

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

R.J. REYNOLDS VAPOR COMPANY,
Petitioner,

v.

FONTEM HOLDINGS 1 B.V.,
Patent Owner.

Case No. **IPR2016-01270**
Patent No. **8,893,726**

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

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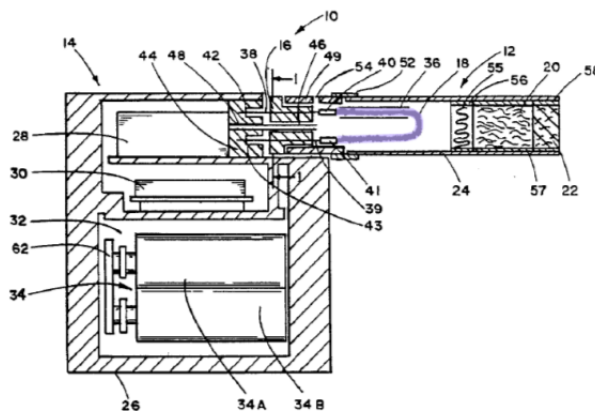
Petitioner's Exhibits	
Exhibit	Description
Ex. 1001	U.S. Patent No. 8,893,726 (“’726 patent”)
Ex. 1002	’726 Patent File History, Non-Final Rejection (August 16, 2013)
Ex. 1003	’726 Patent File History, Amendment (October 8, 2013)
Ex. 1004	’726 Patent File History, Notice of Allowance (August 18, 2014)
Ex. 1005	<i>NJOY, Inc. v. Fontem Holdings I B.V.</i> , IPR2015-01302 (PTAB, filed May 29, 2015), Paper No. 15
Ex. 1006	U.S. Patent No. 4,947, 874 (“Brooks”)
Ex. 1007	U.S. Patent No. 5,944,025 (“Cook”)
Ex. 1008	U.S. Patent No. 6,155,268 (“Takeuchi”)
Ex. 1009	Declaration of Robert Sturges, Ph.D.
Ex. 1010	<i>NJOY, Inc. v. Fontem Holdings I B.V.</i> , IPR2015-01302 (PTAB, filed May 29, 2015), Paper No. 2
Ex. 1011	<i>NJOY, Inc. v. Fontem Holdings I B.V.</i> , IPR2015-01302 (PTAB, filed May 29, 2015), Paper No. 6
Ex. 1012	U.S. Patent No. 5,703,633 (“Gehrer”)

Patent Owner's Exhibits	
Exhibit	Description
Ex. 2001	Declaration of Richard Meyst
Ex. 2002	Merriam-Webster's Collegiate Dictionary (11th ed. 2003), selected pages
Ex. 2003	Information Disclosure Statement filed August 14, 2014 in U.S. Patent Appl. No. 13/777,927, considered by Examiner September 18, 2014
Ex. 2004	<i>R.J. Reynold Vapor Co., v. Fontem Holdings, 1 B.V.</i> , IPR2016-01527, Paper 1, Petition (PTAB August 3, 2016)
Ex. 2005	'726 Patent File History, Statement of Related Applications (February 26, 2013)
Ex. 2006	U.S. Patent No. 4,735,217 (Gerth)
Ex. 2007	The Oxford American Dictionary and Thesaurus (2003), selected pages
Ex. 2008	<i>R.J. Reynold Vapor Co., v. Fontem Holdings, 1 B.V.</i> , IPR2016-01527, Ex. 1010, Declaration of Robert Sturges (Aug. 3, 2016)
Ex. 2009	RESERVED
Ex. 2010	<i>Toyota Motor Corp. v. Cellport Sys.</i> , IPR2015-01423, Paper 7 Decision 2015-10-28
Ex. 2011	<i>Arista Networks, Inc. v. Cisco Systems, Inc.</i> , IPR2015-01710, Paper 7, Decision Denying Institution of Inter Partes Review (PTAB Feb. 16, 2016)
Ex. 2012	<i>Kinetic Tech., Inc. v. Skyworks Solutions, Inc.</i> IPR2014-00529, Paper 8 (PTAB Sept. 23, 2014)

I. INTRODUCTION

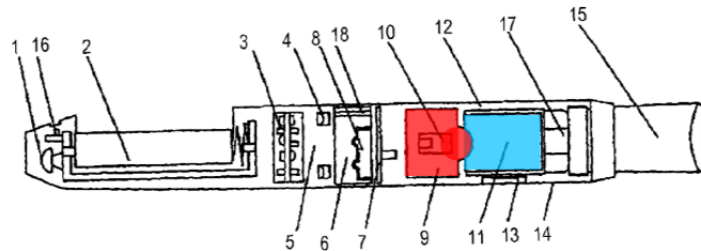
Petitioner seeks *inter partes* review of claims 15 and 16 of the '726 patent based on the same art and arguments previously raised in two proceedings at the Patent Office, original prosecution and a prior IPR. Petitioner is not entitled to a third bite at the apple, especially where its references and arguments already proved insufficient.

The Petition is premised upon the Brooks reference. Brooks teaches an electrical smoking article that has two parts: a reusable controller 14, which includes pressure sensing switch 28, control circuit 30, and batteries 34A and 34B; and a disposable cigarette 12 which includes heating element 18 (shown in purple) that is directly impregnated with liquid to “6 to 10 puffs” like the puff life of a typical cigarette.



In contrast, the '726 patent describes and claims an electronic cigarette that has an atomizer (shown in red) in physical contact with a separate liquid storage

body (shown in blue). Unlike Brooks, the '726 patent discloses that in some embodiments the atomizer is reusable and the liquid storage body can be refilled or replaced.



Petitioner first argues that claims 15 and 16 are anticipated by Brooks. But, as the applicant explained during prosecution, Brooks does not teach a “liquid storage body,” let alone a “liquid storage body in physical contact with the atomizer” as required by the claims. Consequently, the '726 patent issued over Brooks. Brooks’ disclosure has not changed; nor should the result. Petitioner also tacks on obviousness arguments based on Brooks, Takeuchi (which was also a cited reference during initial examination), and Cook. In a prior IPR relating to the '726 patent, however, another petitioner raised Takeuchi and Kaufmann (with disclosure cumulative to Cook’s). The Patent Office considered that art and denied review of claims 15 and 16. Takeuchi is still the same and Cook’s teachings are redundant of Kaufmann’s. That argument remains deficient.

Even if the Board were to consider the art and arguments again, Petitioner and its expert do not meet the legal standards for proving unpatentability. For

anticipation, the elements in the prior art must be arranged in the claimed manner.

Despite Petitioner's efforts, it cannot change that Brooks does not teach the claimed liquid storage body. Brooks fundamental operating principle eliminates any need for a liquid storage body by directly impregnating a heating element with liquid sufficient to provide 6-10 puffs like a traditional cigarette.

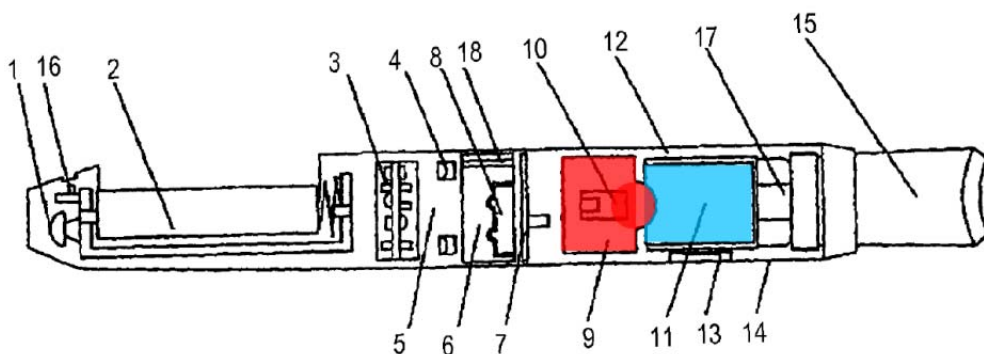
To prove obviousness, the law requires "articulated reasoning with rational underpinning." *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2007). Petitioner and its expert do not satisfy that standard either. In the proposed combinations, Petitioner asserts that one skilled in the art would have used fiber material from Takeuchi or Cooks in place of the porous substrate in Brooks heating element 18. But that combination adds nothing to Brooks because the resulting combination would simply include a heating element 18 with a fiber material. Even if combined, the combination still fails to disclose a separate "liquid storage body" as required by the claims.

Petitioner does not allege that one skilled in the art would have included a separate liquid storage body in Brooks, let alone provide any motivation to make that modification. To the contrary, where Brooks fundamental operating principle eliminates any need for a liquid storage body, one skilled in the art would not have modified Brooks to include one.

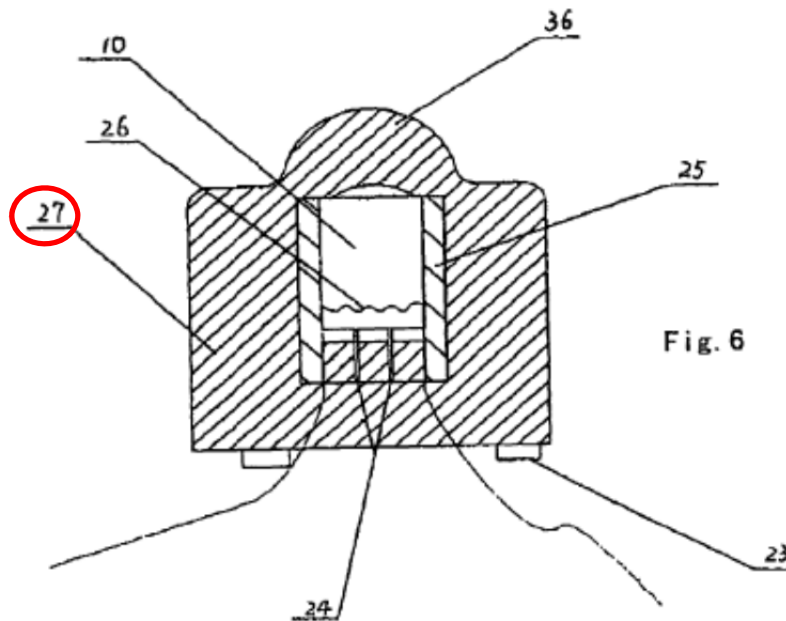
Accordingly, Petitioner's request for *inter partes* review should be denied.

II. THE '726 PATENT

The '726 patent¹ discloses embodiments of and claims an “electronic cigarette.” Specifically, the patent describes the device’s atomizer and liquid storage body. The atomizer (red) and liquid storage body (blue), as well as other components, are shown in annotated Figure 1 below. According to the '726 patent, the atomizer and the liquid storage body are separate components. Atomizer 9 includes a porous body 27 (red circle in Figure 6 below) that contains a heating element 26 within atomization cavity 10. Liquid storage body 28, which is part of liquid-supplying bottle 11, makes contact with porous body 27 of atomizer 9, allowing liquid to move from the storage body into the atomizer via capillary action. Ex. 1001, 2:48-50, 2:66-3:2, 3:64-67. Liquid storage body 28 holds liquid in a porous structure, which can be a fiber. *Id.*, 3:11-18.



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.



Claim 15 includes limitations related to the “atomizer” and separate “liquid storage body.” Claim 15 recites:

An electronic cigarette comprising;

- a housing having an inlet and an outlet;
- an electronic circuit board and an *atomizer* having a heating element, within the housing;
- a battery electrically connected to the electronic circuit board;
- a stream passage within the housing leading from the inlet to the *atomizer*;
- a *liquid storage body* including fiber material in a cylindrical section of the housing, with the *liquid storage body* in *physical contact with the atomizer*;
- and an aerosol passage from the *atomizer* to the outlet.

Claim 16 depends from claim 15 and further recites “a sensor in the stream passage, with the sensor electrically linked to the electronic circuit board.”

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, 17. 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 13. Under either definition, Petitioner has failed to meet its burden.

IV. CLAIM CONSTRUCTION

When the Board previously denied an IPR petition relating to the ’726 patent, it construed the terms “electronic cigarette,” “atomizer,” and “contact” / “physical contact.” Ex. 1005, 8-11. Patent Owner addresses the term “atomizer” below.

A. “atomizer”

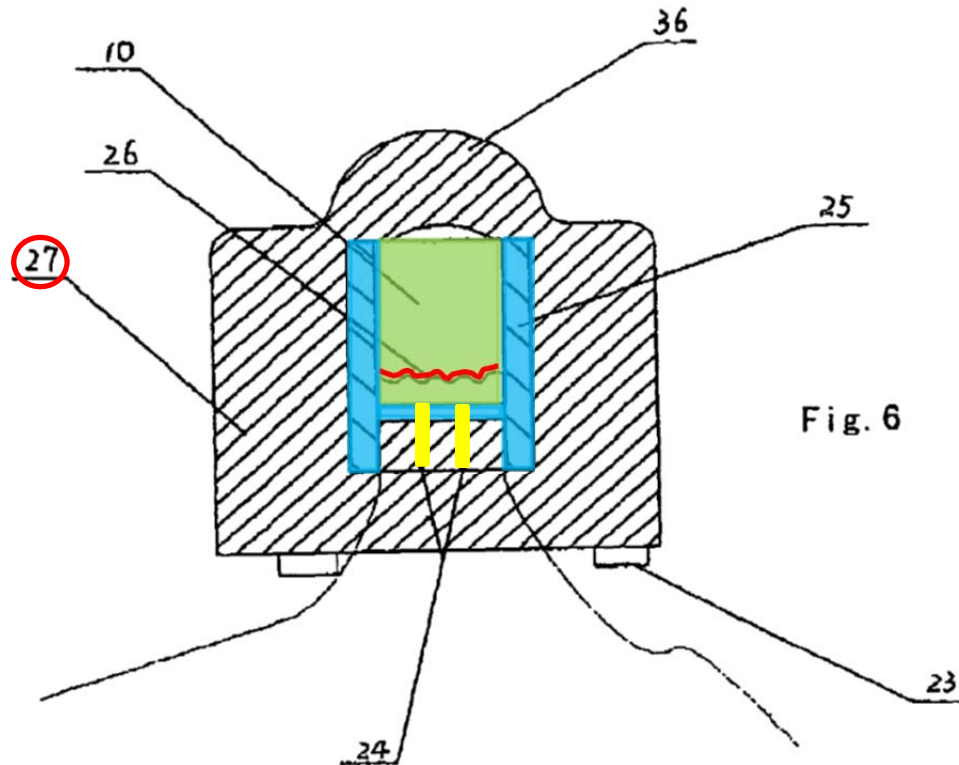
Patent Owner’s Construction	Petitioner’s Construction
“a component or components that convert(s) liquid into aerosol or vapor”	“structure for facilitating atomization”

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 refer to a cavity in the atomizer.

Petitioner modifies the Board’s prior construction of the term “atomizer” and argues that the term means a “structure for facilitating atomization.” Ex. 1005, 10; Petition at 16-17. 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. Ex. 2001, ¶¶19-21. Instead, an “atomizer” is “a component or components that convert(s) liquid into aerosol or vapor.” *Id.*, ¶22.

The ’726 patent discloses an atomizer that includes heating element 26 and a porous 27, which atomizes nicotine solution. Ex. 1001, 2:51-57, 3:49-58, 4:11-13. As shown in Figure 6 below (annotations added), heating element 26 (red) within cavity 10 (green) atomizes nicotine solution. *Id.* Walls 25 (blue) and porous body

27 (red circle) together form cavity 10. 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 Petitioner's construction of "atomizer" extends to components that do not cause atomization, it is improper. That understanding of "atomizer" is unreasonable because it defines the atomizer based on an arbitrary decision about which structures "facilitat[e]" atomization. Under Petitioner's construction, the term could encompass any structure in an electronic cigarette that "facilitat[es]"

atomization,” which might be said for the battery, the housing, the air inlets, etc.

That cannot be the proper construction.

Extrinsic evidence also supports Patent Owner’s proposed construction. Merriam-Webster’s Collegiate Dictionary defines “atomize” as “2: to reduce to minute particles or to a fine spray,” and defines “atomizer” as “an instrument for atomizing usu. a perfume, disinfectant, or medicament.” Ex. 2002, 78. The Oxford American Dictionary is similar, defining “atomize” as “reduce to atoms or fine particles” and “atomizer” as “an instrument for emitting liquids as a fine spray.” Ex. 2007, 83.

For those reasons, an “atomizer” is “a component or components that convert(s) liquid into aerosol or vapor.”

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

Petitioner proposes two grounds of unpatentability:

Ground 1: Claims 15 and 16 are anticipated by U.S. Patent No. 4,947,874 (Brooks) (Ex. 1006); and

Ground 2: Claims 15 and 16 are obvious over Brooks alone or in combination with Takeuchi and/or U.S. Patent No. 5,944,025 (Cook) (Ex. 1007).

Petition at 6.

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

**A. The Patent Office Already Rejected Petitioner's Arguments
When It Issued the '726 Patent and Denied a Previous IPR**

Petitioner argues that claims 15 and 16 are unpatentable over Brooks, by itself or in combination with Takeuchi or Cook. Petition at 6. The Patent Office already considered those arguments, and rejected them.

As Petitioner concedes, the Patent Office considered Brooks during prosecution and decided to issue the '726 patent over it. Ex. 1002, at 10-13. To explain why it is asking the Board to repeat the same exercise, Petitioner asserts that “the Examiner was incorrect....” *Id.*, 12-13. The prosecution history proves otherwise.

When Patent Owner filed the '726 application, it identified Brooks as potentially being material to the examination. Ex. 2005, 1-2. In its initial Office Action, the Patent Office allowed one claim because Brooks lacked a “liquid supply comprising fibers.” Ex. 1002, 3-5. The Office further found that Brook’s heating element was porous and corresponded to the claimed “liquid supply within the housing in physical contact with the atomizer,” rejecting the application’s other claims. *Id.* In an October 2013 Amendment, Patent Owner cancelled the allowed claim and amended another to recite the fibrous liquid supply missing from the prior art. Ex. 1003, 4. Patent Owner further explained to the Office that the amended claim and its dependent claims overcame the prior rejection because, in Brooks, “the liquid supply is the heating element 18 itself,” “there is no liquid

supply as a separately identifiable element,” and “the liquid supply is inseparable from the atomizer.” *Id.*, 6-7.

In view of Patent Owner’s argument, the examiner allowed claims 15 and 16. Ex. 1004 at 2. Petitioner now asserts that Brooks anticipates those same claims, but the Patent Office already reviewed the reference and decided the opposite. Petitioner also seeks to combine Brooks with Takeuchi. But Patent Owner cited Takeuchi to the examiner during initial prosecution, and the claims issued nonetheless. Ex. 2003; Ex. 1001, References Cited; Ex 1004, 2. The logic supporting the Office’s allowance determination was sound: Brook’s heating element is not the same as the claimed “liquid storage body in physical contact with the atomizer.”

The original examiner was not the only one who reviewed and rejected Petitioner’s prior art and arguments. The Board already considered and denied a prior IPR relating to the ’726 patent. There, the petitioner argued that claims 15 and 16, among others, were unpatentable based on Takeuchi combined with Kaufmann. Ex. 1005, 6. The Board rejected that argument, and denied institution on all claims. *Id.*, 25. The prior petitioner relied on Kaufmann as teaching a fibrous material. *Id.*, 21-22. Petitioner here relies on Cook. Petition at 49-51. But Cook adds nothing new. As the Board previously found, Kaufmann discloses a fiber material. Ex. 1005, 24. Cooks teaches the same thing. Ex. 1007, 2:18-22.

Petitioner further relies on Brooks and Takeuchi as teaching a fiber material, but like Cook those references are redundant of Kaufmann for that issue. Petitioner repeat arguments that were already rejected.

Petitioner mentions the prior IPR only once, arguing that its Petition “relies on a different combination, and advances different arguments.” Petition at 4. But that assertion glosses over that the cited prior art and arguments are not meaningfully distinct from what the Board already rejected. Takeuchi is exactly the same as it was before, and Brooks and Cook add nothing new.

Because Petitioner does not explain how its overlapping art and arguments are unique, the Board should reject them under 35 U.S.C. §325(d) as “substantially the same” as those previously presented. Ex. 2010, 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. 2011, 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 Opinions Have Little Probative Value

Petitioner’s experts contradictory opinions are not credible. Here, in the proposed combination of Brooks and Takeuchi, the Petition equates Brooks “porous substrate” with the “porous liquid body” of Takeuchi to argue motivation

for the combination. Specifically, Petitioner and its expert state that one skilled in the art “would have been motivated to use Takeuchi’s fiber teachings because both the porous liquid storage body of Takeuchi [pore structure 302 in tube 36] and the ‘porous substrate’ of Brooks perform the same function, namely holding a liquid aerosol forming substance in an intimate, heat exchange relationship with a heating component for atomization.” Petition at 50-51. In other words, Petitioner asserts one would have swapped Takeuchi’s pore structure 302 with Brooks’ porous substrate because both perform the same function in their respective devices. Petitioner and its expert also claim that Brooks’ porous substrate is not part of the claimed atomizer, and instead is a separate liquid storage body as required by the claims.

Yet in a related IPR, Petitioner and its expert assert that Takeuchi’s pore structure 302, which is purportedly the same as Brook’s porous substrate to justify the combination of the references, is part of the atomizer and not part of the liquid supply. Specifically, in IPR2016-01527, Petitioner states that Takeuchi’s “capillary tube 36/porous material 302 are part of the atomizer. . . . The capillary tube 36/porous material 302 are not part of the liquid container.” Ex. 2004, pp. 43-44. Petitioner’s expert opinion relies on the same conclusion to assert that tube/porous material discloses the claimed atomizer in the related IPR. Ex. 2008, pp. 51-60. Petitioner and its experts contradictory opinion demonstrates that the

testimony is not credible and is based on improper hindsight using the claims as the starting point.

Petitioner's expert's opinions suffer from numerous other flaws. As Petitioner admits, during prosecution of the '726 patent the Patent Office reviewed Brooks, corresponded with Patent Owner about that reference, and issued the '726 patent over it. Petition at 10-13. Patent Owner also provided Takeuchi to the Patent Office during prosecution. Ex. 2003; Ex. 1001, References Cited. In attempting to now second-guess the Patent Office, Petitioner relies on the declaration of Dr. Robert H. Sturges (Ex. 1009). Although Petitioner's expert asserts in passing that he "considered" the prosecution history of the '726 patent (Ex. 1009, ¶8), his declaration does not analyze that history or address the Patent Office's patent grant over Brooks and Takeuchi at all. Instead, Petitioner's expert ignores those key facts and presses the same unpatentability theory that the Patent Office already considered and rejected, namely that Brooks discloses a liquid storage body that is distinct from its atomizer. Ex. 1003, 6; Ex. 1004. Because he repeats the same argument previously found wanting by the Patent Office without analyzing the prosecution history, Petitioner's expert's opinions lack credibility.

Petitioner's expert also often parrots the Petition, offering factually unsupported and conclusory opinions. For example, Petitioner's expert repeats Petitioner's arguments regarding claim construction (Ex. 1009, ¶¶32-37; Petition at

14-17), going so far as to copy Petitioner’s legal conclusions. Ex. 1009 ¶¶11, 33; Petition at 15. Further, Petitioner’s expert often repeats Petitioner’s arguments regarding what a skilled person “would have understood,” without explaining why. Petition at 20-21, 24-25, 38, 46-47, 49-50; Ex. 1009, ¶¶43-45, 64, 71, 81, 85, 87. For example, Petitioner’s expert asserts that a skilled person would have understood “porous substrates” in one embodiment of Brooks’ heating element 18 to be “liquid storage bodies.” Ex. 1009, ¶¶44, 67, 71. But he does not explain how that could possibly be given that the claims recite “an atomizer with a heating element” as distinct structure from the “liquid storage body.” Furthermore, Petitioner’s expert repeats the same information found in the Petition’s claim charts, without adding any additional analysis. Petition at 28-29, 30-31, 32-33, 35, 37, 40-42, 43, 45-46, 51-55; Ex. 1009, ¶¶79, 89.

All of these conclusory opinions have no probative value. *ActiveVideo Networks, Inc. v. Verizon Commc’ns, Inc.*, 694 F.3d 1312, 1327 (Fed. Cir. 2012) (rejecting “conclusory and factually unsupported” expert testimony regarding obviousness); *see also* Ex. 2012, 15 (“Merely repeating an argument from the Petition in the declaration of a proposed expert does not give that argument enhanced probative value.”).

In addition, Petitioner’s expert’s obviousness opinions are plagued by hindsight. For example, he often relies on alleged substitutions of known elements

as support for his opinions. Ex. 1009, ¶¶81, 85-86. As noted by the Supreme Court, however, “[a] patent composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art.” *KSR*, 550 U.S. at 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. Because of similarly deficient expert opinions, the Board denied a previous IPR petition relating to the ’726 patent, finding that “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. 1005, 19-20. Petitioner’s expert does not identify the legally-mandated reasons to support his opinions. Instead, he uses the claims as a roadmap to arrive at his conclusions. The law precludes that type of analysis. *Cheese Sys., Inc. v. Tetra Pak Cheese & Powder Sys., Inc.*, 725 F.3d 1341, 1352-53 (Fed. Cir. 2013).

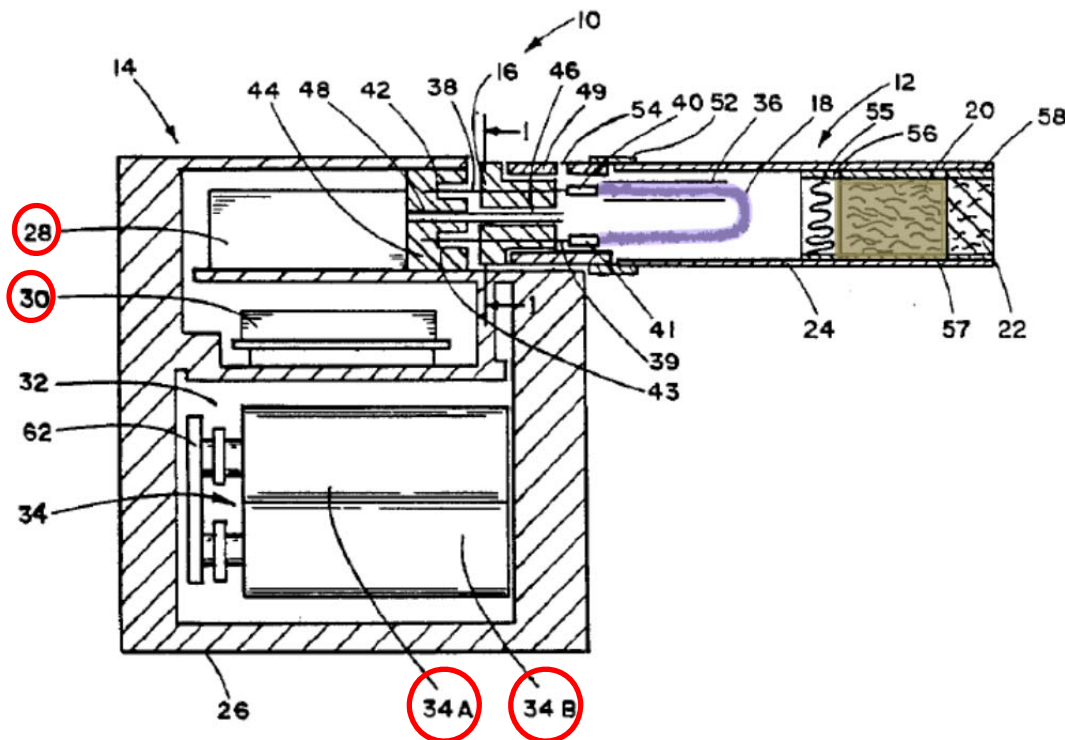
Petitioner’s expert’s contradictory, conclusory and hindsight-biased opinions are entitled to no weight.

C. Ground 1: Claims 15 and 16 Are Not Anticipated by Brooks

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

1. Brooks

Brooks teaches an electrical smoking article that includes heating element 18, as shown in purple in annotated Figure 1 below. Heating element 18 sits within cigarette 12, which also includes a roll of tobacco 20 (brown). Ex. 1006, 7:17-20. Cigarette 12 connects to controller 14, which includes pressure sensing switch 28, control circuit 30, and batteries 34A and 34B (red circles), among other things. *Id.*, 7:20-25.



Heating element 18 is made from fibrous or porous material, is electrically resistant, and is capable of holding an “aerosol forming substance.” *Id.*, 4:7-12, 7:26-30, 7:65-8:3. The heating element also needs to be “air permeable” and have

a “high surface area.” Ex. 1006, 4:7-12, 4:22-25. Specifically, the heating element should be made from “porous material” and have a surface area “greater than about 1,000 m²/g.” *Id.*, 4:12-20.

Brooks discloses that a heating element with these features is “particularly advantageous” because it is “capable of holding and efficiently releasing relatively large quantities of liquid aerosol forming substances,” enough to provide aerosol in “6 to 10 puffs” like the puff life of a typical cigarette.² *Id.*, 3:30-34; 4:25-31, 6:32-36. The design ensures that the “aerosol forming substance is in a heat exchange relationship with the electrical heating element.” *Id.*, 8:4-8. When a user inhales, heating element 18 increases in temperature “which in turn heats and volatilizes the aerosol forming substance” contained within the heater. *Id.*, 10:45-48. As a result, an aerosol forms, picks up tobacco flavor while passing through tobacco roll 20, and exits into a user’s mouth. *Id.*, 10:48-53.

² Brooks lists the puff range for its device as 6 to 10 puffs (Ex. 1006, 4:2-6), 6 puffs or more (*id.*, 4:29-31, 10:67), and “preferably at least about 6 puffs, more preferably at least about 10 puffs” (*id.*, 6:34-36). The examples use the disclosed device to generate 10 puffs (*id.*, 18:29, 19:65, 21:48, 22:39) or 12 puffs (*id.*, 21:40). For simplicity, Patent Owner will reference the 6 to 10 puff range herein.

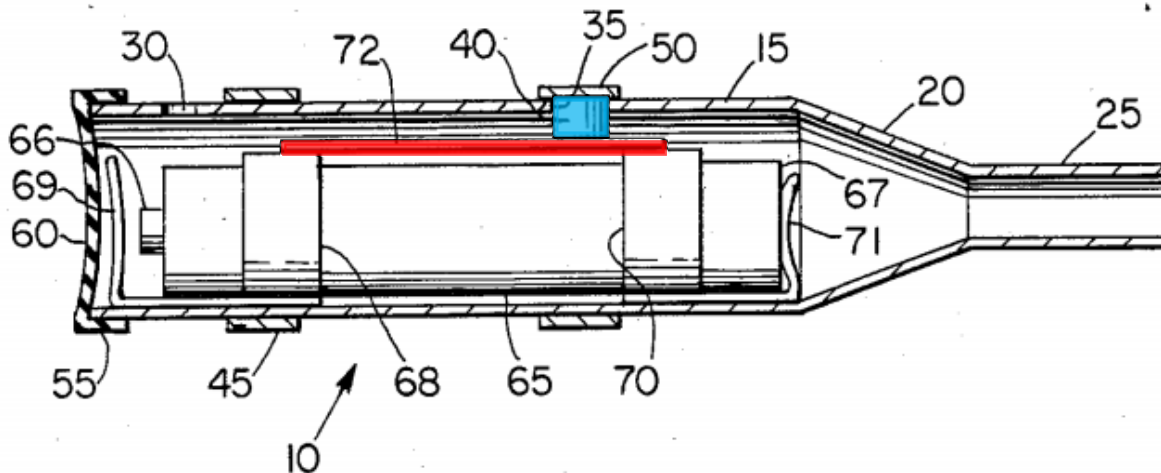
Brooks further describes objectives for its preferred heating elements with the features noted above: they must have “low mass, low density, and moderate resistivity,” be “thermally stable at the temperatures experience during use,” “heat and cool rapidly,” use energy efficiently, provide “almost immediate volatilization of the aerosol forming substance,” prevent waste of the aerosol forming substance, and permit “precise control of the temperature range experienced by the aerosol forming substance.” Ex. 1006, 7:34-47. The heating element must heat rapidly based on current supplied by Brooks’ current actuation and current regulation mechanism and provide 0.5 mg or preferably 0.8 mg of aerosol per puff. *Id.*, 5:38-58, 6:26-28.

Another object of Brooks’ device is to provide reusable controller 14 (containing batteries, a control circuit, and a sensor) that connects to disposable cigarette cartridge 12, which houses liquid-containing heating element 18. *Id.*, 4:35-38, 5:38-42. These components are shown above in annotated Figure 1. Once the liquid is exhausted, a user removes the spent cartridge, throws it away, and replaces it with a new one. *Id.*, 5:58-62.

Brooks also distinguishes prior art devices that, unlike Brooks’ porous heating element (*id.*, 4:7-18), include a liquid storage body in physical contact with a separate heater. Brooks points to U.S. Patent No. 4,735,217 (Gerth). Gerth disclosed a medicament pellet 40 in contact with a heating element 72. Ex. 2006,

5:56-62. That pellet could be made from a liquid nicotine base. *Id.*, 8:46-52.

Pellet 40 (blue) and heating element 72 (red) are shown in annotated Figure 4 below. Heat from heating element 72 caused medicament in pellet 40 to vaporize for inhalation by a user. *Id.*, 6:33-42. Brooks criticized this design as being too large, too heavy, and as too imprecise regarding electrical current and heat. Ex. 1006, 3:42-48.



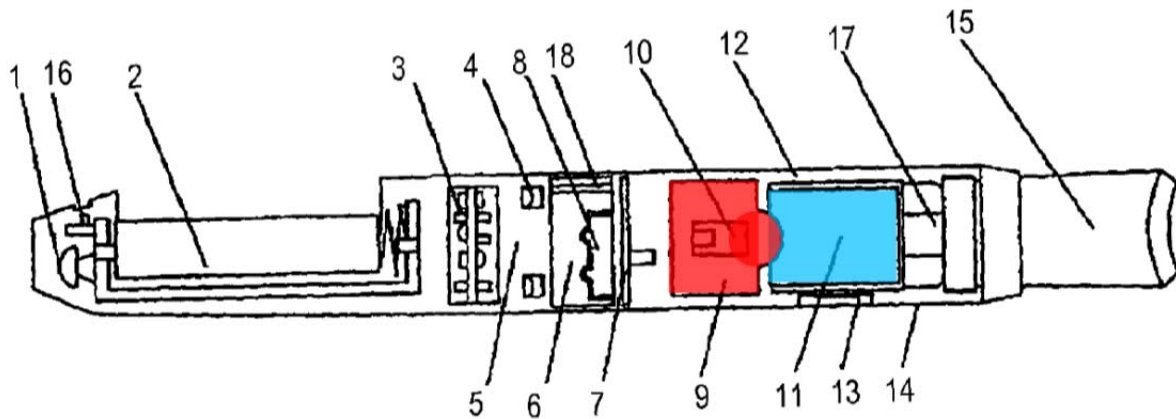
2. Independent Claim 15

Claim 15 is described above. Petitioner argues that Brooks teaches each limitation of claim 15. Petition at 26. But Brooks does not disclose the claimed liquid storage body, much less one that includes fiber material.

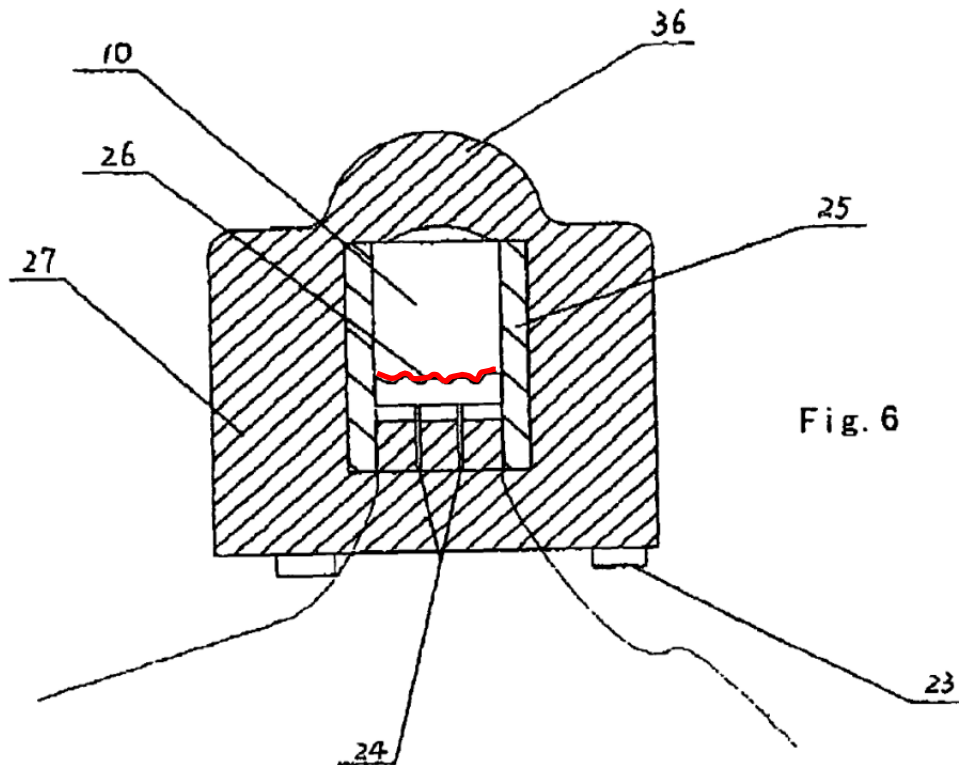
a. Brooks does not disclose the claimed liquid storage body

Claim 15 recites an electronic cigarette with “an atomizer having a heating element” and a “liquid storage body.” Specifically, the claim requires that the “liquid storage body [is] in physical contact with the atomizer.” Ex. 2001, ¶36.

The '726 patent discloses the atomizer and liquid storage body as distinct structures. Ex. 2001, ¶37. They appear in annotated Figure 1 below, with atomizer 9 in red and liquid storage body 28 in blue. As disclosed in the '726 patent, atomizer 9 includes porous body 27, which is made from foam or fiber. Ex. 1001, 2:66-3:2. The porous atomizer holds liquid that ejects into atomization cavity 10 as air flows into atomizer 9, allowing for atomization. *Id.*, 3:49-58. In addition to porous atomizer 9, the device includes solution storage porous body 28 that serves as the liquid reservoir for the device. *Id.*, 3:11-18, 3:64-67. Because the porous body 27 of the atomizer is in physical contact with the solution storage porous body 28, the liquid stored in the solution storage porous body 28 moves into porous atomizer 9 via capillary action. *Id.*, 3:64-67.

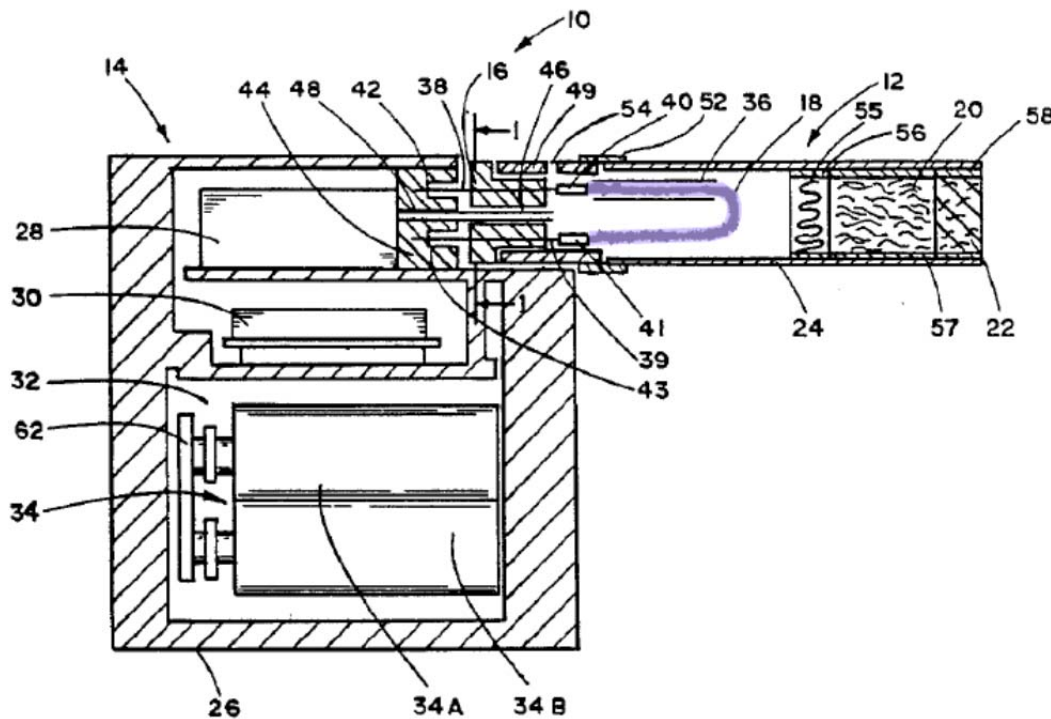


Claim 15 recites that the atomizer includes a heating element 26, which is shown inside in red in the atomizer's porous body 27 in annotated Figure 6 below.



Both claim 15 and the '726 specification use the term "heating element" to describe this component of the atomizer. Ex. 1001, 2:52-57.

Brooks does not teach the claimed liquid storage body, let alone one in contact with an atomizer. Ex. 2001, ¶39. As shown below in Figure 1, Brooks discloses a porous or fibrous heating element 18 (purple) that holds liquid, but the reference lacks a liquid storage body. Brooks' heating element had a specific purpose. Its objective is to "hold[] and efficiently releas[e] relatively large quantities of liquid aerosol forming substances." Ex. 1006, 4:25-31, 6:32-36. In other words, the heating element was designed to have two functions: hold enough liquid for 6-10 puffs of aerosol and vaporize that liquid. Brooks describes more objectives for its preferred heating element: it must have "low mass, low density, and moderate resistivity," be "thermally stable at the temperatures experience during use," "heat and cool rapidly," use energy efficiently, provide "almost immediate volatilization of the aerosol forming substance," prevent waste of the aerosol forming substance, and permit "precise control of the temperature range experienced by the aerosol forming substance." *Id.*, 7:34-47. And the heating element must heat rapidly based on current supplied by Brooks' current actuation and current regulation mechanism and provide the preferred amount of aerosol per puff. *Id.*, 5:38-58, 6:27-36. To achieve these ends, the heating element had to have a large surface area and be air permeable, resistive, and porous. *Id.*, 4:7-25.

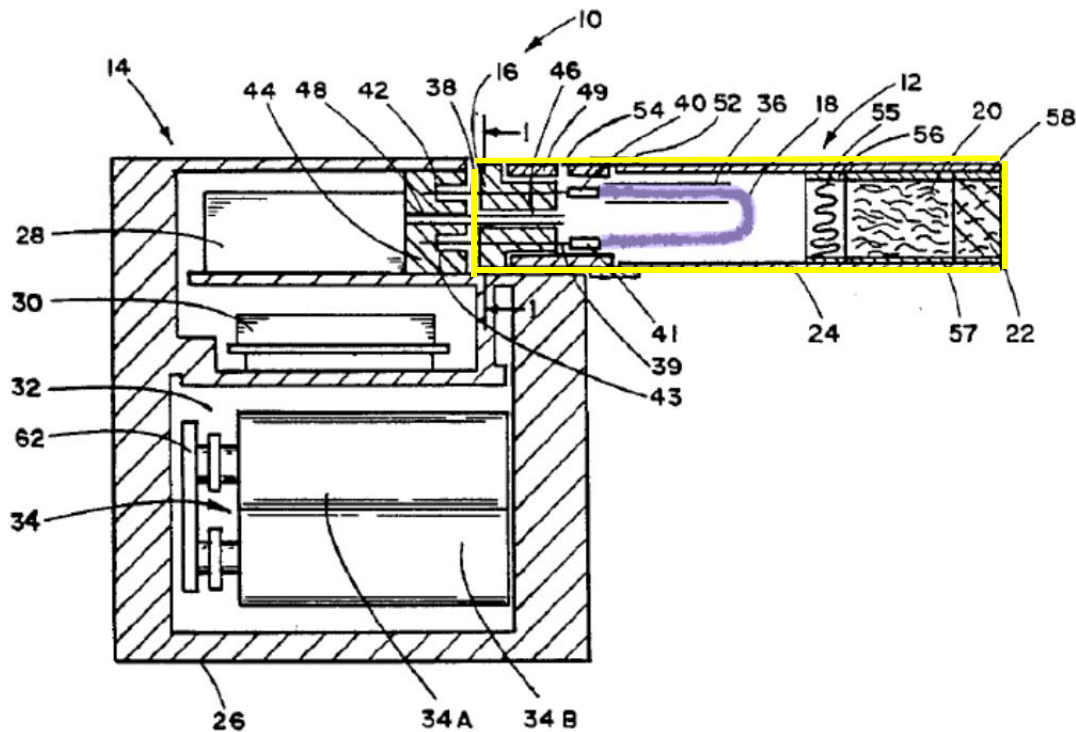


Brooks' heating element 18 is similar to porous atomizer 9 in the '726 patent. Like atomizer 9, Brooks' heating element 18 is both porous (Ex. 1006, 7:26-30) and atomizes liquid (*id.*, 10:45-48). Brooks repeatedly states that heating element 18 itself (and not some separate liquid storage body) holds the liquid in the device: "[R]esistance heating element 18 carrying an aerosol forming substance" (*id.*, 7:15-35); "The resistance heating element 18 ... preferably is a fibrous material having a high surface area and an adsorbant [sic], porous, wettable character, in order to carry a suitable amount of aerosol forming substance for effective aerosol formation" (*id.*, 7:26-30); and "Preferably, the heating element 18

is impregnated with or otherwise carries the aerosol forming substance” (Ex. 1006, 8:4-8).

Every example and embodiment in Brooks refers to directly impregnating the heating element with a liquid aerosol forming substance. *Id.*, 17:1-9; 19:16-22; 20:14-21. And Brooks’ claims 5, 7, 9, 31, 32, 34, 82, 108, 110, and 112 each recite an aerosol forming substance impregnated within a heating element comprising porous material (claims 5, 31, 108), fibrous material (claims 7, 32, 110), and carbon fibers (claims 9, 34, 82, 112). Brooks also presents impregnation of the heating element with liquid as a key feature distinguishing its device from the prior art. Brooks notes that it would not have been possible to coat Gerth’s heater with liquid to deliver sufficient vapor, but goes on to describe heating elements that would be adequate for that purpose. *Id.*, 3:30-34, 4:7-31.

In Brooks’ device the user discards disposable cigarette cartridge 12 once the impregnated liquid in the heater is depleted. *Id.*, 5:58-62, 11:1-5. The user gets a few puffs from the cartridge and then throws it away. Ex. 2001, ¶¶44, 71. For a limited-use disposable device, a solution storage body separate from the atomizer is not necessary because the atomizer itself is capable of holding sufficient liquid to last for the lifespan of the cartridge. Ex. 2001, ¶¶43-44. That configuration is fundamental to Brooks. Brooks’ Cigarette cartridge 12 (outlined in yellow) and heating element 18 (purple) are shown in annotated Figure 1 below.



Brooks further discloses that heating element 18 “heats and volatilizes the aerosol forming substance.” Ex. 1006, 10:45-48. Brooks’ heating element 18 is impregnated with liquid so “that the aerosol forming substance is in a heat exchange relationship with the electrical heating element.” *Id.*, 8:4-8. Because Brooks’ heating element 18 itself hold liquid, that single structure allows for efficient heat transfer by conduction without requiring additional components to transport liquid from a separate storage body. Ex. 2001, ¶42. It also maximizes

surface area between the liquid and the heating element, further contributing to efficient heat transfer. Ex. 2001, ¶43.

Because heating element 18 atomizes the liquid in Brooks, heating element 18 is the atomizer in Brooks. That is true under Patent Owner's construction ("a component or components that convert(s) liquid into aerosol or vapor") because heating element 18 creates the aerosol. Ex. 1006, 10:45-48; Ex. 2001, ¶46. It is also true under Petitioner's overly broad construction for atomizer ("structure for facilitating atomization"), which includes any structures that contribute to atomization in any way. Ex. 2001, ¶46.

Brooks further describes controlling the temperature of the heating element to achieve "a desired temperature range for volatilization of the aerosol former and the tobacco flavor substances," and notes that its heating elements "are capable of holding and releasing relatively large quantities of aerosol forming substances and tobacco flavor materials." Ex. 1006, Abstract, 4:25-41, 5:1-5.

The role of the "heating element" as part of the atomizer is further supported by Brooks' description of the prior art, which refers to the "electrical resistance heating element" of Whittemore serving to vaporize liquid, and to heating element of U.S. Patent No. 4,735,217 achieving temperatures high enough "to volatilize menthol from a menthol pellet." Ex. 1006, 1:57-61, 3:15-24.

And Brooks consistently describes direct impregnation of its atomizer with liquid. Ex. 2001, ¶41. For example, Brooks states "[p]referably, such porous heating elements are impregnated with liquid aerosol forming substances.... Such heating elements are particularly advantageous in that they are capable of holding and efficiently releasing relatively large quantities of liquid aerosol forming substances and tobacco flavor materials." Ex. 1006, 4:22-29. Later, Brooks states "[p]referably, the heating element 18 is impregnated with or otherwise carries the aerosol forming substance in order that the aerosol forming substance is in a heat exchange relationship with the electrical heating element." *Id.*, 8:4-8. Working examples 1, 3, and 4 all refer to impregnating the heating element with liquid aerosol forming substance. *Id.*, 17:1-9, 19:16-22, 20:14-22; Finally, claims 5, 7, 9, 30, 32, 34, 78, 80, 82, 108, 110, 112, and 142 each recite an aerosol forming substance impregnated within a heating element comprising porous material (claims 5, 30, 78, 108), fibrous material (claims 7, 32, 80, 110), and carbon fibers (claims 9, 34, 82, 112, 142).

Brooks also presents impregnation of the heating element with liquid as a key feature distinguishing its disclosed device from the prior art. For example, in discussing U.S. Patent No. 4,735,217 to Gerth et al., Brooks notes that "it is believed that it would not be possible to coat a Nichrome heating element [of Gerth et al.]...with enough vaporizable liquid material to deliver sufficient volatile

material to the user, over the 6 to 10 puff life of a typical cigarette." Ex. 1006,

3:30-34. Later, Brooks distinguishes its device from Gerth et al. by stating:

Preferably, the heating element is a fibrous carbon material, most preferably having a surface area greater than about 1,000 m²/g. (In contrast, the surface area of the Nichrome metal resistance element of Gerth et al is believed to be about 0.01 m²/g). Preferably, such porous heating elements are impregnated with liquid aerosol forming substances....Such heating elements are particularly advantageous in that they are capable of holding and efficiently releasing relatively large quantities of liquid aerosol forming substances and tobacco flavor materials. For example, such heating elements can carry enough aerosol forming substances to provide aerosol for 6 to 10 puffs, or more.

Ex. 1006, 4:18-31.

The electronic cigarette in the '726 patent is different. Unlike in Brooks, the atomizer in the '726 patent is not thrown away after a few puffs. Instead, the '726 patent discloses liquid storage body that is separate from the atomizer and that can hold a much larger volume of liquid than Brooks. Ex. 2001, ¶¶37-38. A user can reuse atomizer 9 with that separate liquid supply.

In this context, it is hardly surprising that the Patent Office issued the '726 patent over Brooks. In its first Office Action, the Patent Office allowed one claim over Brooks because the reference did not disclose a "liquid supply comprising

fibers,” but rejected others based on Brooks’ porous heating element 18. Ex. 1002, 3-5. Patent Owner cancelled the allowed claim and amended another to recite the limitation found lacking in the prior art. Ex. 1003 at 4. Patent Owner also explained to the Patent Office that the newly amended claim overcame the Patent Office’s previous rejection because, in Brooks, “the liquid supply in the heating element 18 itself,” “there is no liquid supply as a separately identifiable element,” and “the liquid supply is inseparable from the atomizer.” *Id.*, 6-7. After Patent Owner amended claim 15 to reflect its current form, the Patent Office allowed claims 15 and 16 over Brooks. Ex. 1004, 2. Despite the Patent Office’s decision to issue the ’726 patent, Petitioner now argues anticipation based on Brooks, without giving any explanation for why the outcome should differ, other than to rely on the conclusory statement that the Examiner got it wrong. Petition at 12-13. For the reasons noted above, however, the Patent Office was correct.

Petitioner’s argument to the contrary hinges on one sentence in Brooks. Brooks discloses that “[o]ther suitable heating elements include . . . porous substrates in intimate contact with resistance heating components. . . .” Ex. 1006, 7:65-8:3. Petitioner asserts that those “porous substrates” are “liquid storage bodies” and the “resistance heating components” are an atomizer. Petition at 20-21, 38-39. But Brooks expressly recites “[o]ther suitable heating elements” include “porous substrates in intimate contact with resistance heating

components.” Ex. 1006, 7:65-8:3. Brooks has no disclosure regarding a liquid storage body separate from the heater. Ex. 2001, ¶41.

Brooks refers to "porous" materials several times outside of the passage cited by Petitioner. In each of these instances, the porous material is explicitly described as part of the heating element (i.e., the atomizer), not as separate solution storage area: "[t]his resistance heating element typically is a porous material...;" "[p]referably, such porous heating elements are impregnated with liquid aerosol forming substances...;" "[t]he resistance heating element 18 employed in cigarette 12 preferably is a fibrous material having a high surface area and an adsorbant, porous, wettable character, in order to carry a suitable amount of aerosol forming substance for effective aerosol formation." Ex. 1006, 4:12-24, 7:26-30.

Moreover, the incorporation of a solution storage area separate from the atomizer is at odds with Brooks' teaching of its smoking articles as comprising a disposable component capable of delivering a limited number of puffs. Ex. 2001, ¶¶43-45. For example, Brooks states "[p]referred smoking articles of the invention can deliver such aerosol, preferably in visible form, for a plurality of puffs, preferably at least about 6 puffs, more preferably at least about 10 puffs, under such conditions." Ex. 1006, 6:32-36. Later, Brooks states "This process continues, puff after puff, normally for at least about 6 puffs, until aerosol delivery drops below the level desired by the user. Then, the user can remove the cigarette 12

from the control pack 14, and dispose of the cigarette." Ex. 1006, 10:66-11:2. The working examples show the disclosed devices delivering 10 puffs (Examples 1, 3, 5, and 6) or 12 puffs (Example 4). Ex. 1006, 18:28-29, 19:64-66, 21:39-48, 22:38-40. For a disposable device designed for such limited usage, there is no need for a solution storage area – the atomizer itself is impregnated with sufficient liquid. Ex. 2001, ¶¶44-45.

In summary, Brooks uses the term "heating element" to refer its atomizer, a usage consistent with the art generally (as illustrated by Brooks' own background section. Ex. 2001, ¶41. Brooks teaches that aerosol forming liquid is impregnated directly into the heating element, which preferably has a porous surface to facilitate this impregnation. Ex. 2001, ¶42. Consistent with this teaching, Brooks teaches that in one embodiment the "heating element" includes "porous substrates in intimate contact with resistance heating components." Ex. 2001, ¶35. Thus, contrary to Petitioner's assertions, Brooks does not teach a liquid storage body separate from an atomizer, such that Brooks cannot disclose the "liquid supply in physical contact " as required by claim 15. Ex. 2001, ¶39.

Finally, in a related IPR, Petitioner confirms that Brooks' "porous substrate" is part of the atomizer and not a liquid storage body. In Petitioner's proposed combination of Brooks and Takeuchi, Petitioner equates Brooks "porous substrate" with the "porous liquid body" of Takeuchi to argue motivation for the

combination. Specifically, Petitioner and its expert state that one skilled in the art “would have been motivated to use Takeuchi’s fiber teachings because both the porous liquid storage body of Takeuchi [*i.e.*, pore structure 302 in tube 36] and the ‘porous substrate’ of Brooks perform the same function, namely holding a liquid aerosol forming substance in an intimate, heat exchange relationship with a heating component for atomization. Petition at 50-51. Petitioner’s expert makes the same claim. Ex. 1009, ¶ 86. Yet, in IPR2016-01527 regarding the parent to the ’726 patent, Petitioner and its expert allege the exact opposite— that Takeuchi’s tube 36 and porous material 302 are part of the atomizer, not part of Takeuchi’s liquid supply. Petitioner could not be more clear when stating that Takeuchi’s “capillary tube 36/porous material 302 are part of the atomizer. . . . The capillary tube 36/porous material 302 are not part of the liquid container.” Ex. 2004, 43; Ex. 2008, 51-60. Petitioner’s about face here to claim that the Takeuchi’s tube/porous material, and thus Brook’s porous substrate are liquid supplies should be rejected.

3. Dependent Claim 16

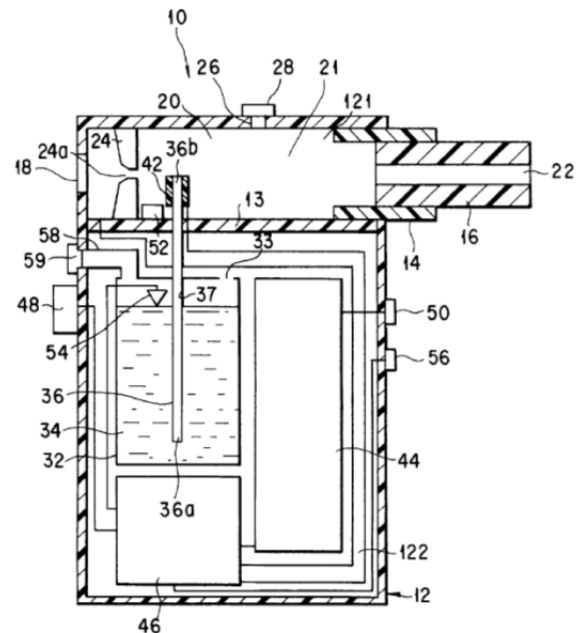
Claim 16 depends from claim 15. All arguments set forth above for claim 1 apply to claim 16. For at least those reasons, Petitioner has failed to meet its burden of showing a reasonable likelihood that Claim 16 is unpatentable.

D. Ground 2: Claims 15 and 16 Are Not Obvious over Brooks Alone or in Combination with Takeuchi and/or Cook

Petitioner asserts that it would have been obvious “to substitute fibrous material for the porous substrate as taught by Brooks, as well as by Cook and/or Takeuchi.” Petition at 46. But even if that were correct—it’s not—the result would be a fibrous heating element, not a separate “liquid storage body” as claimed. Accordingly, the proposed combinations cannot render claim 15 obvious.

1. Takeuchi

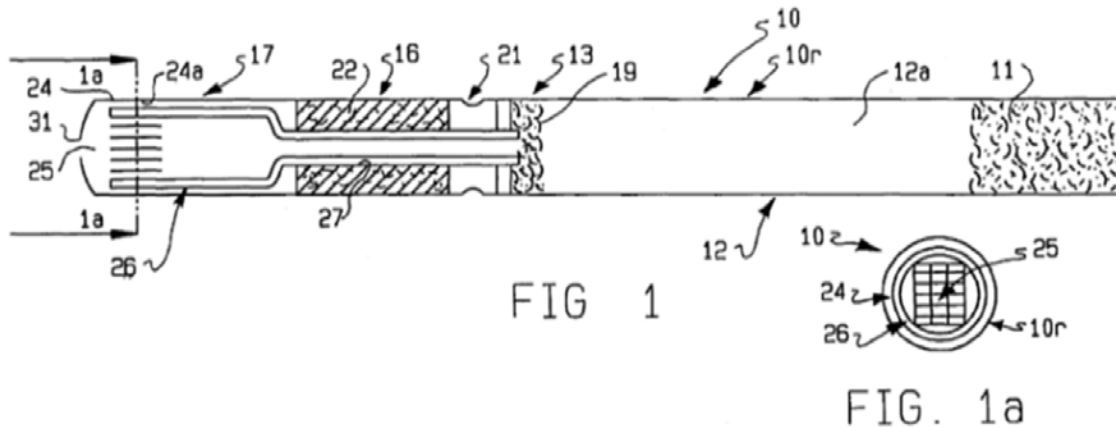
Takeuchi discloses a “flavor generating device.” Liquid flavor source 34 is transported from liquid container 32 through liquid passageway 37 to heater 42, where the liquid is gasified. Ex. 1008, 5:47-52, 7:57-63. Upper chamber 121 then receives the atomized liquid. *Id.*, 6:4-12. Liquid container 32 is the reservoir of liquid for the device and stores liquid flavor source 34 to be used later for atomization. Ex. 2001, ¶54-55. The device is shown in Figure 1 right.



Patent Owner included Takeuchi in an Information Disclosure Statement filed on August 14, 2014, and the Examiner considered the reference during the prosecution of the '726 patent. Ex. 2003; Ex. 1001, References Cited.

2. Cook

Cook discloses a “smokeless” device that uses a catalytic heat source. Cook, Title. The device is shown in Figures 1 and 1a below. When a user draws on the device, air enters through ventilation holes 21, mixes with fuel from reservoir 22, and moves to coated ceramic honeycomb 25. Ex. 1007, 1:32-39, 5:47-67. A lighter flame is applied to tip hole 31, which heats the mixture to cause combustion. *Id.*, 5:47-67. The resulting gases pass through plug 19, which is covered in an aerosol-forming substance, to create an aerosol that moves through tobacco 12a and picks up flavor. *Id.*, 6:1-5. The flavored aerosol then passes through filter 11 and into a user’s mouth. *Id.*, 6:5-6. When a user stops inhaling, honeycomb catalyst 25 retains heat so that the user need not apply any flame for second and subsequent drags. *Id.*, 6:6-10. The device does not use electricity. Further, while fuel reservoir 22 may consist of a synthetic fiber, the liquid to be atomized for inhalation is located in aerosol support plug 19. *Id.*, 2:4-6, 2:18-22. Cook does not disclose the material used to make aerosol support plug 19.



3. Independent Claim 15

a. Brooks as modified by Petitioner or in combination with Takeuchi and/or Cook does not disclose a liquid storage body

Petitioner's sole obviousness argument is that it would have been obvious to modify the "porous substrates" of one embodiment of heating element 18 in Brooks to be "fibrous." Petition at 46. But, as set forth above, Brooks fails to disclose a "liquid storage body in physical contact with the atomizer" as claimed. Instead, Brooks discloses a heating element directly impregnated with liquid. So, even if the "porous substrates" were made from fiber, the result would have been a fibrous atomizer, not a separate liquid storage body. For this reason alone, the Board should deny Ground 2 of the Petition.

The proposed combination of Brooks with Takeuchi is insufficient for another reason. Takeuchi also does not disclose a fibrous liquid storage body. The fibrous material in passageway 37 in tube 36, is not Takeuchi's liquid storage

body. Ex. 2001, ¶¶54-55. As petitioner and its expert admit, passageway 37 transports liquid. Ex. 1009, ¶¶54, 56; Petition at 24. Takeuchi's liquid storage body is called "liquid container 32" (shown in Figure 1 above). Ex. 2001, ¶55. Liquid container 32 does not include fiber material. At most, Takeuchi describes a fibrous liquid transport tube. That is not what is recited in claim 15 so the combination of Brooks and Takeuchi does not disclosed what is recited in claim 15. Indeed, as set forth above, in IPR2016-01527 Petitioner states that Takeuchi's tube 36/porous material 302 is part of the atomizer, not part of Takeuchi's liquid supply. Ex. 2004, pp. 43-44.

b. A skilled person would not have modified Brooks or combined it with Takeuchi and/or Cook

Petitioner does not assert that one skilled in the art would have included Takeuchi's separate liquid supply in Brooks, let alone how or why one skilled in the art would make that combination. One skilled in the art would not make that combination. The disposable component of the Brooks smoking article is designed to deliver 6 to 10 puffs of aerosol, the equivalent of one traditional cigarette. Ex. 1006, 6:32-36, 10:66-11:2, 18:28-29, 19:64-66, 21:39-48, 22:38-40. As such, there is no need for liquid storage outside the heating element, and hence no need for a separate liquid supply and other additional components to transport liquid from that liquid supply to Brooks heating element. Ex. 2001, ¶¶62-64. As set forth

above Brooks heating element is directly impregnated with liquid. A separate liquid supply is contrary to the fundament design of Brooks.

In contrast to Brooks, Takeuchi touts that its liquid-containing tank can be easily refilled, allowing continuous use without having to replace liquid container 32 or any other components. Ex. 1008, 7:18-30. But because Takeuchi includes a liquid storage separate from its heater, Takeuchi requires a separate component, capillary tube 36, to transport liquid to where it is atomized. That fundamental difference would have dissuaded a skilled person from combining Brooks with Takeuchi. Ex. 2001, ¶¶62-63.

Petitioner's proposed combination of Brooks and Cook is deficient for the same reasons. Petitioner does not assert that one skilled in the art would have included a separate liquid supply in Brooks based on Cook, let alone how or why one skilled in the art would make that combination.

Moreover, Cook has a very different mode of operation from Brooks. Ex. 2001, ¶¶62, 64. Brooks relies on an electrical heating element powered by batteries. Ex. 1006, 7:17-25. Cook's device, however, does not use electricity at all and relies on the application of an external flame to create heat that is absorbed and then radiated by honeycomb 25. Ex. 1007, 5:60-67, 6:6-10. The external flame burns fuel to generate heat that passes through plug 19 to create an aerosol that picks up flavor as it passes through cut tobacco 12a. Ex. 1007, 5:60-6:6.

Given the divergent teachings in the two references, a skilled person would not have combined them. Ex. 2001, ¶¶62, 64.

Petitioner's proposed reasons for its combinations reflect hindsight. Petitioner fails to identify any specific reason with rational underpinning for why a skilled person would have included a separate liquid supply in Brooks. KSR, 550 U.S. at 418.

For all of these reasons, Petitioner has not shown that there is reasonable likelihood that claim 15 is obvious over Brooks alone or in combination with Takeuchi and/or Cook.

4. Dependent Claim 16

The same arguments that apply to claim 15 also apply to claim 16. Thus, Petitioner has failed to meet its burden of showing a reasonable likelihood that claim 16 is obvious.

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 7, 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 7,512 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 7, 2016

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

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