

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. **IPR2016-01307**
Patent No. **8,375,957**

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

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Ex. 1001	U.S. Patent No. 8,375,957 ("957 Patent")
Ex. 1002	File History for U.S. Patent No. 8,375,957 (excerpts)
Ex. 1003	Declaration of Dr. John M. Collins in Support of Petition for <i>Inter Partes</i> Review of U.S. Patent No. 8,375,957 ("Collins")
Ex. 1004	U.S. Patent No. 6,155,268 ("Takeuchi")
Ex. 1005	U.S. Patent No. 2,057,353 ("Whittemore")
Ex. 1006	U.S. Patent No. 4,947,874 ("Brooks")
Ex. 1007	EP Patent Publ. No. 0845220 ("Susa")
Ex. 1008	J.A. Speck, <i>Mechanical Fastening, Joining, and Assembly</i> (1997) (excerpt)
Ex. 1009	<i>McGraw-Hill Dictionary of Scientific and Technical Terms</i> , McGraw-Hill Companies, Inc., (6th ed. 2003) (excerpt)
Ex. 1010	Invalidation Decision (No. WX15007), Patent Reexamination Board of the State Intellectual Property Office of the People's Republic of China (June 13, 2010), with certified translation.
Ex. 1011	U.S. Patent Application No. 2006/0093977 A1 ("Pellizzari I")
Ex. 1012	U.S. Patent No. 7,059,307 ("Pellizzari II")
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Ex. 1026	U.S. Patent No. 6,501,052 ("Cox")
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Ex. 1029	U.S. Patent No. 5,266,746 ("Nishihara")
Ex. 1030	U.S. Patent No. 4,968,263 ("Silbernagel")
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Ex. 2001	Declaration of Richard Meyst in Support of Patent Owner Preliminary Response to Petition for <i>Inter Partes</i> Review ("Meyst")

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Ex. 2003	<i>Logic Tech. Devel., LLC v. Fontem Holdings 1 B.V.</i> , IPR2015-00098, Paper 8, Decision Denying Institution of Inter Partes Review (PTAB May 11, 2015)
Ex. 2004	<i>JT Int'l, S.A.v. Fontem Holdings 1 B.V.</i> , IPR2015-01513, Paper 14, Order Dismissing Petitions (PTAB Dec. 14, 2015)
Ex. 2005	<i>NJOY, Inc. v. Fontem Holdings 1 B.V.</i> , IPR2015-01301, Paper 16, Decision Denying Institution of Inter Partes Review (PTAB Dec. 8, 2015)
Ex. 2006	<i>JT Int'l, S.A.v. Fontem Holdings 1 B.V.</i> , IPR2015-01604, Paper 9, Order Dismissing Petitions (PTAB Dec. 14, 2015)
Ex. 2007	European Patent Publication No. 0358002 ("Brooks")
Ex. 2008	<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. 2009	<i>NJOY, Inc. v. Fontem Holdings 1 B.V.</i> , IPR2015-01302, Paper 15, Decision Denying Institution of Inter Partes Review (PTAB Dec. 9, 2015)
Ex. 2010	Non-Final Office Action mailed March 21, 2014 in U.S. Patent Appl. No. 13/915,427 (US Patent No. 8,863,752)
Ex. 2011	Merriam-Webster's Collegiate Dictionary (11th ed. 2003), select pages
Ex. 2012	Random House Webster's Unabridged Dictionary (2nd ed. 2001, select pages
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	<i>Logic Tech. Devel., LLC v. Fontem Holdings 1 B.V.</i> , IPR2015-00098, Paper 2, Petition for Inter Partes Review (PTAB Oct. 21, 2014)
Ex. 2015	Information Disclosure Statement filed October 4, 2012 in U.S. Patent Appl. No. 12/226,819 (US Patent No. 8,375,957), considered by Examiner November 19, 2012
Ex. 2016	Information Disclosure Statement filed December 8, 2011 in U.S. Patent Appl. No. 12/226,819 (US Patent No. 8,375,957), considered by Examiner December 14, 2011
Ex. 2017	Information Disclosure Statement filed May 9, 2012 in U.S. Patent Appl. No. 12/226,819 (US Patent No. 8,375,957), considered by Examiner July 30, 2012

I. INTRODUCTION

Nu Mark LLC ("Petitioner") filed a Petition for *Inter Partes* Review (IPR) of claims 1, 3, 6-11, 14, 16-18, and 21-23 of U.S. Patent No. 8,375,957 ("957 Patent;" Ex. 1001) on June 28, 2016. Paper No. 1 ("Petition"). Petitioner asserts that claims 1, 3, 6-11, 14, 16-18, 22, and 23 of the '957 Patent are obvious over U.S. Patent No. 4,947,874 ("Brooks;" Ex. 1006) in view of U.S. Patent No. 2,057,353 ("Whittemore;" Ex. 1005) (Ground 1), and that claim 21 is obvious over Brooks in view of Whittemore and U.S. Patent No. 5,177,424 ("Connors;" Ex. 1024) (Ground 2). Petition at 13. Petitioner does not challenge the patentability of claims 2, 4, 5, 12, 13, 15, 19, 20, and 24.

Fontem Holdings 1 B.V. ("Patent Owner") requests that the Petition be denied because Petitioner has failed to establish "that there is a reasonable likelihood that they would prevail with respect to at least 1 of the claims challenged in the petition" under 35 U.S.C. § 314(a). Petitioner's proposed combination of Brooks and Whittemore lacks several limitations of the '957 Patent claims, including a solution storage area, screwthread electrodes, and an atomizer having a heater coil wound around a porous component. Further, a person of ordinary skill in the art (POSITA) would have had no motivation to combine Brooks, Whittemore, and Connors in the manner proposed by Petitioner.

First, all of the challenged '957 Patent claims recite an electronic cigarette that includes a "solution storage area" and an "atomizer." Petitioner relies on Brooks for both limitations. However, because Brooks is directed to a disposable cigarette designed for a single use (i.e., "the 6 to 10 puff life of a typical cigarette," see Brooks at 4:5-6¹), Brooks does not disclose and has no need for a solution storage area separate from the atomizer. Instead, Brooks discloses directly impregnating a porous heating element (i.e., atomizer) with liquid.

Second, all of the challenged '957 Patent claims require screwthread electrodes on an end of both the atomizer assembly housing and the battery assembly housing. These screwthread electrodes serve to provide a mechanical and electrical connection between the two housings. Petitioner acknowledges that Brooks does not disclose the use of screwthreads, let alone screwthread electrodes, but asserts that it would have been obvious to adapt Brooks to include the threaded electrode of Whittemore in place of Brooks' plug connector. However, the screwthreads in Petitioner's proposed device are not screwthread electrodes

¹ Brooks lists the puff range for its device as 6 to 10 puffs (4:2-6), 6 puffs or more (4:29-31, 10:67), and "preferably at least about 6 puffs, more preferably at least about 10 puffs" (6:34-36). The examples utilize the disclosed device to generate 10 puffs (18:29, 19:65, 21:38, 22:49) or 12 puffs (21:40).

because they do not provide an electrical connection. Instead, Petitioner's proposed combination retains the pins/prongs of Brooks' plug connector, which are shown extending into the threaded receptacle on the reusable controller. See, e.g., Petition at 35. Because the screwthreads in Petitioner's proposed combination do not provide an electrical connection, they cannot be screwthread electrodes.

Finally, all of the challenged '957 Patent claims recite an atomizer that includes "a heater coil wound around a porous component." Petitioner asserts that Brooks discloses a wire heater coil. However, there is no such disclosure in Brooks, and a wire heater coil would not be compatible with the surface area requirements set forth by Brooks for its heating element. In the alternative, Petitioner asserts that it would have been obvious to adapt Brooks based on Whittemore's disclosure of a wire coil wound around a wick. However, Whittemore's wire heater coil wound around a wick is designed to draw liquid to be vaporized from a separate liquid storage to the heater. Because Brooks discloses that liquid is impregnated directly into its heater, there is no reason to incorporate Whittemore's wire heater coil into Brooks. Petitioner's generic assertion that the combination would improve heating efficiency is insufficient to provide motivation, and has already been repeatedly rejected by the Board in other IPRs. Ex. 2013, p. 12; Ex. 2002, p. 19.

Since Petitioner fails to establish a reasonable likelihood that any of the claims of the '957 Patent are unpatentable, Patent Owner requests that the Board deny *inter partes* review for any claim.

II. THE '957 PATENT

The '957 Patent issued from U.S. Patent Appl. No. 12/226,819, filed January 15, 2009. The '957 Patent was previously involved in IPR No. 2015-00098, which the Board declined to institute, and IPR No. 2015-01513, which terminated via settlement prior to institution. Ex. 2003, 2004. Related U.S. Patent No. 8,863,752 ("752 Patent") was previously involved in IPR No. 2015-01301, which the Board declined to institute, and IPR No. 2015-01604, which terminated via settlement prior to institution. Ex. 2005, 2006.

Petitioner notes that the '957 Patent claims priority to a PCT application published as WO2007/131450, which in turn claims priority to Chinese Patent Appl. No. 200620090805.0. Petition at 12. As further noted by Petitioner, claims 1-5 and 7-20 of that Chinese application were invalidated by the Patent Reexamination Board of the State Intellectual Property Office of the People's Republic of China. Petition, at 12, 15, 30. Invalidation of certain claims of the Chinese patent should have no weight on the Board's decision whether to institute in the present proceeding because foreign patent determinations are non-binding in determining US patents and patent law. *Quad/Tech, Inc. v. Q.I. Press Controls*

B.V., 701 F.Supp.2d 644, 655 (Fed. Cir. 2010) (court held that defendant's attempt to rely on a German invalidation decision on the related German patent was "specious," and that a foreign decision "has no application" in the United States and "is not entitled to any deference.").

In one embodiment, the '957 Patent discloses an electronic cigarette comprising separate battery and atomizer assemblies which are connected via mating screwthread electrodes located at one end of the battery and atomizer assembly housings. These corresponding screwthread electrodes provide a secure mechanical and electrical connection between the two assemblies and allow for easy disassembly/interchangeability. Ex. 2001 ("Meyst"), ¶¶11, 23.

Figs. 2A and 3 of the '957 Patent, below (annotations added), illustrate embodiments of the battery and atomizer assemblies, respectively.

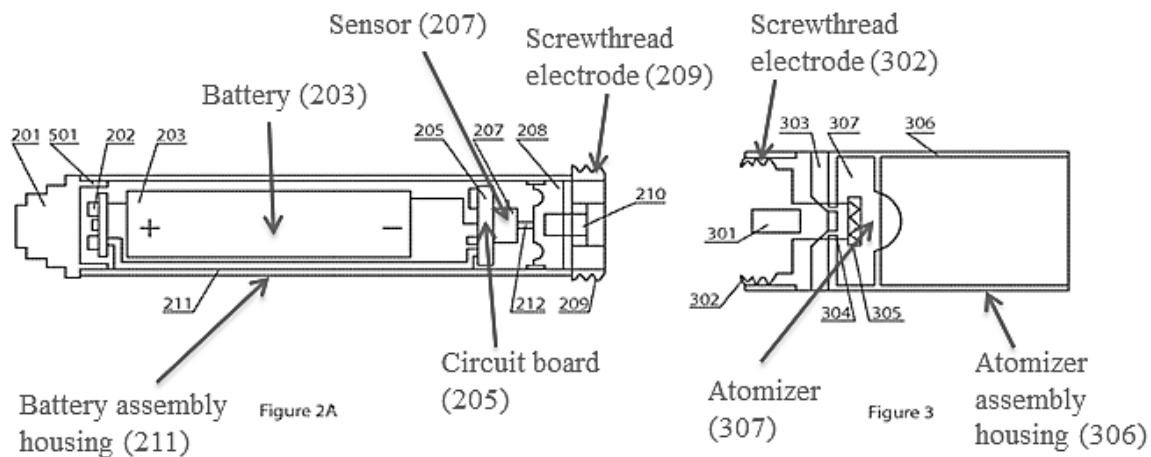
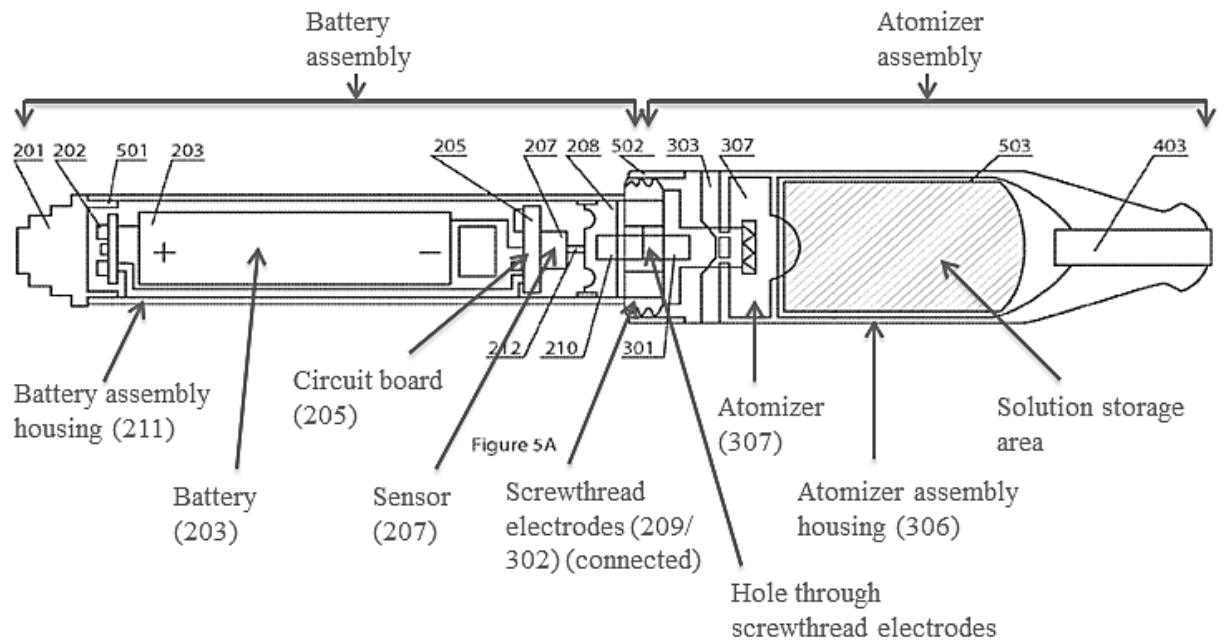


Fig. 5A of the '957 Patent, below (annotations added), illustrates how the atomizer and battery assemblies connect via the screwthread electrodes to form the

complete electronic cigarette. The battery "electrifies the heating body (305) inside the atomizer (307) through MOSFET electric circuit board (205) as well as the internal and external thread electrodes (302, 209), so that the heating body (305) inside the atomizer (307) produces heat." '957 Patent, 4:2-6, 5:16-20. In certain embodiments, screwthread electrodes 209 and 302 are "gold-coated stainless steel or brass." '957 Patent, 3:27-29, 42-44.



The three independent claims of the '957 Patent recite an "electronic cigarette or cigar" (claims 1 and 10) or "electronic cigarette" (claim 23) comprising "a battery assembly housing" and "an atomizer assembly housing." The atomizer assembly housing comprises an "atomizer including a heater coil wound around a porous component." The battery and atomizer assembly housings each includes a "screwthread electrode" on one end, and these screwthread electrodes serve to

connect the two housings. In claim 1, each screwthread electrode has a "hole through its center." The recited devices further comprise a "solution storage area" located within the atomizer assembly housing (claims 1 and 23) or in a separate "solution assembly" (claim 10).

III. PERSON OF ORDINARY SKILL IN THE ART

A POSITA with respect to the '957 Patent has a mechanical or electrical engineering degree, industrial design degree, or a similar technical degree, or equivalent work experience, and 5–10 years of working in the area of electromechanical devices, including medical devices. Meyst, ¶15. Petitioner asserts that a POSITA has "a Bachelor of Science degree in mechanical engineering, or a similar degree, along with at least 3-5 years of experience in designing and developing handheld devices with thermal management and fluid handling technologies." Petition at 22. Under either definition, Petitioner has failed to meet its burden.

IV. CLAIM CONSTRUCTION

A. "Screwthread Electrode"

Patent Owner's Construction	Petitioner's Construction
a projecting helical rib of a screw formed from a conductor for passing electricity that mates with a corresponding groove between	a helical fastener or connector that includes an electrical conductor for passing electric current (Petition at 21)

projecting helical ribs of a screw formed from a conductor for passing electricity	
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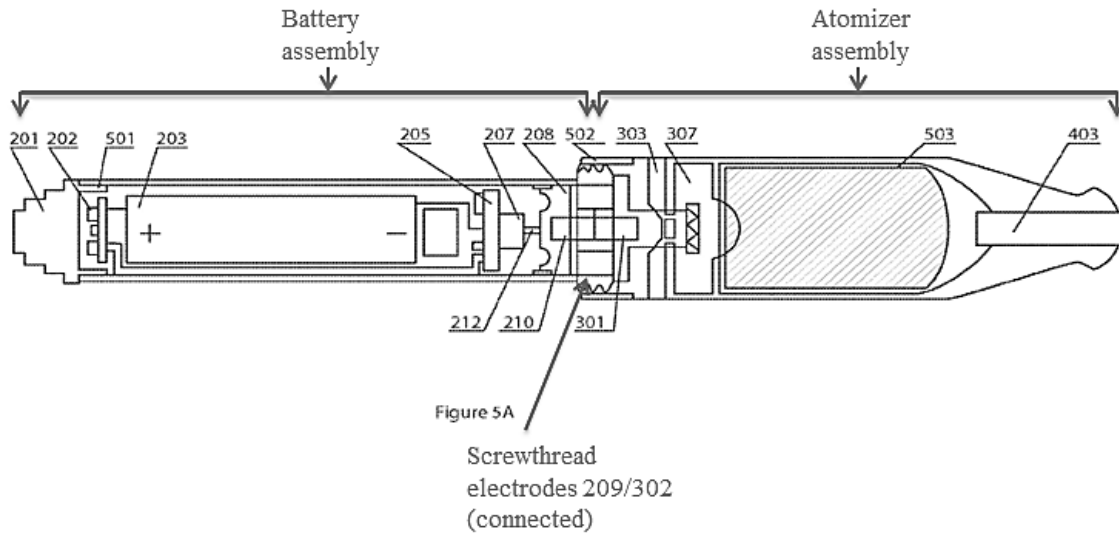
All of the challenged '957 Patent claims recite "screwthread electrodes" on an end of both the atomizer and battery assembly housings, with the screwthread electrodes serving to connect the atomizer and battery assemblies. Every occurrence of the claim term "screwthread" modifies the term "electrode." As discussed below, an electrode is commonly understood to be a conductor of electricity. Thus, a screwthread electrode is a screwthread that conducts electricity, *i.e.*, a screwthread that can create an electrical connection via its threads. This is supported by the claim language requiring that the atomizer and battery assemblies be connected through the screwthread electrodes. The screwthread electrodes electrically connect the battery assembly housing, which includes a source of electricity, to the atomizer housing, which includes an atomizer that must be powered by electricity.

Petitioner's proposed construction is unreasonably broad because it merely requires the screwthread electrode to "include[] an electrical conductor," rather than requiring that the screwthread electrode itself be formed *from* a conductor. Meyst, ¶¶24, 26.

The '957 Patent specification discloses the use of mated screwthread electrodes to create a mechanical and electrical connection between an atomizer

assembly and a battery assembly. For example, Fig. 5A of the '957 Patent, below (annotations added), shows that "[a]n external thread electrode (209) is located in one end of the battery assembly, and an internal thread electrode (302) is located in one end of the atomizer assembly. The battery assembly and atomizer assembly are connected through the screwthread electrode into an emulation cigarette." '957 Patent, 2:63–3:1.

Merriam-Webster's Collegiate Dictionary (11th Ed. 2003) ("Merriam-Webster;" Ex. 2011) and Random House Webster's Unabridged Dictionary (2nd ed. 2001) ("Random House;" Ex. 2012) define "screw thread" as "the projecting helical rib of a screw" and "the helical ridge of a screw," respectively, and define "electrode" as "1: a conductor used to establish electrical contact with a nonmetallic part of a circuit" and "a conductor, not necessarily metallic, through which a current enters or leaves a nonmetallic medium, as an electrolytic cell, arc generator, vacuum tube, or gaseous discharge tube," respectively. Ex. 2011, pp. 401, 1116; Ex. 2012, pp. 628, 1722.



In view of the claims and the specification of the '957 Patent and the extrinsic evidence regarding the ordinary meaning of the terms "screwthread" and "electrode," the broadest reasonable construction of "screwthread electrode" is "a projecting helical rib of a screw formed from a conductor for passing electricity that mates with a corresponding groove between projecting helical ribs of a screw formed from a conductor for passing electricity." Meyst, ¶¶22-26.

B. "Atomizer"

Patent Owner's Construction	Petitioner's Construction
a component or components that convert(s) liquid into aerosol or vapor	no proposed construction

All of the challenged claims of the '957 Patent recite an atomizer assembly housing containing an "atomizer." All of the challenged claims further recite that this atomizer includes a heater coil wound around a porous component, with claims

9 and 11 reciting that this porous component includes a fiber material. Thus, the claims of the '957 Patent show that an "atomizer" may include several different components.

The '957 Patent specification discloses that the "atomizer" is responsible for converting liquid into aerosol or vapor. For example, the '957 Patent states that "[t]he air-liquid mixture sprays onto the heating body (305) [inside the atomizer (307), see '957 Patent, 4:2-6, 5:16-20], gets vaporized, and is quickly absorbed into the airflow and condensed into aerosol, which passes through the air intake hole (503) and suction nozzle (403) to form white mist type aerosol." '957 Patent, 4:13-17, 5:26-31. The specification discloses that the atomizer includes a porous heating body (e.g., "[heating body] may be a porous component directly made of electrically conductive ceramics or PTC (Positive Temperature Coefficient) ceramics and associated with a sintered electrode;" "...cigarette liquid, which soaks the micro-porous ceramics (801) inside the atomizer..."). '957 Patent, 1:52-62, 4:2-9, 4:29-35; 5:16-23. The '957 Patent specification also discloses that the atomizer may include additional components that play a direct role in atomization, e.g., a wire wound around the heating body (the heating body "is made of the micro-porous ceramics on which nickel-chromium alloy wire, iron-chromium alloy wire, platinum wire, or other electrothermal materials are wound"). '957 Patent, 1:57-60, 4:29-32. This is further illustrated by Figs. 8-11 of the '957 Patent, below,

which show diagrams of capillary impregnation and spray atomizers 307

containing heating body 305 and micro-porous ceramics 801.

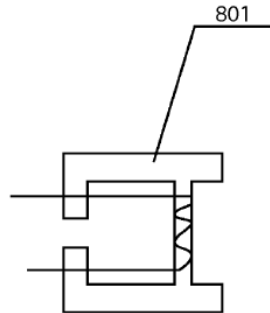


Figure 8

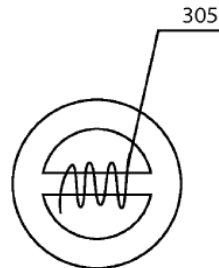


Figure 9

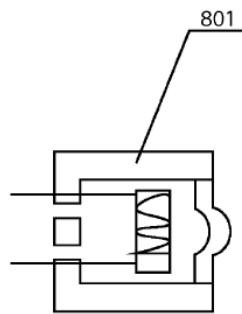


Figure 10

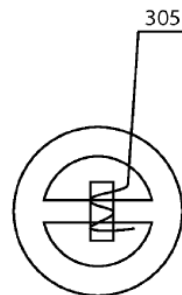


Figure 11

The extrinsic evidence confirms that an atomizer functions to convert liquid into aerosol or vapor. Merriam-Webster 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. 2011, p. 78.

Similarly, Random House defines "atomize" as "2. to reduce to fine particles or spray," and defines "atomizer" as "an apparatus for reducing liquids to a fine spray, as for medicinal or cosmetic application." Ex. 2012, p. 132.

In view of the claims and specification of the '957 Patent and the extrinsic evidence regarding the ordinary meaning of the term, the broadest reasonable construction of "atomizer" is "a component or components that convert(s) liquid into aerosol or vapor." Meyst, ¶¶17-21.

V. THE PETITION FAILS TO SHOW A REASONABLE LIKELIHOOD THAT ANY CLAIM OF THE '957 PATENT IS UNPATENTABLE

Petitioner proposes two grounds for unpatentability of claims 1, 3, 6-11, 14, 16-18, and 21-23 of the '957 Patent. Petition at 13. In Ground 1, Petitioner asserts that claims 1, 3, 6-11, 14, 16-18, 22, and 23 are obvious over Brooks in view of Whittemore. In Ground 2, Petitioner asserts that claim 21 is obvious over Brooks in view of Whittemore and Connors. As addressed in detail below, Petitioner fails to show a reasonable likelihood of prevailing on either of these grounds. Since Petitioner fails to establish a reasonable likelihood that any of the claims of the '957 Patent are unpatentable, the Board should deny *inter partes* review for any claim.

A. Petitioner's Grounds for Unpatentability are Redundant Over Art Considered by the Examiner and Grounds Previously Denied by the Board

Whittemore and the disclosure of Brooks were both considered by the Examiner during prosecution of the '957 Patent. Whittemore was included in an Information Disclosure Statement (IDS) filed October 4, 2012, and is the second

U.S. patent cited on the title page of the '957 Patent. Ex. 2015, p. 1, "U.S. Patents," Cite No. 2. In addition, a 102(b) rejection based on Whittemore was overcome during prosecution of the related '752 Patent. Ex. 2010. As noted by Petitioner, Brooks itself was not used "as a reference in any office actions during prosecution of the '957 Patent." Petition at 14. However, the Examiner considered a reference with cumulative disclosure to Brooks.

A European counterpart of Brooks, EP Publ. No. 0358002 (Ex. 2007), was included in an IDS filed October 4, 2012, in the '957 Patent, and was considered by the Examiner. Ex. 2015, p. 4, "Foreign Patent Documents," Cite No. 9. This EP application was filed August 15, 1989, and claims priority to the application giving rise to Brooks (US Patent Appl. No. 07/242,086). Ex. 2007, Title Page. The disclosure of the EP application is largely identical to that of Brooks.

The '957 Patent was subject to two previous IPR petitions, one of which the Board declined to institute (IPR No. 2015-00098; "'098 IPR") and one of which terminated prior to an institution decision (IPR No. 2015-01513; "'513 IPR"). Ex. 2003, 2004. Petitioner argues that its asserted grounds are not redundant over those set forth in the '098 and '513 IPRs because those proceedings cited U.S. Patent Publ. No. 2007/0267031 ("Hon '031") rather than Brooks. Petition at 14-16. According to Petitioner, Brooks is different from Hon '031 in that it discloses battery and atomizer assemblies organized into separate detachably connected

components. Petition at 15. Petitioner acknowledges that Whittemore and Connors were cited in the previous IPRs, but asserts that the Board did not address those references because it found no articulated reason for modifying the primary reference. Petition at 15.

Contrary to Petitioner's characterization, the underlying arguments in the present petition are redundant over those set forth in the '098 IPR. The petitioner in the '098 IPR asserted that independent claims 1 and 23 of the '957 Patent were obvious over Hon '031 in view of Whittemore, U.S. Patent No. 3,200,819 ("Gilbert;" Ex. 1013 in present IPR), and U.S. Patent No. 5,894,841 ("Voges;" Ex. 1014 in present IPR), and that independent claim 10 was obvious over Hon '031 in view of Gilbert and Whittemore. Ex. 2014 at 4. The '098 IPR petitioner asserted that it would have been obvious to incorporate separable battery and atomizer assemblies into Hon '031, and that once a POSITA had taken this step it would have been obvious to connect the separate assemblies via a screwthread electrode as allegedly disclosed in Gilbert. Ex. 2014 at 20, 27-30. However, no credible motivation was provided for utilizing a screwthread electrode in the proposed device rather than a simpler and cheaper connection such as a plug or wires. The '098 IPR petitioner's argument for using a screwthread electrode essentially boiled down to the fact that screwthread electrodes "had long been known." *Id.* The Board denied institution of the '098 IPR. Ex. 2003.

Petitioner in the current proceeding makes essentially the same argument, with the difference being that Petitioner has identified a reference (Brooks) that teaches separate battery and atomizer assemblies. However, inclusion of Brooks does not change the crux of the underlying argument, namely that it would have been obvious to use a screwthread electrode to connect battery and atomizer assemblies in an electronic cigarette because screwthread electrodes were known in the art. The redundancy between the present arguments and those presented in the '098 IPR is illustrated by Petitioner's reliance on Gilbert and Voges as secondary references.

The petitioner in the '098 IPR also argued that Whittemore "taught to use a heater coil around a porous component," and that it would have been obvious to wrap the heating element of Hon '031 around the porous body of its atomizer because doing so "increases the contact area between the wick and heating coil." Ex. 2014 at 20-21, 38-39. Petitioner in the present proceeding makes essentially the same argument by asserting that it would have been obvious to "adapt Brooks' heating component to coil around the [porous] substrate as taught by Whittemore" because "wire coils promote efficient heat transfer," and because such a modification "would be nothing more than the application of known techniques...to a similar structure...." Petition at 40-42.

The Board has expressly criticized the approach of advancing the same ground based on an allegedly different set of references. For example, in IPR No. 2015-01423, the Board concluded that but for substituting a new reference for an old reference, the petitioner submitted "substantially the same" arguments as those in a prior IPR. The Board noted that the petitioner failed to explain why the disclosure of the new reference is "substantively and meaningfully different" from the disclosure of the old reference. Finally, the Board disallowed the petitioner's attempt to take "a second bite at the apple [that] wastes the Board's limited resources and imposes undue burden on the Patent Owner." Ex. 2008 at 7-8.

B. Petitioner's Expert's Testimony is Conclusory, Incomplete, and Lacks Credibility

To support its arguments, Petitioner provides a declaration from Dr. John Collins ("Collins;" Ex. 1003). Collins' testimony largely mirrors the assertions set forth in the Petition, providing a series of conclusory statements without significant original analysis. As such, Collins' testimony is riddled with the same shortcomings and inconsistencies as the Petition itself, which are discussed in detail below at (V)(C)-(D).

Collins asserts that it would have been obvious to incorporate the screwthread electrode of Whittemore into the smoking article of Brooks. Collins, ¶¶66-77. Despite acknowledging that "[o]ne should be cautious of using hindsight

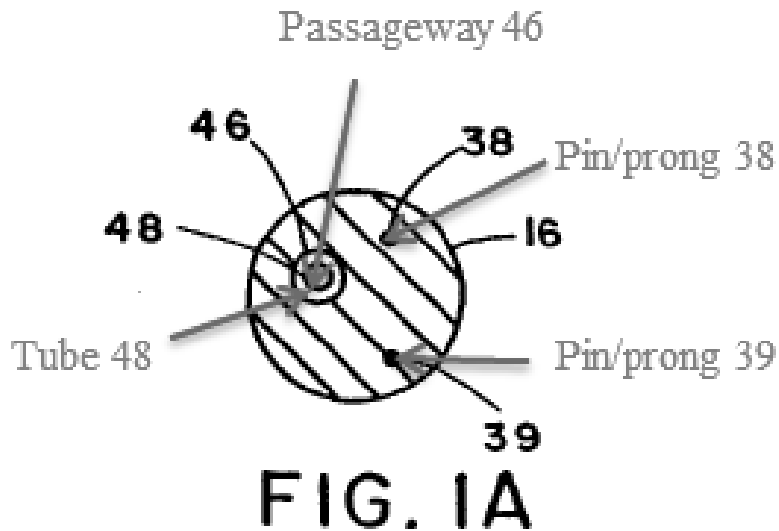
in evaluating whether a claimed invention would have been obvious" (Collins, ¶48), Collins relies entirely on hindsight in formulating his rationale for incorporating a screwthread electrode into the Brooks device. Rather than providing arguments based on the teachings of Brooks, Whittemore, and the state of the art as of the filing date of the '957 Patent, Collins uses the '957 Patent itself as a roadmap for combining Brooks and Whittemore

For example, Collins relies heavily on the fact that screwthread electrodes had been known in the art for many years. Collins, ¶¶72-74. However, Collins does not provide any analysis as to why a POSITA would have been motivated to incorporate a screwthread electrode into the Brooks device specifically, nor does he explain why Brooks itself does not teach or suggest the use of screwthread electrodes if they represented such an attractive and well known alternative. Collins also fails to point out any disclosure in Brooks or any other reference suggesting that the plug-type connector of Brooks was deficient in any way, or that the connectability of the Brooks cigarette cartridge was a concern. Meyst, ¶61.

Collins asserts that a POSITA would have been motivated to replace the plug-in connector of Brooks with mated screwthreads "[b]ecause of the simplicity and ease of assembly and disassembly." Collins, ¶71. This is not a credible motivation, but instead reflects hindsight. Meyst, ¶64. The cigarette component of Brooks' device is designed to be removed and discarded after or 6 to 10 puffs, the

equivalent of one traditional cigarette. Meyst, ¶¶38. Screwthreads and screwthread electrodes are more expensive to manufacture and incorporate into a device than plug-type connectors, and they require a user to line up threads and twist multiple times. Meyst, ¶¶64. There is no credible motivation for a POSITA to replace the plug-type connector of Brooks with a more expensive and labor-intensive alternative. Meyst, ¶¶63-64.

Collins' assertions regarding the proposed combination of Brooks and Whittemore also fail to address the explicit teaching in Brooks that passageway 46 and tube 48 are offset from the center of the device. Brooks, 8:40-42. This is illustrated in Fig. 1A of Brooks, below (annotations added). A POSITA would recognize that offset components are incompatible with the proposed screwthread electrode, since the slightest amount of over- or under-tightening would result in misalignment and twisting the screwthreads to engage the cigarette and controller components would likely break tube 48. Meyst, ¶¶71-72. Further, since Brooks discloses that tube 48 is offset from the center of the device and set away from pins/prongs 38 and 39 (see annotated Fig. 1A, below), Collins' proposed combination cannot meet the limitations of claims 3, 6-9, and 22 of the '957 Patent requiring that the screwthread have a hole through its center. Meyst, ¶¶59-60. Collins fails to address any of these shortcomings in his conclusory analysis.



Collins' testimony is further undermined by its inconsistency. For example, Collins' mirrors Petitioner's assertion that the "porous substrate" disclosed at Brooks 8:1 simultaneously meets two mutually exclusive claim limitations, namely: (1) a solution storage area separate from the atomizer (see, e.g., Collins, ¶53) and (2) a porous component of an atomizer around which a heater coil is wound (see, e.g., Collins, ¶78, A-23). Meyst, ¶74. Collins' willingness to adopt Petitioner's contradictory positions reflects his hindsight analysis and lack of credibility.

C. Ground 1: Claims 1, 3, 6-11, 14, 16-18, 22, and 23 are Not Obvious over Brooks in View of Whittemore

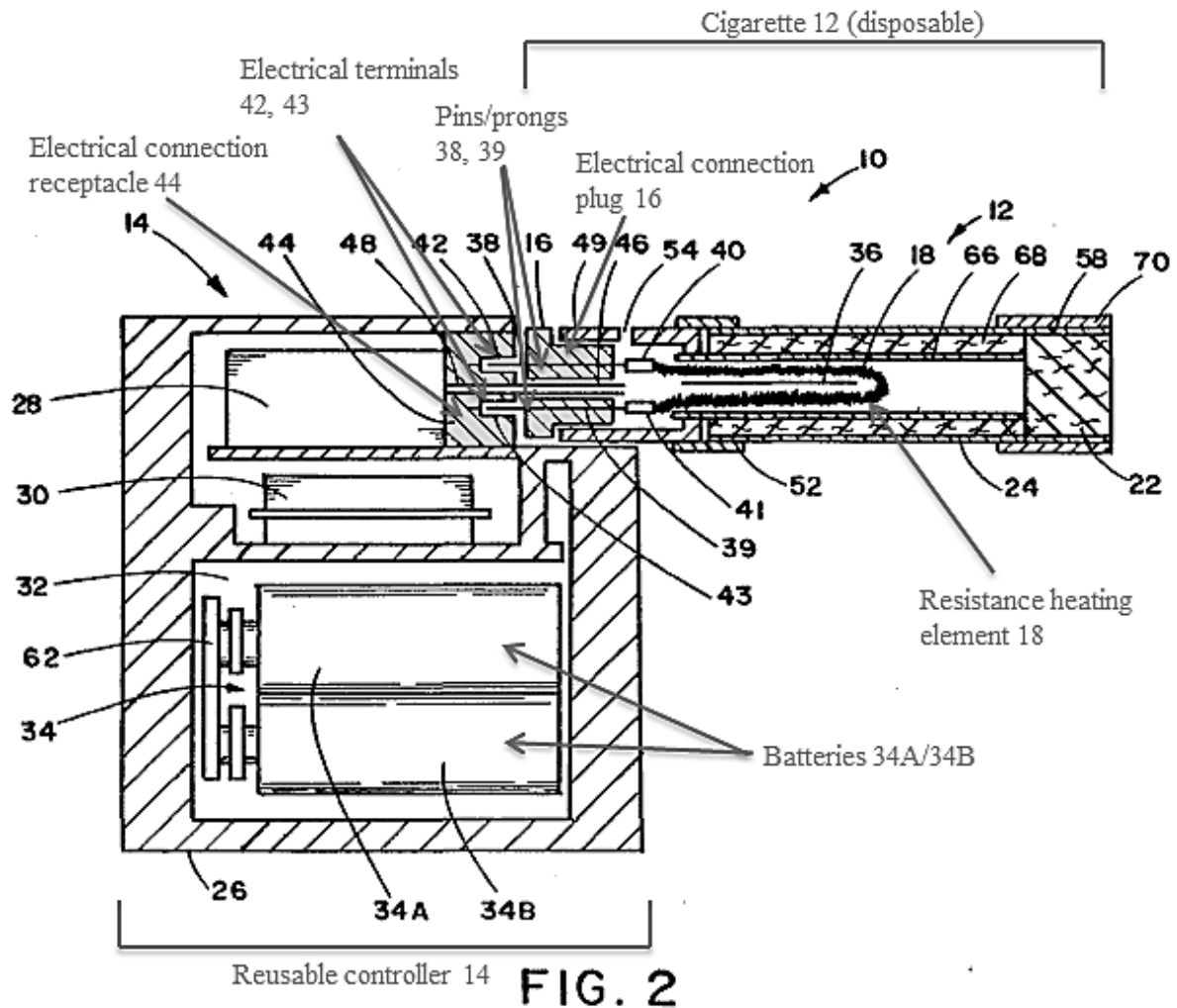
1. Brooks

Brooks discloses a "smoking article" made up of a "disposable portion" ("cigarette 12") and a "reusable controller" ("hand-held controller 14"). Brooks,

Abstract. In all of the disclosed embodiments, the cigarette and controller components are electrically connected via insertion of pins or prongs into a plug.

Fig. 2 of Brooks, below (annotations added), shows an embodiment in which the disposable portion includes "electrical connection plug 16" (light blue in annotated Fig. 2 below) and "resistance heating element 18." Brooks, 7:15-18.

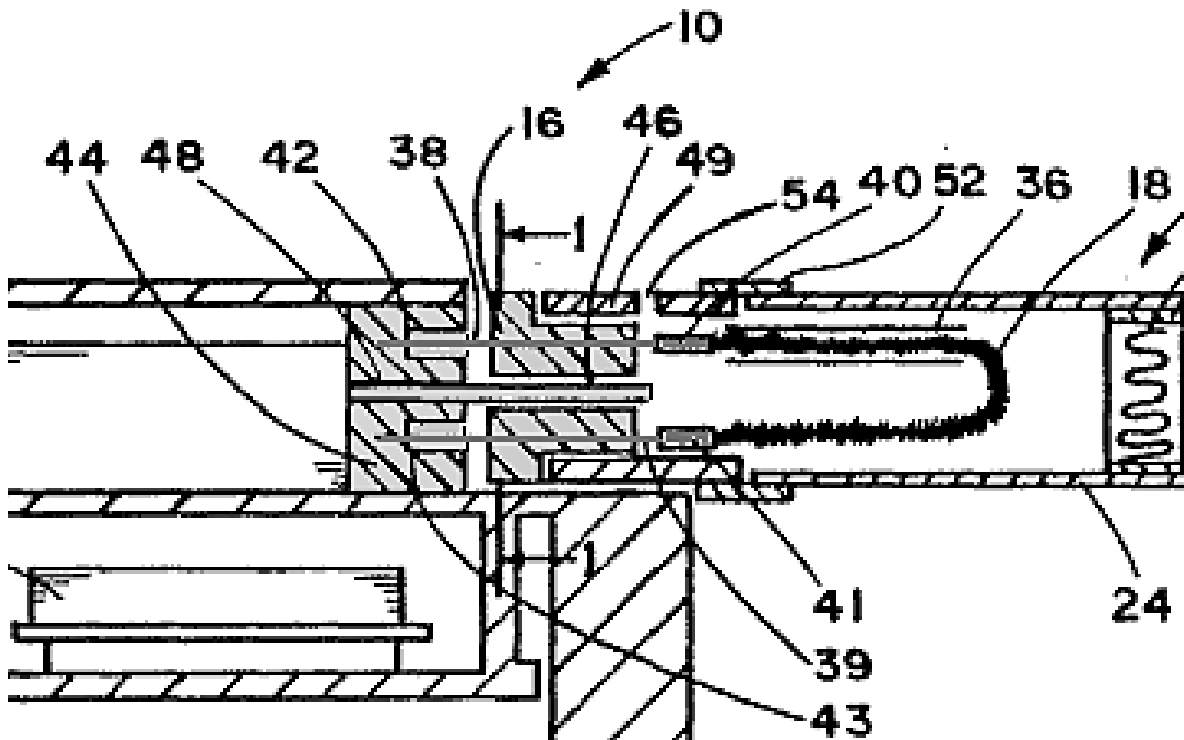
"Electrical connection plug 16 preferably is manufactured from a resilient, electrically insulative material such as a thermoplastic material," and "includes two electrical connector pins or prongs 38, 39 connected to the ends of heating element 18 via connectors 40, 41." Brooks, 8:31-36. Plug 16 also includes passageway 46. Brooks, 8:38-40. The reusable controller component includes "chamber 32 into which battery power supply 34) is inserted," as well as "insulative receptacle 44 (green in annotated Fig. 2 below) which includes plug-in connectors 42, 43 for engagement with prongs 38, 39 of plug 16." Brooks, 7:15-25; 9:41-43.



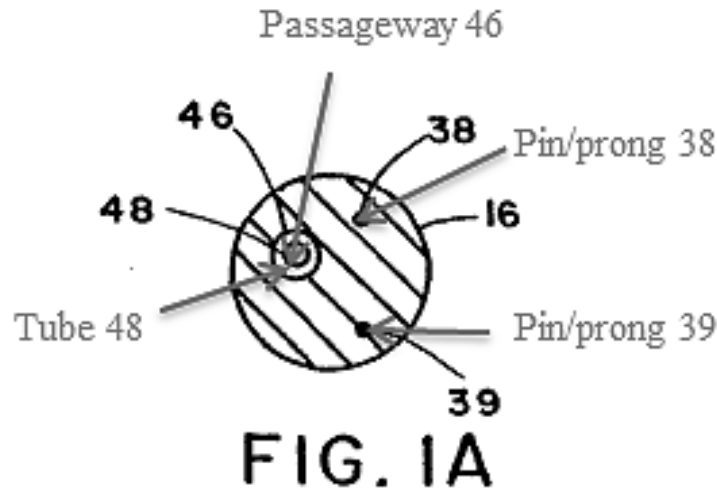
To connect the two portions of the device, "the user inserts the plug 16 of the cigarette 12 into the receptacle 44 of the controller 14," such that "pins 38, 39 engage with electrical terminals 42, 43 located in electrical connection receptacle 44 of the controller 14." Brooks, 8:36-38, 10:34-35. This connection "provides electrical connection of the resistance heating element 18 with the switch 28, the control circuit 30 and the batteries 34A and 34B." Brooks, 10:35-38. When the components are connected, tube 48 is "in airflow communication with the internal

region of the cigarette" and "with pressure sensing switch 28, so that changes in air pressure which occur within the cigarette during draw can be sensed by the switch." Brooks, 8:38-40, 9:43-50.

The annotated figure below provides a closer view of that portion of the Brooks device containing electrical connection receptacle 44 (green), electrical connection plug 16 (light blue), passage 46/tube 48 (orange), connectors 40 and 41 (purple) on the ends of heating element 18, pins/prongs 38 and 39 (red), and electrical terminals 42 and 43 (gray).



As shown in Fig. 1A of Brooks, below (annotations added), "pins 38, 39 and passageway 46 are offset with respect to the longitudinal axis of plug 16." Brooks, 8:40-42.



Brooks does not contemplate a solution storage area. Meyst, ¶¶40-52. Instead, "[r]esistance heating element 18" is impregnated with "liquid aerosol forming substances," specifically "enough aerosol forming substances to provide aerosol for 6 to 10 puffs, or more." Brooks, 4:22-31. Upon heating, the heating element volatilizes the aerosol forming substances, producing an aerosol which is inhaled by a user. In order to facilitate liquid impregnation, the heating element "typically is a porous material." Brooks, 4:12-25, 7:26-30, claims 5, 30, 78, 108. "Other suitable heating elements include porous metal wires or films; carbon yarns, cloths, fibers, discs or strips; graphite cylinders, fabrics or paints; microporous high temperature polymers having moderate resistivities; porous substrates in

intimate contact with resistance heating components; and the like." Brooks, 7:65-8:3.

2. Whittemore

Whittemore discloses a "vaporizing unit[]" for therapeutic apparatus."

Whittemore, p. 1, left col., ll. 1-2. This device, illustrated in Fig. 2 of Whittemore below, resembles a lightbulb attached to a flashlight body. Liquid medicament x is carried along wick D by capillary action, then vaporized by filament/heating element 3. Whittemore, p. 1, left col., ll. 19-28. Terminal plug B "is adapted to be plugged into or positioned in a terminal socket forming part of an electric circuit, such, for example, as the receptacle or socket of an ordinary flashlight C."

Whittemore, p. 1, left col., ll. 39-45. Fig. 1 of Whittemore, below, illustrates terminal plug B plugged into ordinary flashlight C. Electricity flows to filament/heating element 3 via conductors 1 and 2, wherein "conductor 1 is soldered to the inner surface of the metal shell 7 of the plug B, and the other conductor 2 is soldered to the inner surface of the center conducting button 8 of the plug." Whittemore, p. 1, left col., ll. 45-49. Fig. 2 of Whittemore, below (annotations added), illustrates the disclosed vaporizing unit, while Fig. 1 of Whittemore, below, illustrates this vaporizing unit screwed into flashlight C.

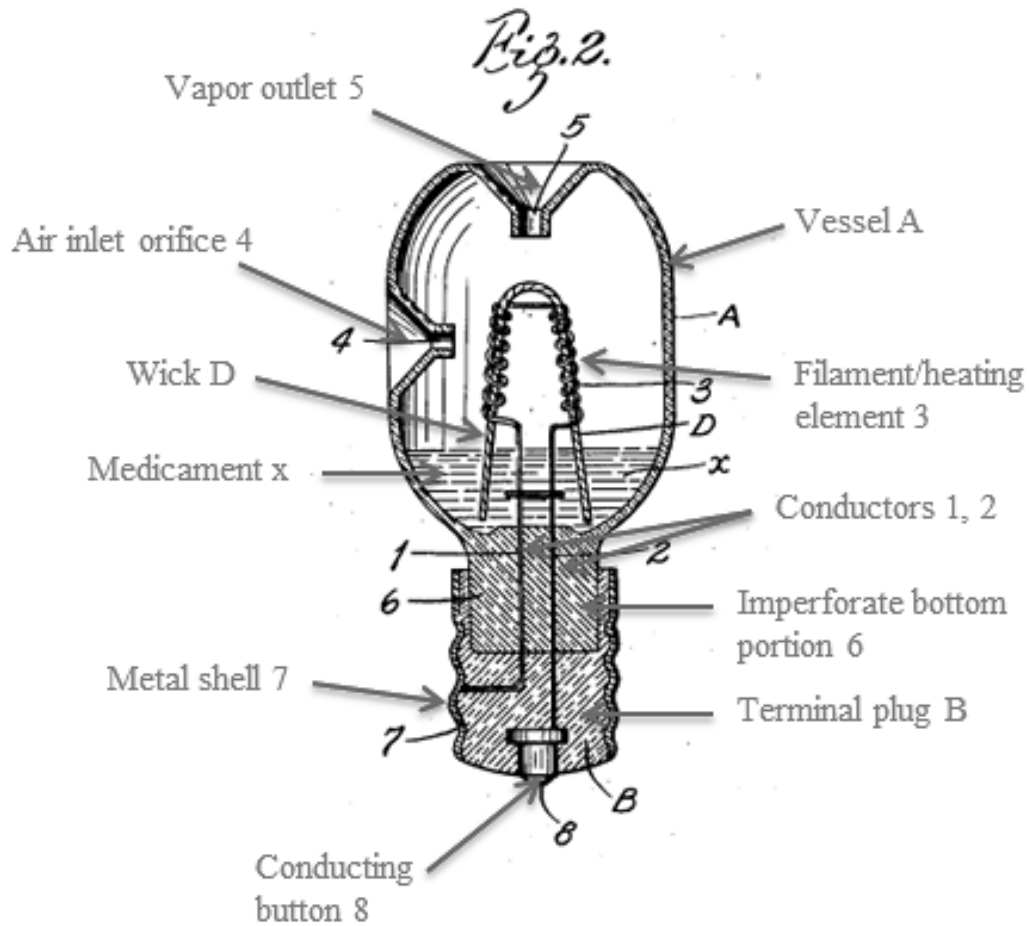
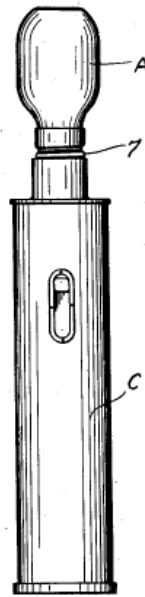


Fig. 1.



3. Claims 1, 3, 6-11, 14, 16-18, 22, and 23 of the '957 Patent are Not Obvious over Brooks in View of Whittemore

As detailed below, Brooks and Whittemore fail to disclose, either alone or in combination, all of the limitations of the challenged '957 Patent claims. First, the combination of Brooks and Whittemore proposed by Petitioner lacks a solution storage area separate from the atomizer as required by all of the challenged '957 Patent claims. Second, Petitioner's proposed combination lacks screwthread electrodes as required by all of the challenged '957 Patent claims, much less screwthread electrodes having a hole through their center as required by challenged claims 3, 6-9, and 22. A POSITA would not have been motivated to incorporate the Whittemore screwthread electrode into the device of Brooks, and such a

combination would be inoperable. Finally, Brooks does not disclose an atomizer that includes a heater coil wound around a porous component as required by all of the challenged '957 Patent claims, and a POSITA would not have combined Brooks and Whittemore to arrive at such an atomizer.

a. Brooks Does Not Teach or Suggest a Solution Storage Area as Required by Independent Claims 1, 10, and 23 and Dependent Claims 3, 6-9, 11, 14, 16-18, and 22

All of the challenged claims of the '957 Patent recite the "atomizer" and the "solution storage area" as two separate components within the atomizer assembly housing (see, e.g., claims 1 and 23: "an atomizer assembly comprising: an atomizer assembly housing...an atomizer, and a solution storage area in the atomizer assembly housing..." and claim 10: "an atomizer assembly comprising: an atomizer assembly housing...an atomizer in the atomizer assembly housing...; and a solution assembly, which comprises...a solution storage area..."). Meyst, ¶40. This is consistent with the '957 Patent specification, which teaches the solution storage area as a store of liquid that will eventually be transferred to the atomizer for aerosolization. Meyst, ¶40.

Petitioner relies on Brooks for the claim limitation of "a solution storage area." Petition at 57-59. However, Brooks does not teach or suggest any embodiment in which liquid is stored outside the atomizer. Meyst, ¶41. Instead, liquid is impregnated directly into the heating element. Based on the disclosure of

Brooks, a POSITA would understand that the atomizer in Brooks includes this "heating element." Meyst, ¶42. For example, Brooks 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." Brooks, 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." Brooks, 1:57-61, 3:15-24.

Brooks consistently describes direct impregnation of its atomizer with liquid. Meyst, ¶¶43-45. 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." Brooks, 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." Brooks, 8:4-8.

Working examples 1, 3, and 4 all refer to impregnating the heating element with liquid aerosol forming substance. Brooks, 17:1-9, 19:16-22, 20:14-22; Meyst, ¶¶43, 45. 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 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." Brooks, 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.

Brooks, 4:18-31.

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. Meyst, ¶47. 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." Brooks, 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." Brooks, 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). Brooks, 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. Meyst, ¶47.

Petitioner ignores Brooks' clear and consistent disclosure of direct impregnation of liquid onto the atomizer, instead twisting the Brooks disclosure to conjure an embodiment that is not disclosed. According to Petitioner, "Brooks

discloses two embodiments for storing and atomizing liquid." Petition at 57, citing Brooks, 7:65-8:3. In the first alleged embodiment, "liquid is stored within the atomizer (*i.e.*, the heating component doubles as a porous component)." *Id.* With regard to this alleged first embodiment, Petitioner states that "the heating element is impregnated with 'aerosol forming' liquid" and "can take several forms, including metal wires, and may include a variety of substances for storing liquid." Petition at 23-24, citing Brooks, 4:22-25, 7:65-8:3. This "first embodiment" is consistent with the disclosure of Brooks.

The second alleged embodiment put forth by Petitioner is wholly unsupported by Brooks. Meyst, ¶¶48-51. In this alleged embodiment, "a resistant heating component is in 'intimate contact' with a 'porous substrate' (*i.e.*, the heating *element* includes a heating resistance heating *component* that is distinct from the porous component)." Petition at 57, citing Brooks, 7:65-8:3. Petitioner asserts that in this second embodiment "the heating element may be a 'resistance heating component' that is in contact with a separate 'porous substrate.'" Petition at 24, citing Brooks, 8:1-3. Petitioner purports to adopt this alleged second embodiment, then asserts that "the space occupied by this porous substrate constitutes a 'solution storage area' because this area is a space wherein solution is stored." Petition at 57-58. In other words, Petitioner appears to interpret the "porous substrate" at 8:1 of Brooks to be the solution storage area, and the "resistance heating component"

at 8:2 to be the atomizer. Petitioner's expert, Collins, parrots Petitioner's arguments regarding the so-called second embodiment without providing any substantive analysis. Collins, ¶53.

Petitioner never clearly delineates what it considers to be the atomizer in Brooks, instead merely stating that it "include[es] at least the heating component of heating element 18." Petition at 59, 73. This imprecision is necessary for Petitioner to reach its conclusion that the "resistance heating component" of Brooks is the atomizer, while the "porous substrates in intimate contact with" this resistance heating component constitutes a separate solution storage area. However, as discussed above, a POSITA would understand that the atomizer of Brooks comprises the entire "heating element," while the vaguely referenced "heating component" (a term which appears only once in Brooks) constitutes a subpart of the heating element (and hence a subpart of the atomizer). Meyst, ¶51.

There is nothing in the disclosure of Brooks to support Petitioner's assertion that the "heating component" in and of itself constitutes an atomizer, and that assertion is contradicted by Petitioner's later statements regarding the alleged heater coil and porous component of Brooks (see (V)(C)(3)(f), below). The lone Brooks passage cited in support of Petitioner's alleged second embodiment lists "porous substrates in intimate contact with resistance heating components" as an example of a "suitable heating element" ("*[o]ther suitable heating elements*

include porous metal wires or films; carbon yarns, cloths, fibers, discs or strips; graphite cylinders, fabrics or paints; microporous high temperature polymers having moderate resistivities; *porous substrates in intimate contact with resistance heating components*; and the like;" Brooks, 7:65-8:3, emphasis added). The "porous substrate" in this passage is explicitly part of the "heating element," i.e., the atomizer, not a solution storage area separate from the atomizer. Meyst, ¶51. A POSITA would recognize that the "resistance heating component" in this passage is also part of the heating element, i.e., the atomizer, because a heating component would be directly involved in converting liquid into aerosol or vapor. Meyst, ¶51.

Petitioner attempts to subvert the plain meaning of the cited Brooks passage by transposing "resistance heating component" and "porous substrate" throughout its arguments. For example, Petitioner states that Brooks' "heating element 18...*takes the form of a resistance heating component in contact with a porous substrate.*" Petition at 54 (emphasis added). Petitioner repeats this sleight of hand later, stating Brooks' "heating element may comprise a 'resistance heating component' that can be in 'intimate contact' with 'porous substrates.'" Petition at 62. However, this is not what the cited Brooks passage says. Instead, Brooks states that "suitable heating elements include...*porous substrates in intimate contact with resistance heating components,*" i.e., the "heating element" includes at

least the "porous substrate." Petitioner's interpretation of the "porous component" in this passage as a solution storage area separate from the atomizer, rather than as a part of the atomizer, is contradicted by the plain meaning of the passage.

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 a 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." Brooks, 4:12-24, 7:26-30.

In summary, Brooks uses the term "heating element" to refer to part of its atomizer, a usage consistent with the art generally (as illustrated by Brooks' own background section). Meyst, ¶51. Brooks teaches that aerosol forming liquid is impregnated directly into the heating element, which preferably has a porous surface to facilitate this impregnation. Meyst, ¶45. Consistent with this teaching, Brooks teaches that in one embodiment the "heating element" includes "porous substrates in intimate contact with resistance heating components." Meyst, ¶¶44, 48. Thus, contrary to Petitioner's assertions, Brooks does not teach a solution

storage area separate from the heating element, i.e., separate from the atomizer, as required by all of the challenged '957 Patent claims. Meyst, ¶52.

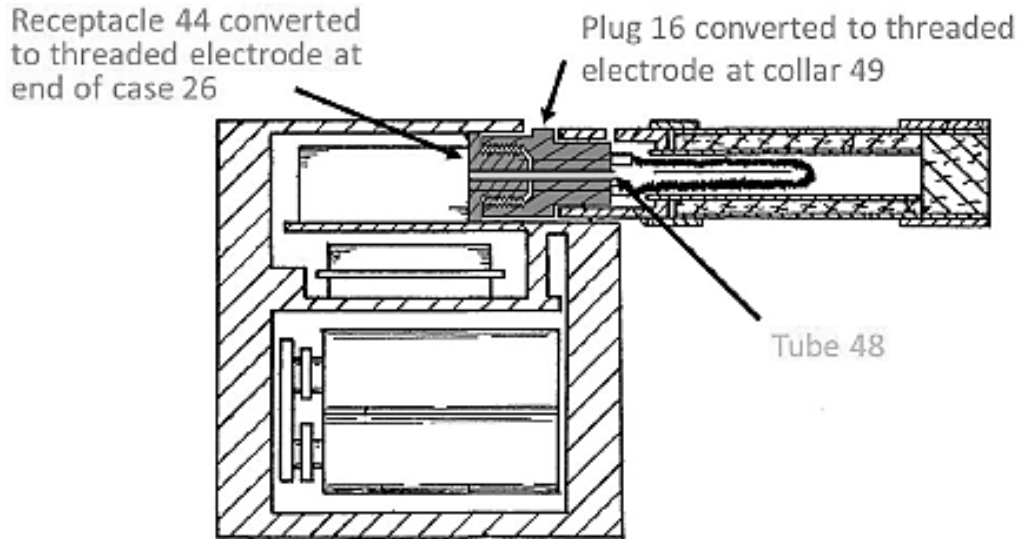
b. The Proposed Combination of Brooks and Whittemore Does Not Include Screwthread Electrodes as Required by Independent Claims 1, 10, and 23 and Dependent Claims 3, 6-9, 11, 14, 16-18, and 22

All of the challenged '957 Patent claims require a screwthread electrode on one end of both the battery and atomizer assembly housings. Those screwthread electrodes provide both a mechanical and an electrical connection between the battery and atomizer assemblies.

Brooks discloses a device with two separable components, namely the disposable portion and the reusable controller. Those components are mechanically and electrically connected by inserting "electrical connector pins or prongs 38, 39" on "electrical connection plug 16" of the disposable portion into "plug-in connectors 42, 43" (also referred to as "electrical terminals 42, 43") on "insulative receptacle 44." Brooks, 7:15-25, 8:33-38; Meyst, ¶54. Brooks does not contemplate the use of a threaded connection between the two components, much less a screwthread electrode. Meyst, ¶54.

Petitioner asserts that "it would have been obvious to a POSA to adapt Brooks to include a threaded electrical connection, as taught by Whittemore." Petition at 30-37, 48-53, 59-61. Petitioner provides the following figure

illustrating an "exemplary embodiment" of its proposed combination of Brooks and Whittemore:



Brooks in view of Whittemore.

Petition at 35, 53, 60.

In this illustration, Petitioner purports to convert "receptacle 44" and "plug 16" of Brooks, both of which are made from insulative, non-conductive materials, to "threaded electrodes." Brooks, 8:31-33, 9:41-43; Meyst, ¶¶54-55.

Petitioner's proposed combination suffers from a critical flaw: its modified connectors do not constitute screwthread electrodes. Meyst, ¶¶55-58.

Screwthread electrodes provide both mechanical and electrical connections between components. Meyst, ¶56. Electricity flows directly through the screwthread electrode, which is made of a conductive material. Meyst, ¶56.

Petitioner makes no attempt to explain how the "threaded electrodes" it incorporates in place of the non-conductive receptacle and plug of Brooks would conduct electricity from the reusable controller to heating element 18. Meyst, ¶¶57-58. In fact, Petitioner's illustration of its proposed combination shows that the combination device retains pins/prongs 38 and 39 from the Brooks disposable component, indicating that these components continue to conduct electricity. Meyst, ¶57. This would lead a POSITA to conclude that the incorporated screwthreads are mechanical, not electrical, connectors. Meyst, ¶¶57-58.

Petitioner's description of its proposed combination confirms this conclusion. Specifically, Petitioner repeatedly states that its combination device maintains the electrical connection of Brooks. For example, Petitioner states that its proposed combination "would retain all the features of Brooks except that the mating of the two detachable components would be achieved with threaded pieces," and accordingly the combination "retains Brooks' electrical and airflow connections between its two components. Specifically, electricity would flow from controller 14 to cigarette 12 as in the unmodified device, and tube 48 would likewise be retained...." Petition at 35. Petitioner goes on to state that "[a]ll that would change is the connector – from a plug to a screwthread – a change that would be well within a POSA's capabilities." Petition at 36.

Petitioner and its expert assert that the combination of Brooks and Whittemore would be a "a simple substitution" with "predictable results," but neither Petitioner nor Collins provide any explanation as to how a POSITA would implement the Whittemore screwthread electrode into Brooks' device without retaining Brooks' electrical connections. Petition at 36; Collins, ¶¶71, 76; Meyst, ¶¶57-58.

In summary, Petitioner's proposed combination of Brooks and Whittemore does not include a screwthread electrode as recited in the '957 Patent claims. Meyst, ¶57. Instead, Petitioner's proposed combination retains pins/prongs 38 and 39 of Brooks and conducts electricity in the same manner as Brooks, with the only difference being the inclusion of a threaded mechanical connection. Meyst, ¶57. Since the threaded connection does not provide an electrical connection, it cannot be a screwthread electrode.

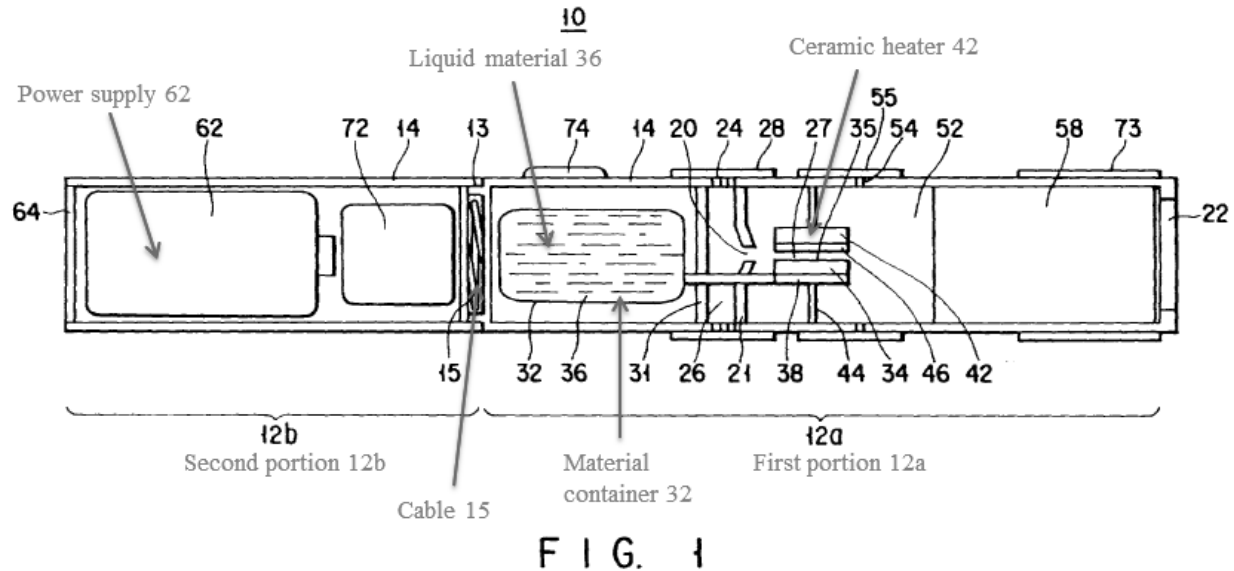
c. A POSITA Would Have Had No Credible Motivation for Incorporating the Screwthread Electrode of Whittemore Into the Brooks Smoking Article

A POSITA would have had no credible motivation for incorporating the screwthread electrode of Whittemore into the smoking article of Brooks. The motivations alleged by Petitioner are based on faulty reasoning and impermissible hindsight.

Petitioner asserts that a POSITA "would have understood that a threaded connection could be used in the Brooks device because such connections (including electrical threaded connections) are so commonplace and routinely used in everyday structures like light fixtures," and "[t]echnologists have applied...threaded electrical connections to vaporization devices at least since the 1930s." Petition at 30-32. In addition to Whittemore, Petitioner cites several additional references, namely EP Patent 0845220 ("Susa;" Ex. 1007), Gilbert (Ex. 1013), and Voges (Ex. 1014), as analogous prior art to support its contention that screwthread electrodes were well known. Petition at 31-35. All three of these references were cited during prosecution of the '957 Patent. Ex. 2016, p. 1, Cite No. A20; p. 3, Cite No. B21; Ex. 2017, p. 1, "U.S. Patents," Cite No. 1.

Susa and Voges do not disclose screwthread electrodes. Meyst, ¶¶66-68. The threaded connections used in the disclosed Susa and Voges devices provide a purely mechanical connection; they do not conduct electricity. Meyst, ¶¶66-68.

Susa discloses a "flavor generation article" with "casing (12) constituted by first and second portions (12a, 12b) that are detachably connected to each other" through connecting portion 13. Susa, Abstract, 5:20-22. Fig. 1 of Susa, below (annotations added), illustrates an embodiment of the disclosed device.



Petitioner states that Figure 1 of Susa "depicts a plug-type connection linking housing pieces 12a and 12b," but asserts that "Susa's disclosure makes clear...that this plug-type connection is interchangeable with other known fastening means – including screws." Petition at 31-32. Susa discloses that "a known structure, e.g., a screw or a fitting pair, can be employed" for connecting portion 13. Susa, 5:17-28. However, this threaded connection is not a screwthread electrode because "portions 12a and 12b are electrically connected to each other through a cable 15." *Id.* This electrical connection could not be replaced with a screwthread electrode because the Susa device requires two-way communication between sensor 73 and control circuit 72. Susa, 8:55-58; Meyst, ¶67. Further, a POSITA would not incorporate the screwthread of Susa into Brooks even as a purely mechanical connection. Meyst, ¶67. The Susa device is able to utilize a

screwthread connection because there are no rigid components that need to mate properly between portions 12a and 12b; the only required interface between the components is a single flexible cable. Meyst, ¶67. This is not the case with the Brooks device, which includes offset pins/prongs and a tube/passage that must align and mate between components.

Voges discloses a nicotine dispenser "comprising a cigarette-shaped hollow tubular body 1 comprising connected body parts 2, 3." Voges, 5:48-51. "Body part 3 is screw threaded at one end for connection with threaded end 6 of body part 2." Voges, 5:54-55. This is illustrated in Fig. 2 of Voges, below.

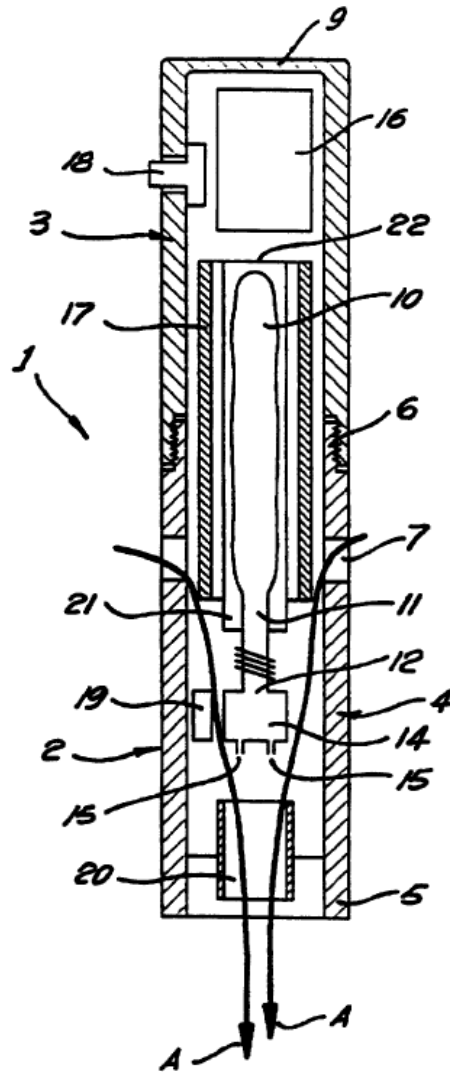


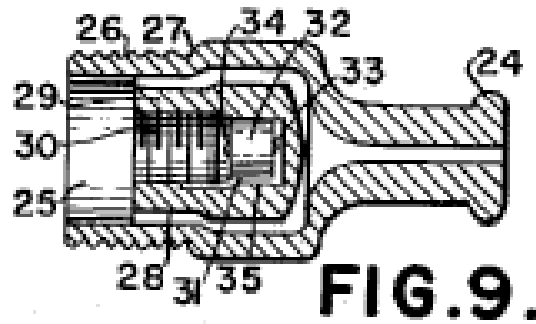
FIG. 2

Electricity is conducted from battery 17 to other components via an internal connection. Meyst, ¶68. Thus, as with Susa, the threaded connection between body parts 2 and 3 in Voges is purely mechanical. Meyst, ¶68.

Gilbert discloses a smoking device using a vacuum tube or bulb "similar to a light bulb." Gilbert, 2:50. As shown in Figure 10 of Gilbert, below, the back end of this bulb has a screw plug 37. This screw plug connects to socket 30, shown in

Figure 9 of Gilbert, below. Socket 30 is internal to the Gilbert device, not on the end of the atomizer housing. Therefore, a POSITA would not have been motivated to incorporate the screwthread connection of Gilbert into the Brooks device in the manner proposed by Petitioner. Meyst, ¶69. Further, socket 30 itself is not a screwthread electrode because it is not formed from a conductor and does not conduct electricity. Meyst, ¶69. Gilbert states "[w]ithin the inner ring 29 is a threaded electric socket 30 and forwardly thereof a battery cavity 31 for detachably receiving a battery 32 having an inner contact 33 and an outer contact 34 with a contact strip 35 between the inner contact 33 and the socket 30." Gilbert, 2:41-45, Fig. 9. Contact strip 35 is required to electrically connect the inner contact 33 of the battery 32 to the inner ring: "[w]hen the bulb 36 is assembled to the socket 30 its tip end 38 will engage the inner battery contact 33 and complete the circuit through the filament of the bulb 36 by the contact strip." Gilbert, 2:70-3:2. If socket 30 were formed from an electrically conductive material, there would be no need for contact strip 35. Meyst, ¶69. Therefore, a POSITA also would not have looked to Gilbert for guidance in producing a device having two connected screwthread electrodes.





Regardless of how well known screwthread electrodes were in the art, the mere fact that elements are known does not make the combination of those elements obvious. "Whether a patent claiming the combination of prior art elements would have been obvious is determined by whether the improvement is more than the predictable use of prior art elements to their established functions.... To reach this conclusion, however, requires more than a mere showing that the prior art includes separate references covering each separate limitation in the claim under examination." Ex. 2009, p. 18-19; citing *Unigene Labs., Inc. v. Apotex, Inc.*, 655 F.3d 1352, 1360 (Fed. Cir. 2011). Petitioner fails to provide such a showing. Petitioner also fails to address why, in view of the purported ubiquity of screwthread electrodes in vaporization devices from the 1930s onward, it took over 75 years for someone to develop the electronic cigarette of the '957 Patent. Meyst, ¶¶62, 65.

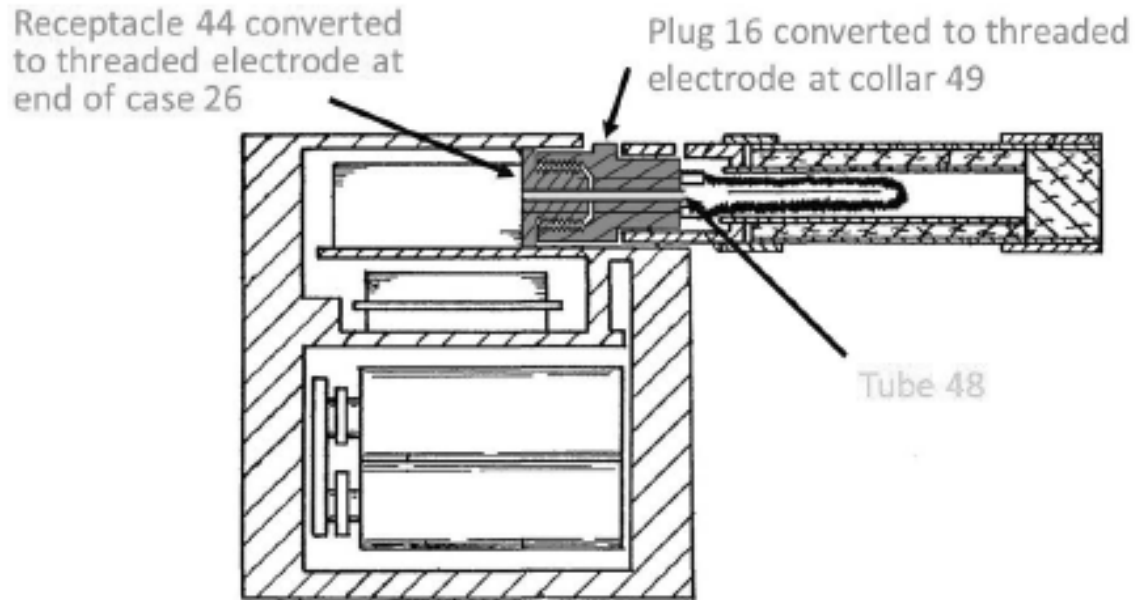
Petitioner asserts that a POSITA "would have known that threaded connections are especially appropriate where components are reusable and thus

require frequent assembly and disassembly, and would have identified the Brooks device as presenting just such a circumstance." Petition at 34. To the contrary, the device of Brooks is precisely the sort of device one skilled in the art would *not* incorporate a screwthread connection into. Meyst, ¶¶64. The simple pin/plug connector of Brooks is cheaper to produce and easier to assemble and use than a screwthread electrode, which requires more expensive and higher tolerance materials. Meyst, ¶¶63-64. In the device of the '957 Patent, the atomizer assembly and battery assembly can be used repeatedly, and the battery assembly is designed to be rechargeable. Meyst, ¶11. In Brooks, on the other hand, the disposable cigarette component is designed to be used for 6-10 puffs, the equivalent of a single traditional cigarette, and then discarded. Meyst, ¶38. Thus, contrary to Petitioner's assertion, the disposable component of Brooks is not "reusable." There is no reason to incorporate a more complex and costly connection into a single-use disposable component. Meyst, ¶¶63, 65.

Moreover, none of the prior art relied on by Petitioner expresses any concern about the ease of assembly/disassembly for the allegedly reusable components. Instead, Petitioner has created a nonexistent problem based on hindsight in order to justify its proposed combination. Petitioner's overreaching rationale contravenes legal precedent. See *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); and *Leo Pharmaceutical Products, 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 proposed combination of Brooks and Whittemore retains pins/prongs 38 and 39 of Brooks, as well as passageway 46 and tube 48 (illustrated in Petitioner's illustration of its combination, below). Meyst, ¶¶57-58, 70-71. A POSITA would not have been motivated to incorporate a screwthread, much less a screwthread electrode, into a device configured in this manner. Meyst, ¶71. The screwthreads on each component could not be twisted together while tube 48 is engaged with passageway 46 and the pins/prongs are engaged with their corresponding slots on controller 14, and engagement of the tube and pins/prongs could not be achieved by twisting the screwthreads. Meyst, ¶71. The situation is further complicated by Brooks' disclosure that "pins 38, 39 and passageway 46 are offset with respect to the longitudinal axis of plug 16." Brooks, 8:40-42. Thus, even if simultaneous plug and screw connections were possible, even the slightest amount of under- or overtightening would prevent proper alignment of the pins/prongs and tube/passageway and cause bending or breakage of these components. Meyst, ¶72.

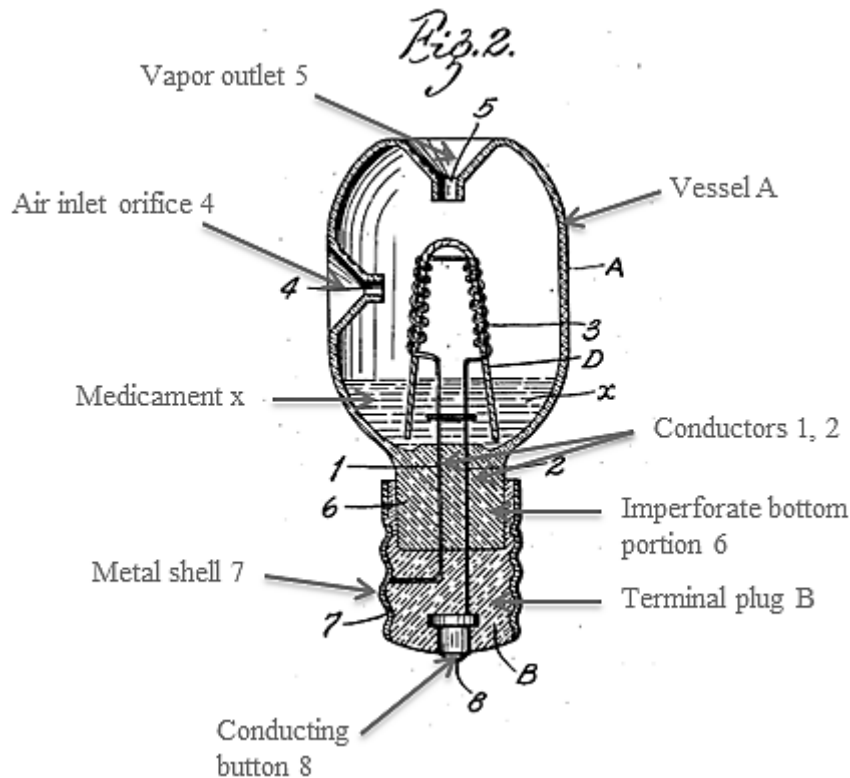


Brooks in view of Whittemore.

Petition at 35, 53, 60.

Claims 1, 3, and 6-9 of the '957 Patent require a hole through the center of the screwthread electrodes on both the battery and atomizer assembly housings, while claim 22 requires a hole through the center of at least one of these screwthread electrodes. The Whittemore device has no such hole through its screwthread electrode, leaving Petitioner to assert that a POSITA would have incorporated the Whittemore screwthread electrode into Brooks "while maintaining the hole through the center of the electrode that Brooks already discloses." Petition at 53. However, a POSITA would have had no motivation to utilize the Whittemore screwthread electrode in the proposed manner.

As shown in Fig. 2 of Whittemore, below (annotations added), the Whittemore device features a lightbulb-type connector, with metal shell 7 threaded for insertion into a socket. Electricity flows through conductors 1 and 2, with conductor 2 attached to the inner surface of the metal shell at center conducting button 8. Whittemore, p. 1, left col., ll. 45-49. Whittemore does not teach or suggest incorporating a hole into metal shell 7. Meyst, ¶70.



A POSITA would not utilize the Whittemore screwthread in a device requiring a hole through the screwthread because such a hole would result in leakage and render the device inoperable. The Whittemore device is explicitly configured to be used in an upright orientation only. Meyst, ¶70. Air enters

vaporization vessel A via air inlet orifice 4 "disposed at a point below the upper end of the vessel," while vapor escapes the vessel via vapor outlet 5 "formed preferably in the top wall of the vessel A." Whittemore, p. 1, left col., ll. 29-34. Operation of the device in a non-upright position would result in leakage of medicament X out of one or both of these inlets. Meyst, ¶70. The bottom portion of vaporization vessel A in which conductors 1 and 2 are embedded is made up of "a solid or substantially imperforate bottom portion 6." Whittemore, p. 1, left col., ll. 33-36. Incorporating a hole into the screwthread that extended into the vessel would disrupt this bottom portion and result in liquid medicament X leaking through the screwthread and into the corresponding receptacle or socket. Meyst, ¶70.

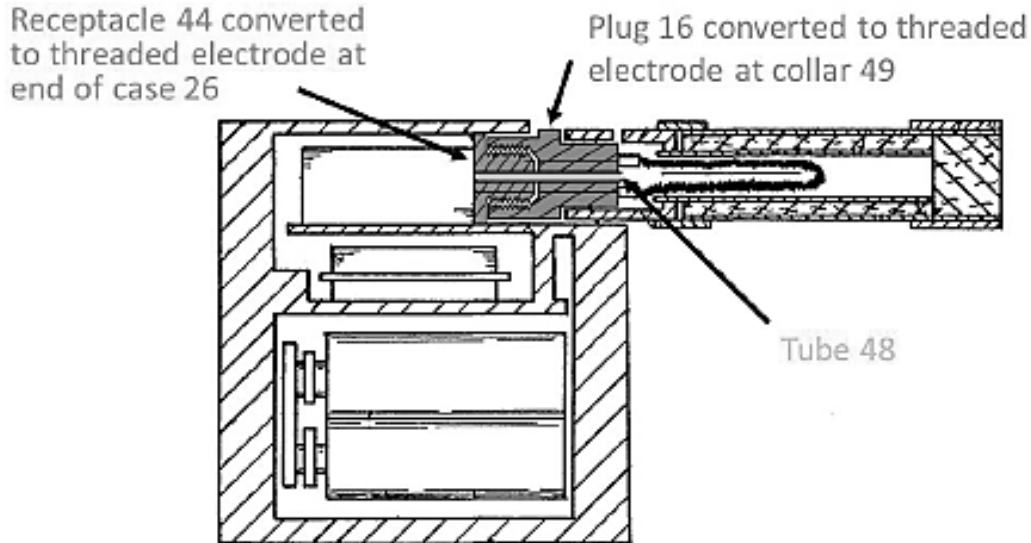
The case law cited by Petitioner (see Petition at 36-37) is not applicable to the present facts and does not support Petitioner's obviousness arguments. In Petitioner's lead case, *Allied Erecting & Dismantling Co. v. Genesis Attachments*, the Federal Circuit confirmed that the relevant inquiry for obviousness is "whether a skilled artisan would have been motivated to combine the teaching of the prior art references to achieve the claimed invention." 825 F.3d 1373, 1381 (Fed. Cir. 2016). In that case, Allied argued that a POSITA would not have made the proposed combination because to do so would have required redesign of the features from one reference prior to incorporation of those features into another

reference. *Id.* at 1380-81. The court affirmed that the claims were unpatentable, but only because there was specific motivation in the record to make the modifications in the combination. *Id.* at 1381-82. Petitioner's other cited cases also confirm that motivation is required. *In re Mouttet*, 686 F.3d 1322, 1333 (Fed. Cir. 2012) (affirming finding of motivation to modify references in the proposed combination); *In re Etter*, 756 F.2d 852, 859 (Fed. Cir. 1985) (affirming Board's finding that the prior art references to be combined included a "strong[] suggestion for combining" those same references); *Par Pharm., Inc. v. Twi Pharms., Inc.*, 773 F.3d 1186, 1197 (Fed. Cir. 2014) (affirming district court's finding of specific motivation in the record to make the combination).

In contrast to these cited cases, Petitioner fails to set forth the modifications necessary to make its proposed combination work, let alone explain why a POSITA would have been motivated to make those modifications. As set forth below at (V)(C)(3)(d), Brook's pins/prongs 38 and 39 and tube 48 would not function if Brook's plug 16 were replaced with Whittemore's screw thread. Yet, Petitioner's proposed combination retains all of these features without explanation. Because Petitioner fails to identify the necessary modifications or provide any motivation to make those modifications, Petitioner fails to demonstrate that a skilled artisan would have been motivated to combine the teaching of Brooks and Whittemore to achieve the claimed invention.

d. The Proposed Combination of Brooks and Whittemore Would be Inoperable

A POSITA would recognize that Petitioner's proposed combination of Brooks and Whittemore would be inoperable. Meyst, ¶¶71-72. As discussed above at (V)(C)(3)(b), Petitioner's proposed combination (see illustration below) retains pins/prongs 38 and 39, offset passageway 46, and tube 48 of Brooks. Petition at 35, 60-61; Meyst, ¶¶70-71. As discussed above at (V)(C)(3)(c), a POSITA would recognize that the presence of these components, particularly in the offset configuration explicitly taught by Brooks (see Brooks 8:40-42, Fig. 1A (below, annotations added)), is incompatible with the proposed screwthread connection. Meyst, ¶¶57-58, 71-72. A screwthread requires twisting, and this could not be done while the pins/prongs and tube are engaged. Meyst, ¶71. Further, engagement of the pins/prongs could not be accomplished by twisting a screwthread. Meyst, ¶71. Finally, even if simultaneous plug and screw connections were possible, even the slightest amount of under- or overtightening would prevent the pins/prongs and tube from connecting in the proper alignment and could cause them to bend or break. Meyst, ¶72.



Brooks in view of Whittemore.

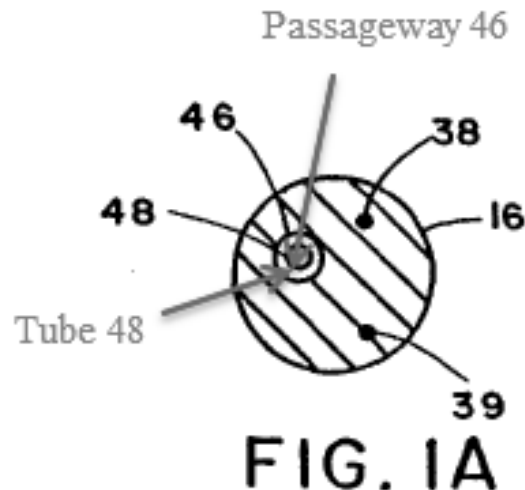
Petition at 35, 53, 60.

e. The Proposed Combination of Brooks and Whittemore Does Not Include a Screwthread With a Hole Through the Center as Required by Independent Claim 1 and Dependent Claims 3, 6-9, and 22

Claims 1, 3, and 6-9 of the '957 Patent require that each of the screwthread electrode on the battery assembly housing and the screwthread electrode on the atomizer assembly housing have "a hole through its center." Similarly, claim 22 requires at least one of these screwthread electrodes to have "a hole through its center." A POSITA would understand that a screwthread electrode having "a hole through its center" would have a hole located at the middle point of the screwthread electrode. This means that in a cross-sectional view, the center of the

hole would be equally distant from all points on the edge of the screwthread electrode.

Petitioner asserts "[r]eceptacle 44 [of Brooks] includes tube 48, which runs through the center of the receptacle 44 and plug 16 to provide an air passage between the cigarette portion and the controller." Petition at 49. Petitioner goes on to assert that a POSITA would "adapt Brooks to include a threaded electrode as taught by Whittemore, while maintaining the hole through the center of the electrode that Brooks already discloses." Petition at 53. However, tube 48 in Brooks does not run "through the center of" receptacle 44 or plug 16. Meyst, ¶¶59-60. Instead, as discussed above at (V)(C)(3)(c), Brooks teaches that tube 48 and passage 46 "are offset with respect to the longitudinal axis of plug 16." Brooks, 8:40-42. This is illustrated in Fig. 1A of Brooks, below (annotations added). Thus, Petitioner's combination device does not include a hole through the center of the alleged screwthread electrodes. Meyst, ¶¶60.



f. The Proposed Combination of Brooks and Whittemore Does Not Include an Atomizer Including a Heater Coil Wound Around a Porous Component as Required by Independent Claims 1, 10, and 23 and Dependent Claims 3, 6-9, 11, 14, 16-18, and 22

All of the challenged claims of the '957 Patent require an atomizer that includes a heater coil wound around a porous component.

Petitioner asserts that Brooks discloses an atomizer including a heater coil wound around a porous component. Petition at 37-38, 61-62. In support of this assertion, Petitioner states "Brooks discloses that its heating element can constitute a 'metal wire,' and further discloses that the heating element can constitute a heating component in 'intimate contact' with 'porous substrates.'" Petition at 37 and 61, citing Brooks 7:65-8:3. The lone reference to a wire in the cited passage of Brooks is the statement that "[o]ther suitable heating elements include porous metal wires...." Nonetheless, Petitioner concludes that Brooks discloses "that the

atomizer may comprise a heater coil where that heating coil is wound around a porous component (the porous substrate)." Petition at 38.

Contrary to Petitioner's assertion, Brooks never discloses a heater coil wound around a porous component. Meyst, ¶73. The only mention of heater coils in Brooks is in reference to prior art devices, which Brooks presents as inferior to its disclosed porous heating element. Meyst, ¶76.

Just as it did when arguing that Brooks discloses a solution storage area separate from the atomizer (see (V)(C)(3)(a)), Petitioner mischaracterizes the disclosure of Brooks by transposing "heating components" and "porous substrates." The cited passage of Brooks states that "suitable heating elements include...porous substrates in intimate contact with resistance heating components," not a heating component in intimate contact with a porous substrate. Meyst, ¶73.

In arguing that Brooks discloses an atomizer that includes a heater coil wound around a porous component, Petitioner ignores the language in the challenged claims requiring a solution storage area separate from the atomizer. As discussed above at (V)(C)(3)(a), Petitioner argues that Brooks' "porous substrates in intimate contact with resistance heating components" provide both an atomizer (the resistance heating component) and a separate solution storage area (the porous substrate) (the so-called "second embodiment"). Meyst, ¶74. Now, in attempting to meet a different limitation of the challenged claims, Petitioner changes its

argument and asserts that Brooks' "porous substrates in intimate contact with resistance heating components" are both components of the atomizer. Petitioner's arguments are mutually exclusive: either the porous substrate and heating component of Brooks constitute an atomizer, in which case Brooks does not disclose a solution storage area, or the porous substrate and heating component of Brooks constitute a solution storage area and an atomizer, in which case Brooks does not disclose an atomizer including a heater coil wound around a porous component. Meyst, ¶74. In either case, there is no heater coil wound around a porous component.

Petitioner goes on to argue that to the extent Brooks does not disclose an atomizer including a heater coil wound a porous component, Whittemore discloses such an element, and that it would have been obvious to incorporate the Whittemore heating wire/porous component into Brooks. Petition at 38-42. According to Petitioner, "Whittemore describes a wick D made of thread or string that is surrounded by 'coiled or looped portions' of a 'filament 3' which acts as a heater when electric current is run through it." Petition at 62. According to Petitioner, a POSITA would have adapted "Brooks' resistance heating component in intimate contact with a porous substrate such that it is wound around the porous substrate, as taught by Whittemore." Petition at 63. Again, this argument undercuts Petitioner's other arguments. Combining Whittemore's atomizer, which

includes a heating wire wrapped around a wick, with Brooks reflects that the so-called second embodiment of Brooks is merely an atomizer that holds liquid (the so-called first embodiment) because Whittemore discloses a separate liquid supply in its lightbulb housing. Thus, there is no separate solution storage area as required by all of the challenged '957 Patent claims.

g. A POSITA Would Have Had No Credible Motivation for Incorporating an Atomizer Including a Heater Coil Wound Around a Porous Component Into the Smoking Article of Brooks

A POSITA would have had no credible motivation to combine Whittemore and Brooks to produce an atomizer that includes a heater coil wound around a porous component. Meyst, ¶¶78-81.

Petitioner states that "Whittemore describes a wick D made of thread or string that is surrounded by 'coiled or looped portions' of a 'filament 3' which acts as a heater when electric current is run through it." Petition at 62. According to Petitioner, a POSITA would have used this teaching as the basis for "adapt[ing] Brooks' resistance heating component in intimate contact with a porous substrate such that it is wound around the porous substrate, as taught by Whittemore." Petition at 63. However, a POSITA would not apply Whittemore to Brooks in this manner because of conflicting features of the disclosed devices. Meyst, ¶47. The disposable component of the Brooks smoking article is only designed to deliver 6

to 10 puffs of aerosol, the equivalent of one traditional cigarette. Brooks, 6:32-36, 10:66-11:2, 18:28-29, 19:64-66, 21:39-48, 22:38-40; Meyst, ¶38. As such, there is no need for liquid storage outside the heating element, and hence no need for a Whittemore-style wick to transport liquid to the heating element. Meyst, ¶47.

Petitioner goes on to assert that it would have been obvious to "adapt Brooks' heating component to coil around the [porous] substrate as taught by Whittemore" because "wire coils promote efficient heat transfer," and because such a modification "would be nothing more than the application of known techniques...to a similar structure..." Petition at 40-42. However, due to its low surface area, a wire coil would not be more efficient than the heating elements disclosed in Brooks, and would in fact be inferior to the specific materials disclosed in Brooks. Meyst, ¶¶80-81. Further, the Board has previously stated that a mere assertion that a POSITA would have wanted more efficient heat transfer, in the absence of any actual teaching in the prior art that improved heat transfer was desirable or necessary, does not constitute a sufficient motivation to combine. Ex. 2013, p. 12; Ex. 2002, p. 19.

D. Ground 2: Claim 21 is Not Obvious over Brooks in View of Whittemore and Connors

Petitioner requests that claim 21 be cancelled as unpatentable under 35 U.S.C. § 103 over Brooks in view of Whittemore and Connors. Petition at 13, 81-87.

1. Claim 21 Is Not Obvious over Brooks in View of Whittemore and Connors

Claim 21 depends from claim 10 and requires that "the primary screwthread electrode [on the battery assembly housing] connects to a charger."

a. Connors Does Not Overcome the Deficiencies of Brooks and Whittemore

The only element of claim 21 for which Petitioner cites Connors is connection of the primary screwthread electrode to a charger. Petition at 81-87. For all other elements, Petitioner continues to rely entirely on Brooks and Whittemore. Thus, claim 21 is not obvious over Brooks, Whittemore, and Connors for at least the same reasons set forth at (V)(C).

b. Petitioner Fails to Provide Any Rationale for Combining Connors with Brooks and Whittemore

Petitioner argues that the batteries in the Brooks device must be rechargeable because they are housed in the "reusable controller." Petition at 81-82. However, the reusability of the controller component has nothing to do with the reusability/rechargeability of the batteries therein; most devices utilizing non-

rechargeable batteries are reusable devices (e.g., flashlight). Petitioner also argues that Brooks does not disclose "any structure that would permit" battery replacement. Petition at 82. To the contrary, Brooks states that "controller 14" includes "a chamber 32 into which battery power supply 34 (shown as batteries 34A and 34B) is inserted." Brooks, 7:20-25. This is precisely how one would describe a slot for inserting non-rechargeable batteries. Meyst, ¶¶83.

Even if Brooks is incorrectly construed to teach the use of rechargeable batteries that can be recharged within the device, Petitioner's proposed combination with Connors would not work. Meyst, ¶¶85-86. Connors utilizes a screwthread electrode for recharging. As discussed above at (V)(C)(3)(b), the threaded connection in Petitioner's proposed combination device is not actually a screwthread electrode. Meyst, ¶¶84, 86. Thus, electricity could not flow from the screwthread of Connors to the screwthread of Petitioner's proposed combination. Meyst, ¶¶84, 86. Likewise, Connors could not be used to recharge the proposed combination device via the pins/plugs that actually do not transmit electricity in the Brooks device, because Connors does not teach any such connection. Meyst, ¶¶84, 86. Further, in Petitioner's proposed combination, receptacle 44 on the battery component is a male screwthread. In Connors, threaded section 32 on adaptor 30 is also a male screwthread. Thus, the Connors could not mate with the battery

compartment of Petitioner's proposed device in the configuration set forth by
Petitioner. Meyst, ¶85.

VI. CONCLUSION

For the reasons discussed above, Patent Owner requests that the Board deny
the Petition for *Inter Partes* Review of the '957 Patent.

Respectfully submitted,

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CERTIFICATE OF COMPLIANCE

The undersigned certifies that this brief complies with the type-volume limitations of 37 CFR § 42.24. This brief contains 11,414 words as calculated by the "Word Count" feature of Microsoft Word 2010, the word processing program used to create it.

Date: September 30, 2016

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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: September 30, 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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