

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

NU MARK LLC,
Petitioner,

v.

FONTEM HOLDINGS 1 B.V.,
Patent Owner.

Case No. **IPR2016-01297**
Patent No. **8,893,726**

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

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LIST OF EXHIBITS

Petitioner's Exhibits	
Exhibit	Description
Ex. 1001	U.S. Patent No. 8,893,726 (“’726 patent”)
Ex. 1002	File History for U.S. Patent No. 8,893,726
Ex. 1003	Declaration of John M. Collins, Ph.D.
Ex. 1004	U.S. Patent No. 6,155,268 (“Takeuchi”)
Ex. 1005	U.S. Patent No. 2,057,353 (“Whittemore”)
Ex. 1006	Decision - Institution of <i>Inter Partes</i> Review, Case No. IPR2014-01300 (“’628 Decision”)
Ex. 1007	Decision - Institution of <i>Inter Partes</i> Review, Case No. IPR2014-01289 (“’331 Decision”)
Ex. 1008	U.S. Patent No. 1,514,682 (“Wilson”)
Ex. 1009	U.S. Patent No. 5,743,251 (“Howell”)
Ex. 1010	U.S. Patent No. 6,598,607 (“Adiga”)
Ex. 1011	U.S. Patent No. 5, 894, 841 (“Voges”)
Ex. 1012	U.S. Patent No. 4,990,939 (“Sekiya”)
Ex. 1013	U.S. Patent No. 4,771,295 (“Baker”)
Ex. 1014	U.S. Patent No. 5,703,633 (“Gehrer”)
Ex. 1015	U.S. Patent No. 5,124,200 (“Mallonee”)
Ex. 1016	U.S. Patent No. 4,797,692 (“Ims”)

Ex. 1017	U.S. Patent No. 3,200,819 (“Gilbert”)
Ex. 1018	U.S. Patent Application No. 2006/0093977 A1 (“Pellizzari I”)
Ex. 1019	U.S. Patent No. 7,059,307 (“Pellizzari II”)
Ex. 1020	U.S. Patent No. 6,501,052 (“Cox II”)
Ex. 1021	U.S. Patent No. 6,234,167 (“Cox”)
Ex. 1022	U.S. Patent No. 5,666,977 (“Higgins”)
Ex. 1023	European Patent Application No. 0358114 A2 (“Brooks 114”)
Ex. 1024	U.S. Patent No. 3,203,025 (“Schreur”)
Ex. 1025	U.S. Patent Publication No. 2001/0026788 (“Piskorz”)
Ex. 1026	European Patent Application No. EP0845220 B1 (“Susa”)
Ex. 1027	U.S. Patent No. 5,745,985 (“Ghosh”)
Ex. 1028	U.S. Patent No. 4,676,237 (“Wood”)
Ex. 1029	U.S. Patent No. 4,945,448 (“Bremenour”)
Ex. 1030	Certified Translation of Chinese Utility Model Publication No. CN 1233436A (“Hongbin”)
Ex. 1031	Decision - Denying Institution of <i>Inter Partes</i> Review, Case No. IPR2015-01302 (“726 Decision”)
Ex. 1032	U.S. Patent No. 6,102,036 (“Slutsky”)
Ex. 1033	Decision - Institution of <i>Inter Partes</i> Review, Case No. IPR2014-00424 (“148 Decision”)
Ex. 1034	U.S. Patent No. 6,491,233 (“Nichols”)

Patent Owner's Exhibits	
Exhibit	Description
Ex. 2001	Declaration of Richard Meyst
Ex. 2002	The Oxford American Dictionary and Thesaurus (2003), selected pages
Ex. 2003	Merriam-Webster's Collegiate Dictionary (11th ed. 2003), selected pages
Ex. 2004	RESERVED
Ex. 2005	U.S. Patent No. 4,945,931 ("Gori")
Ex. 2006	Information Disclosure Statement filed August 14, 2014 in U.S. Patent Appl. No. 13/777,927, considered by Examiner September 18, 2014
Ex. 2007	RESERVED
Ex. 2008	File History of U.S. Patent No. 3,993,331, Response to Office Action, August 8, 2012
Ex. 2009	<i>Toyota Motor Corp. v. Cellport Sys., Inc.</i> , IPR2015-01423, Paper 7, Decision Denying Institution of Inter Partes Review (PTAB Oct. 28, 2015)
Ex. 2010	<i>Arista Networks, Inc. v. Cisco Sys., Inc.</i> , IPR2015-01710, Paper 7, Decision Denying Institution of Inter Partes Review (PTAB Feb. 16, 2016)
Ex. 2011	<i>NJOY, Inc. v. Fontem Holdings 1 B.V.</i> , IRP2015-01301, Paper 16, Decision Denying Institution of Inter Partes Review (PTAB Dec. 8, 2015)
Ex. 2012	<i>VMR Products LLC v. Fontem Holdings 1 B.V.</i> , IPR2015-00859, Paper 9, Decision Denying Institution of Inter Partes Review (PTAB Sept. 16, 2015)

Ex. 2013	<i>NJOY, Inc. v. Fontem Holdings 1 B.V.</i> , IPR2015-01299, Paper 15, Decision Denying Institution of Inter Partes Review (PTAB Dec. 8, 2015)
Ex. 2014	Random House Webster's Unabridged Dictionary (2d ed. 2001), selected pages

I. INTRODUCTION

Petitioner requests that the Patent Office consider the patentability of the '726 patent's claims for a third time. But as in the first two go-arounds, the claims are patentable. In this iteration, the prior art and arguments have not changed; nor should the result.

During initial prosecution a few years ago, three of the four references Petitioner relies on were before the examiner. After months of examination, she issued the patent over that art. Over a year ago, another petitioner filed an *inter partes* review based on a primary reference Petitioner now cites. The Board rejected that petition. Here, Petitioner again argues to the Board that the claims are somehow unpatentable over the same or duplicative references. Just like in the previous proceedings, however, the prior art does not teach what is claimed.

Petitioner and its expert are required to provide "articulated reasoning with rational underpinning" to support their obviousness arguments. *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2007). That rational cannot be based on hindsight in view of the claims at issue. *Cheese Sys., Inc. v. Tetra Pak Cheese & Powder Sys., Inc.*, 725 F.3d 1341, 1352-53 (Fed. Cir. 2013). Yet, Petitioner and its expert cobble together disparate teachings from the prior art, while inventing reasons for their proposed combinations after-the-fact using the '726 patent's claims as a

roadmap. Petitioner's hindsight cannot provide a reasonable basis to find the '726 patent's claims unpatentable.

Petitioner and its expert combine references even though they teach against one another, ignore the stated objectives of prior art references, and engage in incomplete and superficial obviousness analysis without considering all of the consequences of their proposed combinations. For example, even though the Takeuchi reference requires a small heater that changes temperature quickly using little power to generate vapor on demand, Petitioner suggests replacing that heater with a bulky and power-hungry atomizer from the Wilson reference that undermines each of those goals.

Petitioner's expert compounds those errors by offering conclusory opinions with no basis in fact, by claiming that anything known in the prior art would have been obvious (another egregious legal error) and by inventing problems in prior art to justify the proposed combinations. For example, he alleges that Takeuchi's device would have leaked, even though the reference says the opposite. For those reasons, his opinions have little, if any, value.

And, even if the cited references were combined as Petitioner and its expert suggest, the proposed combinations fail to disclose several limitations of the '726 patent's claims and therefore cannot result in unpatentability.

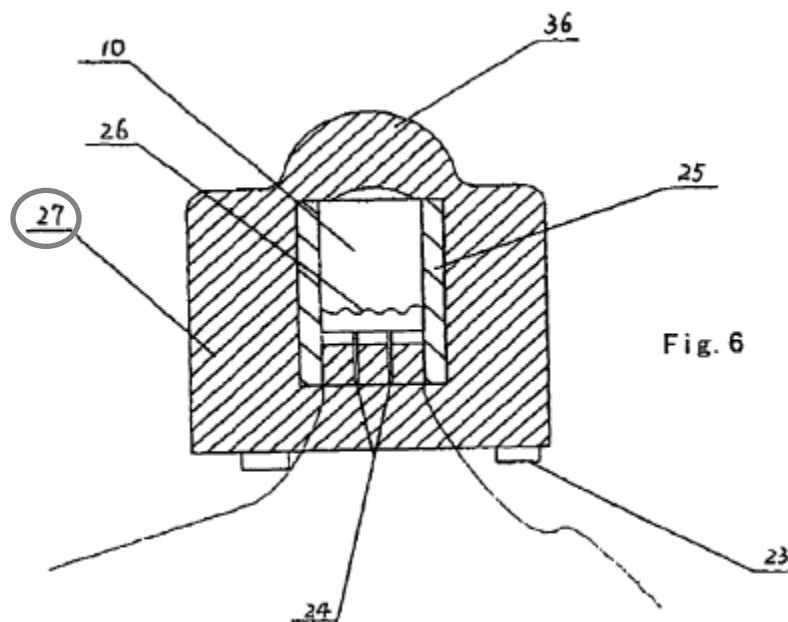
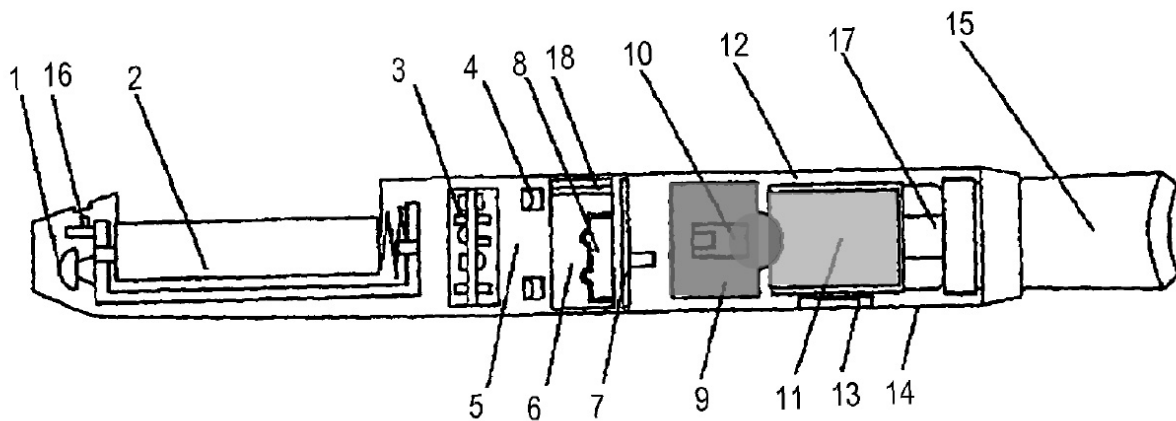
Accordingly, Patent Owner requests that the Petition be denied.

II. THE '726 PATENT

The '726 patent¹ discloses several embodiments of an electronic cigarette. In particular, the specification describes two major components of the device: the atomizer and the liquid storage body. The atomizer (red) and liquid storage body (blue), as well as other components, are shown in annotated Figure 1 below.

Atomizer 9 includes a porous body 27 (red circle in Figure 6 below) in contact with solution storage porous body 28 inside liquid-supplying bottle 11, which allows liquid to move from the storage body to the atomizer via capillary action. *Id.*, 2:48-50, 2:66-3:2, 3:64-67. Solution storage porous body 28 holds the liquid in a porous structure, such as a foam or fiber. *Id.*, 3:11-18. The specification further discloses that “[t]he atomization cavity wall 25 is surrounded with the porous body 27....” *Id.*, 2:66-3:2. This design allows large droplets that form after atomization to stick to walls 25 and reabsorb into porous body 27. *Id.*, 3:59-61.

¹ The '726 patent claims priority to U.S. Patent No. 8,490,628 ('628 patent), and U.S. Patent No. 8,393,331 ('331 patent). The '628 and '331 patents were previously and are currently involved in other IPRs.



The '726 patent also describes the airflow path through the electronic cigarette. Air flows into the device through inlet 4, enters atomizer 9 where it mixes with vaporized liquid, and then flows together with atomized liquid out of mouthpiece 15. *Id.*, 3:18-20, 3:49-52, 3:62-67. The stream of air passes through ejection holes 24 to the heater within atomization cavity 10, and the heater

atomizes liquid that leaves atomizer 9 through aerosol passage 12. *Id.*, 2:57-61;

Ex. 2001 ¶¶12-13.

Claim 1 recites an “electronic cigarette” that includes several components: “a housing having an inlet and an outlet; a liquid storage body in the housing holding a liquid; an airflow path through the housing; and an atomizer in the housing between the inlet and the outlet including: a porous body in contact with the liquid storage body; and a heating wire in the atomizer surrounded by the porous body.”

Dependent claims recite variants of the general design:

- Claim 3 depends from claim 1 and requires that the housing comprise “a cylindrical tube having a central axis and the heating wire extending in a direction substantially perpendicular to the central axis.”
- Claim 9 depends from claim 1 and requires a “wire coil.”
- Claim 10 depends from claim 1 and requires “an atomization cavity within the atomizer.”
- Claim 17 depends from claim 15 and requires a “wire coil in a cavity in the atomizer.”

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 ¶17. Petitioner argues a skilled person would have “3-5 years of experience in designing and developing handheld devices with thermal management and fluid handling technologies.” Petition at 17. Under either definition, Petitioner has failed to meet its burden.

IV. CLAIM CONSTRUCTION

In IPR proceedings, claim terms are given their broadest reasonable construction in light of the specification. 37 C.F.R. §42.100(b). When the Board previously denied IPR of the ’726 patent, the Board construed the following terms:

Claim term	Construction
“electronic cigarette”	“a device for generating liquid droplets for inhalation by a user, where the device functions as a substitute for smoking, <i>e.g.</i> , by providing nicotine without tar”
“atomizer	“a part of the electronic cigarette that includes components that participate in facilitating atomization”
“contact” / “physical contact”	“direct contact”

Ex. 1031 at 8-11. Below, Patent Owner addresses the term “atomizer,” as well as additional terms “atomization cavity” and “central axis.”

A. “atomizer”

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

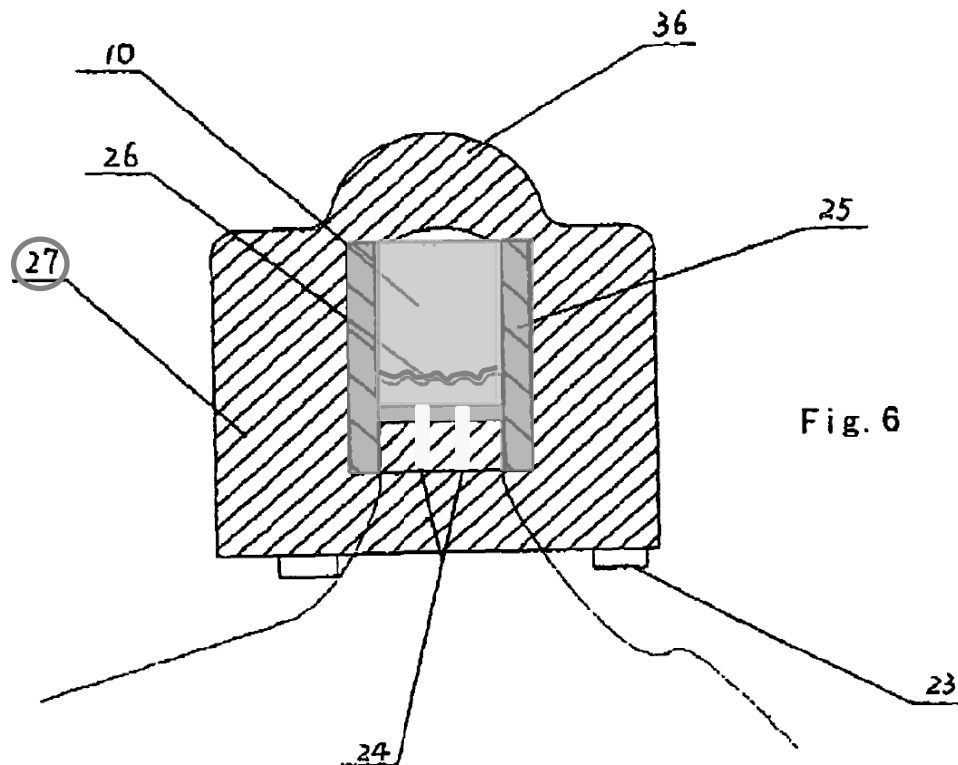
Independent claims 1, 10, 14, 15, and 17 recite an “atomizer” with several different components, such as a heating element, an atomization cavity, and a porous body. Independent claim 1 recites an “atomizer” that includes a porous body and a heating wire surrounded by the porous body, independent claim 14 recites a “porous cylindrical atomizer” surrounding a heating wire coil, and independent claim 15 recites an atomizer having a heating element. Dependent claims 10 and 17 claim a cavity in the atomizer.

Petitioner applies the Board’s prior construction of the term “atomizer.” Ex. 1031 at 10; Petition at 17. But that construction is too broad because it extends beyond components that cause atomization (i.e., converting liquid into aerosol or vapor) to components that do not (e.g., components that transport liquid to the atomizer or receive atomized particles after atomization has occurred). Ex. 2001 ¶19. Instead, an “atomizer” is “a component or components that convert(s) liquid into aerosol or vapor.” Ex. 2001 ¶19. Petitioner’s expert acknowledges that an atomizer “has components used to convert liquid into aerosols....” Ex. 1003 ¶33.

As shown in Figure 6 below (annotations added), heating element 26 (red) within cavity 10 (green) atomizes nicotine solution. Ex. 1001, 2:51-57, 3:49-58,

4:11-13. Walls 25 (blue) and porous body 27 (red circle) together form cavity 10.

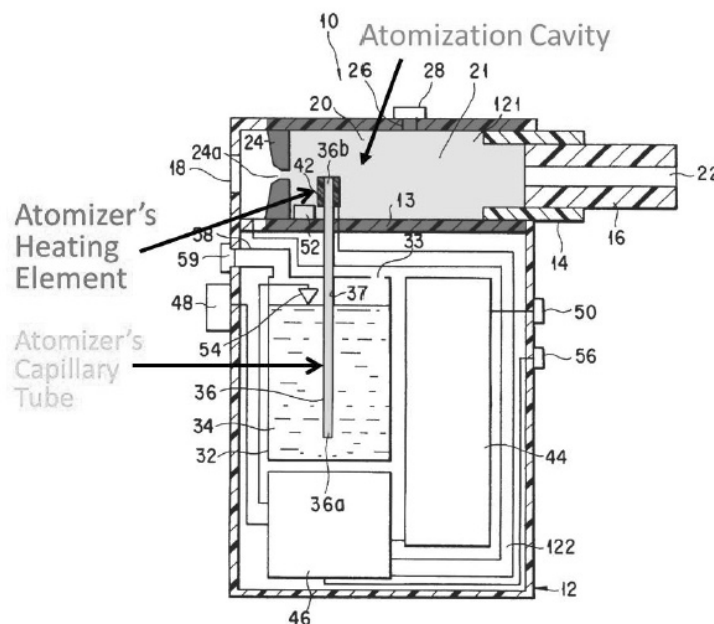
Id., 2:66-3:2; Ex. 2001 ¶20. When air passes through the porous body's ejection holes 24 (yellow) into cavity 10, liquid from the porous body ejects into the cavity as an aerosol where it is further atomized by heating element 26. Ex. 1001, 2:57-65, 3:52-58.



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 ¶20. The ’726 patent expressly refers to all of these components (heating wire, cavity, structures forming the cavity, ejection holes) as the “atomizer.” Ex. 1001, 2:48-50,

2:66-67, 3:49-58; Ex. 2001 ¶20. The claims make clear that the atomizer has subcomponents, including a heating element, a porous body, and a cavity.

Because Petitioner's construction of "atomizer" extends to components that do not cause atomization, it is improper. Petitioner's overbroad construction of "atomizer" is not an accident. It relies on that construction to make up for deficiencies in its prior art. Specifically, Petitioner asserts that U.S. Patent No. 6,155,268 (Takeuchi) (Ex. 1004) discloses an atomizer that includes capillary tube 36, heater 42, and upper chamber 121, as well as output port 36b (as shown in the annotated version of Figure 1 below). Petition at 36 & n.5, 52. But the tube and chamber do not cause atomization. Chamber 121 receives already-atomized particles. Ex. 1004, 5:4-11, 7:60-63. The tube's sole purpose is to move liquid from the liquid storage body to the heater. *Id.*, 5:49-50, 6:4-12; Ex. 2001 ¶68.



During prosecution of the '331 patent, Patent Owner distinguished a reference called Voges II with the same configuration as Takeuchi—an atomizer connected to a liquid storage body by a tube—because it failed to disclose an atomizer in physical contact with a liquid supply. Ex. 2008 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.

Petitioner cites the previous IPR denial, noting the Board’s comment that an “atomizer” is not limited to a single component. Petition at 35 n.4. Patent Owner agrees. An atomizer need not be a single component, but rather must include only the component(s) that cause atomization. Under Petitioner’s construction, the term “atomizer” would extend to any component in an electronic cigarette that “facilitat[es] atomization,” which might be said for the battery, the housing, the air inlets, etc. That understanding of “atomizer” is unreasonable because it defines the atomizer based on an arbitrary decision about which components “facilitat[e]” atomization.

The extrinsic evidence also supports Patent Owner’s proposed construction. To “atomize” is “2: to reduce to minute particles or to a fine spray,” and an “atomizer” is “an instrument for atomizing usu. a perfume, disinfectant, or medicament.” Ex. 2003 at 78. Another dictionary is similar, defining “atomize” as “reduce to atoms or fine particles” and “atomizer” as “an instrument for emitting

liquids as a fine spray.” Ex. 2002 at 83. For these reasons, an “atomizer” is “a component or components that convert(s) liquid into aerosol or vapor.” Ex. 2001 ¶¶18-23.

B. “atomization cavity”

Patent Owner’s Construction	Petitioner’s Construction
“hollow space where atomization occurs”	No construction

Claim 10 recites an “atomization cavity within the atomizer.” The Board and the parties agree that a “cavity” is “a hollow space.” Ex. 1006 at 10; Ex. 1007 at 8; Ex. 1003 ¶56. Based on the specification, “atomization cavity” means a “hollow space where atomization occurs.” Ex. 2001 ¶24. In annotated Figure 6 below, the ’726 patent depicts atomization cavity 10 (green) as a hollow space within the atomizer’s porous body 27. But the “atomization cavity” is more than just a hollow space inside the atomizer, it is the hollow space where atomization occurs. Ex. 1001, 3:49-58; Ex. 2001 ¶24. As further described below, Petitioner interprets the “atomization cavity” as any hollow space within an atomizer. That construction reads “atomization” out of claim 10 and should be rejected.

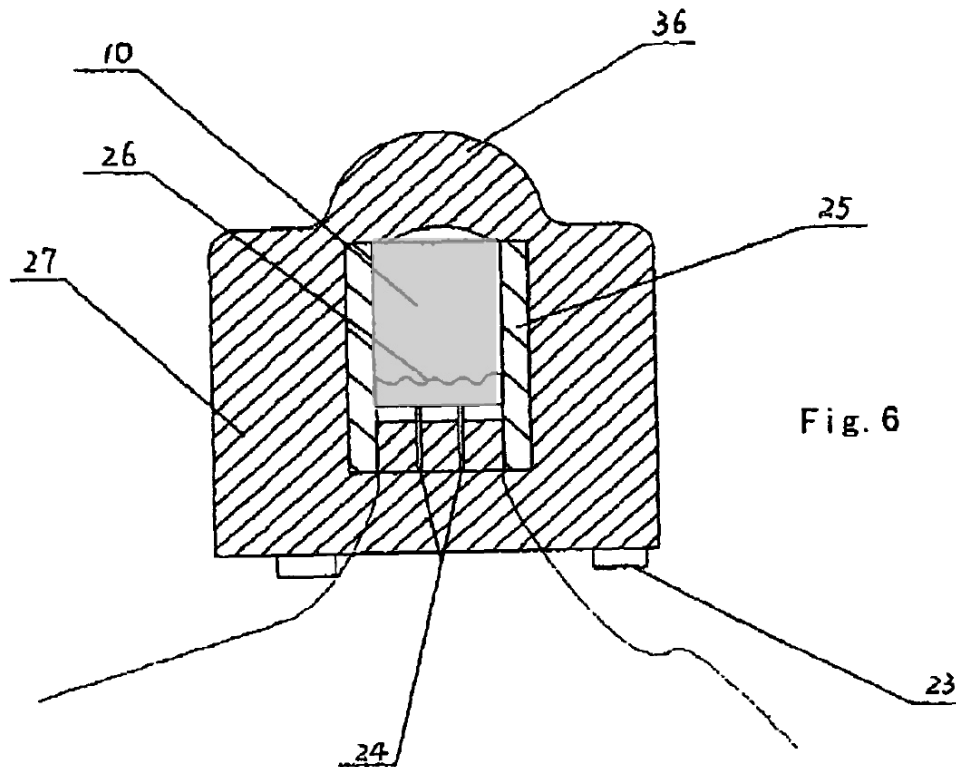


Fig. 6

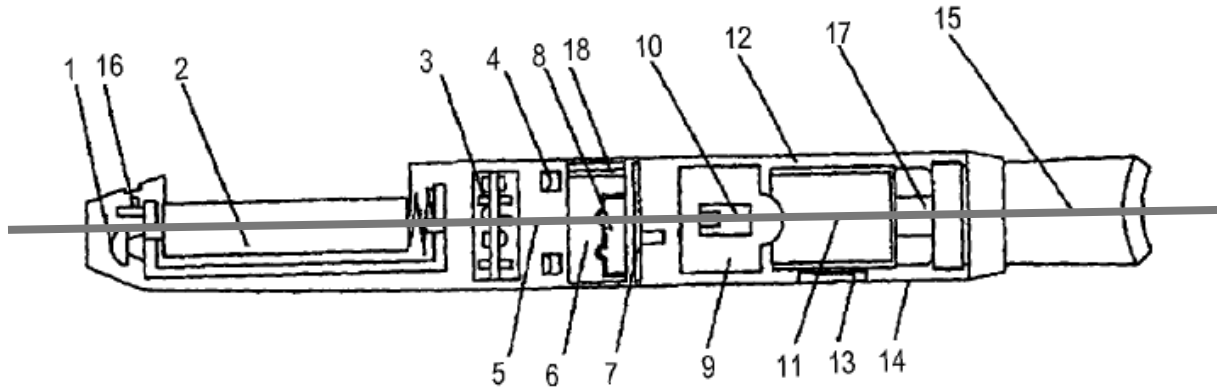
Additional extrinsic evidence supports Patent Owner's position. Petitioner's own expert acknowledges that an atomizer includes "a hollow space where liquid from the liquid supply is transported and aerosolized." Ex. 1003 ¶33. That space is the "atomization cavity." Ex. 2001 ¶¶24-25.

C. "central axis"

Patent Owner's Construction	Petitioner's Construction
"axis through the center"	No construction

Claim 3 depends from claim 1 and recites a housing with "a cylindrical tube having a central axis and the heating wire extending in a direction substantially perpendicular to the central axis." The '726 patent discloses a device shaped like a

cylindrical tube, as shown below in Figure 1. The central axis corresponds to the blue line. Ex. 2001 ¶26.



The plain and ordinary meaning of “central axis” should apply: “an axis through the center.” Ex. 2001 ¶27. Petitioner, however, has interpreted “central axis” to mean any axis, even one that does not extend through the center of a device. Petitioner’s overly broad position is reflected in the annotated figure below, which labels an axis across the top of the device as the “central axis.” Petition at 43.

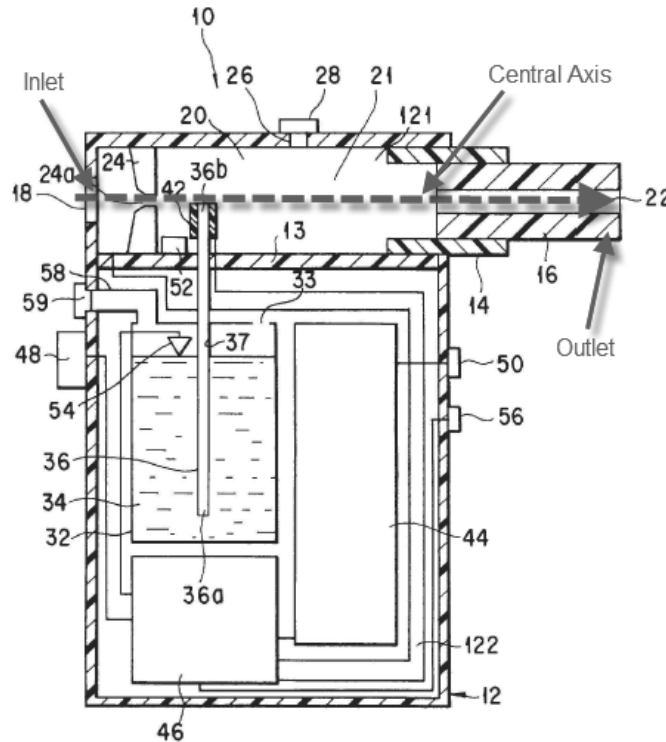


FIG. 1

The claim requires more than just any axis. Ex. 2001 ¶27. The axis is “central,” and that term must have some meaning. The plain and ordinary meaning of “central” is “in, at, or near the center” or “of, at, or forming the center.” Ex. 2014 at 336; Ex. 2002 at 225. In turn, “center” means “the middle part” or “the middle point.” Ex. 2003 at 200; Ex. 2002 at 225. Patent Owner’s proposed construction tracks the plain and ordinary meaning of “central axis,” while Petitioner’s interpretation reads “central” out of the claim. That is improper.

V. THE PETITION FAILS TO SHOW A REASONABLE LIKELIHOOD THAT ANY CLAIM OF THE ’726 PATENT IS UNPATENTABLE

Petitioner proposes five grounds of unpatentability:

Ground 1. Claims 1, 3-4, 9-10, and 14 are obvious over Takeuchi and U.S.

Patent No. 1,514,682 (Wilson) (Ex. 1008);

Ground 2. Claim 2 is obvious over Takeuchi, Wilson, and U.S. Patent No.

6,598,607 (Adiga) (Ex. 1010);

Ground 3. Claims 15-17 are obvious over Takeuchi and Adiga;

Ground 4. Claims 1, 9, 10, and 14 are obvious over U.S. Patent No.

2,057,353 (Whittemore) (Ex. 1005) and Wilson; and

Ground 5. Claim 2 is obvious over Whittemore, Wilson, and Adiga.

Petition at 12-14.

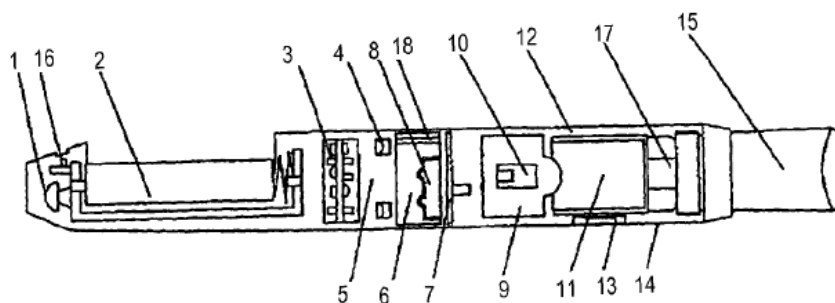
The Board should deny *inter partes* review for all claims.

A. The Patent Office Already Rejected Petitioner's Cited Prior Art and Arguments

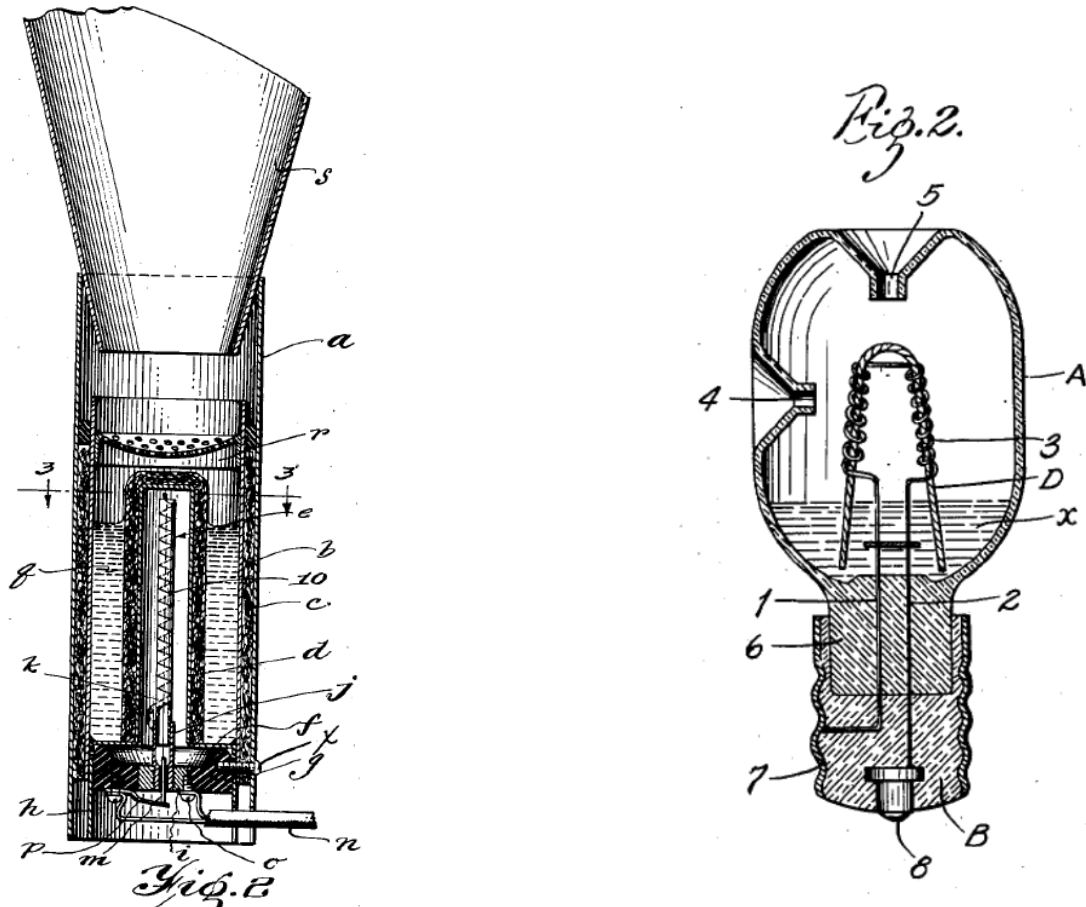
The Patent Office issued the '726 patent even though three of Petitioner's four cited references (Takeuchi, Adiga, and Whittemore) were among the references cited to the examiner. Ex. 1002; Ex. 1001, References Cited. In allowing the claims, the examiner noted that the closest prior art of record (including the references listed above) did not teach or suggest an electronic cigarette having "a heating wire in the atomizer surrounded by a porous body/atomizer in contact with a liquid storage body or that which comprises a liquid storage body including fiber material," as claimed in the '726 patent. Ex 1002 at 2.

Nothing has changed since the examiner issued the claims: the prior art remains deficient. Takeuchi, Adiga, and Whittemore still do not teach the claimed heating wire surrounded by a porous body. Petitioner freely admits as much for Takeuchi and Whittemore and never attempts to argue otherwise for Adiga. Petition at 24, 76. And although Petitioner points to Wilson as teaching what is claimed, the combination of Takeuchi with Wilson is redundant of a combination the Patent Office already found wanting in a prior IPR relating to the '726 patent. The Patent Office was right the first two times around.

Most of the alleged prior art references Petitioner relies on do not disclose electronic cigarettes. The '726 patent's claims recite an "electronic cigarette." The electronic cigarette functions as a cigarette substitute. Ex. 1001, 1:59-65. An embodiment of the claimed device is shown below in Figure 1 of the '726 patent.



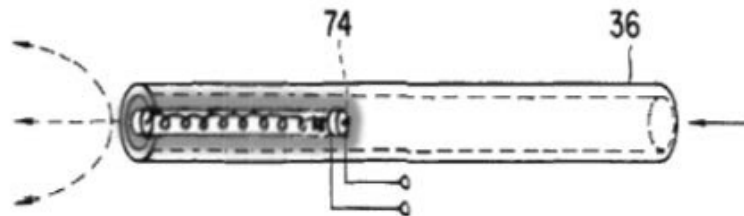
By contrast, Wilson and Whittemore disclose large, upright vaporizers that are different in form and function from the electronic cigarette shown above. The contrast is evident from Wilson's Figure 2 (below left) (Ex. 1008) and Whittemore's Figure 2 (below right) (Ex. 1005).



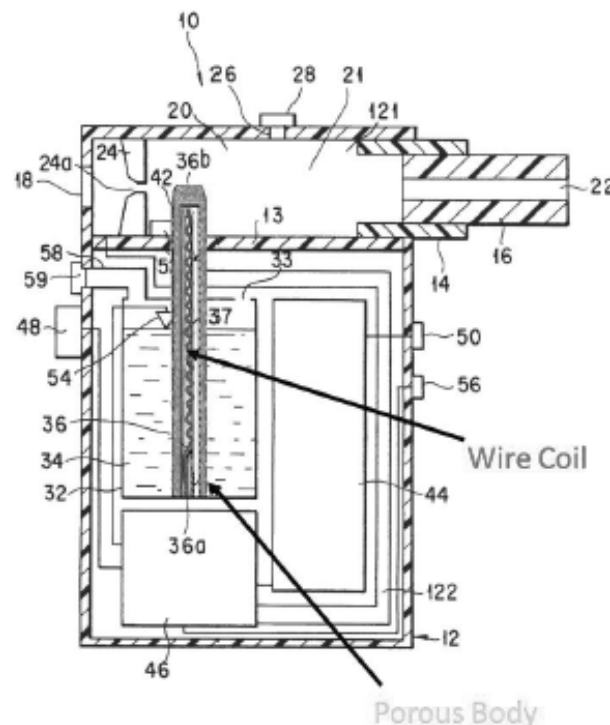
No one would consider Wilson's or Whittemore's vaporizers to be a reasonable cigarette substitute. For its part, Adiga's device has no electrical components and criticizes use of a battery. Ex. 1010, 1:40-43, 2:52-67, 3:31-32. Thus, Adiga, too, is not an electronic cigarette. In light of these disclosures, it is hardly surprising that the examiner allowed the '726 patent over Whittemore and Adiga. And Petitioner concedes the examiner was right about Takeuchi's shortcomings.

The examiner was not the only one who reviewed and rejected Petitioner's prior art and arguments. The Board already considered an IPR challenge to the

'726 patent, and rebuffed it. In that matter, the petitioner argued that claims 1-4, 8-10, and 12-17 (a range that includes all claims currently at issue) were unpatentable over combinations of Takeuchi, Counts, and Kaufmann. Ex. 1031 at 6. The Board rejected those arguments, and denied institution on all claims. Ex. *Id.* at 25. Specifically, the petitioner argued that Takeuchi and Counts taught a wire surrounded by a porous body, as shown in the figure below. *Id.* at 17.



Petitioner now asserts exactly the same argument, using Takeuchi and Wilson, as shown in the annotated figure below. Petition at 29.



Similarly, the prior petitioner relied on Kaufman as teaching a fiber material. Ex. 1031 at 21-22. Petitioner here relies on Adiga for the same reason: its alleged teaching of a fiber material. Petition at 56, 98. Petitioner's current arguments simply repeat those that were already unsuccessful.

In attempting to address redundancy with the prior IPR, Petitioner asserts that its combinations are not duplicative because they involve references not submitted to the Board earlier. Petition at 12. But that does not prove the art is meaningfully distinct. Different references can provide the same teachings, and petitioners can use different references to make the same arguments. Here, Petitioner does nothing to distinguish the substance of its art and arguments from those the Board already rejected. Accordingly, the Board should reject Petitioner's art and arguments under 35 U.S.C. §325(d) as "substantially the same" as those previously presented. Ex. 2009 at 6-7 (denying institution where petitioner substituted a new reference into a previously presented prior art combination but failed to explain how that reference's disclosure was "substantively and meaningfully" different from the replaced reference); Ex. 2010 at 7-11 (denying institution where petitioner's art and arguments were "substantially similar" despite use of a different prior art reference).

B. Petitioner's Expert's Testimony is Conclusory, Incomplete, and Not Credible

To support its arguments, Petitioner provides the declaration of Dr. John Collins (Ex. 1003). Petitioner's current Takeuchi-based approach is redundant of combinations with Counts and Kaufman that the Board rejected in denying a prior petition challenging the '726 patent. Ex. 1031 at 15. Petitioner's expert uses Wilson to incorporate a wire coil and Adiga to incorporate a fibrous liquid storage body into Takeuchi, just as the prior petitioner unsuccessfully tried to do with Counts and Kaufman, respectively. Ex. 1031 at 15-24. Petitioner concedes that Takeuchi and Whittemore fail to disclose the same limitations of the '726 patent's claims, acknowledging that those two references are redundant of each another. Petition at 24, 56, 61, 76, 98. Yet Petitioner's expert never explains whether or how his current prior art combinations are substantively different from the art submitted in the prior IPR, or from each other.

Petitioner's expert's opinions are not only duplicative, they are deeply flawed. Although Petitioner's expert acknowledges that "[o]ne should be cautious of using hindsight in evaluating whether a claimed invention would have been obvious," hindsight permeates his opinions. Ex. 1003 ¶49. For example, Petitioner's expert argues that components claimed in the '726 patent were well known before the invention, *Id.* ¶¶16, 25-42, 74, 76, 87, 92, and that it would have been obvious for a skilled person "to replace, combine, orient, or locate" those

elements “in any manner that suits a particular design” to yield “straightforward, predictable results.” *Id.* ¶41. Then Petitioner’s expert uses the claims as a roadmap, i.e., hindsight, to combine those elements.

That approach violates the law, as the Board found in denying a previous IPR petition relating to the ’726 patent. Ex. 1031 at 19-20. “A patent composed of several elements is not proved obvious merely by demonstrating that each element was, independently, known in the prior art.” *KSR*, 550 U.S. at 401. Rather, there must be “an apparent reason to combine the known elements in the fashion claimed by the patent at issue.” *Id.* at 418. As the Board put it, “obviousness requires the additional showing that a person of ordinary skill at the time of the invention would have selected and combined those prior art elements in the normal course of research and development to yield the claimed invention.” Ex. 1031 at 19. And “rejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.” *KSR*, 550 U.S. at 418.

Petitioner’s expert sometimes gives no reasoning at all for his opinions. For example, he asserts that if any limitation is missing from proposed combinations, “it would at minimum have been obvious to include such a limitation based on the knowledge of a skilled person in light of the express teachings” of the reference.

Ex. 1003 ¶¶79, 89. Petitioner’s expert offers no further explanation for why this would have been so. Petitioner’s expert errs in asserting obviousness based on “design choice” and substitutions of similar elements without explaining why a skilled person would have made the choice or substitution. *Id.* ¶¶32, 39, 40, 53, 57, 65, 66, 70, 72, 75, 80, 82, 84. Petitioner’s expert also repeatedly alleges what references *could* have disclosed rather than what they actually disclosed. *Id.* ¶¶53, 63, 66, 67, 71. Those opinions reflect hindsight.

At times, Petitioner’s expert argues that incorporating a particular component will lead to “predictable results.” *Id.* ¶¶66, 72, 74, 78, 84, 87, 92. But he often fails to explain how the results are predictable and his analysis is conclusory and incomplete. Using the claims as a roadmap, Petitioner’s expert also invents problems in prior art references that have no basis in fact so he can justify prior art combinations. For example, Petitioner’s expert asserts that leaking and pressure equalization were issues in Takeuchi. *Id.* ¶¶73-74. But Takeuchi discloses opening 33 in liquid container 32 that maintains atmospheric pressure and has a “small diameter” to prevent leaking. Ex. 1004, 5:58-6:3. Ignoring what the reference actually discloses, Petitioner’s expert asserts that leaking “is likely” and that pressure control is insufficient. Ex. 1003 ¶¶73 & 74 n.3. Those arguments lack factual support and are improper. *Insite Vision Inc. v. Sandoz, Inc.*, 783 F.3d 853, 859 (Fed. Cir. 2015) (“Defining the problem in terms of its

solution reveals improper hindsight in the selection of the prior art relevant to obviousness.”) (citation omitted); *Leo Pharm. Prods., Ltd. v. Rea*, 726 F.3d 1346, 1354-57 (Fed. Cir. 2013) (rejecting obviousness argument where prior art did not recognize an alleged problem so there was “no reason for one of ordinary skill in the art to attempt to improve” upon the art).

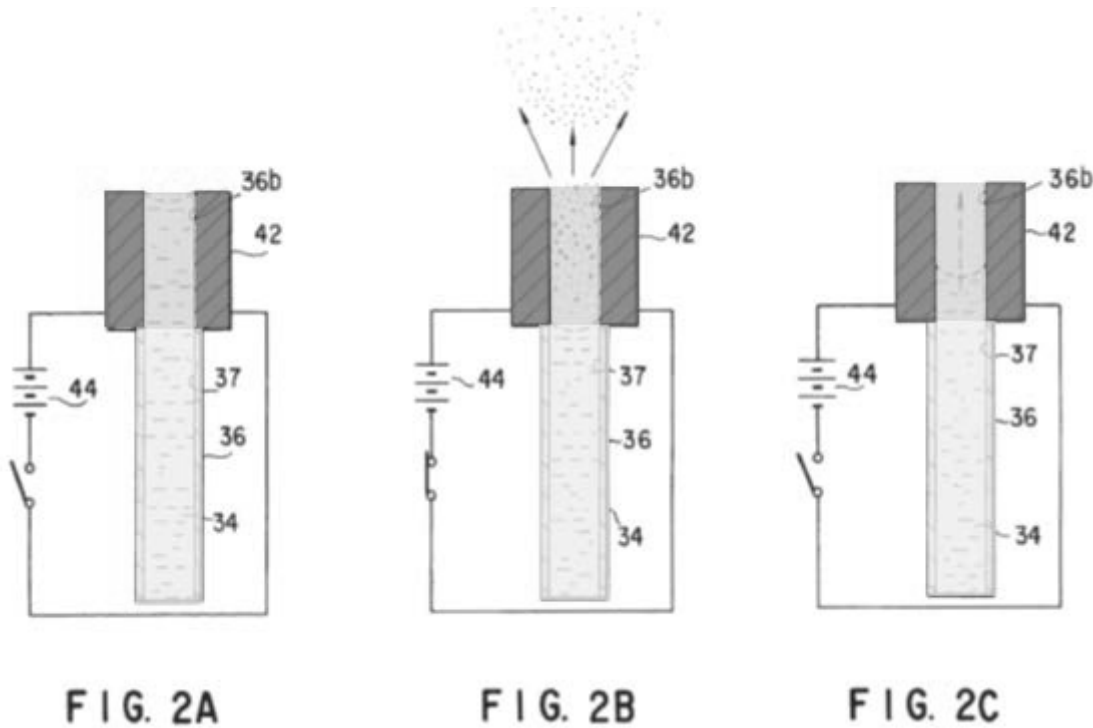
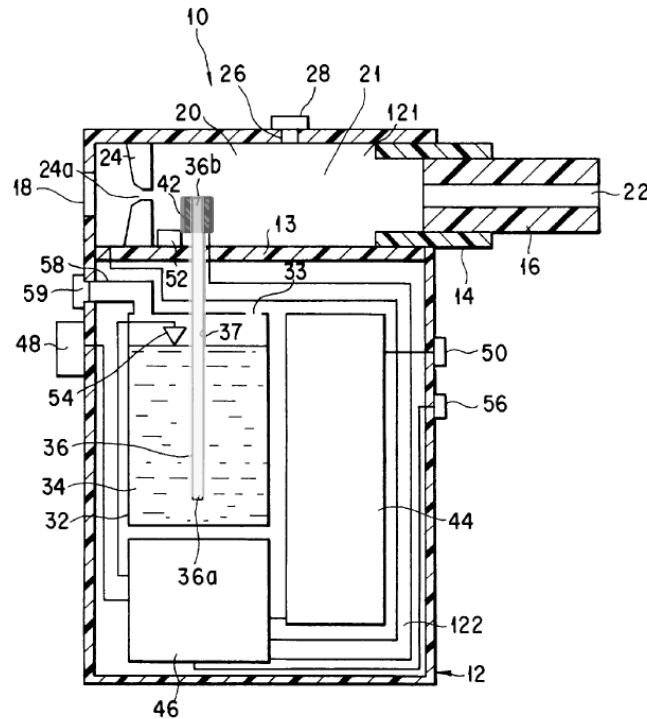
Petitioner’s expert’s self-serving and hindsight-directed opinions should carry no weight in determining whether Petitioner has proven a reasonable likelihood that the claims of the ’726 patent would have been obvious.

C. Ground 1: Claims 1, 3-4, 9-10, and 14 are Not Obvious over Takeuchi and Wilson

For the reasons outlined below, Petitioner has not met its burden of proving a reasonable likelihood of success on this Ground.

1. Takeuchi

Takeuchi discloses a “flavor generating device.” Liquid containing a flavor source is transported through a liquid passageway via capillary force to a small electric heater, where it is gasified (atomized) for inhalation by a user. Ex. 1004, 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), outlet port 36b (green), and capillary tube 36 (yellow). Atomization in the heater’s outlet port 36b is shown below in Figures 2A-2C.



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. 1004, 1:25-29 (emphasis added). Takeuchi's device aimed to provide a puff of flavor "without a time lag." *Id.*, 1:59-64. Another objective was to provide a device "which can be made small in size and light in weight." *Id.*, 1:65-67.

Takeuchi disclosed specific heaters that accomplished the objectives listed above. Those heaters were small in size and shaped like a ring, a rod, and a plate, as shown below in Figures 3-5.

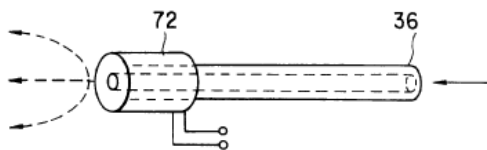


FIG. 3

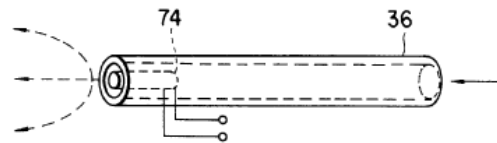


FIG. 4

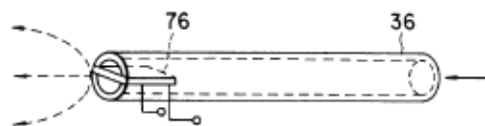


FIG. 5

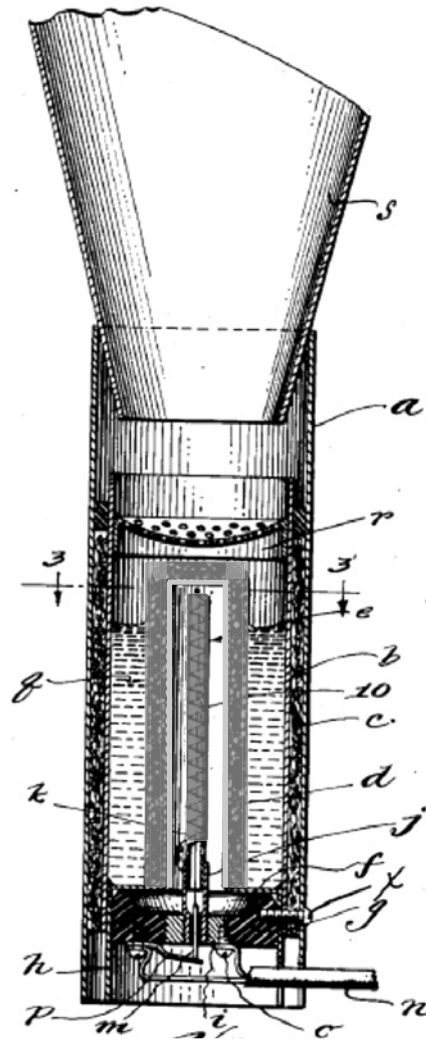
Takeuchi was included in an Information Disclosure Statement filed on August 14, 2014, and the Examiner considered the reference during the

prosecution of the '726 patent. Ex. 2006. The Board also considered Takeuchi as a primary reference in denying an IPR relating to the '726 patent. Ex. 1031.

Petitioner's expert suggests that Takeuchi contains a typographical error relating to the shape of Takeuchi's lower chamber 122, without explaining what that error is. Ex. 1003 ¶53. There is no such error.

2. Wilson

Wilson discloses an electric vaporizer. Ex. 1008, 1:18-23. The patent issued in 1924. The device includes reservoir *b* that contains liquid. *Id.*, 1:73-79. Within the reservoir, sleeve *d* creates a closed-off chamber that includes heating element *e* with resistance coil 10 running the length of the sleeve. *Id.*, 1:79-91, 1:99-103, 2:62-65. The walls of the sleeve form a "stove" that heats up when the resistance coil is activated. *Id.*, 1:79-83, 2:76-85. Cylindrical wick *q* surrounds the sleeve. *Id.*, 2:5-9, 2:76-85. Wick *q* contacts the reservoir and becomes saturated with liquid. Ex. 1008, 2:14-23. Liquid vaporizes on the sleeve surface in contact with the wick and vapor rises through a perforated cap. *Id.*, 2:17-31. Generally, vapor would only form on portions of the wick above the liquid level. Ex. 2001 ¶36. Annotated Figure 2 below shows heating element *e* with resistance coil 10 (red), sleeve *d* (orange outline), and wick *q* (blue).



Wilson's device has several objectives. It aims to provide "a sufficient volume of *continuous* hot vapor" over time. Ex. 1008, 1:14-15 (emphasis added). The design also seeks to provide a heating element with an "entire heating surface" that "may be utilized for vaporizing the medicated liquid." *Id.*, 1:46-49.

Wilson discloses that because of the heat it generates, the device must include insulating material *c* "to prevent the outer barrel from becoming too hot for handling." *Id.*, 1:73-79. Further, because the hot vapor Wilson's device generates

might burn a user, Wilson taught a bell or conoid *s* to separate the device and the user and avoid “pain due to the vapor being too hot.” *Id.*, 1:26-36, 2:34-37.

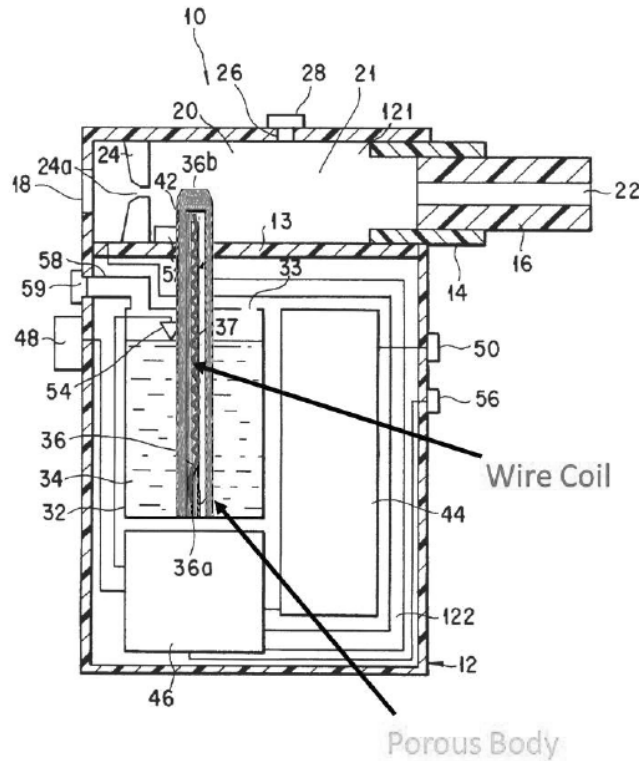
Material *c* and bell *s* are shown above in Figure 2.

Wilson does not mention nicotine or suggest the use of the device as an electronic cigarette. Wilson’s device receives power through a cord and lacks an internal battery. *Id.*, 1:108-2:4.

3. Independent Claims 1 and 14

Independent claims 1 and 14 recite an “electronic cigarette” comprising a “housing” containing a “liquid storage body,” an “atomizer,” and an “air flow path” through the housing, where the atomizer includes “a porous body in contact with the liquid storage body” and a “heating wire ... surrounded by the porous body” or where the atomizer is a “porous cylindrical atomizer” “in contact with the liquid storage body” and containing “a heating wire coil.” Petitioner concedes that Takeuchi does not disclose a heating wire or coil surrounded by a porous body. Petition at 24. To arrive at a heating wire surrounded by a porous atomizer, Petitioner alleges a skilled person would have adapted Takeuchi to include Wilson’s atomizer. Petition at 26. Not so. There is nothing in Takeuchi to suggest that the heating elements it discloses are deficient, or that incorporating the heating element of Wilson would improve Takeuchi’s heating elements.

In fact, Takeuchi teaches away from a combination with Wilson. As shown in the annotated figure below, Petitioner proposes adding Wilson's atomizer (wick, sleeve, and resistance coil) to Takeuchi. Petition at 29. But Wilson's wire coil (red) is much larger than heater 42 disclosed in Takeuchi's Figure 1.



Takeuchi’s heater is small for a reason. Ex. 2001 ¶¶39-40. 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. 1004, 1:59-64, 2:25-29 (emphasis added). These features distinguished Takeuchi over earlier devices. *Id.*, 1:17-24, 1:49-56.

Takeuchi's small heater at the end of a liquid passageway accomplishes these aims (1) because it requires little power to heat up, which is important given the device's limited internal power source 44, (2) because its small size allows for rapid temperature change when power is applied to "instantly gasif[y]" liquid, and (3) because it allows for a small and light device. *Id.*, 7:60-63; Ex. 2001 ¶¶39-40. The design allows a user to get vapor on demand. Ex. 2001 ¶40. As Petitioner's expert acknowledges, "[t]echniques that can aerosolize a small volume of liquid from the liquid supply, on demand (rapidly and at high frequency), are particularly suited to e-cigarettes...." Ex. 1003 ¶33. Petitioner's expert goes on to admit that heaters with "low thermal mass" "rapidly vaporize the liquid" and then "rapidly cooled to stop the vaporization process once the power [i]s removed." Ex. 1003 ¶35. Indeed, Takeuchi criticizes prior art devices that "continuously" heated flavor material because they wasted that material and could not provide vapor on demand. Ex. 1004, 1:17-24; Ex. 2001 ¶40.

Adding Wilson's atomizer would have undermined Takeuchi's stated goals and the desired on-demand operation for an electronic cigarette. First, Wilson's atomizer would generate vapor only after a substantial time lag, just as Takeuchi seeks to avoid. While Takeuchi aims for on demand atomization the moment a user inhales, Wilson seeks the opposite: providing "continuous hot vapor" over time. Ex. 1004, 1:59-64, 2:28-29; Ex. 1008, 1:14-15. That difference in function

is reflected in design. Wilson's resistance coil 10 is much larger than the heaters Takeuchi discloses, so it would have required more time to heat up once power was applied and to cool down after use. Ex. 2001 ¶41. Further, the heating mechanism in Wilson is inefficient. Vaporization does not occur until resistance coil 10 powers on and then transfers heat by convection and radiation across an empty space to sleeve *d*, which functions as the heating surface for vaporizing liquid. Ex. 1008, 1:79-83, 2:76-85; Ex. 2001 ¶¶34-35, 42-43. By contrast, Takeuchi uses conduction, where liquid is in close contact with the heater, which is a much more efficient method of heat transfer. Ex. 2001 ¶43. In Wilson's atomizer, heat diffuses throughout the wick in contact with the sleeve and even into the liquid. *Id.* ¶42. Because of the larger mass of materials to heat, Wilson's atomizer would have heated up and cooled down much more slowly in comparison to Takeuchi's compact heaters. *Id.* ¶41. The cooling lag would have wasted liquid flavor material, which Takeuchi sought to avoid. Ex. 1004, 1:59-64, 2:27-28.

Also, the larger size of Wilson's heater would have increased the weight of Takeuchi's device and would have required more power, quickly draining Takeuchi's internal battery or requiring the use of an external power source making the device less like a traditional cigarette. Ex. 2001 ¶44. As evidence of its greater power needs, Wilson's device is powered by a cord connected to an external power source, not a battery. *Id.* ¶44.

The proposed combination would have resulted in more problems undermining Takeuchi's objectives. As shown in the figure above, wick *q* (green) runs from the bottom of resistance coil 10 (red) to the top. Vapor would have risen from the wick after heating (Ex. 1008, 2:17-31), filling not only Takeuchi's upper chamber 121, but also liquid container 32 and the interior of the device. That approach would have wasted liquid (which Takeuchi teaches against, Ex. 1004, 1:59-64, 2:27-28) and caused corrosion to electronic components such as power source 44 and control circuit 46. Ex. 2001 ¶¶45-46. The wick also would have leaked liquid into Takeuchi's device, increasing the risk of corrosion to electronic components. *Id.* ¶46. It is ironic that Petitioner's expert suggests that leaking is a problem in Takeuchi (even though that reference says otherwise), yet he proposes a combination with Wilson that would create severe leaking problems.

In addition, Petitioner does not suggest insulating the housing in Takeuchi to prevent burning a user's hand or how to prevent burns to a user from the hot vapor Wilson's atomizer generates. *Id.* ¶46. Wilson notes that insulation is required and discloses a protective cone to prevent a user from being burned by hot vapor. Ex. 1008, 1:73-79, 1:26-36. A skilled person would not have undertaken the additional expense and effort to devise how to seal the wick from the rest of the device, how to insulate the lower chamber, or how to ensure that the vapor was sufficiently

cooled before inhalation, especially given the other drawbacks to Wilson’s atomizer. Ex. 2001 ¶¶46-47.

Taken as a whole, the problems caused by Petitioner’s proposed combination show its lack of critical analysis and reliance on hindsight. Anyone can find some purported benefit to a proposed combination, but the question is whether a skilled person would have pursued that 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 ¶47.

Petitioner and its expert do not address any of the issues raised above, and offer only conclusory reasons to support the proposed combination. Each of those reasons shows hallmarks of hindsight. Petitioner argues that Wilson’s resistance coil “ensures good heat transfer” and “enables a larger heating surface.” Petition at 26 (citing Ex. 1003 ¶65). But Petitioner and its expert fail to explain how the surface area of Takeuchi’s heaters would have been inadequate for the device’s intended use. Petitioner and its expert do not explain why a skilled person would have sought a larger heating surface or better heat transfer in Takeuchi’s device. They do not identify any statements in Takeuchi regarding the adequacy or inadequacy of heat transfer or the surface area of Takeuchi’s heaters. 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. 2012 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. 2013 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. Further, the larger surface area would not have been “beneficial,” as Petitioner’s expert argues. Ex. 1003 ¶¶65. The larger surface area would have required more power, wasted flavor material, and caused a lag before vapor production, which Takeuchi teaches against. Ex. 2001 ¶¶41-47.

Petitioner and its expert also argue that a skilled person would have been motivated to add Wilson’s atomizer to Takeuchi because Wilson’s resistance coil 10 could be replaced after oxidation. Petition at 27 (citing Ex. 1003 ¶¶67-68). In doing so, Petitioner cites Howell (Ex. 1009) as support that oxidation issues were “well known” and provided a motivation for the combination. Petition at 27. But that assertion does not prove that oxidation was an issue in Takeuchi. Moreover, Howell provides an easy solution to the alleged oxidation issue: making a heater out of materials such as platinum. Ex. 1009, 3:60-4:4, 4:9-11. As Petitioner’s

expert admits, a skilled person could have made Takeuchi's heater from an oxidation-resistant material to avoid the issue, just as Howell suggests. Ex. 1003 ¶71. That is a much simpler and cheaper solution than redesigning Takeuchi's device to make a removable coil. Ex. 2001 ¶48. Petitioner ignores that simple solution, however, in favor of Wilson's complicated mechanism for removing a heater. Such cherry-picking of prior art disclosures with no explanation reflects hindsight. And while Petitioner's expert suggests it would have been easy to remove Takeuchi's power source 44 and then remove the coil (Ex. 1003 ¶66), taking out the power source would not have provided access to the coil, which is isolated inside liquid container 32. Ex. 2001 ¶49. For its part, Wilson teaches removing the coil from the bottom of the device (Ex. 1008, 2:69-72), but in Petitioner's proposed combination circuit board 42 would have prevented removal in that manner. Ex. 2001 ¶49. Petitioner's expert's conclusory statements overlook difficult design problems and do not prove obviousness.

Petitioner and its expert also argue that the proposed combination would have been a "simple substitution" or "design choice" with "predictable results." Petition at 28 (citing Ex. 1003 ¶66). The Board rejected this conclusory rationale in the prior IPR relating to the '726 patent, which also involved the proposed insertion of a wire coil into Takeuchi. Ex. 1031 at 15-21. Moreover, as described

above, the predictable results of the combination are negative and contrary to Takeuchi's teachings. Ex. 2001 ¶¶41-47.

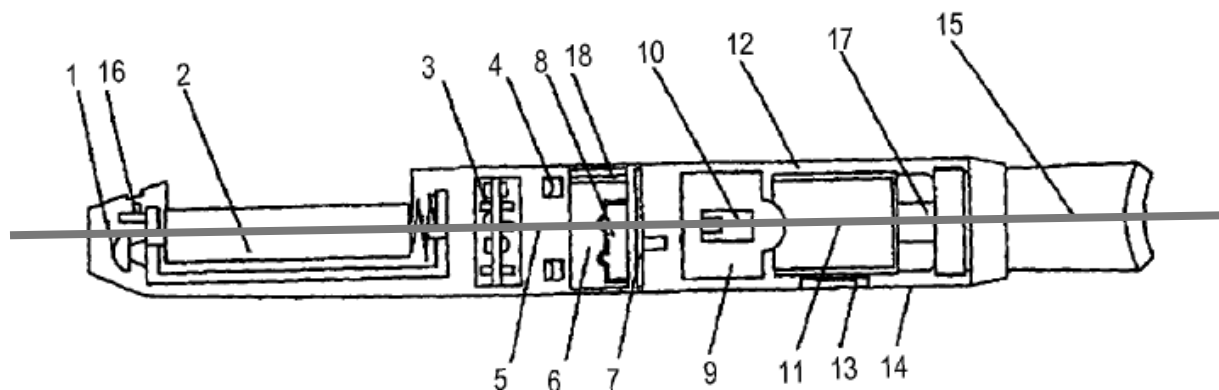
Petitioner's proposed combination is highly suspect and reflects hindsight bias for yet another reason: it contradicts Petitioner's proposed combination in Ground 3. Faced with claim 1, which requires "a heating wire in an atomizer surrounded by the porous body," Petitioner argues it would have been obvious to insert Wilson's atomizer into Takeuchi in order to "ensure[] good heat transfer" and allow for replacement of the heater after oxidation, citing Howell (Ex. 1009). Petition at 24-29. For claim 17, which requires "a wire coil in a cavity in the atomizer," suddenly Howell teaches instead that a naked wire coil, such as in Adiga, is the structure that "ensures good heat transfer" and prevents oxidation. Petition at 61-64. Petitioner never explains why the combinations differ for the two claims, even though its reasoning is the same. The true motivation is clear. Petitioner selected prior art references using the claims as a roadmap and then manufactured a reason to combine them. The law prohibits that approach. *Cheese Sys.*, 725 F.3d at 1352-53 ("Obviousness cannot be based on the hindsight combination of components selectively culled from the prior art to fit the parameters of the patented invention.") (citation and quotation marks omitted); *InTouch Techs., Inc. v. VGO Commc'ns, Inc.*, 751 F.3d 1327, 1352 (Fed. Cir. 2014).

**4. Dependent Claims 3, 4, and 9-10 are Not Obvious over
Takeuchi and Wilson**

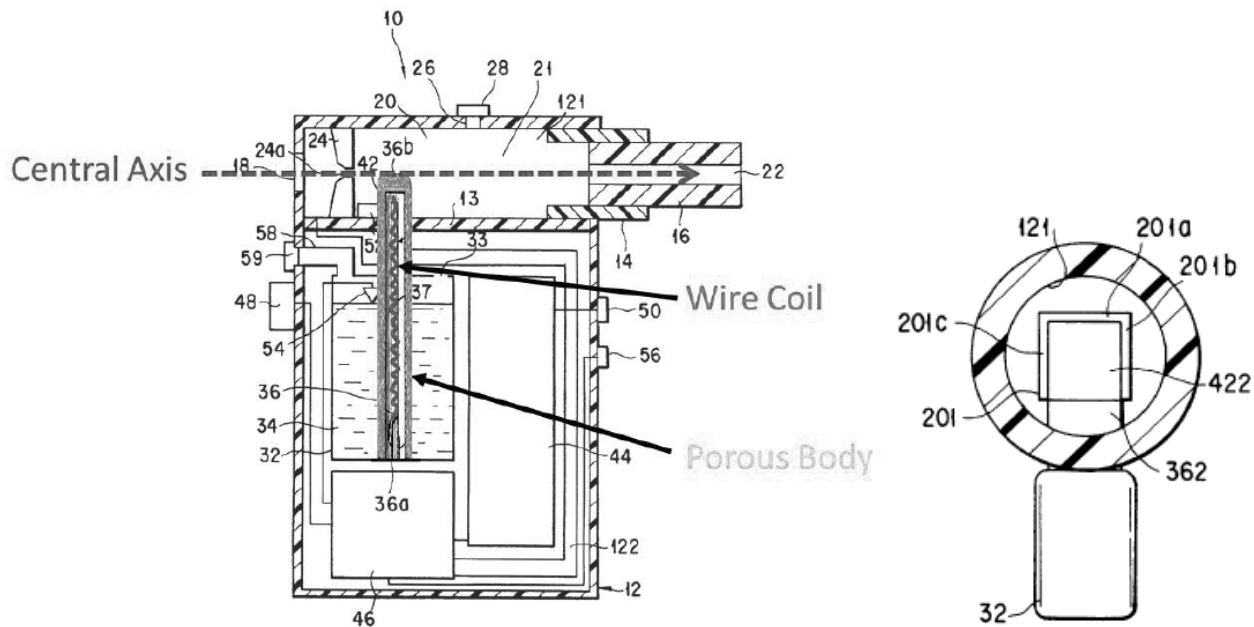
Claims 3, 4, and 9-10 depend from claim 1. All arguments set forth above for claim 1 apply to claims 3, 4, and 9-10. For the following additional reasons, Petitioner has failed to meet its burden of showing a reasonable likelihood that these claims are unpatentable.

a. Claim 3

Claim 3 depends from claim 1 and requires “the housing comprises a cylindrical tube having a central axis and the heating wire extending in a direction substantially perpendicular to the central axis.” The recited “housing” originates from claim 1, and must include an inlet, an outlet, a liquid storage body, an airflow path, and an atomizer. As shown in annotated Figure 1 below, the ’726 patent discloses a device shaped like a cylindrical tube that includes those components. The central axis appears as a blue line. Ex. 2001 ¶26.



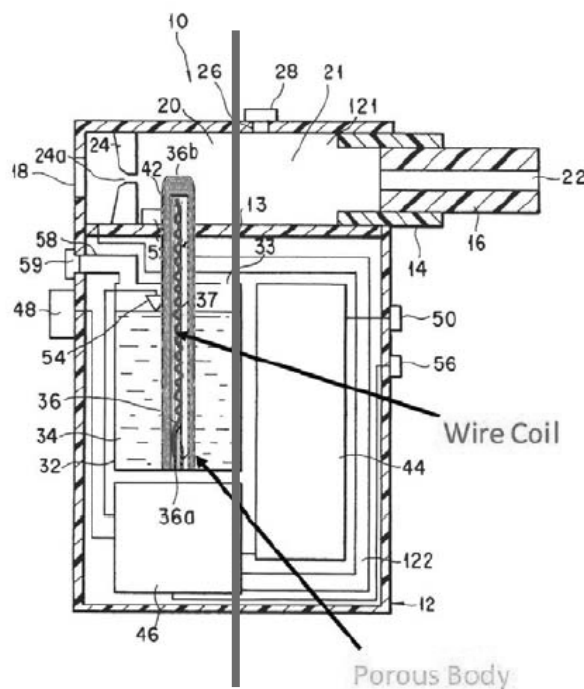
Pointing to Figure 1 of Takeuchi (below left), Petitioner asserts that “inhalation port holder 14 has a ‘cylindrical opening’ for the mouthpiece (mouthpiece 16) that would be understood to be a cylindrical tube.” Petition at 42. Pointing to Figure 13 (below right), Petitioner asserts that Takeuchi also discloses embodiments “of the ‘upper chamber 121’ that are cylindrical.” *Id.* at 43. For both embodiments, Petitioner asserts that “the cylindrical portion of the housing has a central axis.” *Id.* at 44.



Takeuchi, alone or in combination with Wilson, does not disclose the limitations of claim 3. Ex. 2001 ¶¶51-53. Claim 3 depends from claim 1, and therefore requires that the cylindrical housing contain a liquid storage body. As shown in Figure 1, upper chamber 121 does not contain the liquid storage body

(liquid container 32). Similarly, Figure 13, above at right, shows liquid container 32 completely outside the alleged cylindrical upper chamber 121.

Furthermore, as shown in the annotated figure above on the left, Petitioner argues that the “central axis” of the proposed combination of Takeuchi and Wilson runs across the top of the device. Petition at 43. Not so. As explained above, “central axis” means “axis through the center.” And the central axis of claim 3 runs through the housing that includes a liquid storage body. Takeuchi’s liquid storage body is liquid container 32, and the axis running through the center of its housing is shown as a blue line in the annotated figure below. *Id.* at 41. Wilson’s wire coil would be parallel, not perpendicular, to the central axis. Accordingly, the proposed combination does not teach all the elements of claim 3.



b. Claim 4

Claim 4 depends from claim 1. As noted above, Petitioner has failed to demonstrate a reasonable likelihood that claim 4 is unpatentable for the same reasons relating to claim 1. Moreover, claim 4 requires a “battery.” Wilson’s device uses a cord that connects to an external power source to provide electricity to resistance coil 10. Ex. 1008, 1:108-2:4. That makes sense given Wilson’s need for significant power to heat a large thermal mass (sleeve *d*, wick *q*, liquid in reservoir *b*). Ex. 2001 ¶44. As noted above, for these reasons a skilled person would not have used Wilson’s atomizer in a battery operated device like Takeuchi’s. *Id.* ¶44.

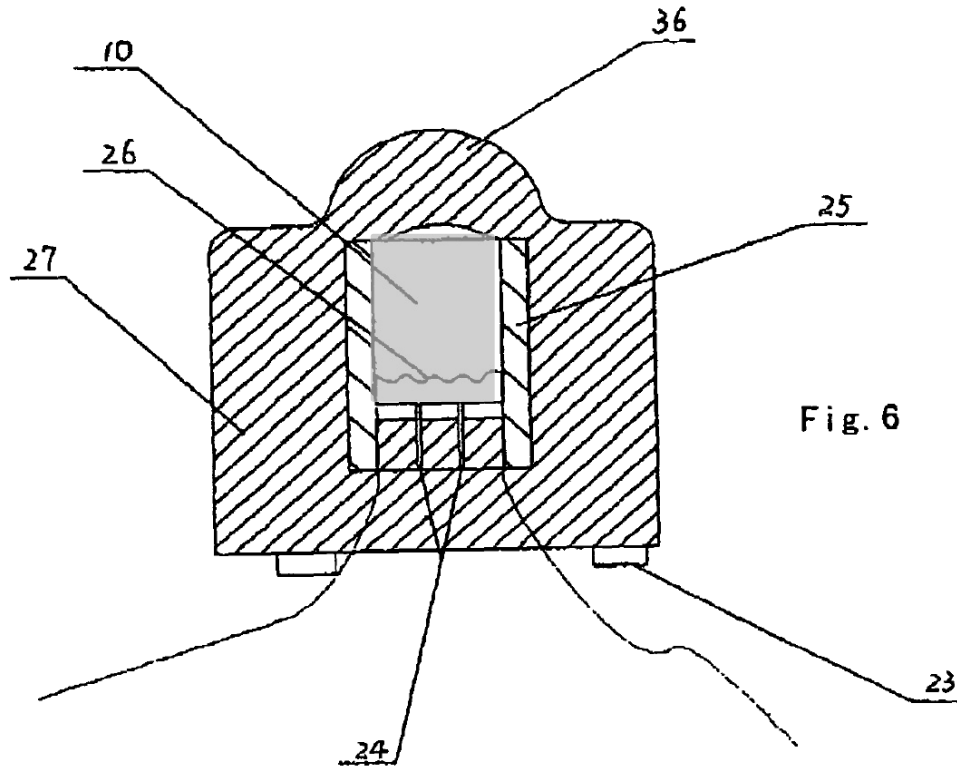
c. Claim 9

Claim 9 depends from claim 1. For the same reasons described above with regard to claim 1, Petitioner has not shown a reasonable likelihood that claim 9 is unpatentable.

d. Claim 10

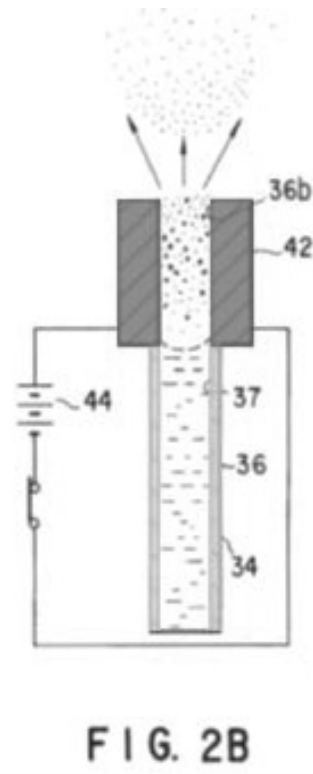
Claim 10 recites an electronic cigarette that includes an atomization cavity within the atomizer. As Petitioner’s expert recognizes, an atomizer includes “a hollow space where liquid from the liquid supply is transported and aerosolized.” Ex. 1003 ¶33. In other words, “a hollow space where atomization occurs.” Ex. 2001 ¶¶24-25, 54. That space in the “atomization cavity.” The ’726 patent depicts

atomization cavity 10 (green) as a hollow space in annotated Figure 6 below and describes it as where atomization happens. Ex. 1001, 3:49-58.



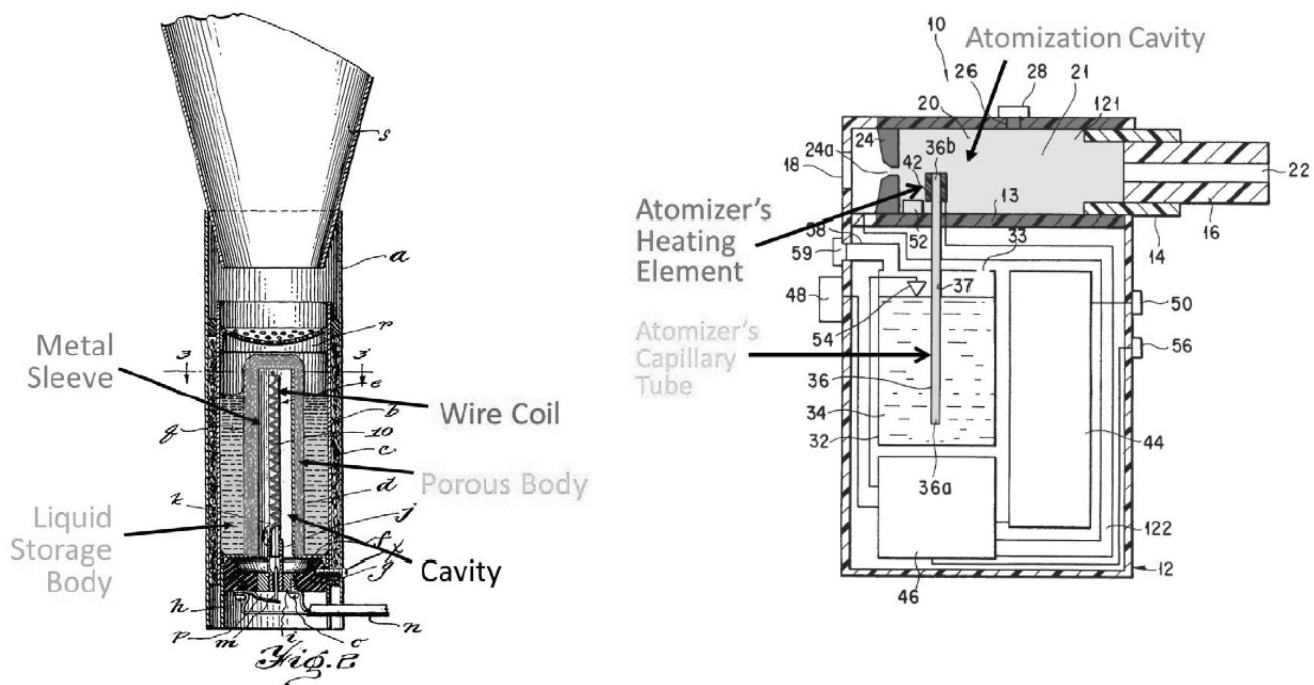
Petitioner relies on Takeuchi and Wilson as disclosing this limitation. For the reasons noted above, a skilled person would not have combined Takeuchi with Wilson. But even if the references were combined, they do not disclose the claimed atomization cavity.

Petitioner's proposed combination of Wilson and Takuchi as shown in the annotated figure below (left) removes the atomization cavity (the cavity inside outlet port 36b) from Takeuchi's device. Petition at 29. In the proposed combination, Wilson's wire coil, sleeve, and wick (labeled as "porous body")



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2:27-31, 2:76-85; Ex. 2001 ¶55. In fact, the cavity Petitioner identifies is sealed, “preventing any of the liquid from coming in direct contact with the resistance coils.” Ex. 1008, 1:84-91. Because the cavity and the coil within it are closed off from the liquid, there cannot be any atomization within the cavity. Ex. 2001 ¶55.



Takeuchi's upper chamber 121 is not an atomization cavity. Claim 1 recites “an atomizer in the housing” and claim 10 further requires an “atomization cavity within the atomizer.” Put another way, claim 10 requires a cavity within an atomizer within a housing. As shown in the annotated figure above, however, upper chamber 121 is formed by Takeuchi's housing, so it cannot be within an atomizer that is within that housing. Furthermore, atomization in Takeuchi does not occur in upper chamber 121. Ex. 1004, 7:60-63, Fig. 2B. In its proposed

combination, as noted above, Petitioner removes that atomization cavity from Takeuchi and replaces it with Wilson's atomizer. *E.g.*, Petition at 54. Petitioner's expert asserts that upper chamber 121 is "where the particles exit outlet port 36b," "includes components ... that convert liquid into aerosols," and "brings air for vaporization and removes vapor." Ex. 1003 ¶55. Regardless, liquid is not atomized in upper chamber 121 so it is not an atomization cavity. Ex. 2001 ¶56.

Petitioner's expert identifies a third purported cavity: pores inside Takeuchi's capillary tube 36. Ex. 1003 ¶56. But there too, atomization does not occur within those pores so they are not atomization cavities. Ex. 2001 ¶57. Further, in Petitioner's proposed combination of Takeuchi with Wilson, capillary tube 36 would have been replaced by Wilson's atomizer and thus not part of the combined device. *E.g.*, Petition at 54.

D. Ground 2: Claim 2 is Not Obvious over Takeuchi, Wilson, and Adiga

Petitioner requests that claim 2 be cancelled over Takeuchi, Wilson, and Adiga. Petition at 13. For the reasons outlined below, Petitioner has not met its burden of proving a reasonable likelihood of prevailing on this Ground.

1. Adiga

As shown in annotated Figures 1 and 2 below, Adiga discloses fuel tank 20 (blue) that includes porous cartridge 24 (red). Ex. 1010, 2:44-48, 3:1-3. The fuel tank holds "liquid fuel, such as ethanol." *Id.*, 2:44-48. Adiga teaches using a

lighter to heat glow element 16 (purple), which serves as a catalyst for the combustion of fuel vapor. *Id.*, 3:30-34. When a user puffs on the device, oxygen and fuel vapor mix and combust when they contact the catalyst, glow element 16. *Id.* 2:48-53; 3:34-36. The resulting hot gases and air then vaporize a solid flavor medium such as a cigarette 13. *Id.*, Abstract, 3:15-19. Adiga's objects of invention are directed to a fuel element for a smoking article. *Id.*, 1:65-2:8. Adiga is not an electronic device. In fact, Adiga criticizes electronic devices because an "electrical heating element requires a battery which requires extra efforts by the consumer and also is generally quite cumbersome." *Id.*, 1:38-43.

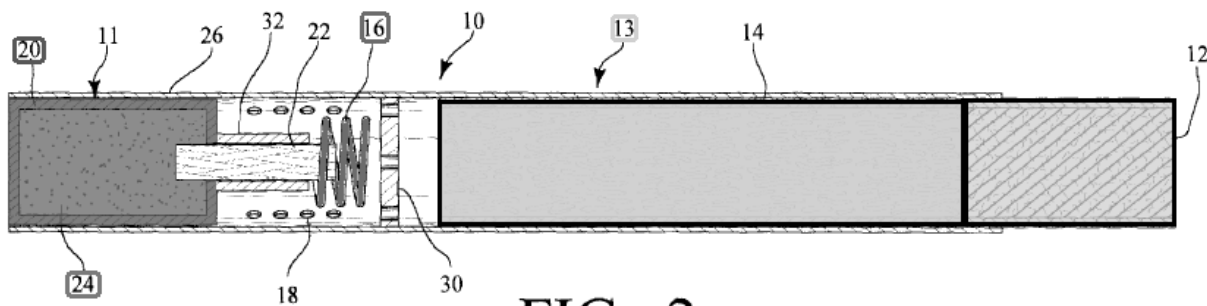
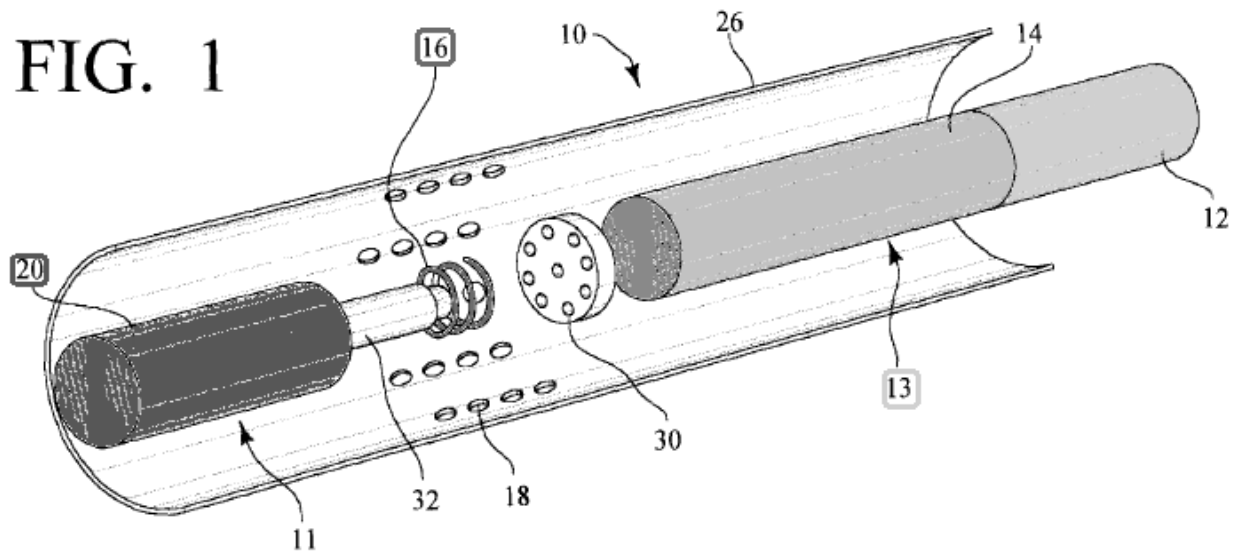


FIG. 2

FIG. 1



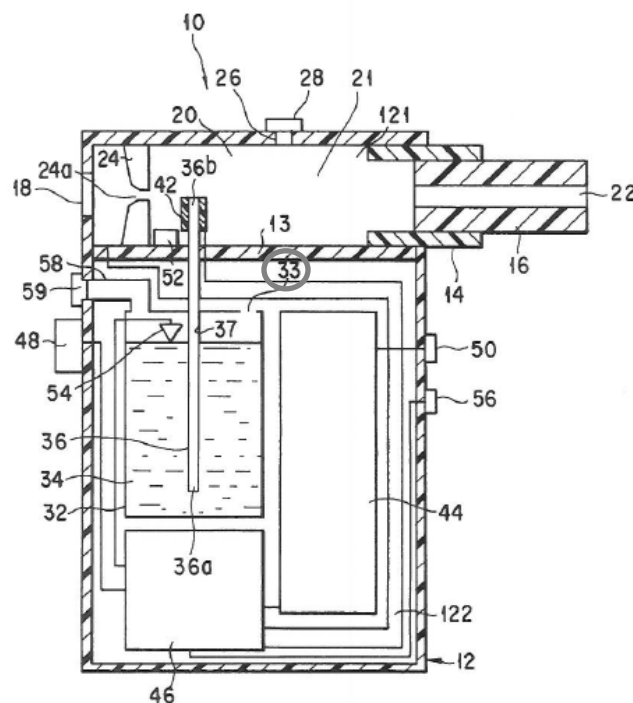
2. Claim 2

Petitioner concedes that even if Takeuchi and Wilson were combined, they would not disclose “a liquid storage body including fiber material,” as recited in claim 2. Petitioner relies on Adiga as disclosing that limitation. Petition at 56. But a skilled person would not have combined Adiga with Takeuchi and Wilson.

Petitioner does not identify any reason with rational underpinning for combining Adiga with Takeuchi and Wilson. *KSR*, 550 U.S. at 418. Petitioner argues it would have been obvious to use Adiga’s porous cartridge 24 in Takeuchi’s container 32 to inhibit leaking and maintain pressure within the container. Petition at 57-59. But those reasons have no rational basis. Petitioner’s argument invents nonexistent problems and turns a blind eye to the disclosures of Takeuchi.

Simply put, Takuchi already solved any issues with leakage and pressure.

Takeuchi's liquid container 32 was designed "so that the liquid flavor source 34 may not leak to the outside" through opening 33 "even if the device is inadvertently turned upside down." Ex. 1004, 5:62-6:3. Opening 33 also "maintain[ed] the inner pressure of the liquid container 32 at an atmospheric pressure." Ex. 1004, 5:58-62. Opening 33 (red circle) is illustrated in Figure 1 below. Given these disclosures, Petitioner's manufactured reasons for combining Takeuchi and Adiga disappear. Ex. 2001 ¶63.



Petitioner's expert asserts, with no explanation, that leaking would still be "likely" and that including fiber would "augment" pressure equalization. Ex. 1003 ¶¶73-74 & n.5. Those conclusory opinions contradicting Takeuchi's teachings are

not credible. Petitioner's expert also argues that Takeuchi and Adiga "include many common elements." *Id.* ¶75. General similarities are not a reason to combine the two references. Petitioner's expert further argues that storing liquid in a porous or fibrous body was "well-known" and "would have had a predictable result." *Id.* ¶74. These opinions fail to provide a specific reason for combining Takeuchi and Adiga. *KSR*, 550 U.S. at 418; *ActiveVideo Networks v. Verizon Commc'ns, Inc.*, 694 F.3d 1312, 1327 (Fed. Cir. 2012). Hindsight drives Petitioner's expert's analysis, not a proper evaluation of the prior art.

A comparison with Petitioner's other proposed combination relating to claim 2 shows that Petitioner and its expert's arguments are hindsight. For Ground 2 (based on Takeuchi, Wilson, and Adiga) and Ground 5 (based on Whittemore, Wilson, and Adiga), Petitioner and its expert rely on exactly the same alleged motivations for inserting Adiga's porous cartridge into two different proposed combinations. Petition 57-59 (citing Ex. 1003 ¶¶73-75) (Ground 2); Petition 98-100 (citing Ex. 1003 ¶¶85-88) (Ground 5). This cut-and-paste approach improperly ignores the differences between Takeuchi and Whittemore, the two lead references. Instead of performing a critical analysis, Petitioner appears to have first selected Adiga for its disclosure and then conjured up recyclable reasons for its two distinct combinations. To do so is error. *Cheese Sys.*, 725 F.3d at 1352-53.

Takeuchi and Adiga also disclose fundamentally different devices that a skilled person would not have combined. Adiga teaches using a lighter to heat a glow element that acts as a catalyst to burn fuel and heat air that vaporizes a flavor medium. Ex. 1010, Abstract, 2:44-67. Adiga's glow element 16 does not generate heat, but rather stays hot because of combusting fuel vapors. Ex. 2001 ¶60. Adiga and Takeuchi also differ in the liquids they store and atomize, which would dissuade a skilled person from combining them. *Id.* ¶61. Adiga's fuel burns to produce hot air that causes a solid flavor medium to vaporize. Ex. 1010, Abstract. Takeuchi, however, atomizes a liquid flavor source that is inhaled by a user. Ex. 1004, 7:57-63. A skilled person would not have used Adiga's fuel storage cartridge design in Takeuchi because there is no indication that Takeuchi's liquid flavor source would have been capable of storage in Adiga's cartridge, much less that the cartridge was proper for holding a liquid to be atomized for inhalation. Ex. 2001 ¶61. What is more, Takeuchi never indicates that its liquid container 32 is insufficient in any way.

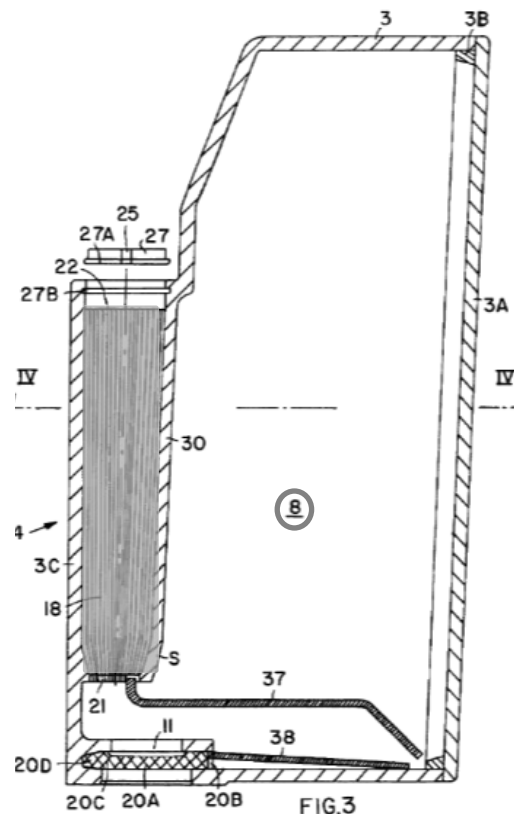
Adiga also disparages electronic devices, teaching away from combinations with any electronic device like Takeuchi. Ex. 1010, 1:38-43; Ex. 2001 ¶62. In particular, Adiga criticizes devices with batteries (such as Takeuchi) because they "require[] extra efforts by the consumer and also [are] generally quite cumbersome." *Id.*, 1:38-43. Adiga's critique would have dissuaded a skilled

person from combining its teachings with an electronic device like Takeuchi. Ex.

2001 ¶62.

As support for its argument, Petitioner points to Gehrer (Ex. 1014), asserting it was “well-known” to use fiber to prevent leaking and pressure problems.

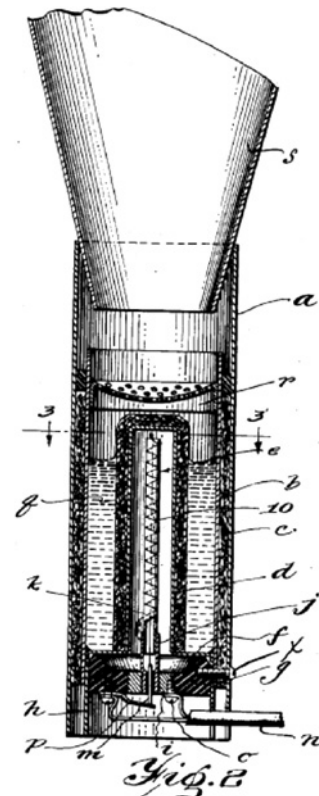
Petition at 22, 58. But Petitioner provides no reason for why a skilled person would have combined Gehrler, an ink container, with Takeuchi, an inhaler. Even so, Gehrler does not disclose a porous liquid storage body. Ex. 2001 ¶64. As shown in the figure below, ink in reservoir 8 (red circle) is free flowing not stored in fiber, and capillary body 18 (purple) is separate from where liquid is stored. Ex. 1014, 2:24-29, 7:62-65.



Petitioner's expert similarly asserts that "[i]t was well-known in the field of e-cigarettes to store or transport liquid in porous/fibrous bodies...." Ex. 1003

¶¶31-32. In making that assertion, however, Petitioner's expert relies mostly on ink-related patents (Ex. 1013, Ex. 1014) and Adiga (Ex. 1010), a non-electric device. None of those devices relates to atomizing liquid for human inhalation. Ex. 2001 ¶65. Petitioner's expert identifies two electrical devices (Ex. 1017, Ex. 1021), but just one of those relates to simulating smoking (Ex. 1017). The facts do not support Petitioner's expert's broad statement.

Petitioner mentions in passing that Wilson's wick is a fiber material in the liquid storage body. Petition at 60. Not so. Petitioner contradicts itself. For claim 1, it asserts that Wilson's wick is the porous body, a part of the atomizer. Petition at 37. Having done so, Petitioner cannot reasonably argue that the wick is also fiber in a liquid storage container as recited in claim 2. Wilson also belies Petitioner's argument. As shown in Wilson's figure 2 right, the liquid is in reservoir *b*, outside wick *q*, and the reservoir does not contain any fiber material.



E. Ground 3: Claims 15-17 are Not Obvious over Takeuchi and Adiga

Petitioner requests that claims 15-17 be cancelled

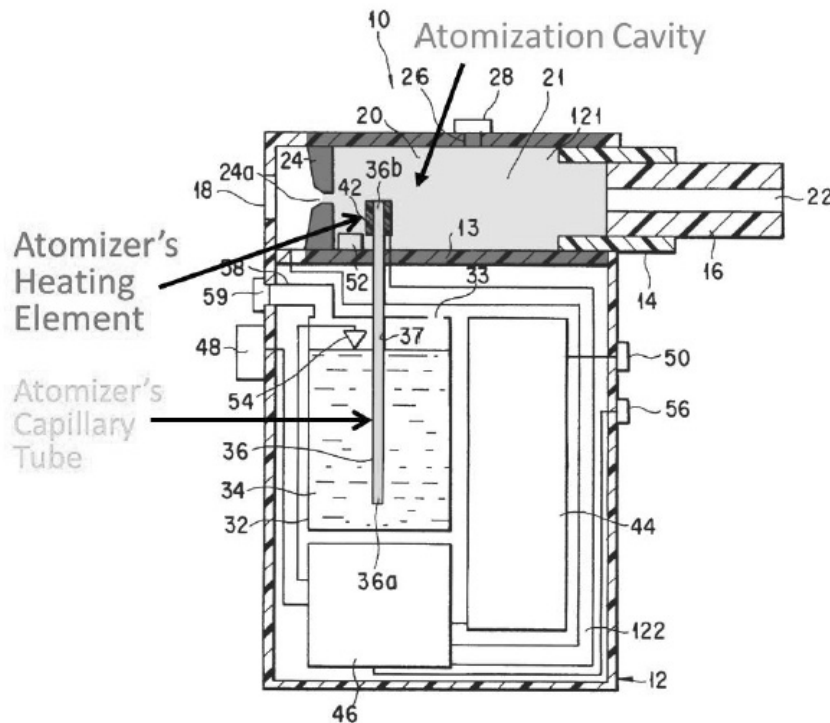
over Takeuchi and Adiga. Petition at 13. The Board already denied institution of these claims based on a combination of Takeuchi, Counts, and Kaufmann. Adiga adds nothing new; its disclosures of a coil and fiber material are duplicative of Counts and Kaufmann's teachings. Petitioner's arguments are redundant of what the Board already rejected. The result here should be the same.

1. Claim 15

Claim 15 is similar to claim 1, but a liquid storage body that includes a fiber material. Petitioner errs in arguing that a skilled person would have combined Takeuchi and Adiga. Claims 16 and 17 depend from claim 15 so all arguments relating to claim 15 apply to those claims.

a. Takeuchi does not disclose an atomizer in physical contact with a liquid storage body

Claim 15 recites a liquid storage body "in physical contact with the atomizer." Petitioner argues that the atomizer in Takeuchi includes capillary tube 36 as shown in green in the annotated figure below. Petition at 18-19, 52, 66. According to Petitioner, capillary tube (36) is "in direct contact with liquid supply (34)." Petition at 67.



Capillary tube 36 plays no role in atomizing; its sole purpose is to move liquid from the liquid container to the heater. Ex. 1004, 2:1-16; Ex. 2001 ¶¶67-68. Petitioner's expert agrees, noting that the tube delivers liquid to the heater. Ex. 1003 ¶¶54-55. That said, he never explains how tube 36 "facilitates" atomization, as required under Petitioner's construction. Petition at 17. Instead, Petitioner and its expert simply assert with no explanation that the entire tube is part of Takeuchi's atomizer. Petition at 18-19; Ex. 1003 ¶¶52, 54. Because capillary tube 36 is not part of the atomizer, Takeuchi does not disclose an atomizer in contact with a liquid storage body. Ex. 2001 ¶¶66-69.

Further, during prosecution of the '331 patent, Patent Owner distinguished Voges II, a reference with the same atomizer-tube-liquid storage body

configuration as disclosed in Takeuchi on the ground that it did not teach an atomizer in physical contact with a liquid supply. Ex. 2008 at 6-8; Ex. 2001 ¶¶69. The Patent Office agreed and issued the '331 patent over Voges II. The result should be the same here.

b. A skilled person would not have combined Takeuchi and Adiga

Petitioner repeats its argument that “it would have been obvious ... to include fiber in Takeuchi’s liquid storage body.” Petition at 67. As explained above in connection with Ground 2, that argument fails.

2. Claim 16

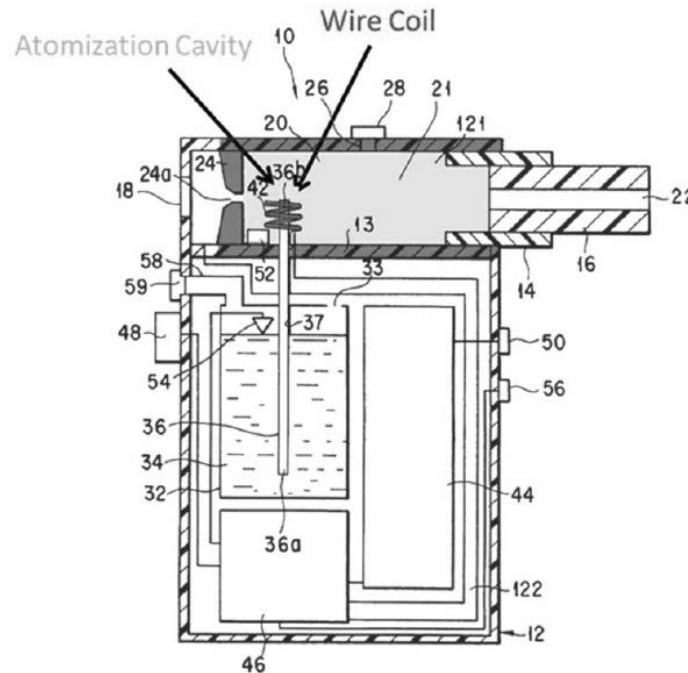
Claim 16 depends from claim 15. As noted above, Petitioner has failed to demonstrate a reasonable likelihood that claim 16 is unpatentable for the same reasons relating to claim 15.

3. Claim 17

Claim 17 depends from claim 15 and recites a heater comprised of “a wire coil in a cavity in the atomizer.” Petitioner admits Takeuchi does not disclose this limitation and argues that a skilled person would have included Adiga’s wire coil in Takeuchi. Petition at 61-62. Petitioner’s argument fails.

To begin with, even if Adiga’s coil were inserted into Takeuchi, the combination does not disclose a wire coil in a cavity in the atomizer. Petitioner

argues that upper chamber 121 in Takeuchi is “a cavity in the atomizer,” as shown in the annotated version of Figure 1 below. Petition at 75.



While upper chamber 121 forms a hollow space, it is not part of the “atomizer” under either proposed construction for that term. Ex. 2001 ¶¶67-68, 71. Under Patent Owner’s construction, upper chamber 121 does not convert liquid into vapor or aerosol, but simply receives liquid droplets that have already been atomized. Ex. 1004, 7:60-63, Fig. 2B. Under Petitioner’s proposed construction, upper chamber 121 does not “facilitate” atomization, because atomization has already occurred before the chamber receives the atomized particles.

Similar to claim 1, claim 15 recites “an atomizer having a heating element, within the housing” and claim 17 further requires “the heating element comprising a wire coil in a cavity in the atomizer.” Put another way, claim 17 requires a cavity

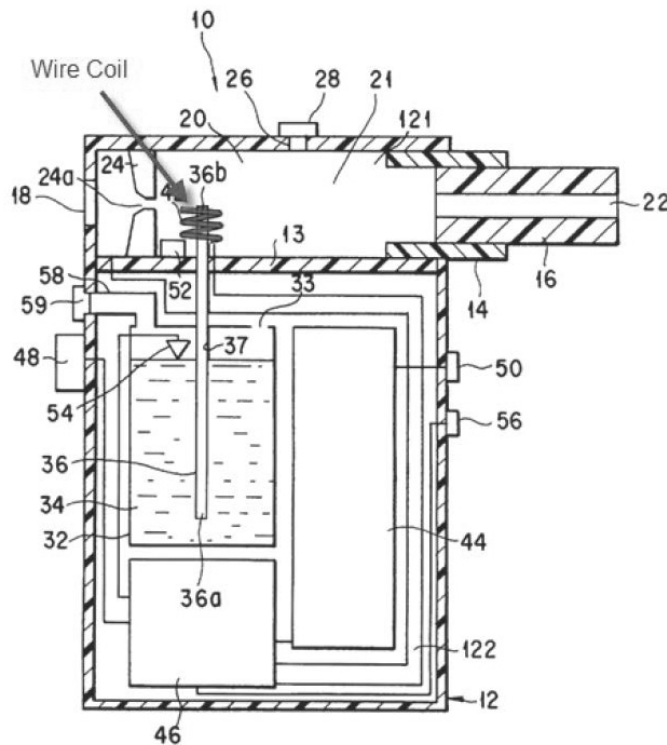
within an atomizer within a housing. As shown in the annotated figure above, however, upper chamber 121 is formed by Takeuchi's housing, so it cannot be within an atomizer that is within that housing.

Petitioner's proposed combination also contradicts Ground 1 and reveals that Petitioner is motivated primarily by hindsight. As described above, Petitioner uses the same reasoning as the basis for combining Takeuchi and Wilson in Ground 1 and Takeuchi and Adiga in Ground 3. Petition at 24-29, 61-64. Petitioner does not explain why its combinations diverge even though its reasoning is the same. The difference is the claim language. In each instance, Petitioner has selected a secondary reference to fit the claim language, and then used the same conclusory rationale to justify each combination. That is hindsight, not the articulated reasoning with rational underpinning the law requires. *KSR*, 550 U.S. at 418.

Takeuchi discloses three different heater shapes: a ring, a rod, and a plate. Ex. 1004, 8:16-26, Figs. 3-5. Takeuchi never gives any indication that those heaters are deficient. Indeed, the disclosed heaters would have been easy to manufacture and durable. Ex. 2001 ¶74.

Petitioner's proposed combination is inferior to Takeuchi's design. Petitioner proposes "adapt[ing] Takeuchi to include the wire coil feature of Adiga" Petition at 62. Petitioner's expert similarly argues a skilled person would have "incorporate[ed] the heating element ... of Adiga into the device of

Takeuchi.” Ex. 1003 ¶¶69. As shown in annotated figure 1 below, Petitioner’s combination removes Takeuchi’s heating element and replaces it with Adiga’s wire coil outside of Takeuchi’s outlet port 36b. Petition at 64.



The proposed combination would have created several issues. Although Petitioner and its expert focus on the shape of Adiga’s coil, they ignore the structure’s other attributes. Adiga’s coil does not generate heat—it catalyzes the combustion of fuel vapors. Ex. 1010, 2:65-67; 3:33-36. By design, the coil acts as a catalyst, not to transfer heat. Ex. 1010, 2:56-59, 2:62-65; Ex. 2001 ¶¶60, 92. By contrast, Takeuchi uses electrical power to activate its heater. Ex. 1004, 4:13-15. That heater is small, so that it heats quickly to provide vapor to a user on demand

and cools quickly to avoid wasting liquid. *Id.*, 1:59-64, 2:25-28, 7:60-8:4. Using Adiga’s coil in Takeuchi would have undermined the objectives of Takeuchi’s small, responsive heater. Ex. 2001 ¶¶75-79.

Moreover, the heaters in Takeuchi are in direct contact with the liquid. That proximity leads to efficient heat transfer by conduction. Ex. 2001 ¶¶75-76.

Petitioner’s proposed combination would create a gap between Adiga’s coil and outlet port 36b, leading to less efficient heat transfer. *Id.* ¶77. The coil would slowly heat air and the outside of the port via radiation, creating a lag before liquid is vaporized. *Id.* ¶77. These consequences of Petitioner’s proposed combination contradict one of Takuchi’s objectives: vaporization on demand when a user puffs on the device. Ex. 1004, 1:59-64, 2:28-29. Using Adiga’s coil would have changed Takeuchi’s mode of operation and frustrated its intended purpose.

Broadcom Corp. v. Emulex Corp., 732 F.3d 1325, 1335 (Fed. Cir. 2013); *In re Ratti*, 270 F. 2d 810, 813 (C.C.P.A. 1959); MPEP 2143.01(VI).

Petitioner does not address these issues, but argues instead that a skilled person would have incorporated Adiga’s coil into Takeuchi because heater shape is a “design choice,” would have been a “simple substitution of shapes that would have had a predictable result,” and would have “ensure[d] good heat transfer” and prevented “oxidation.” Petition at 62-63. Those rationales reflect hindsight. Design choice and substitution provide no articulated reasoning with supporting

rationale for altering Takeuchi's design. *KSR*, 550 U.S. at 418; Ex. 2011 at 11 ("General principles on what may constitute a supporting rationale cannot substitute for specific application of those principles to the facts."). Further, even if heater shape was a mere design choice, Takeuchi specifically chose to omit a coil-shaped heater. Takeuchi knew about coil-shaped heaters, citing Gori (U.S. Patent No. 4,945,931) (Ex. 2005), which disclosed a wire coil heater in a simulated smoking device. Ex. 1004, 1:39-56; Ex. 2005, 4:19-24. Takeuchi discloses several objectives for its design having a heater at the end of a liquid passageway, including requiring low energy, preventing waste, and generating vapor without a lag. Ex. 1004, 1:59-64, 2:27-29. Based on those objectives, Takeuchi selected compact and durable heaters shaped like a ring, a rod, or a plate, leaving out a wire even though that shape was known. *Id.*, 8:19-26, Fig. 1, Figs. 3-5.

Further, as described above, Petitioner's heat transfer argument is conclusory and incorrect. Indeed, the Board already rejected similar arguments. Ex. 2012 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. 2013 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."). Petitioner cites Howell (Ex. 1009) as support for its assertion that it was "well known that a

wire coil ensures good heat transfer,” but never provides any specific reason for combining Takeuchi and Adiga with Howell. Petition at 62. Thus, Howell is irrelevant. Petitioner also fails to explain how oxidation is relevant to heater shape; it just automatically reuses a rationale it has already relied on.

F. Ground 4: Claims 1, 9, 10, and 14 are Not Obvious over Whittemore and Adiga

Petitioner requests that claims 1, 9, 10, and 14 be cancelled over Whittemore and Adiga. Petition at 13-14. For the reasons outlined below, Petitioner has not met its burden of proving a reasonable likelihood of prevailing on this Ground.

1. Whittemore

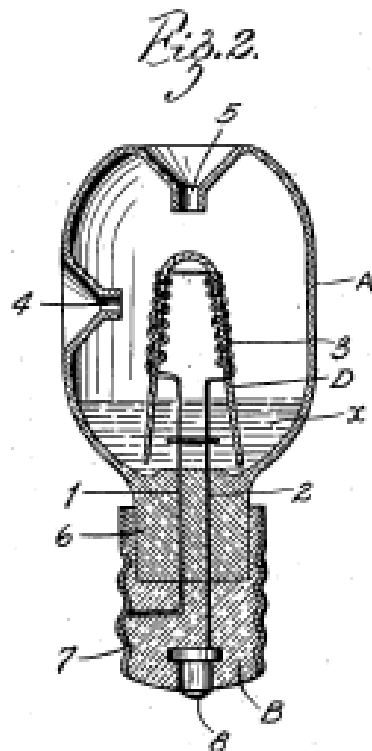
Whittemore discloses a “vaporizing unit.”

Ex. 1005. The patent issued in 1936. As depicted in Figure 2 right, 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.*, 1:19-28.

Whittemore discloses a specific objective for the device. It was intended to “function properly, even though the heating element is spaced a considerable distance above or away from the medicament” *Id.*, 1:5-10. Whittemore repeats the same point: “it is



not necessary that the level of the medicament be maintained in close proximity to the heating element....” *Id.*, 2:19-25.

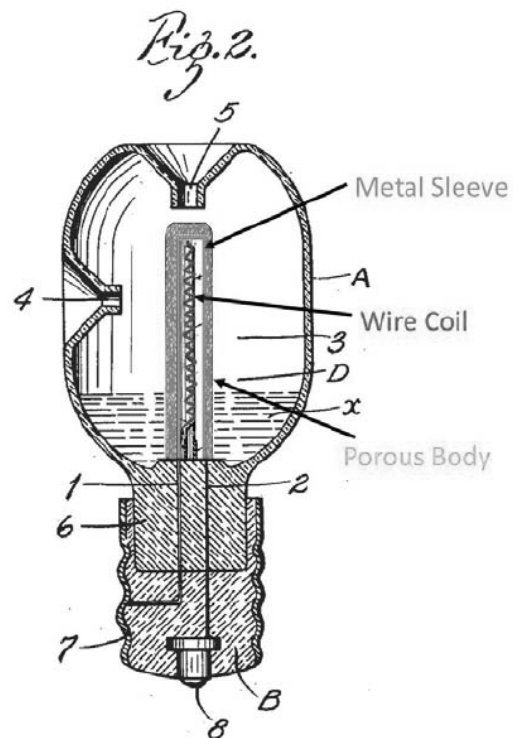
2. Independent Claims 1 and 14

Independent claims 1 and 14 are described above in conjunction with Ground 1. Petitioner concedes that Whittemore (like Takeuchi) does not disclose the claimed “heating wire coil surrounded by a porous body in a cavity within the atomizer.” Petition at 76. Petitioner relies on Wilson, but a skilled person would not have combined Whittemore and Wilson.

Petitioner alleges that a skilled person would have adapted Whittemore to include Wilson’s atomizer. *Id.* at 78. A skilled person would not have made that change. Petitioner proposes inserting Wilson’s atomizer into Whittemore as disclosed in the annotated figure right.

Id. at 81.

This proposed combination is the product of hindsight. As Petitioner’s expert notes, on-demand vapor production is important for an electronic cigarette. Ex. 1003 ¶33. But using Wilson’s atomizer in Whittemore would have resulted in a lag before generating



vapor because resistance coil 10 has to heat the air, sleeve *d*, and wick *q* before any atomization occurs. Ex. 2001 ¶86. By contrast, Whittemore's coil 3 is in direct contact with wick D, which contains the liquid, leading to immediate vapor production when the device is powered on. *Id.* ¶88.

In addition, the proposed combination would have frustrated the objective of Whittemore's device. The object of that device was to keep the heating element separate from the liquid to be atomized. Ex. 1005, 1:5-10, 2:19-25. Petitioner's proposed combination, as illustrated above, contradicts that objective by providing "means whereby the entire heating surface of the heating element may be utilized for vaporizing the medicated liquid." Ex. 1008, 1:46-49. Because the proposed combination of Wilson and Whittemore contradicts Whittemore's teachings, a skilled person would not have pursued that combination. Ex. 2001 ¶¶85-86.

Petitioner's proposed combination also puts a user at risk. *Id.* ¶87. Wilson noted that its atomizer produced hot vapor and taught using a cone to separate a user from where the vapor exits the device and thus avoid "pain due to the vapor being too hot." Ex. 1008, 1:26-36. Petitioner's proposed combination omits any safety measures and hot vapor emerging from Whittemore's vessel would have potentially made direct contact with a user's body. Wilson's design is safer without the proposed combination with Whittemore. Ex. 2001 ¶87.

Furthermore, Whittemore's device delivers medication. Ex. 1005, 1:50-2:8.

In Wilson's atomizer, the large surface area of sleeve d in contact with wick q would have increased the amount of vaporized liquid, potentially oversupplying and wasting the medication and causing it to deplete quickly. Ex. 2001 ¶89. And where Whittemore would have provided consistent production of vapor regardless of liquid level, Wilson's atomizer would have created more and more vapor as liquid volume decreased and more of wick q became exposed to air allowing vaporization to occur over a larger surface area of the wick. *Id.* ¶89. A skilled person also would not have used Wilson's more complex design because of decreased manufacturability and increased expense. Ex. 2001 ¶90. Tellingly, even though Whittemore and Wilson were each issued over 80 years ago, Petitioner cites no evidence to suggest that anyone ever attempted to combine the two.

Petitioner and its expert argue that a skilled person would have combined Whittemore and Wilson because they address the same technical problem (heating a liquid to create an aerosol), because atomizer configuration is a design choice, and because substituting atomizers would have had predictable results. Petition at 76, 80-81 (citing Ex. 1003 ¶¶80-84). These rationales do not provide any reason for why a skilled person would have altered Whittemore's design. Petitioner and its expert overlook the issues raised above. Petitioner's arguments boil down to the idea that it would have been obvious to use any type of known atomizer in

Whittemore. Such conclusory and unsupported assertions do not prove obviousness. *KSR*, 550 U.S. at 418.

Petitioner also argues that a larger heating surface and the ability to replace the heating element after oxidation would have been reasons to combine Whittemore and Wilson. Petition at 79-80. As noted above, however, Wilson's larger atomizer would have had a negative effect. Further, Petitioner does not explain how Whittemore's heating surface would have been insufficient for its intended purpose. Such reasoning smacks of hindsight. On oxidation, the easy solution to any potential problem would have been to make Whittemore's wire coil from an oxidation-resistant material, as Petitioner's expert suggests, not reliance on Wilson's complex design. Ex. 1003 ¶ 71; Ex. 2001 ¶91.

Furthermore, in Petitioner's combination, resistance coil 10 is completely surrounded by glass vessel A. To remove the coil, Petitioner's expert suggests "having the bottom of the bulb of Whittemore be detachable with the atomizer unit." Ex. 1003 ¶84. Petitioner's expert offers no details to support that fanciful assertion. He certainly does not identify any actual light bulb that has a detachable bottom. That is hardly surprising. Creating a detachable light bulb base would have required separating the glass of the bulb and making it re-attachable in a way that would not have allowed liquid to leak from the bulb. Petitioner's expert does not even attempt to explain how this could have been done, and it is hard to

imagine how it might have been successfully accomplished. Ex. 2001 ¶¶90.

Rendering the coil removable would have required the wholesale redesign of Whittemore's device and increased expense, especially to create a detachable bulb that would not leak. *Id.* ¶¶90. A skilled person would not have pursued such a far-fetched, time-consuming, and expensive approach. Petitioner's expert's off-the-wall suggestion is another instance of hindsight.

As with Petitioner's suggested combinations relating to Takeuchi, Petitioner fails to consider the full effects of the proposed combination of Whittemore and Wilson, including on the object of the invention. *See Trivascular*, 812 F.3d at 1068. Looking at the results as a whole, a skilled person would not have combined the references. Ex. 2001 ¶¶83-91.

Petitioner cites Howell (Ex. 1009) as the basis for its alleged oxidation motivation to combine and as teaching that a wire coil allows for "good heat transfer." Petition at 62-63, 80. But Petitioner does not explain why a skilled person would have looked to Howell or combined it with Whittemore and Wilson. Nor does Petitioner identify any statements in Whittemore or Wilson regarding the adequacy or inadequacy of heat transfer in those devices, which proved fatal to similar obviousness arguments. Ex. 2012 at 19, 22; Ex. 2013 at 11-12. Further, as noted above, Howell already offered a simple solution to any oxidation problem

(use of certain heater materials). Ex. 1009, 3:60-4:4, 4:9-11. Instead, Petitioner relies on hindsight in an attempt to justify combining Wilson with Whittemore.

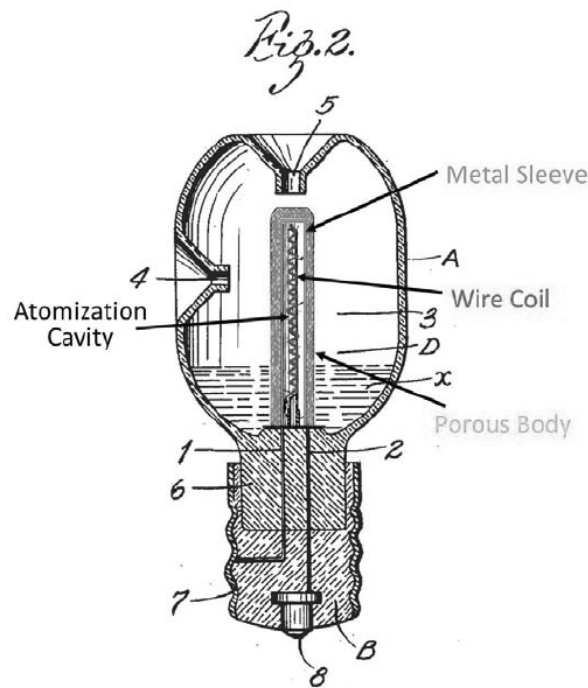
3. Claim 9

Claim 9 depends from claim 1. For the same reasons described above with regard to claim 1, Petitioner has not shown a reasonable likelihood that claim 9 is unpatentable.

4. Claim 10

Claim 10 depends from claim 1, and includes an atomization cavity within the atomizer. An atomization cavity is the space in the atomizer where atomization occurs. As Petitioner's expert put it, "a hollow space where liquid from the liquid supply is transported and aerosolized." Ex. 1003 ¶33.

Petitioner asserts that the combination of Whittemore and Wilson discloses this limitation. Petition at 92. For the reasons noted above, however, a skilled person would not have combined Whittemore with Wilson. Furthermore, even if Whittemore and Wilson were combined, Petitioner does not identify an atomization cavity. Petitioner relies on the space between resistance coil 10 and sleeve *d* in Wilson's atomizer, as shown in the annotated figure below. *Id.* at 94. But as noted above, atomization does not occur in that gap. Liquid is vaporized **outside** sleeve *d* and floats up from wick *q*. Ex. 1008, 2:27-31, 2:76-85; Ex. 2001 ¶¶55, 82.



G. Ground 5: Claim 2 is Not Obvious over Whittemore, Wilson, and Adiga

Petitioner requests that claim 2 be cancelled over Whittemore, Wilson, and Adiga. Petition at 14. For the reasons outlined below, Petitioner has not met its burden of showing a reasonable likelihood that it would succeed on this Ground.

As with Takeuchi and Wilson, Petitioner concedes that even if Whittemore and Wilson were combined, they would not disclose “a liquid storage body including fiber material,” as recited in claim 2. *Id.* at 98. As in Ground 2 addressed above, Petitioner relies on Adiga as disclosing that limitation. *Id.* at 98. Petitioner argues it would have been obvious to insert Adiga’s porous cartridge 24 into Whittemore’s vessel A because doing so would have prevented leaking. *Id.* at 98-99.

A skilled person would not have combined Adiga with Whittemore and Wilson. To begin with, Whittemore and Adiga disclose fundamentally different devices. Adiga's device teaches using a lighter to heat a glow element that serves as a catalyst for the combustion of fuel vapor. Ex. 1010, 3:30-34. When a user puffs on the device, oxygen and fuel vapor mix and combust when they contact the catalyst. *Id.* 2:48-53, 3:34-36. Air heated by combustion then vaporizes a solid flavor medium. Ex. 1010, Abstract, 3:15-19. Adiga's glow element does not generate heat—it catalyzes combustion. Ex. 2001 ¶92.

Adiga and Whittemore also differ in the liquids they store, which would dissuade a skilled person from combining them. *Id.* ¶93. Adiga's fuel burns to produce hot air that causes a solid flavor medium to vaporize. Ex. 1010, Abstract. But Whittemore's liquid is a medicament vaporized for delivery to a user. Ex. 1005, 1:19-28. A skilled person would not have used Adiga's fuel storage cartridge design in Whittemore because there is no indication that Whittemore's medicament would have been capable of storage in Adiga's cartridge, much less that the cartridge was proper for holding a liquid to be atomized for inhalation. Ex. 2001 ¶93. And Whittemore never suggests that its vessel A is inadequate as a liquid container.

Further, Adiga criticizes electric devices with batteries (such as Whittemore) and therefore teaches away from any combination with one. Ex. 1010, 1:38-43;

Ex. 2001 ¶94. In particular, Adiga criticizes devices with batteries (such as Whittemore) because they “require[] extra efforts by the consumer and also [are] generally quite cumbersome.” Ex. 1010, 1:38-43. Adiga’s critique would have dissuaded a skilled person from combining its teachings with an electronic device like Whittemore. Ex. 2001 ¶94.

Notably, Petitioner recycles the same alleged motivations to combine for this proposed combination that it used in Ground 2, even though the combination here is unique. As explained above, this superficial approach reflects Petitioner and its expert’s hindsight in dealing with claim 2.

Petitioner suggests that leakage would have been a reason to combine Whittemore and Wilson. Petition at 98-99. But Whittemore suggests otherwise. Leaking would not be an issue if the device were used as intended. As shown in Figure 2 below, wick D has ends that extend to the bottom of vessel A where medicament *x* is stored. This design allows capillary action created by the wick to feed liquid to the heating element until the liquid is gone. Ex. 2001 ¶¶95-96. Further, Whittemore discloses that the device was intended to keep the heating wire separate from the liquid. Ex. 1005, 1:5-10, 2:19-25. These objectives are only met if the device is operated in a near-vertical position (without severe tilting to one side or the other), and Whittemore’s device was not intended to be used in any other orientation. Ex. 2001 ¶¶95-96. While liquid could leak through inlet 4

Fig. 2.

A cross-sectional view of a mechanical device, likely a lamp or burner. The device consists of a main body (1) with a central vertical tube (3). Inside the tube is a coiled heating element (4). The tube is surrounded by a liquid reservoir (5) and a glass enclosure (6). A burner assembly (7) is at the bottom, with a fuel inlet (8) and a nozzle (9). The device is shown in a cross-sectional view, revealing internal components and the liquid level.

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intended. Ex. 2001 ¶96. Petitioner's expert's opinions are conclusory and based on hindsight.

Petitioner's expert mentions that inserting Adiga's porous cartridge would "maintain pressure in Whittemore's liquid supply." Ex. 1003 ¶87. That statement is puzzling. Whittemore includes inlet 4 and outlet 5 that allow for the free flow of outside air into and out of vessel A. Thus, there is no pressure problem in Whittemore. Ex. 2001 ¶97.

In urging its proposed combination, Petitioner again relies on Gehrler (Ex. 1014). Petition at 99. But Petitioner provides no reason for why a skilled person would have combined Gehrler, an ink container, with Whittemore, a vaporizer. And, as noted above, Gehrler does not disclose a liquid storage body made from fiber. Ex. 1014, Fig. 3, 2:24-29, 7:62-65.

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VI. CONCLUSION

For the reasons discussed above, Patent Owner requests that the Board deny the Petition for *Inter Partes* Review of the '726 Patent.

Respectfully submitted,

Date: October 6, 2016

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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 12,772 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: October 6, 2016

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

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

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