

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

PHILIP MORRIS PRODUCTS, S.A.,
Petitioner

v.

RAI STRATEGIC HOLDINGS, INC.,
Patent Owner

Patent No. 9,901,123

Case IPR2020-01602

PATENT OWNER RESPONSE

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LIST OF PATENT OWNER EXHIBITS

- Ex. 2001 Complaint from ITC Investigation No. 337-TA-1199
- Ex. 2002 ITC Procedural Schedule in *Certain Tobacco Heating Articles and Components Thereof*, ITC Inv. No. 337-TA-1199 (U.S.I.T.C. June 11, 2020)
- Ex. 2003 Excerpt of Respondents' Pre-Hearing Brief in *Certain Tobacco Heating Articles and Components Thereof*, ITC Inv. No. 337-TA-1199 (U.S.I.T.C. Dec. 11, 2020)
- Ex. 2004 U.S. Patent Application Publication No. 2007/0267031
- Ex. 2005 Excerpts of Respondents' Joint Disclosure of Final Contentions in Response to Individual Interrogatory No. 12 (Final Invalidity Contentions) in *Certain Tobacco Heating Articles and Components Thereof*, ITC Inv. No. 337-TA-1199 (U.S.I.T.C. Sept. 18, 2020)
- Ex. 2006 Order Denying Respondents' Motion for Leave to Amend Their Response to the Complaint in *Certain Tobacco Heating Articles and Components Thereof*, ITC Inv. No. 337-TA-1199 (U.S.I.T.C. Oct. 22, 2020)
- Ex. 2007 Excerpts of Deposition Transcript of Stewart M. Fox in *Certain Tobacco Heating Articles and Components Thereof*, ITC Inv. No. 337-TA-1199 (U.S.I.T.C. Nov. 6, 2020)
- Ex. 2008 Excerpts of Ruyan Product Internal R&D Assessment (March 2007)
- Ex. 2009 Excerpts of Commission Staff Attorney's Pre-Hearing Brief in *Certain Tobacco Heating Articles and Components Thereof*, ITC Inv. No. 337-TA-1199 (U.S.I.T.C. Jan. 4, 2021)
- Ex. 2010 Declaration of Charles E. Clemens
- Ex. 2011 Transcript of June 25, 2021 Deposition of Stewart Fox
- Ex. 2012 University of California San Francisco – Tobacco Industry Record of Ex. 1023

- Ex. 2013 University of California San Francisco – Tobacco Industry Record of Ex. 1019
- Ex. 2014 PDF of <https://ucfilament.com/materials/nichrome/> related to nichrome alloys
- Ex. 2015 PDF of <https://www.birkmfg.com/blog/why-use-platinum-in-rtd-temperature-sensors/> related to platinum

I. INTRODUCTION

Petitioner challenges 22 claims of the '123 patent. Petitioner's lead reference in all three Grounds – Hon – describes a dual-stage atomizer that is quite different from the smoking article claimed in the challenged claims of the '123 patent. Recognizing this, Petitioner asserts that independent claims 1 and 15 are obvious in view of Hon alone or Hon combined with two secondary references (Whittemore and Brooks). But as the Board found in the Institution Decision, a POSA would not have modified Hon in view of Whittemore, including because Whittemore's wire-wrapped wick has "little relation" to Hon's atomizer. Similarly, on a full record including this PO Response and testimony from RAI's expert, Charles Clemens, it is also clear that a POSA would not have modified Hon's controller for its dual-stage atomizer in view of the controller circuitry that Brooks describes.

Petitioner is thus left with arguing obviousness based on Hon alone – a position Petitioner effectively concedes is untenable, given its attempts to backstop Hon with Whittemore and Brooks. But, as explained in detail below, Hon fails to teach or suggest two limitations in independent claims 1 and 15 – (i) the "mixture ... wicked into contact with the electrical resistance heater" and (ii) the "controller ... adapted for regulating current flow through the electrical resistance heater during draw." In addition, Petitioner fails to show that a number of dependent claims would have been obvious in view of Hon and the identified secondary references, including

dependent claims requiring (a) an electrically conductive cartridge (claims 11 and 23), (b) that the absorbent fibrous/wicking material of the cartridge is in contact with the electrical resistance heater (claims 14 and 24), and (c) that the liquid mixture in the cartridge comprises essentially pure nicotine or extracts/formulations comprised predominantly of nicotine (claims 6 and 19).

The Board should confirm the patentability of claims 1-7, 9, 11-19, 21, and 23-26 of the '123 patent.

II. THE ALLEGED GROUNDS OF UNPATENTABILITY

The alleged grounds of unpatentability for this trial are:

- Ground 1: Claims 1, 2, 5, 7, 9, 11, 12, 14, 15, 18, 21, and 23-26 are unpatentable under 35 U.S.C. § 103 over Hon alone or with Brooks and Whittemore;
- Ground 2: Claims 3, 4, 13, 16, and 17 are unpatentable under 35 U.S.C. § 103 over Hon, Whittemore, Brooks, and Susa; and
- Ground 3: Claims 6 and 19 are unpatentable under 35 U.S.C. § 103 over Hon, Whittemore, Brooks, and Ray.

(Paper 9 (Institution Decision) at 7.)

III. THE '123 PATENT

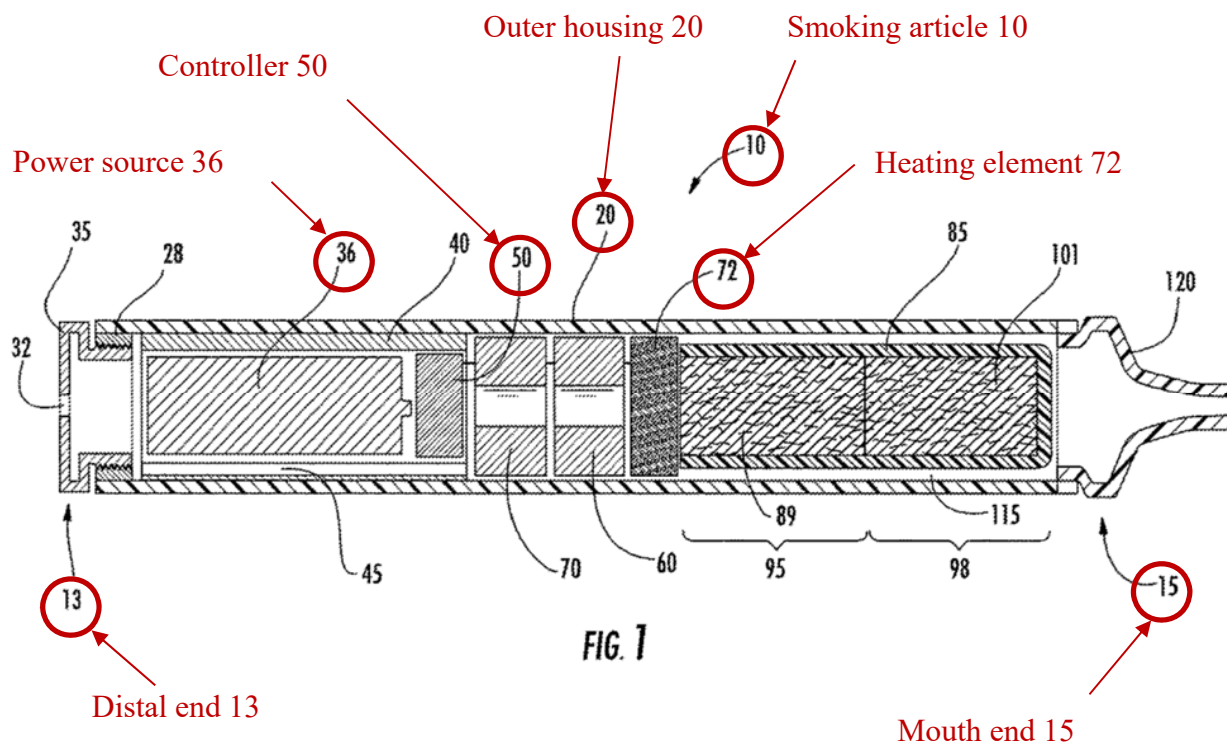
A. Overview Of The '123 Patent

The '123 patent generally describes smoking articles that heat tobacco rather than burn it. (*See, e.g.*, Ex. 1001 at 4:42-52.) In addition to heat-not-burn devices, the '123 patent also describes the use of e-liquid as an aerosol forming material. (*Id.*

at 13:18-21.) For example, the patent discloses aerosol-forming material formulations of mixtures of glycerin and water, or mixtures of propylene glycol and water. (*Id.* at 14:13-15.)

The '123 patent notes that the aerosol-forming material can be maintained within the smoking article in a number of ways. For example, the aerosol-forming material can be contained within a container in liquid form, or soaked within absorbent fibrous materials or sponge-like materials. (*Id.* at 14:26-29.) The smoking articles disclosed in the '123 patent contain control circuitry that may include a controller for regulating current flow through the device during draw by the user. (*Id.* at 30:37-32:34.) The controller may be “puff-actuated,” meaning that the device senses when a user draws (or takes a puff) on the device and then actuates the control circuitry to operate the device.

Figure 1, reproduced below, shows a longitudinal cross-sectional view of one embodiment of the '123 patent invention:



(*Id.* at Fig. 1 (annotated).)

The smoking article 10 is “rod-like or tubular in nature, generally akin to a cigarette-type or cigar-type smoking article” and has an outer housing 20 that is likewise “generally tubular in shape.” (*Id.* at 19:41-50.) The outer housing 20 includes a mouth-end 15 and distal end 13, with “the distal end compris[ing] an opening adapted for intake of air into the smoking article 10.” (*Id.* at 19:59-64.)

An electric power source 36, “such as at least one battery” is located within the outer housing 20. (*Id.* at 20:12-13.) The smoking article 10 further includes a controller 50 that is powered by the electric power source 36. (*Id.* at 20:33-43.) The ’123 patent describes example circuits that can be included in the controller 50

(*see, e.g., id.* at 20:40-48, 30:37-32:34, describing Figs. 4 & 5) and further states that “[r]epresentative types of electronic control components” for the controller 50 may include those of U.S. Patent No. 4,947,874 to Brooks (*id.* at 20:43-48). Brooks is one of the secondary references Petitioner relies on in the Petition. (*See, e.g.,* Petition at 16-17, 25-29.)

In the embodiment of Figure 1, the smoking article 10 includes a cartridge 85 that contains tobacco 89 of some form and an aerosol-forming material. (Ex. 1001 at 22:1-3.) “The tobacco 89 and the aerosol-forming material can be in the form of an intimate mixture or provided in separate regions of the cartridge 85.” (*Id.* at 22:3-6.) The smoking article 10 further includes a resistive heating element 72 that “can be employed in close proximity to an absorbent wicking material such that aerosol-forming material can be wicked or otherwise transferred so as to contact the second resistance element or contact an area in close proximity to the second resistance element (e.g., a region that is exposed to a [sic] the heat produced by the second resistance element).” (*Id.* at 21:38-45.) “The representative smoking article 10 is assembled such that a certain amount of aerosol-forming material and tobacco components can be wicked or otherwise transferred to heating element 72 or the region in close proximity to the heating element.” (*Id.* at 22:20-24.)

B. The Challenged Claims

Petitioner challenges claims 1-7, 9, 11-19, 21, and 23-26 of the '123 patent.

Independent claim 1 recites:

1. An electrically-powered, aerosol-generating smoking article comprising:

an electrical power source within a tubular outer housing having a mouth-end and an end distal to the mouth-end;

at least one electrical resistance heater powered by said electrical power source;

a puff-actuated controller within the tubular outer housing and adapted for regulating current flow through the electrical resistance heater during draw, the controller comprising a sensor adapted for sensing draw on the smoking article by a user; and

a rod-shaped carrier device engaged with the mouth-end of the tubular outer housing and comprising a cartridge providing a liquid storage compartment containing a mixture comprising a tobacco extract and an aerosol-forming material absorbed within an absorbent fibrous material, the cartridge having a generally tubular shape and adapted for airflow therethrough;

wherein the rod-shaped carrier device is operatively positioned such that, during draw, the mixture comprising the tobacco extract and the aerosol-forming material can be wicked into contact with the electrical resistance heater and volatilized to produce a visible mainstream aerosol incorporating tobacco components or

tobacco-derived components that can be drawn into the mouth of the user of the smoking article.

(Ex. 1001 at 32:50-33:8.)

Claims 2-7, 9, and 11-14 depend from claim 1. (*Id.* at 33:9-23, 33:27-28, 33:31-40.) Specifically, claim 6 recites that the mixture comprises essentially pure nicotine, extracts composed predominately of nicotine, or formulations composed predominantly of nicotine; claim 11 recites that the cartridge is electrically conductive; and claim 14 recites that the absorbent fibrous material is in contact with the electrical resistance heater. (*Id.*)

Independent claim 15 is similar to claim 1. (*Id.* at 33:41-34:2.) Claim 15 recites:

15. An electrically-powered, aerosol-generating smoking article comprising:

an electrical power source in the form of a battery within a tubular outer housing having a mouth-end and an end distal to the mouth-end;

at least one electrical resistance heater powered by said electrical power source;

a puff-actuated controller within the tubular outer housing and adapted for regulating current flow through the electrical resistance heater during draw, the controller comprising a sensor adapted for sensing draw on the smoking article by a user; and

a rod-shaped carrier device removably engaged with the mouth-end of the tubular outer housing and comprising a cartridge providing a liquid storage compartment containing a mixture comprising a tobacco extract comprising nicotine and an aerosol-forming material selected from glycerin, propylene glycol, or a mixture thereof, the mixture absorbed within an absorbent wicking material, the cartridge having a generally tubular shape and adapted for airflow therethrough;

wherein the rod-shaped carrier device is operatively positioned such that, during draw, the mixture comprising the tobacco extract and the aerosol-forming material can be wicked into contact with the electrical resistance heater and volatilized to produce a visible mainstream aerosol incorporating tobacco components or tobacco-derived components that can be drawn into the mouth of the user of the smoking article.

(*Id.* at 33:41-34:2.)

Claims 16-19, 21, and 23-26 depend from claim 15. (*Id.* at 34:3-12, 34:17-18, 34:21-30.) Specifically, claim 19 recites that the mixture comprises essentially pure nicotine, extracts composed predominately of nicotine, or formulations composed predominantly of nicotine; claim 23 recites that the cartridge is electrically conductive; and claim 24 recites that the absorbent wicking material is in contact with the electrical resistance heater. (*Id.*)

IV. CLAIM CONSTRUCTION

Claim terms are to be construed in this proceeding in accordance with the standard set forth in *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312 (Fed. Cir. 2005) (en banc). In its Petition, Petitioner proposed no constructions for the subject matter of the challenged claims, choosing instead to adopt “any reasonable construction, including their plain meaning” without explaining its position on what these alleged plain meanings are. (Petition at 10.) In the POPR (Paper 6), Patent Owner reserved the right to put forth constructions for any claim terms should the Board institute trial. In view of the Board’s Institution Decision, Patent Owner submits that one claim term warrants discussion: “wicked into contact.”

Claims 1 and 15 both require the device to be structured such that “the mixture comprising the tobacco extract and the aerosol-forming material can be **wicked into contact** with the electrical resistance heater.” (Ex. 1001 at 33:2-5, 33:63-66 (emphasis added).) Dependent claims 14 and 24 further require that the absorbent [fibrous/wicking] material be “in contact with the electrical resistance heater,” while dependent claim 25 requires that the absorbent wicking material be “positioned in proximity to” the heater. (*Id.* at 33:38-40, 34:23-28.) In the Institution Decision, the Board appears to have preliminarily agreed with Petitioner’s position that if the absorbent fibrous/wicking material is positioned in proximity to the heater, then this

necessarily means that the liquid is “wicked into contact” with the heater. (Paper 9 at 23-24.) Patent Owner respectfully disagrees.

The reason for this disagreement is that the additional limitations of dependent claims 14, 24, and 25 are just that – *additional* limitations. They are not, as the Board appears to have thought, merely elaborations on what it means for liquid to be “wicked into contact” with the heater. The “wicked into contact” limitation of the independent claims relates to the manner in which – the “how” – the liquid reaches the heater. The additional limitations supplied by dependent claims 14, 24, and 25 relate to the location of the fibrous/wicking material (“in contact with” or “in proximity to”) with respect to the heater. A wicking material might be located in proximity to the heater, yet the material in that location would still not necessarily wick liquid “into contact” with the heater. Petitioner’s attempt to conflate “wicked into contact” in claims 1 and 15 with the separate requirements of the dependent claims should be rejected.

Patent Owner submits that the plain and ordinary meaning of “wicked into contact,” as used in claims 1 and 15 of the ’123 patent, is that the mixture comprising the tobacco extract and the aerosol-forming material (*i.e.*, the liquid) must be brought into contact with the electrical resistance heater by wicking. This is supported by, and consistent with, the specification of the ’123 patent.

For example, the specification explains that resistive heating element 72 “can be employed in close proximity to an absorbent wicking material such that aerosol-

forming material can be wicked or otherwise transferred so as to contact the second resistance element or contact an area in close proximity to the second resistance element (e.g., a region that is exposed to a [sic] the heat produced by the second resistance element).” (Ex. 1001 at 21:38-45.) In other words, a POSA reading the specification of the ’123 patent would understand that, for the embodiment where the heater is *located* in “proximity” to the wicking material, there are *multiple* options for the *manner* in which the liquid may reach (or not reach) the heater: (1) it can be “wicked . . . so as to contact” the heater; (2) it can be “otherwise transferred so as to contact” the heater; (3) it can be “wicked . . . so as to contact . . . an area in close proximity to” the heater; or (4) it can be “otherwise transferred so as to contact . . . an area in close proximity to” the heater. (Ex. 2010 (Clemens Declaration) at ¶¶ 43-47.)

A POSA would understand that, by their plain language (“wicked into contact”), claims 1 and 15 require the first option—“wicked so as to contact” the heater. (*Id.* at ¶ 46.) This claim language does not encompass other manners of transfer, as those are explicitly described in the specification as *different* options. (*Id.*) As explained further below, this portion of the specification highlights the difference between what the claims require and the fundamentally different way that the Hon device operates. The claims require option (1), where the liquid is “wicked so as to contact” the heater. In contrast, Hon employs either option (3) or (4),

wicking or otherwise transferring the liquid to an area in proximity to the heater and that is exposed to the heat generated by the heater – and this is not what is recited in claims 1 or 15.

For these reasons, Patent Owner submits that the plain and ordinary meaning of “wicked into contact” is that the aerosol-forming material must be brought into contact with the electrical resistance heater by wicking.

V. LEVEL OF ORDINARY SKILL IN THE ART

For purposes of the trial in this proceeding, RAI accepts Petitioner’s proposed education and experience level of the POSA. (*See* Petition at 9-10.) Thus, for purposes of the trial in this proceeding, the POSA for the ’123 patent would have had a Bachelor’s degree in mechanical engineering, electrical engineering, chemistry, or physics, or a related field, and three to four years of industry experience, or a Master’s degree in mechanical engineering, electrical engineering, chemistry, or physics, or a related field, and one to two years of industry experience. (*See id.*; *see also* Ex. 2010 at ¶¶ 48-50.)

VI. OVERVIEW OF THE CITED REFERENCES

Petitioner asserts five references across the three grounds set forth in the Petition:

- Chinese Patent No. CN2719043Y (“Hon”) (Ex. 1005);
- U.S. Patent No. 4,947,874 to Brooks (“Brooks”) (Ex. 1006);

- U.S. Patent No. 2,057,353 (“Whittemore”) (Ex. 1007);
- European Patent Publication No. EP 0845220 (“Susa”) (Ex. 1008);
and
- U.S. Patent No. 4,284,089 (“Ray”) (Ex. 1009).

(Petition at 3.)

A. Hon

Hon describes an electronic atomization cigarette. (Ex. 1005 at 4.) As shown in Figure 1 below (*id.* at 9), the electronic cigarette includes air inlet 4, normal pressure cavity 5, sensor 6, vapor-liquid separator 7, atomizer 9 with atomization cavity 10, liquid-supplying bottle 11, and mouthpiece 15 within a shell 14 (*id.* at 6).

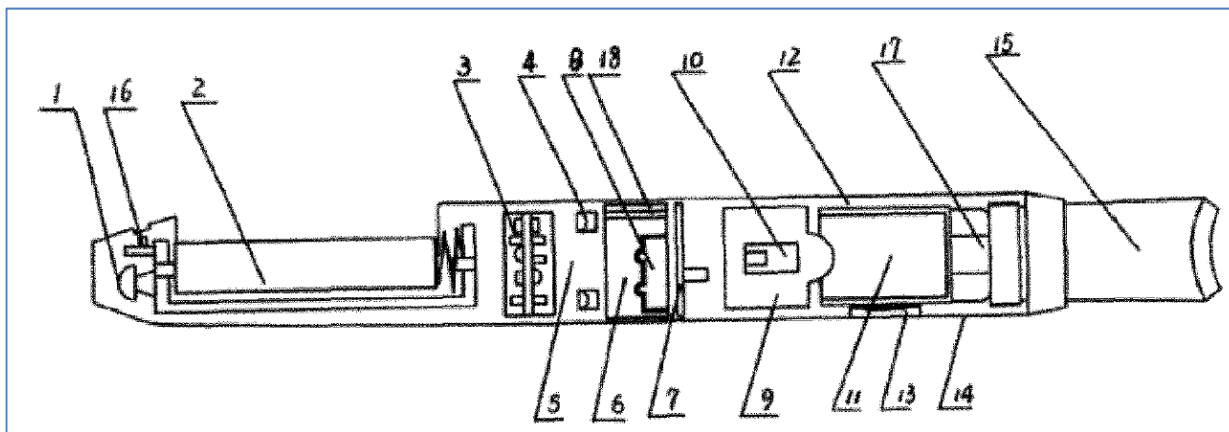
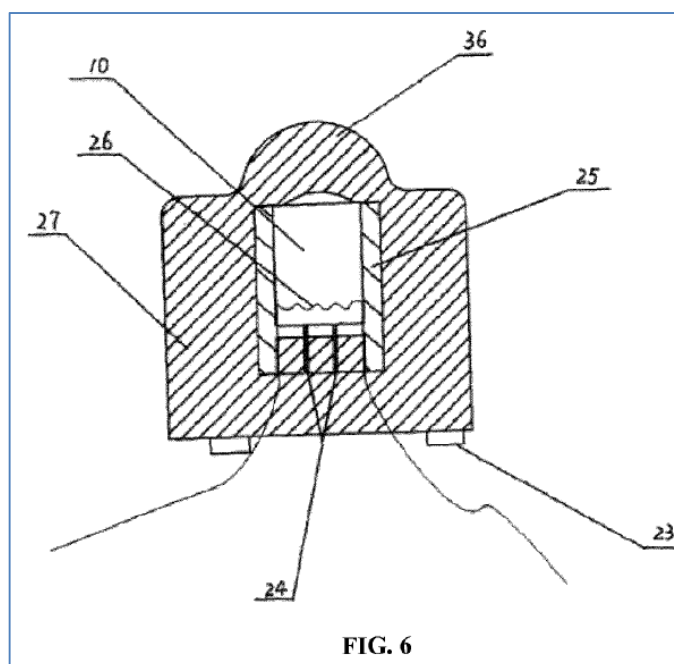


Figure 6, reproduced below, is a structural diagram of the atomizer 9, which includes atomization cavity 10, long stream ejection hole 24, atomization cavity wall 25, heating element 26, porous body 27, bulge 36, and first piezoelectric element 23. (*Id.* at 6-7, 11.) The heating element 26 “may be made of platinum wires, nichrome, or iron-chromium-aluminum alloy wires containing rare earth elements.” (*Id.* at 6.)

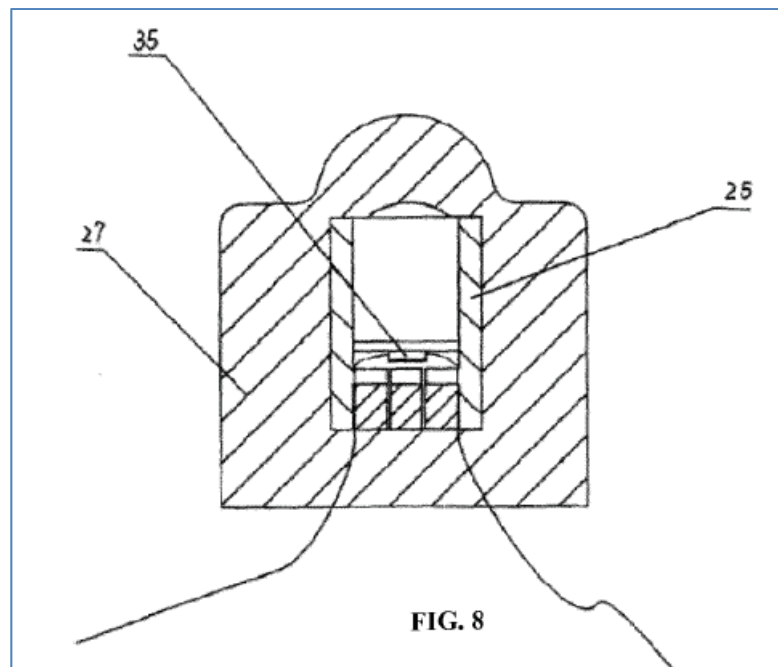


The “porous body 27 is wrapped around the atomization cavity wall 25, and [the porous body] may be made of nickel foam, stainless steel fiber felt, high molecular polymeric foam, and ceramic foam.” (*Id.* at 6.) “[T]he atomization cavity wall 25 may be made of alumina or ceramic.” (*Id.*) The bulge 36 of the porous body 27 is in contact with the liquid-storing porous body 28 in the liquid-supplying bottle 11 to pull liquid around the outside of the atomizer cavity wall 25 using “capillary infiltration.” (*Id.* at 7.)

When a user draws on (or puffs) the device, a negative pressure is created in the mouthpiece 15 and air flows into the air inlets 4, through airflow channel 18 of the sensor, through the hole in the vapor liquid separator 7, and then is forced through ejection holes 24 into the atomization cavity 10 in the atomizer 9. (*Id.*) The “solution in the porous body 27 is driven by the high-speed airflow of the ejection

hole [24] and ejected in the form of droplets into the atomization cavity 10.” (*Id.* at 7.) The nicotine solution is first atomized “ultrasonically by the first piezoelectric element 23,” and then “further atomized under the effect of the heating element 26.” (*Id.*) After atomization, small diameter droplets are suspended in the airstream and form aerosols, which are sucked out via the aerosol passage 12, gas vent 17, and mouthpiece 15. (*Id.*)

“To simplify the design,” Hon describes another embodiment, where “the first piezoelectric element 23 on the atomizer 9 may be removed, and the atomization of the solution relies only on the heating element 26.” (*Id.*) The size of the atomizer could then be made smaller, and “the connection structure of the entire atomizer electronic cigarette is the same as that of Embodiment 1.” (*Id.*) Hon also describes another embodiment, shown in Figure 8 below, where the first piezoelectric element 23 and the heating element 26 in the atomizer 9 can be omitted, and an additional second piezoelectric element 35 can be arranged in the atomization cavity. (*Id.*) In this embodiment, “the airflow via the ejection hole vibrates the focal point at its center to realize atomization, and the strong ultrasonic atomization effect is achieved.” (*Id.*)

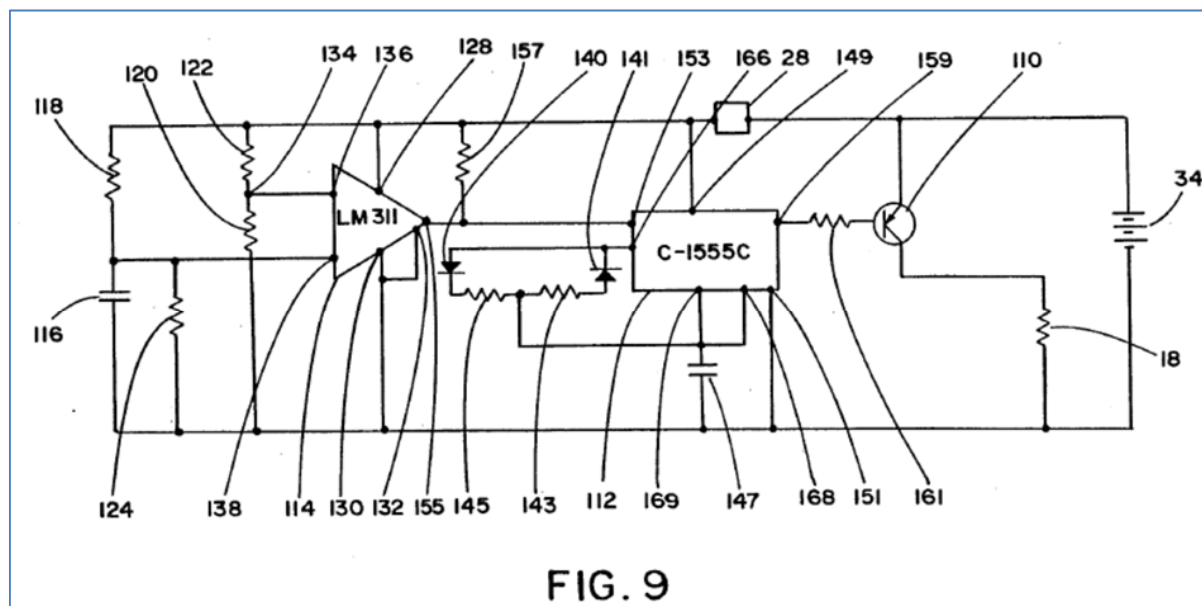


B. Brooks

Brooks issued in 1990 and “relates to cigarettes and other smoking articles such as cigars, pipes, and the like, which employ an electrical resistance heating element and an electrical power source to produce a tobacco-flavored smoke or aerosol.” (Ex. 1006 at 1, 1:6-10.) The ’123 patent specification expressly discusses Brooks, stating that Brooks discloses “electronic control components” and “sensing mechanism components” for electronic smoking articles. (Ex. 1001 at 20:43-63, 21:2-8.)

Figures 9 and 10 of Brooks illustrate exemplary time-based control circuits and related wiring for preferred controllers of the Brooks invention. (Ex. 1006 at 7:5-7.) Each of the circuits of Figures 9 and 10 includes a power source 34, an electrical resistance heating element 18, a current actuation mechanism 28, and a

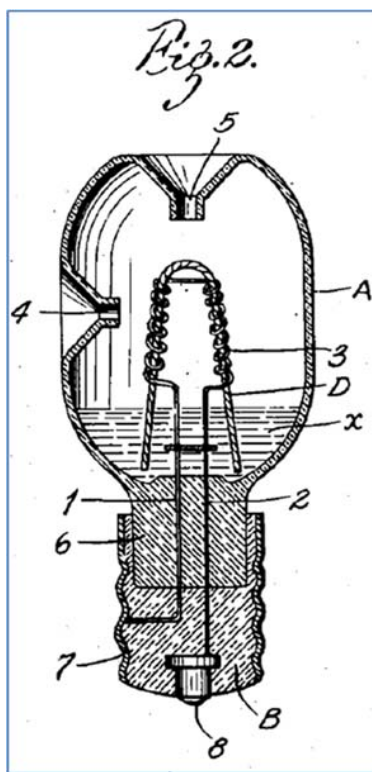
current regulating circuit for controlling the passage of current through the resistance element during periods of current actuation. (*Id.* at 12:39-46, 15:30-35.) Figure 9 is reproduced below.



Brooks describes the use of resistance heating elements that are preferably fibrous materials with high surface areas and porous, wettable characteristics to carry an aerosol forming substance. (*Id.* at 7:26-33.) Brooks more specifically explains that its heating elements are preferably made of carbon. (*Id.* at 7:48-60.) In its Background and Summary sections, Brooks criticizes the use of nichrome metal resistance heating elements because nichrome metal heating elements are not porous and also lack the desired surface area for use with the Brooks devices. (*Id.* at 3:15-42, 4:7-31, 7:30-33.)

C. Whittemore

Whittemore issued in 1936 and describes a vaporization unit for a therapeutic apparatus. (Ex. 1007 at 1-2.) As shown below in Figure 2, the vaporization vessel A is a hollow glass container that holds liquid medicament x. (*Id.* at 1:19-28.) The vaporization vessel A includes an electrically-operated heating means with conductors 1 and 2 and a heating element 3. (*Id.*) The vaporization vessel A includes an air inlet orifice 4 at a point below the upper end of the vessel and a vapor outlet 5 in the top wall of the vessel. (*Id.* at 1:28-39.) Wick D is a wick material and is “in contact or approximate contact with the heating element” 3, such that the “medicament will be carried by capillary action to a point where it will be vaporized by the heat from the filament 3.” (*Id.* at 1:50-2:8.) The wick D forms an inverted v-shaped device that extends “downwardly into the medicament and terminating at or in close proximity to the closed bottom 6 of the vessel A.” (*Id.* at 2:8-18.) The “unit will operate properly so long as there is sufficient medicament in the vaporization vessel A to engage or contact with a portion of the wick D.” (*Id.* at 2:19-25.)



D. Susa

Susa is a 1998 EP publication that describes a flavor generation article used for generating flavor as an inhalation target by heating a liquid material with an electric heater. (Ex. 1008 at 1:5-10.) As the e-liquid material for use with the flavor generation article, Susa describes that the liquid material contains at least a flavor substance. (*Id.* at 2:36-37.) For example, the liquid material may be “used for enjoying only the flavor, e.g., menthol or caffeine,” and “it can be a material that generates only the flavor.” (*Id.* at 6:24-28.) “Also, in order to add smoke to the flavor, the liquid material 36 can contain a material which generates aerosol when heated.” (*Id.* at 6:28-30.) Alcohols, including glycerin, propylene glycol, or their mixture, or other components may be used to generate aerosol. (*Id.* at 6:30-34.)

E. Ray

Ray is a 1981 patent that describes a smoking device for non-burning or non-combustion uses. (Ex. 1009 at Abstract.) The smoking device includes a container defining a passageway having a vaporizable nicotine, and a means for preventing the evaporation of the nicotine during periods of non-use. (*Id.*) “The source of vaporizable nicotine may be an absorbent material which has a nicotine-bearing material absorbed therein. The absorbent may also have absorbed therein a pH adjustment, water, and/or flavoring ingredients.” (*Id.*) The device releases nicotine vapors into air drawn through the passageway of the container. (*Id.*)

VII. HON, BROOKS, AND WHITEMORE DO NOT RENDER CLAIMS 1, 2, 5, 7, 9, 11, 12, 14, 15, 18, 21, AND 23-26 OBVIOUS (GROUND 1)

A. Claims 1 and 15: “the mixture ... can be wicked into contact with the electrical resistance heater and volatilized”

1. Hon Does Not Disclose That “the mixture ... can be wicked into contact with the electrical resistance heater and volatilized”

Independent claims 1 and 15 recite the limitation “wherein ... the mixture comprising the tobacco extract and the aerosol-forming material can be wicked into contact with the electrical resistance heater and volatilized to produce a visible mainstream aerosol.” (Ex. 1001 at 33:1-6, 33:63-67.) Hon does not teach or suggest this limitation.

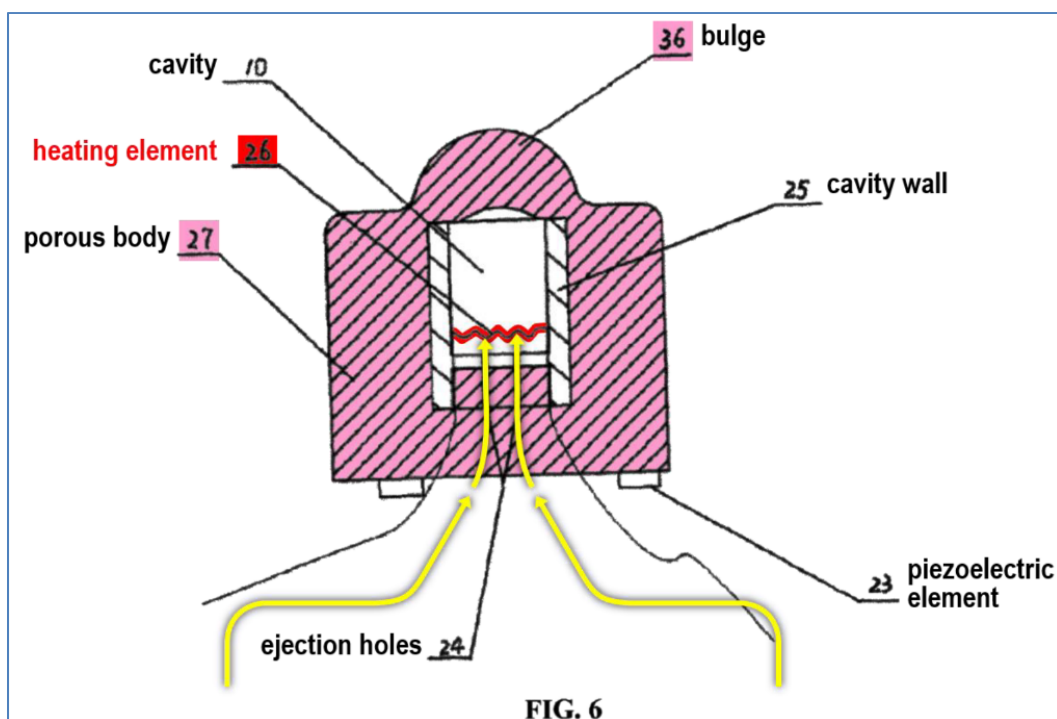
Patent Owner respectfully disagrees with the Board’s preliminary finding, based primarily on Mr. Fox’s then-unrebutted testimony, that Hon’s device wicks its liquid into contact with the heater. (Paper 9 at 23-25.) The Board encouraged the parties to further address in these proceedings Patent Owner’s assertion that Hon’s device does not teach that limitation. (*Id.* at 25.) Patent Owner explains below, and in the accompanying Declaration of Charles Clemens (Ex. 2010), why Hon’s device does not wick liquid into contact with the heater.

RAI agrees with the Board that claims 1 and 15 do not require that the claimed absorbent fibrous/wicking material be in contact with the heater – rather, as the Board notes, dependent claims explicitly state that the absorbent fibrous/wicking

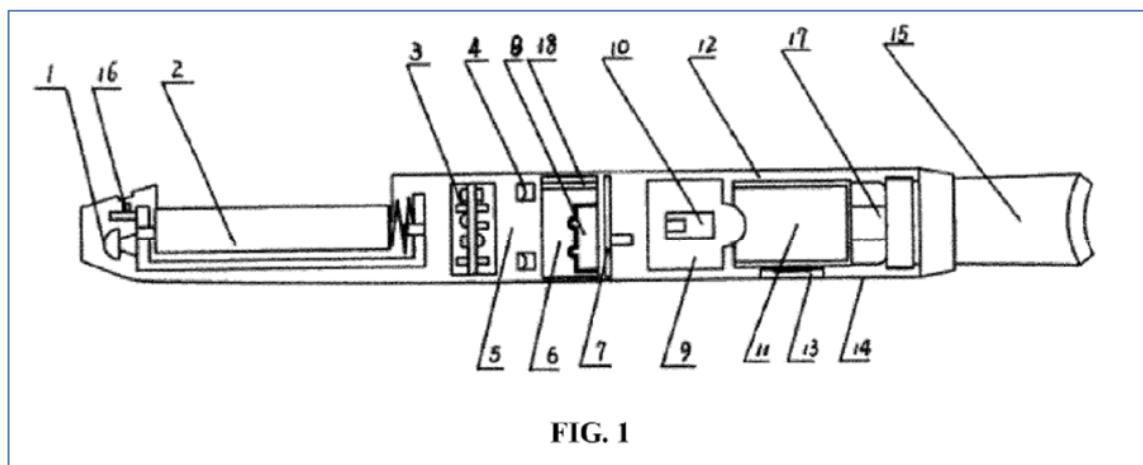
material may be *in proximity to* the heater *or in contact with* the heater. (Paper 9 at 23-24.) RAI also agrees with the Board that Hon describes that its liquid mixture is wicked to a region *near* a resistance heating element. (*Id.*) However, claims 1 and 15, and their “wicked into contact” limitations, explicitly require that: (i) the liquid mixture *contacts* the electrical resistance heater (not a region near the heater), and (as explained above) (ii) the liquid mixture arrives at the electrical resistance heater *by wicking*. Petitioner fails to show how Hon describes either limitation, as explained below.

a) Hon Does Not Disclose That Its Liquid Mixture Comes Into Contact With Its Heating Element

Hon describes a heating element 26 disposed within an atomization cavity 10 for atomizing a solution stored in a liquid supplying bottle 11. Petitioner’s annotated version of Hon’s Figure 6 is reproduced below.



(Petition at 48; Ex. 1005 at Fig. 6.) Hon's Figure 1 is also reproduced below.



(Ex. 1005 at Fig. 1.)

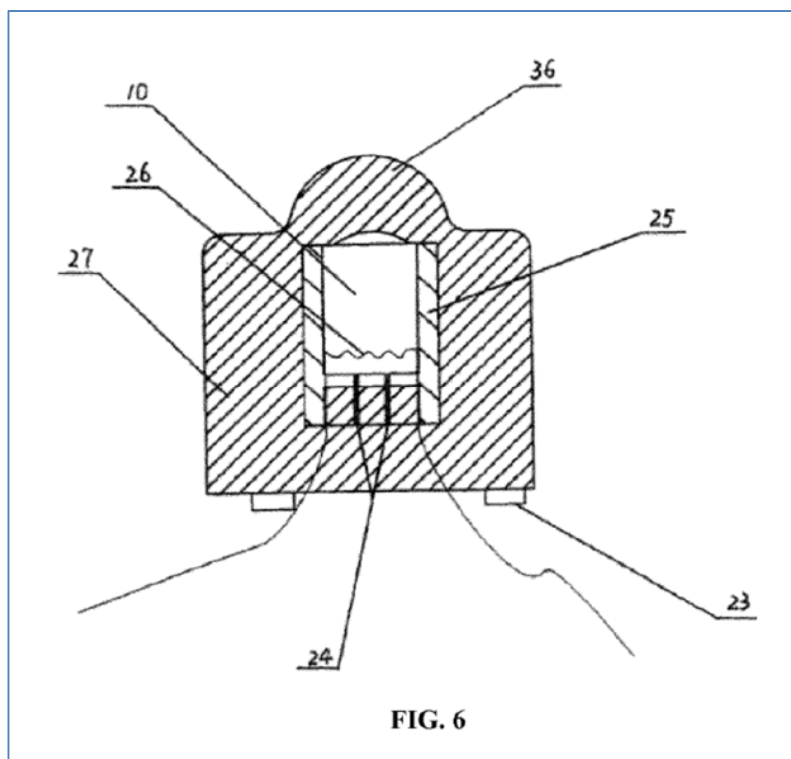
Hon's solution is transferred from the liquid supplying bottle 11 by a bulge 36 which extends into the liquid supplying bottle 11 at one end and is joined to a

porous body 27 of the atomizer at its other end. (*Id.* at 7, Fig. 6.) Hon describes the heating of its liquid as follows:

The solution in the porous body 27 is driven *by the high-speed airflow* of the ejection hole and ejected in the form of droplets into the atomization cavity 10; *it is atomized ultrasonically by the first piezoelectric element 23* and is *further atomized under the effect of the heating element 26*.

(*Id.* at 7 (emphases added).)

While Hon generally describes that the liquid mixture is driven by high-speed airflow and ejected in the form of droplets into its atomization cavity 10, nowhere does Hon actually disclose that the liquid comes into contact with the heating element 26 in the atomization cavity 10. (*See* Ex. 2010 at ¶¶ 67, 70.) Petitioner adds yellow arrows to its annotated version of Hon's Figure 6 which supposedly illustrate the liquid coming into contact with the heating element 26, but Hon's original Figure 6 (shown below) does not include these arrows, nor does Hon describe any such arrows.



(Ex. 1005 at Fig. 6.)

In the Institution Decision, the Board relies on the declaration of Petitioner's expert (Mr. Fox) at paragraph 153 (reproduced below):

153. When the user draws on the device, the liquid "solution in the porous body 27 is driven by the high-speed airflow ... and ejected in the form of droplets into the atomization cavity 10," where it contacts "heating element 26" and volatilized into an aerosol "which is sucked out via the aerosol passage 12, gas vent 17, and the mouthpiece 15." Hon at 7.

(Ex. 1003 at ¶ 153; *see* Paper 9 at 22-23.) But Mr. Fox's statement here is a mischaracterization of what Hon discloses. While Mr. Fox asserts that the liquid

“contacts ‘heating element 26,’” he notably does not put quotation marks around the word “contacts” – because that is not what Hon says.

In summarizing Hon earlier in his declaration, Mr. Fox provides the full quote from Hon:

75. Thus, when the user draws on the device, “[t]he solution in the porous body 27 is driven by the high-speed airflow of the ejection hole and ejected in the form of droplets into the atomization cavity 10; it is atomized ultrasonically by the first piezoelectric element 23 and is further atomized under the effect of the heating element 26.” Hon at 7. That aerosol is then sucked out around the bottle (aerosol passage 12” and out the mouthpiece. See Figure 1 above; Hon at 7 (the aerosol “is sucked out via the aerosol passage 12, gas vent 17, and the mouthpiece 15.”).

(Ex. 1003 at ¶ 75 (highlighting added).) Hon does not state that the liquid “contacts” heating element 26; rather, the liquid “is further atomized under the effect of the heating element 26.” (Ex. 1005 at 7.) During his deposition, Mr. Fox conceded that Hon does not describe that the liquid contacts the heater. (Ex. 2011 at 94:22-95:8.) Mr. Fox’s deposition testimony thus contradicts his declaration assertion that “Hon teaches all of the claim elements.” (Ex. 1003 at ¶ 85; *see also id.* at ¶ 151.) Instead, Mr. Fox testified that it would have been “obvious” in view of Figure 6 and Hon’s description that the liquid would contact the heater. (Ex. 2011 at 94:22-95:8.) But Mr. Fox offers no explanation for why the liquid in Hon would actually contact

heating element 26, or why it would have been obvious (as he now claims) that the liquid contacts the heater. (*See* Ex. 1003 at ¶¶ 151-153.) Nor does Mr. Fox provide any analysis, testing, or evidence demonstrating that the Hon liquid contacts the heater. (*See id.*)

Apparently recognizing this deficiency, Mr. Fox alleged at his deposition that he conducted testing on a Ruyan device that “confirmed [his] views” on “how the [Hon] device operates.” (Ex. 2011 at 100:11-20.) But even if testing of a Ruyan device were relevant and proper in an IPR (it is not), Mr. Fox still would not, and could not, confirm that this alleged testing showed that any liquid *actually contacts* the heater. In fact, he could not even remember exactly how he conducted the alleged testing. (*Id.* at 104:13-105:2.) Most importantly, Mr. Fox has not submitted *any* such testing in this proceeding. (*Id.* at 105:3-5.) Mr. Fox admits that Hon does not disclose either the temperature or the pressure inside the Hon atomization cavity. (*Id.* at 105:6-10, 106:15-107:2.) As Mr. Clemens explains, both of these factors are highly relevant and would affect whether any liquid is even able to contact the heater, or whether it would instead vaporize as soon as it enters the cavity. (Ex. 2010 at ¶ 70.)

Hon neither explicitly nor inherently discloses that any of its liquid mixture comes into contact with its heating element. (*See* Ex. 1005 at 4-7.) For this reason

alone, Petitioner has not met its burden to show that claims and 1 and 15 are unpatentable.

b) Hon's Liquid Mixture Is Not Transferred To Hon's Heating Element By Wicking

Even assuming *arguendo* that Hon's liquid mixture contacts Hon's heating element, Hon's liquid is ***not*** "wicked into contact with the electrical resistance heater," as required by claims 1 and 15. (*See* Ex. 2010 at ¶¶ 71-81.)

Mr. Fox describes the operation of Hon's device in paragraphs 152-153 of his declaration:

Thus, Hon's atomizer wicks the liquid from bottle 11 via bulge 36. The liquid mixture wicks (travels via capillary action) from bulge 36 through the porous body 27 that is "wrapped around the atomization cavity wall 25" to ejection holes 24.

* * *

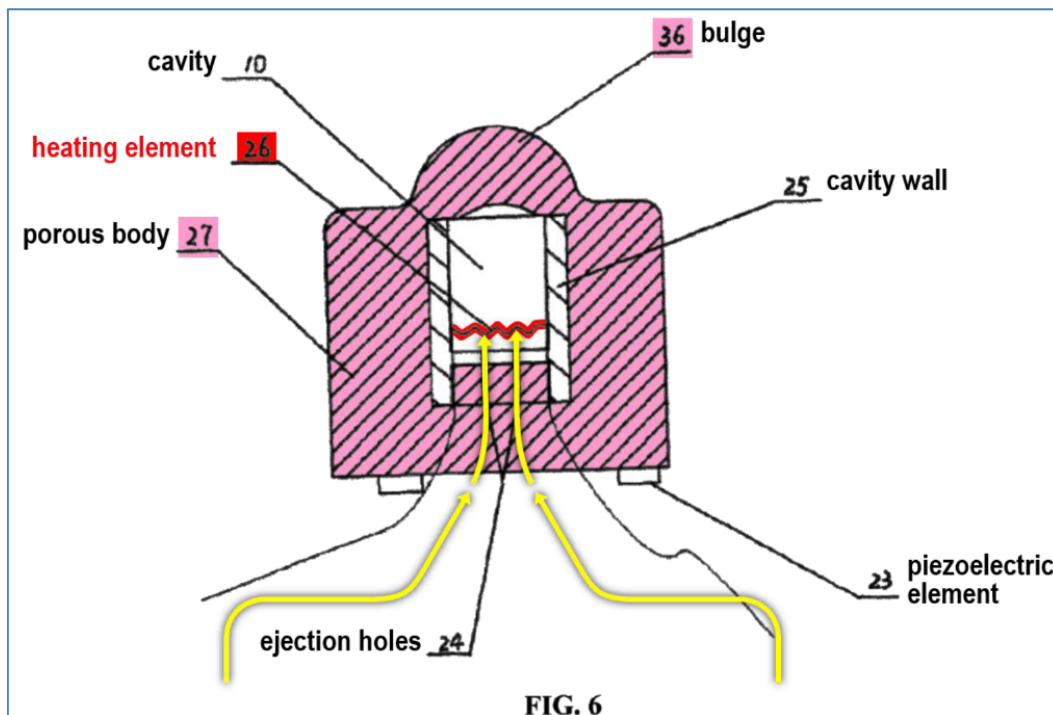
When the user draws on the device, the liquid "solution in the porous body 27 *is driven by the high-speed airflow* ... and ejected in the form of droplets into the atomization cavity 10," where it contacts "heating element 26" and volatilized into an aerosol "which is sucked out via the aerosol passage 12, gas vent 17, and the mouthpiece 15." Hon at 7.

(Ex. 1003 at ¶¶ 152-153 (emphasis added and annotated Fig. 6 omitted).)

Mr. Fox thus concedes that Hon's liquid is ***not*** wicked into contact with the heater. Rather, the liquid is wicked out of bottle 11 and into the atomizer's porous body 27. That is where any wicking stops. From there the liquid is only transported

by “*high-speed airflow of the ejection hole*,” not wicking. (Ex. 1005 at 7 (emphasis added); Ex. 2010 at ¶ 71.) Without the ultrasonic atomization by the piezoelectric element 23 and the high speed airflow, there is no indication in Hon (or Mr. Fox’s testimony) that Hon’s liquid would move out of porous body 27 and into the atomization cavity 10 at all, let alone by wicking as required by the challenged claims. (Ex. 2010 at ¶ 72; Ex. 1005 at 7, Fig. 6.) During his deposition, Mr. Fox confirmed that it is “airflow” that takes the liquid “from the porous body to the heating element.” (Ex. 2011 at 84:21-85:5.)

As shown below in Petitioner’s annotated version of Hon’s Figure 6, the heating element 26 is located within cavity 10 and is separated from porous body 27 by cavity wall 25. (Ex. 1003 at ¶¶ 152-153; Ex. 2010 at ¶ 73.)



In this configuration, high speed airflow through ejection holes 24 is necessary to transport liquid into the atomization cavity 10, and this is why Mr. Fox was unable to affirmatively assert that Hon wicks the liquid into contact with the heater as required by the challenged claims. (Ex. 2010 at ¶¶ 73-74; Ex. 1003 at ¶¶ 152-153, 160.) Rather, Mr. Fox states that “Hon’s atomizer relies on the user’s draw to carry droplets of the liquid mixture from the ejection holes to the heater inside of the atomizer cavity.” (Ex. 1003 at ¶ 160.) That reliance on the “user’s draw to carry droplets ... from the ejection holes” is not wicking. (Ex. 2010 at ¶ 74.)

Moreover, Hon knew how to describe when wicking action was responsible for transporting liquid, as Hon explains that its liquid solution is moved from supply bottle 11 to porous body 27 “via capillary infiltration” (*i.e.*, wicking). (Ex. 1005 at 7; *see* Ex. 2011 at 86:12-24, 92:14-17 (testifying Hon’s “capillary infiltration” means “wicking”); Ex. 2010 at ¶ 71.) Mr. Fox agrees that in the Hon device, “capillary infiltration” will occur wherever there is porous or fibrous material (Ex. 2011 at 90:10-18), and yet there is no porous or fibrous material inside Hon’s atomization cavity 10 (*see, e.g.*, Ex. 1005 at Fig. 6). If Hon’s device also moved the liquid into atomization cavity 10 and into contact with the heater via capillary action (*i.e.*, wicking), then Hon would have said so. But Hon does not describe any additional wicking of the liquid once the liquid is in porous body 27. (*See* Ex. 2010 at ¶¶ 71-74.) Instead, Hon explains, and Mr. Fox concedes, that the “high-speed

airflow of the ejection hole” is responsible for moving liquid droplets into the atomization cavity 10. (Ex. 1005 at 7; Ex. 2010 at ¶¶ 71-74.) At best, Hon teaches that liquid is wicked to an area in proximity to the heater. This is not the embodiment claimed in claims 1 and 15.

In the Institution Decision, the Board relied on the breadth of claims 1 and 15 with respect to the positioning of the absorbent fibrous/wicking material and the heater in its preliminary determination that Hon describes the “wicked into contact with the electrical resistance heater” limitation. (See Paper 9 at 24-25.) Specifically, the Board noted that the ’123 specification describes that liquid can be wicked into contact with the heater when the wicking material is positioned in proximity to (but not in direct contact with) the heater, and therefore that Hon’s disclosure of its porous body 27 being in proximity to its heating element 26 was sufficient to describe Hon’s liquid being “wicked into contact” with the heater. (See *id.*) RAI respectfully disagrees and, for the reasons explained above in Section IV, believes the Board’s preliminary determination is incorrect because it improperly focuses on the position of the wicking material and the heater rather than the claim language, which requires that the liquid be carried *into contact with the heater by wicking*. Mere proximity is not enough to demonstrate that liquid is “wicked into contact.”

In asserting that “[t]his claim element does not require the wick itself to contact the heater, but merely be in proximity to the heater” (Petition at 46),

Petitioner improperly reads the “mixture ... can be wicked into contact” limitation entirely out of claims 1 and 15. Regardless of whether the wicking material is in contact with or in proximity to the heater, claims 1 and 15 still include the *separate* requirement that the liquid be “wicked into contact” with the heater. In other words, the dependent claims are directed to the *location* of the heater and the wick vis-à-vis one another, whereas claims 1 and 15 are directed to the *manner* in which the liquid reaches the heater. These are different claim requirements. (*See* § IV *supra*.)

A POSA would understand that a liquid can be wicked into contact with the heater even when the wicking material is not touching the heater. (*See* Ex. 2010 at ¶¶ 75-79.) For example, cohesive forces between molecules of a liquid can give rise to strong surface tension of the liquid and liquids can “bridge” small gaps between surfaces. (*Id.* at ¶¶ 77-79.) A simple graphic demonstrating surface tension is shown below, and, in this example, the water contacts the person’s finger even though the person’s finger does not contact the surface on which the water resides.



(*Id.* at ¶ 78.) Mr. Fox recognizes that a POSA would understand this concept. (See Ex. 2011 at 92:24-93:13 (stating that once separated from the wicking material, the liquid could move through the ejection holes due to surface tension, but that Hon relies on air to get the liquid out of the holes).)

Here, when a small distance separates the wicking material and the heater as described in the '123 patent, a POSA would understand that cohesive forces and surface tension allow the liquid to be wicked into contact with the heater. (Ex. 2010 at ¶¶ 78-79.) In other words, the liquid mixture that is present in the absorbent fibrous/wicking material will extend a small distance from the fibrous/wicking material to the heater due to surface tension, bridging the gap from the fibrous/wicking material and into contact with the heater. (*Id.*) As the liquid is vaporized and drawn away from the heater during draw by the user, the absence of

liquid in the absorbent fibrous material will cause more wicking action within the fibrous material, thus wicking more liquid into its place and into contact with the heater. (*Id.* at ¶ 79.) Hon’s use of the atomization cavity wall 25 to separate the heating element 26 from the porous body 27, and “high-speed airflow through the ejection hole” 24 to move the liquid into the atomization cavity once it has separated from the wicking material, provides a fundamentally different transport phenomena from the claimed wicking the liquid into contact with the heater. (*Id.* at ¶ 80.)

For the above reasons, Petitioner has not shown that Hon describes or suggests that “during draw, the mixture comprising the tobacco extract and the aerosol-forming material can be wicked into contact with the electrical resistance heater . . .,” as recited in independent claims 1 and 15.

2. A POSA Would Not Have Combined Hon With Whittemore

a) The Board Correctly Determined That Petitioner Has Not Established Why A POSA Would Have Attempted To Modify Hon With Whittemore

After evaluating the Petition and Mr. Fox’s testimony, the Board found that “we are not persuaded that Petitioner sufficiently establishes why a POSA would have attempted to modify Hon’s device by looking to Whittemore.” (Paper 9 at 26.) Petitioner will not be able to make new arguments, provide missing evidence, or put forth new rationales for combining Hon and Whittemore in its reply. *See, e.g.*, 37 C.F.R. § 42.23(b); Trial Practice Guide Update (July 2019) at 40; *Henny Penny Corp.*

v. Frymaster LLC, 938 F.3d 1324, 1330-31 (Fed. Cir. 2019) (“an IPR petitioner may not raise in reply ‘an entirely new rationale’ for why a claim would have been obvious”) (citations omitted). Thus, Patent Owner respectfully submits that the Board should come to the same conclusion in the Final Written Decision.

As RAI explained in the POPR (Paper 6 at 32-34), Petitioner’s stated motivation for combining Hon and Whittemore rests entirely on Mr. Fox’s inaccurate assumptions and conclusory statements, and a mischaracterization of a Board decision in *R.J. Reynolds Vapor Co. v. Fontem Holdings I B.V.*, IPR2016-01268, Paper 63 (PTAB Dec. 19, 2017) (“the 1268 Decision”). (See Petition at 50-53.) The Board agreed. (See Paper 9 at 25-28.)

First, the Board rejected Petitioner’s characterization of the Board’s findings in the 1268 Decision. (*Id.* at 27-28.) The Board determined that the 1268 Decision supports, instead, “that *Whittemore’s wire-wrapped wick has little relation to the atomizer disclosed in Hon* and that Petitioner has not shown sufficiently how or why Petitioner’s proposed substitution would improve Hon’s electronic atomization cigarette.” (*Id.* at 28 (emphasis added).)

Second, a POSA would not have been motivated to modify Hon to include the heater/wick design of Whittemore. (See *id.* at 26-28; Paper 6 at 33-34; Ex. 2010 at ¶¶ 82-96.) The Board held: “The Petition does not adequately explain, however, why a POSA would have made further modifications to Hon’s device by replacing

Hon's atomizer with Whittemore's wick and heater.” (Paper 9 at 27.) The Board further found that “neither Petitioner nor Mr. Fox provide *objective evidence* to support the assertion that Whittemore's wick and heater is ‘simpler and cheaper’ than Hon's atomizer, or that using Whittemore's wick and heater in Hon would have reduced design and manufacturing costs, increased reliability, or increased the expectation of success.” (*Id.* (emphasis added).)

Mr. Fox, in fact, provides no evidence to support that replacing Hon's dual-stage atomizer design with Whittemore's wick/heater design would accomplish what Mr. Fox suggests or that a POSA would have been motivated to modify Hon to incorporate Whittemore's ancient wick/heater design from the 1930s. (*See* Ex. 2010 at ¶¶ 83-85.) For example, Mr. Fox argues that moving to Whittemore's wick/heater design would simplify Hon's device by allowing for Hon's piezoelectric element and associated circuitry to be eliminated (saving cost and complexity). (*See* Ex. 1003 at ¶¶ 162-167.) Mr. Fox alleges that a POSA would have “eliminate[d] the piezoelectric device and associate [sic] circuitry because it adds significant complexity but is not reliable (or otherwise unhelpful) in production devices.” (*Id.* at ¶ 166.) But Mr. Fox fails to explain why eliminating Hon's piezoelectric element would cause a POSA to replace Hon's atomizer with the heater/wick of Whittemore or why Hon's piezoelectric element is unreliable. (*See* Ex. 2010 at ¶ 86.)

Moreover, Hon itself already describes an alternative embodiment that eliminates the first piezoelectric element “[t]o simplify the design.” (Ex. 1005 at 7; Ex. 2010 at ¶¶ 87-88.) In this embodiment, Hon’s atomizer can be made slightly smaller, but otherwise “the connection structure of the entire atomizer electronic cigarette is the same as that of Embodiment 1.” (Ex. 1005 at 7; Ex. 2010 at ¶ 87.) Thus, even if a POSA had been motivated to simplify Hon’s device, a POSA would not have had to look beyond Hon itself to understand that she could have removed the piezoelectric element 23 and continued to use a very similar atomizer. (Ex. 2010 at ¶ 87.) The Board recognized in the Institution Decision that Hon’s alternative embodiments undercut Mr. Fox’s assertions that a POSA would have looked to Whittemore to simplify Hon’s dual-stage atomizer. (Paper 9 at 26-27.)

Petitioner also cites no evidence that Whittemore’s wick would even be compatible with Hon’s device. Whittemore’s wick/heater design dates to the 1930s and was available to Hon. But Hon did not design his device to put its wicking material (porous body 27) in contact with the heater, choosing instead to separate the porous body and the heater with a wall (cavity wall 25). (Ex. 2010 at ¶ 89.) Moreover, Hon’s heater is more efficient, and thus works better and with less power consumption, than the heater in Whittemore’s wick/heater design because Hon is volatilizing tiny aerosol droplets rather than a continuous large volume of liquid as in Whittemore. (*Id.*)

For the above reasons, the Board should confirm in the Final Written Decision its finding that Petitioner failed to “establish[] why a POSA would have attempted to modify Hon’s device by looking to Whittemore.” (Paper 9 at 26.)

b) The Board Should Disregard Mr. Fox’s Opinions Regarding The “Ruyan Devices”

In the Institution Decision, the Board ignored Petitioner’s attempts to rely on the Ruyan devices to bolster its obviousness position with respect to the proposed combination of Hon and Whittemore. (*See* Paper 9 at 25-28; Ex. 1003 at ¶¶ 159-160, 163-165.) The Board should continue to do so in the Final Written Decision. *See, e.g.*, 35 U.S.C. § 311(b) (limiting IPR to “prior art consisting of patents or printed publications”); 37 C.F.R. § 42.104(b)(4) (requiring the petition to “specify where each element of the claim is found in the prior art patents or printed publications”); *Lantz Med., Inc. v. Bonutti Research, Inc.*, IPR 2015-00995, Paper 11 at 9 (PTAB Oct. 21, 2015) (denying institution where “Petitioner ha[d] not provided sufficient evidence to support a threshold showing that the [] operating manual [wa]s a printed publication before the critical date”); *Salpeter v. ARP Wave, LLC*, IPR2019-01384, Paper 12 at 15-16 (PTAB Jan. 27, 2020) (“Petitioner may only rely on prior art patents and printed publications.”).

As discussed in the POPR, Petitioner and Mr. Fox improperly refer to and rely on “Hon’s prior-art Ruyan device” in repeated efforts to bolster their obviousness

arguments with regard to Hon. (Paper 6 at 11-12, 31, 34, 37-38.) The Board should disregard Mr. Fox's opinions and Petitioner's improper arguments concerning the "Ruyan device" for the reasons explained below.¹

Mr. Fox's Reliance on the Ruyan Device and Teardowns is Improper:

Petitioner contends, with no proof, that "the commercially available Ruyan device—as documented by Patent Owner at the relevant time—illustrates a POSA's background knowledge of commercial practices in the art." (Petition at 9.) But Mr. Fox's declaration and deposition make clear that he is relying on the Ruyan devices and teardowns for far more than "background knowledge." Mr. Fox is improperly using that material to bolster insufficient disclosures of its primary reference – Hon – which is not permitted in an IPR. 35 U.S.C. § 311(b). In fact, Mr. Fox conceded during his deposition that he used the supposed shortcomings of

¹ The Board should disregard Mr. Fox's opinions for the additional reason that he was evasive and uncooperative during his deposition. Mr. Fox repeatedly refused to answer simple and direct questions, opting instead to repeat the party lines. As just one example, Mr. Fox was asked several times whether he had any evidence that the RJR teardown report (Ex. 1023) would have been available to a POSA in 2006. (Ex. 2011 at 41:7-65:3.) Rather than answer these questions, he just repeated the same thing each time: that the RJR teardown report allegedly provides evidence of what a POSA would have understood about the device in 2006 had he or she torn one down. (See, e.g., *id.* at 47:18-48:4, 50:22-51:20, 51:25-52:10, 53:4-54:5, 55:2-9, 57:17-58:11.) Mr. Fox even admitted that the reason he refused to answer certain questions was because he was "nervous" that his answers might create a negative "legal argument." (*Id.* at 34:6-9.) This is not a proper basis for refusing to answer questions in a deposition.

the Ruyan devices (and the teardown reports regarding those devices) in all of his invalidity opinions. (*See, e.g.*, Ex. 2011 at 28:21-24 (“The Ruyan devices provide supporting evidence and supplementary evidence to support my argument that the - or my opinion that the ’123 patent claims are invalid.”); 76:18-22 (“RJR’s teardown analysis shows that the Ruyan device has some shortcomings. In my opinion, that would have been a motivation for a POSA to look at improving the -- those devices and improving [Hon].”); *see also id.* at 70:15-71:17; 78:7-17; 79:7-14.) Mr. Fox’s opinions are irretrievably infected with his improper reliance on the Ruyan devices and teardowns, and so the Board should give them no weight.

First, Mr. Fox relies heavily on his (incorrect) conclusion that RJR determined that the Ruyan device had insufficient aerosol generation as part of his allegations concerning why a POSA would have been motivated to modify Hon with Whittemore. (Ex. 1003 at ¶¶ 159-160.) Mr. Fox is relying on RJR’s teardown report on the Ruyan device as substantive support for his opinions, not just background information. Mr. Fox confirmed during his deposition that “the evidence behind [his] opinions” “includes the Ruyan device, their existence, and their construction as described by the tear downs.” (Ex. 2011 at 75:16-21.) Again, this is far more than mere background information.

Second, Mr. Fox repeatedly relies on conclusions allegedly drawn by the authors of the teardown reports, but he makes no attempt to establish that these

reports (or even the Ruyan devices themselves) are prior art to the '123 patent or that they would have been known to a POSA at the filing date of the '123 patent. Instead, the best Mr. Fox could say is that he was *told by counsel* that these reports are evidence of what a POSA would have known at the time. (Ex. 1003 at ¶ 35.)² Mr. Fox states that the two reports are available on the tobacco legacy database, and notes the URLs printed on the documents. (*Id.* at ¶ 33.) But a review of those URLs establishes that the RJR teardown report (Ex. 1023) was made available to the public no earlier than 2019, and the PMUSA report (Ex. 1019) was made available to the public no earlier than 2010. (*See* Exs. 2012, 2013.) As such, Mr. Fox cannot show that these reports reflect what a POSA would have known at the October 2006 filing date of the '123 patent. Even worse, with respect to the PMUSA report (Exs. 1019-1020), Mr. Fox relies on a “much clearer” version of the document (Ex. 1020) that he allegedly received from counsel and for which there is no evidence it was ever available to the public. (Ex. 1003 at ¶ 33.)

² Patent Owner gave Mr. Fox multiple opportunities at his deposition to provide *any* evidence that a POSA would have known about the RJR teardown report as of the October 2006 priority date of the '123 patent. (Ex. 2011 at 41:7-65:3.) Mr. Fox refused to answer the questions and was unable to provide a single shred of evidence in that regard. (*Id.*) Counsel even gave him the opportunity to identify evidence that was not included in his declaration, but Mr. Fox refused and instead chose to provide the “same answer” as to the previous question, which (as noted above) was not an answer at all. (*See supra* footnote 1.)

Third, Mr. Fox makes no attempt to establish that these reports are reflective of what Hon discloses. Mr. Fox admits that the 2004 and 2006 Ruyan devices are “different” from each other, and his opinions reflect this reality, using vague statements like certain components “appear[] similar,” or “appear” to be of “similar construction.” (Ex. 1003 at ¶¶ 29, 33.) And while Mr. Fox at one point contends that the “Ruyan device” is an “actual implementation” of Hon (*id.* at ¶ 159), he provides no evidence supporting that assertion (for either version). Without evidence that the Ruyan device on which he relies is the same as the Hon device, Mr. Fox cannot credibly attribute any alleged shortcomings of the Ruyan device to Hon’s device. And, without this required connection, Mr. Fox’s obviousness opinions are entirely unsupported.

Mr. Fox’s Opinions Regarding the Ruyan Devices are Deficient:

Separately, even if the Board were to consider Mr. Fox’s opinions regarding the Ruyan devices and teardowns, those opinions are substantively deficient as well. Mr. Fox opines that RJR’s teardown report found that the Ruyan device “requires a long and slow draw to produce a satisfactory amount of aerosol,” but his opinion is directly contradicted by statements in the report itself. (Ex. 1003 at ¶ 159.) For example, the RJR engineers said the “first reaction” of those who tried the Ruyan device was that they were “surprised at how much aerosol is generated during a puff,” and that the “increased aerosol yield from the electronic cigar [was] instantly

noticeable.” (Ex. 1023 at 15.) The engineers further found that the aerosol yields “in some cases exceeded yields” from other non-combustible smoking articles, even under normal draw. (*Id.* at 11-12.)

Although not expressly stated, Mr. Fox appears to rely on a portion of the report describing the testing methodology for analyzing the aerosol yields from the Ruyan device:

In an attempt to increase aerosol yields from the electronic cigar, we decided to lengthen the duration of the individual puffs from 2 sec to 3 sec duration. This was decided after casual observations that slightly longer puffs by smokers using the electronic cigar and pipe seemed to generate significantly more aerosol.

(*Id.* at 11.) In other words, the RJR engineers simply noted the unremarkable observation that a longer draw increases the yield of aerosol, something that would have been well known to a POSA at the time. (*See* Ex. 2010 at ¶¶ 91-92.) The report never attributes this to a design flaw with the Ruyan device. (*Id.*) In fact, the engineers found the Ruyan device to be “intricate” and “well-engineered.” (Ex. 1023 at 15.)

Mr. Fox also contends that a “POSA would have realized that a separate problem with the Ruyan device’s performance may have been with the design of the atomizer itself.” (Ex. 1003 at ¶ 160.) But Mr. Fox provides no evidence to support this speculation. The RJR teardown report states that “the Ruyan electronic cigar

seems to have addressed several shortcomings of some of the earlier attempts at producing a cigarette-like aerosol without combustion.” (Ex. 1023 at 14-15.) The report also states that the Ruyan device provided an advancement over previous aerosol generating technology, *including Whittemore*—the exact heater/wick design that Petitioner now claims should be combined with Hon. (*Id.* at 14.) Therefore, even if Mr. Fox could establish (and he cannot) that this Ruyan device is the same as the Hon device, he cannot show that a POSA would have been motivated to incorporate the heater/wick design of Whittemore in Hon in view of the statement in the report that the Ruyan device was *an improvement* over Whittemore. (See Ex. 2010 at ¶¶ 90, 93.)

Mr. Fox also asserts that “[i]mproving the atomizer shape and/or configuration would require a significant effort,” and that it would be easier to just swap out the Ruyan atomizer with the Whittemore heater/wick design to “drastically simplif[y]” the device’s design. (Ex. 1003 at ¶¶ 160-161.) Again, Mr. Fox provides no evidence to support his unsupported speculation. Whether difficult or not, Mr. Fox provides no evidence that it would have been obvious to a POSA (or any easier) to substitute the Whittemore wick/heater design as he proposes. (Ex. 2010 at ¶ 94.) Similarly, Mr. Fox does not explain how a POSA would have modified Hon with Whittemore beyond stating that determining an appropriate wick, heater, and physical arrangement would be “well within a POSA’s skill.” (*Id.* at ¶ 95.)

Because Mr. Fox does not describe *how* a POSA would have modified Hon with the Whittemore heater/wick design, he cannot explain why a POSA would have had a reasonable expectation of success with such an unspecified modification using an element of a now-90+-year-old device. (*Id.*)

For the above reasons, the Board should disregard Mr. Fox’s opinions and Petitioner’s arguments concerning the Ruyan devices and teardowns, and the Board should find that Petitioner has not shown that a POSA would have combined Hon and Whittemore.

B. Claims 1 and 15: “a puff-actuated controller within the tubular outer housing and adapted for regulating current flow through the electrical resistance heater during draw”

1. Hon Does Not Disclose The Claimed Controller

Independent claims 1 and 15 each require “a puff-actuated controller ... adapted for regulating current flow through the electrical resistance heater *during draw*.” (Ex. 1001 at 32:56-60; 33:48-52 (emphasis added).) Claims 1 and 15 separately recite that the controller comprises “a sensor adapted for sensing draw.” (*Id.*) Accordingly, the claimed controller “adapted for regulating current flow ... during draw” requires something more than just detecting the presence of draw. The Board recognized this in the Institution Decision, noting that the specification states that the sensor “*in concert with certain control circuitry* within the controller is *part* of a puff-actuated controller adapted for regulating current flow through one or more

of the resistance heating elements.” (Paper 9 at 30 (citing Ex. 1001 at 20:53-21:2) (internal quotations omitted and emphasis added).)

The ’123 patent describes exemplary control circuitry of its puff-actuated controllers at column 30, line 37 to column 32, line 34 of the specification, with reference to Figures 4 and 5. (Ex. 1001 at 30:37-32:34, Figs. 4-5.) Mr. Fox acknowledges this in his declaration. (See Ex. 1003 at ¶¶ 42, 54-59.) Among other things, the ’123 patent states that the controller can provide for heat generation “that is proportional to the period and magnitude of the draw,” for a deeper puff; for example, the controller can “provide for greater current flow” to the resistive heating element. (Ex. 1001 at 32:7-26; *see also* Ex. 1003 at ¶ 59; Ex. 2010 at ¶ 100.) In addition, the ’123 patent describes providing a predetermined quantity of heat produced by current controlled by a timer, or providing a series of on/off pulses during draw periods to control the amount of heat. (Ex. 1001 at 31:22-39; *see also* Ex. 1003 at ¶ 58; Ex. 2010 at ¶ 99.) A POSA would understand that these exemplary mechanisms are control circuitry adapted to regulate current flow *during draw*. (Ex. 2010 at ¶¶ 98-100.)

In contrast, Hon does not describe anything like the ’123 patent’s exemplary controllers. Mr. Fox, in fact, concedes that “Hon’s puff-actuated controller *does not attempt to control the heater’s temperature*.” (Ex. 1003 at ¶ 110 (emphasis added).) In other words, Hon’s controller is not regulating current flow through the heater

during draw, as required by the challenged claims. (Ex. 2010 at ¶¶ 101-104.) This is why Petitioner relies on Brooks as a secondary reference for the “puff-actuated controller ...” claim element, as further discussed below.

Because of Hon’s deficiencies with respect to this claim element, Petitioner’s analysis of Hon focuses almost entirely on the “puff-actuated” portion of the claim element. (*See* Petition at 23-24.) But turning the current on, which is performed by Hon’s reed switch upon sensing draw, is not current regulation. (Ex. 2010 at ¶ 102.) And Hon’s turning the current off does not happen “during draw,” because the switch only opens after the draw has been completed. (*Id.*) Hon’s simple on/off arrangement makes sense because Hon’s device is a dual-stage atomizer that relies on both an oscillator to generate sound waves for ultrasonic atomization via piezoelectric element 23 and provides for further atomization “under the effect of the heating element 26.” (Ex. 1005 at 7.) Hon describes that the closing of its reed switch results in the start of both Hon’s heater and Hon’s oscillator – in other words, the heater and oscillator are started and stopped together. (Ex. 1005 at 6; Ex. 2010 at ¶ 102.)

The only contention Petitioner provides with respect to this key portion of the claim element (*i.e.*, “adapted for regulating current flow through the electrical resistance heater during draw”) is that: “[w]hen the battery voltage is below a threshold, U2 will turn off field effect transistor U1 regardless of the position of K1,

and thus de-energize the heater RL.” (Petition at 25.) But Hon merely states that “U2 is the low voltage detection element used for the over-discharge protection of the lithium ion battery.” (Ex. 1005 at 6.) Hon provides no further explanation regarding this low voltage detection element – Hon does not state that circuit element U2 will “de-energize the heater” as Petitioner contends, and certainly does not say that this circuit element will do so during draw. (Petition at 25; Ex. 2010 at ¶¶ 103-104.) A POSA would have understood that this low-voltage detection element is a separate battery protection feature that samples the voltage level, regardless of any draw period, and thus does not regulate current flow during draw. (Ex. 2010 at ¶ 104.)

For the above reasons, Petitioner has not shown that Hon discloses “a puff-actuated controller ... adapted for regulating current flow through the electrical resistance heater during draw,” as recited in claims 1 and 15.

2. Petitioner Has Not Demonstrated That It Would Have Been Obvious To Modify Hon With Brooks

In the Institution Decision, the Board indicated that Mr. Fox’s (then-unrebutted) testimony supports that “a POSA would have been motivated to incorporate the Brooks controller into the Hon device to rapidly heat the heater to the optimum temperature and maintain that temperature for the duration of the draw.” (Paper 9 at 32-33.) The Board also encouraged the parties to address whether a

POSA would have had a reasonable expectation of success of achieving the claimed invention by combining the disclosures of Hon and Brooks as Petitioner proposes. (*Id.* at 33.)

Put simply, Petitioner is wrong that the Brooks controller would heat Hon's heater more rapidly or that a POSA would have been motivated to modify Hon to better optimize heater start-up or temperature maintenance. (Ex. 2010 at ¶¶ 105-111.) Moreover, Mr. Clemens' testimony establishes that a POSA **would not** have had a reasonable expectation of success in combining the Brooks controller with Hon's device. (*Id.* at ¶¶ 112-119.)

Petitioner concedes that the Brooks controller is both (a) more complicated than Hon's device and (b) was readily available about 15 years prior to Hon. (Ex. 1003 at ¶¶ 110, 114, 116.) Despite its long-time availability, Hon *did not* use the Brooks controller or anything similar in his device. A POSA would have understood that Hon's simple on/off mechanism was more efficient, given Hon's unique construction, and a POSA would not have been motivated to modify Hon's controller to improve heater start-up or temperature maintenance or otherwise incorporate the circuitry from the Brooks controllers. (Ex. 2010 at ¶¶ 106-111.)

First, a POSA examining Hon's device would not have had any concern with overheating or maintaining an optimum temperature when the heater is on during draw. Hon's atomizer is structured with a very small, super-heated atomization

cavity 10 inside cavity wall 25, which may be made of a ceramic (an insulator). (Ex. 1005 at 6; Ex. 2010 at ¶ 107.) Hon's invention is to eject droplets of liquid solution into this super-heated cavity, which is under negative pressure, to aerosolize the liquid droplets. (Ex. 2010 at ¶ 107.) Hon describes that its heating element is a high temperature metal wire, such as platinum or nichrome. (Ex. 1005 at 6; Ex. 2010 at ¶ 107.) These metal wires can withstand extremely high temperatures, well in excess of 1000 °C. (Ex. 2010 at ¶ 107; Ex. 2014; Ex. 2015.) Because Hon's heating element can withstand extreme temperatures and is designed to super heat Hon's small atomization cavity, a POSA would not have been motivated to provide temperature control or more optimum temperature maintenance in Hon's device. (Ex. 2010 at ¶ 108.) Stated another way, cycling the heating element on and off, as done in the Brooks circuitry using duty cycles, would have reduced the power to the heater, would have required unnecessary additional circuitry and power consumption to implement, and would not have provided any advantage in Hon's device. (*Id.*)

Second, as discussed above, Hon describes a dual-stage atomizer that uses a piezoelectric element 23 to first provide atomization ultrasonically. (Ex. 1005 at 6-7.) Hon's device has a "Colpitts oscillator" that forms a large portion of Hon's exemplary circuit (shown in Figure 12). (*Id.* at 6, Fig. 12; Ex. 2010 at ¶ 109.) This high-frequency oscillator is "fine-tuned to resonate with the annular first

piezoelectric element 23, supplying liquid molecules with energy.” (Ex. 1005 at 7; Ex. 2010 at ¶ 109.) Hon’s device turns on both the heater and the oscillator at the same time – once draw is sensed – and when draw is over, the reed switch opens and current is no longer supplied to the heating element and oscillator. (Ex. 1005 at 6-7; Ex. 2010 at ¶ 109.)

A POSA would not have found the Brooks controller circuitry, including its use of duty cycles, to have been advantageous for use with Hon’s dual-stage atomizer. (Ex. 2010 at ¶ 109.) In Hon, the first stage – ultrasonic atomization – makes the droplets small enough that the second stage – the effect of the heating element – can efficiently atomize further and vaporize the droplets without the need for additional control circuitry. (*Id.*) In addition, if a POSA just replaced Hon’s controller with the Brooks circuitry, as Petitioner appears to propose, the Brooks control circuitry would also shut off Hon’s oscillator (and the ultrasonic atomization stage) when the current is cycling on and off in accordance with the duty cycles used by Brooks. (*Id.*) Mr. Fox does not account for the unique nature of Hon’s atomizer that would have discouraged a POSA from modifying Hon’s device with Brooks’s controller. (*See* Ex. 1003 at ¶¶ 108-119.)

Third, the Brooks controller would not heat Hon’s heater more rapidly (even assuming more rapid heating was desirable). Hon fully activates its high temperature metal wire heating element upon sensing draw by the user, and Hon’s

heater stays powered on during the entire draw. (Ex. 2010 at ¶ 112; Ex. 1005 at 6; Ex. 2011 at 114:14-115:14.) Brooks, as noted above, discloses control circuitry that uses duty cycles that are less than 100% (*e.g.*, 50%). (Ex. 1006 at 13:65-14:34, 14:54-68, 17:57-64, 18:44-56; Ex. 2010 at ¶ 112; Ex. 2011 at 115:24-116:8.) By applying less power, Brooks's controller heats more *slowly* than Hon's controller that provides 100% current to the metal wire upon sensing draw. (Ex. 2010 at ¶ 112.) Even if a POSA wanted to heat Hon's heater more rapidly, she would use a battery with a higher voltage, not modify Hon's controller to replace it with a different controller (such as the Brooks controller). (*Id.*) Mr. Fox never addresses this in his proposed modification of Hon. (*See* Ex. 1003 at ¶¶ 108-119.)

Petitioner and Mr. Fox fail to consider the additional changes that would be required for the proposed Hon-Brooks combination and do not explain why a POSA would have had a reasonable expectation of success merely by incorporating the Brooks controllers into the Hon device. (*See* Paper 6 at 36-39.) For example, a POSA would have understood that she could not simply just incorporate the Brooks circuitry into Hon's device, but rather would likely have to replace both Hon's heater and Hon's battery as well. (Ex. 2010 at ¶ 113.) For example, even operating at a 75% duty cycle, the circuit would provide only about half as much power to the heater, thus leaving the heater undersized to heat the aerosol. (*Id.*) For example, Brooks describes "us[ing] ... relatively large power sources, capable of generating

10 to 40 watts of power or more” and that an “18 volt battery usually generates sufficient power (i.e., about 18 watts)” for its device that uses carbon heating elements. (Ex. 1006 at 4:50-57, 10:18-33; Ex. 2010 at ¶ 114.) Hon describes its battery as a rechargeable lithium ion battery, and Hon’s battery 2 (shown in Figures 1-3) appears to be about the size of a standard AA/AAA battery that operates at about 1.5 V. (Ex. 1005 at 6-7, Figs. 1-3; Ex. 2010 at ¶ 114.) Hon’s device provides a slim, cigarette-sized form factor, and a POSA would not have used the “relatively large” batteries of Brooks in Hon’s device because such batteries would require significantly increasing the size of Hon’s device. (Ex. 2010 at ¶ 114.)

In other words, Petitioner’s proposed combination is not a mere simple substitution of circuitry, but rather would compel a complete redesign of the internal components and outer shell of Hon, into a much larger and clunkier device – hardly any sort of improvement. (*Id.* at ¶ 116.) As noted above, Petitioner focuses solely on what it argues is an improvement to control of Hon’s heater, but fails to account for, among other things, the nature of Hon’s high temperature metal heating elements and Hon’s dual-stage atomizer design, including Hon’s oscillator. (*Id.*) Petitioner, of course, notes that the ’123 patent specification identifies Brooks as disclosing a suitable controller for a vaping device. (Petition at 26.) While this may be true, the ’123 patent does not describe a dual-stage atomizer with an ultrasonic first stage like Hon’s device, or a small, super-heated atomization cavity into which liquid

droplets are ejected via high-speed airflow like Hon's device, and thus the '123 patent's statement is of little relevance to a POSA starting with Hon's device. (Ex. 2010 at ¶ 117.)

Moreover, the evidence further suggests that a POSA would not have been motivated to look to Brooks in an effort to improve the control or management of Hon's metal wire heating element. Brooks describes the use of resistance heating elements that are preferably carbon fibrous materials with high surface areas and porous, wettable characteristics to carry an aerosol forming substance. (Ex. 1006 at 7:26-60; Ex. 2010 at ¶ 118.) In its Background and Summary sections, Brooks criticizes the use of nichrome metal resistance heating elements because they are not porous and have very little surface area. (Ex. 1006 at 3:15-42, 4:7-31; Ex. 2010 at ¶ 118.) Brooks instead describes smoking articles that use carbon resistance heating elements that are porous, require more energy to heat, and have surface areas that are at least 100 times greater (and most preferably 100,000 times greater) than a nichrome wire resistance heating element. (Ex. 2010 at ¶ 118; Ex. 1006 at 4:12-22, 7:30-33.) Mr. Fox offers no reason why a POSA would look to Brooks, which describes a completely different type of heater from Hon and criticizes nichrome metal wire heaters (one of Hon's preferred options for its heating element). (*Id.*)

Separately, with respect to Petitioner's proposed combination of Hon and Whittemore to address the "wicking into contact" limitation of claims 1 and 15,

Petitioner provides no explanation regarding how the use of the Brooks circuitry would affect the heater from the Whittemore device, or whether they would even be compatible. (*See* Petition at 25-29; Ex. 1003 at ¶¶ 108-119.) For this additional reason, Petitioner has failed to show that a POSA would have been motivated to make the proposed Hon-Brooks combination, or that a POSA would have had a reasonable expectation of success in doing so.

Finally, in the Institution Decision, as with Whittemore, the Board properly ignored Petitioner's attempts to rely on the Ruyan device to bolster its obviousness position with respect to the proposed combination of Hon and Brooks. (*See* Paper 9 at 31-33; Ex. 1003 at ¶¶ 109, 112.) For the same reasons explained above in Section VII.A.2.b, the Board should disregard Mr. Fox's opinions and Petitioner's arguments regarding the Ruyan devices and teardown reports. As he did with the proposed Hon-Whittemore combination, Mr. Fox improperly tries to leverage his opinions about the teardown reports to ascribe motivations to a POSA to modify Hon's device. (Ex. 1003 at ¶¶ 109, 112; Ex. 2011 at 69:16-71:17; 119:3-120:16.) First, Mr. Fox suggests, as he did with Whittemore, that the Ruyan device had insufficient aerosol generation that a POSA would have addressed. (Ex. 1003 at ¶ 109; Ex. 2011 at 69:16-71:17.) This is both improper and factually inaccurate, as discussed above with respect to Whittemore. Second, Mr. Fox uses portions of the teardown reports to argue that the Ruyan device could have taken a "substantially

higher-power heater,” which would have addressed the insufficient aerosol generation. (Ex. 1003 at ¶ 112; Ex. 2011 at 119:3-120:16.) Again, this relies on a both a flawed factual premise (the alleged “insufficient aerosol generation”) and is improperly trying to draw motivation to modify Hon’s device from the capacity of the Ruyan device to allegedly support a “higher-power heater.” (*See also* Ex. 2010 at ¶¶ 110-111, 115.)

Petitioner has not shown that a POSA would have been motivated to combine Hon and Brooks or that she would have had a reasonable expectation of success in trying to do so.

C. Petitioner Cannot Show That A Number Of Dependent Claims Would Have Been Obvious For Additional Reasons

1. Claims 11 and 23: “wherein the cartridge is electrically conductive”

Claims 11 and 23 of the ’123 patent further require that the cartridge of independent claims 1 and 15 is “electrically conductive.” Petitioner concedes that none of Hon, Whittemore, and Brooks, alone or in combination, teach or suggest this limitation. Petitioner, instead, argues that “a POSA would have been motivated to select appropriate materials for the cartridge, and would have at least tried metals—which satisfy all four claims because they generally conduct heat and electricity

better than non-metals.”³ (Petition at 59.) Petitioner, however, does not articulate any credible reason why a POSA would have been motivated to modify Hon’s cartridge such that it is electrically conductive. (See Petition at 59-60; Ex. 1003 at ¶¶ 185-189.)

Petitioner acknowledges that Hon describes only that components in its cartridge are made of plastic. (Petition at 57.) Petitioner fails to explain why a POSA would have used “metals” in place of the plastic materials that Hon describes to make Hon’s cartridge electrically conductive. Moreover, there is no reason that Hon’s cartridge, including as modified by Whittemore and Brooks, would need to be electrically conductive. (Ex. 2010 at ¶¶ 121-124.) In Hon, the heater is in the power unit, not the cartridge, so there would be no purpose to use a more expensive material to have the cartridge conduct electricity and a POSA would not have been motivated to do so. (*Id.* at ¶ 122.)

Petitioner points to a reference outside the grounds – Kessler (Ex. 1030) – for the proposition that it was known to use metal mesh materials to absorb and wick a liquid substance. (Petition at 60.) Petitioner asserts that a “POSA seeking to implement Hon would have been motivated to try each of Kessler’s materials in

³ The four claims Petitioner is referring to are claims 9 and 21 (which separately require that “the cartridge is made from paper, plastic, or heat conductive materials”) and claims 11 and 23 at issue here. Claims 11 and 23 do not depend from claims 9 and 21.

Hon's corresponding 'liquid supply bottle' to absorb and retain its liquid mixture to minimize the risk of any heat-related damage from the heater.” (*Id.*) But Petitioner does not provide any explanation as to why Kessler's materials are preferable to Hon's, or why a POSA would have been motivated to use Kessler's materials over Hon's, for this purpose and to address this alleged risk. (*Id.*; *see also* Ex. 2010 at ¶ 124.) Indeed, Mr. Fox's testimony that Petitioner cites is conclusory and lacks any support. (*See* Ex. 1003 at ¶ 189.)

Finally, even if a POSA did modify Hon's cartridge by using a different material such as metal, the modified Hon cartridge would still not be an “electrically conductive” cartridge, as claimed. (Ex. 2010 at ¶ 123) None of the wires in Hon's device are connected in any way to Hon's cartridge, and there would be nothing in Hon's device transferring any electrical current to such a modified cartridge. (*Id.*)

For these additional reasons, Petitioner has not shown that dependent claims 11 and 23 would have been obvious.

2. Claims 14 and 24: “wherein the absorbent fibrous material is in contact with the electrical resistance heater”

Claims 14 and 24 of the '123 patent require that the cartridge's absorbent fibrous or wicking material “is in contact with the electrical resistance heater.” (Ex. 1001 at 33:38-40; 34:23-25.) Petitioner and Mr. Fox concede that Hon does not disclose this limitation. (Petition at 61; Ex. 2011 at 82:7-23.) Instead, Petitioner

relies solely on Whittemore as teaching this limitation, and relies on the proposed combination of Hon and Whittemore that it argued for claims 1 and 15. (Petition at 61; Ex. 1003 at ¶¶ 192-193; Ex. 2010 at ¶¶ 125-126.) Petitioner does not articulate any additional rationale for combining these references with respect to dependent claims 14 and 24, or for modifying Hon’s cartridge as recited in this limitation of claims 14 and 24. (*See id.*)

For the reasons discussed above and in Mr. Clemens’s declaration for claims 1 and 15 (*see* Ex. 2010, ¶¶ 82-96), and those explained by the Board in its Institution Decision, a POSA would not have combined Hon and Whittemore or even “attempted to modify Hon’s device by looking to Whittemore.” (Paper 9 at 26; *see generally id.* at 25-28; *see supra* § VII.A.2.) Without Whittemore, Petitioner cannot show that claims 14 and 24 are unpatentable.

Accordingly, Petitioner has not shown that dependent claims 14 and 24 would have been obvious.

VIII. HON, BROOKS, WHITTEMORE, AND SUSA DO NOT RENDER CLAIMS 3, 4, 13, 16, AND 17 OBVIOUS (GROUND 2)

Petitioner’s Ground 2 adds a fourth prior art reference – Susa – to its proposed obviousness combinations. (Petition at 62.) Petitioner asserts in Ground 2 that claims 3, 4, 13, 16, and 17 are unpatentable under § 103 as obvious in view of Hon combined with Brooks, Whittemore, and Susa. (*Id.* at 62-65.) Dependent claims 3,

4, and 13 each ultimately depend from claim 1, and dependent claims 16 and 17 each ultimately depend from claim 15. (Ex. 1001 at 33:12-15, 33:36-37, 34:3-6.)

In Ground 2, Petitioner does not rely on Susa for curing the defects of Hon, Brooks, and Whittemore with respect to independent claims 1 and 15. (Petition at 63-65.) Accordingly, dependent claims 3, 4, 13, 16, and 17 are not unpatentable for at least the same reasons as independent claims 1 and 15 discussed above.

IX. HON, BROOKS, WHITTEMORE, AND RAY DO NOT RENDER CLAIMS 6 AND 19 OBVIOUS (GROUND 3)

Petitioner's Ground 3 adds a different fourth prior art reference – Ray – to its proposed obviousness combination. (Petition at 66.) Petitioner asserts in Ground 3 that claims 6 and 19 are unpatentable under § 103 as obvious in view of Hon combined with Brooks, Whittemore, and Ray. (*Id.* at 66-68.) Claim 6 depends from claim 1, and claim 19 depends from claim 15. (Ex. 1001 at 33:18-21, 34:9-12.)

In Ground 3, Petitioner does not rely on Ray for curing the defects of Hon, Brooks, and Whittemore with respect to independent claims 1 and 15. (Petition at 66-68.) Accordingly, dependent claims 6 and 19 are not unpatentable for at least the same reasons as independent claims 1 and 15 discussed above. Dependent claims 6 and 19 are also not unpatentable for the additional reasons described below.

Dependent claims 6 and 19 each require that the claimed mixture “comprises essentially pure nicotine, extracts composed predominantly of nicotine, or

formulations composed predominantly of nicotine.” (Ex. 1001 at 33:18-21, 34:9-12.) Petitioner concedes that Hon does not describe a mixture comprising these forms of nicotine as claimed. (Petition at 66.) Petitioner argues, though, that a POSA would have used essentially pure nicotine (or extracts/formulations comprised predominantly of nicotine) to arrive at Hon’s disclosed mixture of “0.4-3.5% nicotine, tobacco flavor 0.05-2%, organic acid 0.1-3.1 %, and antioxidant 0.1-0.5%, and the rest is 1, 2-propylene glycol.” (Ex. 1005 at 8; Petition at 66-68.)

Much of Petitioner’s obviousness argument, however, relies on the alleged “Ruyan device” that is not part of the Grounds and that Petitioner has not been shown to be prior art, as discussed in Section VII.A.2.b above. (*See also* Petition at 67-68; Paper 6 at 11-12, 30-31.) To the extent that Petitioner alleges that “the Ruyan device itself is applicant-admitted prior art” (Petition at 5), Patent Owner disagrees that the ’123 specification admits that the Ruyan devices are prior art. Moreover, Petitioner did not include alleged applicant admitted prior art as a ground of invalidity (*id.* at 3), and thus is precluded from relying on it at trial. *SAS Inst. Inc. v. Iancu*, 138 S. Ct. 1348, 1353 (2018) (“the petition must identify ‘each claim challenged,’ the grounds for the challenge, and the evidence supporting the challenge”); *Koninklijke Philips N.V. v. Google LLC*, 948 F.3d 1330, 1335 (Fed. Cir. 2020) (finding the Board erred by instituting IPR on grounds “not advanced in [the] petition”).

Petitioner also points to Ray, which describes using 300 mg of 98% nicotine mixed with 200 mg of distilled orange oil flavoring agent to saturate a filter paper. (Ex. 1009 at 7:42-49.) But Ray does not describe using essentially pure nicotine or extracts/formulations composed predominantly of nicotine as part of a liquid mixture in a cartridge, and Ray found it to be disadvantageous to heat such a mixture. (*Id.* at 2:21-33; 3:55-59.) At best, Petitioner has shown that 98% nicotine was commercially available. That is not enough to support an obviousness case.

X. CONCLUSION

The Board should hold that claims 1-7, 9, 11-19, 21, and 23-26 are not unpatentable in the Final Written Decision.

Respectfully submitted,

Date: July 2, 2021

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CERTIFICATE OF WORD COUNT

The undersigned hereby certifies that the foregoing Patent Owner Response complies with the type-volume limitations of 37 C.F.R. § 42.24(b). Excluding the items listed in 37 C.F.R. § 42.24(a) as not included in the word count, and using the word count of the word-processing system used to prepare the paper (Microsoft Word), the Patent Owner Response contains 13,222 words.

Dated: July 2, 2021

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