 require the liquid supply to be located "in the housing."

The specification discloses a "solution storage porous body" for storing fluid. Ex. 1001, 3:6-16. 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.*, 3:6-16. The liquid supply is separate from and in contact with the atomizer as 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.*, 3:6-7. In another embodiment, the specification discloses a "solution storage container" for storing liquid, which "can be filled with conventional drug for pulmonary administration apparatus." *Id.*, 2:1-4. Thus, the claims and the specification use the term "liquid supply" as a noun to describe a store for liquid. Ex. 2001 ¶¶26-32.



Petitioner notes that in a previous IPR, the Board construed "liquid supply" to mean "the liquid itself." Petition at 14; Ex. 1007 at 5-10. However, the Board has since revisited this claim term in an IPR on a related patent with a specification that shares the same relevant disclosures. Patent Owner's construction of "liquid supply" conforms with that decision. Considering the same disclosures cited above, the Board in IPR2016-01859 noted that "something more than just a liquid is required by this limitation." Ex. 2110 at 8. There, as here, the claims included language "impos[ing] a physical requirement fixing the shape of the liquid supply … and its orientation." Ex. 2110 at 7-9. In light of the claim language and the specification, the Board ultimately concluded that the "liquid supply" is a "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 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.

The same rationales the Board used before apply to the construction of the term "liquid supply" for the '628 patent. Furthermore, Petitioner's proposed construction is unreasonably broad because it equates "liquid supply" with "liquid," reading the term "supply" out of the claim and encompassing any liquid anywhere in a device.

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. 2003 at 1256. Random House Webster's Dictionary defines "supply" to mean a "store" or "provision." Ex. 2020 at 1912. And Patent Owner's expert agrees with Patent Owner's proposed construction. Ex. 2001 ¶¶26-32. Accordingly, the term "liquid supply" means "a store for liquid."

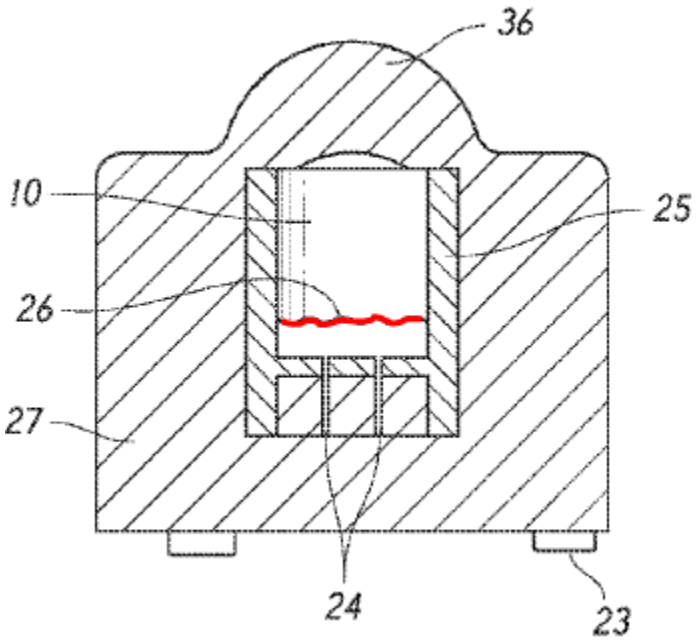
C. "heating wire"

Patent Owner's Construction	Petitioner's Construction
"a flexible metal thread or rod that generates heat"	"a thread or rod that can generate heat"

Independent claims 1 and 8 require "a heating wire in the atomizer." The broadest reasonable interpretation of "heating wire" is "a flexible metal thread or rod that generates heat." 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. Petitioner agrees that a "wire" is "usually very flexible," but

omits the words "flexible" and "metal" from its proposed construction. Petition at 14-15.

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.



Petitioner's omission of "flexible" and "metal" from its construction is an attempt to backtrack from its previous arguments. In its First Petition, Petitioner argued that Takeuchi disclosed all of the '628 Patent's claim limitations "except arguably a heating 'wire.'" Ex. 2002 at 24. Noting that Takeuchi's "rod-like

heaters" only "arguably meet the 'wire' limitation," Petitioner instead "relie[d] upon the teachings of Whittemore for the claimed heating 'wire.'" *Id*. Now, Petitioner refers to Takeuchi's rod-like heater as a "wire-like rod heater," even though it is not a wire. Petition at 2. Moreover, Petitioner's proposed construction is unreasonable because the ordinary meaning of a "wire," even at its broadest, is limited to something that is both "flexible" and "metal." Ex. 2001 ¶36. The specification's disclosures are consistent with that meaning. Petitioner's construction is unreasonably broad because it encompasses any "rod that can generate heat."

D. "substantially perpendicular" / "generally perpendicular"

Patent Owner's Construction	Petitioner's Construction
"at least largely perpendicular"	"not completely perpendicular"

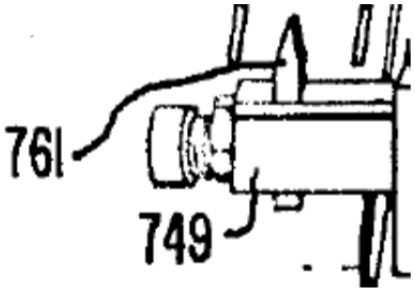
The broadest reasonable interpretation of "substantially/generally perpendicular" is "at least largely perpendicular." Petitioner proposes construing these terms to mean "not completely perpendicular." Petition at 15. Although Patent Owner agrees that these terms do not require precise perpendicularity, Petitioner's construction appears to exclude components that are "completely perpendicular." Petitioner also incorrectly suggests the angle "is not crucial" in the '628 Patent. Petition at 15.

A skilled person would understand that "substantially perpendicular" or "generally perpendicular" components should be largely perpendicular within a

reasonable tolerance. The terms "generally" and "substantially" indicate that some margin of error from exactly perpendicular is acceptable. Ex. 2001 ¶¶37-38.

Petitioner inexplicably reads the "substantially" and "generally" qualifiers so broadly as to remove "perpendicular" from the claims entirely. Petitioner also asserts that the terms "substantially" and "generally" "do not provide any clear guidance as to what is and is not substantially or generally perpendicular." Petition at 15. The Federal Circuit has held otherwise, finding that the terms "generally" and "substantially" are "commonly used in patent claims" and are simply "words of approximation" that "avoid a strict numerical boundary to the specified parameter." *Anchor Wall Sys., Inc. v. Rockwood Retaining Walls, Inc.*, 340 F. 3d 1298, 1310-11 (Fed. Cir. 2003). Petitioner's proposed construction is unreasonably broad because it imparts no meaning to those terms and therefore fails to provide any limit whatsoever on the required perpendicularity. That cannot be right; the claimed components must be at least largely perpendicular.

Patent Owner's proposed construction is also supported by one of Petitioner's expert's own patents. Ex. 2111. That patent describes bar 761 as securing push rod 749 "in a position ***generally perpendicular*** to the direction of movement of the push rod." *Id.*, 21:49-52 (emphasis added). In the excerpt from Figure 15B below, the bar and rod are shown as being largely perpendicular.



Petitioner asserts "the angle between the longitudinal axis and the heating wire is not crucial" despite the claim language requiring a substantially "perpendicular" angle. Petition at 15. Petitioner says the angle is not crucial to make up for the fact that its prior art discloses an upper chamber that is "inclined" with respect to the longitudinal axis. Ex. 1003, 8:59-9:7. But while a skilled person would allow for some deviation from exact perpendicularity, a skilled person would not consider an intentionally "inclined" intersection to be generally perpendicular.

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 1-3, 5, 7, and 8 are anticipated by Takeuchi;

Ground 2. Claims 1-3, 5, 7, and 8 are obvious over Takeuchi in view of Whittemore.

Petition at 8.

A. The Petition Should Be Denied Because Petitioner's Follow-On IPR Challenge Unfairly Prejudices Patent Owner

This is Petitioner's second petition alleging the '628 Patent is invalid over Takeuchi and Whittemore. *See* IPR2016-01527. The Board has exercised its discretion under 35 U.S.C. § 314(a) to deny successive IPR petitions where it is "unjust to Patent Owner to institute review." *NVIDIA Corp. v. Samsung Elecs. Co., Ltd.*, IPR2016-00134, Paper 9 at 11 (PTAB May 4, 2016) (Ex. 2105); *Nautilus Hyosung Inc. v. Diebold, Inc.*, IPR2017-0426, Paper 17 at 11-16 (PTAB June 22, 2017) (Ex. 2106); *Akamai Techs., Inc. v. Limelight Networks, Inc.*, IPR2017-00358, Paper 9 at 6-13 (PTAB May 2, 2017) (Ex. 2107); *Xactware Sols., Inc. v. Eagle View Techs., Inc.*, IPR2017-00034, Paper 9 at 6-11 (PTAB Apr. 13, 2017) (Ex. 2013). "The potential inequity based on a petitioner's filing of serial attacks against the same claims of the same patent, while having the opportunity to adjust litigation positions along the way based on either patent owner's contentions responding to prior challenges or the Board's decision on prior challenges, is real and cannot be ignored." Ex. 2105 at 8. The Board has articulated five factors to weigh in deciding whether instituting review would give "an unfair advantage" to a petitioner:

(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 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.

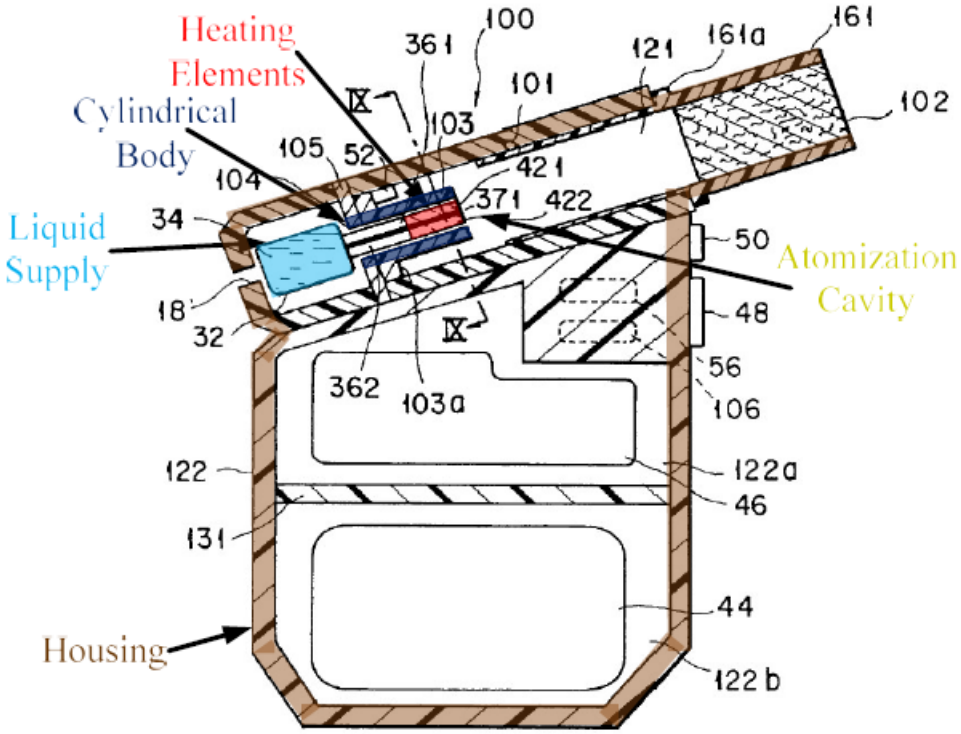
Ex. 2013 at 7-8; Ex. 2107 at 9. All of these factors weigh heavily in favor of denying the present Petition.

1. Petitioner Previously Filed a Petition Directed to the Same Claims of the Same Patent

In IPR2016-01527, Petitioner challenged claims 1, 2, 5, and 8 of the '628 Patent. Ex. 2002 at 7. The present Petition challenges the same claims as well as dependent claim 3 and independent claim 7. Petition at 8.

Petitioner's addition of claims 3 and 7 adds nothing new. Petitioner alleges claim 7 is unpatentable based on the same disclosures it identifies for claims 1, 2,

and 8. Petition at 24, 27-28, 31-50, 59-65. And Petitioner's entire analysis for dependent claim 3, which depends from claim 1 and further requires "an atomization cavity within the atomizer," is nothing more than an annotated arrow pointing to a figure reproduced below. Petition at 51. Yet Petitioner's own expert contradicts Petitioner, and refers to this disclosure as an "area around the atomizer," not "within the atomizer" as required by the claim. Ex. 1002 ¶66.



2. Petitioner Knew of the Prior Art Asserted Here Because It Asserted the Same Prior Art in the Earlier Petition

Petitioner knew of the prior art asserted here because Petitioner asserted it in the prior petition. In IPR2016-01527, Petitioner relied on "Takeuchi as the lead reference," which Petitioner alleged "discloses all of the claimed features with the

arguable exception of the 'heating wire' of claims 1 and 8 and the 'fiber material' in the liquid supply of dependent claim 5." Ex. 2002 at 7. Petitioner also alleged "Whittemore teaches the claimed heating wire." *Id*. Here, Petitioner states: "Ground 1 relies upon Takeuchi as an anticipating only reference, because it discloses all the claim limitations. Ground 2 relies on Takeuchi as the lead reference, but considers a combination of Takeuchi with Whittemore for the 'heating wire' of claims 1, 7 and 8." Petition at 9.

3. Petitioner Received Patent Owner's Preliminary Response and the Board's Decision in the Prior IPR Before Filing This Petition

Petitioner filed the current Petition on April 3, 2017. Patent Owner's preliminary response in IPR2016-01527 was filed November 16, 2016. Ex. 2016. The Board issued its decision in that IPR on January 30, 2017. Ex. 1006.

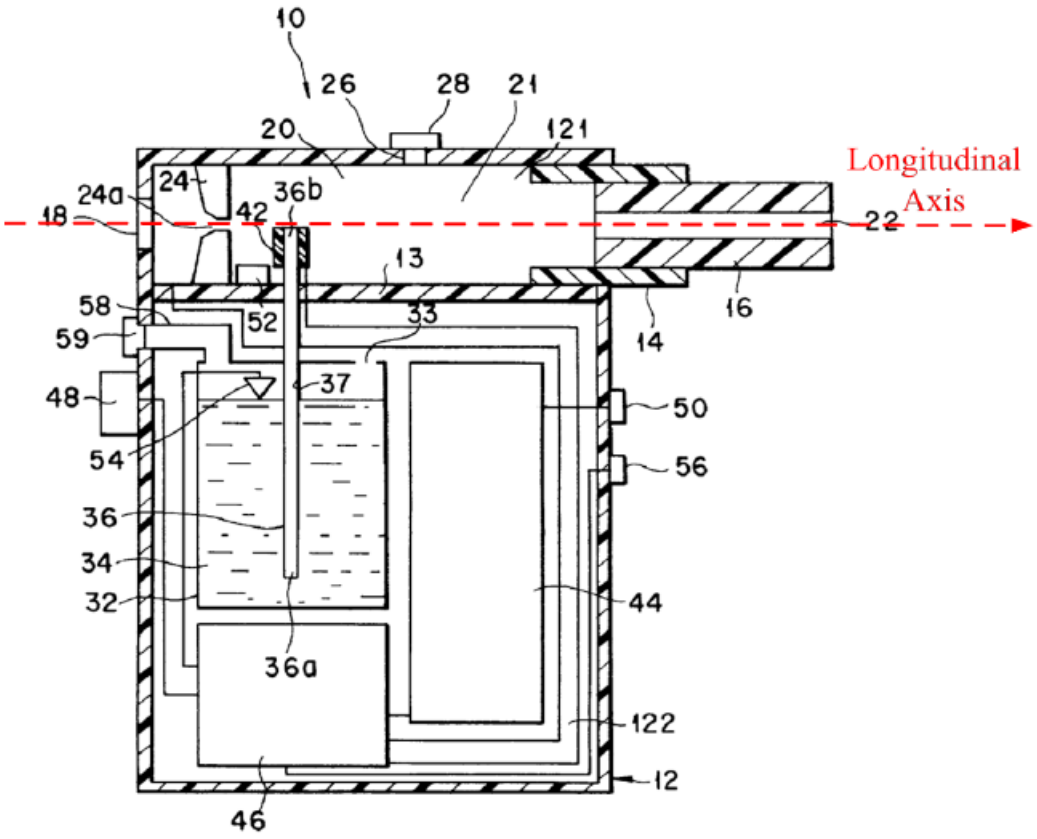
Petitioner also had access to the Board's and Patent Owner's analysis in other IPRs addressing the claims and prior art at issue here. In IPR2014-01300, Patent Owner filed a preliminary response on November 20, 2014, the Board instituted review on February 19, 2015, and Patent Owner filed an opposition on June 22, 2015. Ex. 2101; Ex. 1009; Ex. 2018. That IPR ended in settlement. Ex. 2103. In IPR2016-01285, Patent Owner filed a preliminary response on October 5, 2016, and the Board denied review on November 30, 2016. Ex 2102; Ex. 1008.

Like Petitioner's petitions, both of these prior petitions asserted Takeuchi as the primary reference against the claims at issue here.

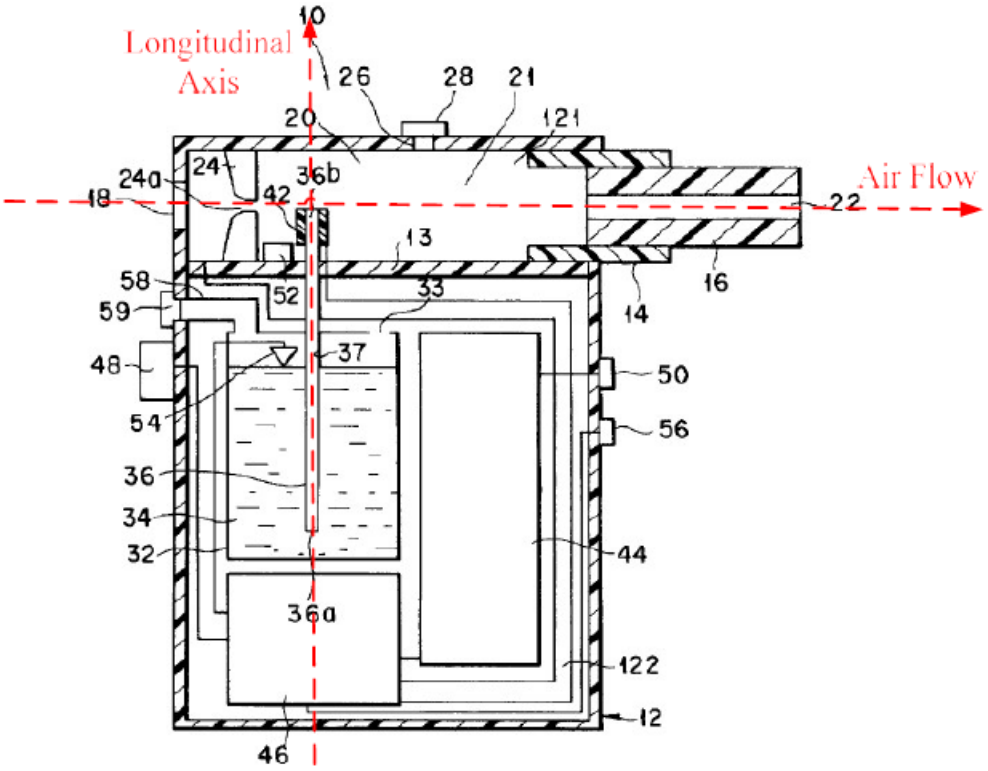
4. Petitioner Filed the Present Petition Two Months After Receiving the Board's Analysis and Nearly Five Months After Receiving Patent Owner's Preliminary Response

When time passes after a petitioner receives feedback from the Board and a patent owner's arguments, the "delay affords Petitioner the unfair advantage of adjusting its litigation positions based on the Patent Owner's and the Board's responses to the First Petition." Ex. 2013 at 7 n.5. Petitioner filed the present Petition two months after the Board's decision and nearly five months after Patent Owner's preliminary response in IPR2016-01527. That timespan is about the same as or longer than other cases where the Board has denied institution under similar facts. Ex. 2013 at 9-10 (follow-on petition filed nearly two months after Board decision and over four months after patent owner response); Ex. 2107 at 11 (follow-on petition filed one month after Board decision and nearly four months after patent owner response); Ex. 2105 at 8-9, 11-12 (follow-on petition filed nearly two months after patent owner response).

Adjusting its positions based on Patent Owner's and the Board's prior responses is precisely what Petitioner has done here. In its First Petition, Petitioner argued Takeuchi's longitudinal axis runs from left-to-right, and included the following annotated figure:



Ex. 2002 at 34. The Board rejected Petitioner's argument and found that Takeuchi's longitudinal axis runs from top-to-bottom. Ex. 1006 at 8-9. The Board noted that "Petitioner does not offer an alternate theory of unpatentability where Takeuchi's longitudinal axis is [top-to-bottom]." *Id*. at 9 n.5. Adjusting to that feedback, Petitioner now submits the updated figure below:



Petition at 18. Petitioner says its newly adjusted arguments are "based on the housing embodiment shown in Figure 8 of Takeuchi" instead of Figure 1, which its previous petition relied upon. *Id*. at 9.

5. Petitioner Provides No Explanation Why the Board Should Permit Another Attack on the Same Claims of the Same Patent Based on the Same Prior Art

"Weighed against the factors outlined above are any non-strategic reasons Petitioner offers for the delay in filing its Second Petition or any other justification for allowing its Second Petition to go forward." Ex. 2013 at 10. The mere fact that a petition is "substantively different" is not enough to "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." *Id*.

Petitioner offers no explanation for why it failed to raise its present arguments in its prior petition. Petitioner only says the present Petition is "not redundant of previous IPRs (Exs. 1006, 1007, 1008, 1009) based on Takeuchi because they were not based on the housing embodiment shown in Figure 8 of Takeuchi." Petition at 9. But that statement is false. A prior petitioner based its IPR challenge in part on Takeuchi's Figure 8. Ex. 2109 at 21-22, 25.

As the Board has previously stated, "Petitioner's strategy of adjusting its challenge in a second Petition based on the Board's feedback in an earlier Institution Decision imposes inequities on Patent Owner" and should be denied. Ex. 2107 at 12.

B. The Petition Should Be Denied Because It Is Redundant

The Board has discretion to deny a petition 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 Sys., Inc.*, IPR2015-01423, Paper 7 (Ex. 2010 at 5-9). The Board specifically "disfavor[s] allowing follow-on petitions that attempt to fix deficiencies in a previous petition that were explained in a previous decision on

institution." *Synaptics Inc. v. Amkor Tech., Inc.*, IPR2017-00085, Paper 12 (Ex. 2104 at 10).

As discussed above, Petitioner presented the same prior art and substantially the same arguments in IPR2016-01527, only adjusting its arguments in an attempt to fix deficiencies the Board explained in its previous decisions. As shown in the chart below, the prior art Petitioner cites is redundant not only of its own earlier petition, but also of petitions filed by other petitioners. Indeed, the petitioner in IPR2014-01300 relied on Takeuchi's Figure 8, the very disclosure Petitioner says makes its Petition unique. Ex. 2109 at 21-22, 25.

IPR	References	Basis	Claim(s) Challenged
This Petition	Takeuchi	§102	1, 2, 3, 5, 7, 8
This Petition	Takeuchi, Whittemore	§103	1, 2, 3, 5, 7, 8
IPR2016-01527	Takeuchi, Whittemore, Gehrer	§103	1, 2, 5, 8
IPR2016-01285	Takeuchi, Adiga	§103	1, 2, 3, 5, 8
IPR2014-01300	Takeuchi	§103	1, 2, 3, 6, 7, 8
IPR2014-01300	Takeuchi, Gilbert	§103	4
IPR2014-01300	Takeuchi, Adiga	§103	5

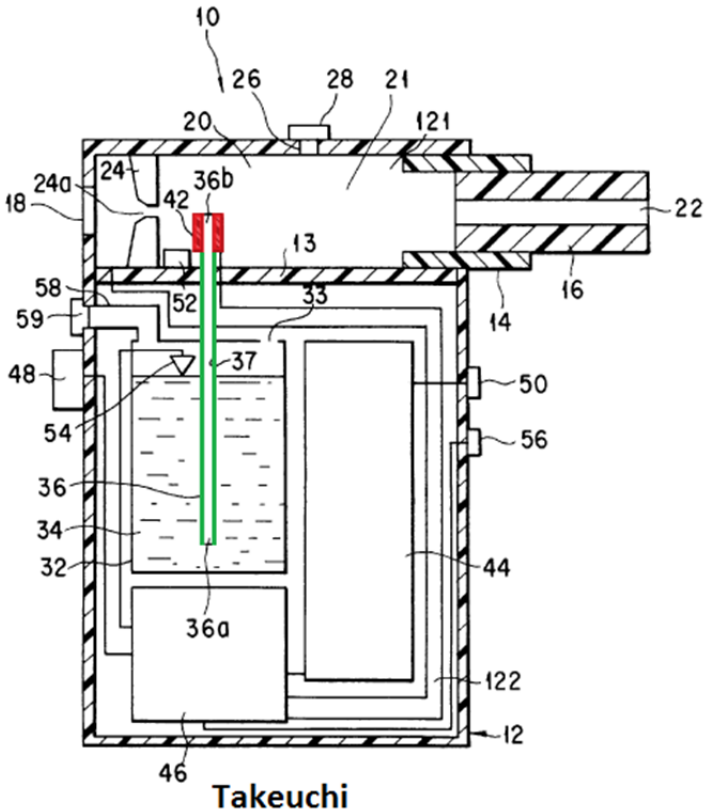
This Petition should be denied as redundant of the petitions in IPR2016-01527, IPR2016-01285, and IPR2014-01300.

C. Ground 1: Claims 1-3, 5, 7, and 8 Are Not Anticipated by Takeuchi

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

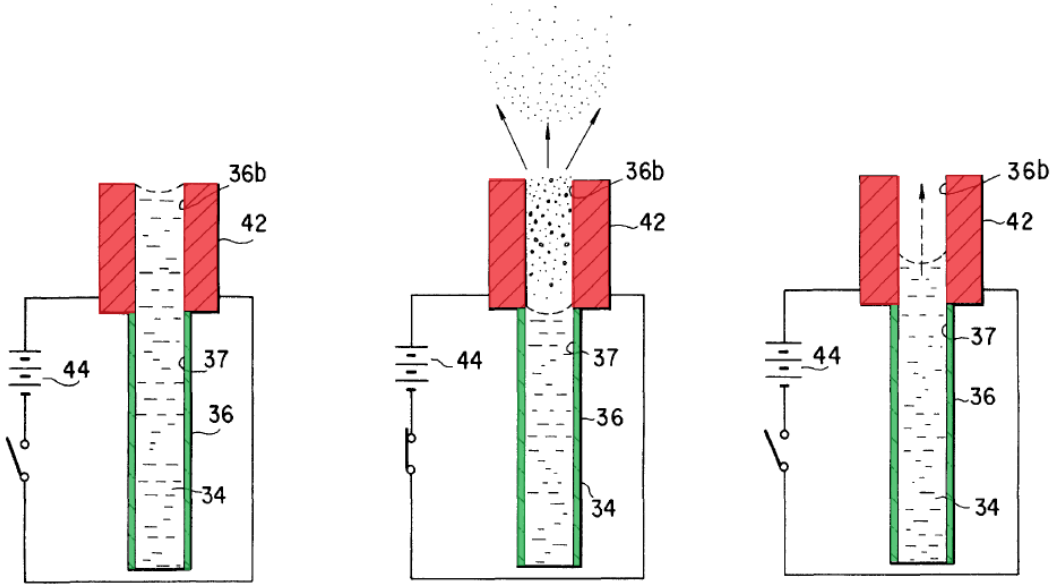


FIG. 2A FIG. 2B FIG. 2C

Instead of using a tube, Takeuchi also discloses that a "gap" between two "substantially parallel" plates can transport liquid via capillary force. *Id*., 3:36-42; 9:29-50. That gap, liquid passageway 371, is shown below in annotated Figure 10.

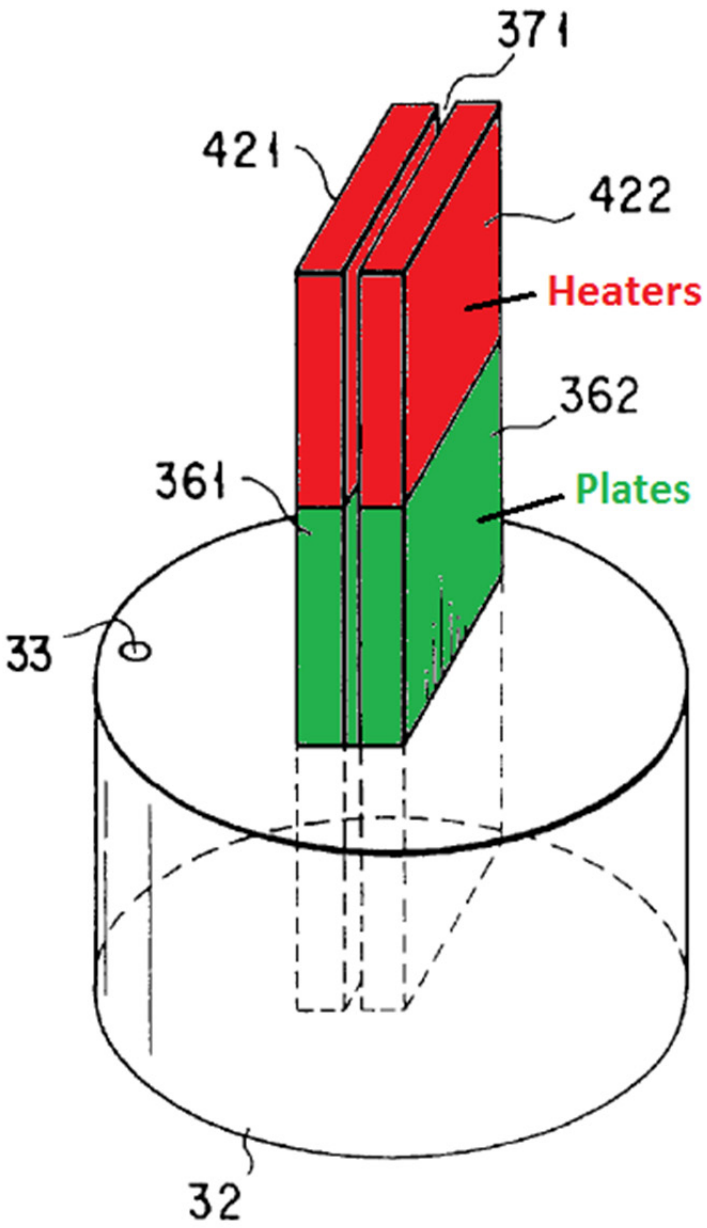


FIG. 10

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; 10:50-63.

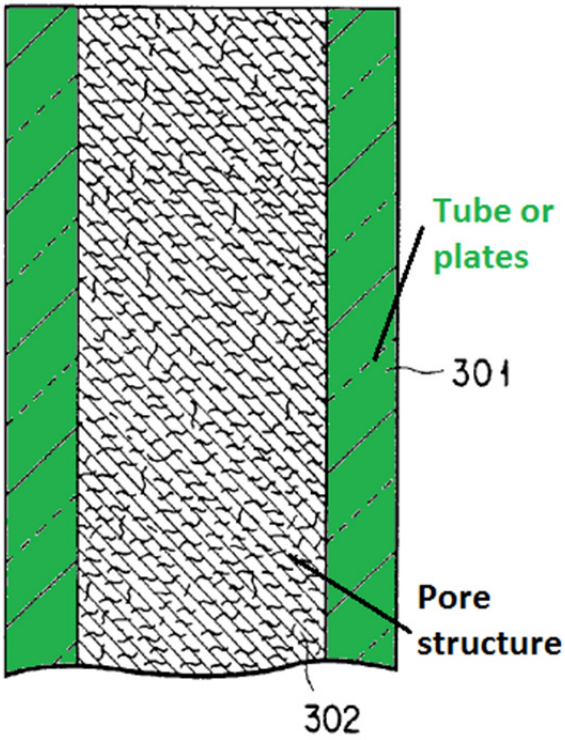


FIG. 14

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 aims to provide a puff of flavor "without a time lag." *Id*., 1:59-64. Takeuchi discloses specific heaters that

accomplish the objectives listed above. Those heaters are small in size and shaped like a ring, a rod, and a plate, as shown below in Figures 3-5.

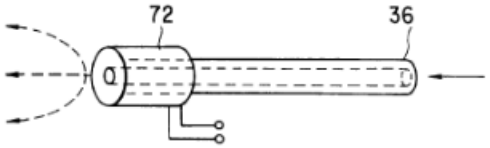


FIG. 3

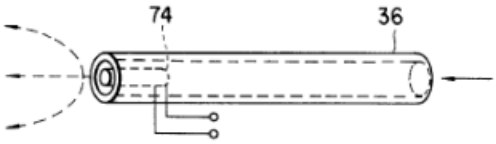


FIG. 4

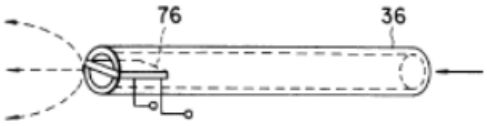


FIG. 5

2. Independent Claims 1, 7, and 8

Independent claims 1, 7, 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 anticipated by Takeuchi. Petition at 24-50. But Takeuchi fails to disclose a "heating wire" having a central axis oriented "substantially" or

"generally" perpendicular to the longitudinal axis of the housing or an atomizer with a porous body projecting into the liquid supply.

a. Takeuchi does not disclose a heating wire with a central axis substantially perpendicular to the longitudinal axis of the housing

Claims 1, 7, and 8 require a heating wire with "a central axis oriented [substantially/generally] perpendicular to [the/a] longitudinal axis of the housing." The parties agree the "longitudinal axis" is "the axis along the length, *i.e.*, the longest dimension, of an object."

Citing the annotated figure below, which redesigns Takeuchi's Figure 8 to use rod-like heater 74, Petitioner asserts that Takeuchi discloses a heating wire with a central axis "substantially" or "generally perpendicular" to the device's longitudinal axis. Petition at 42-45. At the outset, however, it is not clear from Petitioner's annotated figure which axis is the longitudinal axis of the device shown in Figure 8 because the annotated figure shows that the vertical axis is roughly the same length as the axis running through upper chamber 121 (labeled "Heating Wire Direction"). Petition at 43.

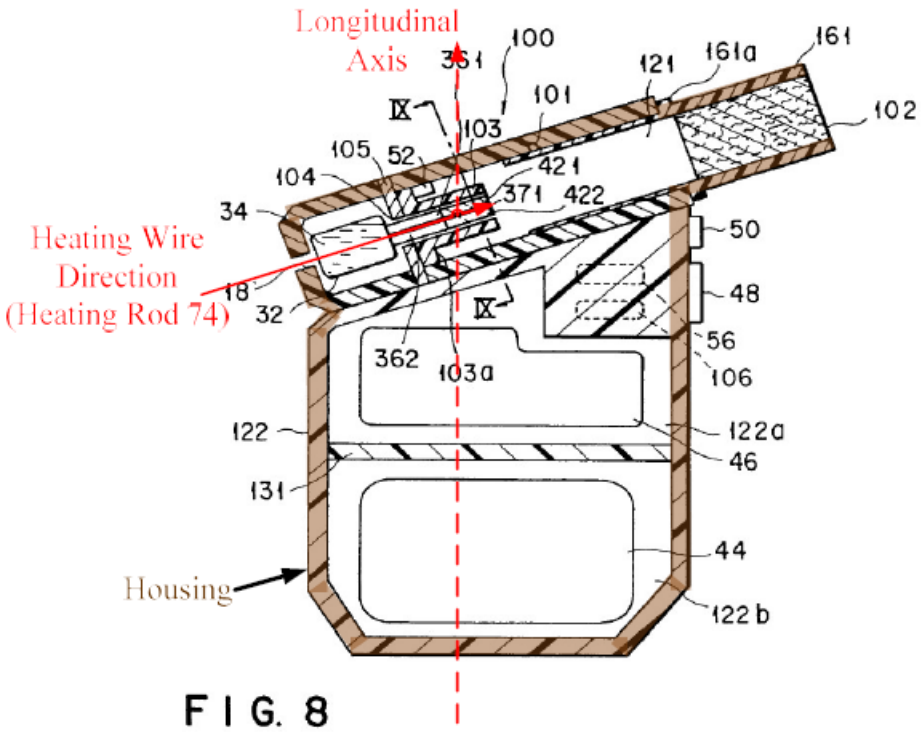


FIG. 8

In this modified embodiment, Petitioner asserts the rod-like heater 74 "crosses the longitudinal axis at an angle that is close to 90°," and that "the amount of incline of the upper housing in the Fig. 8 embodiment is not critical and can be increased (further from perpendicular) or decreased (closer to perpendicular) as a mere design choice." Petition at 42, 44.

Petitioner is incorrect on both counts. First, Takeuchi does not disclose any measurement for the angle of the upper chamber relative to the lower chamber. Takeuchi only states that the "lower chamber 122 has an inclined upper wall" such that "the upper chamber 121 is correspondingly inclined as a whole." Ex. 1003, 8:59-9:1. As reflected by the red axis lines in Petitioner's annotated figure, those axes are oblique, meaning neither perpendicular nor parallel. Ex. 2001 ¶54. Based

on that figure, the angle between those lines is around 72º, which is a significant departure from 90º and therefore not largely perpendicular. Ex. 2001 ¶54.

Second, the amount of Takeuchi's incline is functional, not a matter of design choice. Takeuchi states that "[w]hen the passageway is inclined, the height [for the capillary equation] is not the length of the liquid passageway, but the vertical distance from the liquid level of the liquid flavor source to the outlet of the liquid passageway." Ex. 1003, 3:57-61. Since the liquid becomes depleted during use, "it is desirable that the height be determined taking the possible lowest level of the liquid flavor source into account." *Id*., 4:9-13. It is also "preferred that the inlet of the liquid passageway reach the possible lowest level of the liquid flavor source in the container." *Id*., 4:13-15. Thus, a skilled person reading Takeuchi would want to incline the upper chamber in Figure 8 as much as possible so that the liquid passageway would reach to the bottom of liquid container 32 as the liquid becomes depleted. A perpendicular liquid passageway would cause the device to cease functioning even when a substantial amount of liquid remains in the container. Ex. 2001 ¶55. This situation is illustrated below.

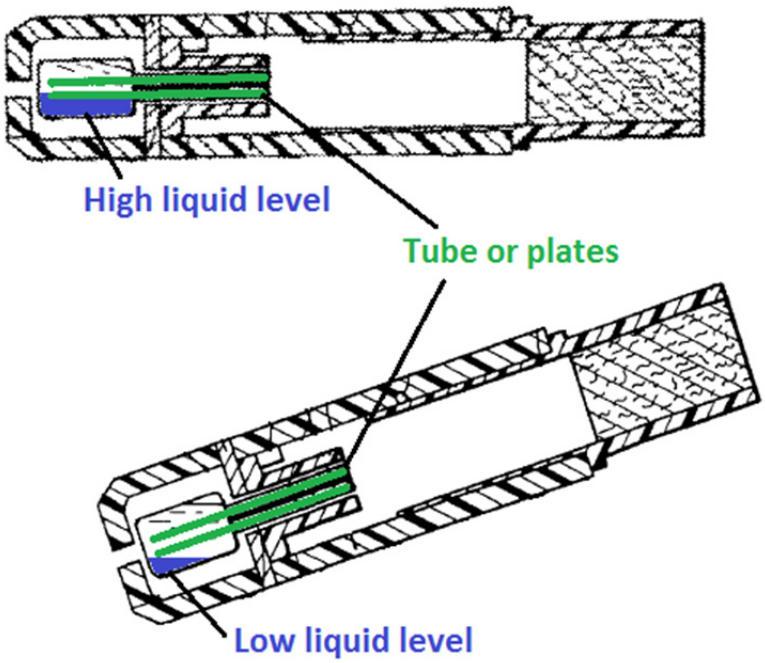


FIG. 8
(modified)

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 44. Petitioner cites *Gardner v. TEC Systems, Inc.*, which affirmed a trial court's invalidation of 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). The Board already rejected Petitioner's argument. Ex. 1006 at 9. Unlike *Gardner*, 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 ¶52. 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. Ex. 2001 ¶52.

Petitioner also asserts that Takeuchi teaches "interchangeabl[e]" heaters and that "the orientation of the heater relative to the longitudinal axis is simply a matter of design choice." Petition at 18, 44. But this is not true. For example, 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. 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. Similarly, the rod-like heater 74 must be aligned such that it can be "inserted into" the tube, and plate heaters 421-424 must be aligned with plates 361 and 362. Ex. 1003, 8:22-23, Figs. 4, 10, 11. The impracticality of reorienting Takeuchi's heaters is illustrated below. Ex. 2001 ¶56.

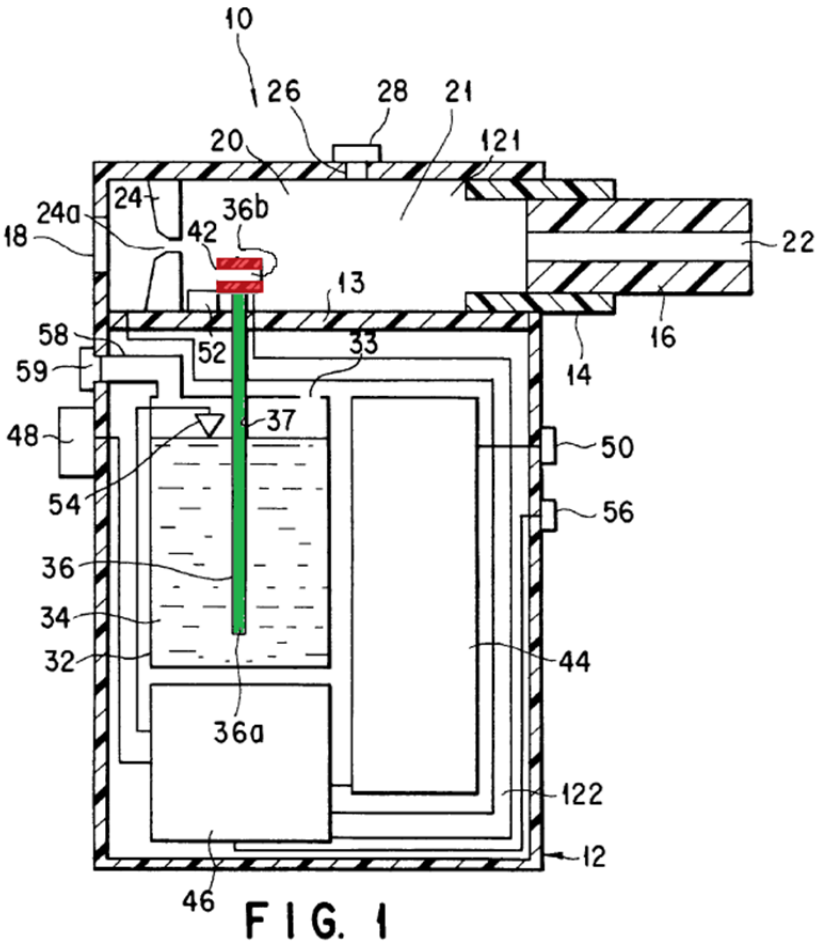


FIG. 1

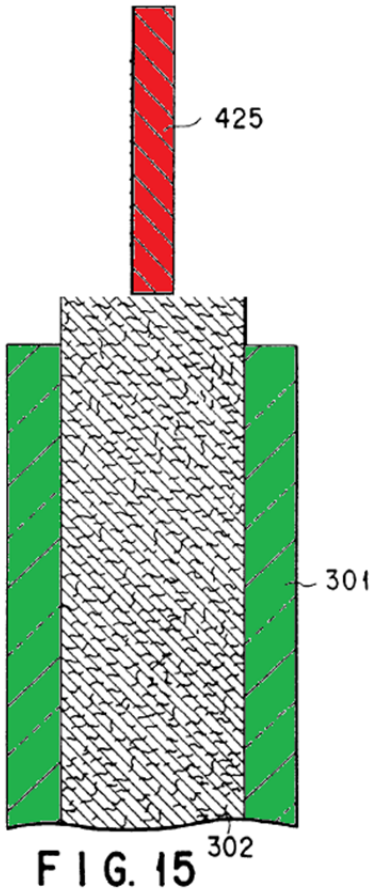


FIG. 15

Furthermore, Petitioner's expert errs in suggesting that the plate-shaped heaters of Figure 8 can be replaced with the rod-like heaters shown in Figures 4 and 6. Ex. 1002 ¶62. The designs are not compatible. The embodiment of Figure 8 uses parallel plates to create a liquid passageway, not a capillary tube as shown in Figures 4 and 6. Ex. 1003, 9:31-38. And the heaters shown in Figures 4 and 6 are based on the embodiment of Figure 1 where the capillary tube and axis of any inserted rod-like heater are parallel to the longitudinal axis of the device. Takeuchi does not disclose any other orientation for a rod-like heater. Ex. 2001 ¶56.

Takeuchi's heaters require a specific orientation to function properly. Takeuchi does not teach that heater orientation is "interchangeable" or "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."

b. Takeuchi does not disclose an atomizer including "a porous body [projecting/extending] into the liquid supply"

Claims 1, 7 and 8 require an atomizer or atomizer assembly including "a porous body [projecting/extending] into the liquid supply." Petitioner alleges Takeuchi's optional intercommunicating pore structure inside capillary liquid passageway 371 is part of Takeuchi's atomizer and discloses what is claimed. Petition at 16, 20-22, 33-34. But the pore structure is not part of the atomizer or atomizer assembly.

Takeuchi's liquid passageway is a "gap or space" through which liquid is transported. Ex. 1003, 3:36-42. Takeuchi's figures call out two liquid passageways: liquid passageway 37, which is "the inner region of at least one capillary tube," and liquid passageway 371, which is "a gap or space between at least two plates spaced apart from each other in substantially parallel." *Id*., 3:36-42; 5:47-52; 9:29-31. The liquid passageway can optionally be filled with a pore structure made of "intercommunicating voids or pores" to increase the distance

liquid will travel by capillary force. *Id*., 3:36-50; 4:4-8. The liquid passageways are shown in annotated Figures 2A and 10 below.

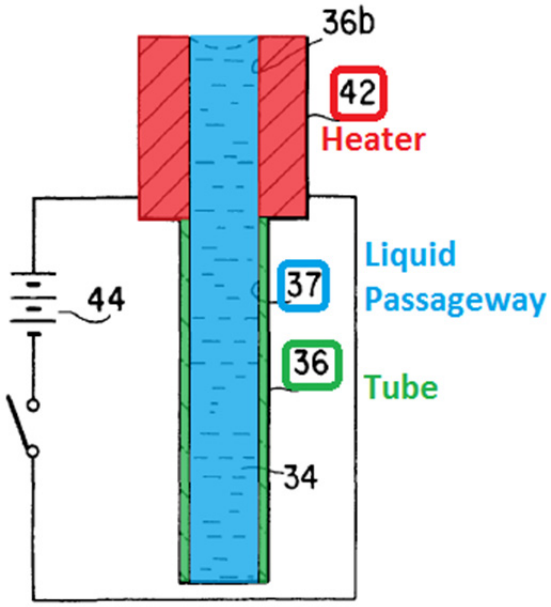


FIG. 2A

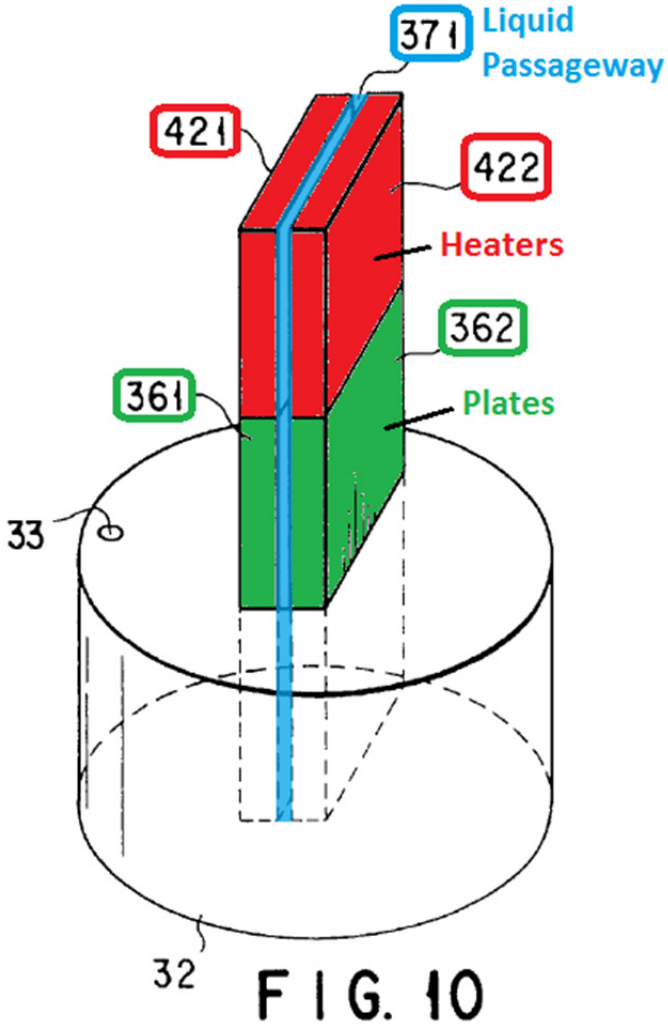


FIG. 10

Petitioner likens Takeuchi's liquid passageway to the '628 Patent's porous body 27 and asserts that "these structures perform the same roles." Petition at 33. But Petitioner misrepresents the role of the porous body in the '628 Patent. Petitioner says "[t]he purpose of the porous body is simply to move the liquid from the liquid supplying bottle 11 to the wire so it can be vaporized." Petition at 13.

However, in the '628 Patent, the porous body does more than "simply" move liquid. Porous body 27 includes ejection holes 24. Ex. 1001, Fig. 6. Air flows through those holes causing liquid to eject as atomized droplets into atomization cavity 10. Ex. 1001, 3:48-54. Thus, the porous body and its ejection holes actually atomize liquid. Further, the cavity wall "is surrounded with the porous body 27," so that droplets too large for inhalation "are reabsorbed by the porous body 27 via the overflow hole 29" rather than being "sucked out via the aerosol passage 12." Ex. 1001, 2:61-64, 3:55-60. In these ways, the '628 Patent's porous body plays a role in atomizing that Takeuchi's pore structure does not: the porous body 27 forms the atomization cavity, atomizes via the ejection holes, and helps optimize the size of liquid particles entrained in the aerosol for inhalation. Ex. 2001 ¶¶22-23.

Takeuchi's pore structure is not properly considered part of an atomizer because it plays no role in atomization. Instead, the pore structure merely moves liquid from the liquid container to the heater. Ex. 1003, 3:35-50, 4:4-8; Ex. 2001 ¶¶62-63. It is the heaters that "gasify," or atomize, the liquid. Ex. 1003, 7:60-8:4; 11:32-50 (claiming "at least one liquid passageway … for transporting the liquid … and a heater … for heating and gasifying the liquid"); Ex. 2001 ¶¶62-63. Petitioner admits "[t]he heater turns the liquid into aerosol and the liquid passageway moves the liquid to the heater so that it can be atomized." Petition at

33. Petitioner's expert agrees that "liquid is atomized by the heater," not by the pore structure. Ex. 1002 ¶56.

Although Petitioner offers no explanation for why the pore structure should be considered part of the atomizer, Petitioner's expert opines that "the liquid passageway 371 (which may also include porous material 302) facilitates atomization by transporting replenishing liquid from the liquid supply to the heater for atomization." Ex. 1002 ¶55. But Petitioner's expert contradicts himself. He later says that "adding fiber to the liquid supply" in Takeuchi would have been obvious "to transport liquid from the liquid supply *to* the atomizer." *Id*. ¶68 (emphasis added).

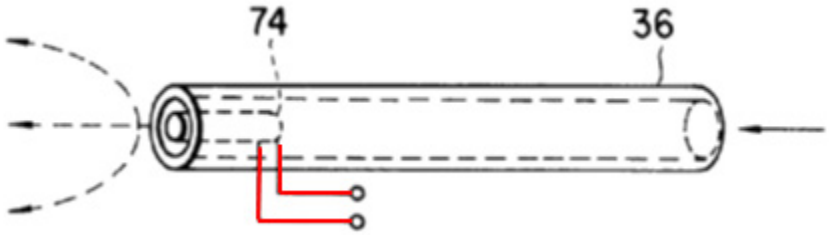
Petitioner's hindsight bias is evidenced by its contradictory arguments in another IPR petition on a related patent. In IPR2016-01270, the same Petitioner argued Takeuchi's pore structure is ***not*** part of the atomizer. Rather, Petitioner argued there that Takeuchi's pore structure is a "liquid storage 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. In denying institution, the Board noted that the "atomizer" and "liquid storage body" elements "are separate components from one another," and that both parties' arguments treated them as such. Ex. 2108 at 7, 13. Petitioner's and its expert's contradictory assertions should be afforded no weight.

c. Takeuchi does not disclose a "heating wire" in the atomizer

Claims 1, 7, and 8 require a "heating wire" in the atomizer or atomizer assembly. Petitioner asserts Takeuchi's rod-like heater 74 is a "wire." Petition at 40-45.

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 ¶59. There is a marked contrast between the thin wires and the much larger cylindrical heater.



Nor does Takeuchi teach whether rod-like heater 74 is flexible or made from metal. Both characteristics are necessary for a "wire." Petitioner's expert concedes that Takeuchi does not disclose what its heaters are made from. Ex. 1002 ¶61. Petitioner's expert nonetheless identifies various materials from which the heaters could be made, attempting to read them into Takeuchi's disclosure. *Id.* Given the small size of Takeuchi's heaters, those structures would not have been flexible; rather, they would have been rigid to render them robust and durable so that the Takeuchi device would be easier to mass produce. Ex. 2001 ¶¶59, 70. Because Takeuchi does not disclose a heating wire, it cannot anticipate claims 1, 7, and 8.

In any case, Takeuchi does not disclose using rod-like heater 74 in the embodiment shown in Figure 8—the one Petitioner relies on. Instead, that embodiment includes plate-like heaters 421 and 422. Ex. 1001, 9:29-34. Takeuchi also does not disclose an embodiment where the rod-like heater 74 is used in conjunction with the intercommunicating pore structure 302. Nor does Takeuchi teach how the rod-like heater 74 could be used with the pore structure. Takeuchi states that when the pore structure is used, the "heater or heaters (not shown) may

be arranged as in FIG. 1, 10 or 11." Ex. 1003, 10:50-59. As shown below, those figures use tubular heater 42, plate heaters 421 and 422, or plate heaters 423 and 424. Ex. 1003, 6:7-10, 9:39-44, 10:22-27. Petitioner's expert asserts that Takeuchi's heaters are interchangeable, but he never explains how or why a skilled person would have combined rod-like heater 74 and pore structure 302.

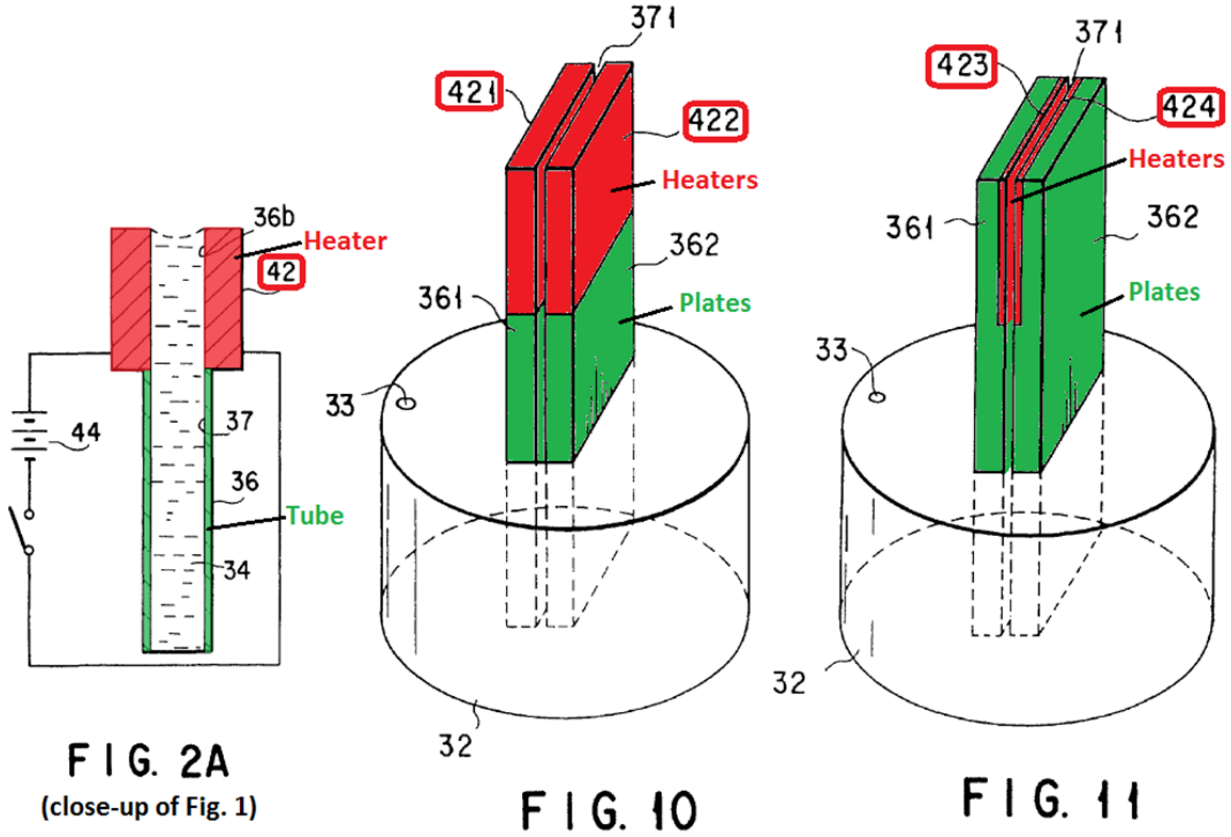


FIG. 2A
(close-up of Fig. 1)

FIG. 10

FIG. 11

Besides these three figures, the only other alternative disclosed in Takeuchi is where "the intercommunicating pore structure 302 may protrude from the enclosure 301," in which case "a heater 425 can be provided on the protruded

end," illustrated below. Ex. 1003, 10:59-63. The heater in that embodiment is shown as a plate, not a wire. Ex. 2001 ¶64.

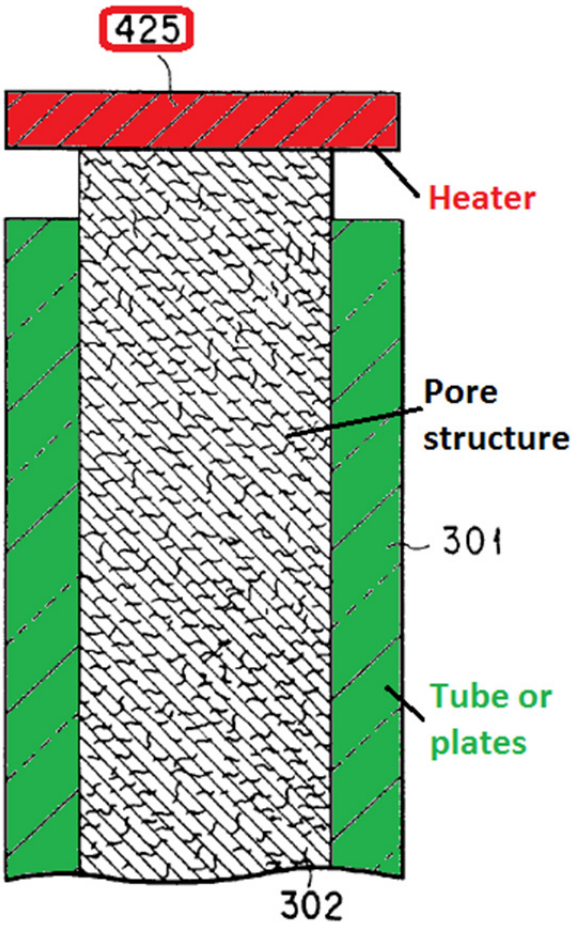


FIG. 15

Thus, even if Takeuchi's rod-like heater 74 were a "heating wire," Takeuchi does not disclose or suggest use of a "heating wire" in conjunction with a "porous body."

3. Claim 2

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

4. Claim 3

Claim 3 depends from claim 1 and further requires "an atomization cavity within the atomizer." Petitioner offers no explanation for how this limitation is met in Takeuchi other than stating that the below annotated figure "illustrates a cylindrical body 103 that forms an atomization cavity at the liquid passageway 371." Petition at 51.

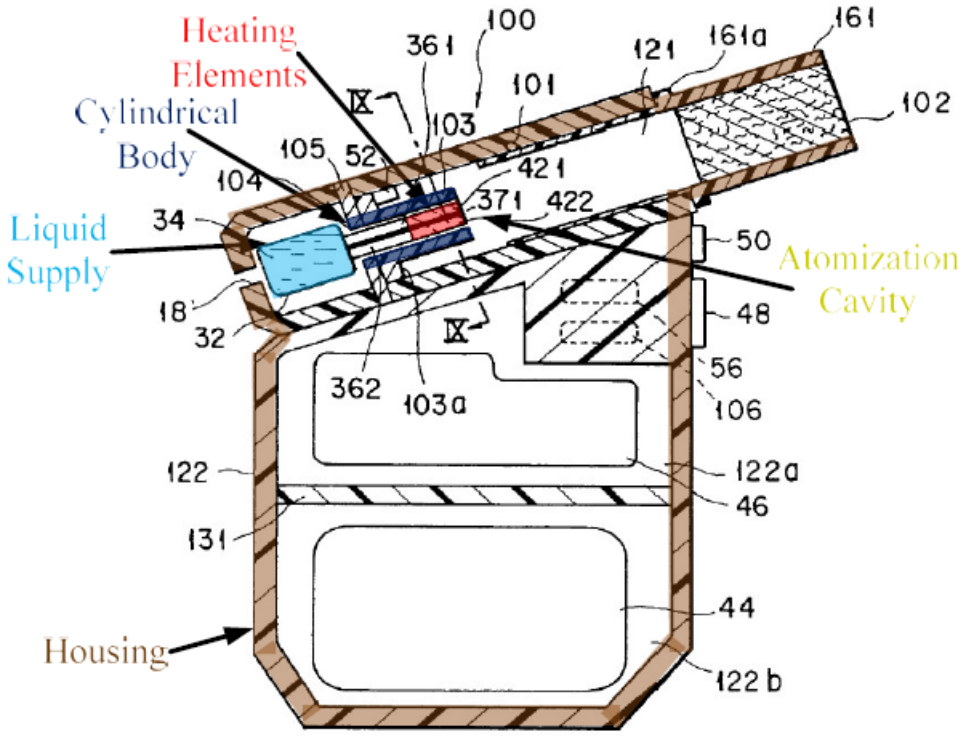


FIG. 8

Petitioner asserts that Takeuchi's atomizer in this figure includes heaters 421 and 422 and plates 361 and 362. As explained above, Takeuchi's atomizer does not include plates 361 and 362 because they merely move liquid to the heater. But even if it did, all of these elements are "surrounded by" cylindrical body 103. Ex.

1003, 9:51-54. Petitioner does not explain how the alleged "cavity" formed by the cylindrical body is "within the atomizer" when all of the alleged atomizer's components are "within" the cylindrical body.

Indeed, Petitioner's own expert confirms the alleged cavity is not "within the atomizer." Petitioner's expert says the "area around the atomizer…is an atomization cavity," not any area "within the atomizer" as required by claim 3. Ex. 1002 ¶66.

5. Claim 5

Claim 5 depends from claim 1 and requires "the liquid supply compris[e] a fiber material." Petitioner argues that Takeuchi's liquid supply is "the liquid itself (liquid 34)" and that it "comprises a fiber material (Pore Structure 302)" because the pore structure 302 is inserted into the liquid. Petition at 52.

Petitioner also argues that Takeuchi's pore structure 302 is part of the atomizer and meets the "atomizer assembly … including … a porous body projecting into the liquid supply" limitation of claim 1. Petition at 37-38. Petitioner cannot have it both ways. *Becton*, 616 F.3d at 1254 ("Where a claim lists elements separately, 'the clear implication of the claim language' is that those elements are 'distinct component[s]' of the patented invention.") (alteration in original). If the pore structure is part of Takeuchi's atomizer, then Takeuchi does not disclose a "liquid supply comprising a fiber material." If the pore structure is

part of the liquid supply, then Takeuchi does not disclose an atomizer with "a porous body projecting into the liquid supply." Either way, Takeuchi does not anticipate claim 5. Tellingly, Petitioner and its expert also backpedal from their assertion that Takeuchi anticipates claim 5, relying on obviousness instead. Petition at 53-54; Ex. 1002 ¶68.

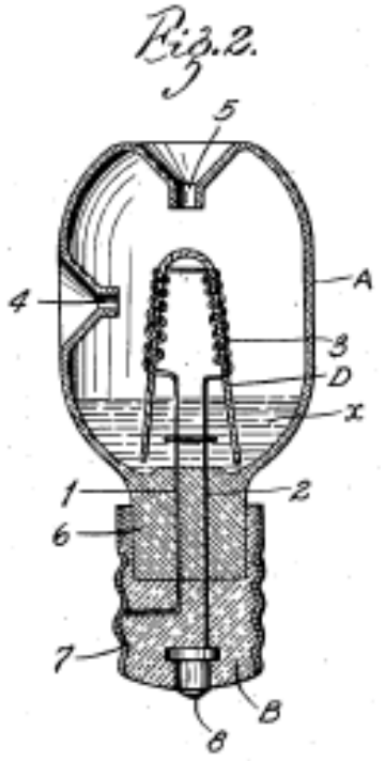
D. Ground 2: Claims 1-3, 5, 7, and 8 Are Not Obvious Over Takeuchi in View of Whittemore

1. Combining Takeuchi with Whittemore Does Not Teach or Suggest the Limitations Absent from Takeuchi Alone

Petitioner's arguments for Ground 2 are identical to its arguments for Ground 1 except that Petitioner substitutes Whittemore's heating element 3 for Takeuchi's heating plates 421 and 422. Petition at 59-66. Petitioner asserts the combination would result in "the central axis through [Whittemore's] heating coil is substantially perpendicular to the vertical longitudinal axis of [Takeuchi's] Figure 8." *Id*. However, even if combined as Petitioner proposes, as explained above in sections C.2.a and C.2.b, the combination would not result in a heating wire with a central axis oriented "substantially" or "generally perpendicular" to the longitudinal axis of the housing or a porous body "projecting" or "extending" into the liquid supply.

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. 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 58; Ex. 1002 ¶73. 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 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 ¶70. 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:

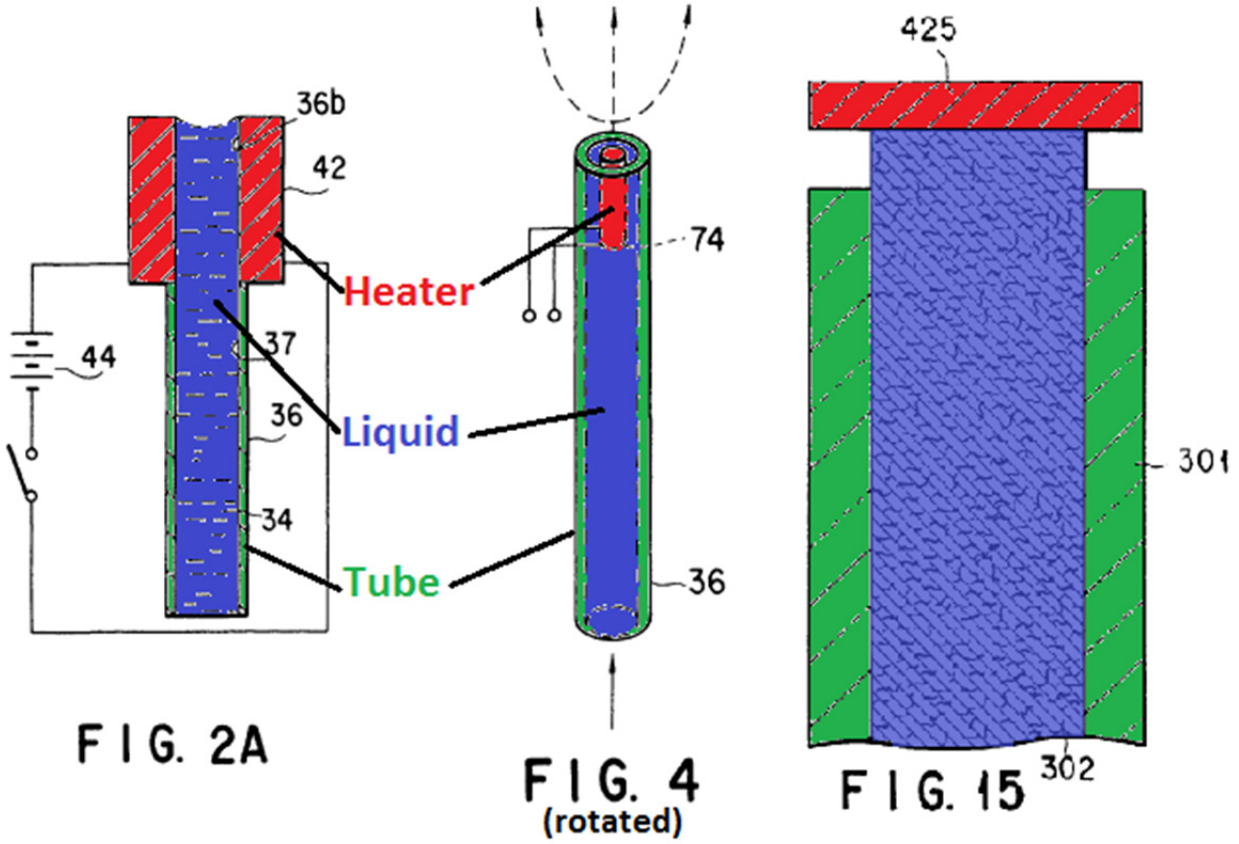


FIG. 2A

FIG. 4
(rotated)

FIG. 15

Takeuchi's heaters are also small by design. Ex. 2001 ¶¶72-76. Takeuchi's device is intended to accomplish the following objectives: "be driven as a whole at a *low energy*," "*suppress waste* of the flavor source," generate flavoring "when the user takes a puff" and "*substantially without a time lag*," and be "*small in size* and *light in weight*." Ex. 1003, 1:59-67, 2:25-29 (emphasis added). These features distinguished Takeuchi over earlier devices. *Id.*, 1:17-24, 1:49-56. Takeuchi's small heaters accomplish these aims: (1) because they require little power to heat up, which is important given the device's limited internal power source 44; (2) because their small size allows for rapid temperature change when power is

applied to "instantly gasif[y]" liquid; and (3) because they allow for a small and light device. *Id.*, 7:60-63. The design allows a user to get vapor on demand. Ex. 2001 ¶¶72-76. Takeuchi criticizes prior art devices that "continuously" heated flavor material because they wasted that material and could not provide vapor on demand. Ex. 1003, 1:17-24; Ex. 2001 ¶¶74-76.

Petitioner proposes "wrap[ping Whittemore's] heating wire … around the porous fiber material 302" in Takeuchi to permit "more precise control of the amount and location of the porous body to be heated." Petition at 58-59. Petitioner's proposed combination is inferior to Takeuchi's design. Under Petitioner's proposal, at best only the edges of the wire would have been in direct contact with the liquid, leading to less efficient heat transfer and undermining its asserted reason for the combination. Ex. 2001 ¶71. 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 would have been less efficient than in Takeuchi. Ex. 2001 ¶71. 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.

Petitioner's proposed combination would have stymied objectives of Takeuchi's device in other ways. As a result, a skilled person would not have

pursued the combination. For example, while Takeuchi aims for on-demand atomization at the moment a user inhales, Whittemore seeks to provide continuously vaporized medicament over time. Ex. 1003, 1:59-64, 2:28-29; Ex. 1004, 1:1-4, 1:50-2:25. That functional difference is reflected in design. Whittemore's heating element 3 is much larger than Takeuchi's heaters, so it would have required more time to heat up and cool down. Ex. 2001 ¶¶73-74. The cooling lag would have wasted liquid flavor material, which Takeuchi sought to avoid. Ex. 1003, 1:59-64, 2:27-28; Ex. 2001 ¶74. Further, contrary to Takeuchi's objectives, Whittemore's larger heater would have required more power, which would either quickly drain Takeuchi's internal battery or require use of an external power source, making the device less mobile and less like a traditional cigarette. Ex. 1003, 1:59-67, 2:25-29; Ex. 2001 ¶¶75-76. As evidence of its greater power needs, Whittemore's device is powered by a large power source within a flashlight tube. Ex. 1004, 1:39-45.

Whittemore's heating wire would also be impractical and would not function in Takeuchi without significant modification. Ex. 2001 ¶69. 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 ¶69. Whittemore's wire would be much too large to function with Takeuchi's intercommunicating pore structure. Ex. 2001 ¶69.

The problems caused by Petitioner's proposed combination show its lack of critical analysis and reliance on hindsight. The key question is whether a skilled person would have pursued a combination in light of its overall effects. *See Trivascular, Inc. v. Samuels*, 812 F.3d 1056, 1068 (Fed. Cir. 2016) (upholding Board's IPR ruling that claims were patentable where proposed obviousness combination would have "destroy[ed] the basic objective" of the primary reference). Here, the answer is no. Ex. 2001 ¶¶67-76.

Petitioner's expert further argues that "strips of inverted u-shaped heating wire" could be substituted for or added to Takeuchi's heater 425 across the top and sides of the pore structure 302 to "cover substantially the entire surface area of the material to be heated." Ex. 1002 ¶74. Hindsight drives those opinions. Takeuchi and Whittemore disclose nothing about "strips of inverted u-shaped heating wire." Nor does Petitioner's expert explain how the "strips" 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 ¶¶69-71. Indeed, if covering more surface area were the goal, a curved plate would have capped nearly the entire exposed surface. Ex. 2001 ¶71. Petitioner's expert does not explain why a skilled person would have made his complicated modifications without any suggestion that Takeuchi's simple, efficient, and durable heaters were inadequate. *Id*. ¶72. Petitioner's expert uses the claims as a roadmap for his proposal. The law forbids that approach. *Cheese Sys., Inc. v. Tetra Pak Cheese & Powder Sys., Inc.*, 725 F.3d 1341, 1352-53 (Fed. Cir. 2013).

Petitioner also offers general reasons for using a wire heater, but does not explain why a skilled person would have wrapped a wire around pore structure 302. Petition at 61. Petitioner argues a skilled person "could" have done what is claimed, but that is not the test for obviousness. *Id.* at 60-61; *InTouch Techs., Inc. v. VGO Commc'ns, Inc.*, 751 F.3d 1327, 1352 (Fed. Cir. 2014).

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

Petitioner's expert's contradictory opinions are not credible. For example, Petitioner alleges Takeuchi discloses an "atomizer" that includes "a porous body projecting into a liquid supply" as well as a "liquid supply comprising a fiber material." Petitioner's expert asserts Takeuchi's intercommunicating pore structure 302 satisfies both the claimed "porous body" and the claimed "fiber material," but contradicts himself as to whether it is part of Takeuchi's alleged

atomizer, liquid supply, or both. In this IPR, Petitioner's expert says Takeuchi's atomizer includes pore structure 302, and that the pore structure "extends into the liquid supply in container 32, which includes liquid supply 34." Ex. 1002 ¶55. He also says "the liquid supply (Liquid 32) comprises a fiber material (Pore Structure 302)." *Id*. ¶67. Thus, here, he says pore structure 302 is both part of Takeuchi's atomizer and part of Takeuchi's liquid supply.

But in IPR2016-01527, Petitioner's expert asserted Takeuchi's pore structure 302 *is* part of Takeuchi's atomizer, but *is not* part of the liquid supply. Ex. 2012 ¶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.").

And 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 said 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, Petitioner and its expert view Takeuchi's pore structure 302 as part of whichever component hindsight demands to meet the claim limitations at

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

F. The Unrebutted Objective Evidence of Non-Obviousness 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 non-obviousness 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 demonstrate claims are non-obvious 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 three prior IPR proceedings—one of which was filed by Petitioner—Petitioner and its expert ignored the objective evidence in the Petition. *See* Ex. 2016 at 84-104; Ex. 2102 at 83-103; Ex. 2018 at 53-75; Ex. 2011 ¶¶98-149; Ex. 2097 ¶¶1-13. Indeed, Petitioner filed a litigation brief a year ago citing the prior IPRs and stating that Petitioner "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. 1002 ¶78 (emphasis added). Once Patent Owner comes forward with objective indicia evidence, it is Petitioner's burden to rebut it—even prior to institution. Ex. 2009 at 3 (denying Petitioner's request for

rehearing on denial of IPR institution because "Petitioner had the opportunity to address this evidence [of objective indicia], but failed to do so in its Petition."); Ex. 2096 at 9-10 (denying petition where petitioner failed to address objective indicia evidence "set forth during prosecution and in the Preliminary Responses in the earlier proceedings"). Petitioner was well aware of the objective evidence of the '628 Patent non-obviousness and made a strategic decision not to address it in the Petition. That decision leaves Fontem's evidence unrebutted.

3. The Objective Evidence of Non-Obviousness Is Substantial

The objective evidence of non-obviousness is substantial for the '628 Patent. As described in more detail below, R.J. Reynolds[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

[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.

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 non-obviousness. *Graham*, 383 U.S. at 17-18. R.J. 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 non-obviousness. *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 "microchip 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.* Further, inventor Hon Lik testified that a perpendicular orientation "worked very well," but orienting the wire parallel to the axis of the device resulted in "very high power consumption." Ex. 2085, 433:15-434:2.

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, 7, and 8 also include a heating element in the atomizer oriented substantially or generally perpendicular to the device axis, and dependent claim 3 includes an atomization cavity in the atomizer. 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, 7, 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 non-obviousness. *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 non-obviousness. *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.

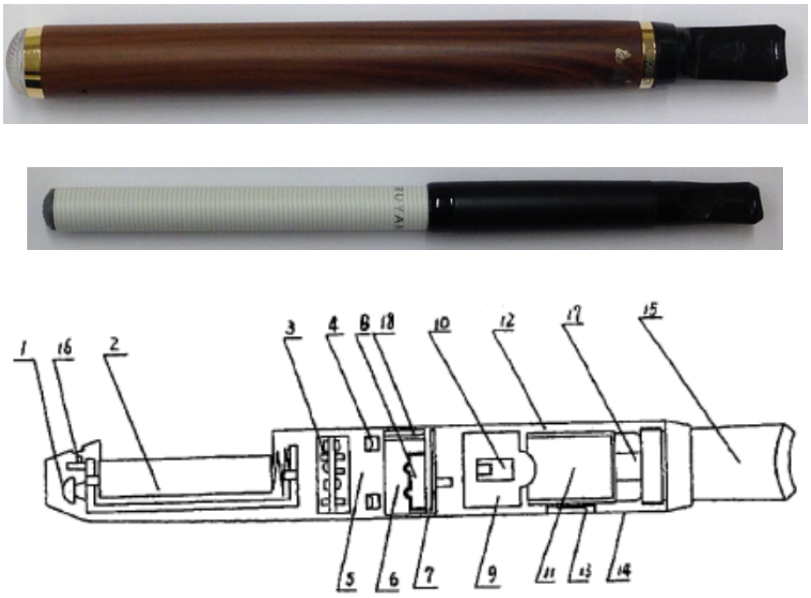


Fig. 1

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 NJOYs 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

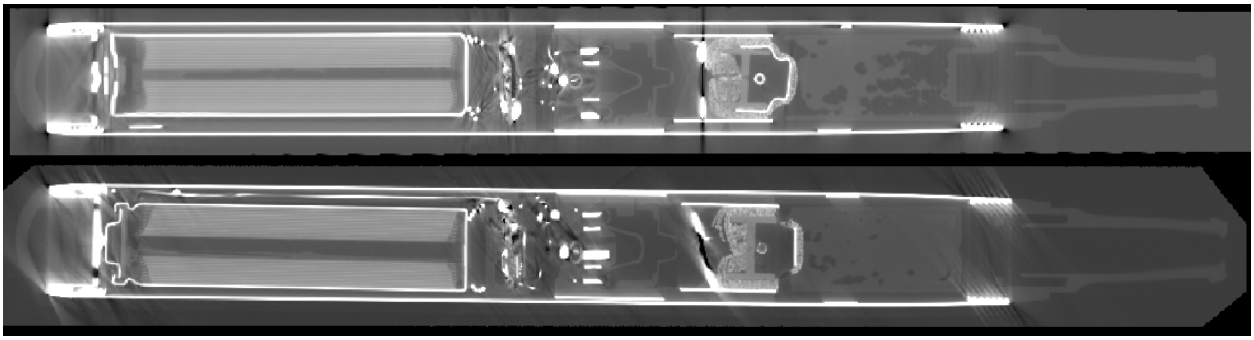
potential and start[ed] pursuing e-Cig opportunities." *Id*. ¶103 (quoting Ex. 2025 at 54). Recognizing the potential for Hon's invention, NJOY's founder approached Ruyan to become its U.S. distributor, but those negotiations broke down in the summer of 2006, so he found "an alternate Chinese supplier 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 it 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.

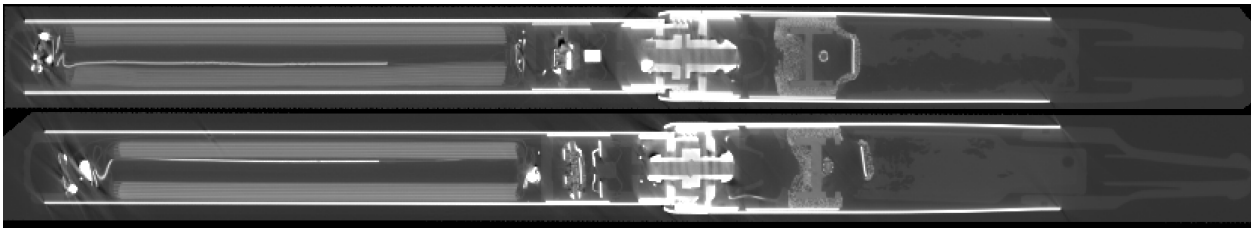


NJOY's NGAR copied what is claimed in claims 1-8 of the '628 Patent. *Id.* ¶108 & Ex. B (NGAR claim chart).

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. Commercial success

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 six 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,

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CERTIFICATE OF COMPLIANCE

The undersigned certifies that this brief complies with the type-volume limitations of 37 CFR § 42.24. This brief contains 13,551 words as calculated by the "Word Count" feature of Microsoft Word 2010, the word processing program used to create it.

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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:	July 25, 2017
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**
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