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Paper 32
Date: March 30, 2022

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.

IPR2020-01602
Patent 9,901,123 B2

Before MICHELLE N. ANKENBRAND, JO-ANNE M. KOKOSKI, and ELIZABETH M. ROESEL, *Administrative Patent Judges.*

KOKOSKI, *Administrative Patent Judge*.

JUDGMENT
Final Written Decision
Determining No Challenged Claims Unpatentable
35 U.S.C. § 318(a)

I. INTRODUCTION

We have jurisdiction to conduct this *inter partes* review under 35 U.S.C. § 6, and issue this Final Written Decision pursuant to 35 U.S.C. § 318(a). For the reasons that follow, we determine that Philip Morris Products, S.A. ("Petitioner") has not shown by a preponderance of the evidence that claims 1–7, 9, 11–19, 21, and 23–26 ("the challenged claims") of U.S. Patent No. 9,901,123 B2 ("the '123 patent," Ex. 1001) are unpatentable.

A. Procedural Background

Petitioner filed a Petition to institute an *inter partes* review of claims 1–7, 9, 11–19, 21, and 23–26 of the '123 patent. Paper 2 ("Pet."). RAI Strategic Holdings, Inc. ("Patent Owner") filed a Preliminary Response. Paper 6. With Board authorization, Petitioner filed a Preliminary Reply (Paper 7), and Patent Owner filed a Preliminary Sur-reply (Paper 8). Pursuant to 35 U.S.C. § 314(a), we instituted an *inter partes* review of claims 1–7, 9, 11–19, 21, and 23–26 on the grounds advanced in the Petition. Paper 9 ("Institution Decision" or "Dec."), 7, 34.

After institution of trial, Patent Owner filed a Patent Owner Response ("PO Resp.," Paper 16), Petitioner filed a Reply ("Pet. Reply," Paper 23), and Patent Owner filed a Sur-reply ("Sur-reply," Paper 25). We held an oral hearing on January 6, 2022, and a transcript is included in the record. Paper 31 ("Tr.").

B. Real Parties in Interest

Petitioner identifies Philip Morris Products, S.A., Philip Morris International, Inc., Altria Client Services LLC, and Philip Morris USA as the real parties-in-interest. Pet. 75. Patent Owner identifies RAI Strategic Holdings, Inc., R.J. Reynolds Vapor Company, RAI Innovations Company,

and R.J. Reynolds Tobacco Company as the real parties-in-interest. Paper 4, 1.

C. Related Matters

The parties indicate that the '123 patent is involved in the following proceedings: (1) *RAI Strategic Holdings, Inc. v. Altria Client Services LLC*, No. 1:20-cv-00393-LO-TCB (E.D. Va.), and (2) *Certain Tobacco Heating Articles and Components Thereof*, U.S. International Trade Commission, Investigation No. 337-TA-1199. Pet. 75–76; Paper 4, 2.

D. The '123 Patent

The '123 patent is titled "Tobacco-Containing Smoking Article," and relates to smoking articles "that produce aerosols incorporating components derived from, or provided by, tobacco," where the aerosols "are not necessarily produced as a result of burning of tobacco." Ex. 1001, code (54), 4:45–49. Instead, the smoking articles produce such aerosols "as a result of the application of heat upon tobacco or materials that are in contact with tobacco." *Id*. at 4:49–52. The '123 patent explains that the smoking articles "produce visible aerosols that are 'smoke-like' in nature, and exhibit many of the sensory characteristics associated with those types of smoking articles that burn tobacco." *Id*. at 4:52–55.

Figure 1 of the '123 patent is reproduced below.

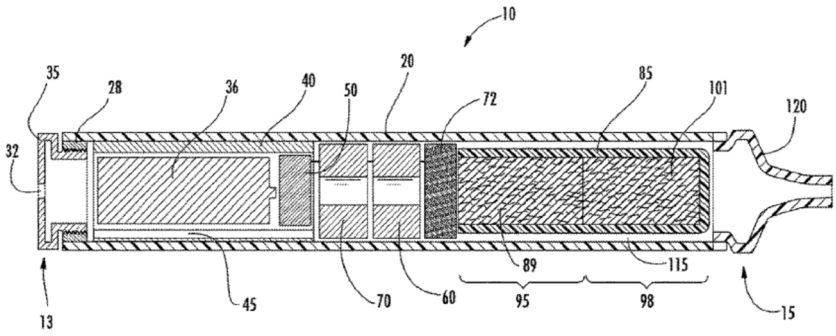


FIG. 1

Figure 1 depicts a longitudinal cross-sectional view of one embodiment of an electrically powered, tobacco-containing smoking article. Ex. 1001, 8:31–32. Smoking article 10 includes outer housing 20 that is "generally tubular in shape," and includes distal end 13 and mouth-end 15. *Id*. at 19:44–49. Control components 50 and sensor 60 are "preferably part of a puff-actuated controller adapted for regulating current flow through one or more of the" heating elements. *Id*. at 20:63–67. Resistance heating elements 70, 72 are powered by electric power source 36, controlled by electrically powered control components 50, and configured to allow airflow therethrough. *Id*. at 21:22–27. Second resistance heating unit 72 "can be formed from relatively high surface area absorbent or wicking-type materials," or

> 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 the [*sic*] heat produced by the second resistance element).

Id. at 21:31–45. Smoking article 10 also includes cartridge 85 that contains tobacco 89 and an aerosol-forming material "in the form of an intimate mixture or provided in separate regions." *Id*. at 22:2–6.

The '123 patent explains that, during use, "[a]ir is drawn through the air passageways or openings 32 in the cap 35 located at the distal end 13 . . . and into the outer container 20." Ex. 1001, 24:20–23. The "[d]rawn air passes through air passageway 45 that extends along the length of the power source 36 and the electronic controls components 50," through an air passageway area within first heating element 70, through air flow sensing region 60, past or through second heating element 72, through an air

passageway that extends along the length of cartridge 85, and into mouth-end piece 120. *Id*. at 24:23–30. The heating elements provide surface region temperatures, and have the ability to heat the tobacco and aerosol-forming materials "in surrounding regions in the vicinity of those heating elements." *Id*. at 24:30–33. Aerosol is formed by the action of the drawn air passing the heated tobacco and aerosol-forming materials in the region of heating element 72. *Id*. at 24:39–41.

E. Illustrative Claim

Petitioner challenges claims 1–7, 9, 11–19, 21, and 23–26 of the '123 patent. Pet. 1, 3. Claims 1 and 15 are the only independent challenged claims. Claim 1 is illustrative of the claimed subject matter, and is reproduced below.

> 1. An electrically-powered, aerosol-generating smoking article comprising:
>
> [a] an electrical power source within a tubular outer housing having a mouth-end and an end distal to the mouth end;
>
> [b] at least one electrical resistance heater powered by said electrical power source;
>
> [c] 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
>
> [d] 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;

> [e] wherein the rod-shaped carrier devise 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, 32:50–33:8 (bracketed labeling designated by Petitioner; *see* Pet. 18 n.3, App'x (Claim Listing)).

F. Prior Art and Asserted Grounds

Petitioner asserts that the challenged claims are unpatentable on the following grounds:

Claims Challenged	35 U.S.C.	References/Basis
1, 2, 5, 7, 9, 11, 12, 14, 15, 18, 21, 23–26	§ 103	Hon[1]
1, 2, 5, 7, 9, 11, 12, 14, 15, 18, 21, 23–26	§ 103	Hon, Brooks,[2] Whittemore[3]
3, 4, 13, 16, 17	§ 103	Hon, Whittemore, Brooks, Susa[4]
6, 19	§ 103	Hon, Whittemore, Brooks, Ray[5]

Pet. 3. Petitioner relies on the Declaration of Stewart Fox ("the Fox Declaration," Ex. 1003) in support of its contentions. Patent Owner relies on

[1] Chinese Patent No. CN 2719043 Y, published Aug. 24, 2005 (Ex. 1005, 1–13 (English translation), 16–28 (original Chinese), "Hon" or "Hon '043"). Petitioner provides an affidavit attesting to the accuracy of the translation. Ex. 1005, 14–15; *see* 37 C.F.R. § 42.63(b).
[2] U.S. Patent No. 4,947,874, issued Aug. 14, 1990 (Ex. 1006, "Brooks").
[3] U.S. Patent No. 2,057,353, issued Oct. 13, 1936 (Ex. 1007, "Whittemore").
[4] European Pat. Pub. No. EP 0845220 B1, published Sept. 3, 2003 (Ex. 1008, "Susa").
[5] U.S. Patent No. 4,284,089, issued Aug. 18, 1981 (Ex. 1009, "Ray").

the Declaration of Charles E. Clemens ("the Clemens Declaration," Ex. 2010) to support its arguments.

II. ANALYSIS

A. Level of Ordinary Skill in the Art

Factors pertinent to a determination of the level of ordinary skill in the art include "(1) the educational level of the inventor; (2) type of problems encountered in the art; (3) prior art solutions to those problems; (4) rapidity with which innovations are made; (5) sophistication of the technology; and (6) education level of workers active in the field." *Envtl. Designs, Ltd. v. Union Oil Co.*, 713 F.2d 693, 696–697 (Fed. Cir. 1983) (citing *Orthopedic Equip. Co. v. All Orthopedic Appliances, Inc.*, 707 F.2d 1376, 1381–82 (Fed. Cir. 1983)). Not all such factors may be present in every case, and one or more of these or other factors may predominate in a particular case. *Id*. Moreover, "[t]hese factors are not exhaustive but are merely a guide to determining the level of ordinary skill in the art." *Daiichi Sankyo Co. v. Apotex, Inc.*, 501 F.3d 1254, 1256 (Fed. Cir. 2007). In determining the level of ordinary skill, we may also look to the prior art, which may reflect an appropriate skill level. *Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001). Additionally, "[a] person of ordinary skill is also a person of ordinary creativity, not an automaton." *KSR Int'l Co. v. Teleflex, Inc.*, 550 U.S. 398, 421 (2007).

Petitioner contends that a person having ordinary skill in the art ("POSA") "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 the same fields with "one to two years of industry experience." Pet. 9–10; Ex. 1003 ¶¶ 13–18. Petitioner further contends that "[s]uch a POSA would have been

familiar with electrically powered smoking articles and/or the components and underlying technology used therein." *Id*. at 10 (citing Ex. 1003 ¶¶ 13–18). Patent Owner states that, "[f]or the purposes of the trial in this proceeding," it "accepts Petitioner's proposed education and experience level of the POSA." PO Resp. 12 (citing Pet. 9–10; Ex. 2010 ¶¶ 48–50). Accordingly, we adopt Petitioner's assessment of the level of ordinary skill in the art, which is undisputed on this record and consistent with the level of skill in the art at the time of the invention as reflected in the prior art in this proceeding.

B. Claim Construction

We apply the claim construction standard articulated in *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc). *See* 37 C.F.R. § 42.100(b) (2019). Under *Phillips*, the "words of a claim 'are generally given their ordinary and customary meaning,'" which is "the meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention, i.e., as of the effective filing date of the patent application." *Phillips*, 415 F.3d at 1312–13 (quoting *Vitronics Corp. v. Conceptronic, Inc.*, 90 F3.d 1576, 1582 (Fed. Cir. 1996)). "[W]e need only construe terms 'that are in controversy, and only to the extent necessary to resolve the controversy." *Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999)).

1. "wicked into contact"

Claims 1 and 15 recite, in relevant part, 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." Ex. 1001, 33:2–5, 33:63–66. Patent Owner argues 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." PO Resp. 10. Patent Owner argues that

> 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.

Id. at 11 (citing Ex. 2010 ¶¶ 43–47) (alteration in original). According to Patent Owner, "claims 1 and 15 require the first option—'wicked so as to contact' the heater," and the claim language "does not encompass other manners of transfer, as those are explicitly described in the specification as *different* options." *Id*. (citing Ex. 2010 ¶ 46); *see also* Sur-reply 3 ("[T]he claim does ***not*** recite that the aerosol-forming material is 'wicked *or otherwise transferred* into contact' with the heater.").

Patent Owner also argues that "[i]n 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." PO Resp. 30–31 (second alteration in original). Patent Owner argues that "the dependent claims are directed to the *location* of the heater and the wick vis-á-vis one another, whereas claims 1 and 15 are directed to

the *manner* in which the liquid reaches the heater," and "[t]hese are different claim requirements." *Id*. at 31.

Petitioner responds that "the specification describes embodiments in which the absorbent wicking material does not contact the heater, but the aerosol-forming material is nonetheless wicked into contact with the heater," and, "[t]hus, 'wicked into contact' must allow for additional, assistive, mechanisms of liquid transport to allow the wicked liquid to contact the heater from some distance away." Pet. Reply 4 (citing Ex. 1001, 21:38–45). Therefore, Petitioner contends, "[t]he plain and ordinary meaning of the claim term allows for any number of additional methods of liquid transport, so long as the liquid is wicked and, as a result, contacts the heater." *Id*.

Having reviewed the claim language, the Specification, and the evidence from the complete record now before us, we determine that "wicked into contact with the electrical resistance heater" means "wicked into contact (1) with the heater, or (2) with an area in close proximity to, and exposed by the heat produced by, the heater." We do not adopt Patent Owner's position that "wicked into contact" requires that the liquid mixture must be brought into contact with the electrical resistance heater solely by wicking.

The Specification teaches that heating element 72 "can be formed from relatively high surface area absorbent or wicking-type materials" that "are useful for supporting or holding sufficient aerosol-forming material for aerosol generation, as well as for wicking additional aerosol-forming material for aerosol generation during subsequent puffs." Ex. 1001, 21:31–38. The Specification also teaches that 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 heating element or contact an area in close proximity to the second resistance heating element (e.g., a region that is exposed to a [*sic*] the heat produced by the second resistance element).

Id. at 21:39–45. The Specification goes on to teach that the "smoking article 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.

The Specification further teaches that the "resistance heating elements provide surface region temperatures, and hence the ability to heat aerosol-forming materials and tobacco materials in surrounding regions in the vicinity of those heating elements." Ex. 1001, 24:30–33. In that regard, the Specification describes that aerosol "is formed by the action of the drawn air passing heated tobacco components and aerosol-forming material in the region occupied by the second heating element 72" and is then "drawn through the mouth-end piece 120, and into the mouth of the smoker." *Id*. at 24:39–43.

Because volatilization occurs by exposure to and/or contact with the heating element, these disclosures in the Specification indicate that the mixture comprising the tobacco extract and the aerosol-forming material must be exposed to the heat produced by the heater. According to the Specification, this is accomplished when the absorbent fibrous or wicking material either contacts the heater, or contacts an area in close proximity to the heater. The Specification, therefore, conveys the necessity of the liquid mixture being wicked to an area that either contacts the heater, or that is close enough to the heater to be exposed to its heat.

Additional recitations found in the dependent claims further confirm that "wicked into contact with the electrical resistance heater" as used in claims 1 and 15 encompasses both wicking into contact with the heater, and wicking into contact with an area in close proximity to the heater. *See Philips*, 415 F.3d at 1314 ("Other claims of the patent in question, both asserted and unasserted, can also be valuable sources of enlightenment as to the meaning of a claim term."). Dependent claims 14, 24, and 25 are set forth below.

> 14. The smoking article of claim 1, wherein the absorbent fibrous material is in contact with the electrical resistance heater.
>
> 24. The smoking article of claim 15, wherein the absorbent wicking material is in contact with the electrical resistance heater.
>
> 25. The smoking article of claim 15, wherein the absorbent wicking material is positioned in proximity to the at least one electrical resistance heater.

Ex. 1001, 33:38–40, 34:23–28. These dependent claims, which are directed to the location of the heater in relation to the wicking material, also include the manner in which the liquid reaches the heater recited in the independent claims. Claims 14 and 24, therefore, require that the liquid be wicked into contact with the heater *and* the wicking material be in contact with the heater. Claim 25 requires that the liquid be wicked into contact with the heater *and* the wicking material be positioned in proximity to the heater. Because claims 14, 24, and 25 are narrower than the independent claims from which they depend, claims 1 and 15 necessarily encompass smoking articles in which the absorbent fibrous or wicking material is either in contact with the heater or is positioned in proximity to the heater. *Trustees of Columbia Univ. in City of New York v. Symantec Corp.*, 811 F.3d 1359,

1370 (Fed. Cir. 2016) ("[I]n a situation where dependent claims have no meaningful difference other than an additional limitation, the independent claim is not restricted by the added limitation in the dependent claim. In such situations, *construing the independent claim to exclude material covered by the dependent claim would be inconsistent*." (emphases added) (citations omitted)). Therefore, the phrase "wicked into contact with the resistance heater" must be construed broadly enough to encompass embodiments in which the wicking material "is in contact with" the heater *and* embodiments in which the wicking material is "positioned in proximity to" the heater.

Notably, the Specification does not provide any further detail as to how the liquid comes to contact the heater when the wicking material is in proximity to, instead of in contact with, the heater. Patent Owner argues that "[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" because "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." PO Resp. 31 (citing Ex. 2010 ¶¶ 75–79). In that regard, Mr. Clemens testifies:

> When the wicking material and the heater are in proximity to one another as described in the '123 patent, a POSA would understand that cohesive forces and surface tension allow the liquid (on the wicking material) to be wicked into contact with the heater even if the heater and wicking material are separated by a small distance. The liquid mixture that is present in the wicking material will extend a small distance from the wicking material to the heater, bridging the gap from the wicking material and into contact with the heater. As the liquid is vaporized and drawn away from the heater during draw by the user, the absence of liquid in the wicking material will cause

> more wicking action within the wicking material, thus wicking more liquid into its place and into contact with the heater.

Ex. 2010 ¶ 79.

The smoking article described in claims 1 and 15, however, includes elements in addition to the heater and the wicking material, and the Specification describes the arrangement of those elements and the use of the smoking article. Ex. 1001, 5:56–8:10, 19:37–30:36, Figs. 1–3. The Specification also describes the role the airflow generated by the user's draw plays in facilitating the volatilization of the liquid mixture. *Id.* at 21:15–62, 24:19–43, 27:16–33, 29:1–26. In light of these disclosures in the Specification, neither Patent Owner nor Mr. Clemens adequately addresses how a POSA would understand the arrangement of the other elements in the smoking article, and their function during use, to affect the cohesive forces and surface tension between the wicking material and the heater, and/or provide other mechanisms to transport the liquid from the wicking material to the heater. Moreover, as Petitioner points out, "'surface tension' and 'cohesive forces' are *additional* methods of liquid transport, beyond wicking." Pet. Reply 4.

Accordingly, we are not persuaded the term "wicked into contact" requires that the liquid mixture must be brought into contact with the electrical resistance heater solely by wicking, as Patent Owner contends. Nothing in the language of claims 1 and 15 would indicate to a POSA that "wicked into contact with the electrical resistance heater" cannot include forces other than wicking, particularly when the absorbent fibrous or wicking material is located in proximity to the heater. This is consistent with the Specification, which, as described above, teaches that the liquid is either wicked into contact with the heater or wicked into contact with an area

in close proximity to, and exposed to the heat produced by, the heater, for volatilization, depending on the location of the absorbent fibrous or wicking material in relation to the heater.

In view of the foregoing, we construe the phrase "wicked into contact with the electrical resistance heater" to mean "wicked into contact (1) with the heater, or (2) with an area in close proximity to, and exposed to the heat produced by, the heater."

C. Obviousness over Hon, Brooks, and Whittemore

Petitioner contends that the subject matter of claims 1, 2, 5, 7, 9, 11, 12, 14, 15, 18, 21, and 23–26 of the '123 patent would have been obvious over Hon alone, or over the combined teachings of Hon, Brooks, and Whittemore. Pet. 10–62. Petitioner relies on the Fox Declaration in support of its contentions. *Id*.

1. Overview of Hon

Hon is directed to an electronic atomization cigarette. Ex. 1005, 4. Figure 1 of Hon is reproduced below:

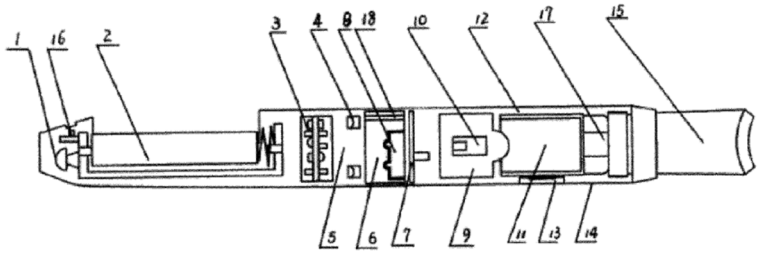


FIG. 1

Figure 1 is a schematic diagram of the structure of an electronic cigarette. *Id*. at 5. Hon teaches "a mouthpiece-shaped, cigar-shaped, or a pipe-shaped body" that includes battery 2, air inlet 4, normal pressure cavity 5, sensor 6, vapor-liquid separator 7, atomizer 9, liquid-supplying bottle 11, and mouthpiece 15 "set successively in the enclosure 14." *Id*. at 6.

Hon's Figure 6 is reproduced below.

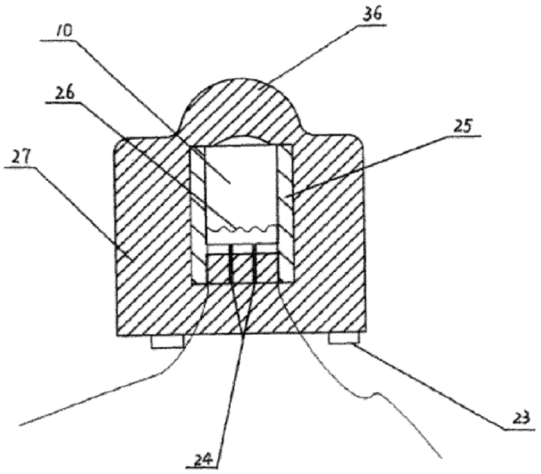


FIG. 6

Figure 6 is a structural diagram of an atomizer that includes atomization cavity 10, long stream ejection hole 24, atomization cavity wall 25, heating element 26, porous body 27, and bulge 36. Ex. 1005, 5–6. Hon teaches that "porous body 27 is wrapped around the atomization cavity wall 25" and "may be made of nickel foam, stainless steel fiber felt, high molecular polymeric foam, and ceramic foam." *Id*. "[A]tomization cavity wall 25 may be made of alumina or ceramic." *Id*.

Hon teaches that "[w]hen a smoker smokes, the mouthpiece 15 is under negative pressure[,] the air pressure difference or high-speed stream between the normal pressure cavity 5 and the negative pressure cavity 8 will cause the sensor 6 to output an actuating signal," which causes the cigarette to begin operating. Ex. 1005, 6. Air enters normal pressure cavity 5 through air inlet 4, proceeds through the through hole in vapor-liquid separator 7, and flows into atomization cavity 10 in atomizer 9. *Id*. at 7. The solution in porous body 27 is driven by a high speed airflow passing through ejection hole 24 and ejected in the form of droplets into atomization cavity 10. The

solution "is atomized ultrasonically by the first piezoelectric element 23 and is further atomized under the effect of heating element 26." *Id*. After atomization, large-diameter droplets are attached to the wall and reabsorbed by porous body 27 via overflow hole 29, and small-diameter droplets form an aerosol that is sucked out via aerosol passage 12, gas vent 17, and mouthpiece 15. *Id*. at 7. According to Hon, liquid storing porous body 28 in liquid-supplying bottle 11 is in contact with bulge 36 on atomizer 9 "to realize the solution supply via capillary infiltration." *Id.*; *see also id.* at 6, Fig. 11 (showing and describing porous body 28 in liquid-supplying bottle 11).

2. Overview of Brooks

Brooks relates to cigarettes and other smoking articles that "employ an electrical resistance heating element and an electrical power source to produce a tobacco-flavored smoke or aerosol." Ex. 1006, 1:6–10. Brooks teaches that the smoking articles "are capable of providing the user with the sensations of smoking (e.g., smoking taste, feel, satisfaction, pleasure, and the like), by heating but not burning tobacco, without producing sidestream smoke or odor, and without producing carbon monoxide." *Id*. at 1:11–16. Brooks also describes "a reusable controller which can be used with the cigarettes or disposable portions of the invention, as well as with other resistance heating aerosol producing articles." *Id*. at 4:35–38. This reusable controller includes "a current actuation means, a separate current regulating means to control the temperature of the heating element, and a battery power supply." *Id*. at 4:38–42.

Brooks states that "[p]referably, the current actuation means is puff actuated, so that current flows through the resistance heating element to produce aerosol only during draw by the user." Ex. 1006, 4:58–61. Brooks

also states that "the current regulating means preferably is based on controlling the time period during which current passes through the resistance element during draw," which, "in turn, controls the temperature experienced by the resistance element and by the aerosol forming substances." *Id*. at 4:64–5:1. Included in the current regulating means is an electrical control circuit that "maximizes initial heating of the heating element, until a desired temperature range for volatilization of the aerosol former and the tobacco flavor substances is reached, usually between about 150º C. and about 350º C." *Id*. at 5:1–6. Brooks teaches that the control circuit "normally maintains the heating element within the desired temperature range during the balance of the puff and/or ensures that the heating element does not overheat during puffing." *Id*. at 5:7–12.

3. Overview of Whittemore

Whittemore is directed to vaporizing units for a therapeutic apparatus. Ex. 1007, 1:1–2. Figure 2 is reproduced below:

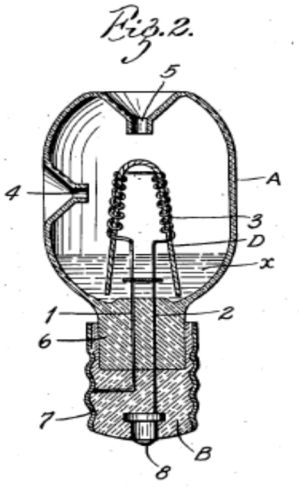


Figure 2 is an enlarged vertical sectional view of a therapeutic apparatus with a vaporizing unit. *Id*. at 1:15–16. Vaporizing vessel A is a hollow glass container that holds liquid medicament x. *Id*. at 1:19–23. Conductors 1 and 2 are combined with heating element 3 such that, when conductors 1

and 2 are energized, heating element 3 is heated. *Id*. at 1:24–27. Wick D is combined with heating element 3 so that a portion of wick D is always in contact, or in approximate contact, with heating element 3, and a portion of wick D is also in contact with liquid medicament x. *Id*. at 1:53–2:5.

According to Whittemore, medicament x is carried on wick D by capillary action to a point where it will be vaporized by the heat from heating element 3. Ex. 1007, 2:5–8. Whittemore states that "wick D consists of a thread, string or strand of some suitable wick material doubled intermediate its ends so as to form a substantially inverted V-shaped device whose side portions are encased in and surrounded by coiled or looped portions" of heating element 3, and "the lower ends or free ends of the side pieces of the wick projecting downwardly into the medicament and terminating at or in close proximity to the closed bottom 6 of the vessel." *Id*. at 2:9–18.

4. Claims 1 and 15

Petitioner contends that Hon, Brooks, and Whittemore disclose all of the elements of claims 1 and 15 as follows:

Preamble: "An electrically-powered, aerosol generating smoking article, comprising:" (Pet. 17–18 (relying on Ex. 1005, code (57), 7–8, Fig. 1; Ex. 1003 ¶¶ 88–89));

Element 1/15[a]: "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;" (Pet. 18–20 (relying on Ex. 1005, 6, Fig. 1; Ex. 1003 ¶¶ 90–95)).

Element 1/15[b]: "at least one electrical resistance heater powered by said electrical power source;" (Pet. 20–22 (relying on Ex. 1005, 5–7, Fig. 6, Fig. 12; Ex. 1007, 1:24–28; Ex. 1003 ¶¶ 96–99));

Element 1/15[c]: "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" (Pet. 22–29 (relying on Ex. 1005, 6–7, Fig. 1, Fig. 12; Ex. 1006, code (57), 1:6–10, 3:63–67, 4:50–5:26, 7:5–7, 7:25–8:23, 9:51–65, 10:42–47, 12:39–16:31, 20:53–21:27; Ex. 1003 ¶¶ 76–80 100–107, 114–117));

Element 1/15[d]: "a rod-shaped carrier device [removably] engaged with the mouth-end of the tubular outer housing 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 [fibrous material/absorbent wicking material], the cartridge having a generally tubular shape and adapted for airflow therethrough;" (Pet. 29–45 (relying on Ex. 1005, 1, 3, 5–8, Fig. 1, Fig. 11; Ex. 1007, 2:7–25; Ex. 1003 ¶¶ 74, 75, 120–145, 151–153)); and

Element 1/15[e]: "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." (Pet. 45–53 (relying on Ex. 1005, 1, 6–7, Fig. 1, Fig. 6; Ex. 1007, 2:21–25; Ex. 1003 ¶¶ 146–168)).

Patent Owner argues in response that Petitioner does not establish that the asserted prior art discloses wicking the tobacco extract and aerosol-forming material mixture into contact with the electrical resistance heater

(element 1/15[e]) or a puff-actuated controller (element 1/15[c]) as independent claims 1 and 15 require. PO Resp. 20–55. We focus our analysis on element 1/15[e], which is dispositive of the controversy between the parties.

a) Element 1/15[e]: "the mixture comprising the tobacco extract and the aerosol-forming material can be wicked into contact with the electrical resistance heater and volatilized"

Petitioner contends that Hon alone, or the combined teachings of Hon and Whittemore, teaches claim element 1/15[e]. Pet. 45–53. We first address Petitioner's contentions as to Hon alone, and then turn to Petitioner's contentions as to Hon and Whittemore.

(1) Whether Hon teaches element 1/15[e]

Petitioner contends that Hon teaches "wicking material that is 'positioned in proximity to' the heater and wicks the liquid into contact with the heater." Pet. 47. Petitioner provides an annotated version of Hon's Figure 6, reproduced below, to illustrate its contentions:

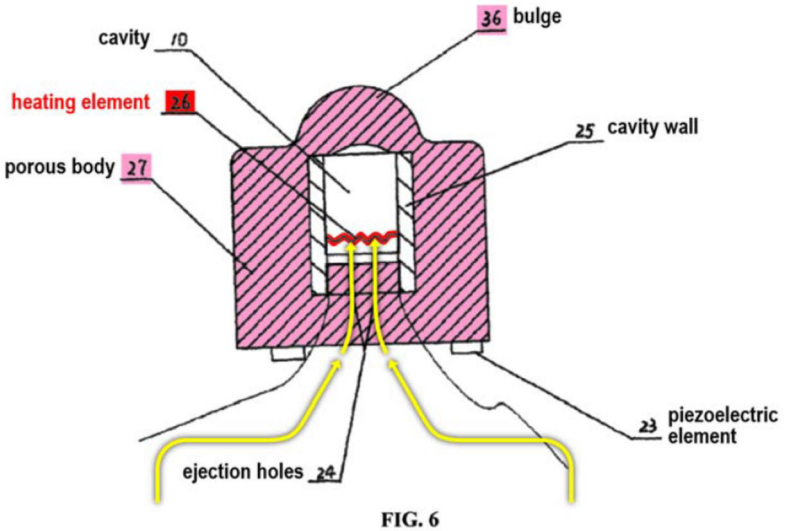


FIG. 6

Id. at 48. Annotated Figure 6 is a structural diagram of an atomizer described in Hon, wherein Petitioner labels each element, highlights heating

element 26 in red and porous body 27 in pink, and adds yellow arrows leading from outside the atomizer and through ejection holes 24. *Id*. With reference to annotated Figure 6, Petitioner contends that Hon's atomizer wicks the liquid mixture from the liquid-supplying bottle (not shown) to bulge 36 in porous body 27, after which the liquid mixture "is then further wicked around and through the porous body 27 'wrapped around the atomization cavity wall 25' to ejection holes 24." *Id*. at 47–48 (citing Ex. 1005, 6, Fig. 6; Ex. 1003 ¶ 152). Petitioner further contends that, "[d]uring the user's draw, the wicked liquid mixture contacts the heating element" when the solution in porous body 27 is driven by high speed airflow and ejected in the form of droplets into atomization cavity 10, "where it contacts 'heating element 26' and is volatilized." *Id*. at 48 (citing Ex. 1005, 7; Ex. 1003 ¶ 153).

Patent Owner responds that Hon's liquid mixture is not wicked into contact with Hon's heater. PO Resp. 27–33. Instead, Patent Owner argues, Hon's liquid mixture "is wicked out of bottle 11 and into the atomizer's porous body 27," and "[f]rom there the liquid is only transported by '*high-speed airflow of the ejection hole*,' not wicking." *Id*. at 27–28 (citing Ex. 1005, 7 (emphasis added); Ex. 2010 ¶ 71). Referring to Petitioner's annotated version of Hon's Figure 6, Patent Owner argues that "heating element 26 is located within cavity 10 and is separated from porous body 27 by cavity wall 25." *Id*. at 28 (citing Ex. 1003 ¶¶ 152–153; Ex. 2010 ¶ 73). Patent Owner further argues that "high speed airflow through ejection holes 24 is necessary to transport liquid into the atomization cavity 10," and this "reliance on the 'user's draw to carry droplets . . . from the ejection hole' is not wicking." *Id*. at 29 (citing Ex. 2010 ¶¶ 73–74; Ex. 1003 ¶¶ 152, 153, 160) (alteration in original). According to Patent Owner,

> Hon's use of the atomization cavity wall 25 to separate the heating element 26 from 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 into contact with the heater.

Id. at 33 (citing Ex. 2010 ¶ 80).

Having considered the complete trial record, we determine that Petitioner fails to establish by a preponderance of the evidence that Hon teaches that "the mixture comprising the tobacco extract and the aerosol-forming material can be wicked into contact with the electrical resistance heater" as claims 1 and 15 require. As set forth above, we determine that "wicked into contact" means that that the liquid mixture can be wicked into contact with the heater, or wicked into contact with an area in close proximity to, and exposed to the heat generated by, the heater. *See* Section II.B.1, *supra*. Hon teaches that contact between liquid storing porous body 28 in liquid-supplying bottle 11 and bulge 36 on atomizer 9 causes the liquid mixture to wick into porous body 27, which is wrapped around atomization cavity wall 25 of atomization cavity 10. Ex. 1005, 6–7. Hon also teaches that heating element 26 is set in atomization cavity 10. *Id*. at 6. Hon further teaches that the liquid mixture is "atomized under the effect of the heating element 26" after it is driven by the high-speed airflow of ejection holes 24 in cavity wall 25 and ejected as droplets into atomization cavity 10. *Id*. at 7.

Hon, therefore, discloses wicking the liquid mixture in porous body 27 to an area that is separated from Hon's heating element 26 by atomization cavity wall 25, and that the liquid mixture is exposed to heat produced by heating element 26 only after it is driven through ejection

hole 24 by the airflow generated by the user's draw. In light of these express disclosures in Hon, Petitioner does not establish that Hon's liquid mixture is wicked to an area in "close proximity" to Hon's heater, as the second part of our claim construction requires.

In particular, Petitioner does not show that the liquid in Hon's porous body 27 is wicked to an area in close proximity to the heater where it is exposed to heat generated by heating element 26. In Hon, atomization cavity wall 25 separates porous body 27 from heating element 26 and prevents liquid entrained in the porous body from being exposed to heat from the heating element. In that regard, Mr. Clemens testifies that "Hon's atomizer is structured with a very small, super-heated atomization cavity inside cavity wall 25, which may be made of a ceramic (an insulator to help concentrate heat)." Ex. 2010 ¶ 107; *see also id*. ¶ 89 ("Hon instead chose to separate the porous body and the heater with the walls of the atomization cavity (cavity wall 25)."). Hon teaches that the liquid mixture is wicked by porous body 27 to an area that contacts the outside of atomization cavity wall 25, which, as Mr. Clemens points out, insulates the porous body from heat generated by heating element 26 inside of atomization cavity 10. Neither Petitioner nor Mr. Fox show that this area is in close proximity to, and exposed to the heat produced by, the heater as claims 1 and 15 require.

Moreover, we are not directed to, nor do we discern, any evidence in the record that indicates that ejection hole 24 in atomization cavity wall 25 allows the liquid mixture in porous body 27 to be wicked to an area in close proximity to heating element 26. On the contrary, the evidence shows that high speed airflow created by the user's draw is necessary to propel the liquid mixture through Hon's ejection hole 24 and that atomization cavity wall 25 creates a physical separation between the liquid mixture in porous

body 27 and heating element 26 that precludes the liquid mixture from being wicked into contact with an area in close proximity to, and exposed to the heat produced by, heating element 26.

Accordingly, we determine that Petitioner does not establish, by a preponderance of the evidence, that Hon discloses that the liquid mixture is wicked into contact with an area in close proximity to, and exposed to the heat produced by, the heater as required by claims 1 and 15.

(2) Whether a POSA would have combined Hon and Whittemore to arrive at claim element 1/15[e]

Petitioner also contends that the combination of Hon and Whittemore teaches "the wicking material itself 'is in contact with' the heater." Pet. 47. In particular, Petitioner contends that "it would have been obvious to replace Hon's complicated atomizer with a simple heater/wick design as taught by Whittemore (Ex. 1007), thus wicking the liquid directly to the heater to volatilize Hon's mixture and generate the aerosol." *Id*. at 50. Petitioner contends Whittemore teaches that a liquid mixture is carried on a wick by capillary action to a point where it will be vaporized by the heat from the heating element that is wrapped around the wick. *Id*. Petitioner contends that a POSA would have been motivated to replace Hon's atomizer with Whittemore's heater/wick design "to reduce design costs and effort, reduce manufacturing costs including parts and assembly, [and] increase reliability." *Id*. at 53. According to Petitioner, "doing so would have been a simple substitution, and a POSA would have had a reasonable expectation of success in implementing such a device." *Id*. (citing Ex. 1003 ¶¶ 158–168).

Patent Owner responds that Petitioner and Mr. Fox do not provide "evidence to support that replacing Hon's dual stage atomizer design with Whittemore's wick/heater design" would simplify Hon's device, "or that a

POSA would have been motivated to modify Hon to incorporate Whittemore's ancient wick/heater design from the 1930s." PO Resp. 35 (citing Ex. 2010 ¶¶ 83–85). Patent Owner also argues that "Hon itself already describes an alternative embodiment that eliminates the first piezoelectric element '[t]o simplify the design.'" *Id*. at 36 (citing Ex. 1005, 7; Ex. 2010 ¶¶ 87–88) (alteration in original). According to Patent Owner, "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." *Id*. (citing Ex. 2010 ¶ 87). Patent Owner further argues that "Hon's heater is more efficient, and thus works better and with less power consumption, than the heater in Whittemore's wick/heater design." *Id*. (citing Ex. 2010 ¶ 89).

The Supreme Court requires an expansive and flexible approach in determining whether a patented invention would have been obvious at the time it was made. *See KSR*, 550 U.S. at 415. The existence of a reason for a person having ordinary skill in the art to modify a prior art reference is a question of fact. *See In re Constr. Equip. Co.*, 665 F.3d 1254, 1255 (Fed. Cir. 2011). In an obviousness analysis, some kind of reason must be shown as to why a person having ordinary skill in the art would have thought of combining or modifying the prior art to achieve the patented invention. *See Innogenetics, N.V. v. Abbott Labs.*, 512 F.3d 1363, 1374 (Fed. Cir. 2008). A reason to combine or modify the prior art may be found explicitly or implicitly in market forces, design incentives, the "'interrelated teachings of multiple patents'; 'any need or problem known in the field of endeavor at the time of invention and addressed by the patent'; and the background knowledge, creativity, and common sense of the person of ordinary skill."

Perfect Web Techs., Inc. v. InfoUSA, Inc., 587 F.3d 1324, 1329 (Fed. Cir. 2009) (quoting *KSR*, 550 U.S. at 418–21).

Based on our review of the complete trial record, we determine that Petitioner fails to establish by a preponderance of the evidence that a POSA would have been motivated to replace Hon's atomizer with Whittemore's heater and wick.

As an initial matter, Hon itself describes ways to simplify its design. Ex. 1005, 7. In particular, Hon teaches that (1) first piezoelectric element 23 on atomizer 9 can be removed such that atomization only relies on heating element 26, which results in a smaller atomizer; or (2) first piezoelectric heating element 23 and the heating element can be removed, and "single or multi-layer, flat second piezo electric element 35 is added in the atomization cavity" that is vibrated by the airflow through the ejection holes "to realize atomization, and the strong ultrasonic atomization effect is achieved." *Id*. Petitioner concedes that removing Hon's piezoelectric element would also eliminate its associated circuitry, thereby "reducing cost and complexity," but argues that "the atomizer will no longer have the benefit of the piezoelectric device's vibrations to help form an aerosol" because "the heater is now the primary source of energy for forming the aerosol." Pet. 52 (citing Ex. 1005, 7). Petitioner goes on to argue that, as a result, a POSA would have "further simplified" Hon's design by replacing Hon's atomizer with Whittemore's wick and heater. *Id*. (citing Ex. 1003 ¶¶ 159–168).

We are not persuaded by Petitioner's argument. Petitioner does not show persuasively that replacing Hon's atomizer with Whittemore's wick and heater would have simplified the device as compared with the modifications Hon expressly teaches. In this regard, we credit Mr. Clemens's well-reasoned testimony that that Hon's heater produces

more aerosol at a higher efficiency while using less power than the heater in Whittemore's wick/heater design. Ex. 2010 ¶ 89 (explaining that "Hon's device and heater are volatilizing copious tiny aerosol droplets at high speed under conditions of negative pressure and high temperature, while Whittemore's design uses a continuous large volume of room-temperature liquid with a large (relative to Hon) heated and low surface area of cotton string").

Petitioner attempts to support its simplification argument with Mr. Fox's testimony, and also relies on what Petitioner refers to as "the Ruyan device." *See* Pet. 5. Petitioner contends that the Ruyan device (which Hon invented) is applicant-admitted prior art because "the '123 patent admits that '[r]epresentative smoking articles . . . can be provided' using the 'exemplary components' of the prior art Ruyan device." *Id*. (citing Ex. 1001, 19:25–36). Mr. Fox admits that the '123 patent does not describe the Ruyan device, and instead asserts that "the Tobacco Legacy Database (https://www.industrydocuments.ucsf.edu/tobacco/) has contemporary teardown reports generated by" R. J. Reynolds Tobacco Co. ("RJR") and Philip Morris U.S.A. ("PMUSA"), "showing the internals of the Ruyan devices." Ex. 1003 ¶¶ 24, 25; Ex. 1019; Ex. 1020; Ex. 1023. Petitioner points out that two inventors listed on the '123 patent (John Robinson and David Griffith) are also identified as authors of the RJR teardown report, which documents disassembling a Ruyan device. Pet. 6 (citing Ex. 1023; Ex. 1024); *see* Ex. 1001, code (72). Petitioner argues 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." Pet. 9 (citing *Yeda Research & Dev. Co. v. Mylan Pharms., Inc.*, 906 F.3d 1031, 1041–42 (Fed. Cir. 2018)). Patent Owner responds that

Petitioner and Mr. Fox improperly rely on the Ruyan device, as described in the RJR teardown report, as substantive support for Mr. Fox's opinions, and not solely as background information. PO Resp. 37–41.

We agree with Petitioner that evidence of a POSA's background knowledge is not limited to prior art references. *See, e.g.*, *Qualcomm Inc. v. Apple Inc.*, 24 F.4th 1367, 1376 (Fed. Cir. 2022) ("[E]ven though evidence such as expert testimony and party admissions are not themselves prior art references, they are permissible evidence in an *inter partes* review for establishing the background knowledge possessed by a person of ordinary skill in the art."); *Yeda*, 906 F.3d at 1041–42 (holding that a petition may rely on non-statutory prior art as evidence of the motivation of a POSA to combine or modify the prior art). We need not decide if Petitioner's reliance on the Ruyan device, as described in the RJR teardown report, is proper here, however, because we are not persuaded that the RJR teardown report supports Mr. Fox's opinions.

Mr. Fox relies on the RJR teardown report as evidence of what a POSA would have known about the Ruyan device, which, according to Mr. Fox, is "an actual implementation of Hon's design." Ex. 1003 ¶ 159. Mr. Fox then relies on that knowledge of the Ruyan device to support the contention that a POSA would have been motivated to replace Hon's atomizer with Whittemore's wick and heater. Pet. 51–53; Ex. 1003 ¶¶ 158–168. In particular, Mr. Fox testifies that the RJR teardown report explains that the Ruyan device "requires a long and slow draw to produce a satisfactory amount of aerosol," and, as a result, "a POSA would have wanted to ensure that sufficient liquid is delivered to the heater for volatilization." Ex. 1003 ¶ 159 (citing Ex. 1023, 11, 15–16). Mr. Fox further testifies 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," because "[i]f the user draws on the device with too much or too little force (or for an insufficient amount of time)," the heater would receive an unsatisfactory quantity or quality of the liquid mixture, which "may have contributed at least in part to the observed need for long and slow draws when using the Ruyan device." *Id*. ¶ 160. Mr. Fox also opines that the RJR teardown report demonstrates "that a POSA would have known that Ruyan's actual devices lacked the piezoelectric element and circuitry, or if it were included, it did not function in at least some of the commercially available devices," which "indicates that Ruyan eliminated them in practice or they were unreliable." *Id*. ¶¶ 163, 165 (citing Ex. 1023, 7–8).

The RJR teardown report, however, does not say that the Ruyan device failed to produce sufficient aerosol. Instead, the RJR teardown report states that, when using an "intense" puffing regimen that "consists of 22 puffs, 60ml volume, with each puff lasting two seconds" with "[o]ne puff taken every thirty seconds until the final puff is taken" (also called "60/30/2"), aerosol yields were "relatively low." Ex. 1023, 3. It goes on to state that when the duration of the individual puff was lengthened from two seconds to three seconds ("60/30/3"), "aerosol yields from the electronic cigar *increased significantly*," likely "due to an increase in temperature of the heating elements, *resulting in more efficient aerosol generation*." *Id*. at 11–12 (emphases added). Notably, Mr. Fox does not contend that a three second puff was unacceptable to users.

The RJR teardown report also states that "for first reaction (again anecdotal responses) of those who have tried it is that they are surprised at how much aerosol is generated during a puff." *Id*. at 15. It further notes that one "Medium" extract cartridge that came with the Ruyan device "yielded

significant amounts of aerosol for more than 600 puffs," which, "[w]ith 22 puffs defining one 'smoking' of an Eclipse cigarette, this cartridge . . . yielded aerosol equivalent to 25 to 30 Eclipse cigarettes." *Id*. at 13. Thus, the RJR teardown report appears to contradict Mr. Fox's opinion that a POSA would have been motivated to replace Hon's atomizer because the Ruyan device did not produce sufficient aerosol.

We also credit Mr. Clemens's testimony, which is consistent with the RJR teardown report, that:

> The RJR engineers actually found 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. In doing so, the RJR engineers specifically stated that the Ruyan device provided an advancement over previous aerosol generating technology, including Whittemore itself. Ex. 1023 at 14 ("While the idea of generating a cigarette-like aerosol without burning tobacco is not new (see: Whittenmore [sic], Jr. US 2,057,353; McComick, US 2,104,266; Brooks et al., US 4,947,874; Counts, et al. US 5,060,671; Counts et al., US 5,144,962)) the Ruyan electronic cigar seems to have addressed several shortcomings of some of the earlier attempts at producing a cigarette-like aerosol without combustion.") Therefore, a POSA would not have been motivated to incorporate the heater/wick design of Whittemore in the Hon device, where the authors of the teardown report on the Ruyan device expressly found the Ruyan device to be an improvement over Whittemore.

Ex. 2010 ¶ 93.

The RJR teardown report, therefore, does not demonstrate that the Ruyan device failed to produce sufficient aerosol or otherwise displayed poor performance in need of improvement, and neither Petitioner nor Mr. Fox provide any other evidence that establishes that a POSA would have understood otherwise. Accordingly, we are not persuaded that Mr. Fox's

testimony establishes, on this record, that a POSA would have understood the Ruyan device to be deficient such that a POSA would have been motivated to replace Hon's atomizer with Whittemore's wick and heater as Mr. Fox proposes. Additionally, 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. Petitioner's analysis, and the cited testimony of Mr. Fox, does not persuade us that a POSA would have combined the teachings of Hon and Whittemore as Petitioner proposes.

We are also not persuaded that Petitioner establishes that a POSA would have had a reasonable expectation of success in replacing Hon's atomizer with Whittemore's wick and heater. Mr. Fox testifies that choosing an appropriate wick, heater, and physical arrangement "would have been well within a POSA's skill" and "would also simplify the design (and thus implementation and manufacturing cost and complexity)" by eliminating the piezoelectric element and its associated circuitry. Ex. 1003 ¶¶ 161–162. Mr. Fox also testifies that, as a result, "a POSA would have had a reasonable expectation of success in achieving a suitable wick/heater combination to provide the desired amount of aerosol during the user's draw with much less effort than implementing Hon's complicated atomizer." *Id*. ¶ 161. Petitioner also states that "a POSA would have had a reasonable expectation of success using well known methods and components, such as those taught by Whittemore, to improve the device taught by Hon." Pet. Reply 19. Such conclusory assertions, lacking factual substantiation, are insufficient for evaluating reasonable expectation of success as part of an obviousness

determination. *Wasica Fin. GmbH v. Cont'l Auto. Sys., Inc.*, 853 F.3d 1272, 1286 (Fed. Cir. 2017).

Petitioner also points to the Board's decision in IPR2016-01268 ("the 1268 IPR") to support Petitioner's contention that replacing Hon's atomizer with Whittemore's wick and heater "would have been a simple substitution." Pet. 53 (citing *R.J. Reynolds Vapor Co. v. Fontem Holdings 1 B.V.*, IPR2016-01268, Paper 63 at 17–18 (PTAB Dec. 19, 2017) ("the 1268 Decision," Ex. 1022)).

In the 1268 Decision, the Board evaluated the combination of Hon and Whittemore with respect to different claims of a different, unrelated patent. The Board determined that the petitioner did not adequately explain why replacing the heater in Hon's atomizer with Whittemore's wire-wrapped wick, while also retaining Hon's porous body, was a simple substitution, relying on credible testimony from the patent owner's declarant that Whittemore's wick performs the same function as Hon's porous body. Ex. 1022, 18. In that regard, the Board credited the patent owner's contention, supported with the declarant's testimony, that removing Hon's entire atomizer and replacing it with Whittemore's wire-wrapped wick would have been a simple substitution, over the petitioner's insufficiently supported contentions. *Id*. at 17. At the same time, the Board credited the patent owner's declarant's testimony that "if the porous body 27 and the heating wire 26 of Hon '043 are removed in making the modification, then the atomizer of Hon '043 is entirely discarded and replaced *with something else having little relation to the atomizer disclosed in Hon '043*." *Id.* at 18 (emphasis added). The italicized testimony is applicable to Petitioner's contention here. We find that Whittemore's wire-wrapped wick has little relation to the atomizer disclosed in Hon and that Petitioner has not shown

persuasively how or why Petitioner's proposed substitution would have improved Hon's electronic atomization cigarette.

Patent Owner was the petitioner in the 1268 IPR, and Petitioner contends that Patent Owner's arguments here contradict those it made as the petitioner in the 1268 IPR and "[t]hat should be dispositive." Pet. Reply 12–13. Relying on *Ultratec, Inc. v. CaptionCall LLC*, Petitioner contends that "Patent Owner's and Mr. Clemens's arguments that (i) a POSA would *not* combine Hon with Whittemore or (ii) Hon's heater is more efficient than Whittemore's, are not credible in light of Patent Owner's previous representations to the Board." *Id*. at 13–14 (citing *Ultratec, Inc. v. CaptionCall LLC*, 872 F.3d 1267, 1272–73 (Fed. Cir. 2017)).

The facts here are distinguishable from those in *Ultratec*. There, the same expert offered allegedly conflicting testimony addressing the same patents, references, and limitations. *Ultratec*, 872 F.3d at 1269–1270. Our reviewing court stated that, under those circumstances, conflicting testimony on cross-examination "would be highly relevant to both the Board's analysis of the specific issues on which [the expert] gave inconsistent testimony and to the Board's overall view of his credibility" and "any such inconsistencies would likely bear on the overall credibility of the expert." *Id*. at 1274.

In contrast, Mr. Clemens did not testify in the 1268 IPR, which was directed to different limitations of a different patent. *See* Ex. 1022, 2–6. Nor does Petitioner allege that Mr. Clemens previously provided any testimony regarding the '123 patent, the challenged claims, Hon, or Whittemore that conflicts with his testimony in this proceeding. We are not persuaded that Mr. Clemens's credibility here is undermined by the testimony of a different witness in a different proceeding concerning a different patent and different challenged claims. *See also Intel Corp. v.*

Qualcomm, Inc., IPR2018-01261, Paper 30 at 25–26 (PTAB Jan. 9, 2020) (refusing to accord less weight to the petitioner's expert's testimony because it allegedly conflicted with testimony given on behalf of the petitioner by a different expert in a different proceeding concerning the same patent). Moreover, Petitioner does not direct us to any authority to support the proposition that Patent Owner is precluded from making arguments regarding Hon and Whittemore in this proceeding that arguably conflict with the arguments it made as petitioner in the 1268 IPR. Accordingly, we disagree with Petitioner that the 1268 Decision is dispositive of any of the issues now before us.

For these reasons, we determine that Petitioner does not establish, by a preponderance of the evidence, that a POSA would have been motivated to combine Hon and Whittemore to arrive at the claim limitation requiring that the liquid mixture is wicked into contact with the heater.

(3) Conclusion

It is Petitioner's burden to establish facts supporting its challenge that claims 1 and 15 would have been obvious over Hon alone or the combined teachings of Hon, Brooks, and Whittemore by a preponderance of the evidence. 35 U.S.C. § 316(e) (2018); *see also Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1363 (Fed. Cir. 2016) (citing 35 U.S.C. § 312(a)(3) (requiring *inter partes* review petitions to identify "with particularity . . . the evidence that supports the grounds for the challenge to each claim")). After considering Petitioner's and Patent Owner's positions, as well as their supporting evidence, we are not persuaded that Petitioner has demonstrated that Hon teaches or suggests that the liquid mixture can be "wicked into contact with the electrical resistance heater" under the proper claim construction. We are also not persuaded that Petitioner has demonstrated

that a POSA would have had a reason to modify Hon in view of Whittemore to reach this limitation. Petitioner does not rely on Brooks to remedy this deficiency in Hon and Whittemore. Accordingly, we conclude that Petitioner has not demonstrated, by a preponderance of the evidence, that claims 1 and 15 of the '123 patent would have been obvious over Hon alone, or over the combined teachings of Hon, Brooks, and Whittemore.

5. Dependent Claims

Petitioner contends that claims 2, 5, 7, 9, 11, 12, and 14, which depend from claim 1, and claims 18, 21, and 23–26, which depend from claim 15, would have been obvious "for the same reasons as their respective independent claim" and for additional reasons related to the added limitations in each dependent claim. Pet. 53–62. Petitioner's arguments regarding the additional limitations in the dependent claims do not remedy the deficiencies discussed above with respect to independent claims 1 and 15. Thus, for the same reasons given above with respect to Petitioner's challenge to claims 1 and 15, we also conclude that Petitioner has not demonstrated, by a preponderance of the evidence, that claims 2, 5, 7, 9, 11, 12, 14, 18, 21, and 23–26 of the '123 patent would have been obvious over Hon alone, or over the combined teachings of Hon, Brooks, and Whittemore.

D. Remaining Grounds

Petitioner contends that claims 3, 4, 13, 16, and 17 would have been obvious over the combined teachings of Hon, Whittemore, Brooks, and Susa, and that claims 6 and 19 would have been obvious over the combined teachings of Hon, Whittemore, Brooks, and Ray. Pet. 62–68. Each of claims 3, 4, 6, 13, 16, 17, and 19 directly depend from either claim 1 or claim 15, and, therefore, require that the liquid mixture be "wicked into contact with the electrical resistance heater." Ex. 1001, 33:12–15, 33:18–21,

33:36–37, 34:3–6, 34:9–12. Thus, for the same reasons given above with respect to Petitioner's challenge of claims 1 and 15, we also conclude that Petitioner has not demonstrated by a preponderance of the evidence that claims 3, 4, 6, 13, 16, 17, and 19 would have been obvious over the asserted prior art.

III. CONCLUSION

For the reasons given, we are not persuaded that Petitioner has shown by a preponderance of the evidence that claims 1–7, 9, 11–19, 21, and 23–26 of the '123 patent would have been unpatentable based on the challenges presented in the Petition.

In summary:

Claims	**35 U.S.C. §**	**References/Basis**	**Claims Shown Unpatentable**	**Claims Not shown Unpatentable**
1, 2, 5, 7, 9, 11, 12, 14, 15, 18, 21, 23–26	103	Hon		1, 2, 5, 7, 9, 11, 12, 14, 15, 18, 21, 23–26
1, 2, 5, 7, 9, 11, 12, 14, 15, 18, 21, 23–26	103	Hon, Brooks, Whittemore		1, 2, 5, 7, 9, 11, 12, 14, 15, 18, 21, 23–26
3, 4, 13, 16, 17	103	Hon, Whittemore, Brooks, Susa		3, 4, 13, 16, 17
6, 19	103	Hon, Whittemore, Brooks, Ray		6, 19
Overall Outcome				1–7, 9, 11–19, 21, 23–26

IV. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that Petitioner has not shown by a preponderance of the evidence that claims 1–7, 9, 11–19, 21, and 23–26 of the '123 patent are unpatentable; and

FURTHER ORDERED that, because this is a Final Written Decision, parties to the proceeding seeking judicial review of the Decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.

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